

COMPREHENSIVE GLOBAL STABILITY ANALYSIS REPORT
Chiquita Canyon Landfill
Castaic, California

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PROJECT NO. RM22.1077.00

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Acronyms

CCL	Chiquita Canyon Landfill
CCR	California Code of Regulations
CGS	California Geological Survey
DTSC	Department of Toxic Substances Control
ETLF	Elevated Temperature Landfill Event
GLA	Geo-Logic Associates
GMM	Ground Motion Model
HDPE	High Density Polyethylene
LARWQCB	Los Angeles Regional Water Quality Control Board
LCRS	Leachate Collection and Removal System
LEA	Local Enforcement Agency (Los Angeles County Department of Public Health)
LFG	Landfill Gas
M	Moment Magnitude
MPE	Maximum Probable Earthquake
MSE	Mechanically Stabilized Earth
MSW	Municipal Solid Waste
PGA	Peak Ground Acceleration
RTFA	RT Frankian and Associates
SCAQMD	South Coast Air Quality Management District
SCS	SCS Engineers
TT	Tetra Tech
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDRs	Waste Discharge Requirements

1.0 INTRODUCTION

This Comprehensive Global Stability Analysis Report (Report) was prepared by Geo-Logic Associates, Inc. (GLA) to summarize the results of Comprehensive Global Stability Analyses completed to address the Department of Toxic Substances Control (DTSC) October 15, 2025 directive that Chiquita Canyon, LLC (Chiquita) complete an analysis of “*global slope stability modeling [sic] identifying which slopes are most likely to be vulnerable to instability from the SET event and the criteria used for the analysis,*” including “*an analysis of global slope stability that is inclusive of the recent placement of Tank Farm 13 at the toe of the CCL main canyon slope in Cell 8B (on top of existing waste that can be consumed by the SET event), and when the Tank Farm 13 is no longer located in Cell 8B, how this will affect slope stability.*” The analyses described in this report were based on this directive and the Work Plans and analysis agreements that are described below.

1.1 Summary of Findings

GLA completed comprehensive static and seismic stability analyses of representative western, northern, eastern, and southern slopes of the Chiquita Canyon Landfill using updated site conditions, monitoring data, material properties, and seismic-hazard information. The analyses also evaluated the proposed western slope buttress, surcharge loading associated with the southern leachate tank farm, and the effects of an agency-requested back-calculated internal pressure condition. The principal findings are summarized below.

Western Slope Deformation. Review of topographic survey data and site observations indicates that deformation along the western slope is spatially associated with a broader area of settlement within the western-central landfill. The observed pattern is more consistent with settlement-driven, time-dependent deformation of the refuse mass than with movement of a coherent mass along a discrete translational or rotational failure surface. No distinct headscarp or other well-defined upslope boundary of a displaced mass has been identified. In addition, the upper portion of the base liner system near the western toe has been exposed during three separate construction activities without observable displacement, distortion, or other evidence of deformation along the bottom containment system. These observations do not preclude localized shearing within the refuse mass or liner system, but do not provide evidence of a coherent global slope failure mechanism.

Leachate, Landfill Gas (LFG), and Temperature Conditions. Measured leachate elevations are locally substantial within the western landfill; however, the interpreted surfaces represent interpolation between discrete monitoring points within heterogeneous refuse and should not be interpreted as conventional phreatic

surfaces. LFG monitoring indicates that the landfill is predominantly maintained under negative pressure and that recent positive pressures are isolated rather than laterally continuous. For the stability analyses, the measured leachate surface was conservatively increased by 5 feet to account for potential positive LFG pressure, and the waste below this combined pressure surface was assumed to be fully saturated with hydrostatic pressure extending to the leachate collection and removal system (LCRS). Elevated temperatures occur locally within the refuse, but available monitoring indicates substantial lateral and vertical variability and decreasing temperatures toward the landfill base. The available information does not provide a technical basis for applying a generalized temperature-related reduction to liner-interface shear strengths throughout the landfill.

Analysis Assumptions. The analyses incorporate conservative assumptions intended to avoid overstating stability. The Dr. Stark-recommended degraded-municipal solid waste (MSW) shear-strength profile was assigned throughout the entire waste mass, although field observations indicate that degraded waste occurs in discrete zones and that substantial portions of the waste retain greater shear resistance. The critical liner-interface shear strength applicable to each portion of the landfill was used in the analyses. Static and pseudostatic (i.e., yield-acceleration) analyses considered both circular and non-circular failure surfaces, with the yield-acceleration searches constrained to substantially conform to the minimum static failure surfaces while allowing limited variation to identify physically reasonable low-yield-acceleration surfaces.

Representative Conditions Stability. The analyses indicate acceptable static stability and generally limited estimated seismic displacement for the evaluated slopes. Existing western slope static factors of safety range from approximately 1.4 to 2.0; construction of the proposed buttress increases these values to approximately 1.8 to 2.9, with estimated seismic displacements of approximately 1 to 4 inches. Northern slope static factors of safety range from approximately 1.9 to 4.1, and eastern slope factors of safety are approximately 2.3 to 2.6. Yield accelerations for two northern sections and both eastern sections exceed one-half the applicable bedrock peak ground acceleration (PGA), such that seismic displacement calculations were not warranted. Southern slope static factors of safety range from approximately 1.5 to 1.8, with estimated seismic displacements of approximately 3 to 6 inches. Surcharge loading associated with the leachate tank farm has essentially no effect on the calculated stability of the southern slopes.

Back-Analysis and Sensitivity Evaluation. At agency direction, a back-analysis was performed to estimate the increase in the measured internal pressure surface required to reduce the static factor of safety at a representative western cross section to approximately 1.0. The results of analysis indicated that the combined pressure surface would have to be increased by approximately 32 feet above the measured leachate surface under the selected no-head-on-liner condition. Because no discrete failure surface has been identified and the failure geometry, MSW shear strength, and internal pressure conditions are not independently known, the back-analysis is highly non-unique and the resulting pressure surface should not be interpreted as a reconstructed field condition. Nonetheless, applying the back-calculated pressure increase to the other analyzed sections provides a conservative “what-if” sensitivity evaluation. As expected, calculated factors of safety and yield accelerations decrease; however, none of the evaluated slopes have a calculated static factor of safety below 1.0, with calculated factors of safety approximately 1.2 or greater. Thus, even under this imposed pressure scenario, the analyses do not indicate an unstable slope condition.

Overall, the analyses do not identify a global static instability for any of the representative landfill slopes evaluated. The proposed western slope buttress provides a substantial improvement in western slope stability, the southern leachate tank farm does not materially affect stability, and calculated seismic displacements under representative conditions are limited. The results are consistent with the available site observations, which indicate broad settlement and deformation of the refuse mass but do not provide evidence of movement along a discrete global failure surface.

1.2 Work Plan Background

1.2.1 Original Work Plan

A December 2025 Work Plan was prepared by GLA to describe the means and methods to address the DTSC October 15, 2025 stability analysis requirements summarized above. As described in the December 2025 Work Plan, the analyses would be based on GLA’s understanding of previous and current site conditions, site observations, available site data, and previous stability analyses performed for different phases of construction at the Chiquita Canyon Landfill. The analyses would also address stability of existing alternatives and alternatives that may be proposed in response to DTSC’s October 15, 2025 letter.

1.2.2 DTSC Work Plan Comments

On February 23, 2026, DTSC provided “*comments and recommendations to be incorporated into a revised comprehensive global stability study work plan for DTSC*”

approval.” The DTSC correspondence attached a CalRecycle letter that included additional comments and recommendations and DTSC noted *“All these comments must be addressed in order for DTSC to approve the work plan.”* On March 6, 2026, Chiquita received additional comments on the Work Plan from the Los Angeles County Public Health Department acting as the Local Enforcement Agency (LEA) that were identical to the CalRecycle comments.

1.2.3 Revised Work Plan

On March 13, 2026, GLA prepared a Revised Comprehensive Slope Stability Study Work Plan (Revised Work Plan) that addressed the DTSC, CalRecycle, and LEA comments. The purpose of the Revised Work Plan was to address the DTSC requirement to complete static and seismic stability analyses of global stability that is inclusive of the Tank Farm 13 area and the CalRecycle recommendation to address areas where critical infrastructure is located. In accordance with the CalRecycle comments, the Revised Work Plan added an assessment of the eastern landfill slopes in addition to the northern, western, southern, and Tank Farm 13 slopes. The Revised Work Plan is included in Appendix A-1.

1.2.4 Additional Regulatory Comments and Chiquita Response

On May 6, 2026, the LEA conditionally approved the Revised Work Plan subject to installation of piezometers, implementation of a real-time slope movement detection system, continued leachate and gas removal, and submittal of a written response addressing the comments of Dr. Timothy Stark that were in a letter appended to the LEA correspondence. The response to the LEA letter is included in Appendix A-2.

1.2.5 July 1, 2026, Video Meeting and Subsequent Data Transmittal

On July 1, 2026, Chiquita and representatives of DTSC, the LEA, CalRecycle, the Los Angeles Regional Water Quality Control Board (LARWQCB) and Dr. Stark participated in a video meeting to discuss the data available and planned for incorporation into the analyses. During this meeting, it was agreed that GLA would compile the principal information that would be incorporated into the analysis and submit it to the agencies for their review. This information was compiled and submitted on July 17, 2026.

1.2.6 August 14, 2026, Video Meeting and Agreements

On August 14, 2026, Chiquita and representatives of DTSC, the LEA, CalRecycle, the LARWQCB, and Dr. Stark participated in another video meeting to discuss specific analytical techniques and cross section locations that the agencies believed were important to the analysis. These additional analyses and sections included:

An inverse or back-analysis will be performed to estimate the magnitude of a combined leachate and LFG pressure surface that would result in a static factor of safety slightly greater than 1.0. The resulting pressure surface could then be applied to the eastern slopes as part of “what-if” analyses. GLA noted that, because the geometry of any potential failure surface, refuse shear strength, and actual magnitude and distribution of internal pressures are not independently known, the back-analysis is highly non-unique.¹ The analysis therefore cannot determine which, if any, of these combinations represents actual field conditions. Consequently, the pressure surface derived from the analysis cannot be considered a unique reconstruction, or even necessarily a reasonable estimate, of actual subsurface pressure conditions. In GLA’s opinion, the resulting pressure surface will therefore provide little meaningful information regarding actual subsurface conditions and will have even more limited significance when applied to slopes having substantially different geometries. Nonetheless, GLA agreed to perform the analysis in accordance with the agency directive.

The agencies recommended adding a north-to-south cross section that would pass through the unbuttressed or “open” southern face of the landfill. GLA noted that this cross section was already planned for analysis and would be included.

1.3 Purpose And Scope of Analyses

The primary purpose of the analyses described in this Report was to perform a comprehensive static and seismic stability analysis of the landfill using updated site-specific information and incorporating the procedures summarized above and described in the Revised Work Plan. The scope of work performed to meet these objectives included:

- Completion of an updated seismic hazard assessment for the site.

- Review of Propeller aerial survey data collected between 2022 and 2026 and development of contours of equal settlement and settlement profiles along representative cross sections to evaluate the magnitude and spatial distribution of observed deformation at the landfill.

- Review of measured leachate level information from dedicated elevation monitoring points and development of leachate level profiles for use in characterizing representative pore-pressure conditions in the landfill.

¹ In other words, an indeterminate range of combinations of assumed failure-surface geometry, material strength, and internal pressure could produce essentially the same calculated factor of safety.

Review of the LFG pressure data and plots to evaluate the magnitude and distribution of positive LFG pressures within the landfill and their potential effect on slope stability.

Review of temperature probe data to assess the magnitude and distribution of internal temperatures in the landfill,

Review of the July 2026 West Slope Mitigation Project Drawings to characterize the soil buttress geometry and other design features relevant to stability and to incorporate this information into the stability analyses for the western slope.

Identification of representative cross sections for stability analyses of the western, northern, eastern, and southern slopes of the landfill.

Review of available landfill base grading and containment system materials and other relevant published and site-specific data to select representative material properties for analysis.

Completion of static slope stability and seismic deformation analyses for the representative cross sections.

Except for the updated seismic hazard assessment, this report does not reproduce the site geologic and hydrogeologic conditions described in previous reports. The site geology is well characterized in those reports, and no changes in geologic conditions have occurred that would warrant repeating that information for the current evaluation. Similarly, groundwater occurs at depth below the landfill and is hydraulically separated from the refuse and liner system; therefore, groundwater conditions do not materially affect the stability analyses presented herein. The previously documented geologic and hydrogeologic characterization remains applicable and is incorporated by reference, as appropriate.

2.0 UPDATED SITE CONDITIONS RELEVANT TO THE ANALYSES

2.1 Slope Settlement and Deformation

Previous analyses and site observations indicate that deformation near the toe of the western slope is primarily associated with settlement and deformation of the landfill. To evaluate the magnitude and spatial distribution of this deformation, available topographic surveys were compared for selected periods between 2022 and April 2026. The evaluation focused primarily on periods during which little or no significant filling or construction occurred along the western slope and toe, thereby minimizing the potential for operational grade changes to obscure deformation of the landfill itself.

The evaluation includes three time intervals, as shown by the settlement and lateral deformation plots presented in Appendix B:

2022 through Fourth Quarter 2023 (Appendix B-1). This interval extends from the beginning of GLA inspections of the area above the western slope to immediately before construction of the first western slope toe drain project. The data were reviewed to provide historical context but were not relied upon for the deformation evaluation because significant filling occurred during this period, making it difficult to distinguish landfill deformation from operational grade changes.

Late 2023 through 2024 (Appendix B-2). This interval extends from completion of the first western slope toe drain project to the start of the second toe drain project. Relatively little significant filling or construction occurred along the western slope during this interval; consequently, comparison of the available topographic surveys provides a more representative indication of settlement and lateral deformation of the landfill.

Late 2024 through April 2026 (Appendix B-3). This interval extends from completion of the second western slope toe drain project through April 2026 and is based principally on Propeller topographic data dated November 27, 2024, and April 15, 2026. As with the preceding interval, little significant filling occurred on the western slope and no construction activities were being performed along the toe that would materially affect the topographic comparison.

Comparison of the topographic data for the two periods considered most representative of landfill deformation (Appendices B-2 and B-3) indicates a consistent relationship between settlement within the landfill and deformation along the western slope. The predominant deformation occurs across a broad area of the western-central landfill, with settlement generally increasing inward from the western perimeter. This pattern is evident during both

evaluation periods and becomes more pronounced during the November 2024 through April 2026 period.

The observed deformation is more consistent with settlement-driven, time-dependent deformation of the refuse mass than with movement of a coherent mass along a discrete translational or rotational failure surface. Under this interpretation, settlement and vertical compression of the refuse are accompanied by lateral deformation toward the comparatively less-confined western slope. This interpretation is consistent with the broad distribution of settlement, absence of a distinct headscarp or other well-defined upslope boundary, outward bulging near the toe, downslope tilting of vertical risers, and variable geomembrane deformation along the western slope.²

The available information does not preclude localized shearing within the refuse mass or along portions of the underlying liner system, nor does it independently establish the specific subsurface mechanism responsible for the observed deformation. However, neither the deformation pattern nor observations made when the refuse slope was exposed during the toe drain projects provide evidence of a coherent translational or rotational failure mechanism or define a discrete failure surface. For example, the upper portion of the base liner system near its anchor trench at the toe of the western slope has been exposed on three separate occasions during construction activities. These exposures provided opportunities to directly observe the liner system in an area where deformation associated with a failure extending to the base of the landfill might reasonably be expected to manifest. No displacement, distortion, or other observable evidence was identified during these exposures that would indicate deformation along the bottom containment system. Although these observations do not preclude localized deformation elsewhere beneath the landfill, they provide additional field evidence that the observed western slope deformation is not associated with movement of a coherent waste mass along the bottom containment system.

2.2 Leachate Surface

Leachate elevations measured at dedicated monitoring points within the western portion of the landfill were reviewed to characterize leachate conditions for the stability analyses. Measured leachate elevations are summarized in Table 1 and the monitoring locations and interpreted leachate surfaces based on the June 1, 2026, measurements are shown in

² Interpretation of current surface conditions is complicated by the geomembrane cover installed over the western slope in early 2025, which can mask or subdue surface expressions of underlying waste deformation. However, repeated observations of the western slope between 2022 and installation of the geomembrane did not identify a headscarp, slide-related cracking, or other features indicative of movement along a discrete failure surface.

Appendix C. The locations of the monitoring locations are also shown in Figures 1 and 2 and in the cross sections shown in Figures 3 through 5. The measured data indicate that leachate is present at elevations substantially above landfill base grades over portions of the western landfill, with the interpreted leachate elevations generally occurring well below the existing landfill surface. The resulting measured leachate head above base grade locally exceeds 100 feet and, in portions of the landfill interior, is on the order of 200 feet or more. The interpreted elevations generally vary gradually across the landfill, although localized variations are apparent between monitoring locations. The data also indicate relatively higher leachate levels are measured in the elevated temperature portion of the landfill.

The leachate elevations shown in Appendix C and in Figures 3 through 5 were developed by interpolating between discrete monitoring points within the heterogeneous refuse mass. Accordingly, the resulting surfaces should not be interpreted as conventional groundwater or phreatic surfaces, nor do the measured elevations necessarily indicate that the entire thickness of refuse below the depicted surfaces is saturated. Rather, the measurements represent hydraulic conditions at individual monitoring locations and provide a site-specific indication of the elevations to which leachate occurs within the landfill. Interpretation of these measurements requires consideration of the way leachate occurs and moves through municipal solid waste (MSW), particularly under the atypical conditions that can develop in areas affected by an elevated temperature event.

2.3 Landfill Gas Pressure

Landfill gas pressure data for the period from October 2024 through June 2026 are shown in Appendix D and were reviewed to evaluate whether positive LFG pressures within the refuse could materially affect slope stability. The monitoring data indicates that the landfill was predominantly maintained under negative pressure throughout the period evaluated. Although localized positive pressures were recorded during late 2024, primarily within portions of the western and northwestern landfill, the frequency of positive-pressure measurements decreased substantially with time. Positive pressures were recorded at 55 of 635 monitoring locations during the fourth quarter of 2024, compared with only 4 of 757 locations during the second quarter of 2026. The more recent monitoring therefore indicates that positive LFG pressures are isolated and do not define a laterally continuous or widespread internal pressure condition.³

³ Based on these data, widespread positive LFG pressure is not considered representative of current conditions within the landfill in general and the western slope specifically. Localized positive pressures may occur intermittently within the heterogeneous refuse mass; however, the available monitoring information does not indicate that such pressures form a continuous pressure zone of sufficient extent to warrant representation as a generalized destabilizing gas-pressure surface in the stability analyses. As described in

2.4 Internal Landfill Temperatures

Elevated temperatures associated with the reaction area were considered in evaluating whether temperature-related reductions in liner-system interface shear strength are warranted. Table 2 summarizes temperatures measured at 40 monitoring probes as averages of the maximum daily temperatures recorded from May 18 through June 17, 2026. Maximum temperatures exceeded 180°F at 15 probes and exceeded 200°F at several probes, with the highest localized maximum of approximately 260°F recorded at TP-23. These data confirm significant heating within portions of the refuse mass. However, they do not indicate that comparable temperatures occur throughout the landfill or along the underlying liner systems.

The monitoring results demonstrate substantial lateral and vertical variability. As shown on Figures 1 and 2, probes with maximum temperatures greater than 180°F are interspersed with substantially cooler probes, rather than distributed uniformly throughout the landfill. The temperature profiles also vary appreciably with depth and do not define a consistent, laterally continuous high-temperature zone near the landfill base. Although localized outward excursions occur within several profiles, most do not exhibit a well-developed, common “belly-shaped” temperature profile, and the depths and elevations of the temperature maxima vary among probes. Collectively, these data are more consistent with spatially heterogeneous zones of heating than with uniform high-temperature conditions throughout the refuse mass.

The distinction between maximum and average probe temperature is also important. The maximum reported for each probe represents the highest temperature measured at any monitored depth and should not be interpreted as the temperature at the bottom of the probe or at the liner. Of the 40 probes, only six (TP-3, TP-11, TP-15, TP-22, TP-23, and TP-33) had average temperatures greater than 180°F. As shown in Table 3, four of these six probes terminate more than 100 feet above the closest underlying liner, while TP-3 and TP-23 terminate approximately 33 and 57 feet above the liner, respectively. Thus, the locations exhibiting the most sustained high temperatures generally do not provide direct information concerning temperatures at the liner interfaces.

The deeper probes provide the most relevant information concerning possible thermal conditions near the bottom liner. Probe installations TP-24, TP-27, TP-31, TP-32, TP-36, TP-

Section 4 below, the piezometric surface used for the analyses was increased by 5 feet in the stability models for the cross sections that were analyzed. This adjustment substantially exceeds the positive LFG pressures observed in the available monitoring data and provides a simple, conservative allowance for gas pressure without assuming that the isolated positive measurements represent a continuous internal pressure condition.

38, and TP-40 terminate approximately 14 to 28 feet above the closest liner; because the deepest monitored interval does not always coincide with the probe termination depth, the deepest actual temperature measurements are approximately 14 to 44 feet above the liner. These profiles consistently indicate decreasing temperatures within the lower waste as the liner is approached. At TP-24, the measured temperature decreased from approximately 210°F at 250 feet below ground surface (bgs) to approximately 153°F at 320 feet bgs. At TP-31, it decreased from approximately 193°F at 165 feet bgs to approximately 141°F at 280 feet bgs; and at TP-36, it decreased from approximately 172°F at 165 feet bgs to approximately 136°F at 230 feet bgs. Similar reductions were measured at TP-27, TP-32, TP-38, and TP-40. These results are consistent with the conclusion of the First Quarter 2026 Liner and LCRS Integrity Report (SCS Engineers, 2026b) that temperatures decrease within the lowest waste layers and in proximity to the bottom liner system.

Elevated temperatures can potentially affect the physical or mechanical properties of geosynthetic materials, but the magnitude of any effect depends on the particular material and interface, the temperature and duration of exposure, and the applicable normal-stress conditions. The occurrence of elevated temperatures within the waste mass does not, by itself, establish that the underlying geosynthetics experienced comparable temperatures or that liner-system interface shear strength has been adversely affected. The quarterly SCS liner-integrity evaluations (SCS Engineers, 2025, 2026a, 2026b) also report no evidence that the elevated-temperature reaction has compromised the integrity of the liner or leachate collection and removal system.

Accordingly, the available data do not provide a technical basis for applying a generalized temperature-related strength reduction throughout the landfill liner system. Such a reduction would require evidence of the magnitude and duration of temperature exposure at the particular liner interface being evaluated, together with evidence that the exposure materially reduced the applicable interface shear strength. The available monitoring data instead indicates localized high temperatures within the refuse mass, substantial spatial and vertical heterogeneity, and thermal attenuation toward the landfill base.

3.0 BACK ANALYSIS

3.1 Back Analysis Requirement

The regulatory agencies have directed that a back-analysis be performed to estimate an internal pressure surface for application to stability analyses at different cross-sections and locations within the landfill. It is important to recognize that this analysis is not being performed in response to a documented slope failure. There is no evidence that a slope failure has occurred at the landfill. In particular, repeated site observations have not

identified a defined headscarp, toe displacement, surface cracking, or other features that would establish the presence or geometry of a discrete slope failure surface.

This distinction imposes important limitations on the analysis. Conventional back-analysis is most defensible where an actual failure has occurred, the geometry of the failure surface can be reconstructed with reasonable confidence, and the analysis is used to solve for one or a limited number of unknown parameters. In the present case, there is no independently established failure surface anywhere within the landfill. In addition, the shear strength of the MSW is inherently variable and cannot be uniquely established from the available information. Consequently, the potential failure geometry, MSW shear strength, and internal pressure conditions cannot all be independently determined by back-analysis. A numerical analysis can identify combinations of assumed strength, failure geometry, and pressure that produce a selected limiting factor of safety, but the resulting pressure surface is not a unique solution and does not demonstrate that the calculated pressure condition exists within the landfill.

Similar limitations apply to transferring a back-calculated pressure surface to other portions of the landfill. The relationship between internal pressure and stability is dependent on the geometry and conditions of the cross-section being analyzed, including waste thickness, slope geometry, liner configuration, foundation conditions, and other site-specific factors. Accordingly, a pressure surface calculated to produce a limiting stability condition at one cross-section does not have the same stability significance at another cross-section having substantially different geometry. Direct application of such a surface elsewhere would implicitly assume that the model-derived pressure condition is laterally continuous and physically applicable throughout the landfill, neither of which is established by the back-analysis. The resulting surface is therefore more appropriately considered an equivalent destabilizing pressure distribution associated with the assumptions used in the analysis, rather than a reconstructed physical leachate or landfill-gas pressure surface.

3.2 Back Analysis Procedure

Nonetheless, a back-analysis was performed in accordance with the agency directive. To reduce the number of independent variables to the extent practicable, the following assumptions were incorporated into the analyses:

1. The MSW shear strength used in the analysis is based on Dr. Stark's recommended shear strength and his concurrence with using this value at a video meeting with the agencies on July 1, 2026.

2. The shear strength of the base liner system was assumed to be equal to 12 degrees with no cohesion to model a typical large displacement strength of a textured geomembrane and geotextile (or geocomposite) interface.
3. The potential failure surface was estimated using the 2024–2026 deformation plot for Cross Section F that is presented in Appendix B-3. This section was selected because it provides the best-defined and least ambiguous deformation pattern at the site.
4. A baseline internal pressure condition was identified using the current site leachate measurements summarized in Table 1 and the interpreted leachate surfaces presented in Appendix C. Using these assumptions, search routines were used to evaluate potential failure surfaces within the search limits established from the observed deformation pattern at Cross Section F (see Appendix E). The baseline pressure surface was then incrementally raised to determine the pressure condition required to reduce the calculated factor of safety to approximately 1.04.

3.3 Back Analysis Results

The results of the analyses are included in Appendix E and show the calculated static factor of safety for the baseline condition was approximately 1.99 when pressure head was not applied to the liner system and approximately 1.83 when pressure head was applied to the liner system. Sensitivity analyses indicated an increase of approximately 32 feet was required to reduce the calculated factor of safety to approximately 1.04 for the no-head-on-liner condition, whereas an increase of approximately 24 feet was required when pressure head was also applied to the liner system.⁴ The back-analysis therefore indicates that a substantial increase in equivalent internal pressure above the baseline condition is required to produce the specified limiting stability condition at Cross Section F. The resulting back-calculated pressure surface represents the pressure condition required by the model to achieve the target factor of safety under the stated assumptions; it should not be interpreted as a reconstructed or independently verified field pressure condition and it does not independently determine the pressure conditions within the landfill.

⁴ These results are largely self-compensating: applying pressure head to the liner reduces the baseline factor of safety but consequently requires a smaller increase in the pressure surface to reach the same target factor of safety. Thus, either assumption ultimately produces an equivalent pressure condition calibrated to the same limiting stability criterion.

4.0 CONDITIONS AND METHODS OF ANALYSIS

4.1 Material Properties Assumed for Analysis

4.1.1 Underlying Bedrock

Bedrock underlying the existing landfill and the buttress was assumed to have infinite strength (i.e., failure surfaces were not allowed to pass through this material). The validity of this assumption was verified by performing supplemental analyses that considered the R.T. Frankian & Associates (RTFA) recommended shear strength for the bedrock and allowing failure surface to extend below the base of the liner and the buttress. Both sets of analyses returned the same critical failure surfaces and safety factors.

4.1.2 Liner Systems

The base and slope liner systems vary across the landfill as a result of the different periods of landfill development and include combinations of soil-bentonite admixture or compacted clay, GCL, HDPE geomembrane, geocomposite or granular drainage materials, geotextiles, and protective cover soil. The liner configurations applicable to the individual landfill areas are summarized in Table 4. Available interface shear-strength data were reviewed for each liner configuration to identify the critical layer or interface for stability analysis. The critical interfaces and corresponding shear-strength parameters used in the analyses are summarized in Table 5. The available laboratory test data, historical shear-strength evaluations, and supporting strength envelopes are provided in Appendix F. The shear strength of the critical liner interface applicable to each portion of the landfill was used in the stability analyses.

4.1.3 Degraded MSW Strength

The MSW was conservatively assumed to be degraded and laterally and vertically continuous throughout the waste mass for all stability analyses. Site-specific observations indicate that actual conditions are substantially more heterogeneous. For example, degraded waste has been observed in discrete zones, layers, and lenses rather than as a continuous material throughout the western slope. In addition, excavations into the waste along the western toe have frequently remained unsupported at heights exceeding 20 feet and at inclinations approaching 0.5H:1V. Although these observations do not provide a quantitative measure of waste shear strength, they provide qualitative evidence that substantial portions of the waste retain greater shear resistance than would be represented by assuming continuously degraded MSW.

Figure 6 in Appendix F compares the range of degraded-MSW shear strengths reported in various publications, the degraded-MSW strength profile used in some previous GLA stability evaluations, and the degraded-MSW strength profile recommended by Dr. Timothy

Stark in an August 21, 2024 memorandum prepared on behalf of Weston Solutions, Inc., an EPA contractor. Dr. Stark confirmed that this strength profile was appropriate during the July 1, 2026 video meeting with the agencies. The Stark-recommended shear strength profile, which lies toward the lower portion of the reported range of degraded-MSW shear strengths, was assigned to the entire waste mass for the current stability analyses. This assumption is therefore conservative because it does not credit the greater shear resistance that would be provided by less-degraded waste between the relatively small and discrete zones of degradation that have been observed in the LFG well boring logs and in waste excavations along the western slope of the landfill.

4.1.4 Compacted Soil Fill

Most of the soil used for the leachate tank farm and the western slope buttress construction was obtained from onsite borrow sources and is relatively uniform, consisting predominantly of relatively fine-grained sand and silt with little clay. For purposes of the stability analyses, the in-place unit weight of the buttress soil was assumed to be 130 lb/ft³ based on 68 field density tests performed on site borrow soil during construction of the Cell 8B leachate tank farm. The leachate tank farm and buttress fill have the same compaction specifications, and construction was/is being performed under continuous CQA observation, with regular confirmation of moisture-density relationships and field density testing to verify that the soil is placed and compacted in accordance with the project requirements.

For the purposes of analysis, the compacted soil fill was assigned an assumed effective stress envelope characterized by zero cohesion and a friction angle of 32 degrees. A cohesionless strength representation is consistent with the predominantly frictional nature of the material and conservatively avoids reliance on apparent cohesion that may result from partial saturation or soil structure. The relative uniformity of the borrow material, together with controlled placement and compaction under the project CQA program, supports use of a single representative shear strength for the buttress fill.

4.1.5 Internal Western Slope Buttress Geosynthetics

CEC Detail 1 on Drawing C500 in Appendix G shows that the inboard slope of the lower western slope buttress will be lined with an 80-mil textured HDPE geomembrane placed over compacted soil fill and overlain by a cushion geotextile or geocomposite. The shear strength of this interface is expected to be governed by the textured HDPE-to-geotextile or HDPE-to-geocomposite contact. For purposes of the stability analyses, this interface was conservatively assigned a large-displacement shear strength characterized by zero cohesion and a friction angle of 12 degrees. This assumed strength is relatively conservative

but is also largely inconsequential because this component has little to no effect on the overall stability of the buttress system.

4.2 Leachate and LFG Pressure

4.2.1 Leachate Surface

The leachate surfaces shown in Figures 2 through 5 and in the Appendix C cross sections were developed by interpolating between discrete monitoring points to define a leachate surface within the heterogeneous refuse mass. The surfaces shown on these sections do not necessarily indicate that the entire thickness of MSW below the surfaces is saturated. This is because leachate occurrence within MSW is typically laterally and vertically discontinuous, reflecting preferential leachate flow through relatively permeable pathways and localized accumulations or perched conditions above lower-permeability materials.

For purposes of the stability analyses, the MSW below the interpreted leachate surface was conservatively assumed to be fully saturated and full hydrostatic pressure was conservatively assumed to extend from the upper hydraulic boundary to the bottom hydraulic boundary at the leachate collection and removal system (LCRS). There is no evidence that the LCRS should be considered nonfunctional, and significant sustained hydraulic head is not expected to develop immediately above the liner.⁵

4.2.2 Landfill Gas Pressure

As noted above, LFG pressure data for the period from October 2024 through June 2026 are shown in Appendix D and were reviewed to evaluate whether positive LFG pressures within the refuse could materially affect slope stability. The monitoring data indicates that the landfill was predominantly maintained under negative pressure throughout the period evaluated. Although localized positive pressures were recorded during late 2024, primarily within portions of the western and northwestern landfill, the frequency of positive-pressure measurements decreased substantially with time.⁶ The available monitoring indicates that positive LFG pressures are isolated and do not define a laterally continuous or widespread internal pressure condition.

⁵ For example, the site operational and monitoring data provide no indication that the LCRS has failed or that elevated-temperature conditions have materially impaired its ability to collect and remove leachate. During the first quarter of 2026, approximately 0.58 to 0.78 million gallons of leachate per month were reportedly removed through the LCRS manifold, demonstrating continued active collection and removal of leachate. In addition, groundwater monitoring identified no new measurably significant impacts to groundwater attributable to the landfill, providing no indication of a loss of containment associated with failure of the liner or LCRS.

⁶ For example, positive pressures were recorded at 55 of 635 monitoring locations during the fourth quarter of 2024, compared with only 4 of 757 locations during the second quarter of 2026.

Based on these data, widespread positive LFG pressure is not considered representative of current conditions within the western slope. Localized positive pressures may occur intermittently within the heterogeneous refuse mass; however, the available monitoring information does not indicate that such pressures form a continuous pressure zone of sufficient extent to warrant representation as a generalized destabilizing gas-pressure surface in the stability analyses. Nonetheless, to conservatively account for the potential influence of significant, positive LFG pressures throughout the waste mass, the piezometric surface that is shown in Appendix C was increased by 5 feet in the stability models to provide a conservative allowance for potential LFG pressure that may not be captured by the data in Appendix D.

4.2.3 Pressure Surface Assumed for Analysis

Leachate and LFG pressures were approximated using a laterally and vertically continuous combined pressure surface that is 5 feet higher than the leachate surfaces shown in Figures 3 through 5 and in Appendix C. Because the leachate surfaces shown in Figures 3 through 5 and Appendix C only extend to the furthest physical monitoring points in the respective cross sections, the combined leachate/LFG pressure surface was extended horizontally from the closest data point to the slope face for the purposes of analysis. The buttress includes a toe drain along the alignment at the base of the slope and it will be encapsulated by a geomembrane on completion (see Detail 1 on Drawing C500 in Appendix G). Therefore, the analyses assume leachate will not build up in the upper buttress soil and that precipitation will not infiltrate into the system.

4.3 Static Safety Factors and Yield Accelerations

Static safety factors and yield accelerations were calculated using the Morgenstern and Price (1965) limit equilibrium method as implemented by the computer program SLIDE2. The Morgenstern-Price method satisfies force and moment equilibrium, and the half-sine interslice function was used for the analyses. Sensitivity analyses show that the difference between safety factors calculated using the four different Morgenstern-Price interslice functions have a maximum differential of 0.02, which is negligible within the context of the evaluations that were performed. SLIDE2 search routines were used to identify the potential failure surface with the lowest safety factor (SF) associated with each section. Both circular and non-circular failure surfaces were evaluated for each section that was analyzed, and in all cases, non-circular failure surfaces that intersected the existing liner below each slope had the lowest safety factors.

Stark and Idries (2025) caution against allowing an automated failure-surface search to continue after application of a seismic coefficient because the search may migrate toward progressively larger, potentially unrealistic sliding masses as the inertial force increases

with mass. They therefore recommend identifying the critical failure surface under static conditions, holding that surface fixed, and varying the seismic coefficient to determine yield acceleration. This provides a useful safeguard against numerically driven, physically unreasonable pseudostatic failure surfaces.

However, the minimum static factor-of-safety surface is not necessarily the surface having the lowest yield acceleration or producing the greatest seismic displacement. For example, FHWA guidance (Kavazanjian et al., 2011) recognizes this distinction, and Bray and Macedo (2023) similarly note that the potential sliding mass having the lowest static factor of safety may not be the most critical for dynamic analysis. This is particularly relevant to the Bray–Macedo procedure because yield acceleration, dynamic response, and calculated displacement depend in part on the geometry and dynamic characteristics of the potential sliding mass.

For the current analyses, the yield-acceleration search was therefore constrained so that the resulting failure surface substantially conformed to the minimum static failure surface, while allowing limited variation necessary to identify a physically reasonable surface with a low yield acceleration. This approach addresses the numerical concern identified by Stark and Idries while avoiding the assumption that the minimum static failure surface must, by definition, also represent the dynamically critical sliding mass.

4.4 Seismic Displacement

4.4.1 Seismic Source Update

The Chiquita seismic source evaluation was updated using the 2023 U.S. National Seismic Hazard Model (NSHM23) and associated western U.S. fault database (Hatem et al., 2024). NSHM23 represents an update to the fault and earthquake rupture models previously available for California and incorporates revised fault geometries, slip-rate information, deformation models, and earthquake magnitude estimates. The updated evaluation considered active fault sources within approximately 100 km of the site, and the results of this evaluation are summarized in Table 7. The peak ground acceleration (PGA) information in Table 5 was calculated using the four principal NGA-West2 active-crustal ground-motion models (GMMs): Abrahamson et al. (2014), Boore et al. (2014), Campbell and Bozorgnia (2014), and Chiou and Youngs (2014). The previous and updated deterministic seismic hazard evaluations indicate that ground motions at the site are controlled primarily by the nearby faults of the Transverse Ranges rather than the more distant San Andreas fault.

4.4.2 Method

Seismic deformation was evaluated using the simplified fully coupled procedure developed by Bray and Macedo (2019, 2021a, 2021b, 2023). The procedure estimates permanent

earthquake-induced shear displacement while accounting for both the yield resistance and dynamic response of the potentially deforming mass. The principal parameters used in the analysis include the yield coefficient, the initial fundamental period of the potentially deforming mass, earthquake moment magnitude, and the spectral acceleration at a period of 1.3 time the initial fundamental period. The yield coefficient represents the horizontal seismic coefficient required to reduce the calculated factor of safety to 1.0 and is determined from pseudostatic slope stability analyses.⁷ The initial fundamental period is estimated based on the representative height and shear-wave velocity of the potentially deforming mass as described in Bray and Macedo (2021b). The spectral acceleration profile used for analysis is included with the analysis printouts in Appendix H. The peak ground velocity measurements used in the analyses are summarized in Table 6. Because of the proximity of faulting, the displacement calculations were based on the Bray-Macedo combined ordinary and pulse equations.

4.5 Cross Sections Selected for Analysis

The locations of the cross sections analyzed for this Report are shown in Figure 2 and the conditions at each cross section location are shown in Figures 3, 4, and 5. These sections included:

Western Slope. Five representative cross sections along the western slope of the landfill were selected to assess pre-buttress conditions and the stability of the slope on completion of the buttress project. Details for the buttress are included in Appendix G. As shown in these drawings, the buttress is being constructed along an alignment of approximately 2,950 feet at the toe of the western slope. The CEC drawings include buttress cross sections every 50 feet at alignment Stations 2+00 through 29+50. A mechanically stabilized earth (MSE) retaining wall will be constructed at about Station 19+00 to accommodate property line restrictions.⁸ Construction of the lower buttress will include tying into the existing slope liner at the toe of the slope and extending it up the inboard slope as shown in Detail 1 (Drawing C500) of the CEC drawings. A toe drain running the length of the buttress will be

⁷ Hynes-Griffin and Franklin (1984) developed a rational basis for selection of a pseudostatic seismic coefficient using Newmark sliding-block analyses of a large suite of earthquake records together with consideration of embankment response. They concluded that, for slopes not subject to liquefaction or substantial earthquake-induced strength loss and for which limited deformation can be tolerated, use of a horizontal seismic coefficient equal to one-half the predicted peak bedrock acceleration (PGA), together with a pseudostatic factor of safety greater than 1.0, provides a conservative screening criterion against unacceptably large earthquake-induced deformation. Therefore, deformation analyses were not performed for cases where the yield acceleration was equal or greater than 0.5 times the PGA.

⁸ Static and seismic analyses were performed during design of the MSE wall and they are not repeated or included in this Report.

constructed before the upper buttress soil is placed and compacted. The toe drain and portion of the upper buttress adjacent to existing MSW will be encapsulated by a geomembrane on completion of the project. The CEC cross sections in Appendix G were extended to beyond the top of the western slope for the purposes of analysis as shown in Figures 2 and 3.

Northern Slope. Three cross sections were selected perpendicular to the steepest and highest slopes at the locations shown in Figure 2. As shown in Figure 4, the slopes associated with Sections NS-01 and NS-02 are relatively short and have modest inclinations compared to slopes on the western and southern sides of the landfill. Section NS-01 is representative of the steepest and tallest slope on the northern end of the landfill.

Eastern Slope. Two sections were identified perpendicular to the steepest and highest slopes on the eastern slope of the landfill at the locations shown in Figure 2. These slopes are also relatively flat compared to other slopes on the western and southern sides of the landfill.

Southern Slope. Five representative cross sections were identified to assess the steepest and highest slopes on the landfill (Sections SS-01, SS-02, and SS-03), the potential effects of Leachate Tank Farm 8 on stability (Sections SS-04 and SS-05), and the unbuttressed southern end of the landfill (SS-05). Cross Sections SS-04 and SS-05 were evaluated with and without the surcharge loading associated with the tank farm.

5.0 RESULTS OF ANALYSES

5.1.1 Representative Conditions

The results of the analyses are summarized in Table 7 and the analysis output is included in Appendix H. Overall, the analyses indicate acceptable static stability and generally limited estimated seismic displacement for the evaluated slopes:

Western Slope. Under existing conditions, calculated static factors of safety range from 1.4 to 2.0 for the primary cross sections. Construction of the proposed western slope buttress substantially increases the calculated factors of safety to 1.8 to 2.9. For the buttressed condition, calculated yield accelerations range from 0.15g to 0.28g, with estimated seismic displacements of approximately 1 to 4 inches. Thus, the buttress provides a substantial improvement in static stability while limiting predicted earthquake-induced deformation.

Northern Slopes. Calculated static factors of safety range from 1.86 to 4.1. At Sections NS-01 and NS-02, the calculated yield accelerations exceed one-half the PGA; therefore, seismic displacement calculations were not warranted. Section NS-03 has a calculated yield acceleration of 0.13g and an estimated seismic displacement of approximately 3 inches.

Eastern Slopes. The eastern slopes have calculated static factors of safety of 2.3 and 2.6. Calculated yield accelerations exceed one-half the PGA at both sections; accordingly, seismic displacement calculations were not warranted. The results indicate substantial static and seismic stability margins for the evaluated eastern slopes.

Southern Slopes. Calculated static factors of safety range from approximately 1.5 to 1.76, with yield accelerations ranging from 0.09g to 0.13g. Estimated seismic displacements range from approximately 3 to 6 inches, with the largest displacement calculated at Section SS-01. Analyses at Sections SS-04 and SS-05 were performed both with and without surcharge loads representing the Leachate Tank Farm in Cell 8B. The surcharge has essentially no effect on the calculated stability results: the static factors of safety and calculated seismic displacements are unchanged or nearly unchanged between the corresponding A and B cases. Thus, the tank farm loading does not materially affect the stability of the evaluated southern slopes.

5.1.2 Application of Back Analysis Pressure Surface

As summarized in Table 8, application of the back-calculated combined leachate and LFG pressure surface, approximately 32 feet above the June 2026 measured leachate surface, reduces the calculated static factors of safety and yield accelerations relative to the representative-condition analyses for all evaluated portions of the landfill. Despite this substantial assumed increase in internal pressure, none of the evaluated slopes approaches a calculated static factor of safety below 1.0; static factors of safety are approximately 1.2 or greater, with most substantially higher. The corresponding yield accelerations generally decrease, with the lowest values of approximately 0.04g to 0.05g occurring along portions of the southern slope; several northern and eastern slope sections continue to have comparatively high yield accelerations. These results demonstrate the expected sensitivity of calculated stability to the assumed internal pressure conditions, but should not be interpreted as establishing that the back-calculated pressure surface represents actual conditions elsewhere in the landfill. As discussed previously, the back-analysis is highly non-unique, and application of a pressure surface derived for one slope geometry to substantially different landfill geometries introduces additional uncertainty. Accordingly, the results are most appropriately considered “what-if” sensitivity analyses;

notably, even under this imposed pressure scenario, the analyses do not indicate an unstable slope condition.

6.0 LIMITATIONS

Geo-Logic Associates prepared this report under the direction of Richard Mitchell, PG, CEG. Neven Matasovic, Ph.D., PE, GE peer reviewed the document. The conclusions and recommendations of this report are based largely on limited data collected by others and professional judgment. Therefore, the findings and conclusions based on the results of the analyses presented in this report should be reviewed and modified if additional information relevant to the evaluation is obtained. We have employed accepted geotechnical engineering and engineering geologic procedures, and our professional opinions and conclusions are made in accordance with these principles and practices. This standard is in lieu of all warranties, either expressed or implied.



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Table 1
SUMMARY OF LEACHATE ELEVATION DATA
Chiquita Canyon Landfill

POINT NO.	POINT ID	COORDINATES			PIEZOMETER COMPLETION DETAILS					FLUID ELEVATION			
		Northing	Easting	GS Elevation (ft MSL)	Boring Diameter (in)	Casing Diameter (in)	As-Built Casing Depth (ft bgs)	As-Built Solid Pipe (ft)	As-Built Perforated Pipe (ft)	5/1/2026 (ft MSL)	6/1/2026 (ft MSL)	7/1/2026 (ft MSL)	8/1/2026 (ft MSL)
1001	CV-24188	1980073	6365636	1,265	36	8	100	30	70	1,202	1,203	1,204	1,206
1002	CV-24133	1982183	6367883	1,284	36	8	110	30	80	1,189	1,189	1,189	1,188
1003	CV-2402	1981949	6365544	1,360	36	8	45	20	25	1,323	1,324	1,324	1,356
1005	CV-2009	1981768	6367114	1,382	36	8	148	UNK	UNK	1,293	1,313	1,316	1,262
1007	CV-113	1982022	6366674	1,343	36	8	60	34	26	1,312	1,313	1,370	1,369
1009	CV-24181	1980292	6366164	1,342	36	8	146	30	116	1,268	1,268	1,268	1,268
1011	CV-24123	1982149	6366820	1,308	36	8	60	30	30	1,259	1,260	1,260	ND
1012	CV-2207	1981660	6367430	1,388	36	8	231	32	199	1,169	1,169	1,169	1,168
1013	CV-24149	1981230	6366602	1,408	36	8	108	30	78	1,327	1,327	1,254	1,248
1014	CV-24169	1980660	6366374	1,399	36	8	135	30	105	1,309	1,308	1,184	1,180
1019	CV-2506	1979667	6366398	1,247	36	8	185	30	155	1,128	1,128	1,128	ND
1021	CV-2476	1981437	6366639	1,414	36	8	163	30	133	1,294	1,287	1,253	1,288
1022	CV-2002	1980561	6365357	1,275	36	8	91	22	69	1,216	1,215	1,215	1,214
1023	CV-24112	1981387	6367436	1,391	36	8	98	30	68	1,304	1,304	ND	ND
1024	CV-2008	1981754	6366820	1,392	36	8	124	32	92	1,280	1,281	1,279	1,274
1026	CV-2572	1979424	6366558	1,149	36	8	107	30	77	1,045	1,044	1,044	1,043
1027	CV-2513	1979065	6366026	1,161	36	8	109	30	79	1,056	1,056	1,056	1,055
1028	CV-24231	1979603	6365776	1,292	36	8	173	30	143	1,126	1,126	1,127	1,126
1029	CV-24106	1980270	6366664	1,329	36	8	115	30	85	1,241	1,241	1,243	1,242
1030	CV-2012	1981309	6367703	1,351	36	8	134	32	102	1,255	1,255	1,255	1,248
1031	CV-2523	1981543	6368198	1,284	36	8	122	30	92	1,167	1,168	1,168	1,166
1032	CV-24187	1980192	6365806	1,314	36	8	128	30	98	1,207	1,209	1,205	1,205
1033	CV-24117	1980346	6367212	1,305	36	8	103	30	73	1,228	1,228	1,229	1,228
1034	CV-2512	1979220	6365481	1,248	36	8	66	30	36	1,185	1,185	1,185	1,184
1035	CV-2480	1980643	6366035	1,390	36	8	171	30	141	1,222	1,221	ND	1,225
1036	CV-24132	1982119	6367487	1,286	36	8	90	30	60	1,201	1,201	ND	ND
1037	CV-24199	1980065	6366401	1,340	36	8	148	30	118	1,202	1,202	1,146	1,144
1038	CV-24141	1981508	6365298	1,295	36	8	30	20	10	1,289	1,287	1,287	1,286
1039	CV-2003	1980765	6365485	1,308	36	8	95	22	73	1,258	1,258	1,253	1,251

NOTES:

1. Fluid (leachate) elevations are static levels determined from in-well Lorentz Liquid Level Temperature Sensors (LLTS). The LLTS uses an absolute pressure sensor and operates with a plug-in barometer installed in the controller.
2. ND - No Data; Sensor Offline or Showing Error.
3. UNK - Length of solid and perforated pipe is unknown.
4. See Appendix C for locations of piezometers and 6/1/2026 elevations in cross section.

Table 2																																							
AVERAGE OF MAXIMUM MAY 18 THROUGH JUNE 17 2026 DAILY TEMPERATURES (°F) AT PROBE DEPTH INTERVALS																																							
Chiquita Canyon Landfill																																							
PROBE ID	NORTHING	EASTING	GROUND SURFACE ELEVATION (ft MSL)	TOTAL DEPTH (ft bgs)	PROBE INTERVAL (FT BELOW GROUND SURFACE)																																		
					15	30	45	60	65	70	75	80	85	90	95	100	105	110	120	125	130	135	140	145	150	155	160	165	180	185	190	200	210	220	230	250	265	280	320
TP-1	1981755	6365540	1377	125	149	127	136	142				147				152				147																			
TP-2	1981507	6365461	1335	80	114	141	148	157																															
TP-3	1981182	6365428	1292	55	203	213	233																																
TP-4	1980301	6365506	1268	75	151	158	157	157																															
TP-5	1980603	6365551	1301	90	137	163	166	160			165																												
TP-6	1979988	6365828	1305	130	109	115	117	115				132				139			138			142																	
TP-7	1980306	6365799	1320	123	127	130	136	139			143					154																							
TP-8	1980584	6365944	1353	180	140	146	142																																
TP-9	1980983	6365924	1352	141	111	122	130	137				141				172				208																			
TP-10	1980737	6366122	1364	130	122	127	131	141				141				143				155																			
TP-11	1980905	6366290	1373	158	171	184	187					198				208				208																			
TP-12	1980865	6366617	1398	192	101	121	126					135				139				150																			
TP-13	1981186	6366386	1374	166	149	166	165				168					171						173																	
TP-14	1981083	6366653	1393	157	91	115	128				146					159				169				172															
TP-15	1981315	6366568	1376	170	183	198	200				201					203																							
TP-16	1981430	6366764	1394	131	138	177	147	142				141				143																							
TP-17	1981534	6366646	1398	135	141	146	143	144				147				148				161																			
TP-18	1981868	6366468	1365	90	138	171	208																																
TP-19	1981807	6366741	1374	155	144	146	146				148					159				164				232															
TP-20	1982028	6366793	1335	97	128	135	141																																
TP-21	1981238	6365804	1352	110	117	144	153	160		162			181		211			256																					
TP-22	1981377	6366018	1349	147	197																																		
TP-23	1981729	6366232	1365	107	191	221	229				260																												
TP-24	1980531	6366233	1380	320	111	117	126									143									165							189			210		153		
TP-25	1981419	6366871	1401	138	111	124	127	128			132			148			201			210							165												
TP-26	1981665	6366912	1392	159	119	138	143	149				150				169				171				178															
TP-27	1982001	6366919	1333	154	127	137	140	150				156				157				153				130															
TP-28	1980190	6366176	1352	173	79	93	114			125					132				131				140			144													
TP-29	1980687	6366649	1393	245	115	128	129					134							148							155					166			189					
TP-30	1980817	6366867	1396	200	105	113	115			146						170					168					168				175									
TP-31	1981476	6367157	1398	290	112	127	131					139								163									193				187			141			
TP-32	1981876	6367285	1339	196	127	140	144			154						163					170					167				150									
TP-33	1981456	6366284	1363	50	174	188	197																																
TP-34	1981132	6366434	1379	124	124	129	137	134			136			137				145	151																				
TP-35	1980719	6366444	1392	142	100	124	135		137				149				163			172			175																
TP-36	1981433	6367538	1369	250	103	125	133				136								155								172					161			136				
TP-37	1980945	6367236	1383	180	105	115	136				136					142					163					177			184										
TP-38	1980732	6367309	1339	250	115	136	143				150								162								172					162			136				
TP-39	1980386	6366790	1332	190	101	119	138				143						151					157					159												
TP-40	1979663	6365958	1273	220	99	121	128				129							125								144				149				134					

Table 3
PROBE TEMPERATURES AND DISTANCE TO CONTAINMENT SYSTEMS
Chiquita Canyon Landfill

PROBE ID	CLOSEST ADJACENT LINER	SURFACE ELEVATION (ft MSL)	TOTAL PROBE DEPTH (ft bgs)	BOTTOM PROBE ELEVATION (ft MSL)	ELEVATION OF LINER BELOW PROBE (ft MSL)	CLOSEST PROBE DISTANCE TO ADJACENT LINER (ft)	MAXIMUM PROBE TEMPERATURE (°F)	AVERAGE PROBE TEMPERATURE (°F)
TP-1	Module 2B/3/4	1,377	125	1,252	1,225	27	152	143
TP-2	Module 2B/3/4	1,335	80	1,255	1,192	63	157	140
TP-3	Module 4	1,292	55	1,237	1,204	33	233	216
TP-4	Module 4	1,268	75	1,193	1,152	41	158	156
TP-5	Module 4	1,301	90	1,211	1,073	137	166	158
TP-6	Module 5	1,305	130	1,175	1,085	89	142	126
TP-7	Module 4	1,320	123	1,197	1,069	128	154	138
TP-8	Module 2B/3/4	1,353	180	1,173	1,048	125	146	142
TP-9	Module 2B/3/4	1,352	141	1,211	1,055	156	208	146
TP-10	Module 2B/3/4	1,364	130	1,234	1,050	183	155	137
TP-11	Cell 1/2A	1,373	158	1,215	1,062	152	208	193
TP-12	Cell 1/2A	1,398	192	1,206	1,050	155	150	129
TP-13	Cell 1/2A	1,374	166	1,208	1,067	141	173	165
TP-14	Cell 1/2A	1,393	157	1,236	1,061	175	172	140
TP-15	Cell 1/2A	1,376	170	1,206	1,069	138	203	197
TP-16	Cell 1/2A	1,394	131	1,263	1,071	193	177	148
TP-17	Cell 1/2A	1,398	135	1,263	1,083	180	161	147
TP-18	Cell 1/2A	1,365	90	1,275	1,229	46	208	172
TP-19	Cell 2 Phase 2B	1,374	155	1,219	1,159	60	232	163
TP-20	Cell 2 Phase 2B	1,335	97	1,238	1,203	35	141	135
TP-21	Module 2B/3/4	1,352	110	1,242	1,083	158	256	173
TP-22	Module 2B/3/4	1,349	147	1,202	1,070	131	197	197
TP-23	Module 2B/3/4	1,365	107	1,258	1,202	57	260	225
TP-24	Module 2B/3/4	1,380	320	1,060	1,046	14	210	152
TP-25	Cell 2 Phase 1	1,401	138	1,263	1,073	190	210	148
TP-26	Cell 2 Phase 1	1,392	159	1,233	1,088	145	178	152
TP-27	Cell 2 Phase 2B	1,333	154	1,179	1,158	20	157	144
TP-28	Module 4	1,352	173	1,179	1,039	140	144	120
TP-29	Cell 1/2A	1,393	245	1,148	1,058	90	189	145
TP-30	Cell 1	1,396	200	1,196	1,066	130	175	145
TP-31	Cell 2 Phase 1	1,398	290	1,108	1,086	22	193	149
TP-32	Cell 2 Phase 2A	1,339	196	1,143	1,114	28	170	152
TP-33	Cell 1/2A	1,363	50	1,313	1,083	230	197	186
TP-34	Cell 1/2A	1,379	124	1,255	1,065	190	151	137
TP-35	Cell 1/2A	1,392	142	1,250	1,058	193	175	144
TP-36	Cell 1	1,369	250	1,119	1,100	18	172	140
TP-37	Cell 1	1,383	180	1,203	1,078	126	184	145
TP-38	Cell 1	1,339	250	1,089	1,070	18	172	147
TP-39	Module 2B/3/4	1,332	190	1,142	1,051	91	159	138
TP-40	Module 5	1,273	220	1,053	1,036	17	149	129

NOTES:

1. Temperatures based on average of May 18 Through June 17 maximum daily temperatures - see Table 2.
2. See Figures 1 and 2 for probe locations.

Table 4
BASE AND SLOPE LINER CONFIGURATIONS
Chiquita Canyon Landfill
Castaic, California

CANYONS A AND D	
Base Liner Subgrade Soil-Bentonite Admixture Sand Layer (LCS) Protective Cover Soil	Slope Liner Subgrade HDPE Protective Cover Soil
CANYON C CELL 1	
Base Liner Subgrade Low Permeability Soil (<1E-7 cm/sec) Single-Side Textured HDPE (Down) Sand or Granular layer (LCS) Protective Cover Soil	Slope Liner Subgrade HDPE Protective Cover Soil
CANYON C CELL 2 PHASES 1, 2A, 2B	
Base Liner Subgrade Geosynthetic Clay Liner Double-Side Textured HDPE Granular Layer (LCS) Protective Cover Soil	Slope Liner Subgrade Geosynthetic Clay Liner Single-Side Textured HDPE Protective Cover Soil
CANYON C CELL 1/2A AND MODULES 2B, 3, AND 4	
Base Liner Subgrade Geosynthetic Clay Liner Double-Side Textured HDPE Geocomposite (LCS) Protective Cover Soil	Slope Liner Subgrade Double-Side Textured HDPE Geocomposite (LCS) Protective Cover Soil
MODULE 5	
Base Liner Subgrade Compacted Clay Liner Double-Side Textured HDPE Geocomposite (LCS) Protective Cover Soil	Slope Liner Subgrade Double-Side Textured HDPE Geocomposite (LCS) Protective Cover Soil
CELL 6	
Base Liner Subgrade Compacted Clay Liner Double-Side Textured HDPE Cushion Geotextile Granular Layer (LCS) Filter Geotextile Protective Cover Soil	Slope Liner Subgrade Geosynthetic Clay Liner Double-Side Textured HDPE Cushion Geotextile Protective Cover Soil
CELLS 8A AND 8B	
Base Liner Subgrade Compacted Clay Liner Geosynthetic Clay Liner Double-Side Textured HDPE Cushion Geotextile Granular Layer (LCS) Filter Geotextile Protective Cover Soil	Slope Liner Subgrade Geosynthetic Clay Liner Double-Side Textured HDPE Cushion Geotextile Protective Cover Soil

Table 5
SUMMARY OF LINER SYSTEM STRENGTH DATA AND ASSUMPTIONS FOR ANALYSIS
Chiquita Canyon Landfill
Castaic, California

LINER SYSTEM	COMPONENT	CRITICAL LAYER OR INTERFACE	SHEAR STRENGTH DATA				
			REPORTED SHEAR STRENGTH		SHEAR STRENGTH USED FOR ANALYSIS		REFERENCE
			c' (psf)	Ø' (degrees)	c' (psf)	Ø' (degrees)	
Canyons A and D	Base Liner	Soil-Bentonite Admixture	0	18	0	17	See EMCON information and plots in Appendix F.
	Slope Liner	Subgrade-HDPE	0	22	0	17	See EMCON information and plots in Appendix F.
Canyon C Cell 1	Base Liner	Low Permeability Soil - Textured HDPE	0	18	0	17	See EMCON information and plots in Appendix F.
	Slope Liner	Subgrade-HDPE	0	22	0	17	See EMCON information and plots in Appendix F.
Cell 2 Phases 1, 2A, 2B	Base Liner	GCL-HDPE	Trilinear Strength		Trilinear Strength		See EMCON information and plots in Appendix F.
	Slope Liner	GCL-HDPE	Trilinear Strength		Trilinear Strength		See EMCON information and plots in Appendix F.
Cell 1/2A and Modules 2B, 3, 4	Base Liner	Textured HDPE-Geocomposite	100	14	0	14	See Appendix F.
	Slope Liner	Textured HDPE-Geocomposite	100	14	0	14	See Appendix F.
Module 5	Base Liner	Textured HDPE-Geocomposite	105	12.5	0	12	See Appendix F.
	Slope Liner	Textured HDPE-Geocomposite	105	12.5	0	12	See Appendix F.
Cells 6, 8A, 8B	Base Liner	Textured HDPE-Geotextile	0	14	0	14	See Appendix F.
	Slope Liner	Textured HDPE-Geotextile	0	14	0	14	See Appendix F.

Table 6
SUMMARY OF HOLOCENE-ACTIVE FAULTS WITHIN 100 KILOMETERS OF THE SITE
Chiquita Canyon Landfill
Castaic, California

FAULT	FAULT STYLE	RUPTURE DISTANCE Rrup (km)	DETERMINISTIC MAGNITUDE (Mw)	EQUALLY WEIGHTED PHGA (g)	EQUALLY WEIGHTED PGV (cm/s)	MEDIAN PHGA (g)			
						ASK14	BSSA14	CB14	CY14
Holser	Reverse	1.34	6.79	0.579		0.577	0.434	0.684	0.623
					50	53	38	59	51
San Gabriel	Right-lateral strike-slip	6.14	7.22	0.377		0.339	0.324	0.430	0.415
					40	40	34	44	41
Northridge	Thrust (reverse)	8.02	6.85	0.402		0.405	0.380	0.423	0.400
Oak Ridge (Onshore)	Thrust (reverse)	8.03	7.12	0.333		0.305	0.278	0.385	0.362
Santa Susana	Thrust (reverse)	8.14	7.10	0.532		0.477	0.450	0.657	0.545
					51	52	44	57	51
San Cayetano	Thrust (reverse)	10	7.11	0.310		0.373	0.237	0.315	0.312
Simi-Santa Rosa	Reverse	14	6.83	0.233		0.203	0.221	0.265	0.242
Sierra Madre (San Fernando)	Thrust (reverse)	19	6.63	0.165		0.171	0.152	0.186	0.153
Santa Ynez (East)	Left-lateral reverse	28	7.14	0.128		0.116	0.131	0.142	0.123
Verdugo	Reverse	28	6.85	0.108		0.098	0.103	0.124	0.108
San Andreas (Mojave, South)	Right-lateral strike-	32	7.28	0.118		0.112	0.116	0.129	0.114
Pitas Point	Left-lateral reverse	33	7.10	0.109		0.104	0.100	0.120	0.114
Anacapa-Dume	Thrust (reverse)	35	7.28	0.119		0.104	0.114	0.127	0.129
Sierra Madre	Reverse	37	7.14	0.097		0.090	0.092	0.106	0.102
Hollywood	Left-lateral reverse	42	6.62	0.063		0.054	0.067	0.072	0.057
Malibu Coast	Reverse	43	6.64	0.060		0.054	0.062	0.066	0.056
Santa Monica	Left-lateral reverse	44	6.51	0.054		0.046	0.060	0.063	0.048
Puente Hills (Los Angeles)	Thrust (reverse)	46	6.88	0.077		0.092	0.069	0.073	0.074
Elysian Park (Upper)	Thrust (reverse)	46	6.59	0.060		0.056	0.058	0.070	0.056
Mission Ridge-Arroyo Parida-Santa Ana	Left-lateral reverse	48	6.92	0.064		0.061	0.064	0.067	0.065
Garlock (West)	Left-lateral strike-slip	48	7.32	0.083		0.079	0.082	0.090	0.079
Pleito	Thrust (reverse)	49	7.03	0.070		0.063	0.068	0.078	0.071
Newport-Inglewood	Right-lateral strike-	50	7.14	0.072		0.068	0.072	0.080	0.067

Table 6
SUMMARY OF HOLOCENE-ACTIVE FAULTS WITHIN 100 KILOMETERS OF THE SITE
Chiquita Canyon Landfill
Castaic, California

FAULT	FAULT STYLE	RUPTURE DISTANCE Rrup (km)	DETERMINISTIC MAGNITUDE (Mw)	EQUALLY WEIGHTED PHGA (g)	EQUALLY WEIGHTED PGV (cm/s)	MEDIAN PHGA (g)			
						ASK14	BSSA14	CB14	CY14
Raymond	Left-lateral strike-slip	52	6.65	0.050		0.044	0.052	0.058	0.045
Palos Verdes	Right-lateral reverse	52	7.34	0.077		0.074	0.076	0.084	0.074
Puente Hills (Santa Fe Springs)	Thrust (reverse)	58	6.54	0.042		0.040	0.042	0.046	0.040
Clamshell-Sawpit	Reverse	59	6.55	0.039		0.034	0.041	0.046	0.035
Red Mountain	Thrust (reverse)	61	7.39	0.071		0.066	0.066	0.075	0.078
Oak Ridge (Offshore)	Thrust (reverse)	61	6.67	0.040		0.037	0.042	0.045	0.038
Channel Islands	Thrust (reverse)	65	7.23	0.066		0.071	0.056	0.063	0.075
Puente Hills (Coyote Hills)	Thrust (reverse)	67	6.75	0.042		0.041	0.040	0.045	0.042
North Channel	Reverse	71	6.76	0.038		0.036	0.037	0.041	0.037
White Wolf	Left-lateral reverse	71	7.13	0.050		0.045	0.047	0.056	0.052
Santa Cruz Island	Left-lateral reverse	75	7.12	0.046		0.042	0.043	0.052	0.048
Pitas Point (Lower, Montalvo)	Left-lateral reverse	77	7.21	0.055		0.073	0.045	0.049	0.052
San Jose	Left-lateral strike-slip	81	6.52	0.026		0.021	0.027	0.031	0.023
Cucamonga	Thrust (reverse)	85	6.83	0.032		0.028	0.031	0.038	0.031
Pitas Point (Upper)	Left-lateral reverse	85	6.78	0.031		0.029	0.029	0.034	0.031
Santa Ynez (West)	Left-lateral reverse	91	7.07	0.033		0.031	0.034	0.036	0.033
Chino	Right-lateral reverse	93	6.74	0.026		0.023	0.026	0.031	0.023

Table 6 SUMMARY OF HOLOCENE-ACTIVE FAULTS WITHIN 100 KILOMETERS OF THE SITE Chiquita Canyon Landfill Castaic, California									
FAULT	FAULT STYLE	RUPTURE DISTANCE Rrup (km)	DETERMINISTIC MAGNITUDE (Mw)	EQUALLY WEIGHTED PHGA (g)	EQUALLY WEIGHTED PGV (cm/s)	MEDIAN PHGA (g)			
						ASK14	BSSA14	CB14	CY14

NOTES:

1. Fault-source information and finite rupture geometry are based on the published NSHM23 western U.S. fault-system solution (WUS Version 4/R1) and associated fault-section database.
2. Rrup is the closest distance to the selected finite rupture plane. Deterministic magnitudes correspond to the upper end of the nonzero-rate NSHM23 individual-parent-fault rupture range represented by the selected rupture.
3. Ground motions are median predictions for Vs30 = 760 m/s, California regional/default basin conditions, using the four NGA-West2 relationships listed below. The equally weighted PHGA is the arithmetic average of the four median predictions.
4. Potential near-source/directivity effects were evaluated separately using the Bayless-Abrahamson-Somerville method. No generic directivity adjustment is applied to the PHGA values shown in this table. Finite-rupture and hanging-wall effects applicable to reverse faults are represented through the NGA-West2 model inputs; potential strike-slip directivity effects for the San Andreas and San Gabriel faults were evaluated separately.
5. Median RotD50 PGVs were calculated using the OpenQuake Engine implementations of the ASK14, BSSA14, CB14, and CY14 NGA-West2 ground-motion models (Pagani et al., 2014; Abrahamson et al., 2014; Boore et al., 2014; Campbell and Bozorgnia, 2014; Chiou and Youngs, 2014).
6. Attenuation relationships :
 - ASK14 - Norman A. Abrahamson, Walter J. Silva, and Ronnie Kamai, Summary of the ASK14 Ground Motion Relation for Active Crustal Regions, Earthquake Spectra, Volume 30, No. 3, pages 1025-1055, August 2014.
 - BSSA14 - David M. Boore, Jonathan P. Stewart, Emel Seyhan, and Gail M. Atkinson, NGA-West2 Equations for Predicting PGA, PGV, and 5% Damped PSA for Shallow Crustal Earthquakes, Earthquake Spectra, Volume 30, No. 3, pages 1057-1085, August 2014; © 2014.
 - CB14 - Kenneth W. Campbell and Yousef Bozorgnia, NGA-West2 Ground Motion Model for the Average Horizontal Components of PGA, PGV, and 5% Damped Linear Acceleration Response Spectra, Earthquake Spectra, Volume 30, No. 3, pages 1087-1115, August 2014.
 - CY14 - Brian S.-J. Chiou and Robert R. Youngs, Update of the Chiou and Youngs NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra, Earthquake Spectra, Volume 30, No. 3, pages 1117-1153, August 2014.

Table 7
SUMMARY OF STABILITY ANALYSIS RESULTS
Chiquita Canyon Landfill
Castaic, California

CROSS SECTION	SLOPE	STATIC SAFETY FACTOR		SEISMIC DISPLACEMENT						
		Existing Conditions	After West Slope Buttress	Yield Acceleration (g)	Site Period (T _s , sec)	1.3 T _s	Spectral Acceleration @ 1.3T _s (g)	Earthquake Moment Magnitude	Estimated Displacement (cm)	Estimated Displacement (in)
9+00	Western	1.7	1.8	0.15	0.48	0.63	0.60	6.8	10.1	4
16+00	Western	1.7	2.7	0.21	0.61	0.79	0.48	6.8	4.1	2
19+00	Western	1.5	2.9	0.20	0.70	0.91	0.42	6.8	4.0	2
21+00	Western	1.4	2.9	0.23	0.61	0.80	0.48	6.8	3.3	1
24+00	Western	2.0	2.6	0.28	0.51	0.66	0.60	6.8	2.8	1
NS-01	Northern	2.8	NA	>0.5 x PGA (0.47)	NA	NA	NA	NA	NA	NA
NS-02	Northern	4.1	NA	>0.5 x PGA (0.33)	NA	NA	NA	NA	NA	NA
NS-03	Northern	1.8	NA	0.13	0.77	1.01	0.38	6.8	8.7	3
ES-01	Eastern	2.3	NA	>0.5 x PGA (0.33)	NA	NA	NA	NA	NA	NA
ES-02	Eastern	2.6	NA	>0.5 x PGA (0.37)	NA	NA	NA	NA	NA	NA
SS-01	Southern	1.5	NA	0.09	0.76	0.99	0.38	6.8	16.2	6
SS-02	Southern	1.5	NA	0.13	0.64	0.84	0.42	6.8	8.5	3
SS-03	Southern	1.6	NA	0.13	0.73	0.95	0.40	6.8	12.9	5
SS-04A	Southern	1.7	NA	0.12	0.77	1.00	0.38	6.8	16.2	6
SS-04B	Southern	1.7	NA	0.12	0.77	1.00	0.38	6.8	16.2	6
SS-05A	Southern	1.5	NA	0.10	0.85	1.11	0.34	6.8	12.5	5
SS-05B	Southern	1.5	NA	0.10	0.85	1.11	0.34	6.8	12.5	5

NOTES:

1. See Figure 2 for cross section locations.
2. See Appendix H for analysis output.
3. See Appendix H for bedrock spectral accelerations for Holser fault.
4. All safety factors are associated with non-circular failure surfaces. Circular surface analyses were performed for all cross sections and returned higher safety factors in all cases.
5. Seismic displacement calculations are associated with the western slope buttressed condition and with existing conditions for the northern, eastern, and southern slopes.
6. Displacement calculations not warranted if yield acceleration is greater than 0.5 x PGA (Hynes-Griffin and Franklin, 1984).
7. SS-04A and SS-05A include surcharge loads representative of Leachate Tank Farm 8 loads. SS-04B and SS-05B do not include the surcharge loads.

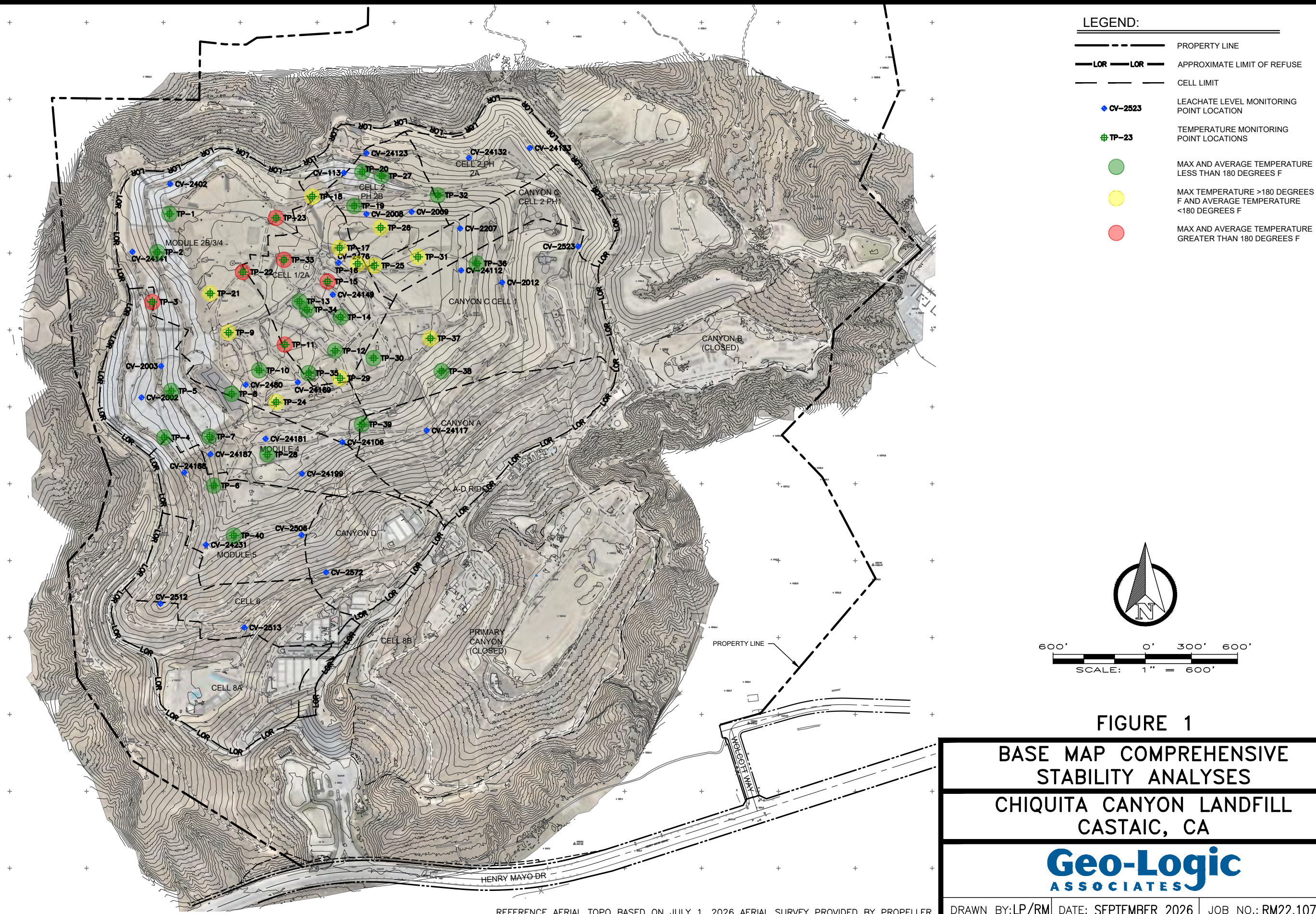
Table 8
COMPARISON OF REPRESENTATIVE STABILITY ANALYSIS RESULTS WITH
RESULTS USING BACK ANALYSIS PRESSURE SURFACE
Chiquita Canyon Landfill
Castaic, California

CROSS SECTION	SLOPE	STATIC SAFETY FACTOR		YIELD ACCLERATION	
		Representative Conditions	Back-Calculated Pressure Surface	Representative Conditions	Back-Calculated Pressure Surface
9+00	Western	1.8	1.3	0.15	0.06
16+00	Western	2.7	2.2	0.21	0.15
19+00	Western	2.9	2.2	0.20	0.14
21+00	Western	2.9	2.3	0.23	0.15
24+00	Western	2.6	2.2	0.28	0.22
NS-01	Northern	2.8	2.2	>0.5 x PGA (0.47)	>0.5 x PGA (0.31)
NS-02	Northern	4.1	1.8	>0.5 x PGA (0.33)	0.23
NS-03	Northern	1.8	1.5	0.13	0.09
ES-01	Eastern	2.3	2.2	>0.5 x PGA (0.33)	>0.5 x PGA (0.30)
ES-02	Eastern	2.6	2.3	>0.5 x PGA (0.37)	>0.5 x PGA (0.35)
SS-01	Southern	1.5	1.2	0.09	0.04
SS-02	Southern	1.5	1.2	0.13	0.05
SS-03	Southern	1.6	1.5	0.13	0.10
SS-04A	Southern	1.7	1.5	0.12	0.10
SS-04B	Southern	1.7	1.5	0.12	0.10
SS-05A	Southern	1.5	1.3	0.10	0.07
SS-05B	Southern	1.5	1.3	0.10	0.07

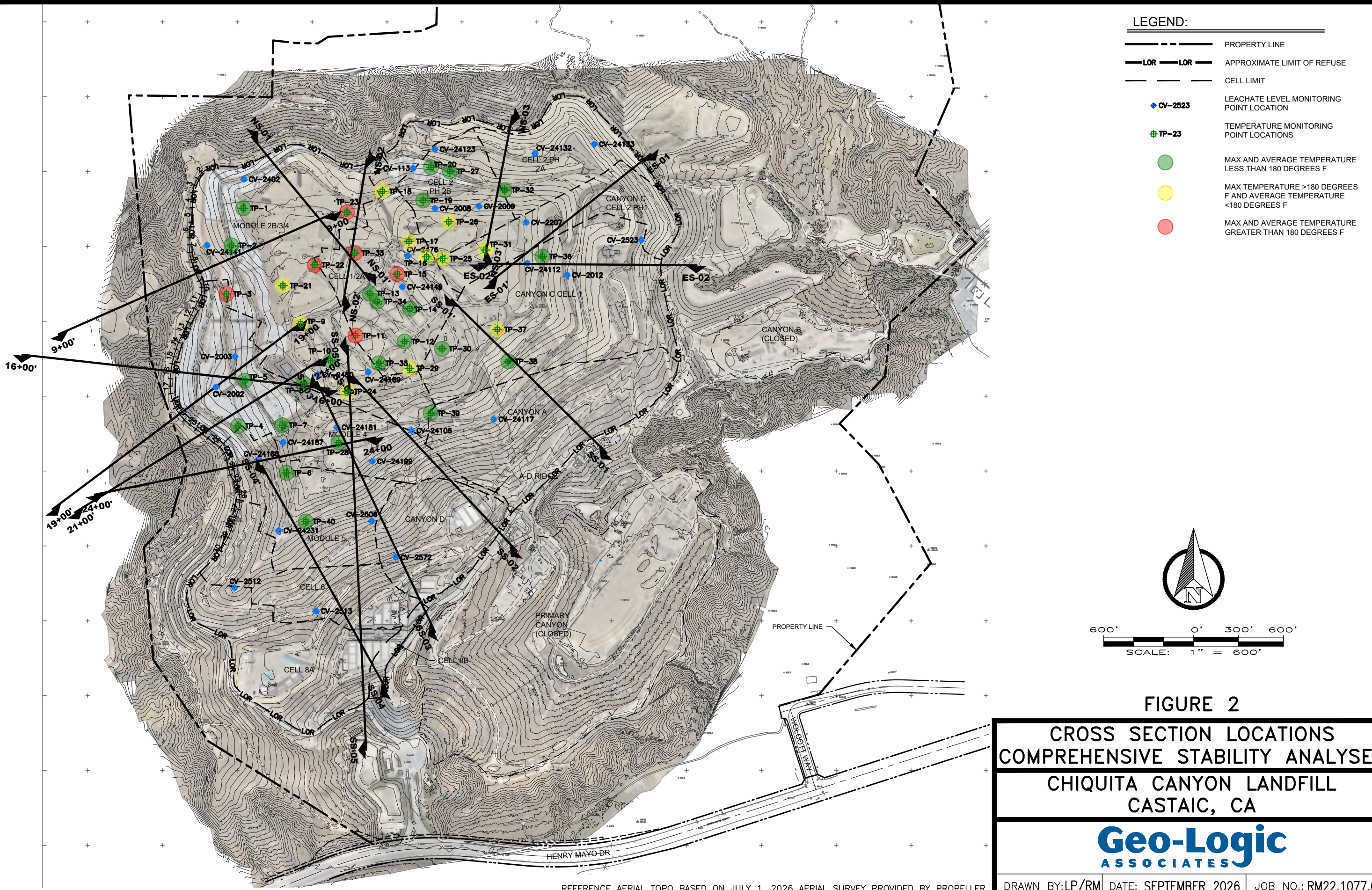
NOTES:

1. See Figure 2 for cross section locations.
2. See Appendix E for back analysis output.
3. Representative conditions pressure surface is 5 ft above baseline June 2026 measured surface.
4. Back analysis pressure surface is 32 ft above baseline June 2026 measured surface.
5. SS-04A and SS-05A include surcharge loads representative of Leachate Tank Farm 8 loads. SS-04B and SS-05B do not include the surcharge loads.
6. Western slope analyses assume buttress has been constructed.

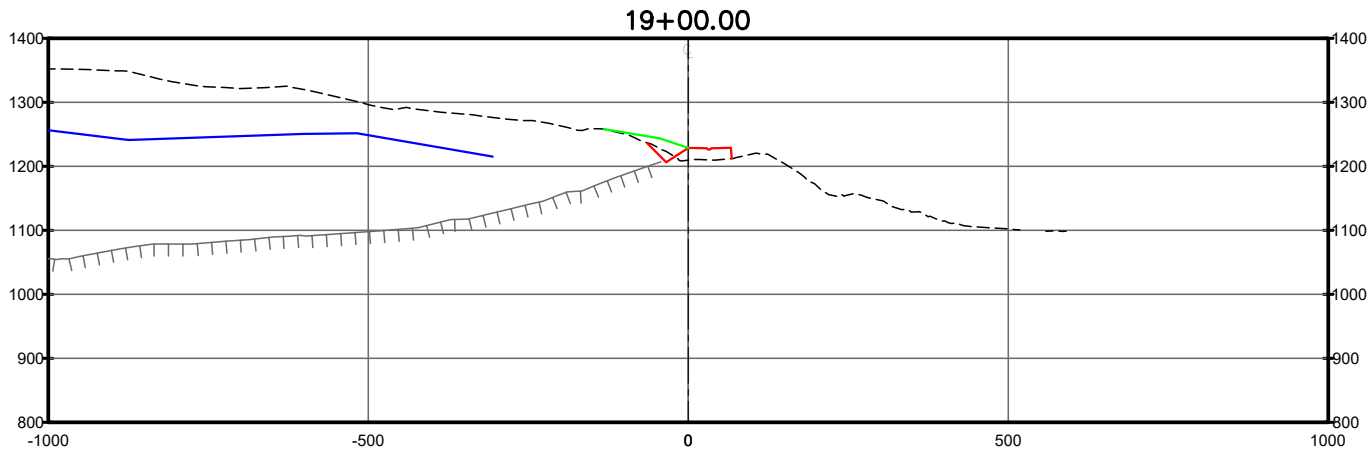
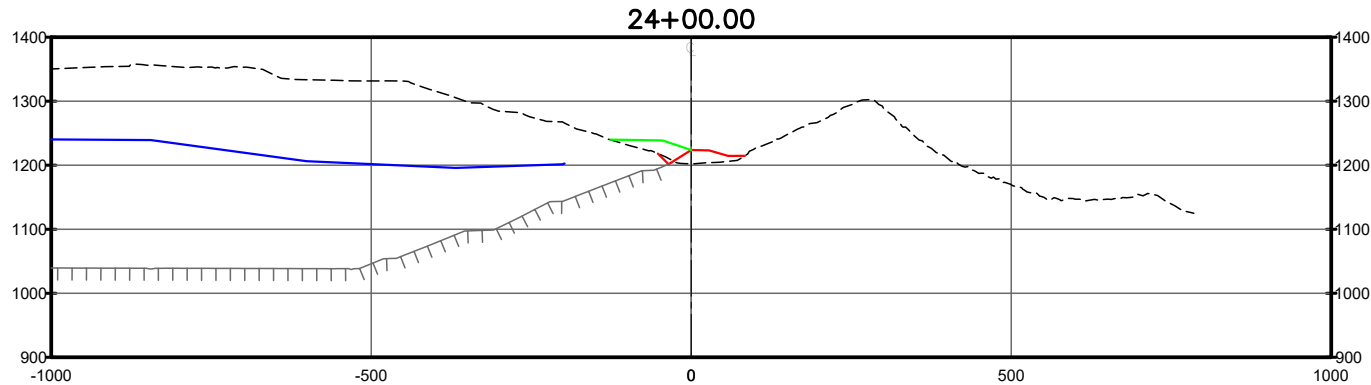
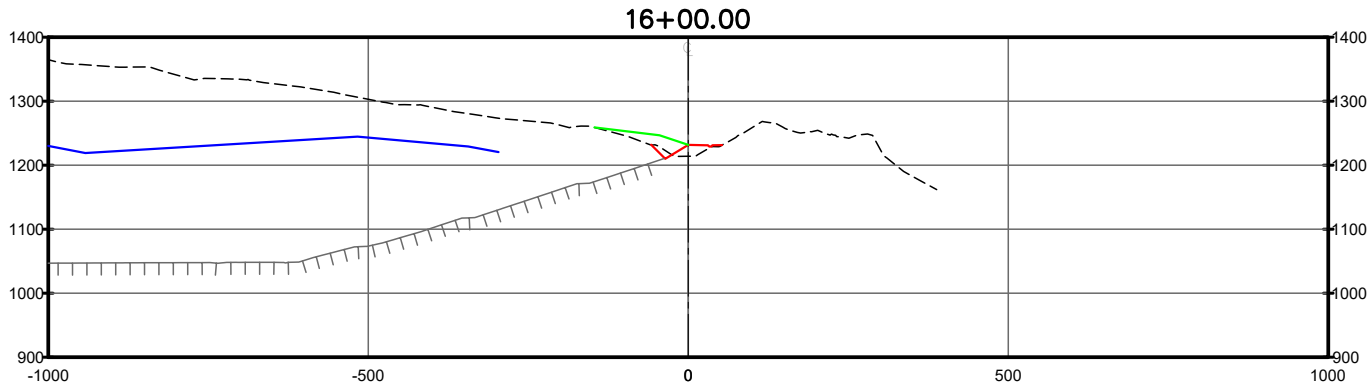
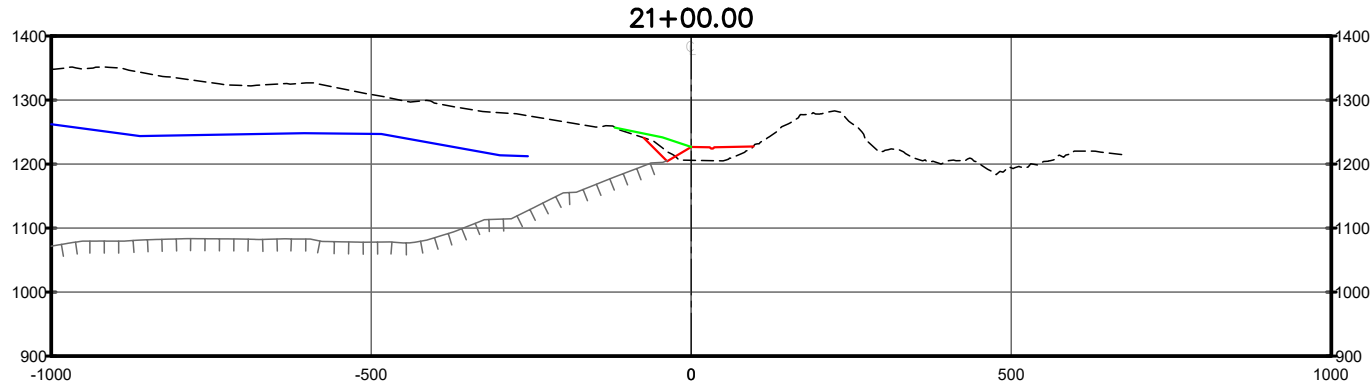
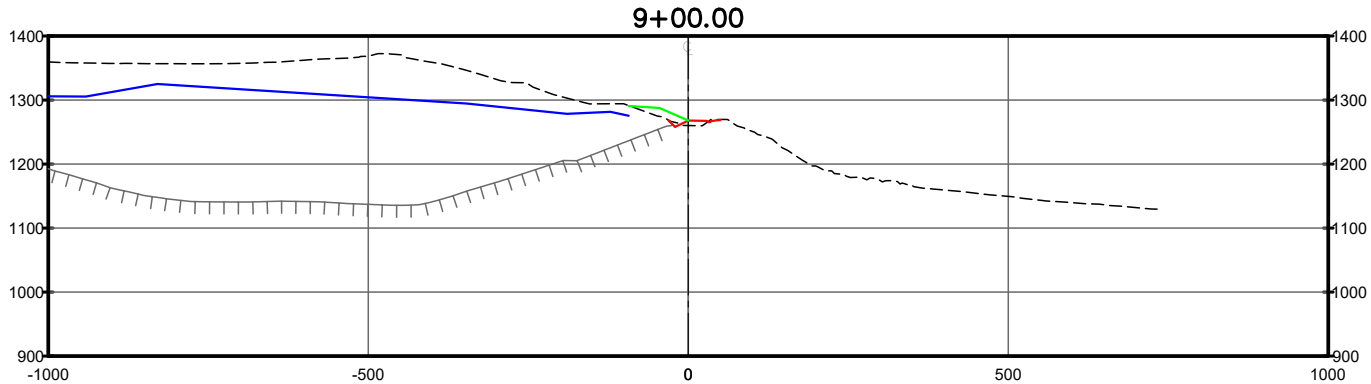
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P:\SITES\CHIQUITA CYN LF WEST SLOPE EXCAV\FIGURES\1026.1002-CCL-WEST SLOPE-FIG 2-(2026-09-01).DWG September 8, 2026 -- 9:50 AM BY: GLA-USER



P:\SITES\CHIQUITA CYN LF\WEST SLOPE EXCAV\FIGURES\1026.1002-CCL-WEST SLOPE-FIG 3--(2026-09-01).DWG September 4, 2026 -- 12:40 PM BY: GLA-USER



LEGEND:

- SUBGRADE
- TOPO 2026-07-01
- LEACHATE LIQUID LEVEL 2026-06-01
- LOWER BUTTRESS GRADE
- UPPER BUTTRESS GRADE

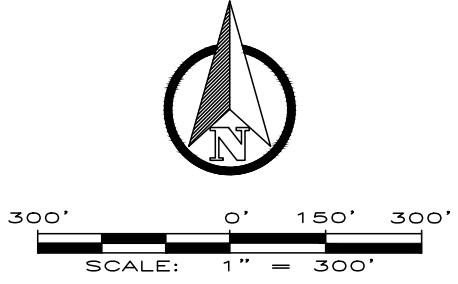


FIGURE 3

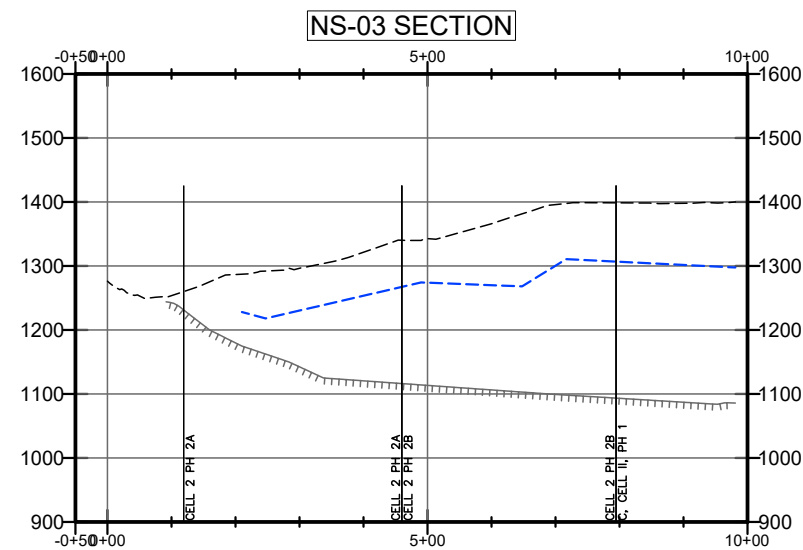
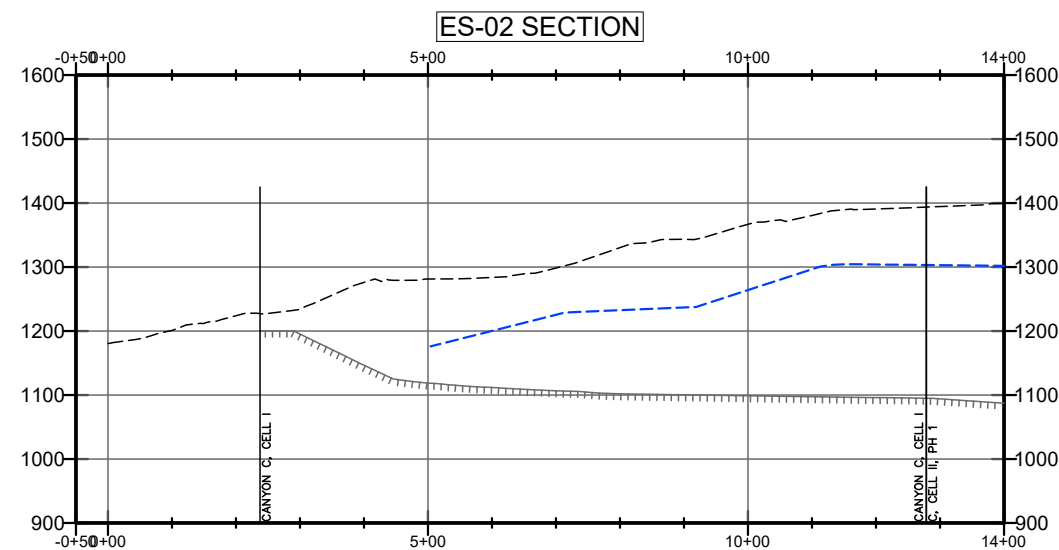
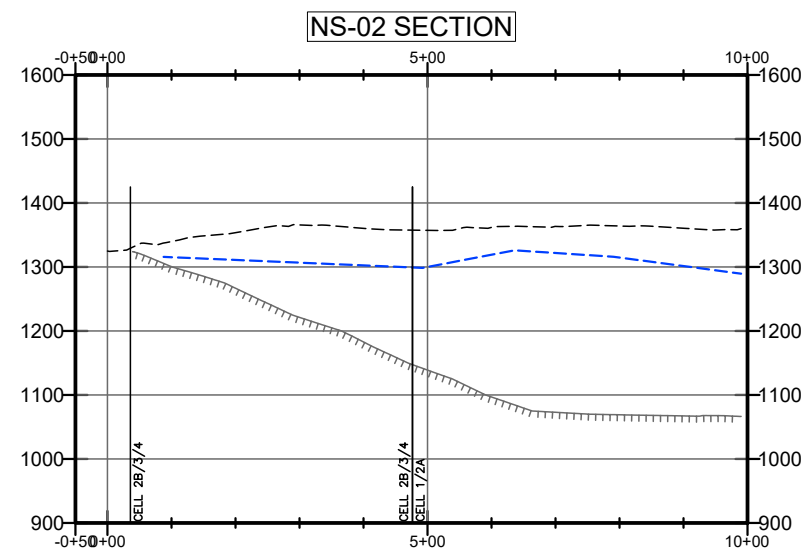
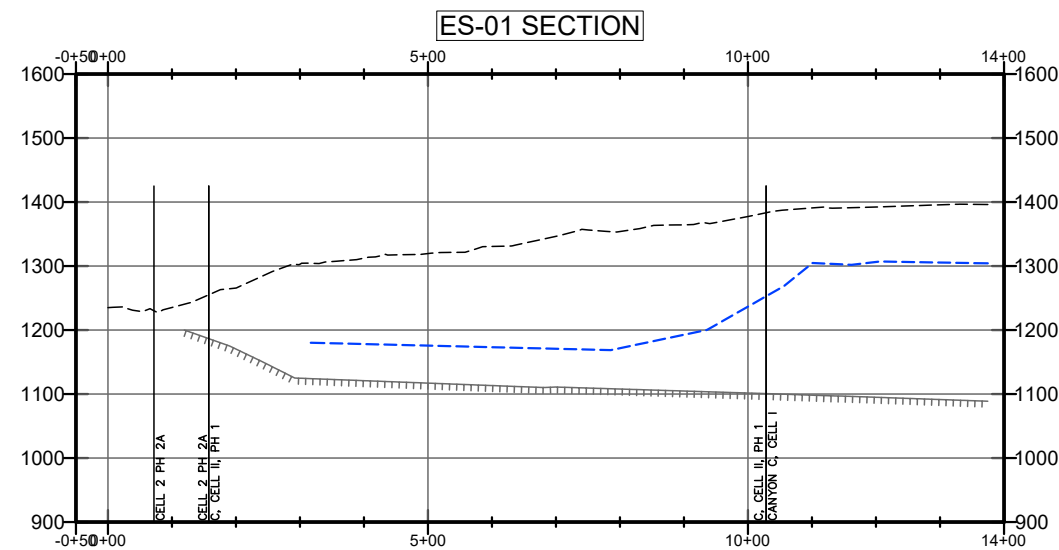
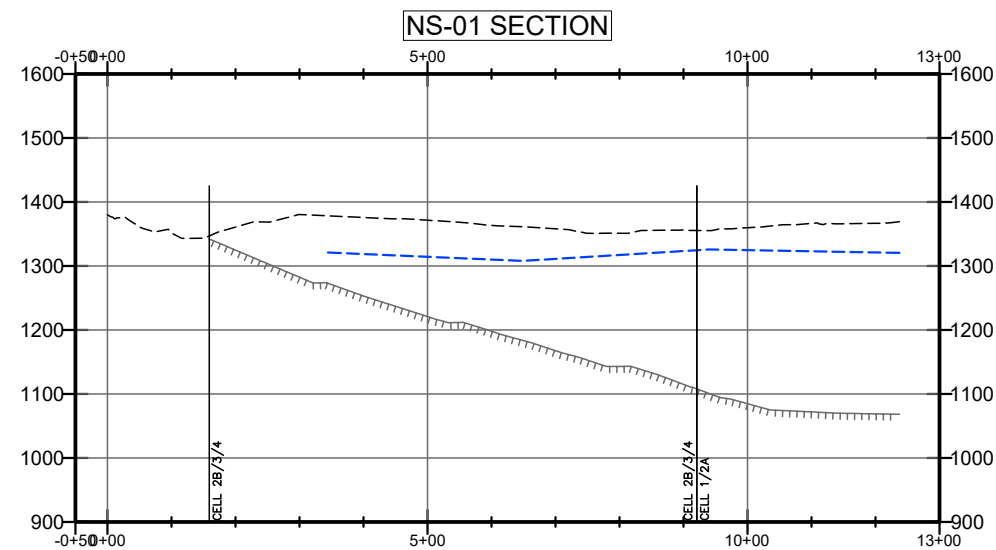
CROSS SECTIONS
COMPREHENSIVE STABILITY ANALYSES
CHIQUITA CANYON LANDFILL
CASTAIC, CA

Geo-Logic
ASSOCIATES

DRAWN BY: LP/RM | DATE: SEPTEMBER 2026 | JOB NO.: RM22.1077.00

REFERENCE AERIAL TOPO BASED ON JULY 1, 2026 AERIAL SURVEY PROVIDED BY PROPELLER

P:\SITES\CHIQUITA CYN LF\WEST SLOPE EXCAV\FIGURES\1026.1002-CCL-WEST SLOPE-FIG 4_6-(2026-09-01).DWG September 4, 2026 - 12:47 PM BY: GLA-USER



LEGEND:

- SUBGRADE
- TOPO 2026-07-01
- LEACHATE LIQUID LEVEL 2026-06-01

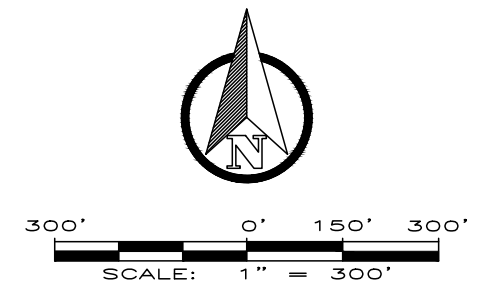


FIGURE 4

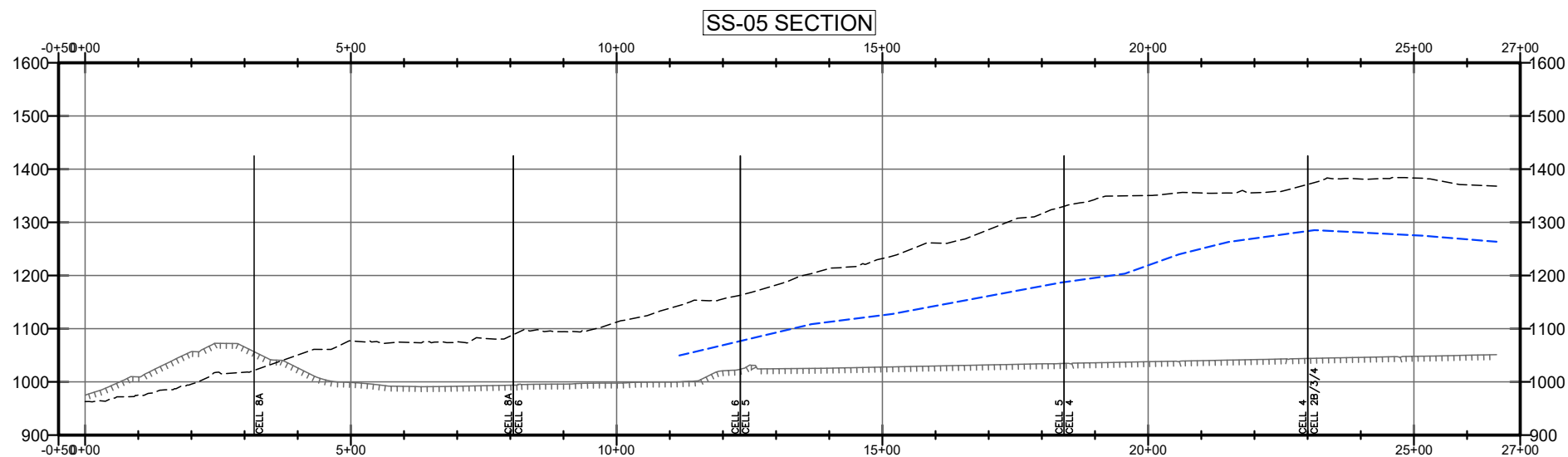
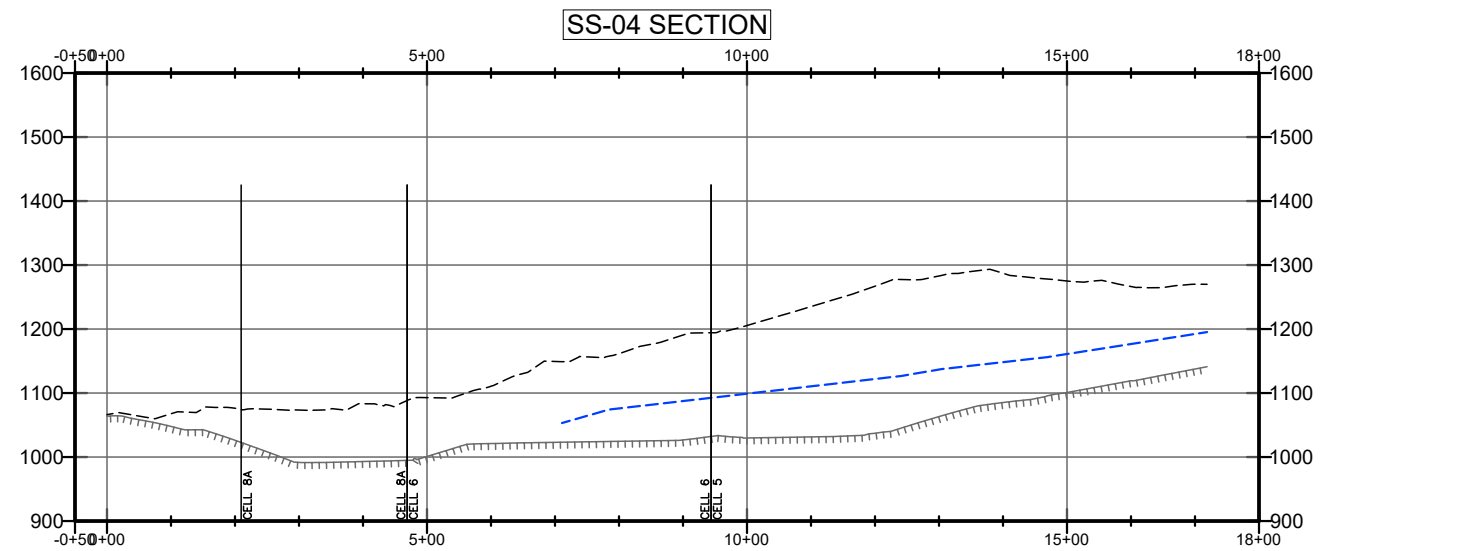
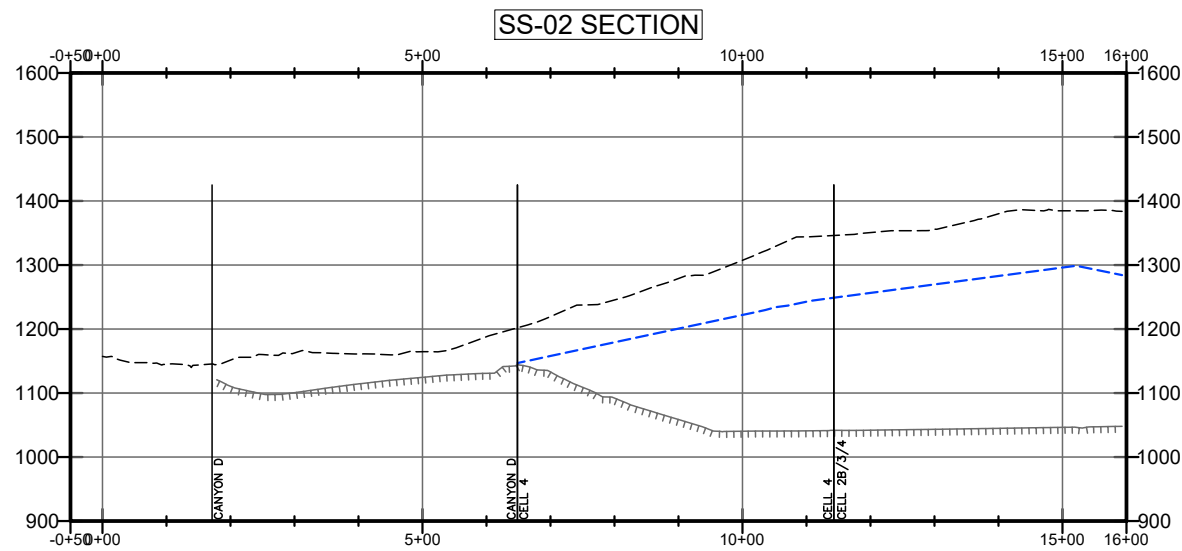
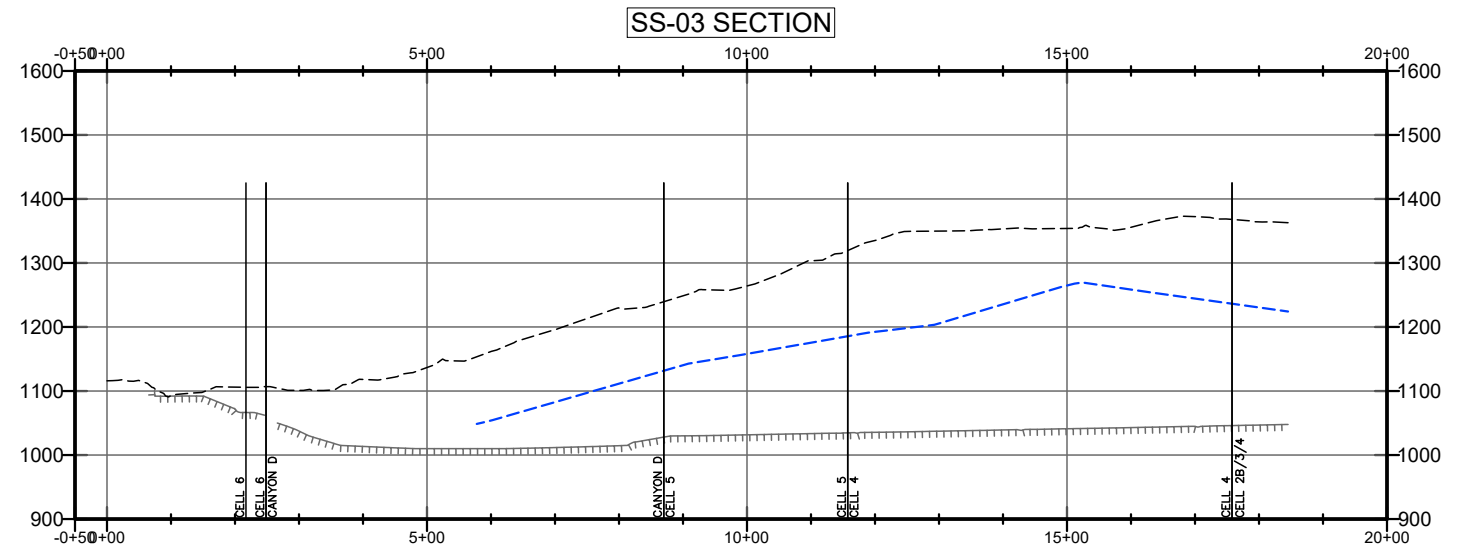
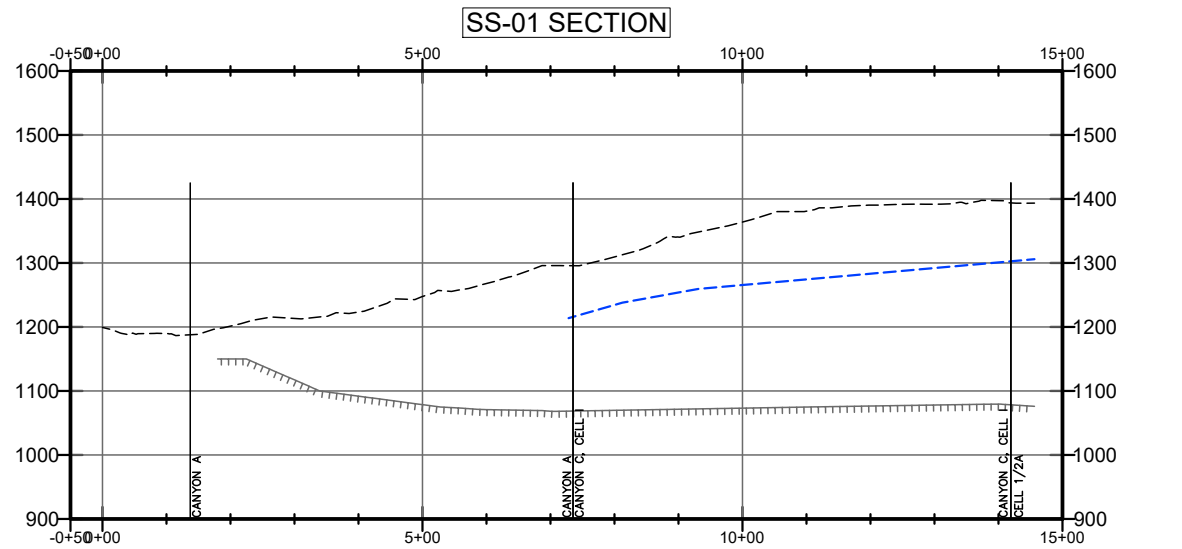
CROSS SECTIONS
COMPREHENSIVE STABILITY ANALYSES
CHIQUITA CANYON LANDFILL
CASTAIC, CA

Geo-Logic
ASSOCIATES

REFERENCE AERIAL TOPO BASED ON JULY 1, 2026 AERIAL SURVEY PROVIDED BY PROPELLER

DRAWN BY:LP/RM DATE: SEPTEMBER 2026 JOB NO.: RM22.1077.00

P:\SITES\CHIQUITA CYN LF\WEST SLOPE EXCAV\FIGURES\1026.1002-CCL-WEST SLOPE-FIG 4_6-(2026-09-01).DWG September 4, 2026 - 12:53 PM BY: GLA-USER



LEGEND:

- SUBGRADE
- TOPO 2026-07-01
- LEACHATE LIQUID LEVEL 2026-06-01

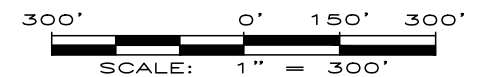


FIGURE 5

CROSS SECTIONS

COMPREHENSIVE STABILITY ANALYSES

CHIQUITA CANYON LANDFILL

CASTAIC, CA

Geo-Logic
ASSOCIATES

REFERENCE AERIAL TOPO BASED ON JULY 1, 2026 AERIAL SURVEY PROVIDED BY PROPELLER

DRAWN BY: LP/RM DATE: SEPTEMBER 2026 JOB NO.: RM22.1077.00

Appendix A
REVISED WORK PLAN AND CORRESPONDENCE

Appendix A-1
MARCH 13, 2025 REVISED COMPREHENSIVE GLOBAL STABILITY STUDY
WORK PLAN



March 13, 2026

Mr. Dylan Smith
Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California 91384

**REVISED COMPREHENSIVE GLOBAL STABILITY STUDY WORK PLAN
CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

Dear Mr. Smith:

This Revised Comprehensive Global Stability Study Work Plan (Revised Work Plan) was prepared by Geo-Logic Associates, Inc. (GLA) to address the February 23, 2026 Department of Toxic Substances Control (DTSC) comments on the December 17, 2025 Comprehensive Global Stability Work Plan (Work Plan). The Revised Work Plan also addresses Work Plan comments from the California Department of Resources Recycling and Recovery (CalRecycle) and the County of Los Angeles Department of Public Health, acting as the Local Enforcement Agency (LEA).

ORIGINAL WORK PLAN

The December 2025 Work Plan was prepared by GLA to describe the means and methods to address the DTSC October 15, 2025 directive that Chiquita Canyon, LLC (Chiquita) complete an analysis of “*global slope stability modeling[sic] identifying which slopes are most likely to be vulnerable to instability from the SET event and the criteria used for the analysis,*” including “*an analysis of global slope stability that is inclusive of the recent placement of Tank Farm 13 at the toe of the CCL main canyon slope in Cell 8B (on top of existing waste that can be consumed by the SET event), and when the Tank Farm 13 is no longer located in Cell 8B, how this will affect slope stability.*” The DTSC directive was apparently informed by CalRecycle’s slope stability work plan recommendation in its September 12, 2025 letter to DTSC that states:

The CCL should complete a comprehensive global stability study for areas where critical infrastructure is located (e.g., temporary Tank Farm 13 located in Cell 8B) assuming the reaction encompasses the entire waste management unit. The CCL’s consultant GLA, in a presentation to USEPA in 2024, indicating that if the reaction expanded to the interface of Module

4/5, certain slope stability factors start dropping below the acceptable factor of safety.¹

The purpose of the December 2025 Work Plan was to address the DTSC requirement to complete static and seismic stability analyses of global stability that is inclusive of the Tank Farm 13 area and the CalRecycle recommendation to address areas where critical infrastructure is located. As described in more detail in the Work Plan, the analyses would be based on GLA's understanding of previous and current site conditions, site observations, available site data, and previous stability analyses performed for different phases of construction at the Chiquita Canyon Landfill (the Landfill). The analyses would also address stability of existing alternatives and alternatives that may be proposed in response to DTSC's October 15, 2025 letter.

DTSC REQUIREMENTS

On February 23, 2026, DTSC provided "*comments and recommendations to be incorporated into a revised comprehensive global stability study work plan for DTSC approval.*" The DTSC correspondence attached a CalRecycle letter that included additional comments and recommendations and DTSC noted "*All these comments must be addressed in order for DTSC to approve the work plan.*" On March 6, 2026, Chiquita received additional comments on the Work Plan from the LEA that are identical to the CalRecycle comments. The DTSC and CalRecycle/LEA comments are incorporated in this Revised Work Plan. To provide additional context, the DTSC and CalRecycle/LEA comments are identified verbatim in Attachment 1 in *italics*, with GLA's response immediately below.

PURPOSE OF REVISED WORK PLAN

The purpose of the Revised Work Plan is to address the DTSC requirement to complete static and seismic stability analyses of global stability that is inclusive of the Tank Farm 13 area and the CalRecycle recommendation to address areas where critical infrastructure is located. In accordance with the CalRecycle comments (see Attachment 1), the Revised Work Plan adds an assessment of the eastern Landfill slopes in addition to the northern, western, southern, and Tank Farm 13 slopes. The analyses will also

¹ As described in Chiquita's November 21, 2025 response to DTSC's October 15, 2025 correspondence, CalRecycle's comment did not accurately represent the information presented in the October 2024 presentation to the USEPA. CalRecycle also apparently did not consider information in the December 9, 2024 GLA "Information to Address Regulatory Agency Western and Southern Slope Stability Evaluation Comments" report that presented analyses using considerably more information than the analyses that were discussed at the October 2024 meeting. These analyses extended the reaction area to the boundary of Module 4 and Module 5, and the results showed acceptable static safety factors and seismic displacements for all conditions that were analyzed.

address stability of existing alternatives and alternatives that may be proposed in response to DTSC's October 15, 2025 letter.

DATA SOURCES

The analyses will be based on GLA's understanding of previous and current site conditions, site observations, available site data, and previous stability analyses performed for different phases of construction at the landfill. This information includes site-specific landfill design, constructing, and testing information; published information regarding municipal solid waste (MSW) shear strength; published information regarding liner component shear strength; published relevant case histories, relevant geologic and seismologic information; and site-specific data that has included:

- Site topographic maps.

- The results of surface crack and fissure mapping performed at the site.

- Leachate removal information.

- Leachate level measurements.

- LFG monitoring well boring logs.

- LFG monitoring well pressure data.

- Temperature probe data.

- Relevant observations from regular site surveys, special site surveys by GLA staff, construction observations, and other similar sources site construction.

- Landfill containment system information including material property data for the different materials.

These data sources are referenced, and relevant site-specific data are included in the following reports:

- GLA (2024a) West and North Slope Stability Analyses; February 2024.

- GLA (2024b) West and North Slope Stability Analysis (DRAFT); March 2024.

- GLA (2024c) Evaluation of Los Angeles Regional Water Quality Control Board Denial of Cell 8B Final Construction Quality Assurance Report; June 2024.

- GLA (2024d) Master Development Plan Stability Analyses; August 2024.

- GLA (2024e) Information to Address Regulatory Agency Western and Southern Slope Stability Evaluation Comments; December 2024.

A consolidated reference list for these reports follows the detailed response to comments in Attachment 1. As a general practice, each successive analysis has incorporated newly available site data and any additional published information considered relevant to the analyses being performed. Potentially applicable published information identified by DTSC and/or CalRecycle/LEA will be reviewed and incorporated, as appropriate. This information will include, but not be limited to:

Ghazizadeh, S., and Bareither, C.A. (2020), "Temperature Effects of Internal Shear Behavior in Reinforced GCLs.", *J. Geotech. Geoenviron. Engrg.*, ASCE, 146(1), 14 pp.

Stark, T.D., N. Huvaj-Sarihan, and G. Li, "Shear Strength of Municipal Solid Waste for Stability Analyses," *Environmental Geology J.*, Springer Pub., <http://dx.doi.org/10.1007/s00254-008-1480-0>, 57(8), 2009, 1911-1923.

Additional information not identified by DTSC or CalRecycle/LEA that will be reviewed includes, but is not limited to:

Akpinar, M.V., and Benson, C.H. (2005). *Effect of temperature on shear strength of two geosynthetic clay liner interfaces*. *Geotextiles and Geomembranes*, 23(6), 443–463.

Karademir, T. (2011). *Elevated temperature effects on interface shear strength of geosynthetics*. Ph.D. Dissertation, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, Georgia.

Karademir, T., and Stark, T.D. (2014). *Elevated temperature effects on geosynthetic interface shear strength*. *Proceedings, 10th International Conference on Geosynthetics*, Berlin, Germany.

Rowe, R.K., and Rimal, S. (2012). *Time and temperature effects on geomembrane strain from gravel indentations*. *Canadian Geotechnical Journal*, 49(12), 1417–1430.

Koerner, R.M. (2012). *Designing with Geosynthetics*, 6th Edition. Xlibris Publishing, Bloomington, Indiana.

Hsuan, Y.G., Koerner, R.M., and Lord, A.E. (2008). *Temperature effects on the mechanical behavior of high-density polyethylene geomembranes*. *Geosynthetics International*, 15(6), 376–387.

In GLA's opinion, the available site-specific data, supplemented by relevant peer-reviewed studies and published technical literature, provide an adequate technical basis for comprehensive global stability evaluations. Should the analyses identify any data gaps that could materially influence the evaluation, those gaps will be identified

and discussed in the stability analysis report, along with any recommended additional data collection or evaluation.

METHODS OF ANALYSIS

Basis of Analysis

Stability analyses will be based on parameter sets that are realistic, internally consistent, and supported by observed site conditions and accepted engineering principles. Parameters will not be selected in isolation or adjusted solely to satisfy prescriptive or outcome-driven expectations. Internal consistency is essential: if one assumption is adopted, the implications of that assumption must also be carried through the analysis. Selective or isolated conservatism that is not physically consistent with other adopted parameters does not provide meaningful insight into system behavior and will therefore be avoided.

In this context, GLA will evaluate the CalRecycle recommendation for GLA to assume that the reaction encompasses the entire waste management unit. Based on available site data, field observations, and operational history, there is no credible evidence indicating that this condition is present or reasonably likely to occur. Nonetheless, supplemental analyses will be performed that explicitly consider this specified condition. The significance of these results will be evaluated relative to observed site behavior, site history, and the internal consistency of the adopted assumptions. Where outcomes differ materially from analyses based on realistic, site-supported parameters, those differences will be clearly identified and attributed to the controlling assumptions rather than hypothetical conditions that are not reasonably foreseeable.

Analytical Methods

Static safety factors and yield accelerations will be calculated using the Morgenstern and Price (1965) limit equilibrium method as implemented by the computer program SLIDE2.² The Morgenstern-Price method satisfies force and moment equilibrium and the interslice function that returns the lowest static safety factor will be used for the analyses.³ The yield acceleration is the horizontal seismic load that results in a safety factor of 1 for the slope being analyzed. Search routines that span the entire potential sliding surface being analyzed will be used to identify the surface(s) with the lowest static

² Morgenstern, N.R. and V.E. Price, 1965, The Analysis of the Stability of General Slip Surfaces; *Geotechnique*, Volume 15, Issue 1, March 1965, pp. 79-93.

³ As discussed during the October 23, 2024 meeting referenced in footnote 1, sensitivity analyses show that the difference between safety factors calculated using the four different Morgenstern-Price interslice functions result in a maximum differential of 0.02, which is insignificant within the context of these evaluations.

safety factor. Both circular and non-circular sliding surfaces will be considered, although previous analyses have shown that non-circular surfaces have relatively lower safety factors.

Consistent with previous analyses, seismic displacements will be calculated based on a deterministic assessment of the magnitudes and bedrock spectral accelerations associated with maximum credible earthquakes (MCEs) on Holocene-active faults within 100 km of the landfill. Consistent with the December GLA report, the deformations will be calculated using the MCEs and bedrock accelerations on the Holser, San Gabriel, and San Andreas faults. Potential displacements associated with the Newport-Inglewood fault will also be considered to address the CalRecycle and LEA comments.

Previous displacement analyses used the Bray and Travasarou (2007) procedure because it is widely used in California and is generally considered a standard-of-practice approach for estimating earthquake-induced slope displacements in geotechnical engineering applications, including landfill stability evaluations. Although Bray and Macedo (2019) represents a more recent refinement of the Newmark-type displacement procedure, it has not yet been adopted as a universal standard of practice within the profession. Nevertheless, in the interest of addressing the DTSC comment and providing additional context for comparison, GLA will perform supplemental displacement estimates using the Bray and Macedo (2019) procedure and compare those results with the Bray and Travasarou (2007) analyses.

Material Properties for Analysis

The following material properties that were previously used in the GLA December 9, 2024 “Information to Address Regulatory Agency Western and Southern Slope Stability Evaluation Comments” report will be used for the analyses:

Degraded Municipal Solid Waste (MSW) Shear Strength. As described in Attachment 1, the December GLA (2024e) report incorporated degraded municipal solid waste (MSW) shear strength parameters explicitly recommended by Dr. Timothy Stark, who was retained by the regulatory agencies as their technical expert.⁴ GLA therefore assumes that DTSC accepts these parameters for use in the Comprehensive Global Stability analyses. The Stark-recommended degraded shear strength profile is shown in Attachment 1.

⁴ Stark, Timothy D., 2024, Review Comments on May 7, 2024 GLA Report on West and North Slope Stability Analysis Update for Chiquita Canyon Landfill; memorandum to Weston Solutions, July 7, 2024. Although this memorandum is dated July 7, 2024, CalRecycle indicates it did not receive the report until August 21. CalRecycle transmitted the memorandum to the Los Angeles County Department of Public Health on September 4, 2024 and it was not provided to GLA for review until after this date.

Displaced Unaffected (or Non-Degraded) MSW Shear Strength. The July 7, 2024 Stark Memo provided a recommended bilinear strength envelope for displaced, non-degraded MSW. This recommendation was adopted for the December GLA (2024e) report and will be carried forward for use as applicable in the Comprehensive Global Stability analyses.

In-Place and Unaffected (or Non-Degraded) MSW Shear Strength. The Kavazanjian et al. (2013) MSW shear strength will be assumed for MSW outside of the reaction area that has not been affected by movement.⁵ As described in more detail in Attachment 1, the shear strength envelope presented in Kavazanjian et al. (2013) was not developed solely from data obtained at the Operating Industries, Inc. (OII) Landfill. Although the OII investigation provided one of the most comprehensive datasets of large-scale MSW shear testing and is therefore frequently cited, the recommended strength relationships presented in the paper were developed through consideration of a broader body of information. Kavazanjian et al. (2013) synthesize results from multiple published MSW shear strength studies, including laboratory and field testing programs and back-analyses of landfill slope performance reported in the literature (e.g., Singh and Murphy, 1990; Landva and Clark, 1990; Kavazanjian et al., 1995; Stark et al., 2009; Zekkos et al., 2006–2010). Accordingly, the recommended shear strength envelope represents the collective behavior of MSW observed across numerous studies and landfill sites rather than conditions specific to the OII facility.

Liner Shear Strength. The December GLA (2024e) analyses incorporated the residual shear strength parameters for liner systems potentially affected by the reaction and elevated temperatures, as recommended in the July 7, 2024 Stark Memorandum. These recommendations will be implemented in the evaluations described in this Revised Work Plan. For liner systems not affected by the reaction and elevated temperatures, large-displacement shear strengths will be used. Where site-specific laboratory test data are not available, liner shear strength parameters will be assessed using information from the published literature referenced previously in this Revised Work Plan and in Attachment 1.

Leachate and Landfill Gas Pressures

Leachate and landfill gas (LFG) pressures within municipal solid waste landfills are inherently laterally and vertically discontinuous due to heterogeneous waste placement,

⁵ Kavazanjian, E., Matasovic, N. and R.C. Bachus, 2013, 11TH Peck Lecture: Predesign Geotechnical Investigation for the OII Superfund Site Landfill; Journal of Geotechnical and Geoenvironmental Engineering, ASCE, November 2013.

intermittent low-permeability layers, preferential flow paths, and active gas extraction. Accordingly, stability analyses necessarily rely on simplified, representative pressure surfaces that are intended to reasonably bound site conditions rather than replicate localized, transient features.

Previous stability evaluations for the landfill have incorporated both leachate levels and LFG pressures in the stability analyses, and sensitivity analyses have been performed to evaluate the potential effects of variations in these pressures on calculated factors of safety and estimated displacements. The same analytical approach will be used in the current evaluation. Representative leachate elevations and LFG pressures will be developed based on available monitoring data and relevant field observations, and sensitivity analyses will be performed to evaluate conditions reflecting historically observed maximum leachate levels and LFG pressures, as appropriate. Stability analyses will be performed using the SLIDE2 software package, which includes the capability to explicitly incorporate gas pressures in the stability modeling. Accordingly, the methods used in the current analyses will be consistent with those applied in previous landfill stability evaluations and will address the potential influence of both leachate and LFG pressures on stability conditions.

WORK PLAN COMPONENTS

Data Collection and Review

The objective of this task will be to collect and review site data collected since the last stability evaluations were completed in the fourth quarter of 2024 and to use that information to identify representative cross sections and stability models. Data sources will include (but not be limited to):

- Current site topography based on the most recent (2025) Propeller aerial surveys. Earlier site topography will also be reviewed and incorporated if judged to be relevant to the analyses.

- Any known or anticipated construction-related activities that alter site topography will be considered and incorporated in the analyses.

- The results of surface crack and fissure mapping performed at the site.

- Leachate removal information.

- Leachate level measurements.

- LFG monitoring well boring logs.

- LFG monitoring well pressure data.

Temperature probe data.

Relevant design and construction information for Tank Farm 13.

Landfill containment system information including material property data for the analyses.

Cross Sections, Material Properties, and Pressures

The information will be reviewed, compiled, and used to identify representative cross sections for analysis. Based on current site understanding, one or more east-to-west cross sections will be identified to evaluate stability of the western slopes, one or more west-to-east cross sections will be identified to evaluate stability of the eastern slopes, one or more north-to-south cross sections will be identified to evaluate stability of the northern slopes, and two or more cross sections will be identified to evaluate the southern slope of the landfill, including Tank Farm 13. The section locations will be selected to represent the most critical combinations of slope height, slope inclination, critical infrastructure, material property variation, and pressure conditions. The subsurface materials along each cross section will be evaluated based on the available data and fluid levels incorporated in the analyses will be estimated as summarized above. As part of this task, sequential topographic data, surface fissure and cracking mapping, and site observations regarding leachate seepage will be used to identify zones of previous instability, if any.⁶

Documentation and Recommendations

The results of the analyses will be documented in a report that will summarize the data used for the analyses and the analysis results. Relevant data, site information, and analysis output will be appended to the report. Principal uncertainties associated with the analyses will be identified, and if warranted, the report will include recommendations for additional investigations to assess subsurface MSW properties, fluid levels, internal pressures, and/or short-term stabilization measures. In accordance with CalRecycle and LEA comments, the report will be provided to DTSC in draft form and will not be finalized until DTSC comments are addressed. The final report will be signed and stamped by two licensed GLA professionals.

TIMELINE

An approximate timeline for each of the associated tasks is shown in the attached schedule. This schedule assumes a four-week DTSC Work Plan review and approval

⁶ If reasonably well-characterized, zones of instability or previous sliding, if any, can be used with other site information to assess subsurface stratigraphy and possible zones of degraded MSW, the distribution of subsurface fluids, and to back-calculate shear strengths.

period. The schedule also includes a four-week DTSC Draft Report review and comment period. Shorter or longer review, approval, and comment periods will shift the report submittal date accordingly. This timeline is approximate and may change based on other factors or unanticipated circumstances.

Please contact the undersigned at (415) 699-8073 if you have questions or need additional information.

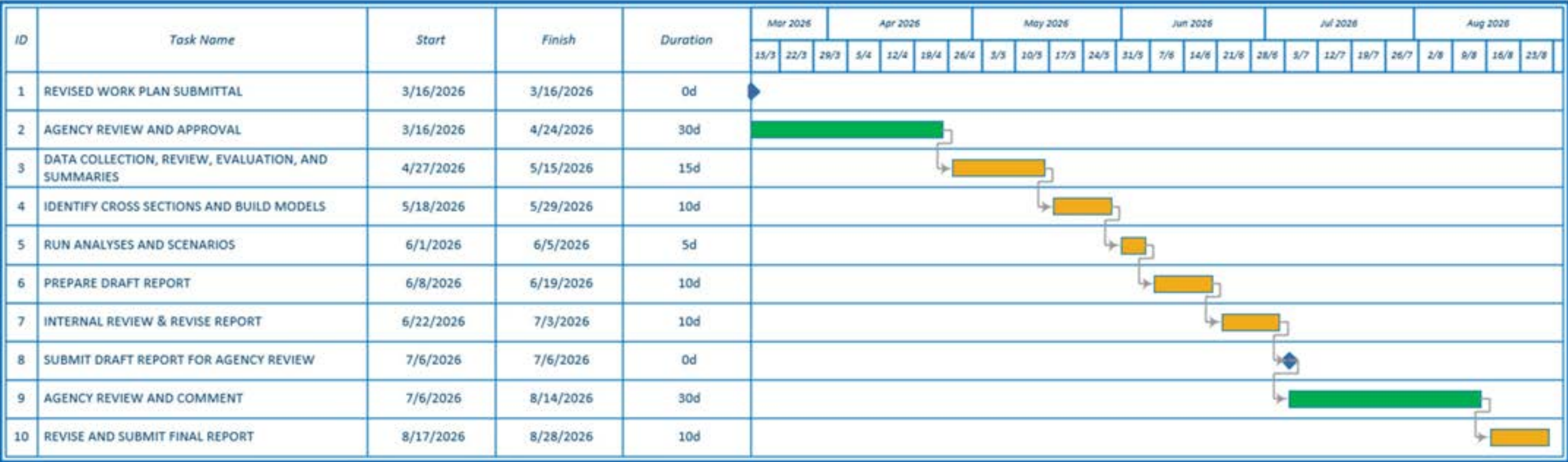
Very truly yours,

Geo-Logic Associates, Inc.



Richard A. Mitchell, PG, CEG
Principal Engineering Geologist





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DTSC FEBRUARY 23, 2026 COMMENTS

General Comments

1. Estimate Reduced Shear Strength of Municipal Solid Waste (MSW) due to SET Event:
Include estimated Post-SET MSW shear strength properties for analysis profiles slices that intersect areas of documented SET effects at high temperature. Respondents shall provide MSW shear strength parameters that are representative of conditions near the end of/following an SET event from either (1) site-specific MSW sampling and shear strength testing from CCL; (2) technical references; or (3) other proposed parameters approved by DTSC.

All GLA stability analyses performed in 2024 to assess the western and southern slopes of the landfill incorporated reduced shear strengths for degraded MSW potentially affected by the reaction. These reports include:

GLA (2024a) West and North Slope Stability Analyses; February 2024.

GLA (2024b) West and North Slope Stability Analysis (DRAFT); March 2024.

GLA (2024c) Evaluation of Los Angeles Regional Water Quality Control Board Denial of Cell 8B Final Construction Quality Assurance Report; June 2024.

GLA (2024d) Master Development Plan Stability Analyses; August 2024.

GLA (2024e) Information to Address Regulatory Agency Western and Southern Slope Stability Evaluation Comments; December 2024.

Prior to the December GLA (2024e) report, the shear strength of degraded municipal solid waste (MSW) was based on published literature values. The December GLA report incorporated degraded MSW shear strength parameters explicitly recommended by Dr. Timothy Stark. Dr. Stark was retained by the regulatory agencies as their technical expert, and his recommendations regarding degraded MSW shear strength parameters were therefore incorporated into the analyses. Figure 4 from the December GLA report is included with this attachment and illustrates both the degraded MSW profile assumed in the earlier GLA analyses (GLA 2024a, 2024b, 2024c, and 2024d) and the Stark-recommended degraded MSW profile used in the December analyses. Use of the Dr. Stark-recommended profile was identified in the original Work Plan and is retained in the Revised Work Plan. GLA therefore assumes that DTSC accepts these parameters for use in the analyses.

2. SET Event Effects on Liner Geotextile, Geomembrane, and Geosynthetic Clay Liner (GCL) Interface Shear Strength: *When considering analysis profiles slices that*

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intersect areas of documented SET event effects with high temperatures, evaluate the potential adverse thermal effect on shear strength properties of geotextiles and geomembranes (e.g., degradation of peak strength of GCLs). DTSC notes that at some locations, the high or highest SET-event-induced MSW temperatures are at the greatest depths of the probe array and are at much higher temperatures. DTSC notes at select temperature monitoring probe (TP) locations (based on readings from CCL temperature probes in SCS RMC® on January 8, 2026), the deepest temperature readings are the highest, and exceed 200° Fahrenheit (F), including TP-03 at 232°F, TP-09 at 207°F, TP-21 at 253°F, and TP-25 at 202°F.

The Workplan should provide technical literature references, or information from product manufacturers that estimate the shear strength properties of side-slope bottom liner interfaces during or following an exposure to the estimated elevated MSW, leachate and landfill gas temperatures typical of the CCL SET event. And, based on technical literature and product vendor data, whether additional adverse, accelerated chemical effects on geotextiles/geomembranes/GCL may occur from contact with leachate or landfill gas at elevated SET temperatures. Also, evaluate whether higher SET-related temperatures warrant “de-rating” of the peak and residual interface shear strength estimated for floor and side slope bottom liners, respectively. If so, apply these “de-rated” shear strength liner interface properties to the stability analysis.

Available technical literature indicates that the GCL internal shear strength typically exceeds its interface strength. However, at higher temperatures (e.g., from a SET event), some GCLs exhibit reduced internal shear strength.¹ For those areas of CCL with side-slope GCL bottom liners, CCL should evaluate the likelihood of whether the estimated elevated MSW/leachate temperatures at depth - associated with the CCL SET event - might reduce the GCL bottom liner’s internal shear strength such that the GCL internal shear strength becomes weaker than the GCL interface shear strength. If so, include a GCL residual internal shear strength (“de-rated” for SET-induced higher temperature of GCL) in the stability analysis.

Potential effects of elevated temperatures on the shear strengths of geosynthetic materials underlying the landfill have been considered in previous analyses (see, for example, the GLA December 2024e report addressing western and southern slope stability). These potential effects will continue to be evaluated based on information available in the published technical literature and data obtained from existing temperature monitoring probes. The evaluation will consider the magnitude of the heat source and the proximity of elevated

¹ Ghazizadeh, S., and Bareither, C A. (2020), “Temperature Effects of Internal Shear Behavior in Reinforced GCLs.”, *J. Geotech. Geoenviron. Engrg.*, ASCE, 146(1), 14 pp.

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temperatures to the nearest side slope or base liner system to determine whether temperature-related reductions in geosynthetic shear strength are warranted. In addition to the GCL reference identified by DTSC, other technical resources that will be considered include, but are not limited to:

Akpınar, M.V., and Benson, C.H. (2005). *Effect of temperature on shear strength of two geosynthetic clay liner interfaces*. Geotextiles and Geomembranes, 23(6), 443–463.

Karademir, T. (2011). *Elevated temperature effects on interface shear strength of geosynthetics*. Ph.D. Dissertation, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, Georgia.

Karademir, T., and Stark, T.D. (2014). *Elevated temperature effects on geosynthetic interface shear strength*. Proceedings, 10th International Conference on Geosynthetics, Berlin, Germany.

Rowe, R.K., and Rimal, S. (2012). *Time and temperature effects on geomembrane strain from gravel indentations*. Canadian Geotechnical Journal, 49(12), 1417–1430.

Koerner, R.M. (2012). *Designing with Geosynthetics*, 6th Edition. Xlibris Publishing, Bloomington, Indiana.

Hsuan, Y.G., Koerner, R.M., and Lord, A.E. (2008). *Temperature effects on the mechanical behavior of high-density polyethylene geomembranes*. Geosynthetics International, 15(6), 376–387.

3. Account for New Soil Surcharge Loads: *The Workplan must propose evaluating the degree of estimated settlement that typically occurs at an MSW and that which will occur as a result of the SET event in the study. Also, the Workplan must propose evaluating where new soil surcharge placement is estimated to be needed to reestablish grades for positive drainage, and that the study will account for these new estimated soil surcharge loads on the applicable stability profiles.*

The Revised Work Plan does not include evaluation of additional soil surcharge loads because no soil surcharge placement is currently planned or contemplated. The stability analyses will evaluate existing conditions and anticipated landfill configurations based on currently available grading information. While settlement of municipal solid waste is a well-recognized behavior, the magnitude and spatial distribution of settlement associated with future events cannot be reliably predicted at this stage and there are no design plans indicating that soil will be placed to reestablish grades for drainage. Accordingly, evaluating new soil surcharge loads would require purely hypothetical assumptions regarding both

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settlement magnitude and the location and thickness of potential soil placement. Such assumptions would not meaningfully inform the stability evaluation. Nevertheless, as is common practice in landfill stability analyses, sensitivity evaluations may be performed to illustrate the potential effects of generalized surcharge loading where appropriate.

4. *Account for Displacement of Liner Systems vs. Final Cover: The Work Plan should include displacement analysis and should differentiate, and separately estimate magnitudes of displacement of liner systems, versus displacement of final cover.*

The requested differentiation between displacements of liner systems and final cover is not directly relevant to the evaluation of overall landfill stability addressed in this Revised Work Plan. Because final grading plans have not yet been developed and the final cover system has not yet been selected, a meaningful analysis of final cover stability cannot be performed at this time.

Engineering Comments – ESPO (Peter Gathungu)

1. *Methods of Analysis. Analytical Methods: It is stated in the first sentence in the second paragraph that the Bray and Travasarou (2007) procedure will be used to calculate seismic displacements consistent with previous analyses. DTSC notes that more recent/updated procedures/models, such as Bray & Macedo (2019), are available and may be more appropriate. While consistency with previous analyses may be informative, DTSC requires the use of updated procedures which are based on more robust data. However, Bray and Travasarou (2007) may be used in addition to the updated procedures.*

The Bray and Travasarou (2007) procedure is widely used in California and is generally considered a standard-of-practice approach for estimating earthquake-induced slope displacements in geotechnical engineering applications, including landfill stability evaluations. This method has therefore been the basis for displacement evaluations performed by our firm and many others on similar projects. While Bray and Macedo (2019) represents a more recent refinement of the Newmark-type displacement procedure, it has not yet been adopted as a universal standard of practice within the profession. Selection of appropriate analytical methods is typically an engineering judgment made by the engineer of record based on project conditions and accepted professional practice. Nevertheless, in the interest of addressing the DTSC comment and providing additional context for comparison, we will perform supplemental displacement estimates using the Bray and Macedo (2019) procedure and compare those results with the Bray and Travasarou (2007) analyses.

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2. *Methods of Analysis. Analytical Methods:* It is stated in the first sentence in the second paragraph that maximum credible earthquakes (MCEs) associated with Holocene-active faults with 50 kilometers of the landfill will be used in determination of seismic displacements. MCEs must account for Holocene-active faults within a 100-kilometer radius of the landfill as defined in 22 California Code of Regulations (CCR) Section 66260.10 and 27 CCR Section 20164. The Work Plan must be revised so that the MCE complies with above regulation citations.

The deterministic seismic hazard evaluation focused on seismic sources within approximately 50 km of the site because ground motions at the site are controlled by nearby faults with the highest combinations of magnitude and site peak ground acceleration (PGA). As summarized in previous report tables, the Holser (1.8 km, M6.8, PGA $\approx$ 0.60g), Santa Susana (8.2 km, M6.9, PGA $\approx$ 0.51g), Northridge (7.8 km, M6.9, PGA $\approx$ 0.42g), San Gabriel (6.4 km, M6.4, PGA $\approx$ 0.37g), and Southern San Andreas (32 km, M8.2, PGA $\approx$ 0.19g) faults dominate the ground motion estimates because they produce the largest expected shaking at the site. Faults located at greater distances generally produce substantially lower spectral accelerations due to attenuation of seismic waves with distance and therefore do not meaningfully influence the controlling deterministic ground motions. Nevertheless, in response to the DTSC comment, additional regional faults within 100 km of the site will be identified and reviewed to confirm that they do not control the deterministic hazard for the site.

3. *Methods of Analysis. Material Properties for Analysis:* It is stated in the third bullet - In-Place and Unaffected (or Non-Degraded) MSW Shear Strength - that “[t]he Kavazanjian et al. (2013) MSW shear strength will be assumed for MSW outside of the reaction area that has not been affected by movement”. The Kavazanjian et al. (2013) MSW (municipal solid waste) shear strength is based on investigation at the Operating Industries, Inc. (OII) Superfund Site Landfill where landfill operations occurred from 1948 to 1984 and as such the nature of MSW at OII may not be representative of MSW at CCL as the types of waste placed in landfills are expected to vary over time. The Work Plan must be revised to discuss the representativeness of OII data for use at CCL.

The shear strength envelope presented by Kavazanjian et al. (2013) in the Rankine Lecture/Peck Lecture paper was not developed solely from data obtained at the Operating Industries, Inc. (OII) Landfill. While the OII site investigation provided an extensive and well-documented dataset of large-scale direct shear tests and waste characterization that contributed meaningfully to the understanding of MSW shear strength behavior, the recommended shear strength relationships presented in Kavazanjian et al. (2013) were

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developed through consideration of a much broader body of information. The paper synthesizes results from multiple published MSW testing programs, including laboratory and field shear tests reported in the technical literature, as well as back-analyses of landfill slope performance and failures documented in prior studies. These datasets include, among others, the MSW shear strength work reported by Singh and Murphy (1990), Landva and Clark (1990), Kavazanjian et al. (1995), Stark et al. (2009), and Zekkios et al. (2006–2010). The recommended envelope is therefore intended to represent the collective behavior of MSW observed across numerous landfills and studies rather than conditions unique to the OII facility. The OII testing program is frequently cited because it represents one of the most comprehensive field-based MSW shear strength datasets available; however, the strength relationships presented in Kavazanjian et al. (2013) reflect a synthesis of multiple independent datasets and case histories and have been widely adopted in the geotechnical literature and engineering practice as representative of typical MSW shear strength behavior. The Revised Work Plan includes this discussion.

4. *Methods of Analysis - Leachate and Landfill Gas [LFG] Pressures: It is stated in this section that the most recent leachate elevation data, and LFG pressures estimated based on relevant field observations will be used in the analyzed cross sections. DTSC requires that sensitivity analysis includes the use of past observed highest/maximum leachate levels and gas pressures, given the varying conditions, spatial and temporal, that are likely to be encountered at the landfill. In addition, the analysis methods, including software, used for stability evaluation must have the capability to accommodate gas pressures.*

Previous stability evaluations for the landfill have incorporated both leachate levels and LFG pressures in the stability analyses, and sensitivity analyses have been performed to evaluate the potential effects of variations in these pressures on calculated factors of safety and estimated displacements. The same analytical approach will be used in the current evaluation. Representative leachate elevations and LFG pressures will be developed based on monitoring data and relevant field observations, and sensitivity analyses will be performed to evaluate conditions reflecting historically observed maximum leachate levels and LFG pressures, as appropriate. Stability analyses will be performed using the SLIDE2 software package, which includes the capability to explicitly incorporate gas pressures in the stability modeling. Accordingly, the methods used in the current analyses will be consistent with those applied in previous landfill stability evaluations and will address the potential influence of both leachate and LFG pressures on stability conditions.

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5. *Work Plan Components - Data Collection and Review: The objective of the data collection task is stated to be review of site data collected since the last stability evaluations were completed in the fourth quarter of 2024. We recommend the Work Plan be revised to include discussion of site data collected prior to the stability evaluations completed in the fourth quarter of 2024, including site data used in landfill design and the approved closure plan or site closure documents, if available, as well as the adequacy of that site data.*

This information has been included by reference in all previous stability reports, and a comprehensive list of previous references is included at the end of this attachment. The adequacy of the data is addressed in the Revised Work Plan.

6. *Work Plan Components - Data Collection and Review: The first bullet in this section states that current (2025) and earlier site topography will be reviewed and incorporated in the site data used for slope stability evaluations. DTSC requires that any known or anticipated construction-related activities, including known or anticipated construction-related activities that alter site topography, are also considered and incorporated into a revised work plan.*

Any known or anticipated construction-related activities that alter site topography will be considered and incorporated as described in the Revised Work Plan.

7. *Work Plan Components - Documentation and Recommendations: The text states that if warranted, recommendations for additional investigations for the assessment of subsurface MSW properties, fluid levels, internal pressures, and/or short-term stabilization measures will be included in the global slope stability report. The additional investigations to assess MSW properties, fluid levels, and internal pressures are likely to take an extended period. DTSC recommends the currently available data is reviewed and validated to determine if it is adequate to complete the global slope stability evaluation. If the available data is determined to be inadequate and therefore additional investigations are warranted, CCL must commence planning and implementation of the additional investigations.*

This recommendation is acknowledged.

CALRECYCLE JANUARY 9, 2026 AND LEA MARCH 6, 2026 COMMENTS

General Comments

1. *The purpose of this global stability study is to provide a detailed stability analysis of the current SET Event and to identify potential issues should it continue to expand. Because CCL has elected not to construct any containment barrier(s) to prevent additional expansion of the SET Event and has placed critical environmental infrastructure (i.e., the temporary leachate storage and treatment system) at the toe*

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of the slope in Canyon D, Cell 6, and Cell 8, the CCL shall locate the critical cross-section for each slope and determine if the slope will be stable based on both static and seismic forces.

The preliminary cross sections identified in the Work Plan address this comment. As described in the Revised Work Plan, additional cross sections will be considered and/or the existing cross sections may be relocated based on information developed during the data review portion of the analysis.

- 2. Stability analyses shall be based on accepted engineering practice, information gathered from academic and/or industry publications, and realistic past case studies, such as the Countywide and Bridgeton Landfills, that account for actual field conditions.*

All previous analyses have addressed this comment. The analyses performed for this investigation will continue to consider all relevant information.

- 3. The CCL is using a containment strategy (i.e., removing heat via typical gas extraction wells) that has not been effective at other SET Events. Current data from CCL demonstrate that the SET Event is expanding outside CCL's Data-Driven Reaction Boundary identified in September and December of 2025, and there is no barrier to contain it within the currently identified boundary. Once the entire facility is covered with a geomembrane, field observations of cracks and fissures indicative of slope instability will no longer be possible. As a result, CCL must use slope stability analyses to identify locations where, if specific slope instability metrics are observed, CCL could implement countermeasures, such as an earthen slope buttress or pressure relief system, to stabilize the waste mass so a slope failure similar to one that occurred on the western slope does not occur.*

The statements regarding the effectiveness of containment strategies, the potential expansion of the SET event, and the need for potential future countermeasures represent regulatory observations and operational considerations rather than elements of the analytical methodology. Because this work plan is intended to describe the technical approach, data sources, and analytical methods that will be used to evaluate slope stability, inclusion of these broader operational or policy considerations is outside the scope of the work plan. The results of the stability analyses will, however, provide information that can be used to evaluate and support potential mitigation measures should such actions be required.

General Comments

- 1. Page 3. Include the Newport-Inglewood Fault in the analysis.*

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The Newport-Inglewood fault was identified and considered in all previous GLA analyses (see the seismic hazard table included with this attachment). This fault is 49 km from the landfill and has a moment magnitude of 7.50. However, due to its distance from the site, the resultant site ground motions associated with an earthquake on this fault are small (the site PGA associated with the MCE is only 0.094g). Therefore, this fault is less critical than the closer faults. However, if CalRecycle and the LEA believe it necessary, displacements associated with rupture of the Newport-Inglewood fault can be performed.

2. *Page 4 – In-Place and Unaffected Municipal Solid Waste (MSW) Shear Strength: Include non-degraded MSW strength parameters² in the PLAN. Based on field case histories, this MSW shear strength does not use a cohesion value, which impacts stability at low vertical stresses.*

See the above response to DTSC comments regarding MSW shear strength and the text in the Revised Work Plan.

3. *Page 4 - Liner Shear Strength: Apply residual interface strength to all side slope bottom liner interfaces.*

See the above response to DTSC comments regarding residual shear strength and the text in the Revised Work Plan.

4. *Page 4 and 5 - Leachate and Landfill Gas Pressures: Replicate localized and transient features that are likely to cause slope instability during a SET Event, similar to what occurred in the western slope area. These localized, transient, and high liquid and gas pressures should be used, and, where data are unavailable, gas pressure should be determined using the ideal gas law and measured temperatures.*

Leachate and LFG pressures will be evaluated as described in the responses to the DTSC comments and in the Revised Work Plan. Use of the ideal gas law to estimate landfill gas pressure solely from measured temperature is of limited applicability because pressure is not a function of temperature alone. Application of the ideal gas law requires additional assumptions regarding gas volume and gas mass, both of which are expected to vary within the landfill due to gas generation, migration, extraction, changing waste void space, and liquid/vapor phase interactions. Accordingly, measured field pressures and site observations provide a more reliable basis for evaluating landfill gas pressures.

² Stark, T.D., N. Huvaj-Sarihan, and G. Li, "Shear Strength of Municipal Solid Waste for Stability Analyses," *Environmental Geology J.*, Springer Pub., <http://dx.doi.org/10.1007/s00254-008-1480-0>, 57(8), 2009, 1911-1923.

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5. *Page 5 - Data Collection and Review: Include liquid and gas pressures as data sources. Use an inverse analysis of the west slope failures to estimate gas and liquid pressures to use on the east and south slopes.*

Liquid and LFG pressures will be based on site-specific data to the extent practicable. Implementation of an inverse (back-analysis) approach is not practical under the current conditions because the key inputs required for a meaningful back-calculation are not well defined. Inverse analyses typically rely on identification of a reasonably well-constrained failure surface and reasonably representative pore pressure conditions at the time of failure. In the areas of concern at the site, no clearly defined or continuous failure surface has been identified. In addition, available information indicates that leachate levels and LFG pressures are localized and transient, varying spatially and temporally within the waste mass. Under these conditions, it is not possible to uniquely define the geometry of a potential failure mechanism or the pore pressure distribution required to perform a reliable back-calculation. As a result, an inverse analysis would require numerous assumptions regarding failure surface geometry and localized pressure conditions, which could lead to non-unique or non-representative results. For this reason, forward stability analyses that evaluate a range of plausible pressure conditions and potential failure geometries provide a more technically defensible approach for assessing stability.

6. *Page 5 - Cross Sections, Material Properties, and Pressures: GLA must determine the critical cross-section for both the east and south sides of the landfill. While a general representational cross-section is valuable for comparison purposes, multiple cross-sections should be selected to identify the critical cross-section (i.e., the cross-section that yields the lowest factor of safety and highest seismically induced permanent deformation).*

This comment is incorporated in the Revised Work Plan.

7. *Page 6 - Documentation and Recommendations: GLA should provide a draft report and afterwards present their findings to the DTSC before finalizing the report so comments and changes can be incorporated.*

This comment is incorporated in the Revised Work Plan.

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Table 1
SUMMARY OF HOLOCENE- ACTIVE FAULTS WITHIN 50 KILOMETERS OF THE SITE
Chiquita Canyon Landfill
Castaic, California

FAULT	DISTANCE (km)	MAXIMUM OR CHARACTERISTIC MAGNITUDE (M _w)	EQUALLY WEIGHTED MEDIAN PEAK ACCELERATION (g)	MEDIAN PEAK GROUND ACCELERATION (g)			
				1	2	3	4
Holser	1.8	6.80	0.60	0.630	0.437	0.697	0.626
Santa Susana	8.2	6.90	0.51	0.485	0.443	0.600	0.502
Northridge	7.8	6.90	0.42	0.457	0.399	0.395	0.415
San Gabriel	6.4	7.30	0.37	0.369	0.335	0.391	0.365
Oak Ridge (Connected)	7.8	7.40	0.36	0.355	0.305	0.365	0.405
Oak Ridge (Onshore)	7.8	7.20	0.35	0.346	0.290	0.383	0.380
San Cayetano	10	7.20	0.28	0.275	0.245	0.299	0.309
Simi-Santa Rosa	14	6.90	0.24	0.254	0.231	0.241	0.228
Garlock	49	7.72	0.19	0.216	0.188	0.175	0.184
Southern San Andreas	32	8.20	0.19	0.207	0.184	0.165	0.191
Sierra Madre (Connected)	21	7.30	0.18	0.191	0.159	0.171	0.194
Santa Ynez (Connected)	28	7.40	0.15	0.148	0.147	0.142	0.144
Sierra Madre (San Fernando)	21	6.70	0.13	0.141	0.124	0.143	0.128
Santa Ynez (East)	28	7.20	0.13	0.133	0.137	0.133	0.128
Santa Monica	36	7.40	0.12	0.123	0.115	0.178	0.135
Verdugo	28	6.90	0.11	0.114	0.106	0.117	0.112
Anacapa-Dune	36	7.20	0.11	0.115	0.102	0.104	0.118
Sierra Madre	37	7.20	0.10	0.103	0.095	0.099	0.106
Newport-Inglewood	49	7.50	0.09	0.095	0.090	0.087	0.088
Pitas Point	46	7.30	0.09	0.095	0.082	0.084	0.096
Malibu Creek	42	7.00	0.08	0.080	0.085	0.046	0.073
Ventura-Pitas Point	42	7.00	0.07	0.077	0.069	0.075	0.074
Puente Hills	50	7.00	0.07	0.075	0.066	0.072	0.074
Pleitas	51	7.10	0.07	0.070	0.069	0.071	0.073
Hollywood	42	6.70	0.07	0.065	0.073	0.075	0.058
Mission Ridge-Arroyo Parida-Santa Ana	47	6.90	0.07	0.067	0.066	0.069	0.065
Elysian Park	48	6.70	0.06	0.066	0.057	0.065	0.058

NOTES:

1. Fault distances and MCE magnitudes based on USGS 2008 Seismic Hazard Mapping Program (Field et al., 2008; Petersen et al., 2008). The maximum (or characteristic) magnitude along a fault is estimated by using the mapped surface geology and recorded earthquake location and depth distributions to obtain fault length or area. Using the fault dimensions and, in some cases, estimates of where earthquake ruptures may initiate and terminate (segmentation models), the maximum or characteristic magnitudes are calculated from relationships that are dependent on fault length or area (Ellsworth, 2003).
2. Where applicable, near source directivity average factor calculated using the Abrahamson (2000)-Somerville (1997) method.
3. Attenuation relationships :
 1. Norman A. Abrahamson, Walter J. Silva, and Ronnie Kamai, Summary of the ASK14 Ground Motion Relation for Active Crustal Regions, Earthquake Spectra, Volume 30, No. 3, pages 1025-1055, August 2014.
 2. David M. Boore, Jonathan P. Stewart, Emel Seyhan, and Gail M. Atkinson, NGA-West2 Equations for Predicting PGA, PGV, and 5% Damped PSA for Shallow Crustal Earthquakes, Earthquake Spectra, Volume 30, No. 3, pages 1057-1085, August 2014; © 2014.
 3. Kenneth W. Campbell and Yousef Bozorgnia, NGA-West2 Ground Motion Model for the Average Horizontal Components of PGA, PGV, and 5% Damped Linear Acceleration Response Spectra, Earthquake Spectra, Volume 30, No. 3, pages 1087-1115, August 2014.
 4. Brian S.-J. Chiou and Robert R. Youngs, Update of the Chiou and Youngs NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra, Earthquake Spectra, Volume 30, No. 3, pages 1117-1153, August 2014.

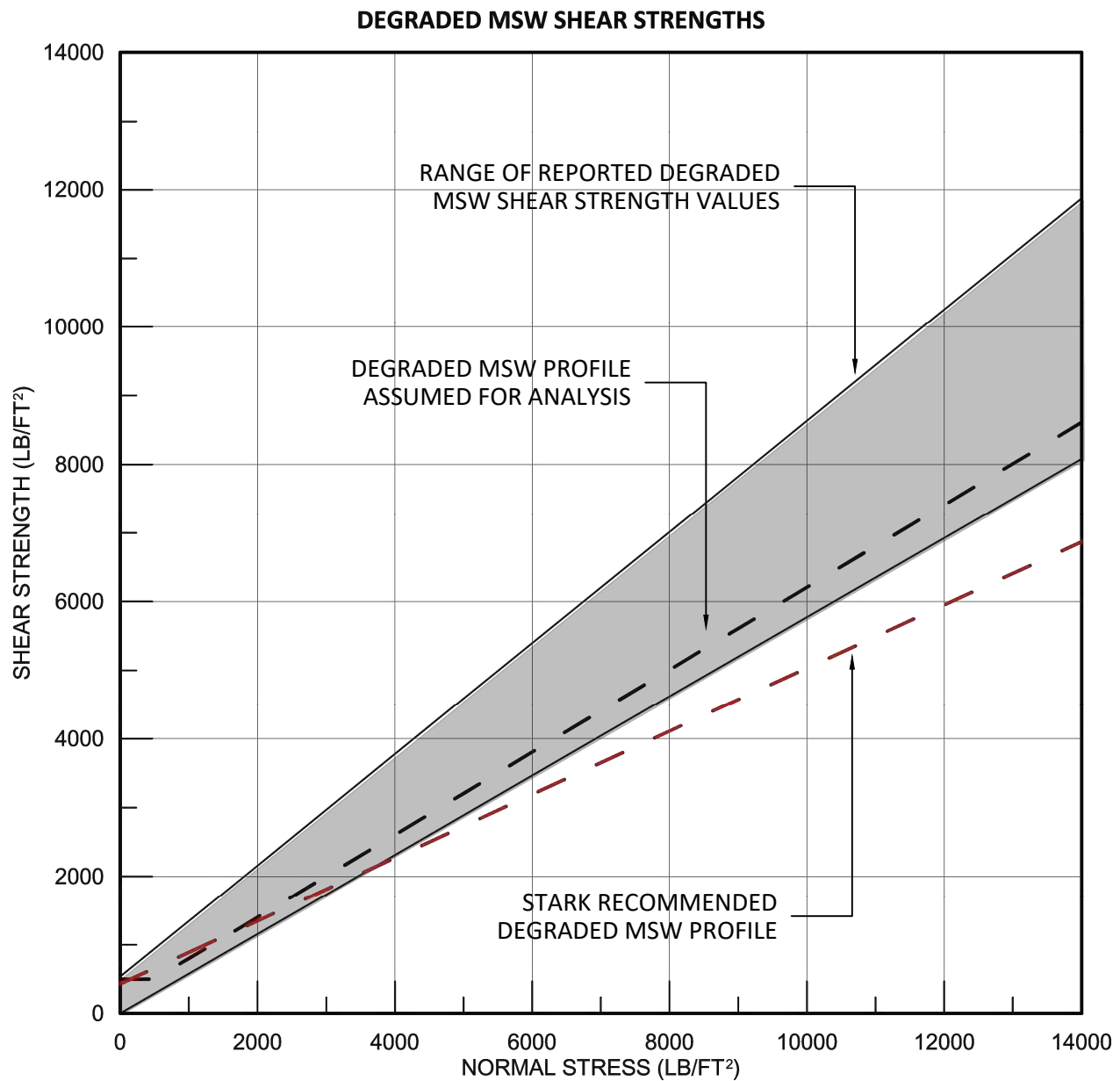


FIGURE 4

REPRESENTATIVE DEGRADED MSW STRENGTH

UPDATED STABILITY EVALUATION
CHIQUITA CANYON LANDFILL
LOS ANGELES COUNTY, CA

Geo-Logic
ASSOCIATES

DRAWN BY: RM | DATE: SEPTEMBER 2024 | JOB NO. RM22.1077

CHIQUITA RESPONSE TO LEA MAY 6, 2026 CORRESPONDENCE



May 20, 2026

Via E-Mail

Eric Morofuji, EHS III
Solid Waste Management Program
Local Enforcement Agency (LEA)
5050 Commerce Drive
Baldwin Park, California 91706
emorofuji@ph.lacounty.gov

Re: Chiquita Canyon, LLC – Response to LEA’s May 6, 2026 Comments on the Revised Comprehensive Global Stability Study Work Plan

Dear Mr. Morofuji:

Chiquita Canyon, LLC (Chiquita) submits this response to the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency (LEA), regarding the LEA’s May 6, 2026 letter commenting on Chiquita’s Comprehensive Global Stability Study Work Plan (the Plan). This response also addresses LEA Comment No. 4, which requests that Chiquita review and submit written responses addressing the comments and technical issues raised in Dr. Timothy Stark’s April 19, 2026 letter. Chiquita provides its responses below.

LEA Comment No. 1: High-Temperature Piezometer Installation. Consistent with CalRecycle’s 2024 guidance, install high temperature piezometers, rated above 450° F, to obtain direct measurements of elevated liquid pressures along the western slope. In addition, install a series of piezometers along the southern and eastern slopes to monitor pore pressure and to assess SET Event progression and slope stability risk.

Chiquita will assess the need for high-temperature piezometer installations following the collection and evaluation of the data for the global slope stability study. If during that data collection and evaluation it is determined there is insufficient liquid pressure data to properly evaluate global slope stability, Chiquita will begin the installation of high-temperature piezometers in discrete areas where additional data is needed to properly evaluate global slope stability.

LEA Comment No. 2: Real-Time Slope Failure Detection System. Implement a real-time slope movement detection system capable of identifying deformation during construction activities and during periods of high-temperature SET Event expansion. This system should ensure timely detection of slope movement due to instability and inform rapid response actions.

Chiquita does not currently have concerns regarding slope movement or instability in the planned

Chiquita Canyon, LLC Response to Dr. Stark's April 19, 2026 Letter

May 20, 2026

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excavation areas. However, as a precautionary measure, Chiquita has begun the procurement process for real time slope movement monitoring devices to be used in areas where slope excavation activities are planned. These devices will be deployed during excavation to monitor for slope movement, enable timely detection of potential deformation or instability, and support rapid response actions, if needed.

LEA Comment No. 3: Continued Leachate and Gas Removal. *Continue the uninterrupted extraction of leachate and landfill gas to reduce pore pressures, limit gas pressure buildup, and lower the risk of additional flow-type failures. Continuous removal shall be maintained to support slope stability and prevent further deformation along the western slope and other areas.*

Elevated temperature landfill (ETLF) events are characterized by the accumulation of heat within the waste mass in excess of heat removal and dissipation capacities. As such, Chiquita's primary strategy to curtail its ETLF event has been to maximize the extraction of leachate and landfill gas to enhance heat removal from the waste mass. Chiquita has continued, and will continue, to remove leachate and landfill gas as expeditiously as practicable and to the best of its ability, despite ongoing constraints outside of Chiquita's control, including the ongoing lack of disposal capacity in Southern California and the rest of North America.¹

Chiquita further maintains that no flow-type failure has occurred at the Landfill. Direct evidence collected from the Landfill continues to refute the occurrence of any type of flow-failure onsite.

LEA Comment No. 4: CCL shall review and submit written responses by May 20, 2026, addressing the comments and technical issues from Dr. Stark's letter dated April 19, 2026. See enclosed letter.

As a preliminary matter, several of Dr. Stark's comments pertain to different reports,² different agency correspondence, and, in some instances, landfills other than the Chiquita Canyon Landfill

¹ In the past two years, Chiquita has contacted over 650 potential disposal facilities and is in constant discussions with disposal outlets about additional capacity and disposal volume. Chiquita continues to search for new potential disposal facilities.

² For example, Dr. Stark writes on page 1 of his letter, "The subject GLA Work Plan was prepared to respond to the March 22, 2024 letter to CCL from the Los Angeles County Department of Public Health in its role as the Local Enforcement Agency (LEA). The LEA letter appended a March 12, 2024 letter from Todd Thalhamer of CalRecycle that included a series of comments and requirements based on his review of the information in the February 2024 Stability Analysis Report (GLA, 2024) that was prepared to address the stability analysis requirements in LEA/CalRecycle November 2023 letters to CCL." Dr. Stark's history of the Plan is incorrect. The Plan identified as the "subject" Plan was initially dated December 17, 2025 and was prepared to address the Department of Toxic Substances Control's (DTSC) October 15, 2025 comments that referenced a Department of Resources Recycling and Recovery (CalRecycle) September 12, 2025 letter to DTSC which contained a recommendation that Chiquita complete a comprehensive global stability study. The Plan was revised on March 13, 2026 in response to DTSC's February 23, 2026 comments, which included comments from CalRecycle dated January 9, 2026. These same CalRecycle comments were later appended to a comment letter from the LEA, dated March 6, 2026. As Dr. Stark correctly states, Mr. Thalhamer's March 12, 2024 comments were associated with a Geo-Logic Associates February 2024 Stability Analysis Report. These comments were addressed in a subsequent work plan and report that itself was updated several times in 2024.

Chiquita Canyon, LLC Response to Dr. Stark's April 19, 2026 Letter

May 20, 2026

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(the Landfill).³ Portions of the review also appear to rely on outdated or unrelated information and do not consistently reflect an understanding of the current site conditions, updated monitoring results, recent topographic evaluations, or the actual scope and purpose of the March 13, 2026 revised Plan.⁴ Nonetheless, Chiquita notes Dr. Stark's comments and will incorporate them, as applicable, into the stability analyses discussed in the Plan.

Chiquita provides the following overarching clarifications:

- Previous and future analyses distinguish, and will continue to distinguish, between areas affected by the reaction and areas interpreted to remain unaffected. Material properties and pressure assumptions have been, and will continue to be, selected based on site-specific conditions and available data.
- Yield acceleration evaluations have been performed, and will continue to be performed, in accordance with standard accepted practice by identifying the critical static failure surface and seismic acceleration that results in a pseudostatic safety factor of 1.0.
- Geo-Logic Associates (GLA) did not use the Kavazanjian et al. (1995) MSW strength model referenced in the review comments but instead used the more recent Kavazanjian et al. (2013) model for non-degraded waste, together with reduced-strength assumptions for degraded waste conditions where appropriate. Degraded waste strength has been, and will continue to be, consistent with Dr. Stark's recommendations.
- Leachate and landfill gas (LFG) pressures will continue to be evaluated using the best available site-specific information, including monitoring data, field observations, and evolving site conditions.
- Multiple cross sections are being evaluated for all landfill slopes, and prior analyses have incorporated conservative assumptions regarding the lateral and vertical continuity of degraded waste zones, elevated pressures, and heterogeneous waste conditions.
- Preliminary buttress stability analyses for the western slope have already been completed and will be refined and incorporated into the Comprehensive Global Stability Study Report as the design advances.

GLA will continue to evaluate its interpretations of the data regarding deformation mechanisms, settlement behavior, and potential instability against newly acquired field observations, survey data, monitoring information, and construction observations. As additional information becomes available, GLA will update its interpretations and analyses accordingly.

³ As another example, Dr. Stark writes on page 2 of his letter, "The landfill site is a former limestone quarry, which began in 1939 and ended in 1988. The quarrying resulted in two quarry pits, the North Quarry Pit and the South Quarry Pit, which were excavated to maximum depth of 240 feet below ground surface (bgs). The north and south quarry portions cover an area of approximately 52 acres. Landfilling began in the North Quarry Pit in 1974 and continued in this area until 1985. In 1985, the landfill underwent expansion to the southwest into the area known as the South Quarry Pit." Dr. Stark's description of the Chiquita Canyon Landfill is incorrect and instead describes a different landfill facility involving former limestone quarry operations and distinct North and South Quarry Pits.

⁴ The inclusion of site history and operational details unrelated to the Chiquita Canyon Landfill raises concerns that portions of the review comments were derived from another document without adequate review of or reconciliation with the Plan. The incorrect regulatory and document history and the misidentification of the landfill facility raise additional concerns regarding the thoroughness and care applied in reviewing the Plan and preparing comments.

2.1 PURPOSE OF REVISED WORK PLAN

Top of Page 3: GLA states: "... address stability of existing alternatives and alternatives that may be proposed in response to DTSC's October 15, 2025 letter"

GLA should address the alternatives for buttressing the west slope to stop the current slope movement/failure, which includes construction of a toe buttress. This analysis should include the factor of safety (FoS), i.e., the level of safety, used to design the buttress.

Comment noted. As stated in the above response to LEA Comment No. 3, Chiquita maintains that no flow-type failure has occurred at the Landfill. Rather, the purpose of the west slope buttress is to re-route and/or relocate existing infrastructure, extend the "bottom" engineered liner system, construct a soil buttress with integral liquids drainage infrastructure, and cap the installation with EVOH geomembrane. The improvements will include: (i) a soil buttress which is designed and constructed with sufficient height, thickness, extent, compaction, and other criteria to provide adequate support to the west slope to prevent potential slope failure; and (ii) engineered liner, cover, gas control systems, and leachate and other liquids drainage sufficient to prevent the extrusion of leachate, other liquids, or saturated waste, and landfill gas emissions from the west slope.

The west slope buttress had not been identified as a mitigation measure when the Plan was prepared. Since that time, preliminary stability analyses have been completed for the proposed buttress, including evaluations of buttress geometry, material unit weight, and target factors of safety. These analyses were submitted to the U.S. Environmental Protection Agency (EPA) on May 12, 2026, and will be updated as necessary during final design and as part of the Comprehensive Global Stability Study Evaluation, and the results will be included in the Comprehensive Global Stability Study Report.

2.2 DATA SOURCES

Middle of Page 4: GLA cites the following reference, which I did not co-author.

Karademir, T., and Stark, T.D. (2014). Elevated temperature effects on geosynthetic interface shear strength. Proceedings, 10th International Conference on Geosynthetics, Berlin, Germany

Comment noted. Future documents will include the correct citation.

2.3 METHODS OF ANALYSIS - Basis of Analysis

Middle of Page 5: GLA states. "In this context, GLA will evaluate the CalRecycle recommendation for GLA to assume that the reaction encompasses the entire waste management unit. Based on available site data, field observations, and operational

history, there is no credible evidence indicating that this condition is present or reasonably likely to occur.”

Current temperature and landfill gas generation show the SET Event is expanding as fingers towards the south and east. In addition, SCS was tasked with analyzing if any internal break existed within the waste mass that could possibility contain the SET Event. In their Revised Reaction Break/Barrier Plan dated July 8, 2024 SCS found that:

- **No Cell Separation Berms** – Section 4, Page 4 - historical photos b/t 2002 and 2008 do not indicate berms that could be used to isolate reaction.
- **No Legacy Roads** – Section 4, Page 4 - historical photos between 2002 and 2024 no legacy road segment that could be used to isolate reaction.
- **Uncertain Intermediate Soil Cover Break** – Section 4, Page 4 - historical photos in 2004 indicate soil cover on sideslopes of Cell 1/2A, 2-Phase 2B, and Canyon A but borings do not indicate thick enough soil cover layer.

As a result, there is no barrier or break to prevent the SET Event from encompassing/consuming the entire waste management unit. Thus, global stability analyses should assume that the SET Event can/will encompass the entire waste management unit. This means elevated liquid and gas pressures and degraded waste strengths should be used for all stability analyses to predict future stability. In areas the SET Event has not reached yet, normal liquid and gas pressures and non-degraded waste strengths can be used to evaluate current stability.

Dr. Stark's comments regarding SCS's evaluation and interpretation of site conditions are noted. Dr. Stark's final sentence acknowledges that normal liquid and gas pressures and non-degraded waste strengths may be used in areas where the ETLF⁵ has not reached. This distinction is inconsistent with his broader assertion earlier in the paragraph that the ETLF should be assumed capable of encompassing the entire waste management unit for all future stability evaluations. Importantly, that distinction is generally consistent with the methodology applied in previous GLA analyses, which differentiate between areas interpreted to be affected by the ETLF and areas interpreted to remain unaffected, based on available monitoring data, field observations, operational history, and other site-specific information. Consistent with prior practice, future analyses will continue to evaluate site conditions and apply material properties and pressure assumptions appropriate to the specific area and condition being analyzed.

2.4 METHODS OF ANALYSIS - Analytical Methods

Bottom of Page 5: *GLA states. “The yield acceleration is the horizontal seismic load that results in a safety factor of 1 for the slope being analyzed. Search routines that span the entire potential sliding surface being analyzed will be used to identify the surface(s) with the lowest static.....”*

⁵ Although Dr. Stark's letter refers to the reaction as a “SET event,” “ETLF” is the accurate term that appropriately characterizes the nature of the reaction occurring at the Landfill.

Search routines should not be used with a seismic coefficient. GLA should locate the critical circular and non-circular failure surfaces without a seismic coefficient. After locating these two critical failure surfaces, GLA should vary the seismic coefficient for only these two failure surfaces to estimate the yield accelerations (see Stark and Idries, 2025).

Dr. Stark's comment describes the standard procedure for estimating yield acceleration. Previous GLA analyses have followed this procedure by first identifying the critical circular and non-circular failure surfaces under static conditions, without applying a seismic coefficient, and then varying the seismic coefficient only along those identified surfaces to estimate the critical combination of yield acceleration and failure surface that results in a pseudostatic safety factor of 1.0, consistent with the referenced methodology. Future analyses will continue to follow this approach.

Middle of Page 6: *GLA states. "GLA will perform supplemental displacement estimates. Instead of a rigid block, Kramer and Smith (1997) use a compliant (deformable) block to estimate permanent, earthquake-induced displacements, which is better than the original rigid-block. However, given the current slope instability along the western slope and a significant SET Event, I think it is appropriate to consider a more sophisticated method such as the software package FLAC by Itasca in Minneapolis, Minnesota (Lin et al., 2025a and b) to estimate permanent, earthquake-induced displacement mechanisms and magnitudes. A FLAC analysis can simulate the complex response of degraded waste, elevated liquid pressures, and the shear behavior of geosynthetic interfaces in the bottom liner system (Lin et al., 2025a and b).*

Comment noted. Chiquita will consider a FLAC analysis for this purpose.

2.5 METHODS OF ANALYSIS - Material Properties for Analysis

In-Place and Unaffected (or Non-Degraded) MSW Shear Strength.

Middle of Page 6: *GLA states. "GLA will perform supplemental displacement estimates using the Bray and Macedo (2019) procedure and compare those results with the Bray and Travasarou (2007) analyses."*

Kavazanjian et al. (1995) suggest the following effective stress shear strength parameters for MSW: cohesion (c') of 500 psf (24 kPa) and friction angle (ϕ) of 0 degrees for normal stress range of 0 to 30 kPa and $c' = 0$ and $\phi = 33$ degrees for normal stress range of 30 to 300 kPa as shown in Figure 2 below from Kavazanjian et al. (1995). The use of a c' of 500 psf (24 kPa) at low stress has a significant influence on the calculated factor of safety (FoS). If GLA continues to insist on using the strength parameters in Kavazanjian et al. (1995), it is recommended the FoS also be computed using the MSW shear strength parameters provided by Huvaj and Stark (2008) and Stark et al. (2009), which are based on failed landfill slopes.

The stress-dependent MSW strength parameters recommended by Stark et al. (2009) are:

$$0 \leq \text{Normal stress} \leq 4,200 \text{ psf} \quad c' = 125 \text{ psf and } \phi' = 35^\circ \quad \text{Normal stress} \geq 4,200 \text{ psf} \\ c' = 625 \text{ psf and } \phi' = 30^\circ$$

Huvaj and Stark (2008) and Stark et al. (2009) only allow a c' of 125 psf at low normal stresses instead of 500 psf as recommended by Kavazanjian et al. (1995).

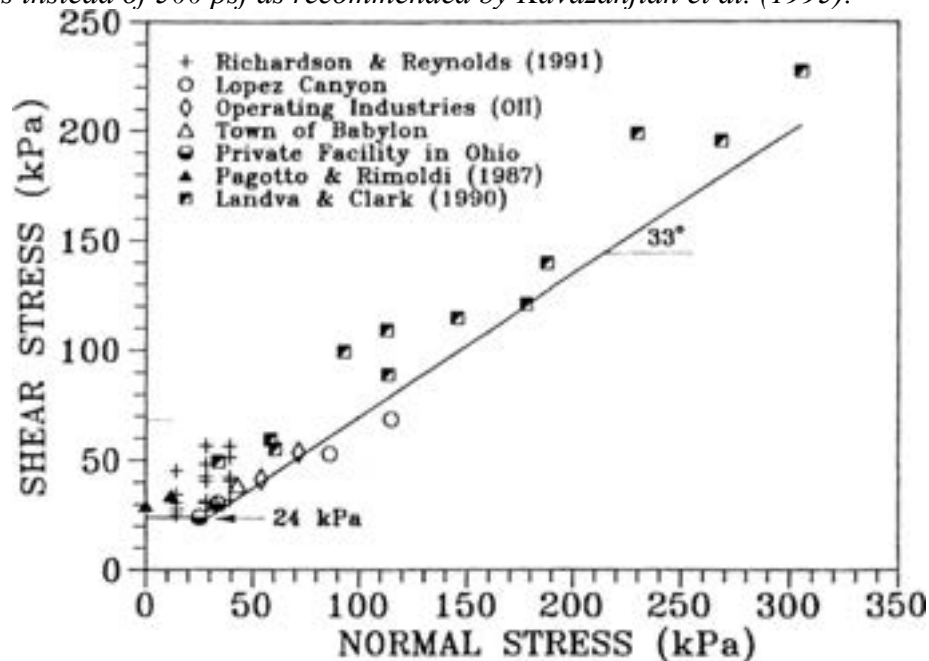


FIG. 2 Shear Strength of MSW

No analyses performed by GLA to date have used the Kavazanjian et al. (1995) strength model. Accordingly, the basis for Dr. Stark's statement that GLA "continues to insist" on using that strength model is unclear. GLA uses the Kavazanjian et al. (2013) strength model for non-degraded waste. That model was published after the Stark et al. (2009) model and is based on a larger dataset than was available when Stark et al. (2009) was published. In GLA's opinion, the Kavazanjian et al. (2013) model is more representative of intact MSW. Previous GLA analyses have explicitly included Dr. Stark's recommendation for degraded waste and will continue to do so in future analyses.

2.6 METHODS OF ANALYSIS - Leachate and Landfill Gas Pressures

Middle of Page 6: GLA states. "Stability analyses will be performed using the SLIDE2 software package, which includes the capability to explicitly incorporate gas pressures in the stability modeling."

GLA expresses concerns about using the Ideal Gas Law to estimate the liquid and gas pressures in their SLIDE2 stability analyses on Page 9 of 10 in Attachment 1. Then GLA states in Attachment 1:

“Accordingly, measured field pressures and site observations provide a more reliable basis for evaluating landfill gas pressures.”

I agree and recommend that CCL install some Geokon high temperature piezometers that have a working range up to 480°F. This would provide a direct estimate of the elevated liquid pressures, rather than estimating them from downhole temperature measurements and the ideal gas law (discussed next). The increase in temperature causes an increase in liquid and gas pressures, which can cause slope instability.

Landfill gas is continuously generated during a SET Event. Thiel (1998) provides a procedure for incorporating gas pore pressure (u_g) at the geomembrane-soil interface in an infinite-slope analysis for design of a gas pressure relief layer below a geomembrane final cover system to improve slope stability. The resulting infinite-slope analysis calculates the factor of safety (FoS) using the following expression:

$$FoS = \frac{a' + (h \cdot \gamma \cdot \cos(\beta - u_g)) \cdot \tan(\phi')}{(h \cdot \gamma \cdot \sin(\beta))} \quad (2)$$

where a' is the effective stress geosynthetic interface adhesion, β is the slope angle from the horizontal; h is the thickness of cover soil normal to the slope; γ is the average total unit weight of the cover soil placed above the geomembrane; and ϕ' is the effective stress interface friction angle. Inspection of this equation shows that gas pressure reduces the effective normal stress acting on the geomembrane interface, thereby reducing the interface friction and, ultimately the FoS.

Stark et al. (2010) use a similar approach that can be applied for modeling gas pressure in MSW landfills. For example, slope stability software allows a user to define pore-water or liquid pressure in a layer using a pore-water pressure ratio (see Equation (1) above, which relates the pore-water pressure to the static total vertical stress or a constant pore-water pressure, where the pore-water pressure is constant at all locations within a layer or material type. If a leachate level is also assigned to the same material unit (in this case, MSW) the pore-water pressures calculated by ru or constant pore pressure are added to the pore pressures calculated from the phreatic surface used to model the leachate level. Stark et al. (2010) present a hypothetical example in which pore-water pressures are modeled as a phreatic or piezometric surface, while gas pressures are incorporated using a constant pore pressure. If the gas pressure is measured as a pressure head, the pressure head can be converted to a pressure by multiplying it by the unit weight of landfill gas, e.g., $\gamma_g = 81.5 \text{ pcf}$ (12.8 N/m^3) as suggested by Thiel (1998).

As mentioned above, Chiquita will assess the need for high-temperature piezometer installations following the collection and evaluation of the data for the global slope stability study. Additionally, GLA will evaluate LFG pressures using the best available site-specific information at the time the analyses are performed. The analytical methods and pressure assumptions incorporated into the evaluations will be selected based on available monitoring data, site observations, and the specific conditions being analyzed. Consistent with previous analyses, LFG and leachate pressures may be represented using a combination of phreatic surfaces, pore-pressure ratios, equivalent pressure distributions, and/or the Thiel (1998) approach as appropriate for the available data and modeling approach.

2.7 WORK PLAN COMPONENTS - Data Collection and Review

Middle of Page 8: GLA states. "Any known or anticipated construction-related activities that alter site topography will be considered and incorporated in the analyses."

As a result, GLA should include the stability analyses used to size the west slope buttress that is proposed to stop the slope failure/movement that is currently occurring. This analysis should include the FoS to which the buttress is being designed, e.g., 1.5, and the size, width, and unit weight of the buttress material to stop the movement.

Stability analyses for the proposed western slope buttress have already been completed as part of the preliminary design evaluation. These analyses considered the conceptual and preliminary buttress geometry, material unit weight, and the target factors of safety for both static and seismic conditions. The analyses will be updated as appropriate during final design and the results will be incorporated into the Comprehensive Global Stability Study Report.

2.8 WORK PLAN COMPONENTS - Cross Sections, Material Properties, and Pressures

Top of Page 9: GLA states. "Based on current site understanding, one or more east-to-west cross sections will be identified to evaluate stability of the western slopes, one or more west-to-east cross sections will be identified to evaluate stability of the eastern slopes, one or more north-to-south cross sections will be identified to evaluate stability of the northern slopes, and two or more cross sections will be identified to evaluate the southern slope of the landfill, including Tank Farm 13."

I strongly disagree that only "one or more cross-sections" should be analyzed to evaluate the stability of the western, eastern, and northern slopes. Prior to this point in this Work Plan, GLA frequently describes the heterogeneous nature of MSW, gas and liquid pressures, MSW shear strength, and landfill geometry. As a result, analyzing only one cross-section is not sufficient to locate the critical cross-section, i.e., lowest static and seismic FoS. At a minimum, GLA should analyze two or more cross-sections for every slope as they proposed for the southern slope.

GLA's statement that "one or more" cross sections will be evaluated was not intended to suggest that only a single cross section would be analyzed for any slope. Rather, GLA will evaluate multiple cross sections for each landfill slope, as appropriate, to assess the range of site geometries,

waste conditions, and pressure conditions present across the facility. For example, the recent western slope buttress evaluation incorporated nine separate cross sections for the preliminary design assessment.

Previous GLA analyses have also accounted for the heterogeneous nature of the waste mass by incorporating multiple conservative assumptions regarding the lateral and vertical continuity of degraded waste zones, leachate conditions, and LFG pressures. For example, these analyses have assumed the zones of degraded waste and the leachate/LFG pressure surfaces are laterally and vertically continuous. GLA will continue this practice in future evaluations to ensure that the analyses reasonably bound the range of anticipated site conditions and identify critical stability conditions where present.

***Middle of Page 9:** GLA states. "As part of this task, sequential topographic data, surface fissure and cracking mapping, and site observations regarding leachate seepage will be used to identify zones of previous instability, if any."*

Clearly GLA should use the fissures, tension cracking, leachate outbreaks, and other evidence of slope stability along the western slope to guide their inverse and forward slope stability analyses. For example, the current west slope movement should be used to estimate the liquid and gas pressures acting on the slope by assuming a FoS at or below unity (1.0), i.e., failure.

This was exactly the procedure that was used for the buttress conceptual design analysis.

It is apparent that significant ongoing waste-mass movement/flow along the west slope is slope instability. For example, in its March 2026 Fissure and Tension Crack Monitoring Summary for CCL, GLA characterizes the observed cracking as "surface features" attributable to routine settlement rather than indicators of slope movement within the waste mass. This interpretation is inconsistent with field evidence, such as, the crack geometry, slope displacement patterns, and progressive widening of the movement area documented since late 2025, which indicate active slope movement not settlement due to thermal degradation of the waste. By dismissing these features as superficial, GLA's analysis fails to recognize the potential underlying instability mechanism and therefore cannot support credible conclusions about current or future slope stability. For example, GLA states in their March 2026 Fissure and Tension Crack Monitoring Summary for CCL:

"Observations on the western slope included bulging at the toe of the slope, vertical risers tilted in a downslope direction, "trampolining" of the geomembrane near the top of slope, and evidence of variable, multi-directional geomembrane stress between the crest and toe. The observed deformation is spatially coincident with, and likely associated with, the reaction area and corresponding zone of maximum settlement originally described and shown in Figure 3 of the GLA November 11, 2025 monthly summary report and reattached herein as Figure 3.

Collectively, these features do not indicate a conventional slope instability involving movement along one or more discrete slip surfaces. Rather, the deformation pattern is more consistent with settlement-driven, time-dependent lateral squeezing of waste within the reaction area. In this interpretation, ongoing vertical compression and settlement of reaction area waste generate deviatoric stresses that are relieved through gradual outward deformation toward the slope face. This mechanism is expressed at the ground surface as bulging near the toe, rather than as a distinct translational or rotational instability. Chiquita intends to construct a soil buttress on the west side of the Landfill, adjacent to the prior "west slope toe drain project. Chiquita and its consultants are in the process of planning and designing this project."

The reasoning above ignores the likely explanation that the observed phenomena are caused by slope instability/flow rather than settlement. For example, GLA concludes these observations "do not indicate a conventional slope instability involving movement along one or more discrete slip surfaces". As discussed below, one should not expect "conventional slope instability" during a SET Event. A SET Event is unique and results in more of a flow failure instead of a "conventional" slope failure. Consultants with prior SET-Event experience routinely identify these fissures, tension cracks, and displacement patterns as manifestations of active slope instability, not routine settlement. Without consideration of this possibility, CCL's monitoring and stability evaluations may fail to recognize the slope movement mechanism and resulting hazard.

In particular, the elevated gas and liquid pressures result in more of a flow failure than movement along a distinct failure surface, such as, a geosynthetic interface or weak layer of waste, in a non-SET Event facility. This is evident by the waste mass along the western slope moving/flowing outside of the limits of waste placement. A flow failure is more concerning than a non-SET Event slope failure because the waste mass can flow a greater distance than a no-flow failure mass due to the elevated gas and liquid pressures. A similar flow failure occurred during the SET Event in the Countywide MSW Landfill. If CCL does not continue to remove leachate from the landfill, more waste will likely become saturated, or near saturated, increasing the potential for additional slope movement/flow.

GLA's conclusion that bulging at the toe along the western slope is entirely "settlement-driven" may not be correct. Often, settlement induced movement causes the slope to flatten not bulge out at the toe. If the west slope does not undergo additional slope movements, it will eventually flatten, i.e., settle back into the landfill, due to a reduction in the gas and liquid pressures and thermal degradation of the waste. A good case study is presented in Jafari et al. (2017), which describes the progression of a SET Event through a MSW landfill and the manifestation of the souffle falling into the landfill at the end of a SET Event not during it, i.e., after slope instability occurs.

Chiquita Canyon, LLC Response to Dr. Stark's April 19, 2026 Letter

May 20, 2026

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Dr. Stark's comments and interpretations are noted. However, much of the discussion appears to rely on older information and does not reflect more recent field observations, updated monitoring data, or current topographic evaluations completed for the Landfill. GLA's interpretations are routinely checked and refined against newly acquired field information, including updated survey and topographic datasets, observed deformation patterns, construction observations, and monitoring results as they become available.

As with any large and evolving waste mass, site understanding continues to develop as additional information is collected. Accordingly, interpretations are based on the totality of available site-specific data rather than generalized analogies or conceptual descriptions derived from unrelated facilities. The "soufflé" analogy is not a substitute for ongoing site characterization, deformation monitoring, and engineering evaluation grounded in current field conditions.

If you have any questions, please do not hesitate to reach out to me at dylan.smith@wasteconnections.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Dylan Smith', with a stylized flourish at the end.

Dylan Smith
Chiquita Canyon

cc: Robert Ragland, Los Angeles County Department of Public Health
Liza Frias, Los Angeles County Department of Public Health
Azar Kattan, Los Angeles County Department of Public Health
Lusi Mkhitarian, LEA
Karen Gork, LEA
Bahaa Abuelsaad, LEA
Beverly Tway, LEA
Renee Jensen, LEA Counsel
Blaine McPhillips, County Counsel
Emiko Thompson, Los Angeles County Department of Public Works
Alex Garcia, Los Angeles County Department of Regional Planning
Ai-Viet Huynh, Los Angeles County Department of Regional Planning
Wes Mindermann, CalRecycle
Todd Thalhamer, CalRecycle
Rachel Beck, CalRecycle
Janelle Heinzler, CalRecycle
Jeff Lindberg, California Air Resources Board

Chiquita Canyon, LLC Response to Dr. Stark's April 19, 2026 Letter

May 20, 2026

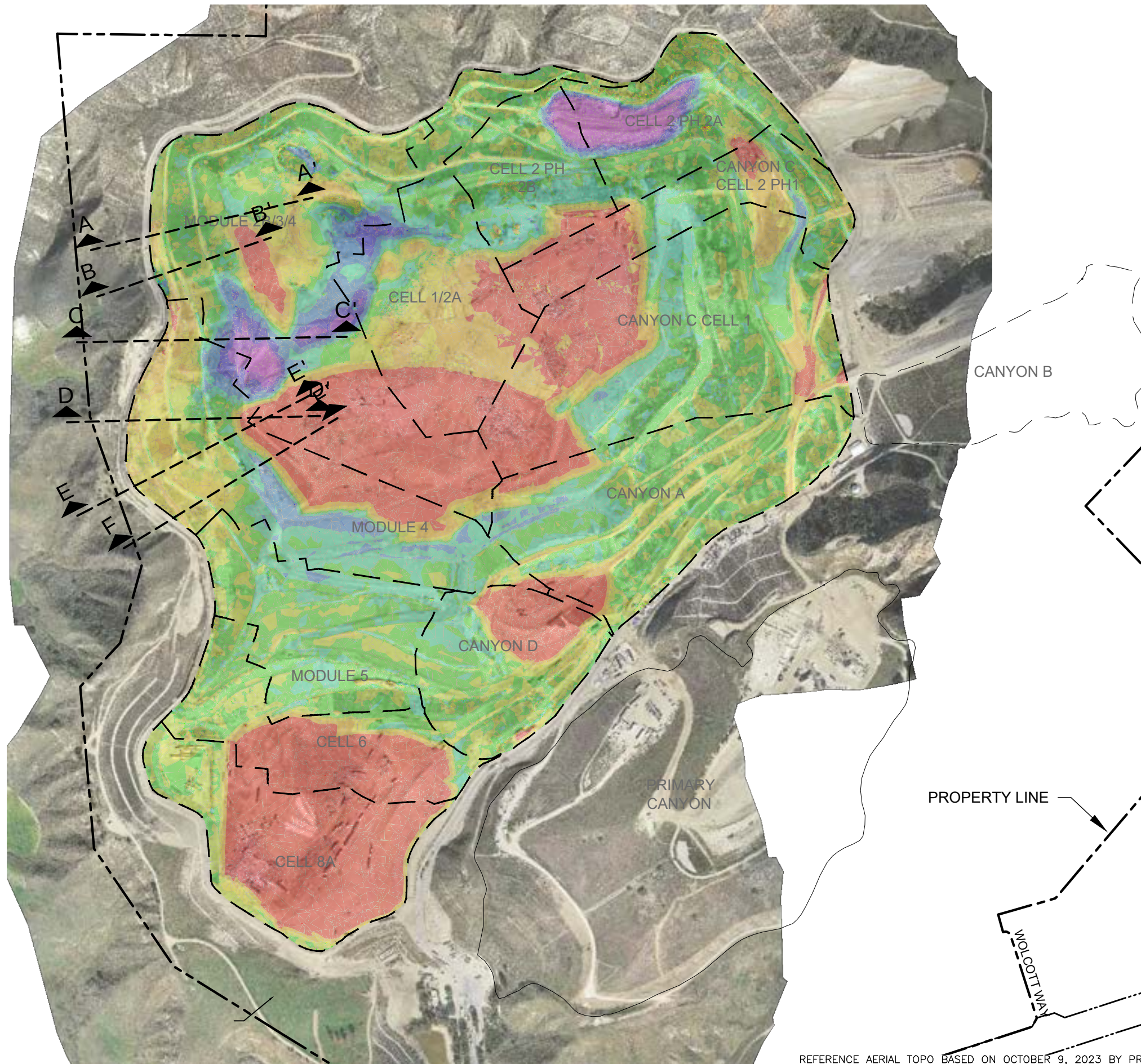
Page 13 of 13

Jack Cheng, South Coast Air Quality Management District
Larry Israel, South Coast Air Quality Management District
Enrique Cases, Los Angeles Regional Water Quality Control Board
Amy Miller, United States Environmental Protection Agency
Joel Jones, United States Environmental Protection Agency
Gregory Shaffer, Department of Toxic Substances Control
Gregory Gentile, Department of Toxic Substances Control
Natasha DiPietro, Department of Toxic Substances Control
John Perkey, Chiquita Canyon
Kevin Green, Chiquita Canyon
William Haley, Chiquita Canyon
Sarah Phillips, Chiquita Canyon
Matt Breuer, Chiquita Canyon

Appendix B
SETTLEMENT-DEFORMATION PLOTS

Appendix B-1
2022-2023 SETTLEMENT

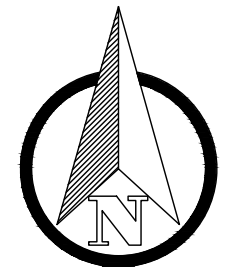
P:\SITES\CHIQUITA CYN LF\COMPARATIVE STABILITY EVALUATION-2026\FIGURES\1026.1002-CCL-FIG 1--SETTLEMENT-2022VS2023--(2026-08-18).DWG August 20, 2026 -- 11:02 AM BY: GLA-USER



LEGEND

-----		PROPERTY BOUNDARY	
-----		EXISTING LINER	
FILL (FT)		CUT (FT)	
	>+10		>-20
	+10 TO +5		-20 TO -15
	+5 TO +2		-15 TO -10
	+2 TO 0		-10 TO -5
			-5 TO -2
			-2 TO 0

NOTE: MAP SHOWS FILL AND SETTLEMENT (CUT) BETWEEN 9/30/2022 AND 10/9/2023.



500' 0' 250' 500'
SCALE: 1" = 500'

FIGURE 1

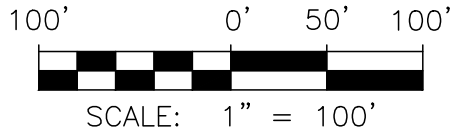
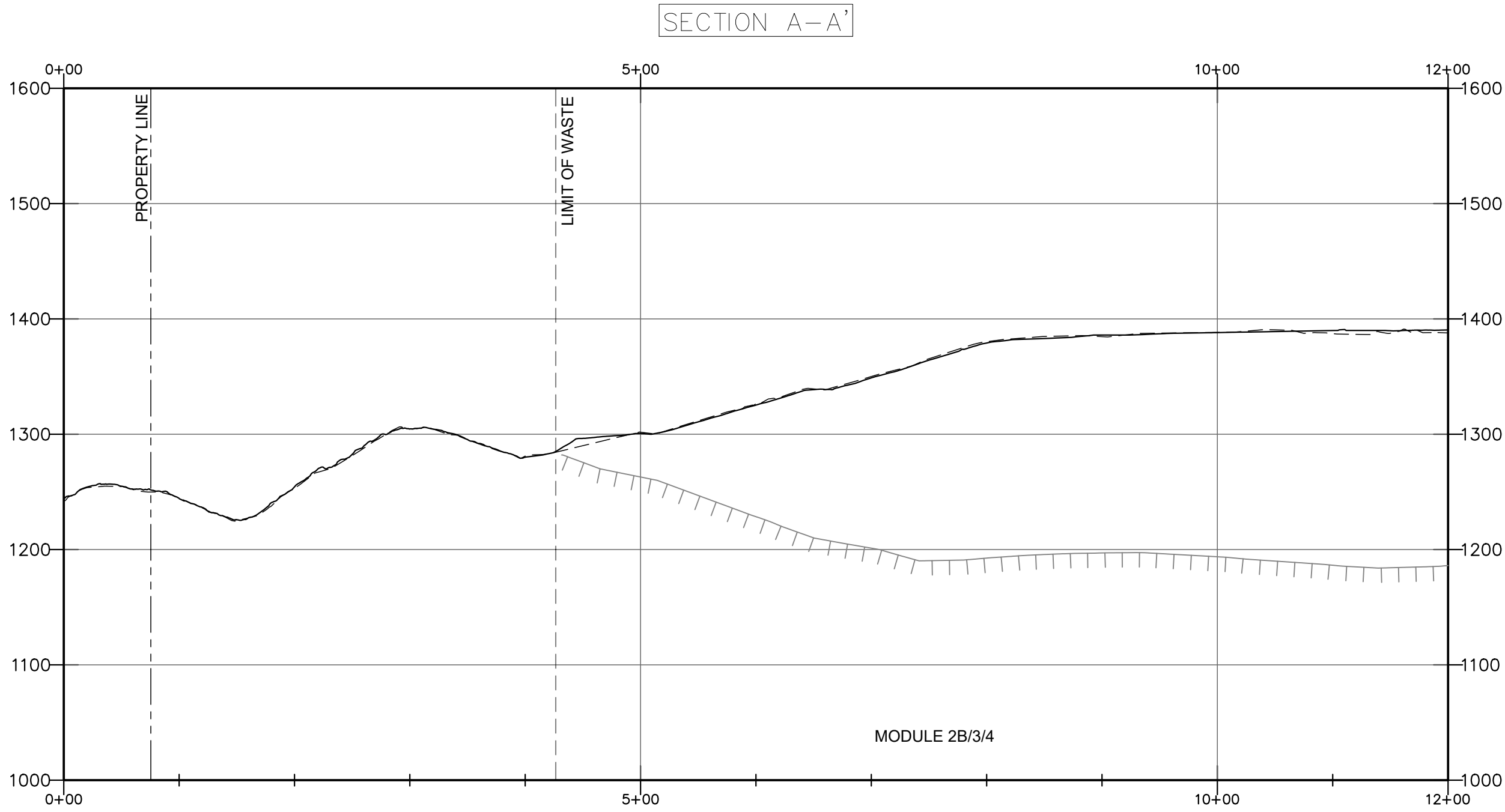
SETTLEMENT MAP AND
CROSS SECTIONS LOCATIONS
CHIQUITA CANYON LANDFILL
CASTAIC, CA

Geo-Logic
ASSOCIATES

DRAWN BY: LP/RM | DATE: AUGUST 2026 | JOB NO.: 1026.1002.100

REFERENCE AERIAL TOPO BASED ON OCTOBER 9, 2023 BY PROPELLER

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LEGEND

	TOPOGRAPHY (OCTOBER 9, 2023)		PROPERTY LINE
	TOPOGRAPHY (SEPTEMBER 3, 2022)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 2

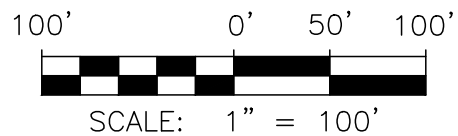
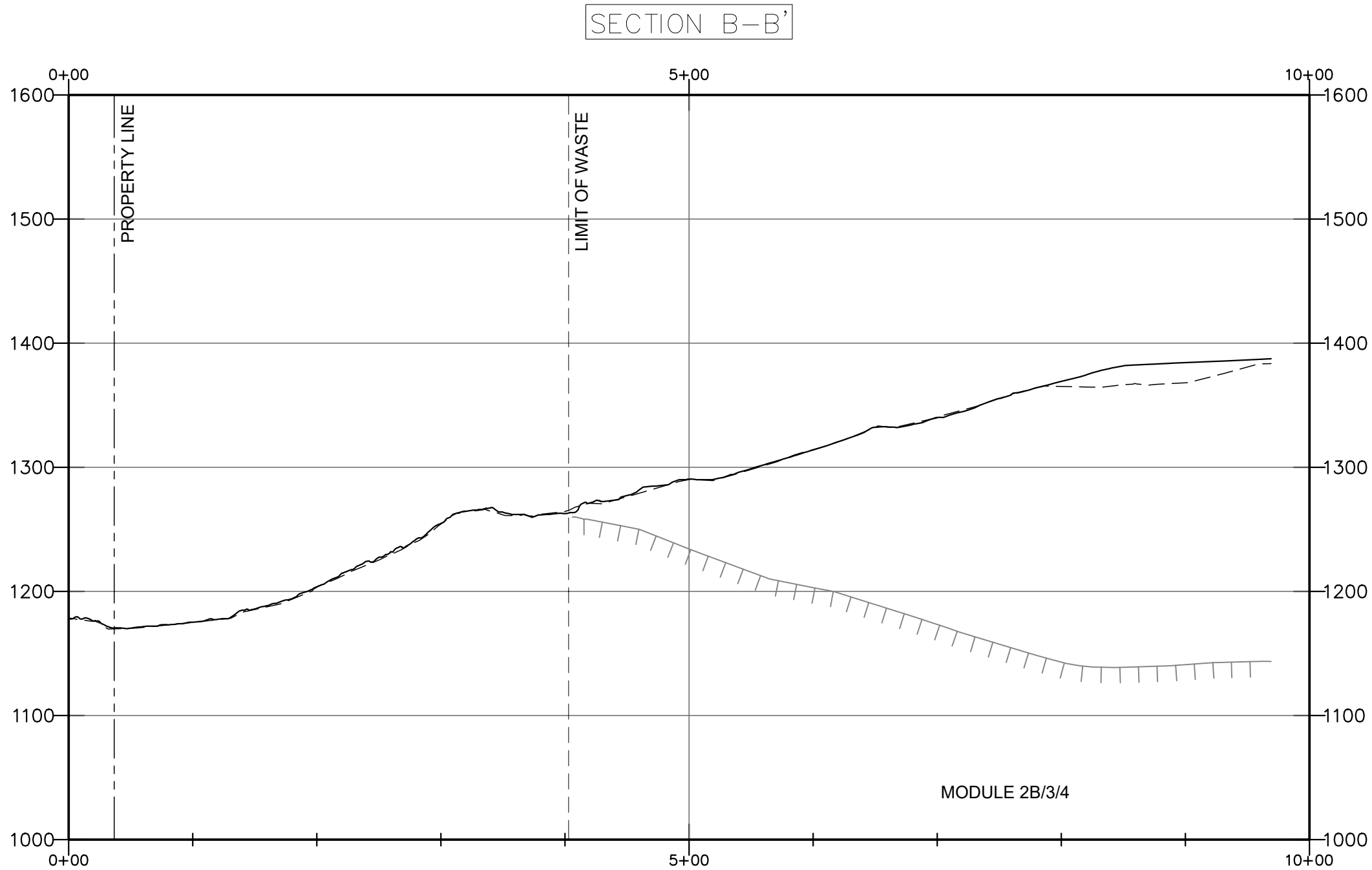
CROSS SECTION A-A'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	TOPOGRAPHY (OCTOBER 9, 2023)		PROPERTY LINE
	TOPOGRAPHY (SEPTEMBER 3, 2022)		LIMIT OF WASTE
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FIGURE 3

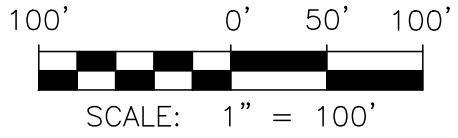
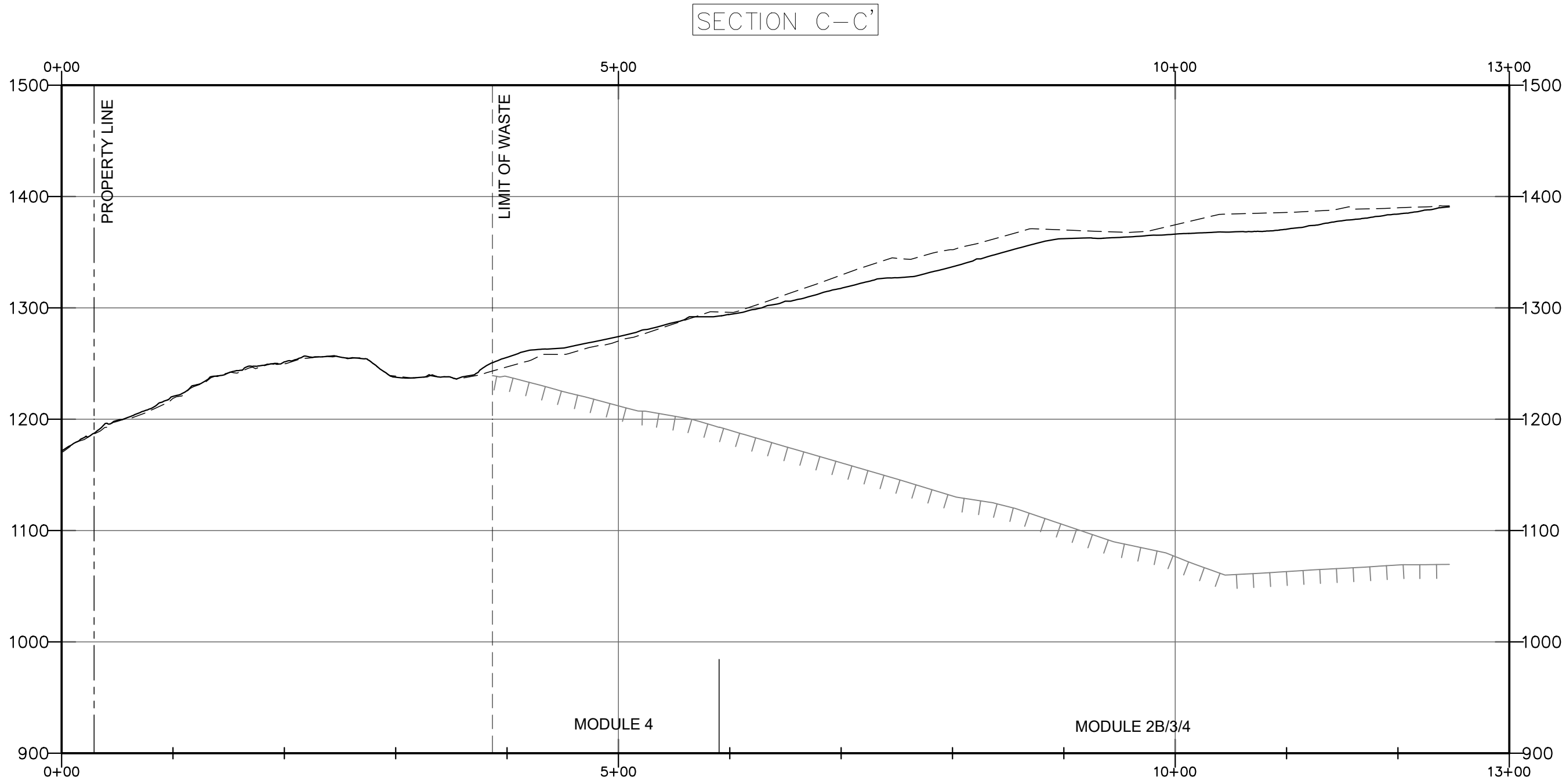
CROSS SECTION B-B'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

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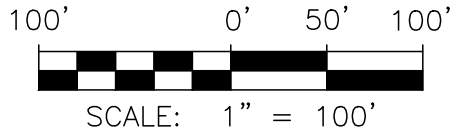
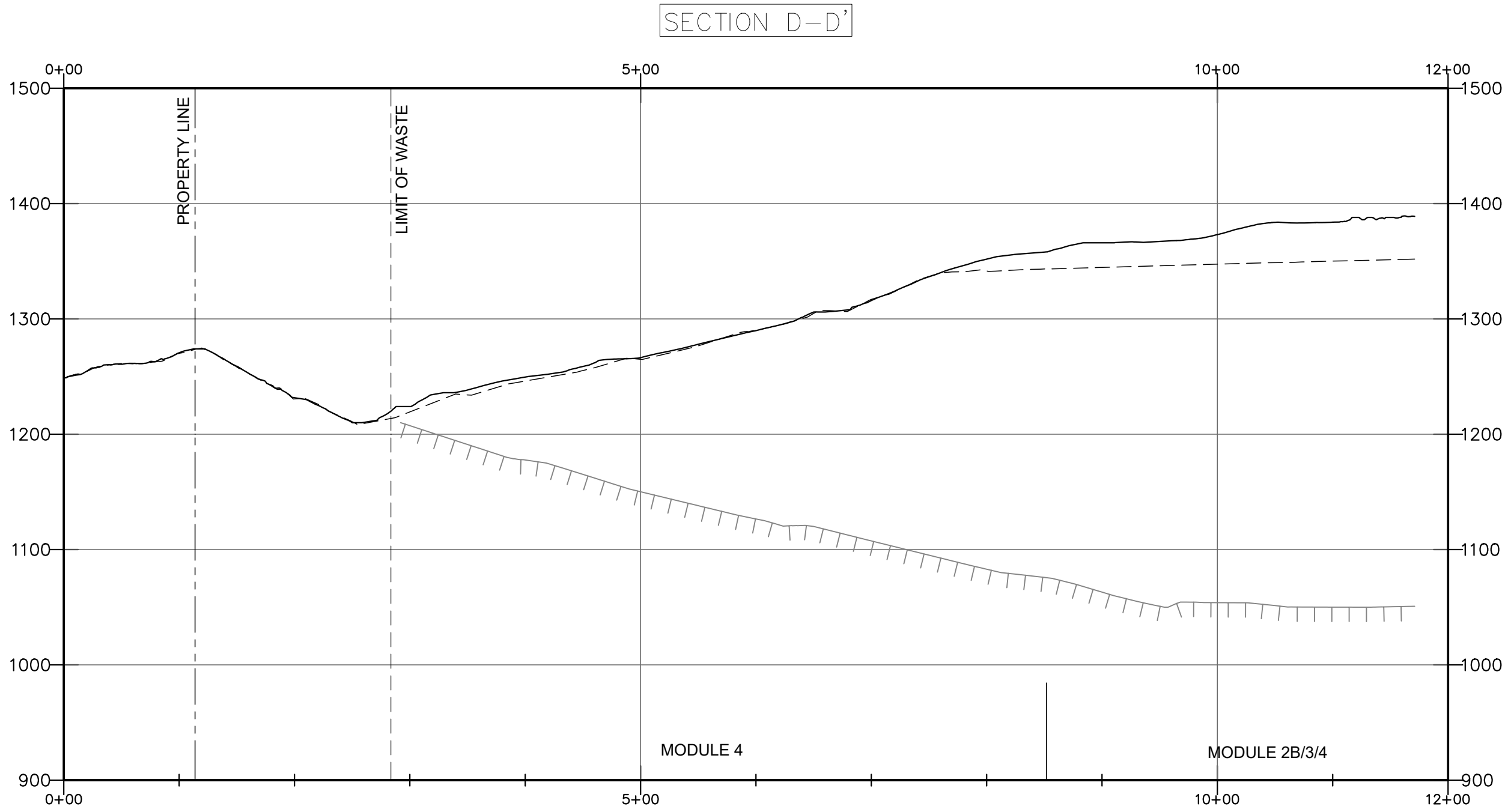
FIGURE 4

CROSS SECTION C-C'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

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	TOPOGRAPHY (SEPTEMBER 3, 2022)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 5

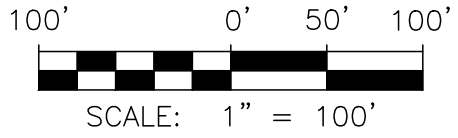
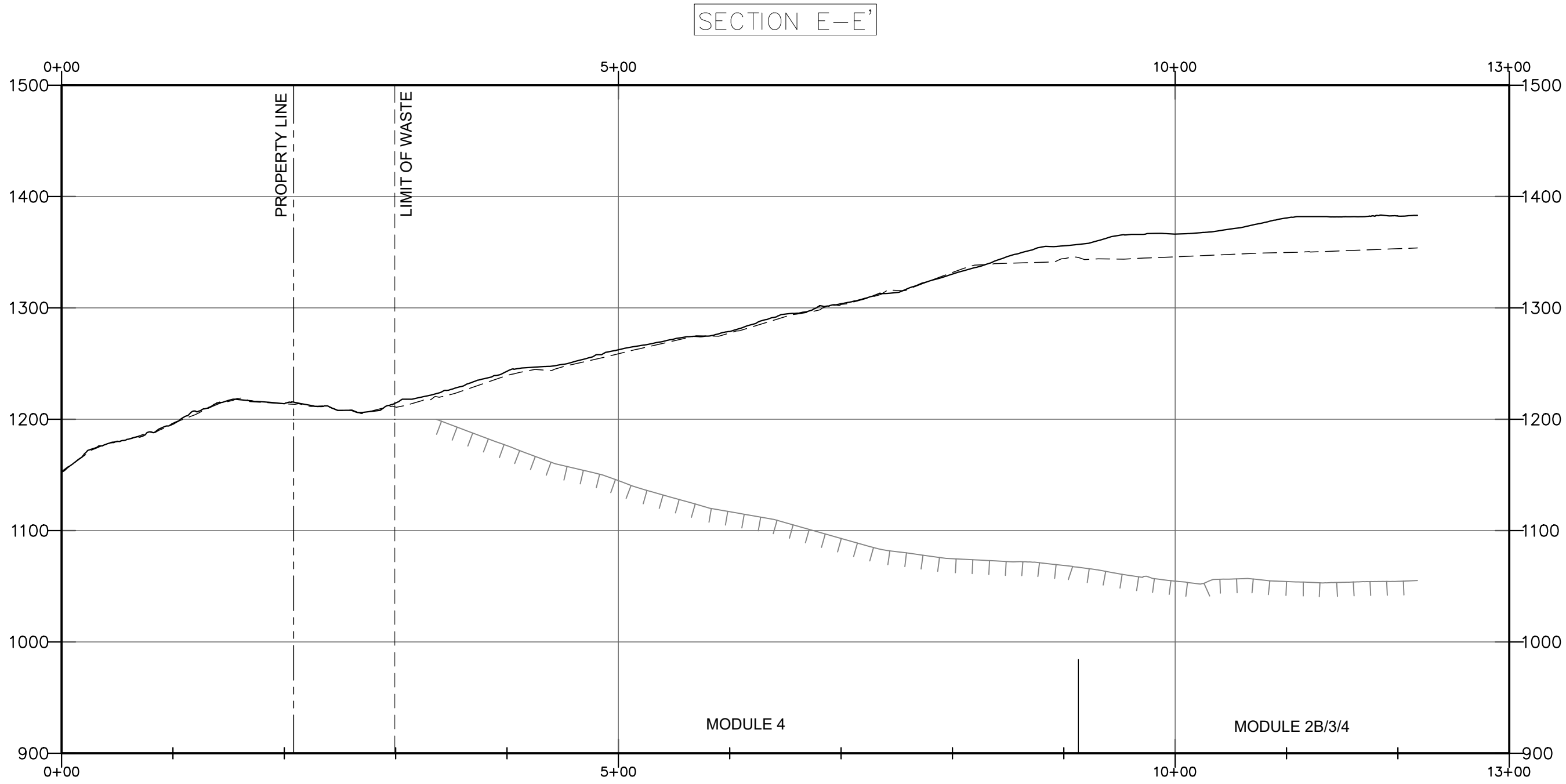
CROSS SECTION D-D'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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	TOPOGRAPHY (SEPTEMBER 3, 2022)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 6

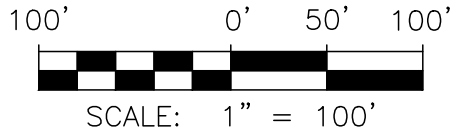
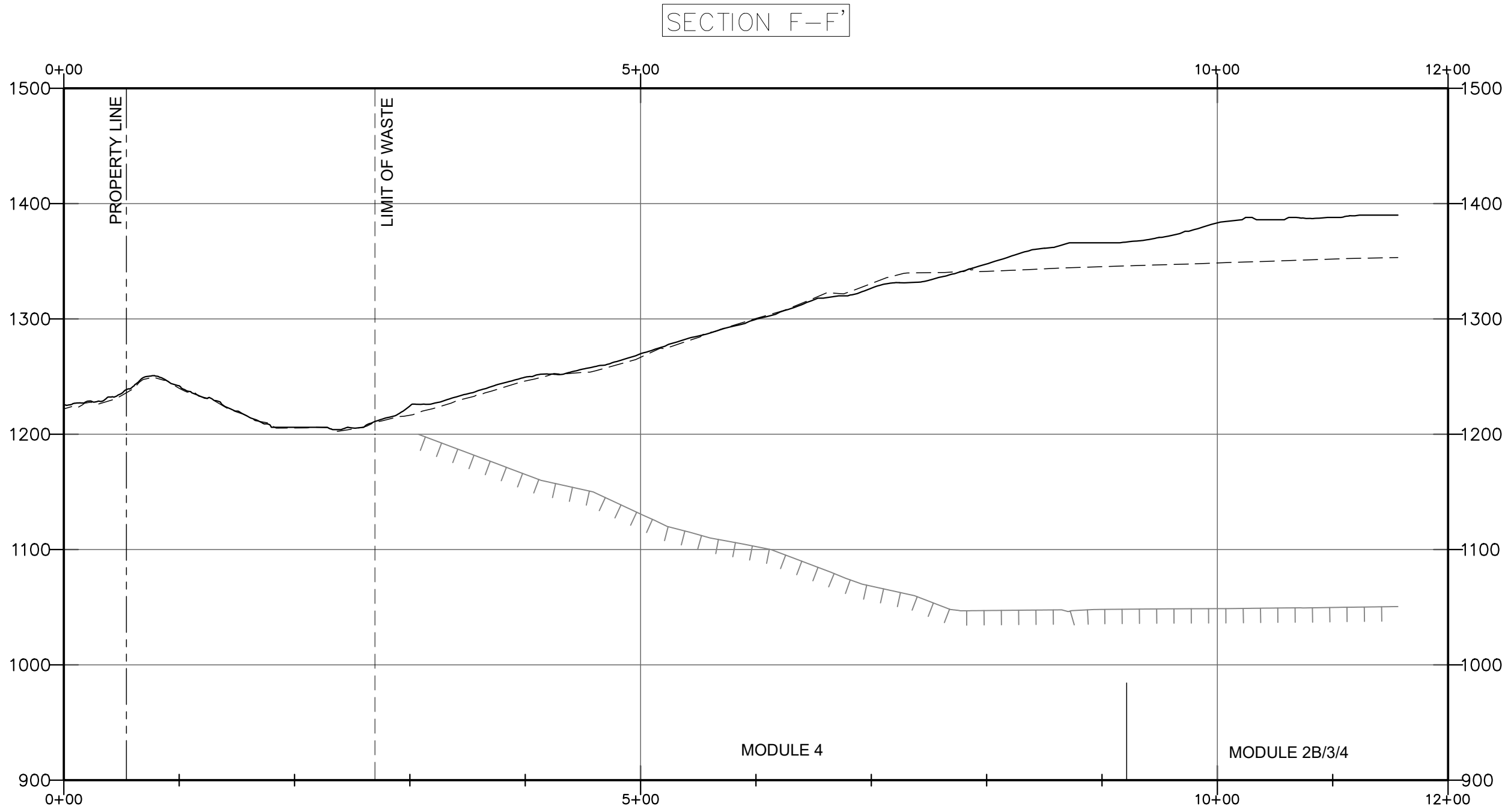
CROSS SECTION E-E'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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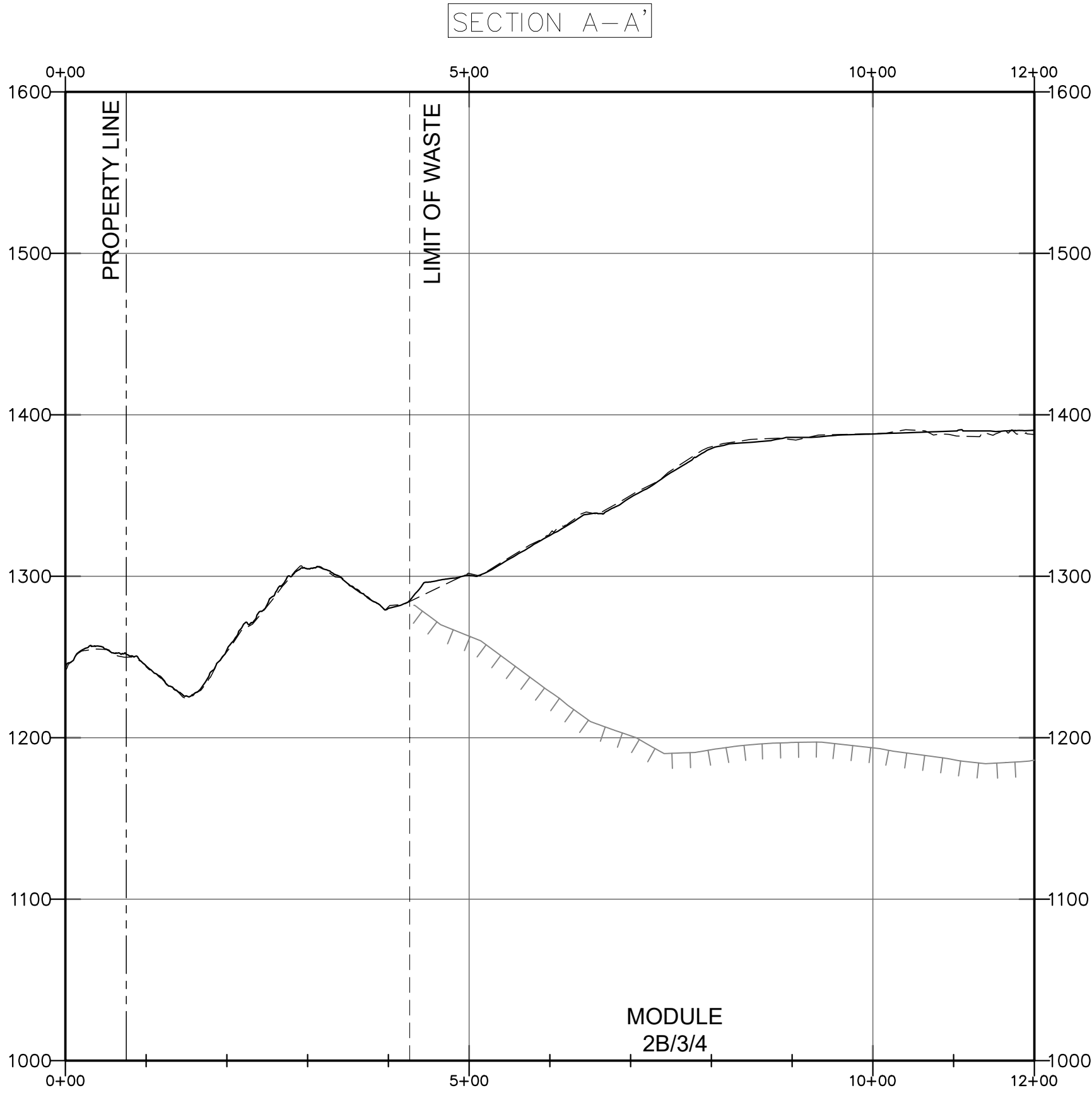
FIGURE 7

CROSS SECTION F-F'

CHIKUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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	PROPERTY LINE
	LIMIT OF WASTE

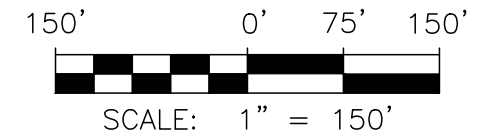


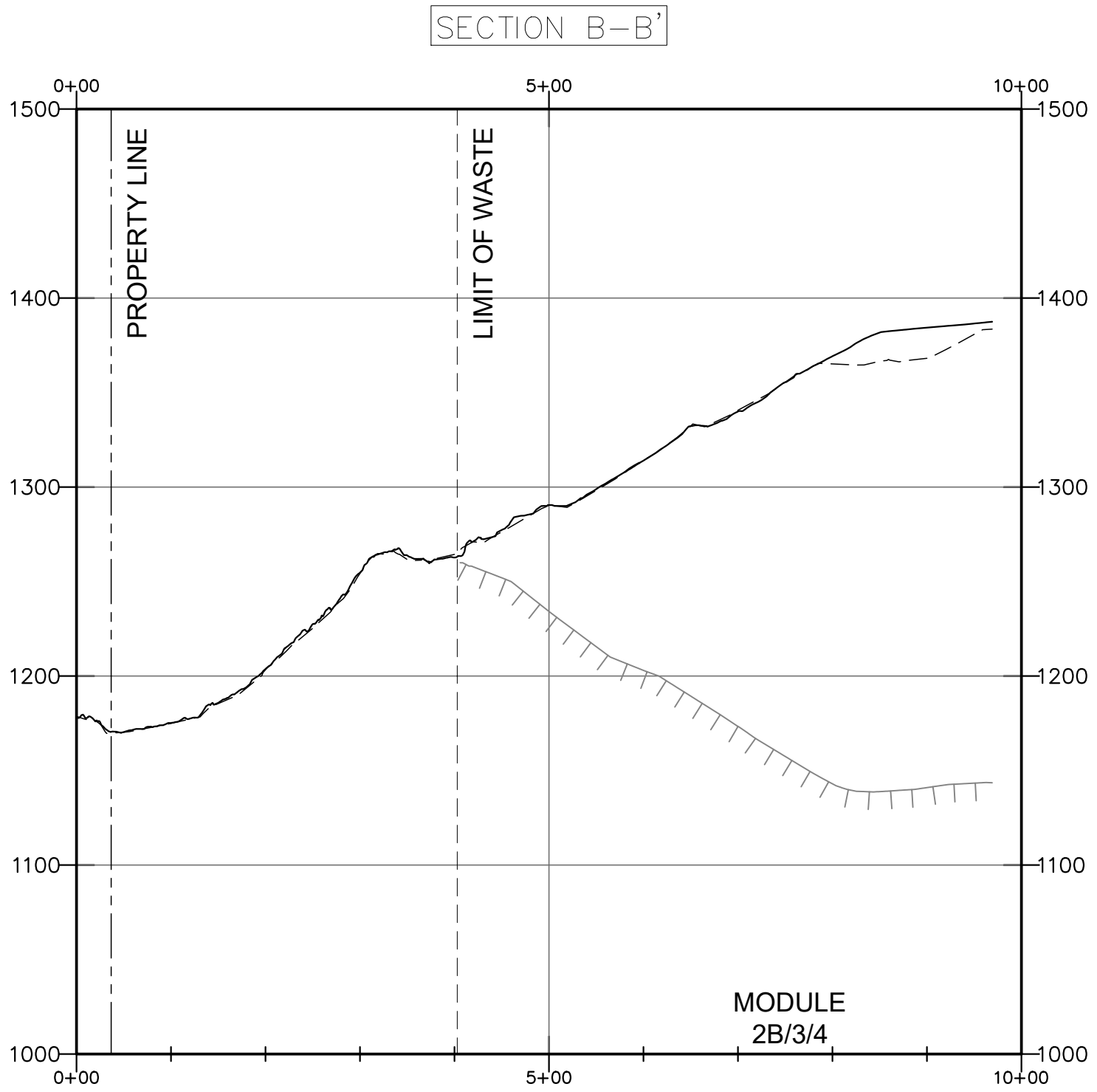
FIGURE 2

CROSS SECTION A-A'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

TOPOGRAPHY
(OCTOBER 9, 2023)

TOPOGRAPHY
(SEPTEMBER 3, 2022)

EXISTING LINER

PROPERTY LINE

LIMIT OF WASTE

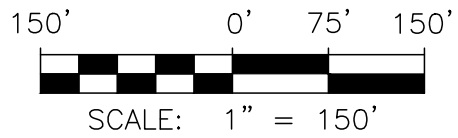


FIGURE 3

CROSS SECTION B-B'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic

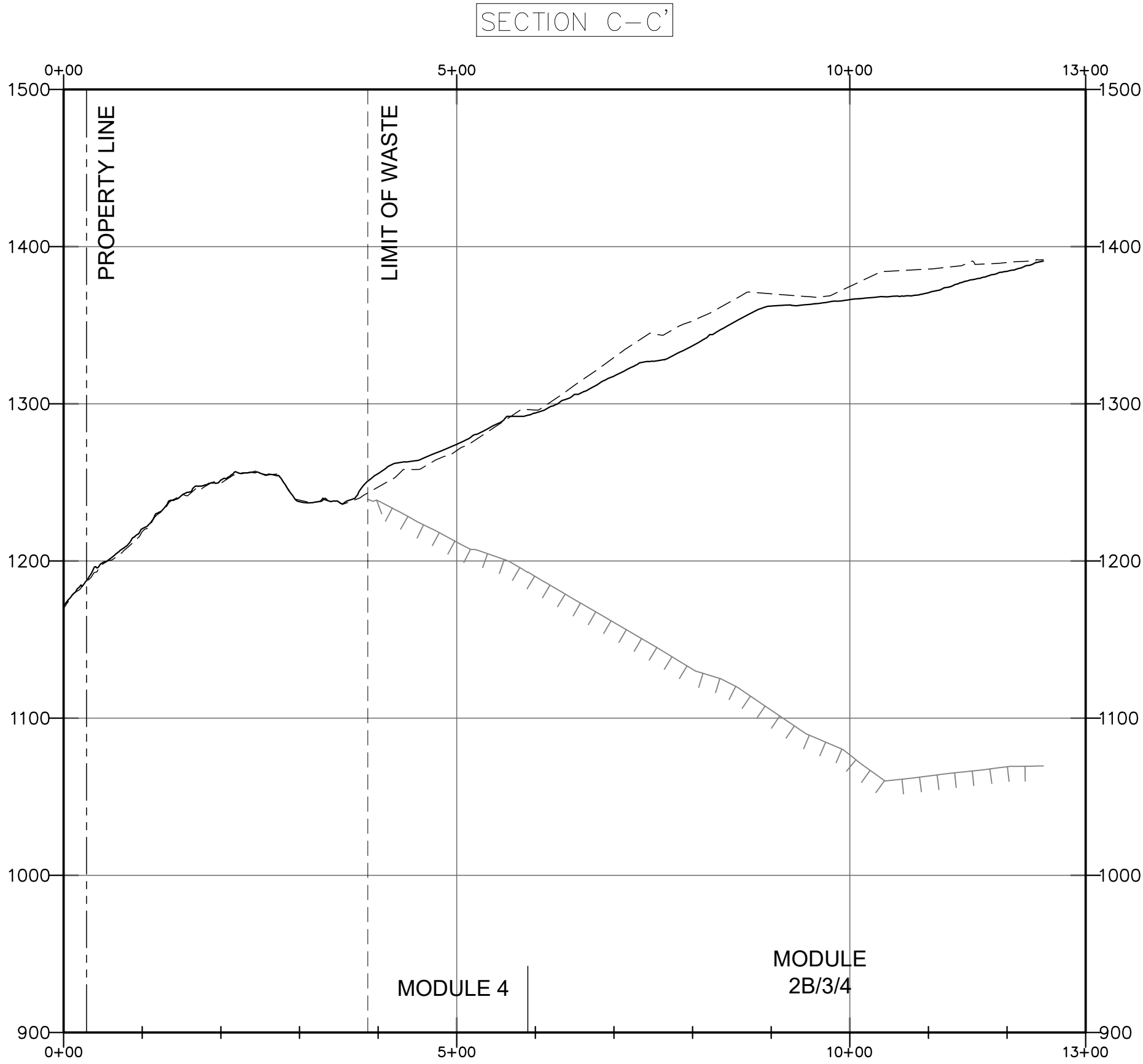
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	PROPERTY LINE
	LIMIT OF WASTE

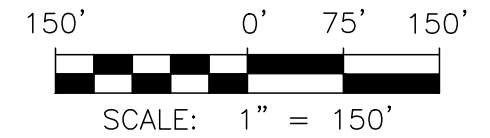


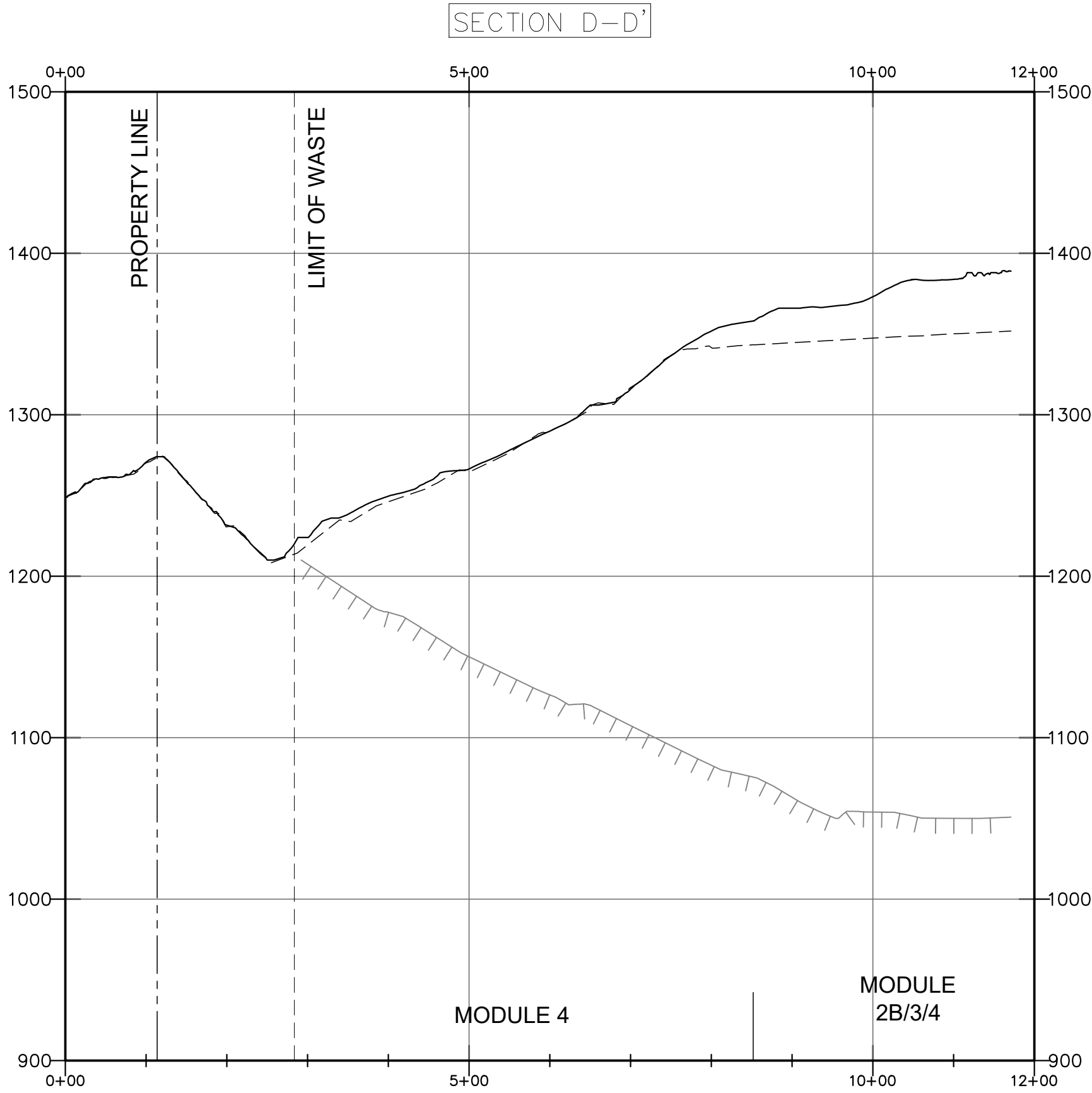
FIGURE 4

CROSS SECTION C-C'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

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	TOPOGRAPHY (SEPTEMBER 3, 2022)
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	PROPERTY LINE
	LIMIT OF WASTE

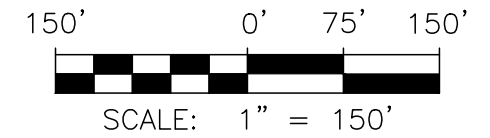
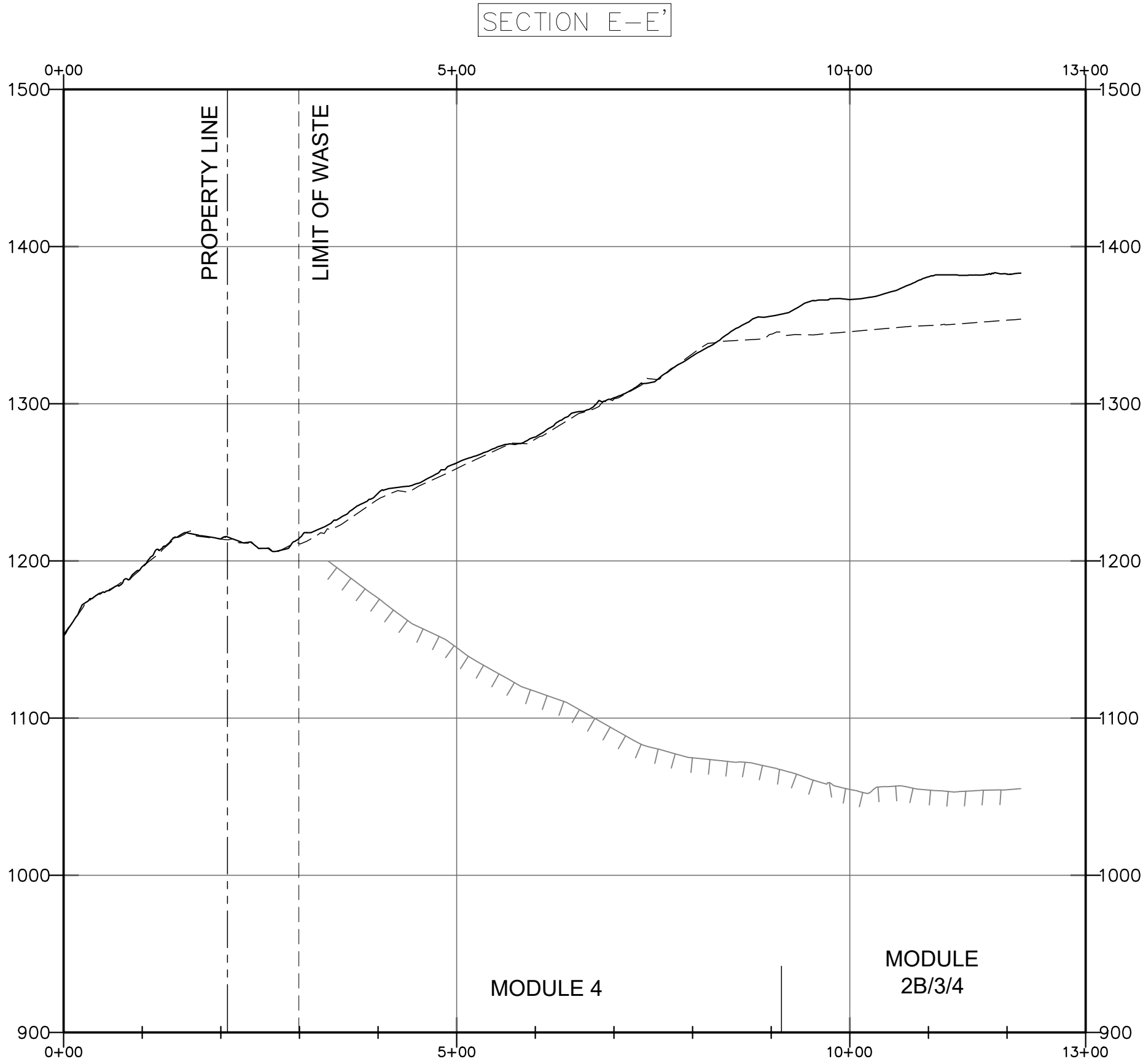


FIGURE 5

CROSS SECTION D-D'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	TOPOGRAPHY (OCTOBER 9, 2023)
	TOPOGRAPHY (SEPTEMBER 3, 2022)
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	PROPERTY LINE
	LIMIT OF WASTE

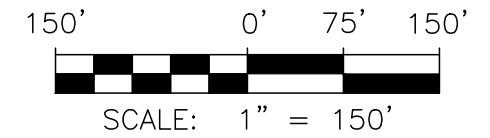


FIGURE 6

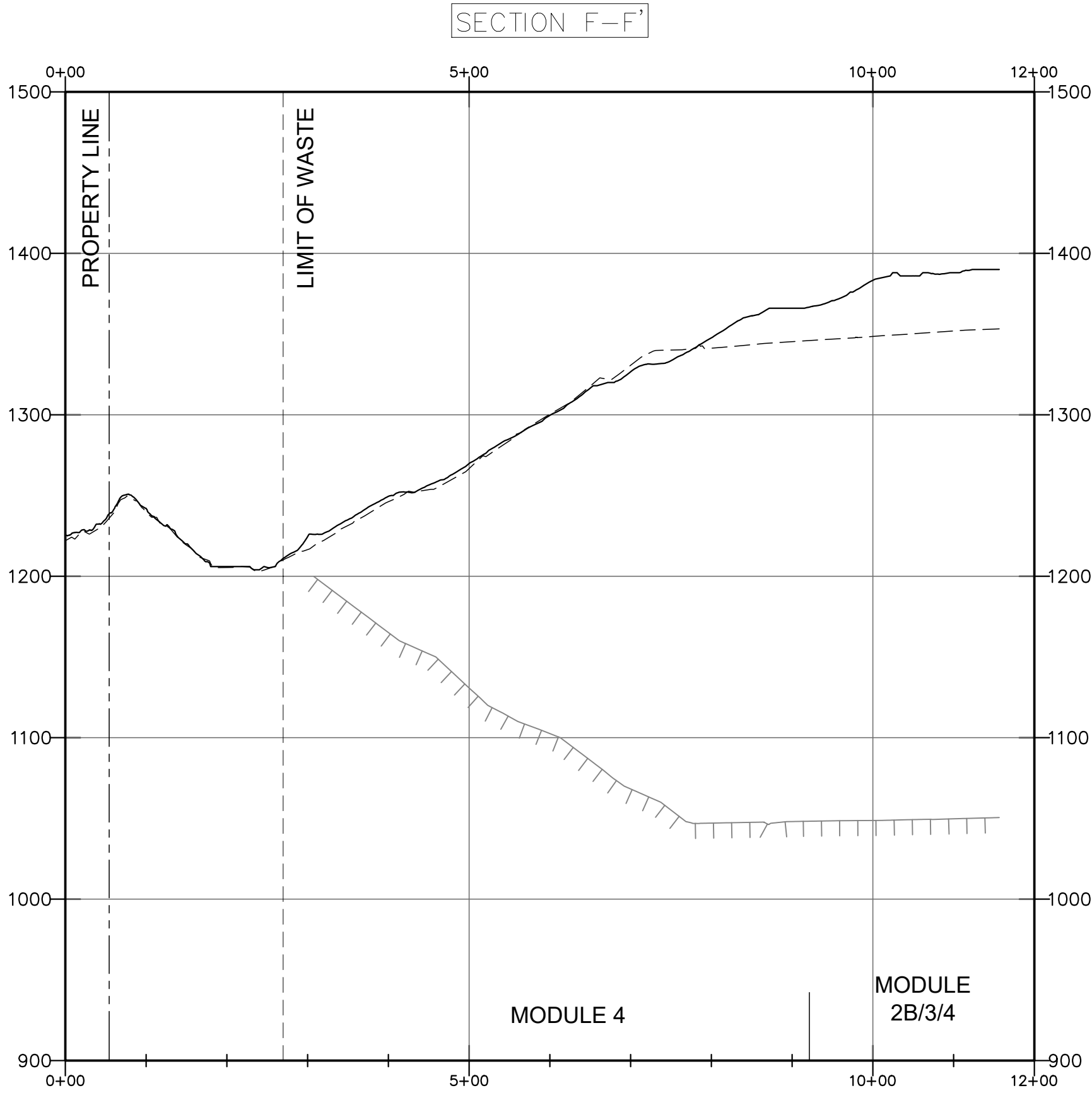
CROSS SECTION E-E'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

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	LIMIT OF WASTE

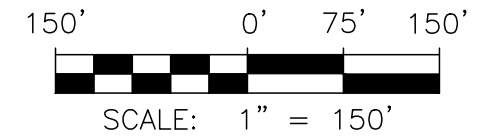


FIGURE 7
CROSS SECTION F-F'

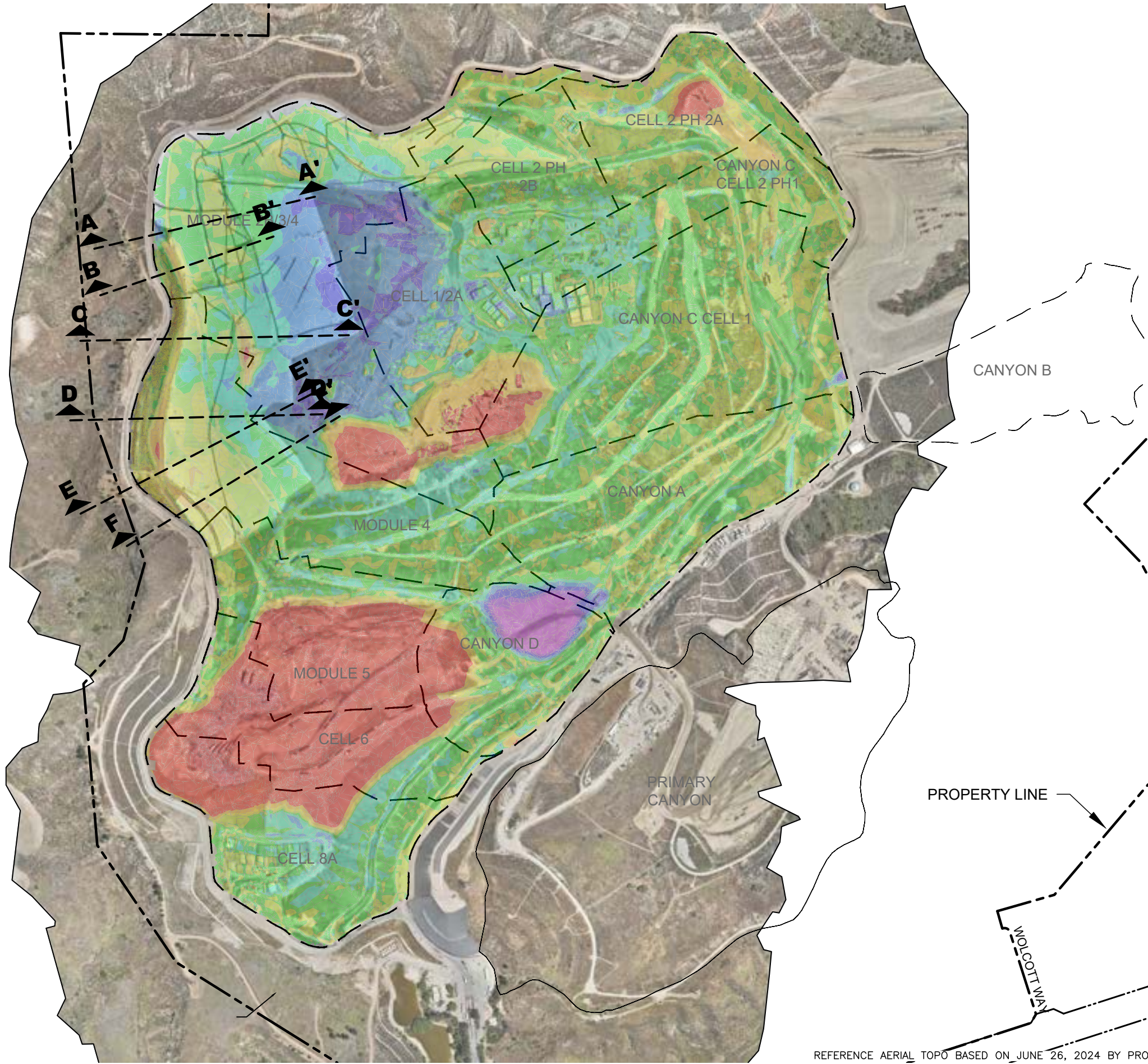
CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

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Appendix B-2
2023-2024 SETTLEMENT

P:\SITES\CHIQUITA CYN LF\COMPARATIVE STABILITY EVALUATION-2026\FIGURES\1026.1002-CCL-FIG 1-SETTLEMENT-2023VS2024.DWG August 20, 2026 - 11:01 AM BY: GLA-USER



LEGEND

PROPERTY BOUNDARY

EXISTING LINER

FILL (FT)

>+10

+10 TO +5

+5 TO +2

+2 TO 0

CUT (FT)

>-20

-20 TO -15

-15 TO -10

-10 TO -5

-5 TO -2

-2 TO 0

NOTE: MAP SHOWS FILL AND SETTLEMENT (CUT) BETWEEN 12/4/2023 AND 6/26/2024.

FIGURE 1

SETTLEMENT MAP AND
CROSS SECTIONS LOCATIONS
CHIQUITA CANYON LANDFILL
CASTAIC, CA

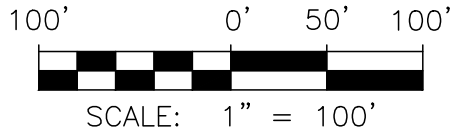
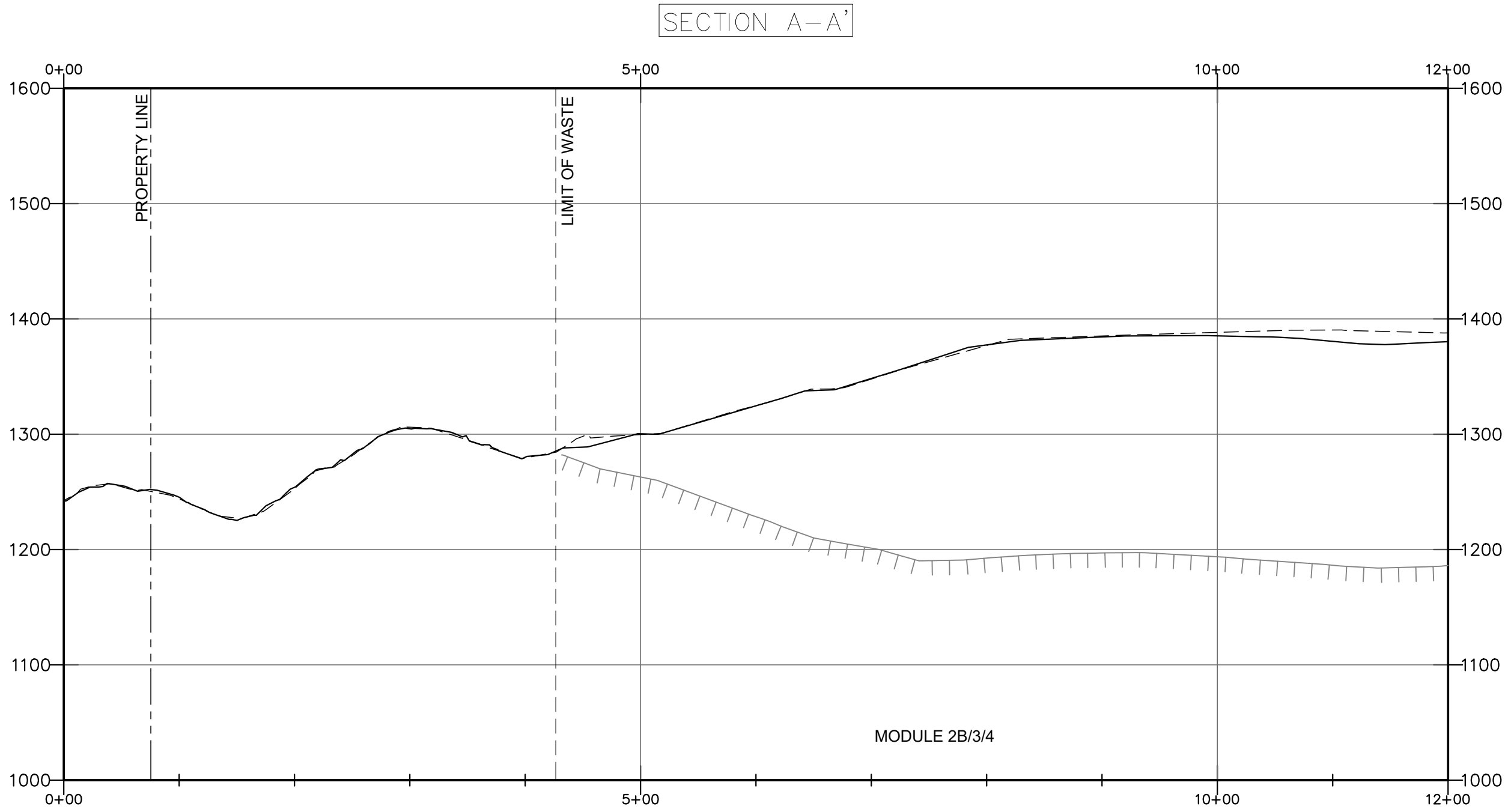
DRAWN BY:LP/RM

DATE: AUGUST 2026

JOB NO.:1026.1002.100

REFERENCE AERIAL TOPO BASED ON JUNE 26, 2024 BY PROPELLER

P:\SITES\CHIQUITA CYN LF\COMPARATIVE STABILITY EVALUATION-2026\MODELS\PROFILES\ZCCL-XS-(2026-08-20)_23VS24.DWG August 20, 2026



LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 2

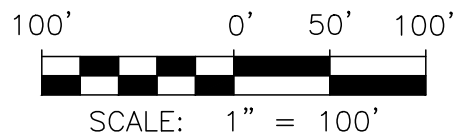
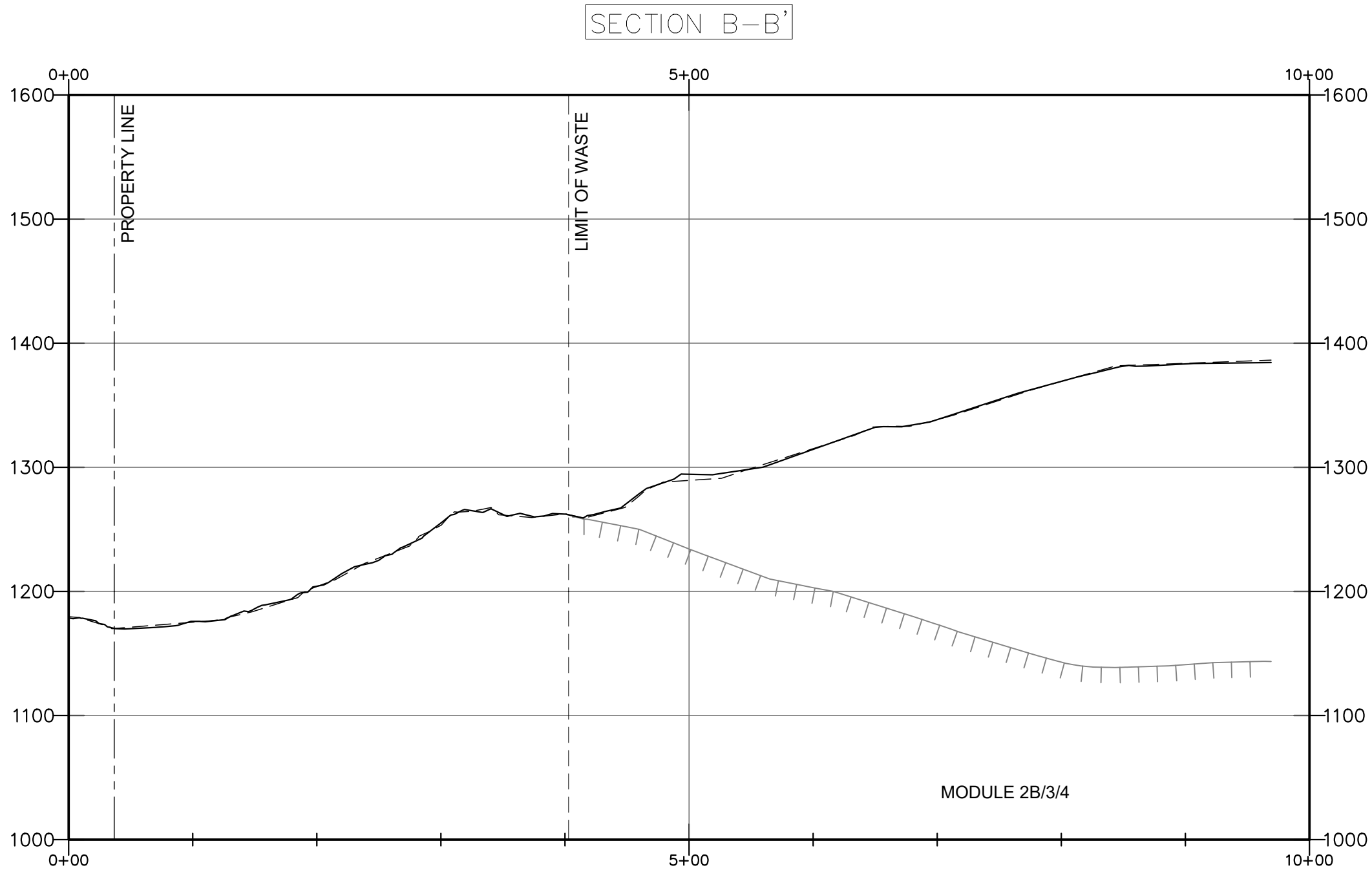
CROSS SECTION A-A'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 3

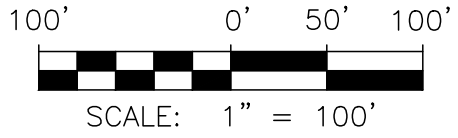
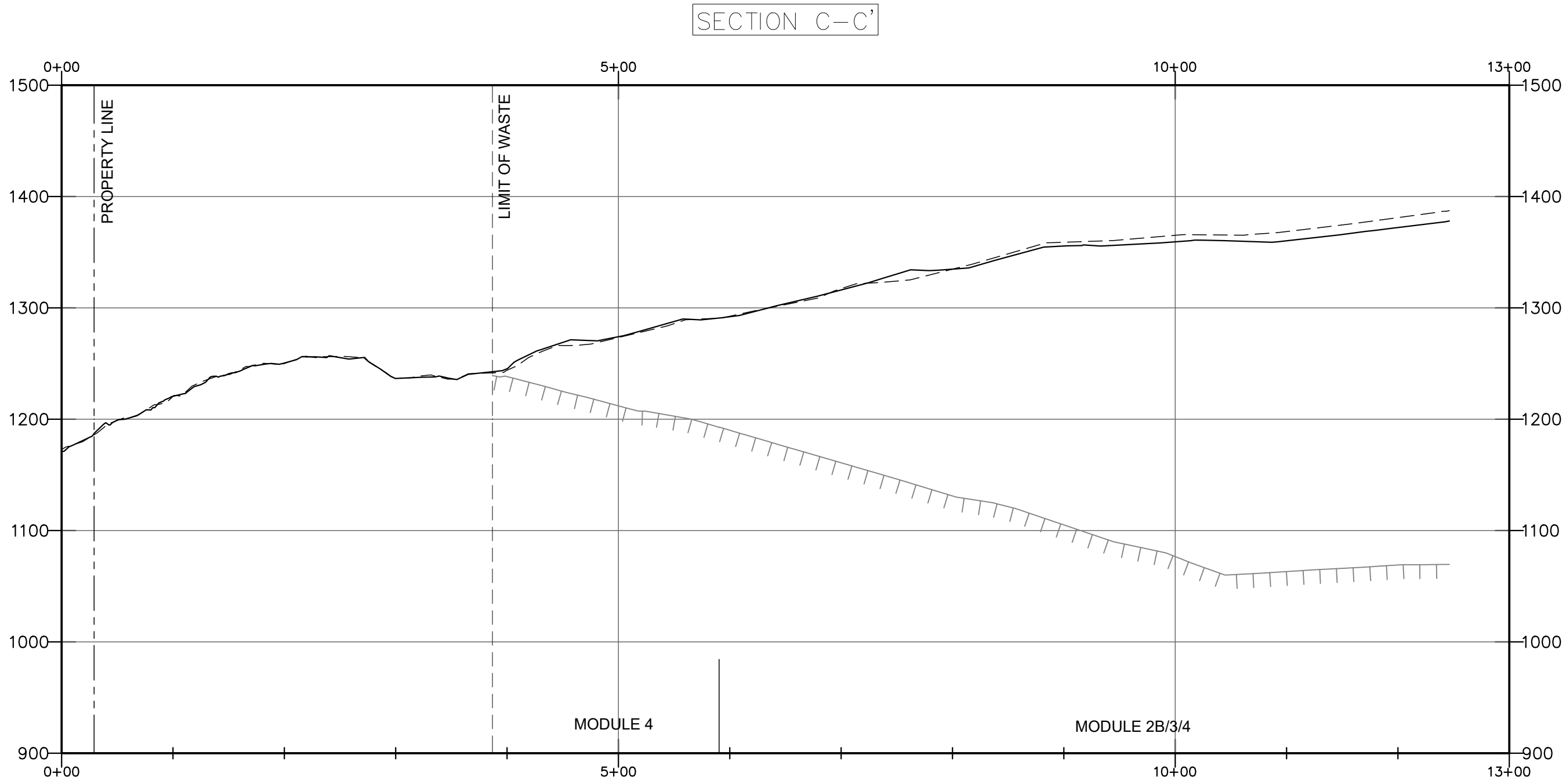
CROSS SECTION B-B'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP | DATE: AUGUST 2026 | JOB NO. 1026.1002

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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 4

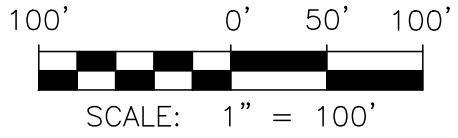
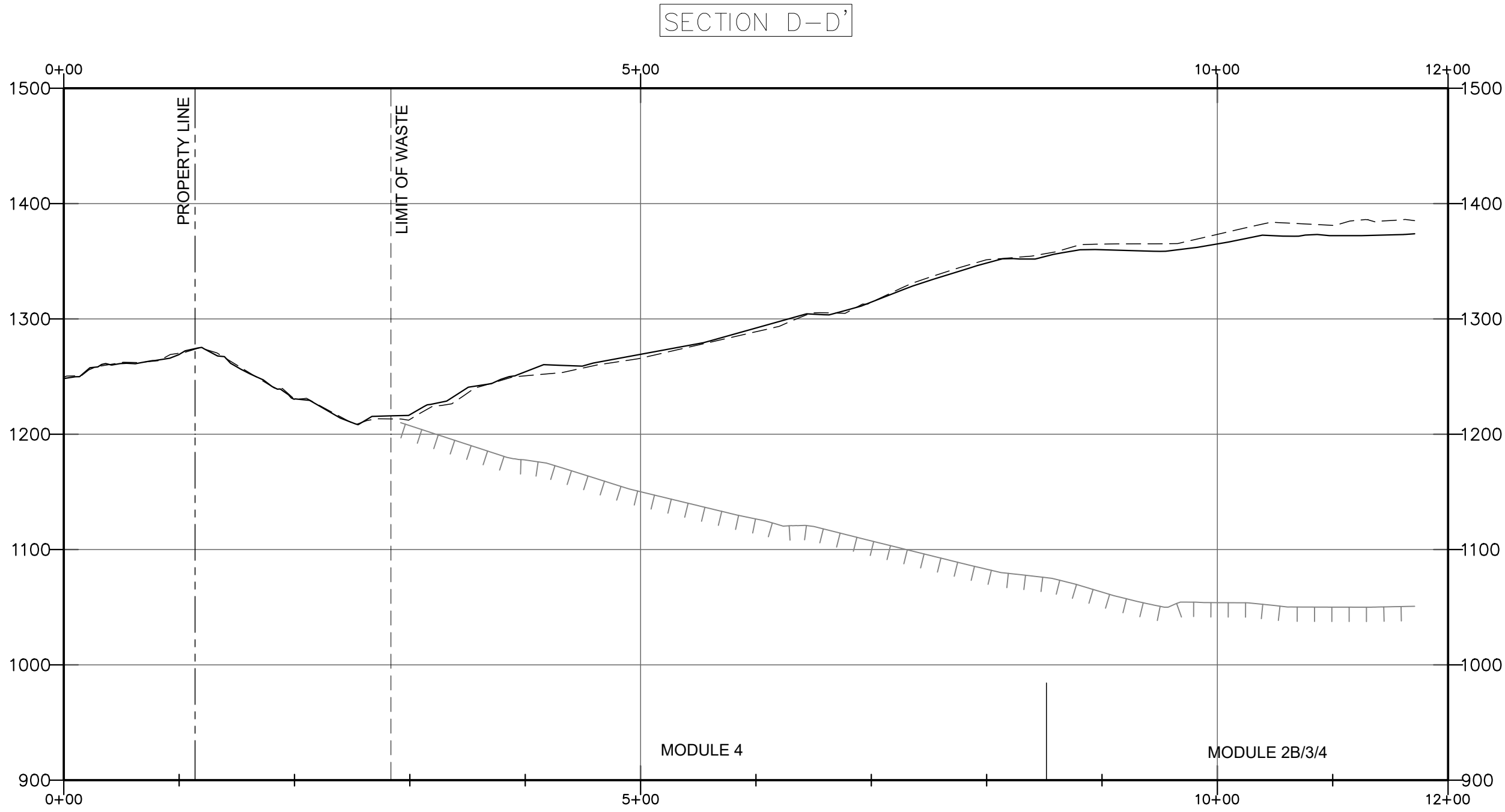
CROSS SECTION C-C'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 5

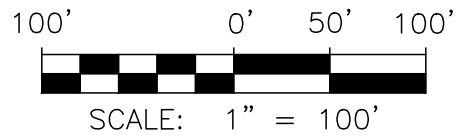
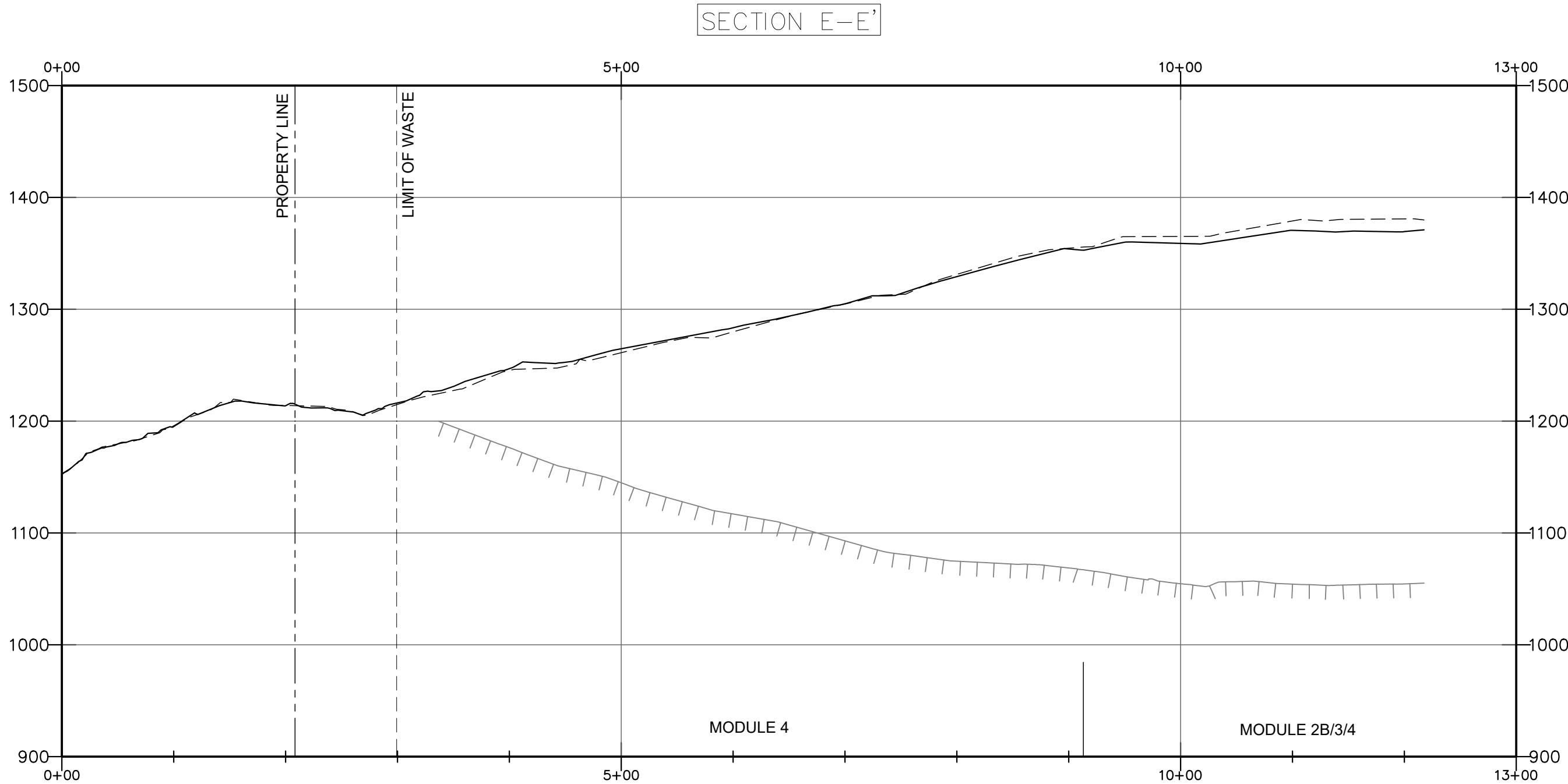
CROSS SECTION D-D'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 6

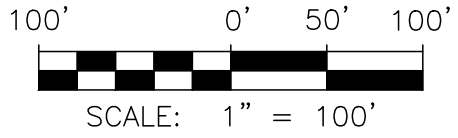
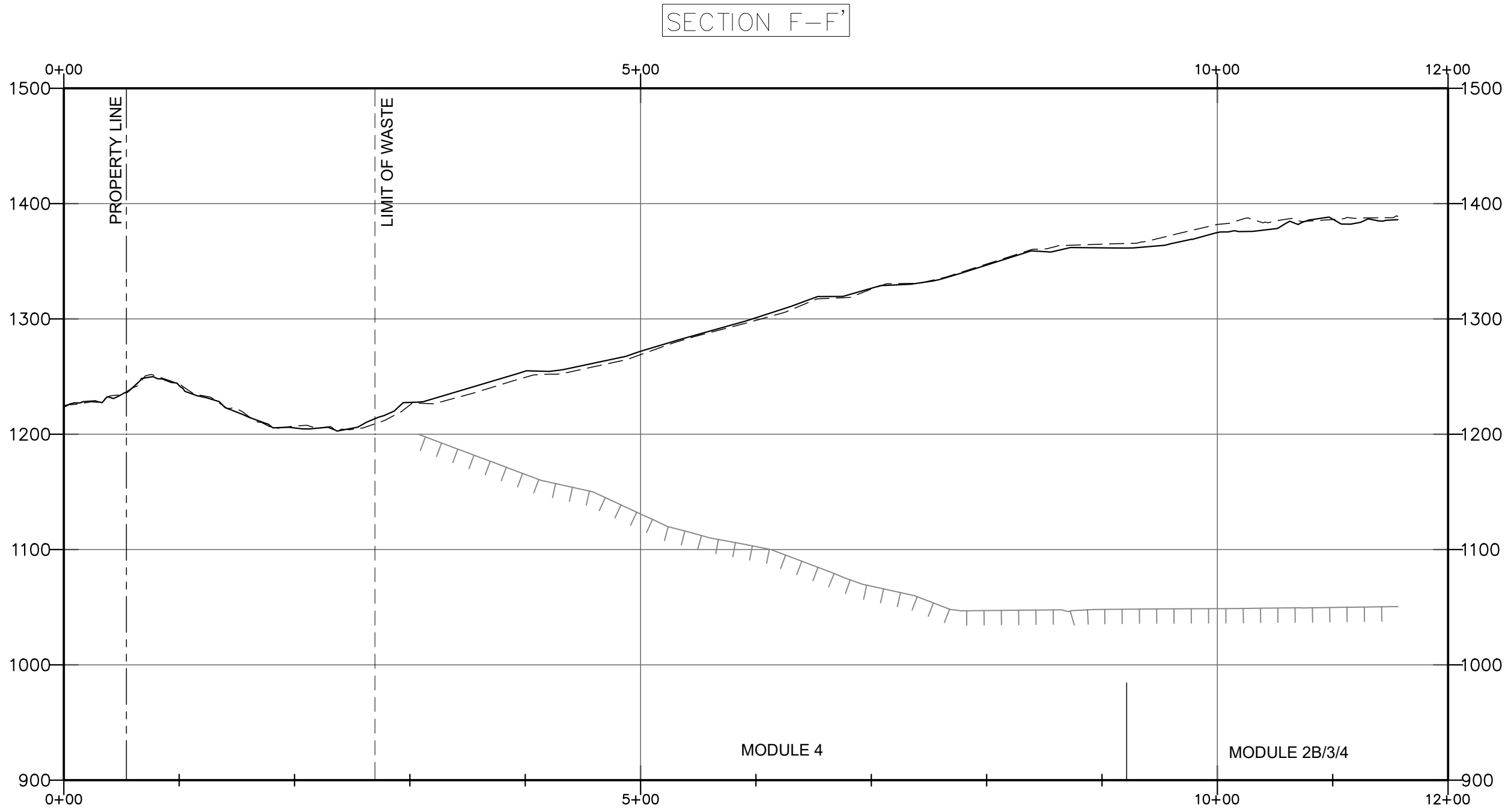
CROSS SECTION E-E'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP | DATE: AUGUST 2026 | JOB NO. 1026.1002

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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)		PROPERTY LINE
	TOPOGRAPHY (DECEMBER 4, 2023)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 7

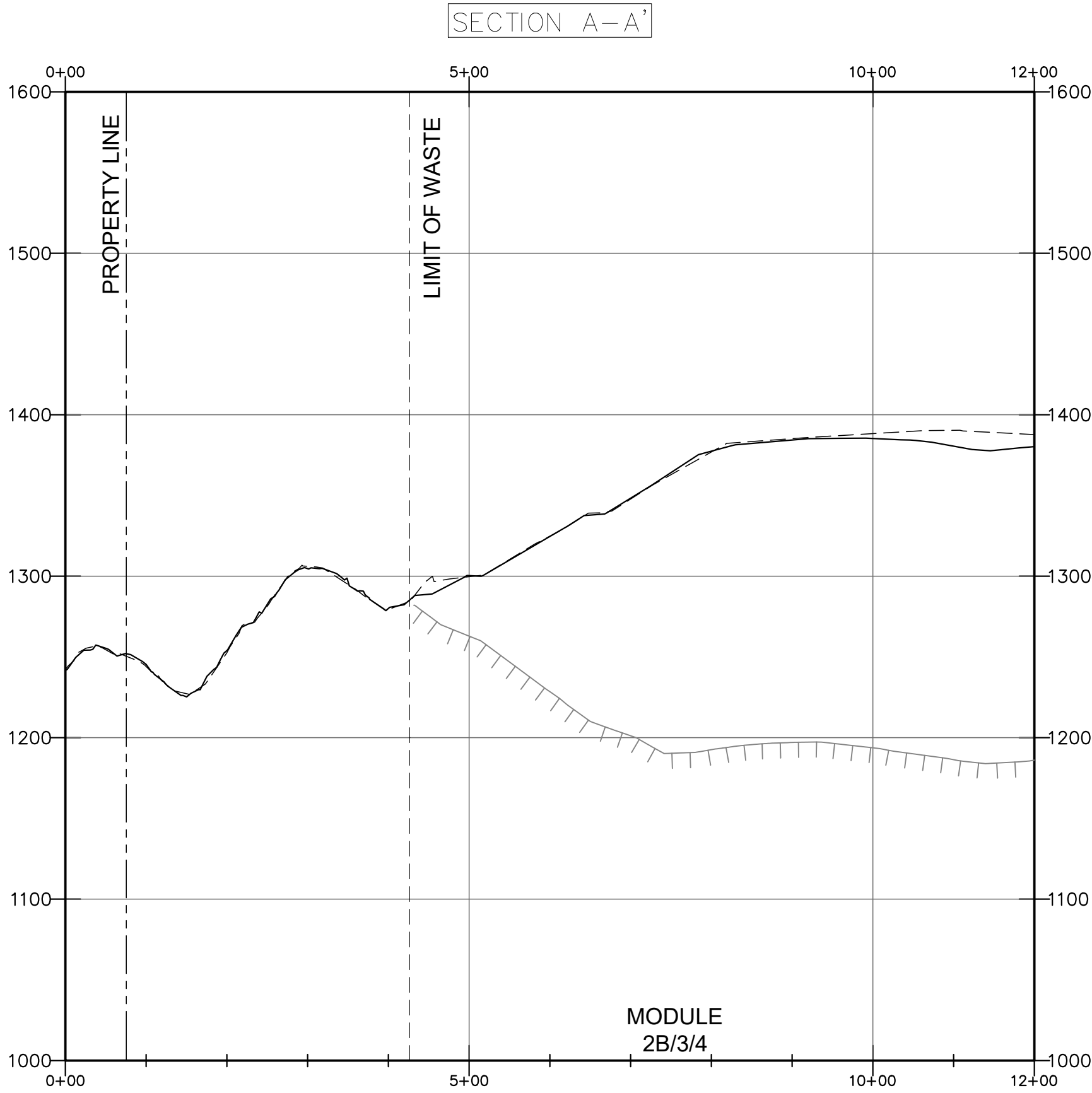
CROSS SECTION F-F'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

TOPOGRAPHY
(JUNE 26, 2024)

TOPOGRAPHY
(DECEMBER 4, 2023)

EXISTING LINER

PROPERTY LINE

LIMIT OF WASTE



FIGURE 2

CROSS SECTION A-A'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

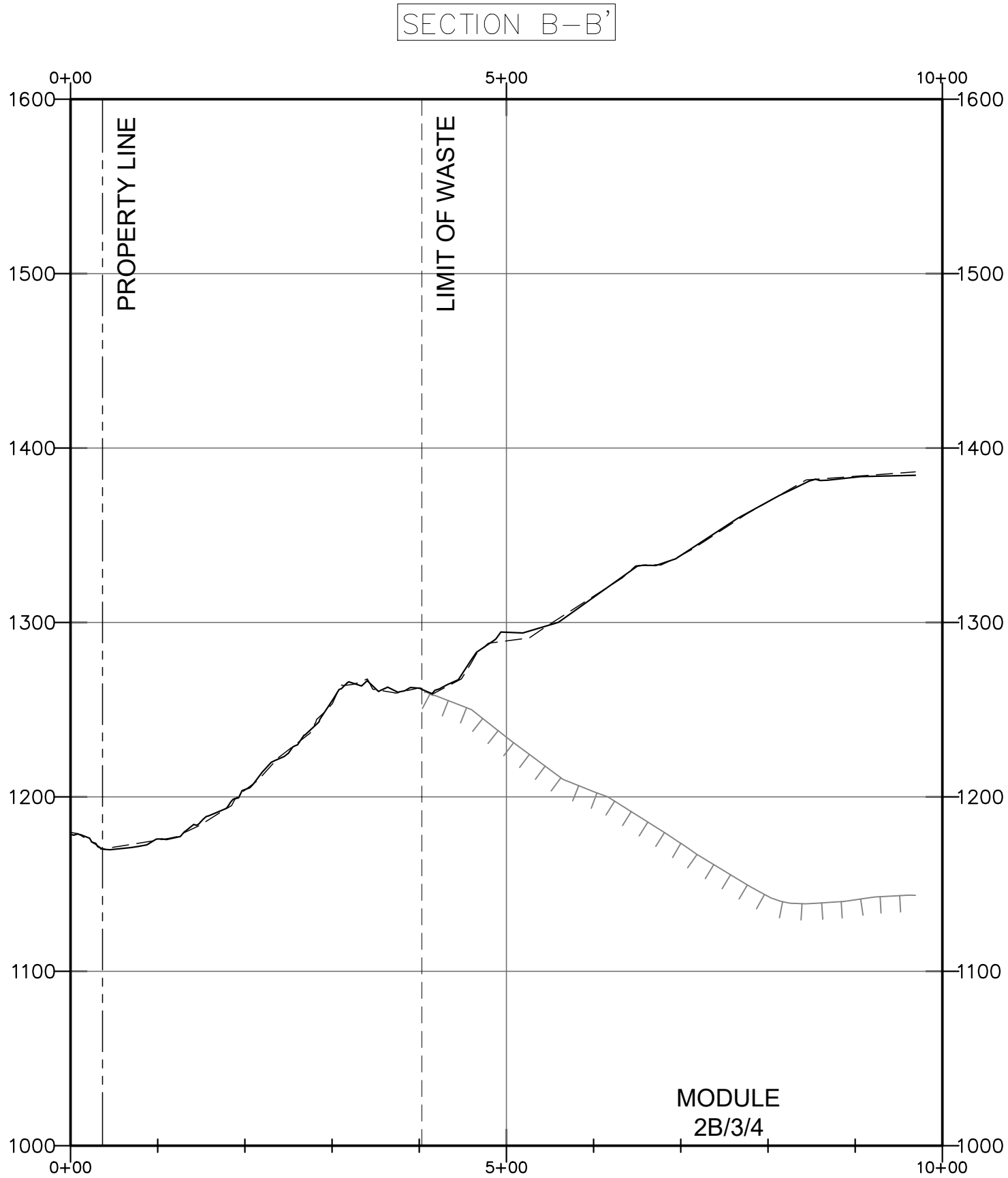
Geo-Logic

ASSOCIATES

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DATE: AUGUST 2026

JOB NO. 1026.1002



LEGEND

	TOPOGRAPHY (JUNE 26, 2024)
	TOPOGRAPHY (DECEMBER 4, 2023)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE



FIGURE 3

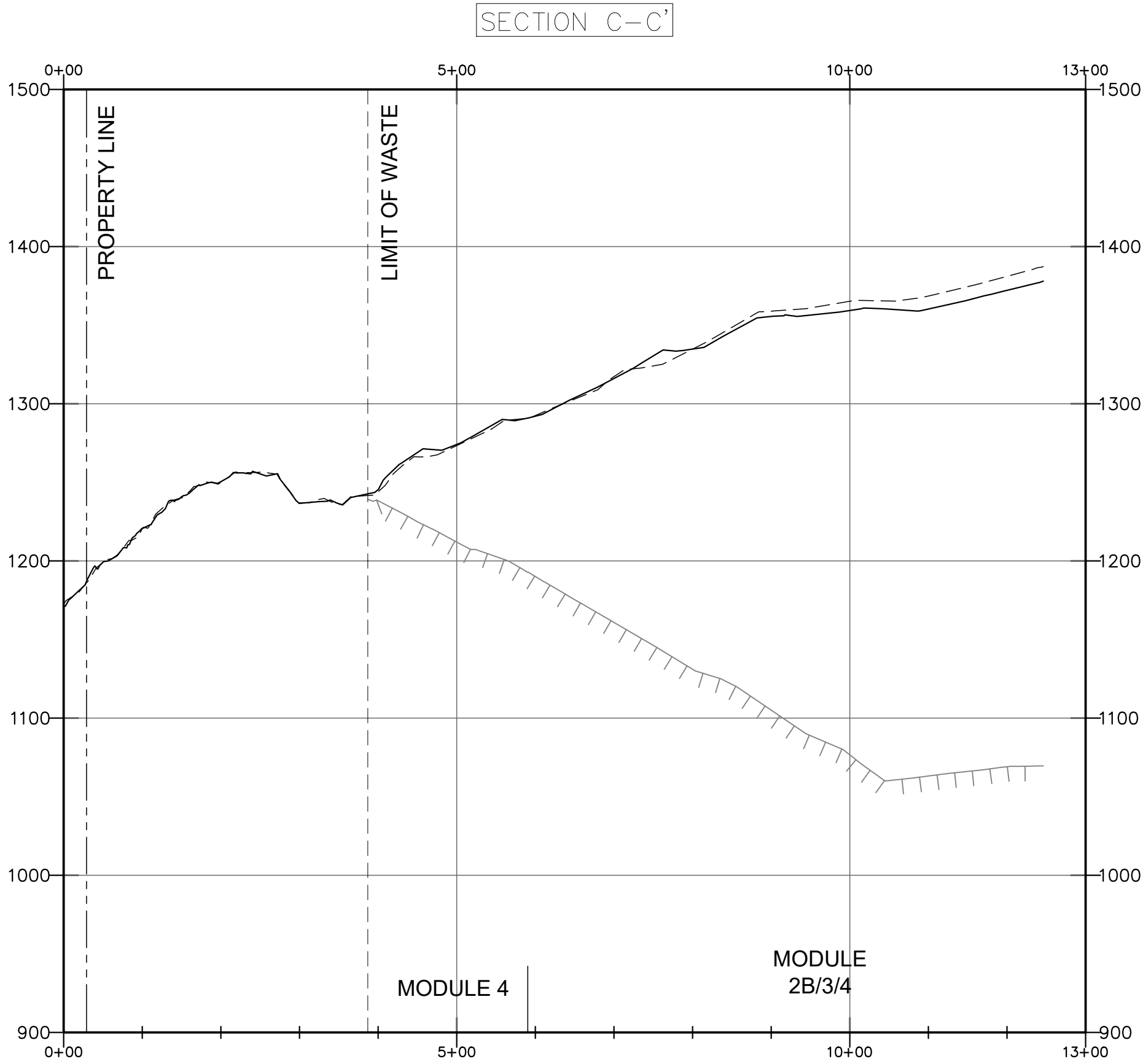
CROSS SECTION B-B'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

TOPOGRAPHY
(JUNE 26, 2024)

TOPOGRAPHY
(DECEMBER 4, 2023)

EXISTING LINER

PROPERTY LINE

LIMIT OF WASTE

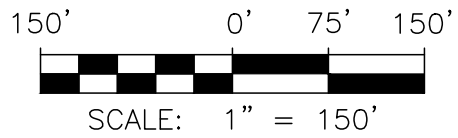


FIGURE 4

CROSS SECTION C-C'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

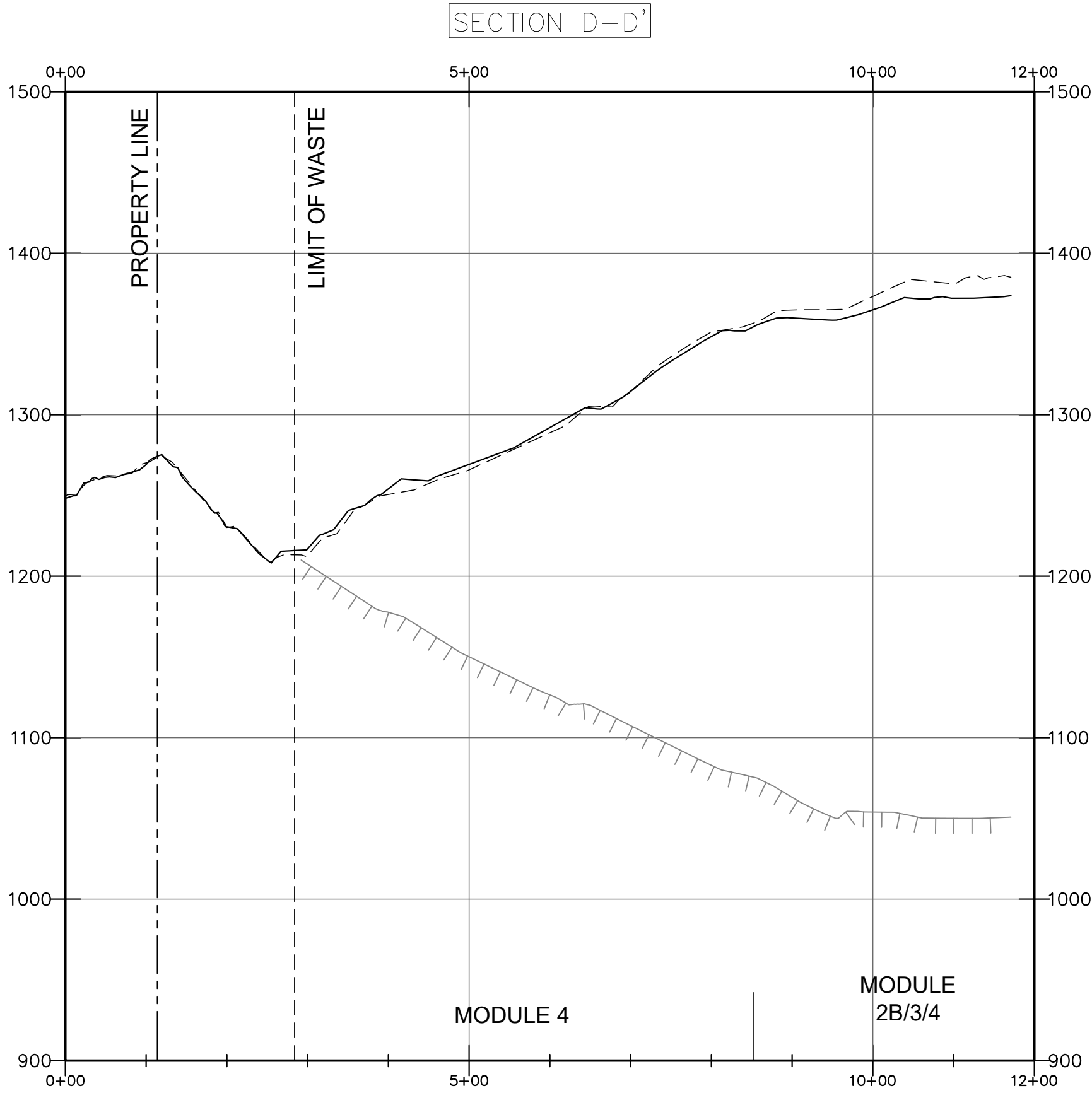
Geo-Logic

ASSOCIATES

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LEGEND

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	TOPOGRAPHY (DECEMBER 4, 2023)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE



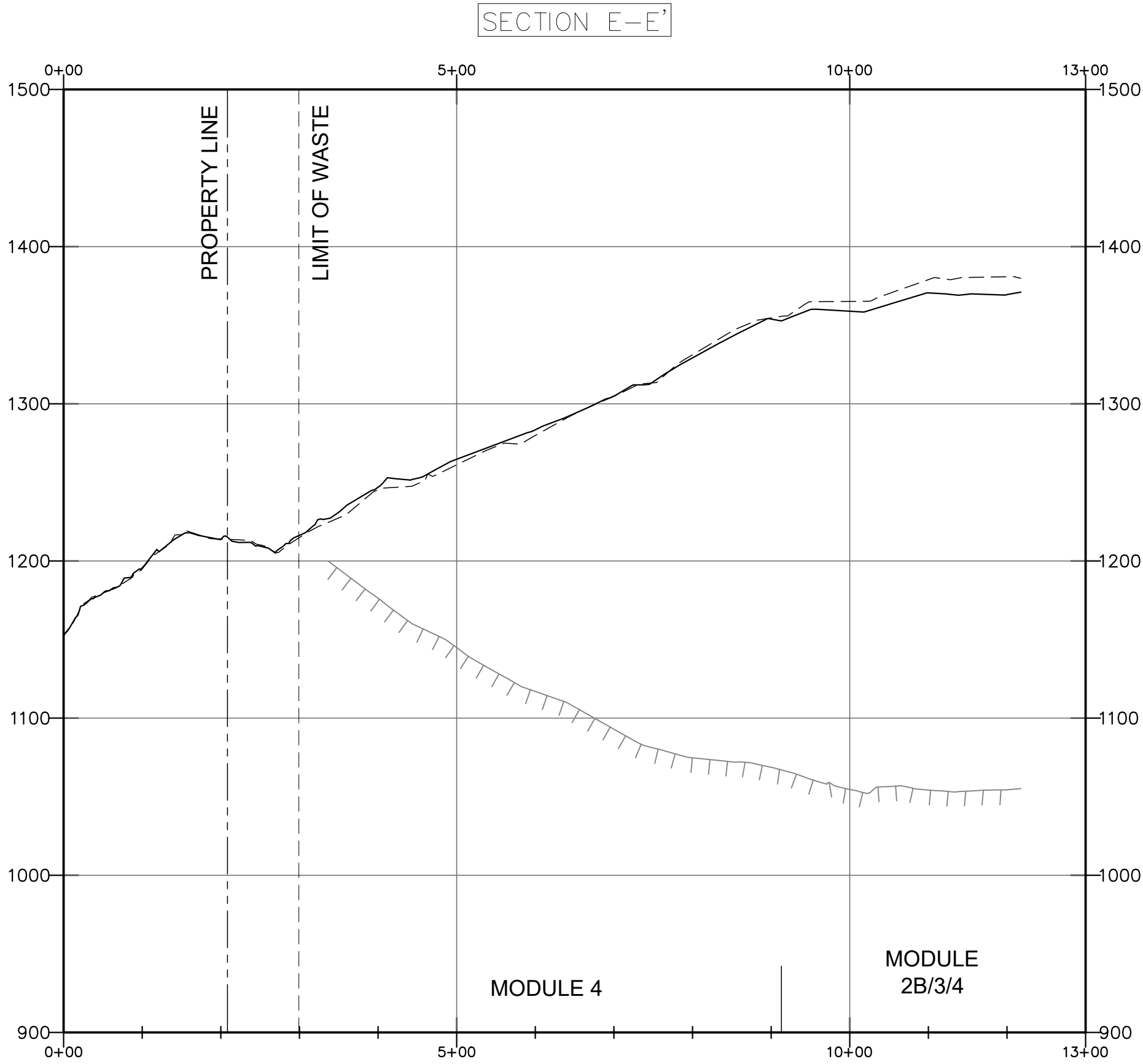
FIGURE 5

CROSS SECTION D-D'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

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LEGEND

TOPOGRAPHY
(JUNE 26, 2024)

TOPOGRAPHY
(DECEMBER 4, 2023)

EXISTING LINER

PROPERTY LINE

LIMIT OF WASTE

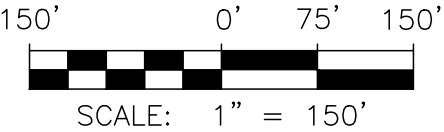


FIGURE 6

CROSS SECTION E-E'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic

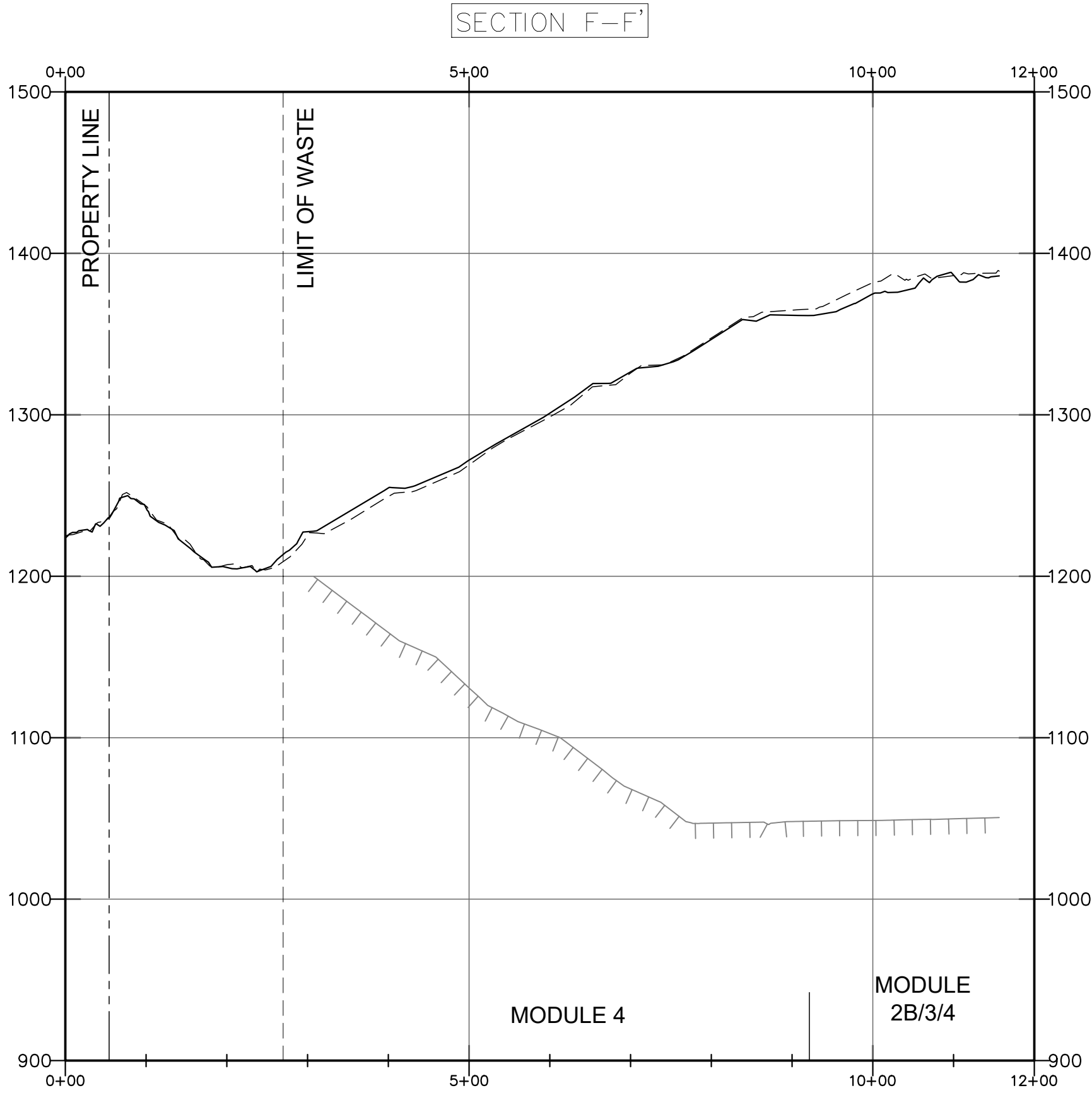
ASSOCIATES

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DATE: AUGUST 2026

JOB NO. 1026.1002

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LEGEND

	TOPOGRAPHY (JUNE 26, 2024)
	TOPOGRAPHY (DECEMBER 4, 2023)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE

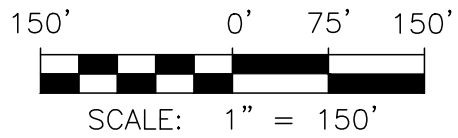


FIGURE 7

CROSS SECTION F-F'

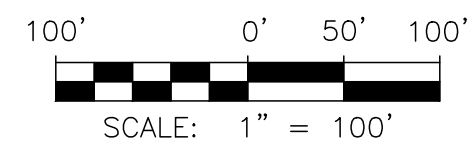
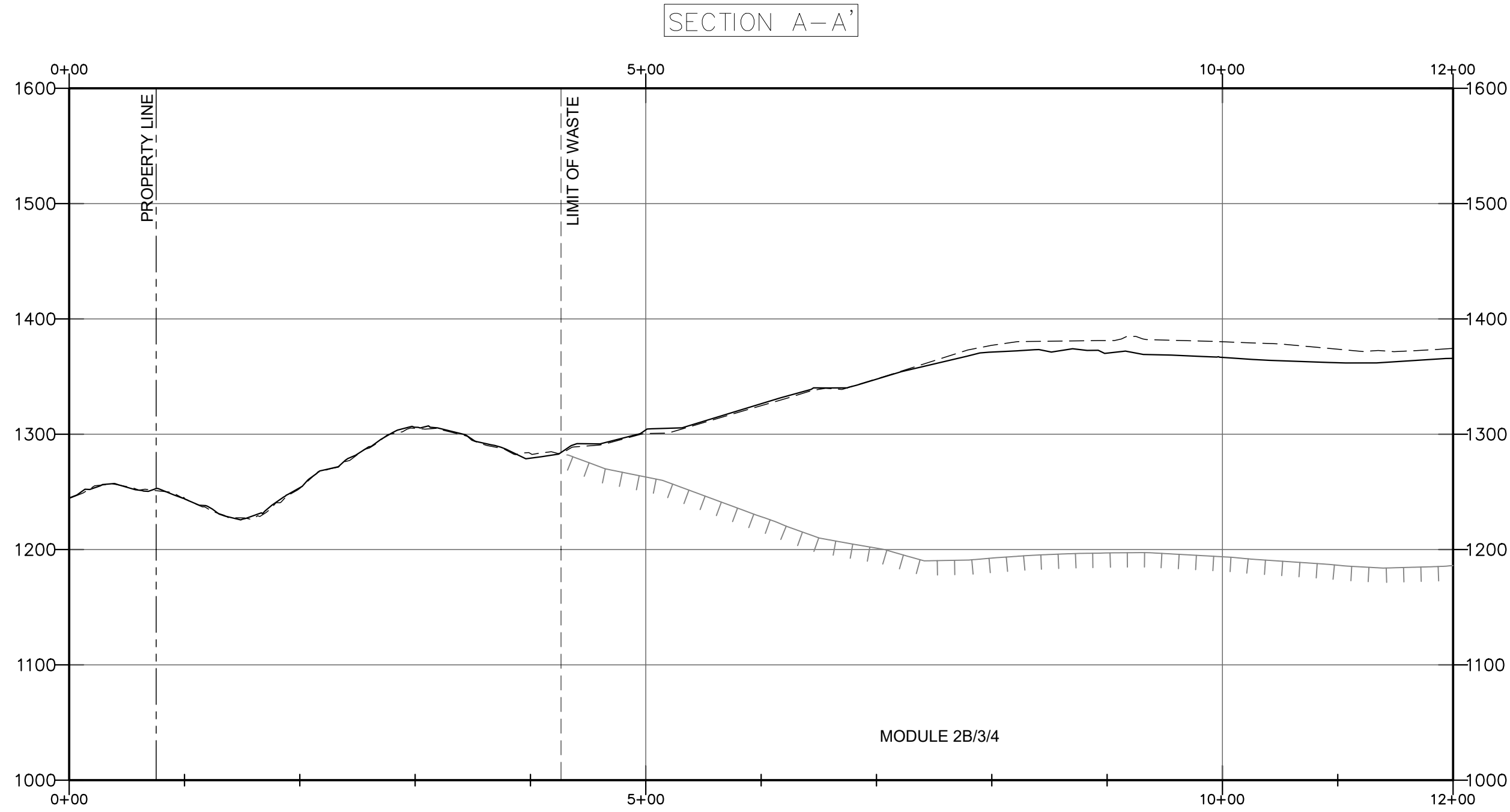
CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

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Appendix B-3
2024-2026 SETTLEMENT

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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)		PROPERTY LINE
	TOPOGRAPHY (NOVEMBER 27, 2024)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 2

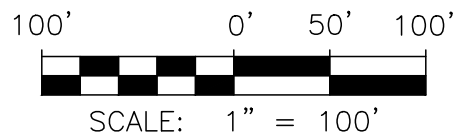
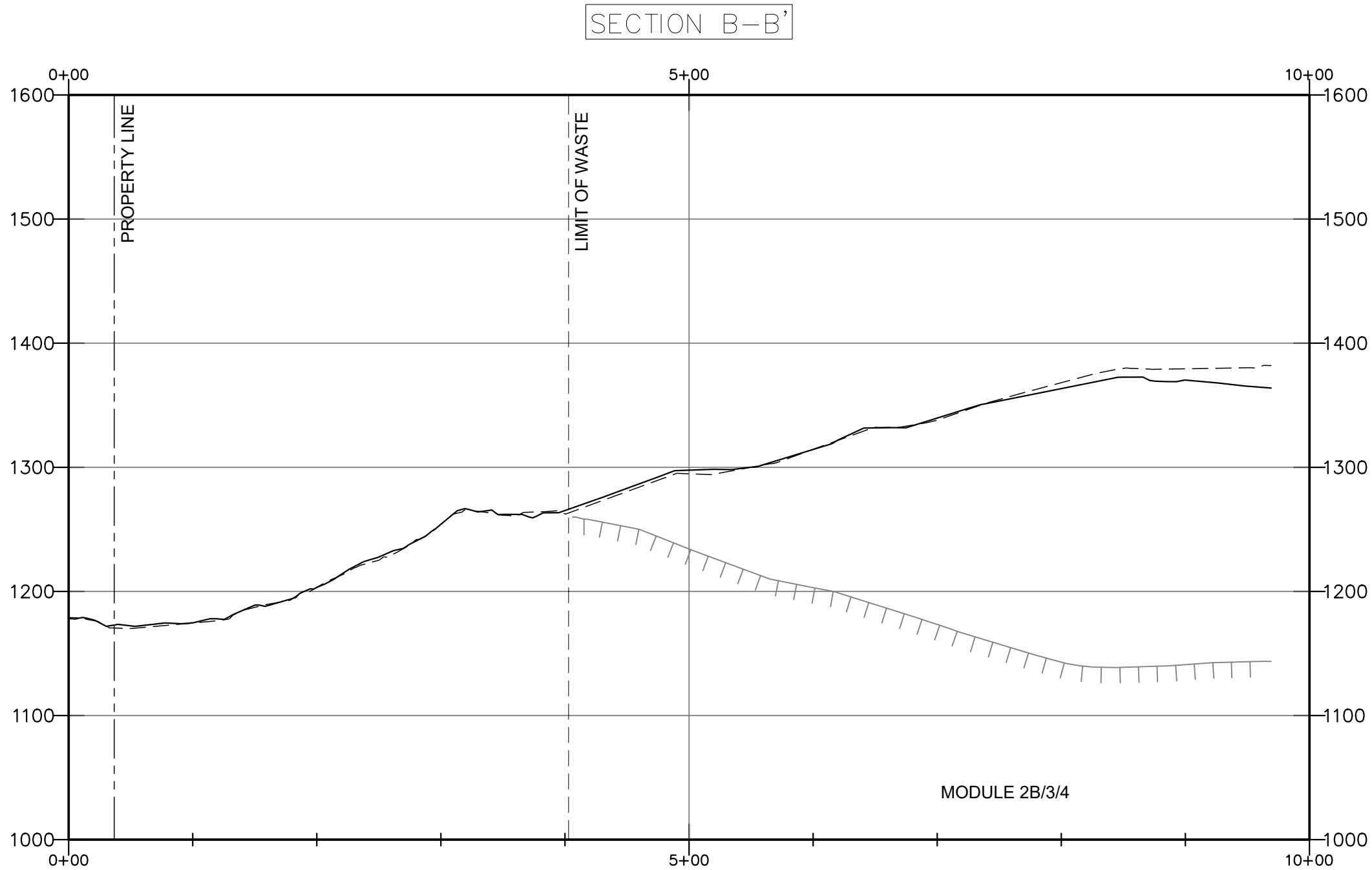
CROSS SECTION A-A'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)		PROPERTY LINE
	TOPOGRAPHY (NOVEMBER 27, 2024)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 3

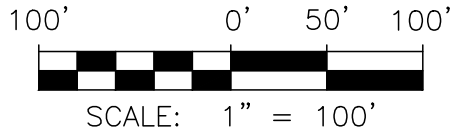
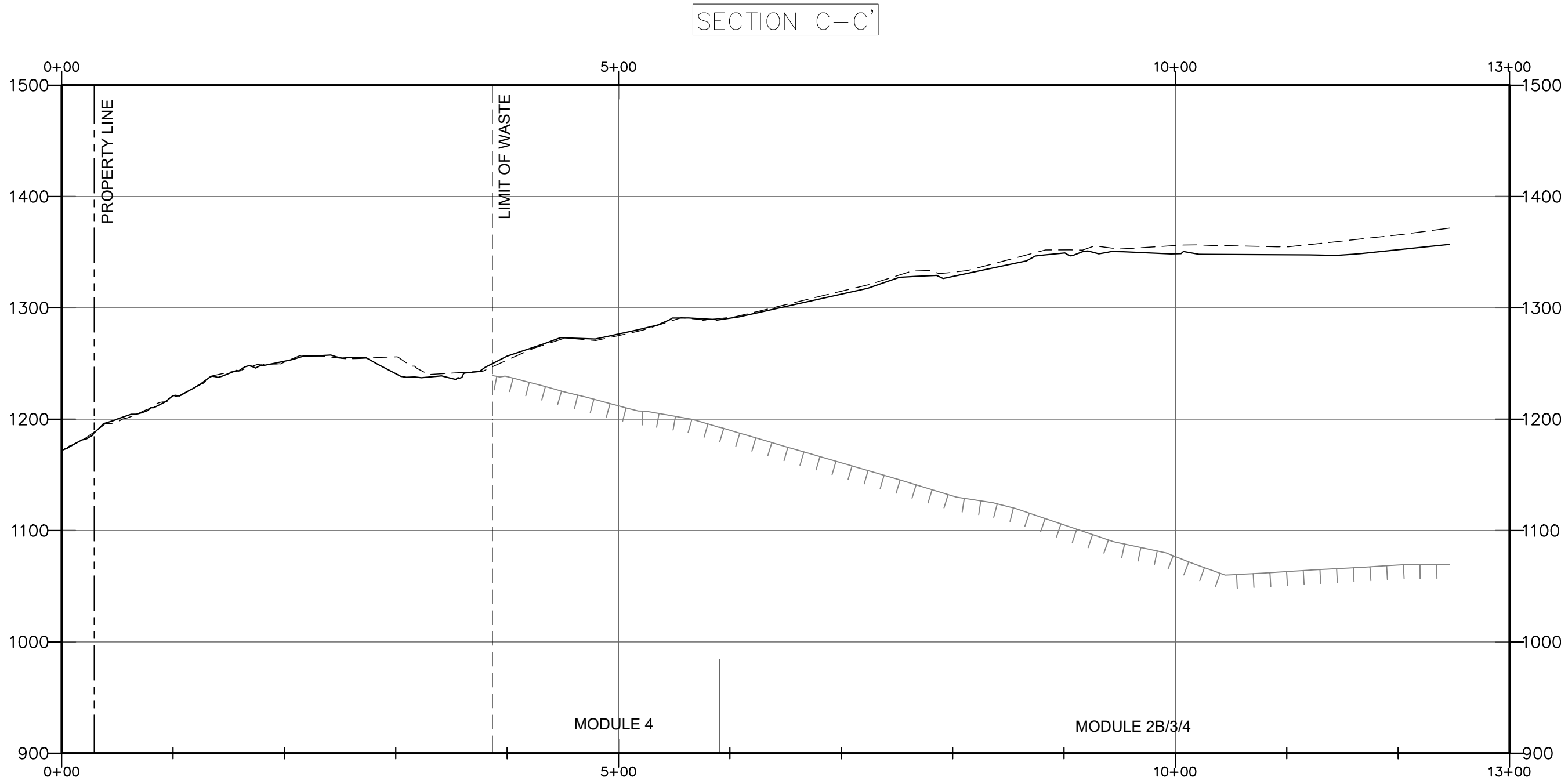
CROSS SECTION B-B'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP | DATE: AUGUST 2026 | JOB NO. 1026.1002

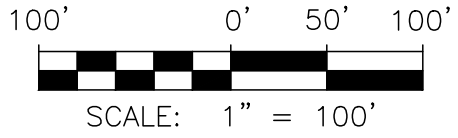
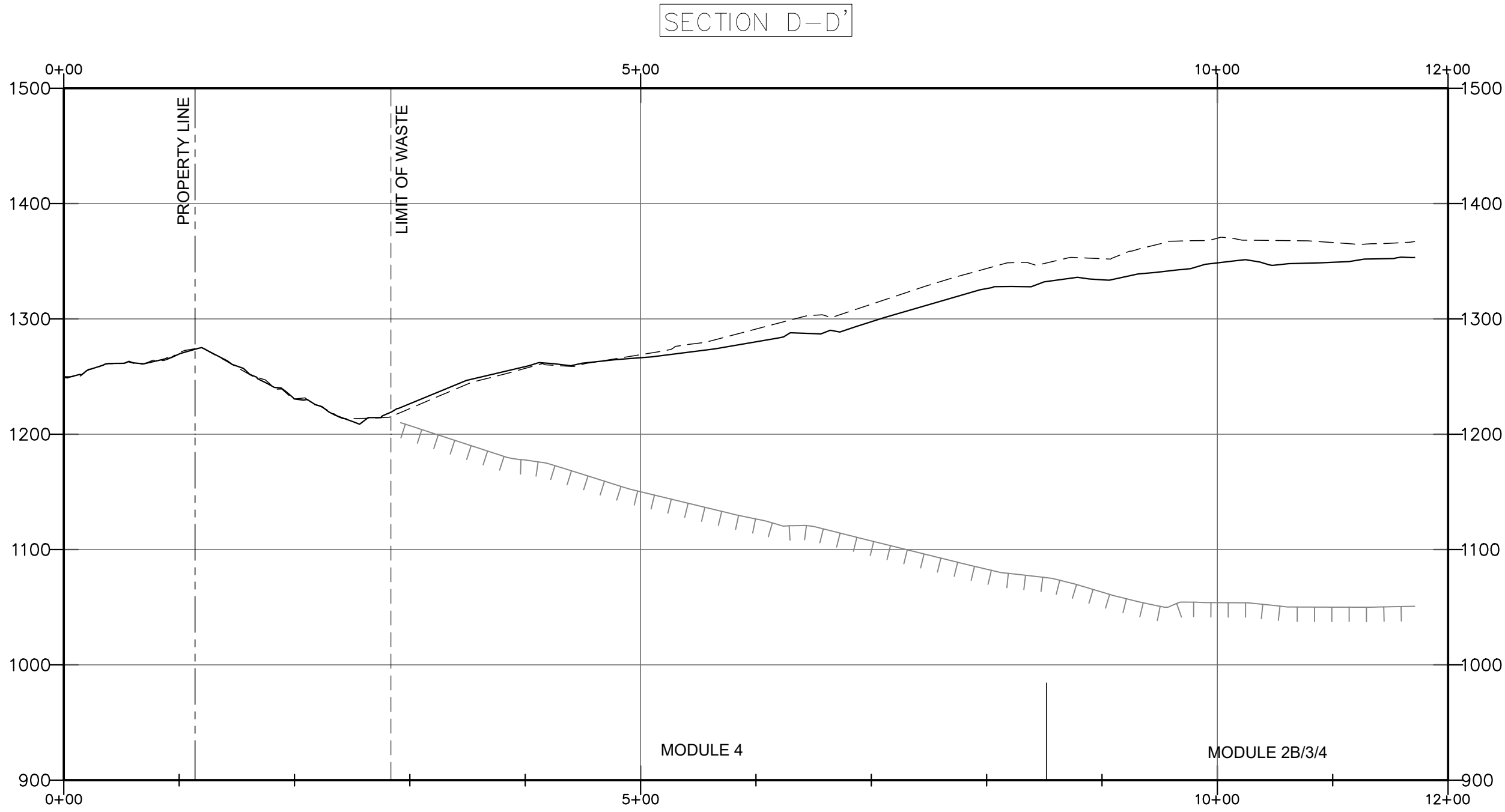
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LEGEND	
	CURRENT TOPOGRAPHY (APRIL 15, 2026)
	TOPOGRAPHY (NOVEMBER 27, 2024)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE

FIGURE 4		
CROSS SECTION C-C'		
CHIQUITA CANYON LANDFILL CASTAIC, CALIFORNIA		
CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002

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LEGEND

 CURRENT TOPOGRAPHY
(APRIL 15, 2026)

 TOPOGRAPHY
(NOVEMBER 27, 2024)

 EXISTING LINER

 PROPERTY LINE

 LIMIT OF WASTE

FIGURE 5

CROSS SECTION D-D'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

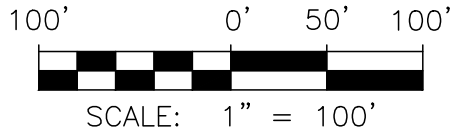
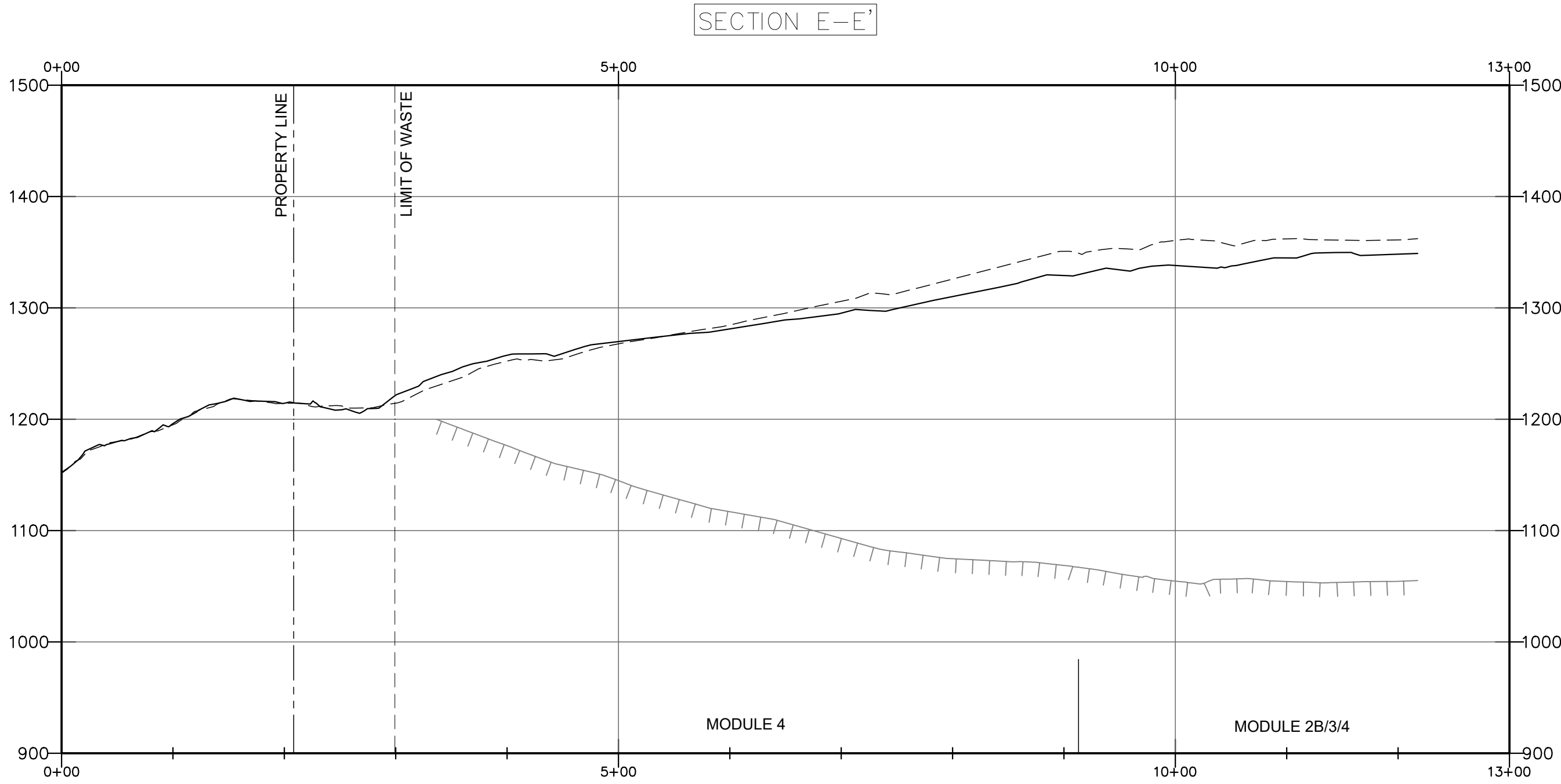


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DATE: AUGUST 2026

JOB NO. 1026.1002

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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)		PROPERTY LINE
	TOPOGRAPHY (NOVEMBER 27, 2024)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 6

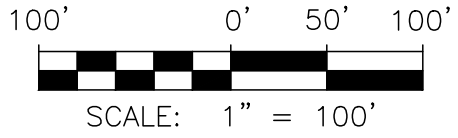
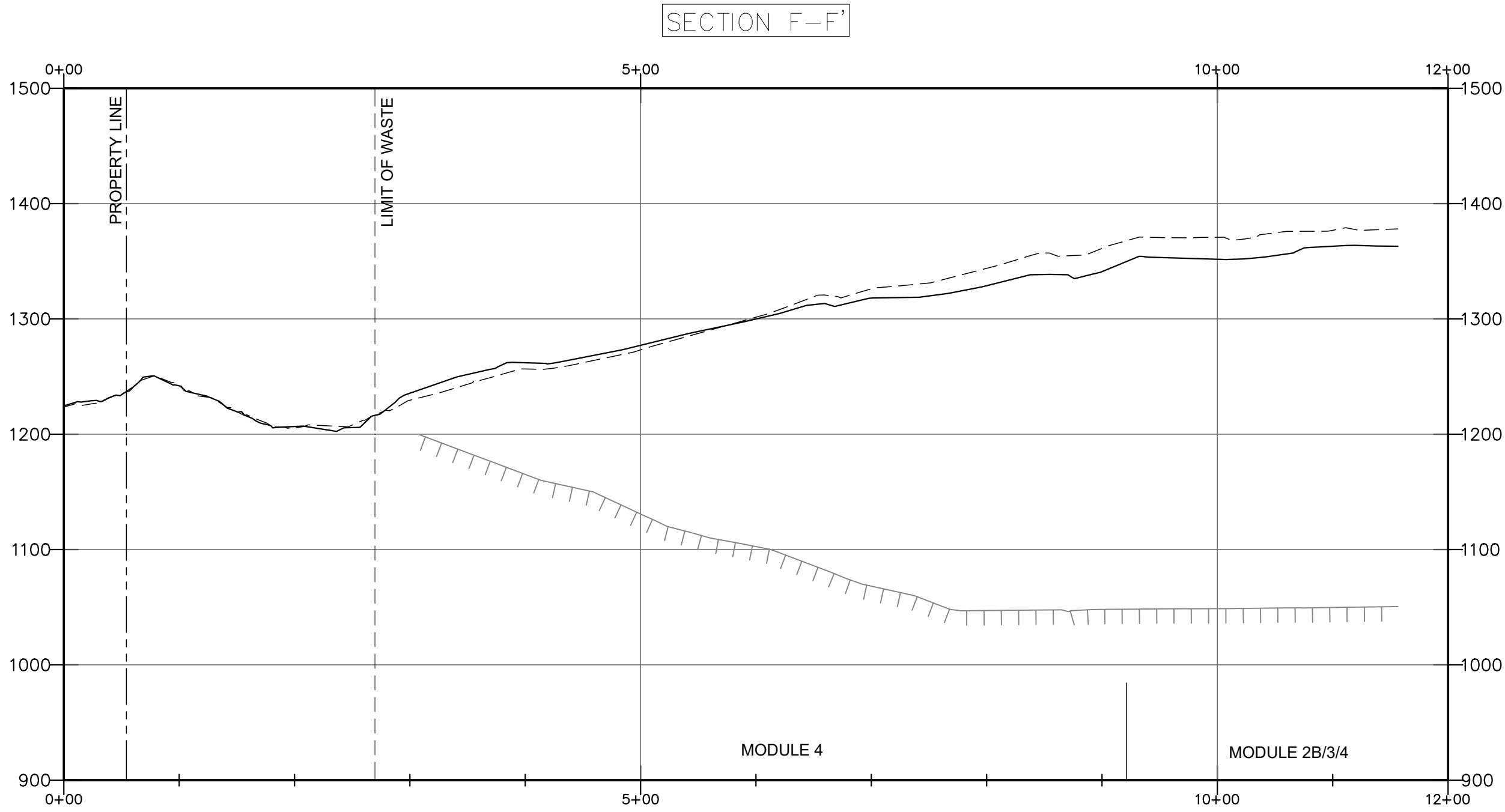
CROSS SECTION E-E'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)		PROPERTY LINE
	TOPOGRAPHY (NOVEMBER 27, 2024)		LIMIT OF WASTE
	EXISTING LINER		

FIGURE 7

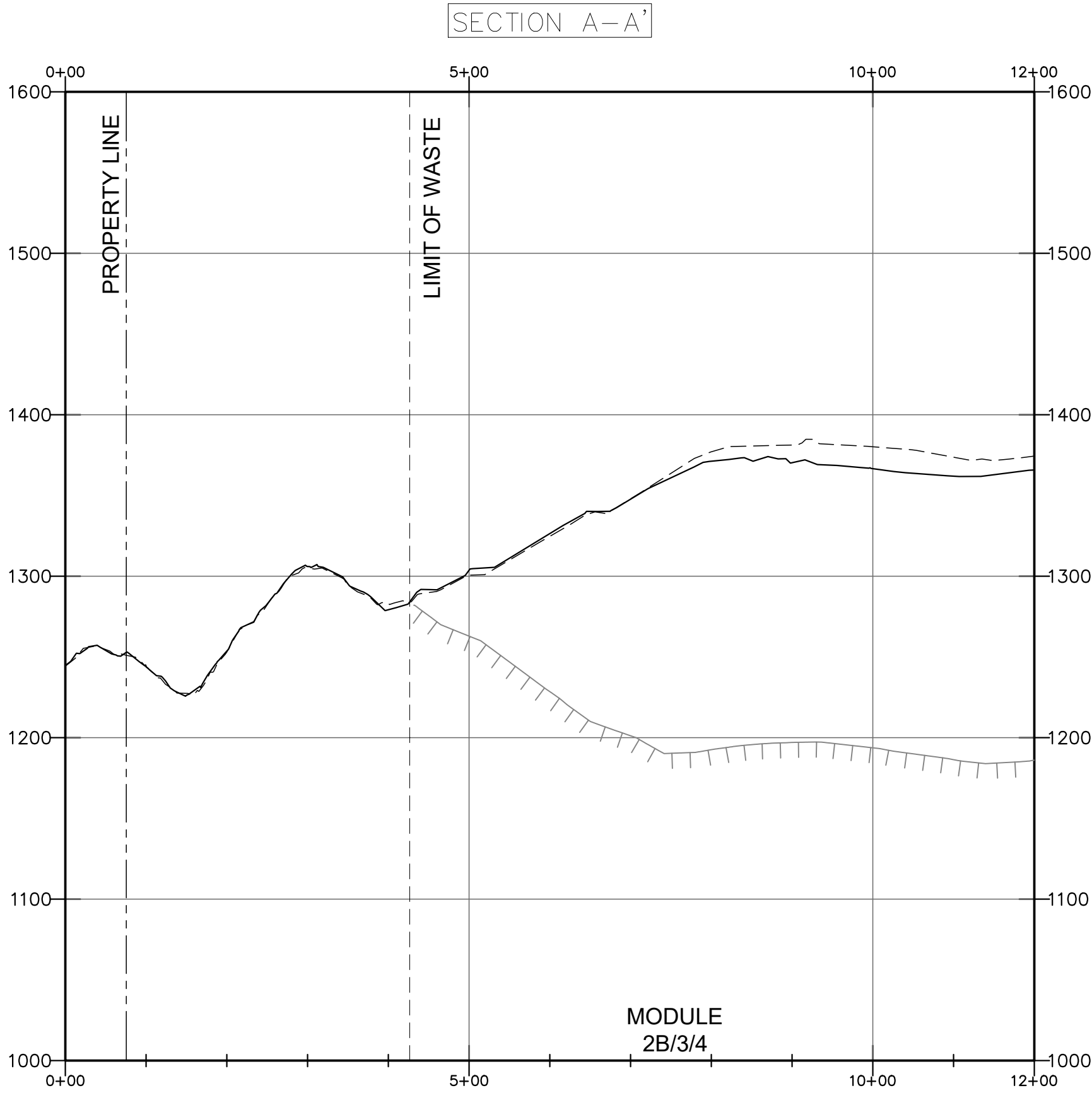
CROSS SECTION F-F'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)
	TOPOGRAPHY (NOVEMBER 27, 2024)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE



FIGURE 2

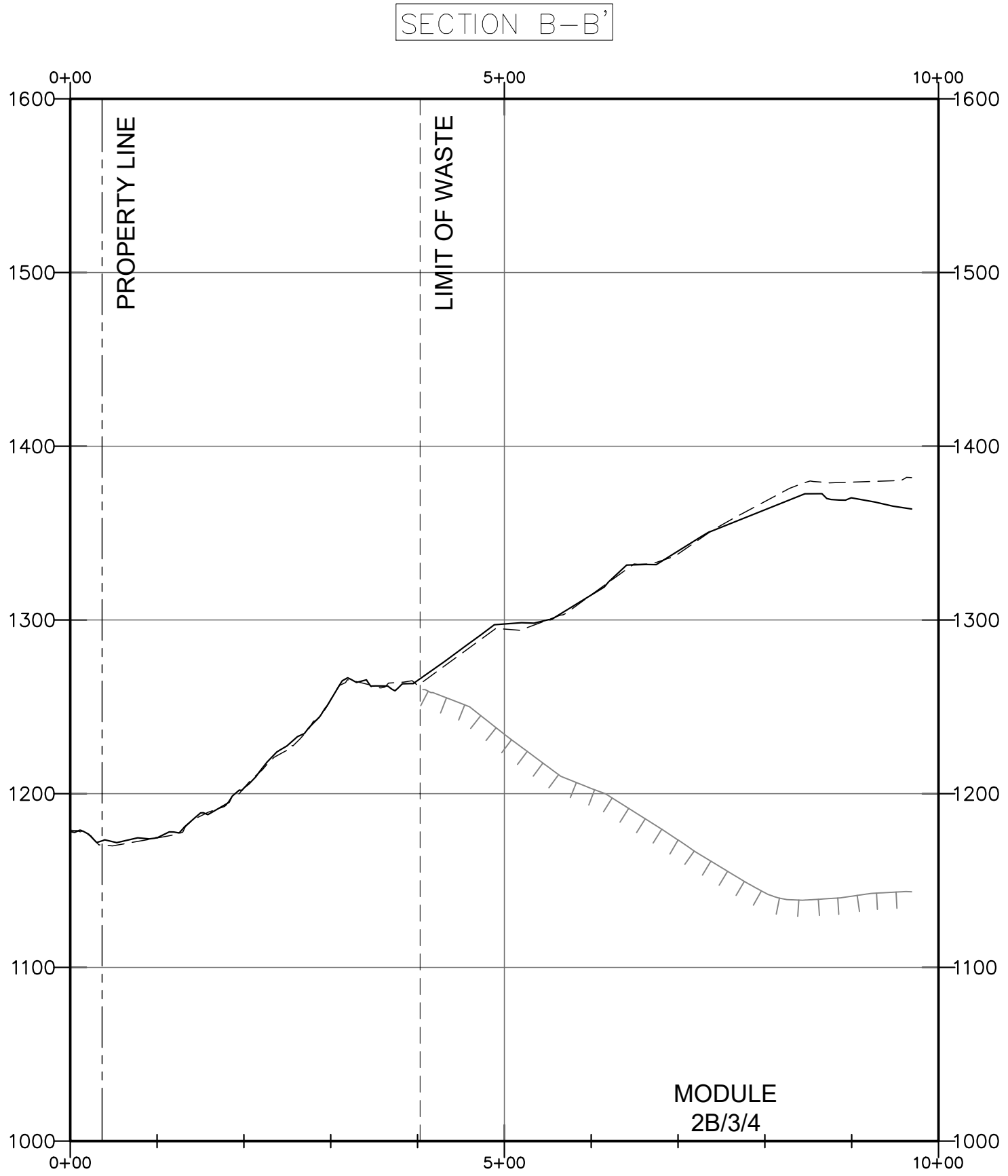
CROSS SECTION A-A'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

Geo-Logic
ASSOCIATES

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LEGEND

- CURRENT TOPOGRAPHY (APRIL 15, 2026)
- TOPOGRAPHY (NOVEMBER 27, 2024)
- EXISTING LINER
- PROPERTY LINE
- LIMIT OF WASTE

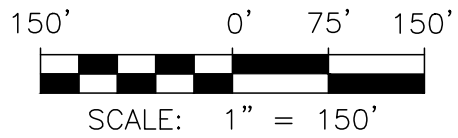


FIGURE 3

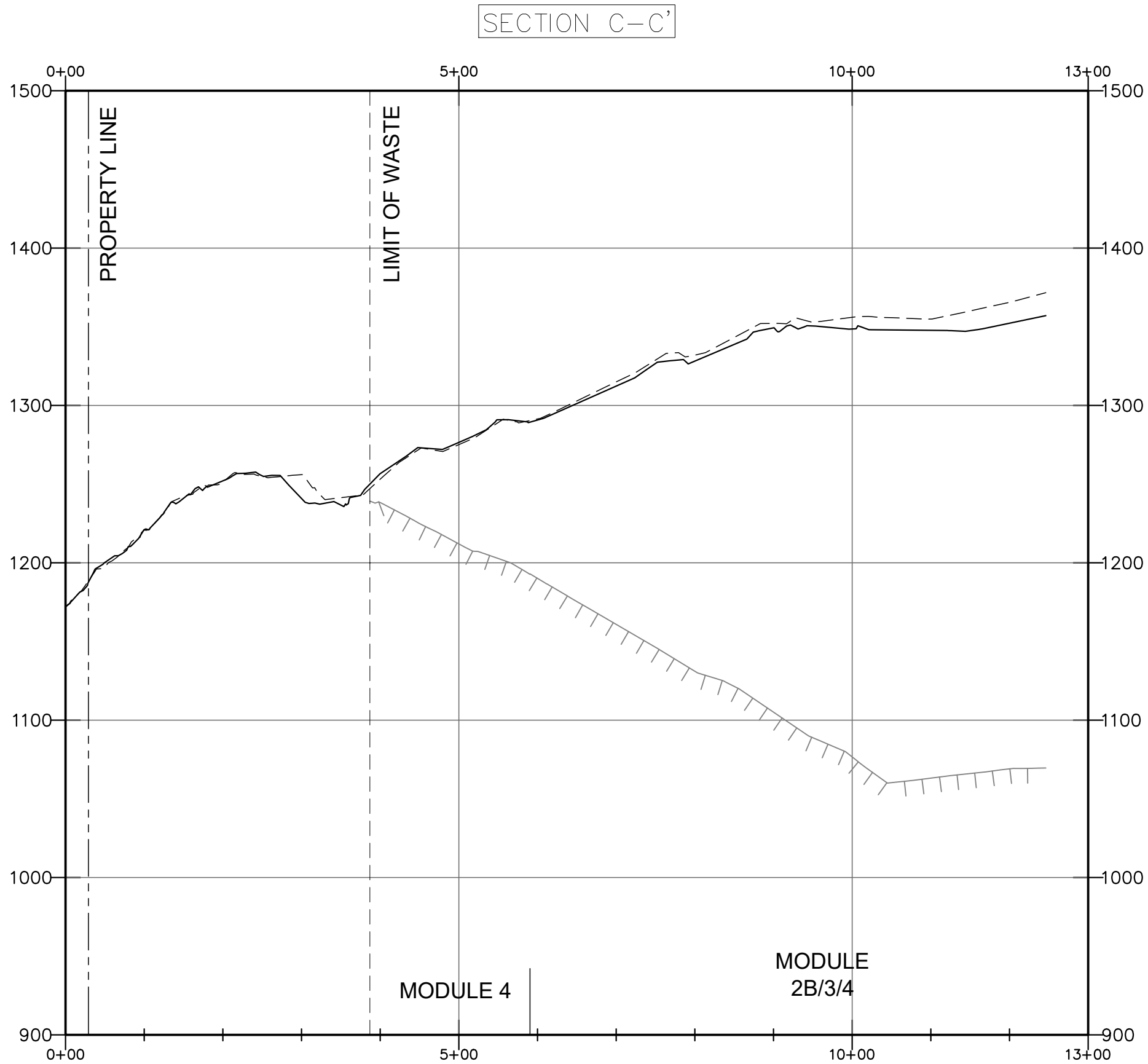
CROSS SECTION B-B'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)
	TOPOGRAPHY (NOVEMBER 27, 2024)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE

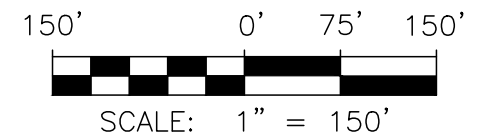


FIGURE 4

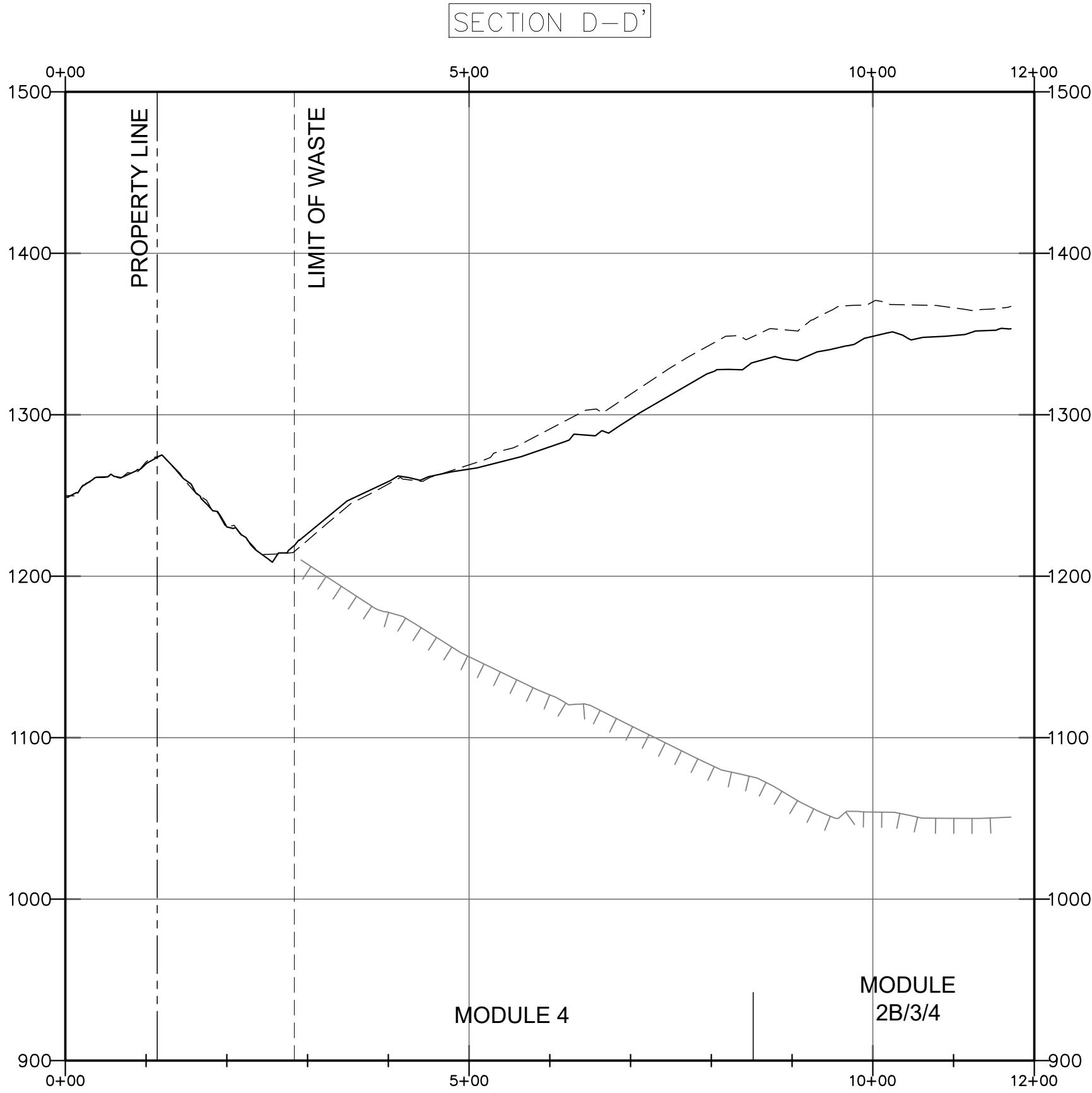
CROSS SECTION C-C'

CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)
	TOPOGRAPHY (NOVEMBER 27, 2024)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE

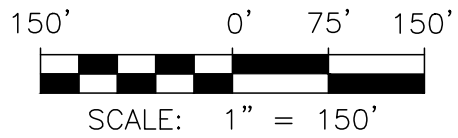


FIGURE 5

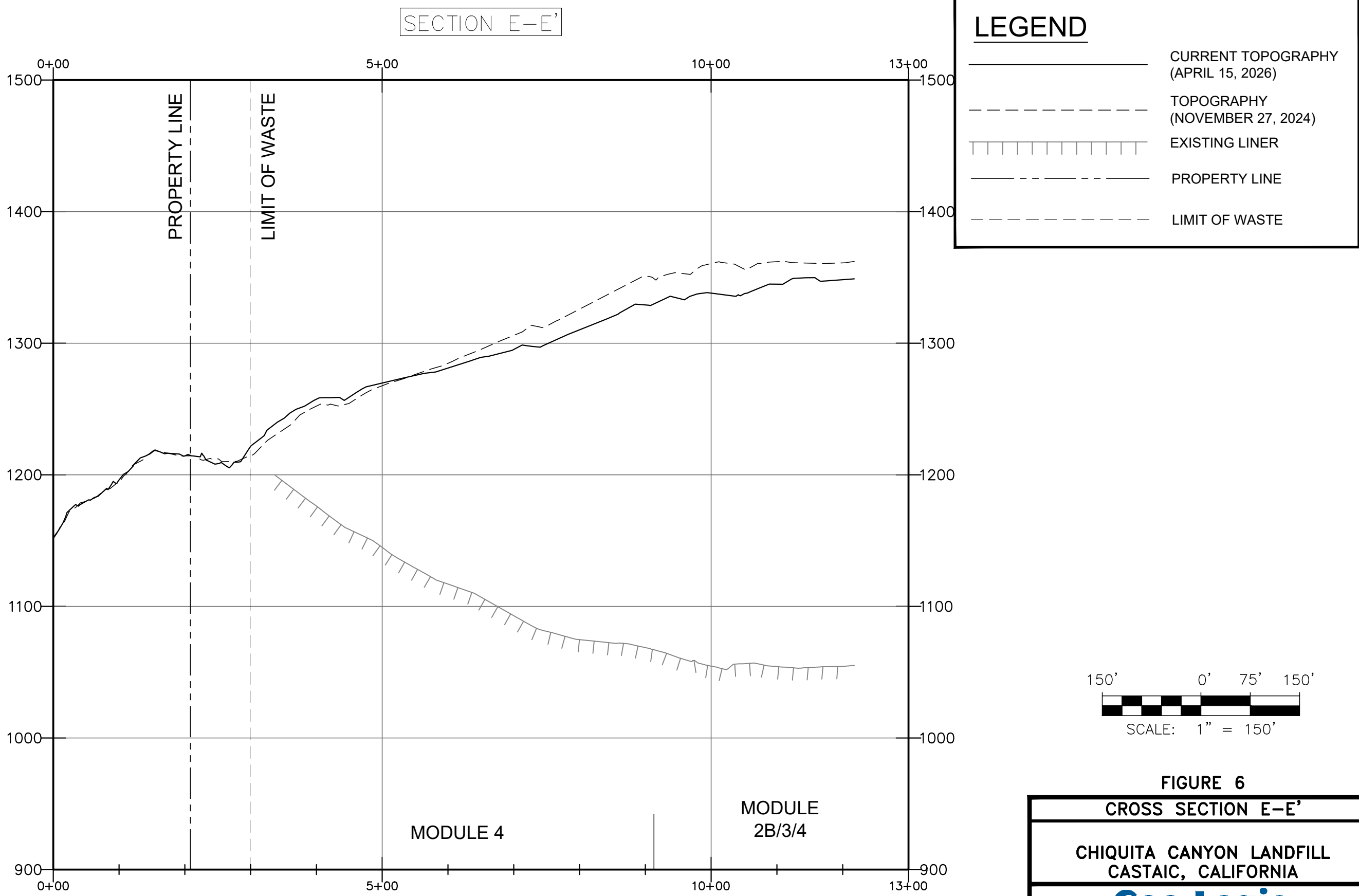
CROSS SECTION D-D'

**CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA**

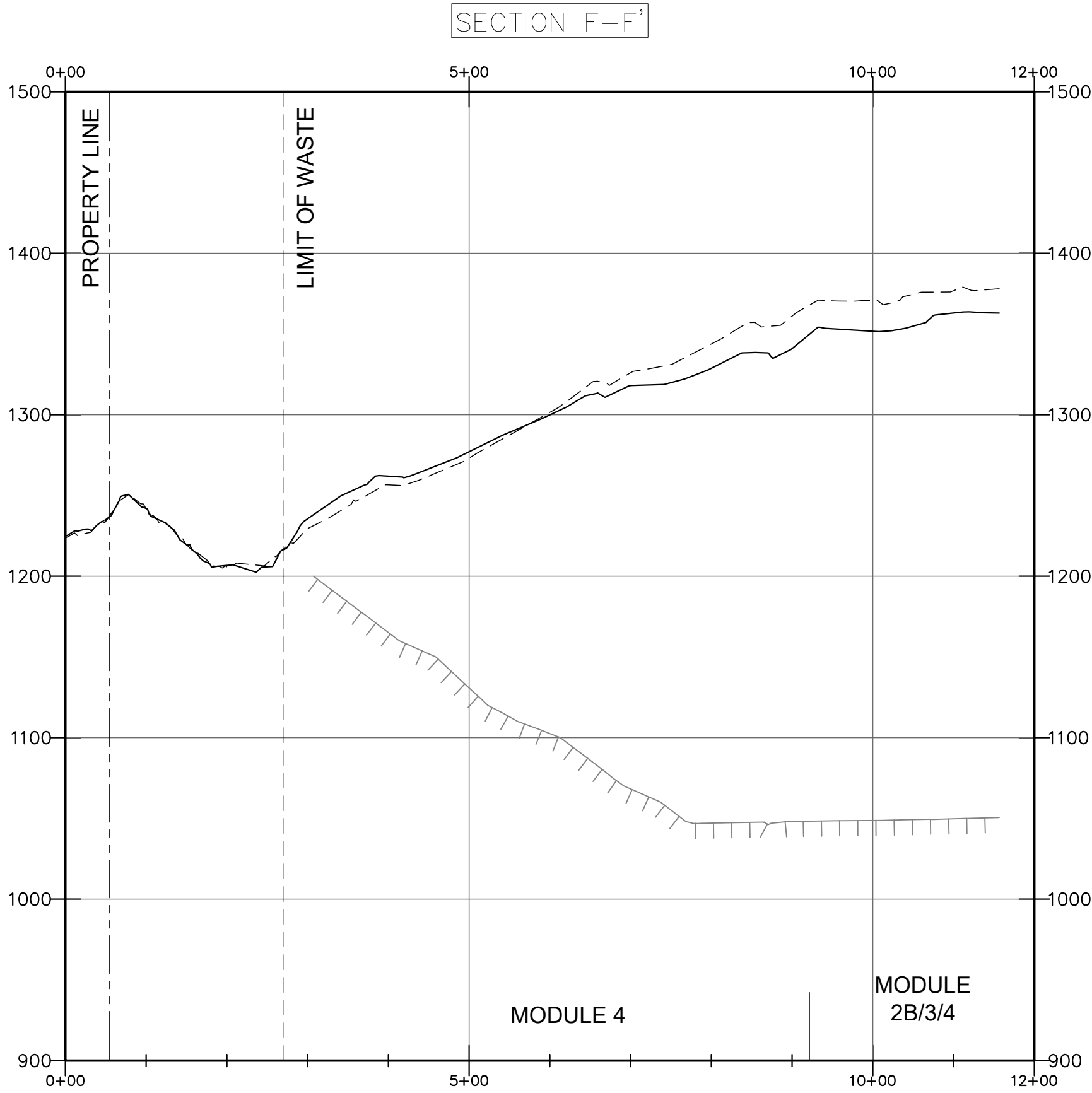
**Geo-Logic
ASSOCIATES**

CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)
	TOPOGRAPHY (NOVEMBER 27, 2024)
	EXISTING LINER
	PROPERTY LINE
	LIMIT OF WASTE



FIGURE 7
CROSS SECTION F-F'

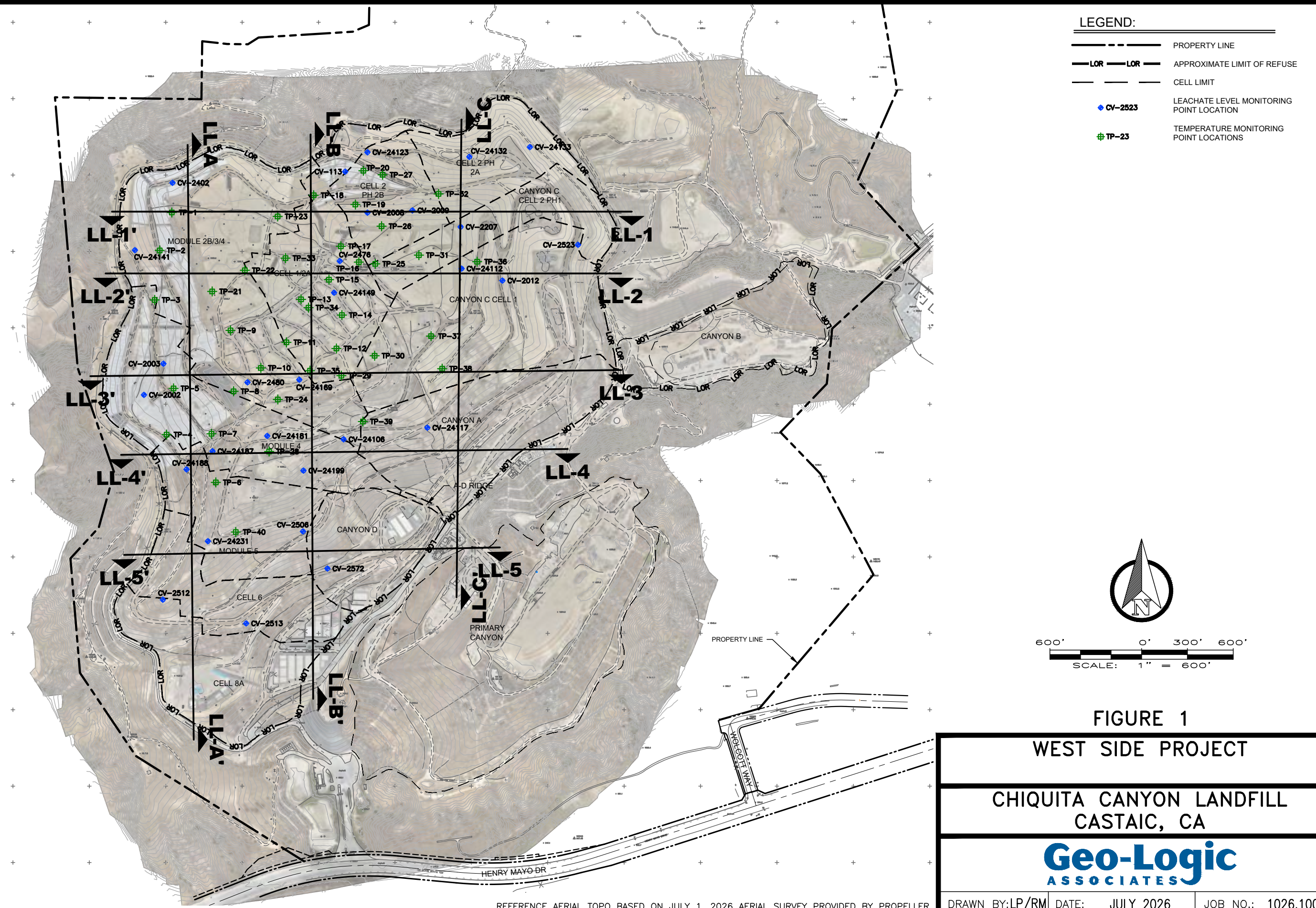
CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

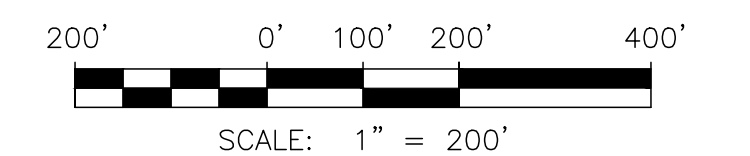
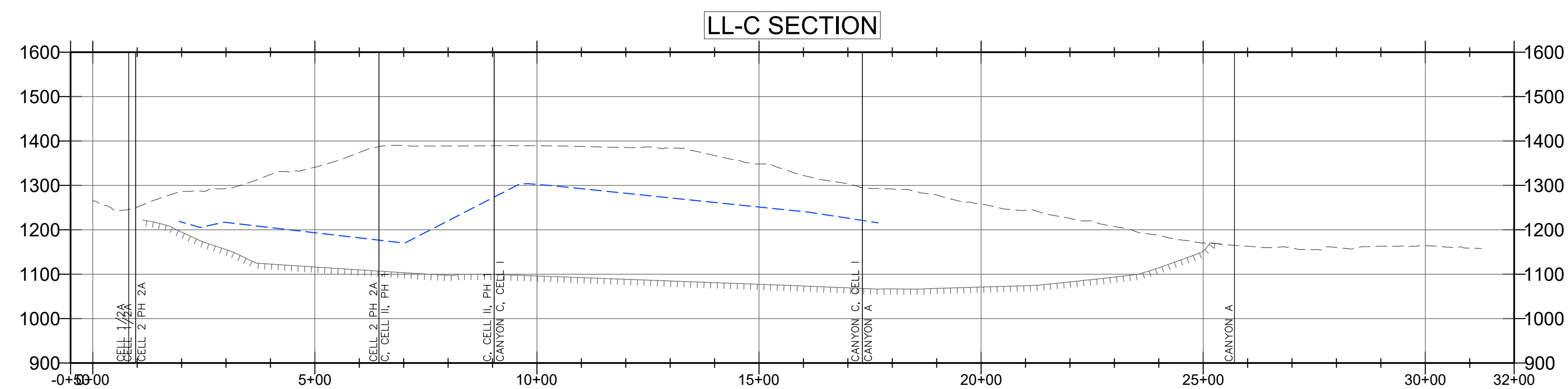
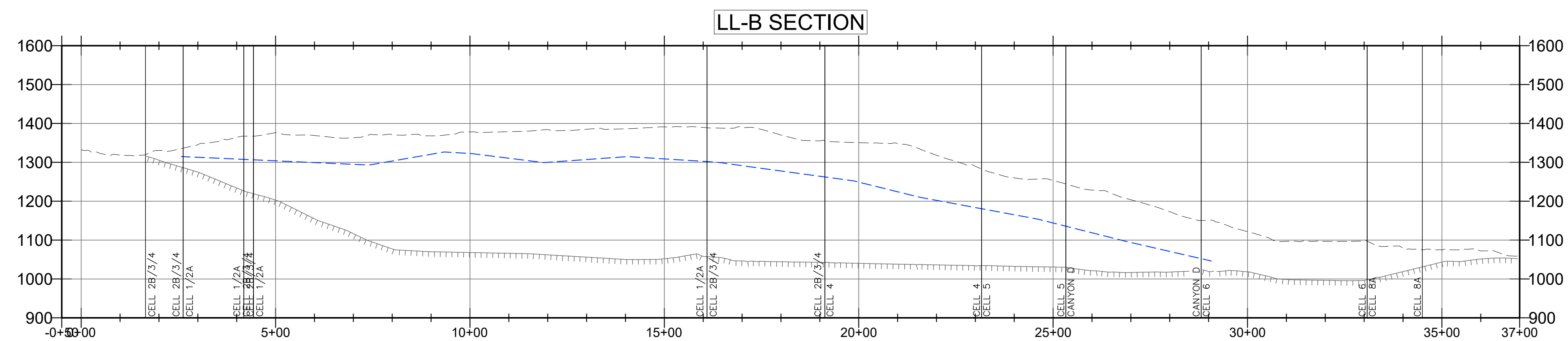
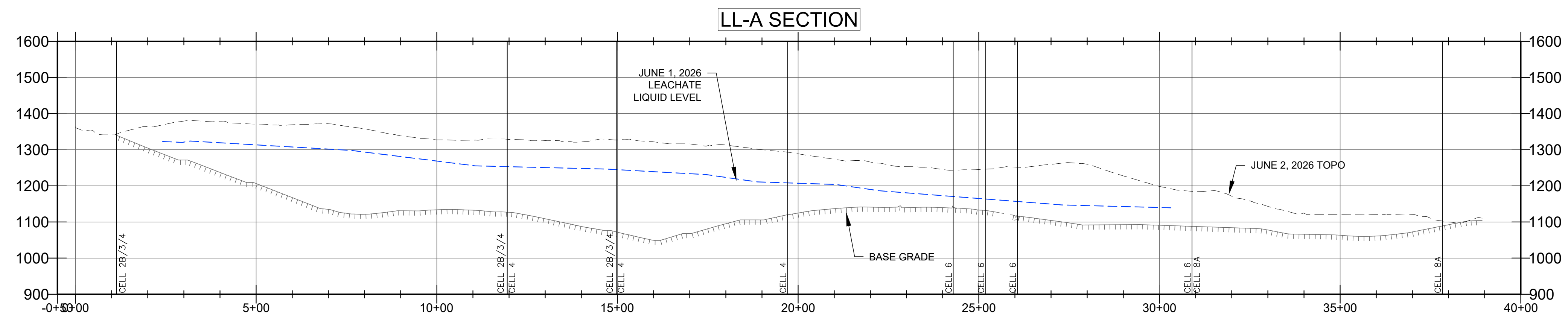
CAD DSGN BY: LP	DATE: AUGUST 2026	JOB NO. 1026.1002
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Appendix C
FLUID LEVEL MEASUREMENTS AND SURFACES

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SCALE
H: 1" = 200'
V: 1" = 200'



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ISSUED FOR REVIEW
REFERENCE AERIAL TOPO BASED ON JUNE 2, 2026 AERIAL SURVEY BY PROPELLER

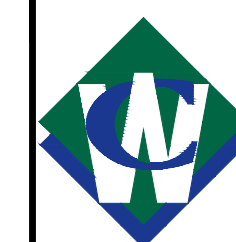
REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: JULY 2026
DESIGNED BY: R MITCHELL
CAD DESIGN BY: L PADILLA
CHECKED BY: R MITCHELL
APPROVED BY: R MITCHELL



Geo-Logic
ASSOCIATES

2777 EAST GUASTI ROAD
SUITE 1
ONTARIO, CA 91761
(909) 626-2282
www.geo-logic.com



CHIQUITA CANYON
A Waste Connections Company

29201 HENRY MAYO DRIVE
CASTAIC, CA 91384

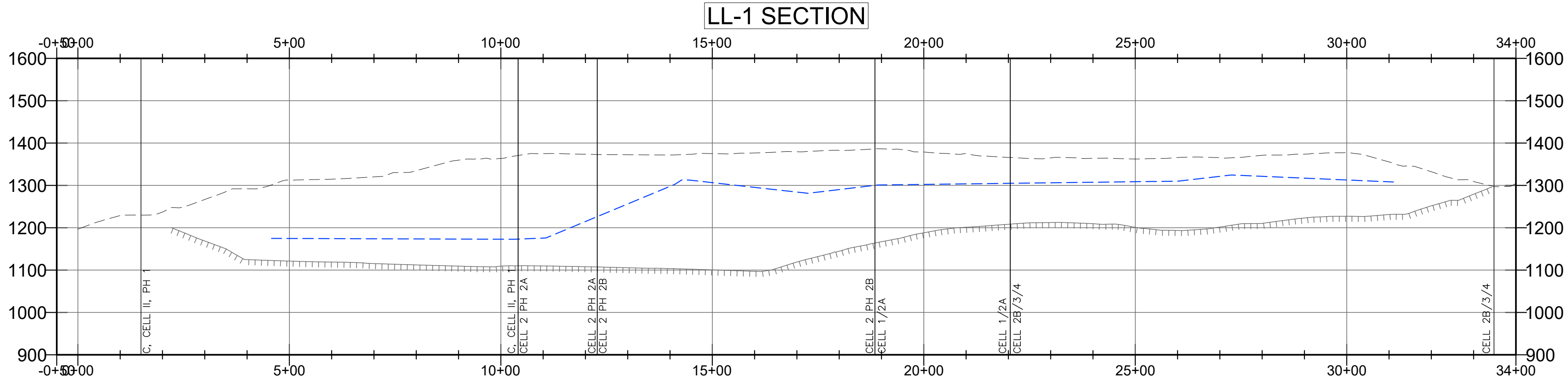
CHIQUITA CANYON LANDFILL
WEST SIDE SLOPE PROJECT
CROSS SECTIONS

DWG NO.

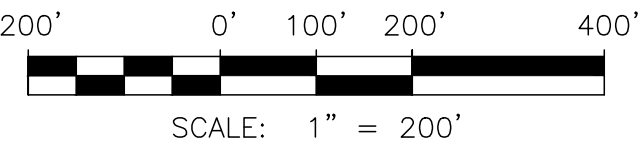
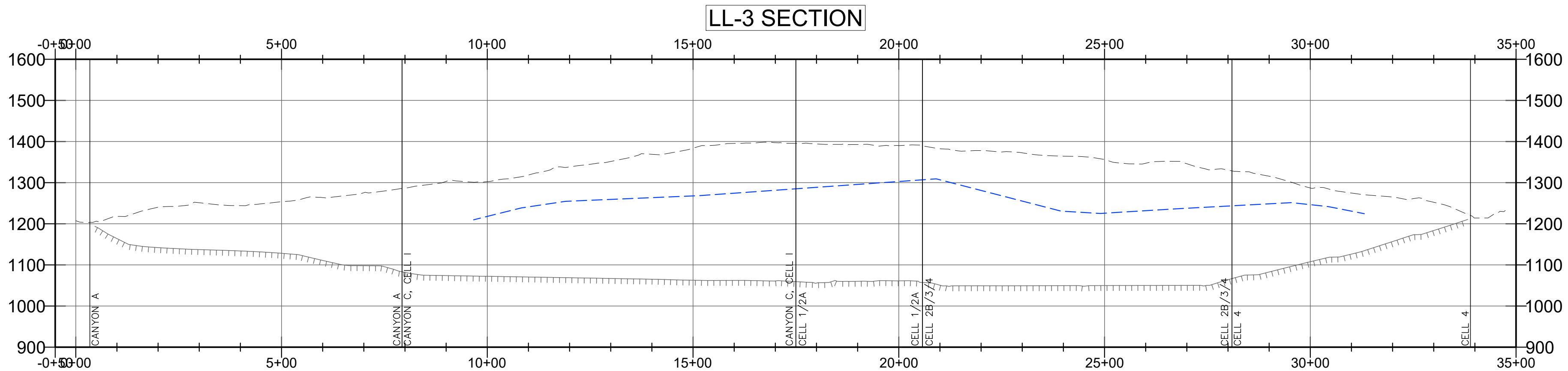
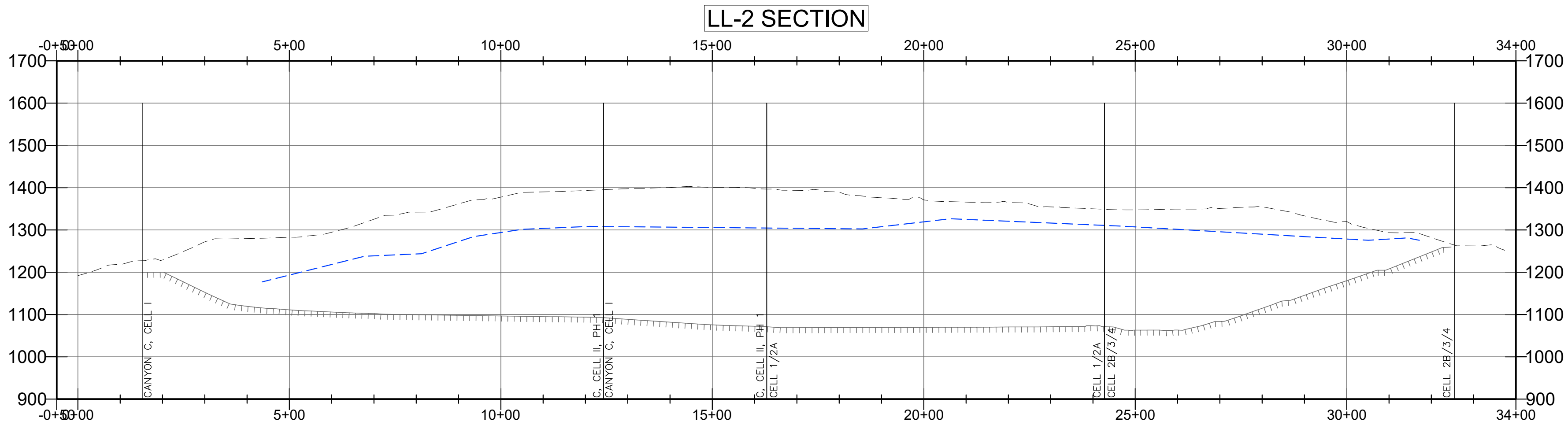
PROJECT NO.

RM22.1077

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SCALE
H: 1" = 200'
V: 1" = 200'



SCALE: 1" = 200'

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REFERENCE AERIAL TOPO BASED ON JUNE 2, 2026 AERIAL SURVEY BY PROPELLER

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: JULY 2026
DESIGNED BY: R MITCHELL
CAD DESIGN BY: L PADILLA
CHECKED BY: R MITCHELL
APPROVED BY: R MITCHELL



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(909) 626-2282
www.geo-logic.com



CHIQUITA CANYON
A Waste Connections Company

29201 HENRY MAYO DRIVE
CASTAIC, CA 91384

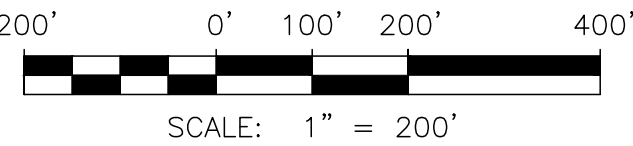
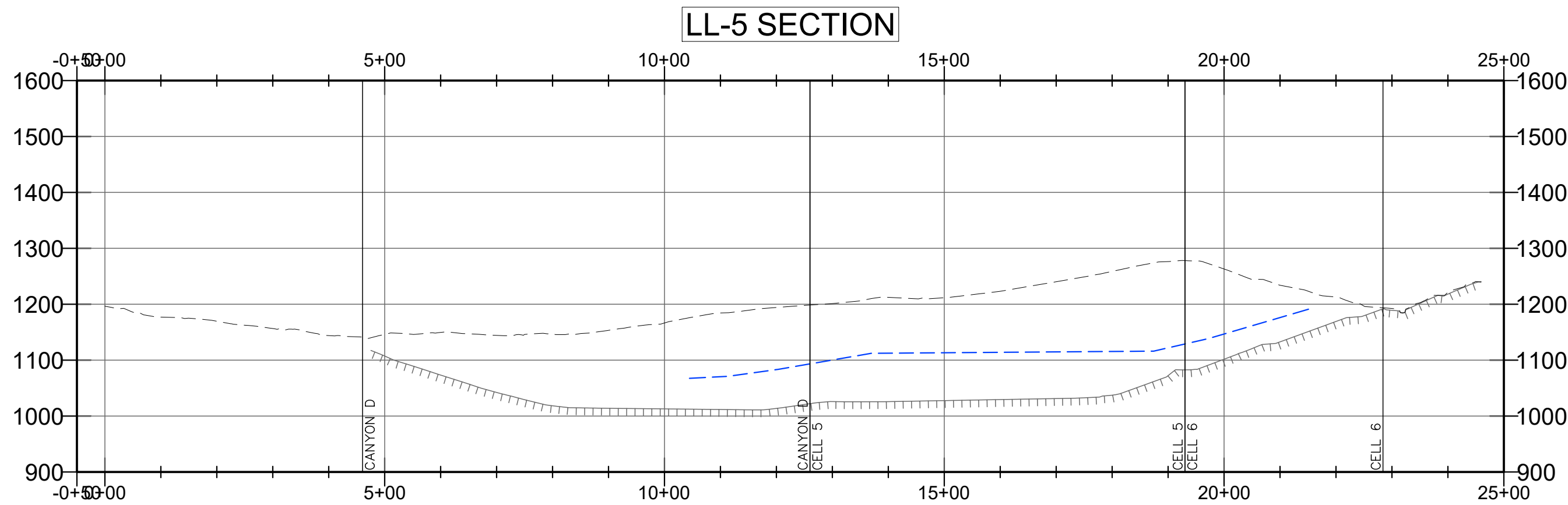
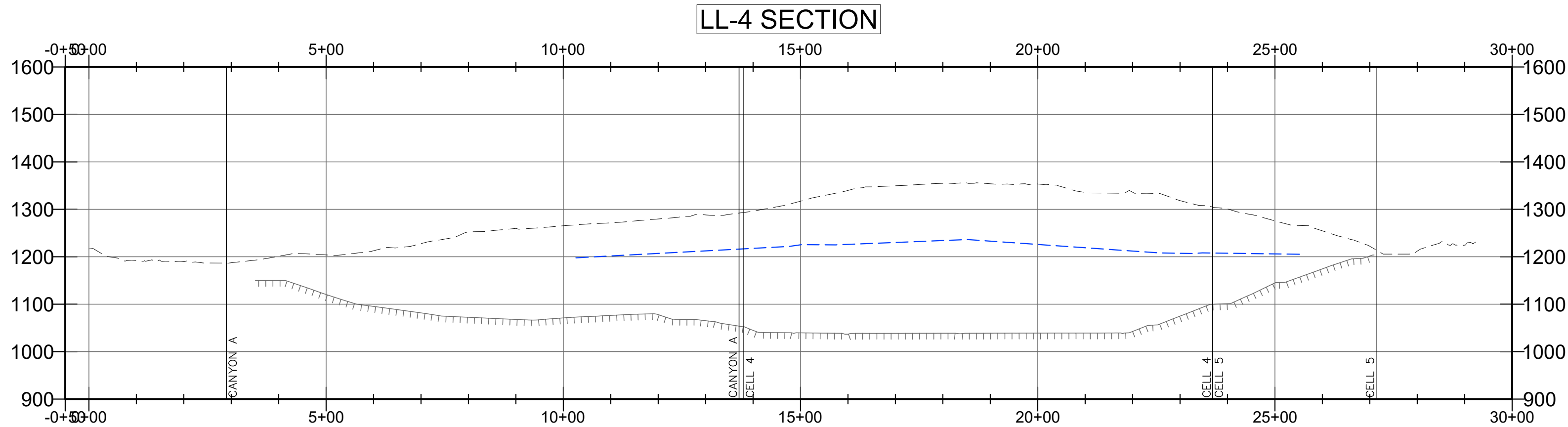
**CHIQUITA CANYON LANDFILL
WEST SIDE SLOPE PROJECT
CROSS SECTIONS**

DWG NO.

PROJECT NO.
RM22.1077

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SCALE
H: 1" = 200'
V: 1" = 200'



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ISSUED FOR REVIEW
REFERENCE AERIAL TOPO BASED ON JUNE 2, 2026 AERIAL SURVEY BY PROPELLER

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: <u> JULY 2026 </u>
DESIGNED BY: <u> R MITCHELL </u>
CAD DESIGN BY: <u> L PADILLA </u>
CHECKED BY: <u> R MITCHELL </u>
APPROVED BY: <u> R MITCHELL </u>



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ASSOCIATES

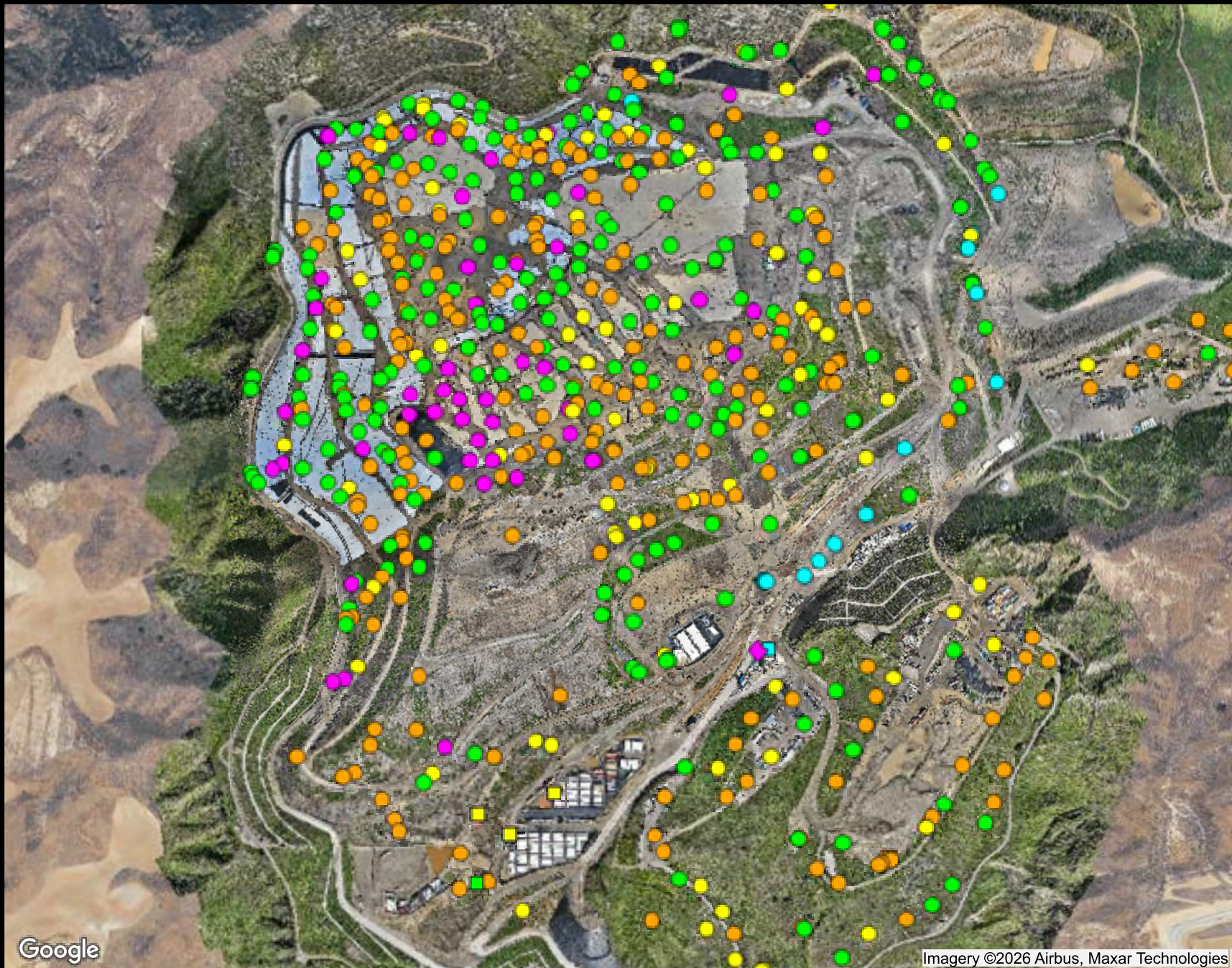
2777 EAST GUASTI ROAD
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**CHIQUITA CANYON**
A Waste Connections Company

29201 HENRY MAYO DRIVE
CASTAIC, CA 91384

CHIQUITA CANYON LANDFILL WEST SIDE SLOPE PROJECT CROSS SECTIONS		DWG NO.
		PROJECT NO. RM22.1077

Appendix D
LANDFILL GAS PRESSURE PLOTS



Ranges Mapped

					# Points
	>=	-101	and	< -10	31
	>=	-10	and	< -2	229
	>=	-2	and	< -1	89
	>=	-1	and	< 0	231
	>=	0	and	< 101	55

Point Type Legend

- ▽ calibration record
- ◇ flare-engine-ghg
- △ monitoring probe
- sample port
- well





Ranges Mapped

			# Points
	>=	<	
	>=	<	
	>=	<	
	>=	<	
	>=	<	

Point Type Legend

○ well





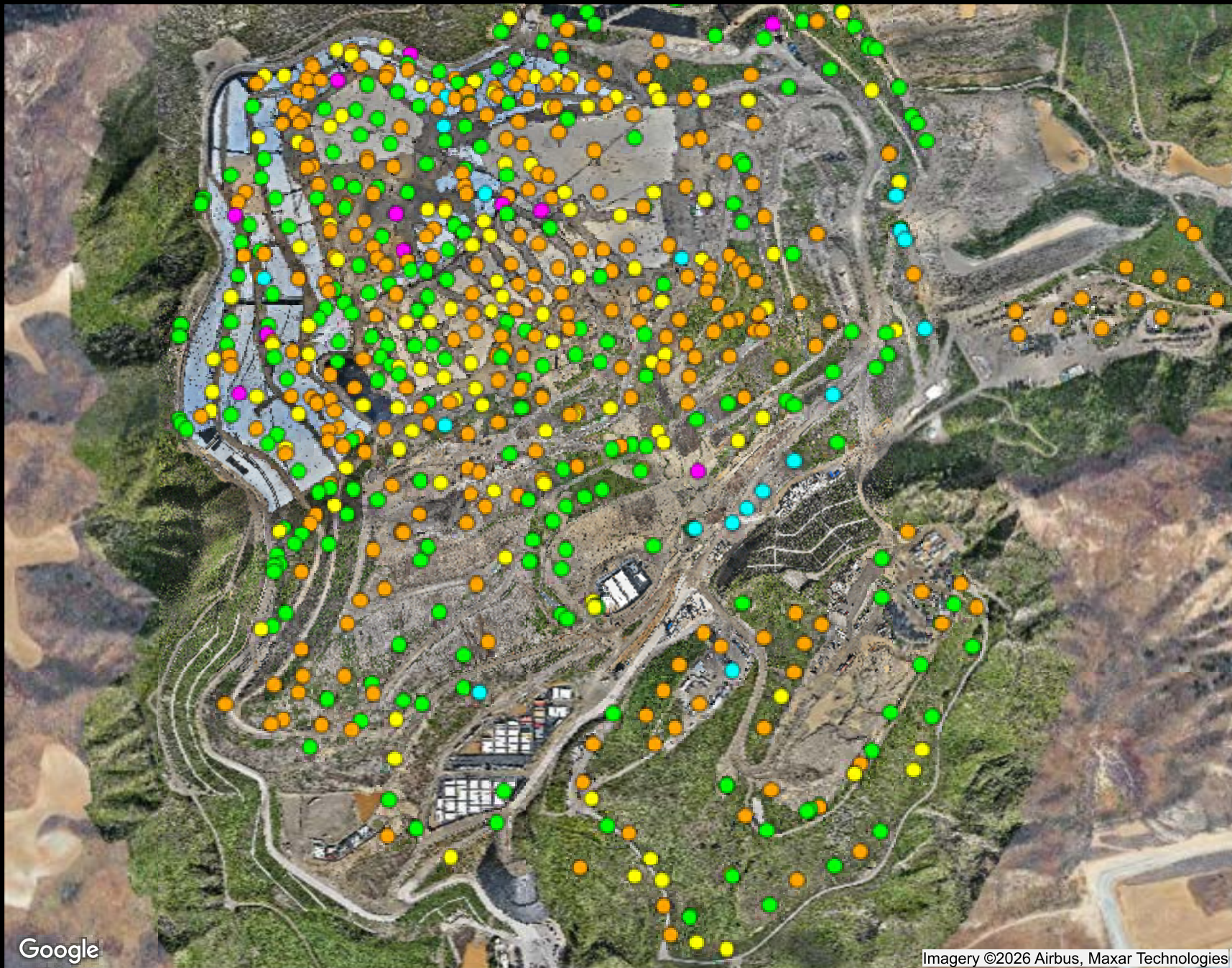
Ranges Mapped

			# Points
	>=	<	
	>=	<	
	>=	<	
	>=	<	
	>=	<	

Point Type Legend

○ well





Ranges Mapped

				# Points
	>=	-101	and < -10	20
	>=	-10	and < -2	237
	>=	-2	and < -1	114
	>=	-1	and < 0	288
	>=	0	and < 101	11

Point Type Legend

 well





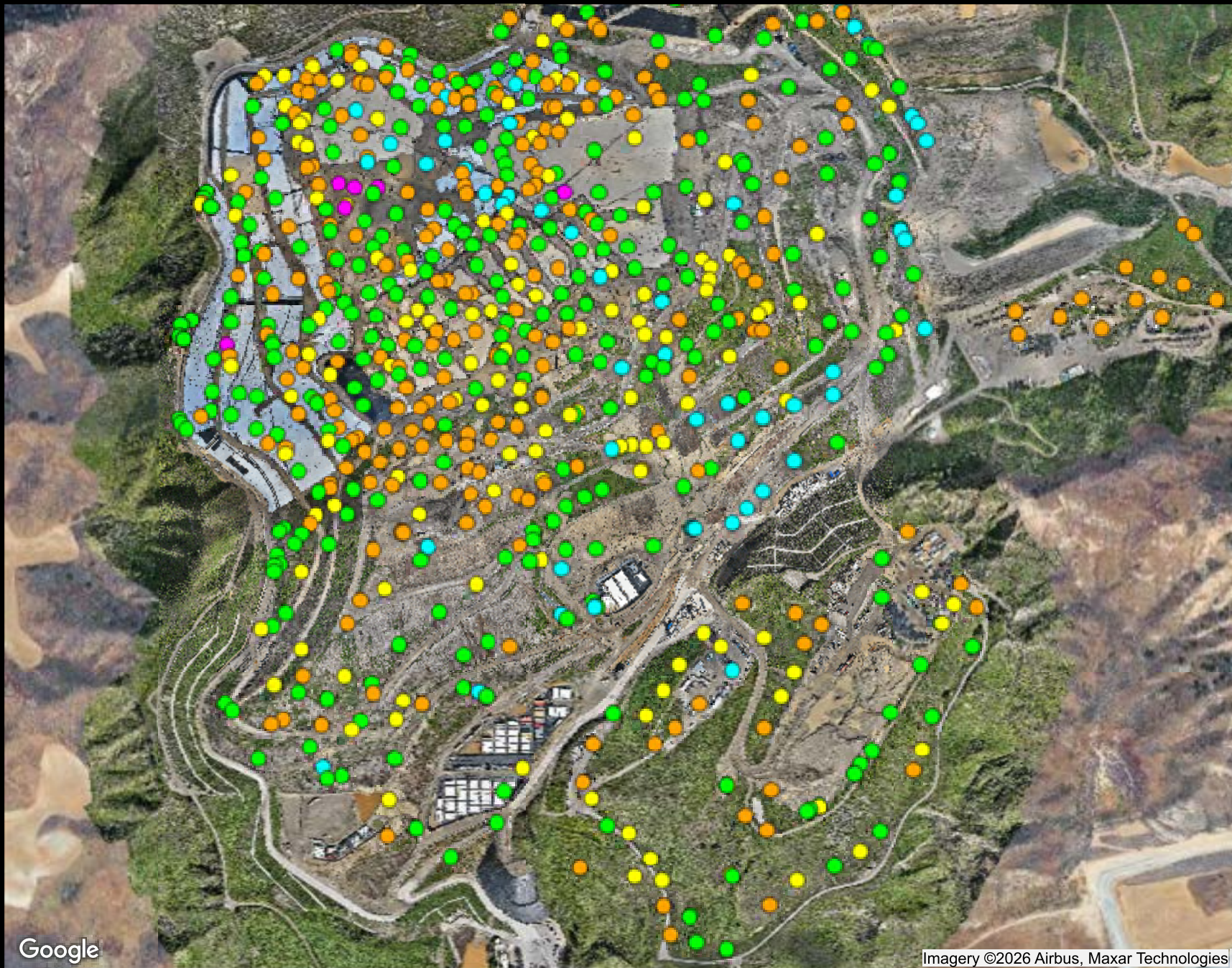
Ranges Mapped

			# Points
	>=	<	
	>=	<	
	>=	<	
	>=	<	
	>=	<	

Point Type Legend

○ well





Ranges Mapped

				# Points
	>=	-101	and < -10	59
	>=	-10	and < -2	319
	>=	-2	and < -1	136
	>=	-1	and < 0	237
	>=	0	and < 101	6

Point Type Legend

 well





Ranges Mapped

			# Points
■	≥ -101	$\text{and } < -10$	67
■	≥ -10	$\text{and } < -2$	291
■	≥ -2	$\text{and } < -1$	113
■	≥ -1	$\text{and } < 0$	282
■	≥ 0	$\text{and } < 101$	4

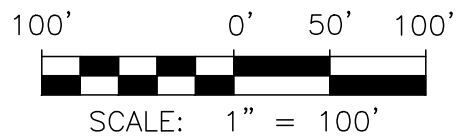
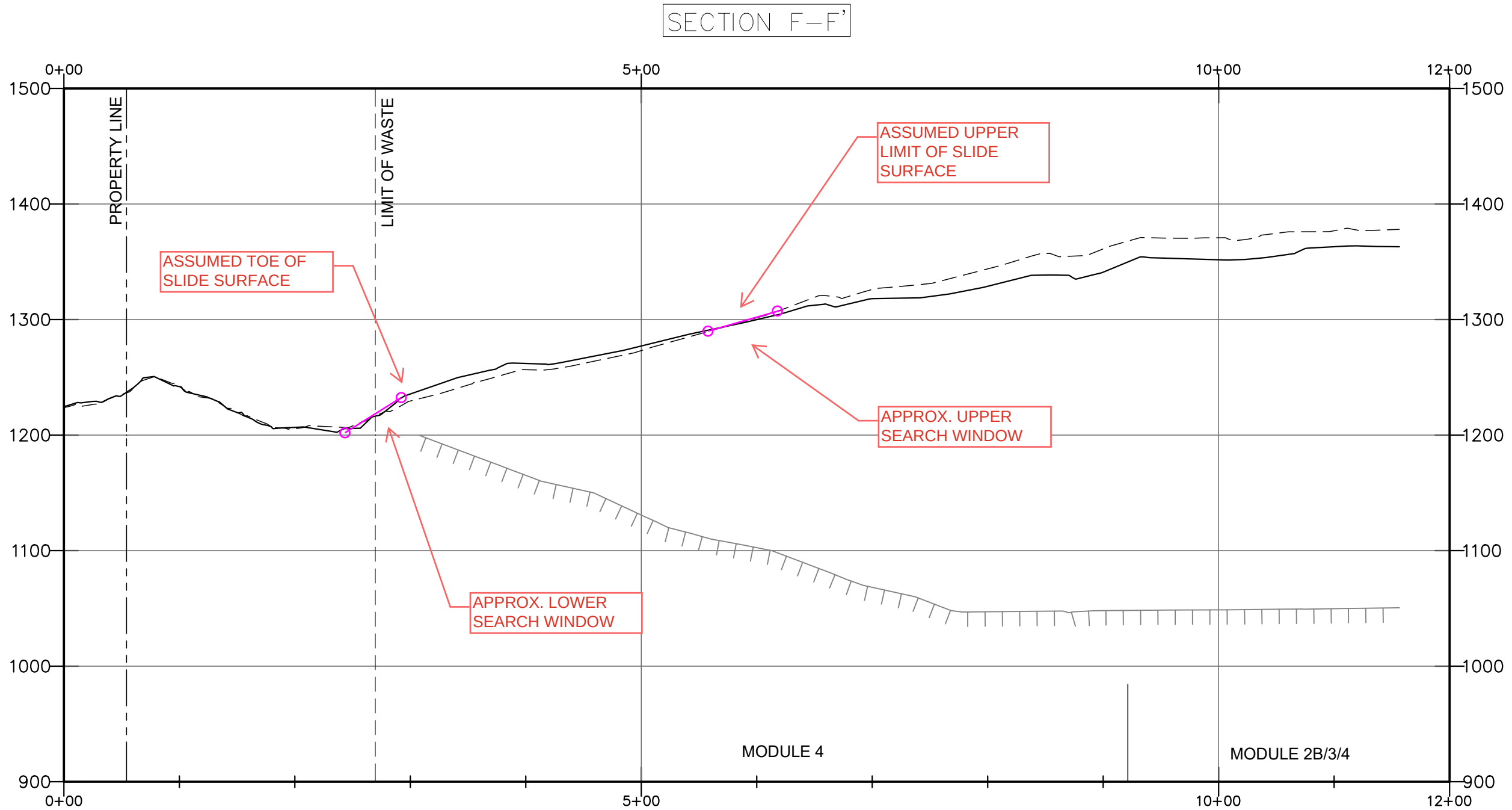
Point Type Legend

well



Appendix E
BACK ANALYSIS OUTPUT

P:\SITES\CHIQUITA CYN LF\COMPARATIVE STABILITY EVALUATION-2026\MODELS\PROFILES\ZCCL-XS-(2026-08-20).DWG August 20, 2026



LEGEND

	CURRENT TOPOGRAPHY (APRIL 15, 2026)		PROPERTY LINE
	TOPOGRAPHY (NOVEMBER 27, 2024)		LIMIT OF WASTE
	EXISTING LINER		

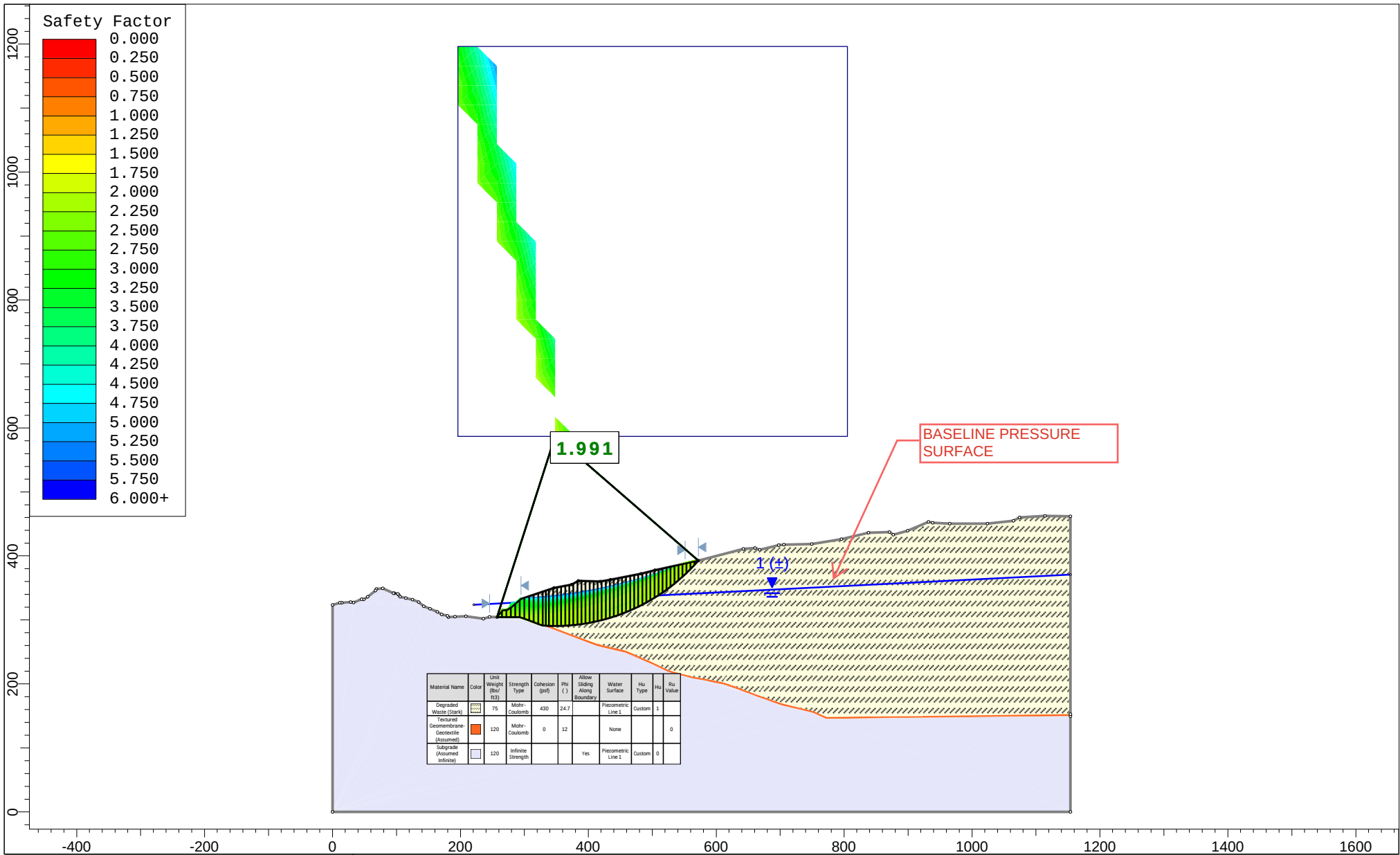
FIGURE 7

CROSS SECTION F-F'

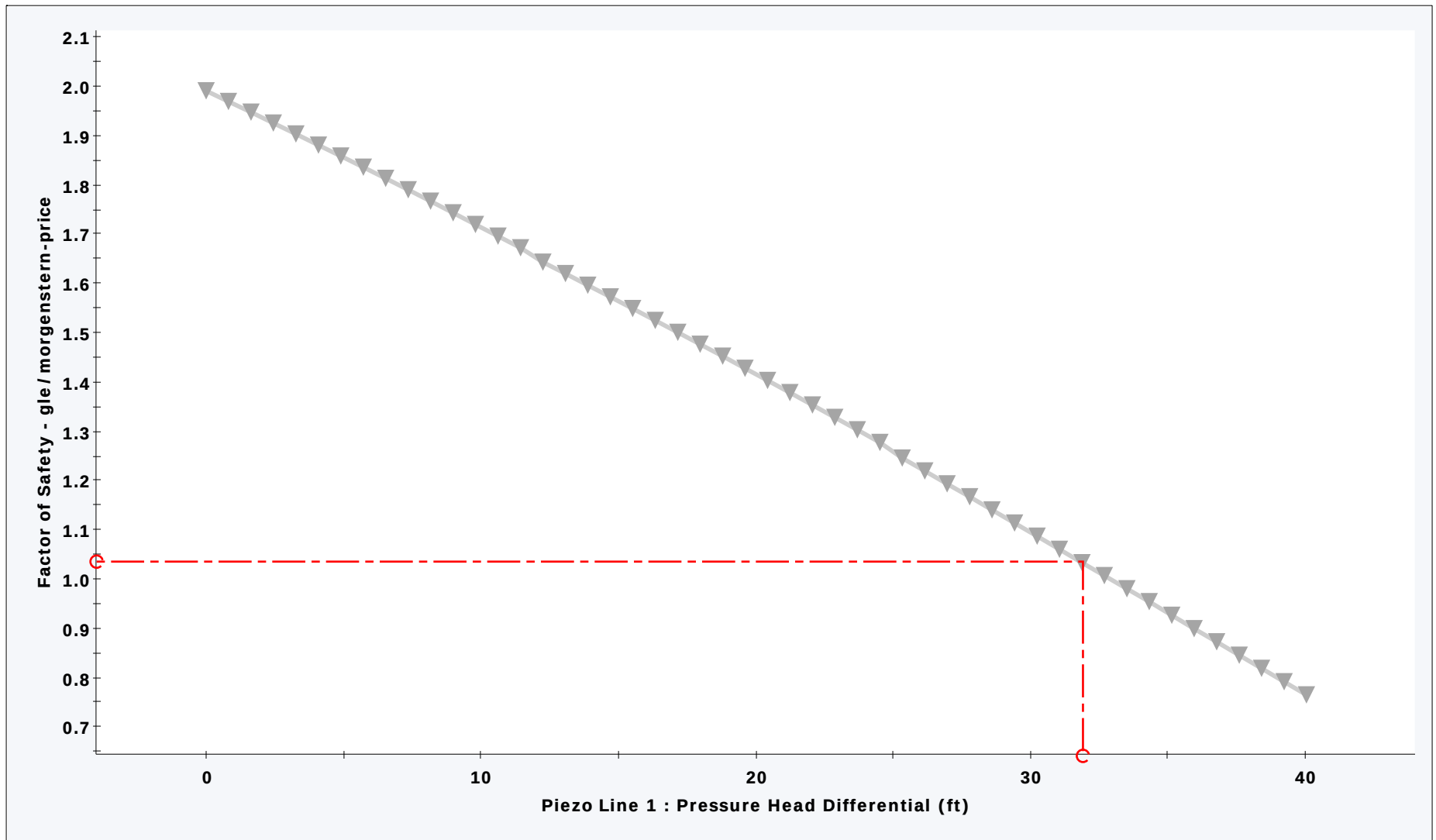
CHIQUITA CANYON LANDFILL
CASTAIC, CALIFORNIA

Geo-Logic
ASSOCIATES

CAD DSGN BY: LP | DATE: AUGUST 2026 | JOB NO. 1026.1002



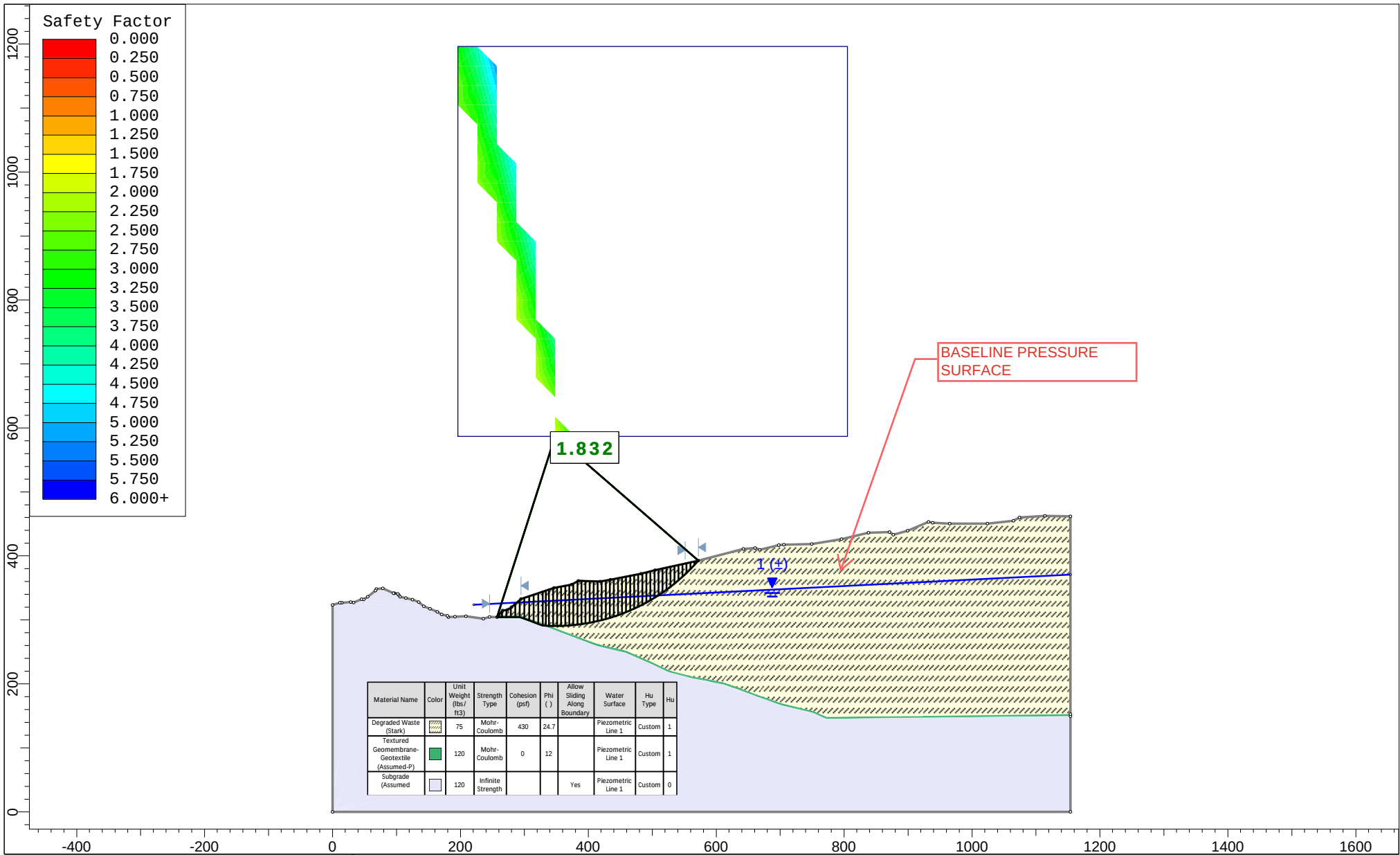
Project			
COMPREHENSIVE STABILITY EVALUATION			
Group	Section F		Scenario Static Safety Factor (No Head on Liner)
Drawn By	R. Mitchell		Company GLA
Date	9/1/2026		File Name Back Analysis Cross Sections +5.slmd



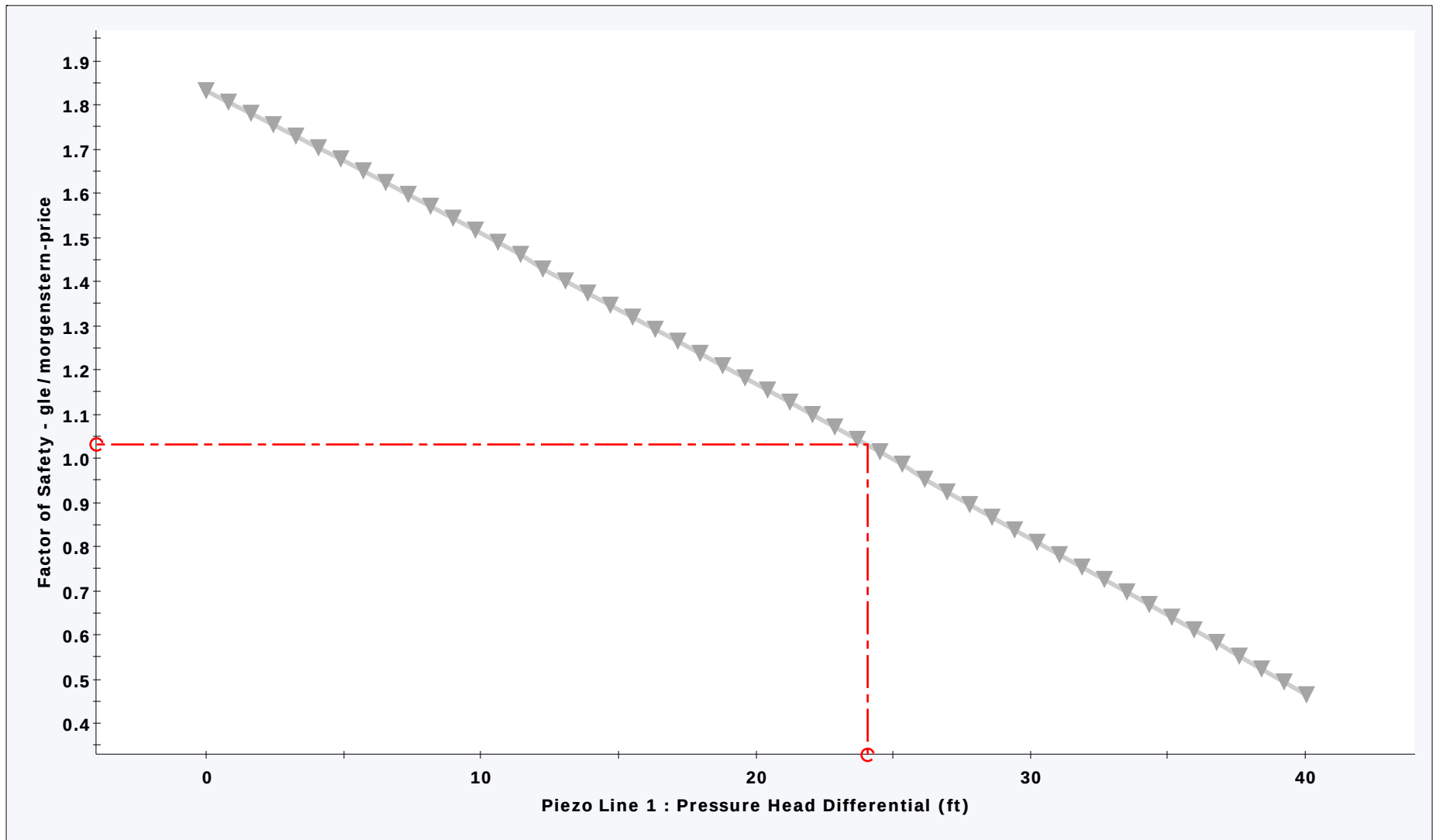
—▼— Piezo Line 1 : Pressure Head Differential (ft)



Project			COMPREHENSIVE STABILITY EVALUATION	
Group	Section F		Scenario	Static Safety Factor (No Head on Liner)
Drawn By	R. Mitchell		Company	GLA
Date	9/1/2026		File Name	Back Analysis Cross Sections +5.slmd



Project				COMPREHENSIVE STABILITY EVALUATION			
Group		Section F			Scenario		
Drawn By		R. Mitchell			Company		
Date		9/1/2026			File Name		
					Static Safety Factor (Head on Liner)		
					GLA		
					Back Analysis Cross Sections +5.slmd		



—▼— Piezo Line 1 : Pressure Head Differential (ft)



Project			
COMPREHENSIVE STABILITY EVALUATION			
Group	Section F	Scenario	Static Safety Factor (Head on Liner)
Drawn By	R. Mitchell	Company	GLA
Date	9/1/2026	File Name	Back Analysis Cross Sections +5.slmd

Appendix F
LINER AND DEGRADED MSW SHEAR STRENGTH DATA

TABLE 1
SUMMARY OF LINER SYSTEMS ON ENGINEERING LANDFILL AND STRENGTH VALUES

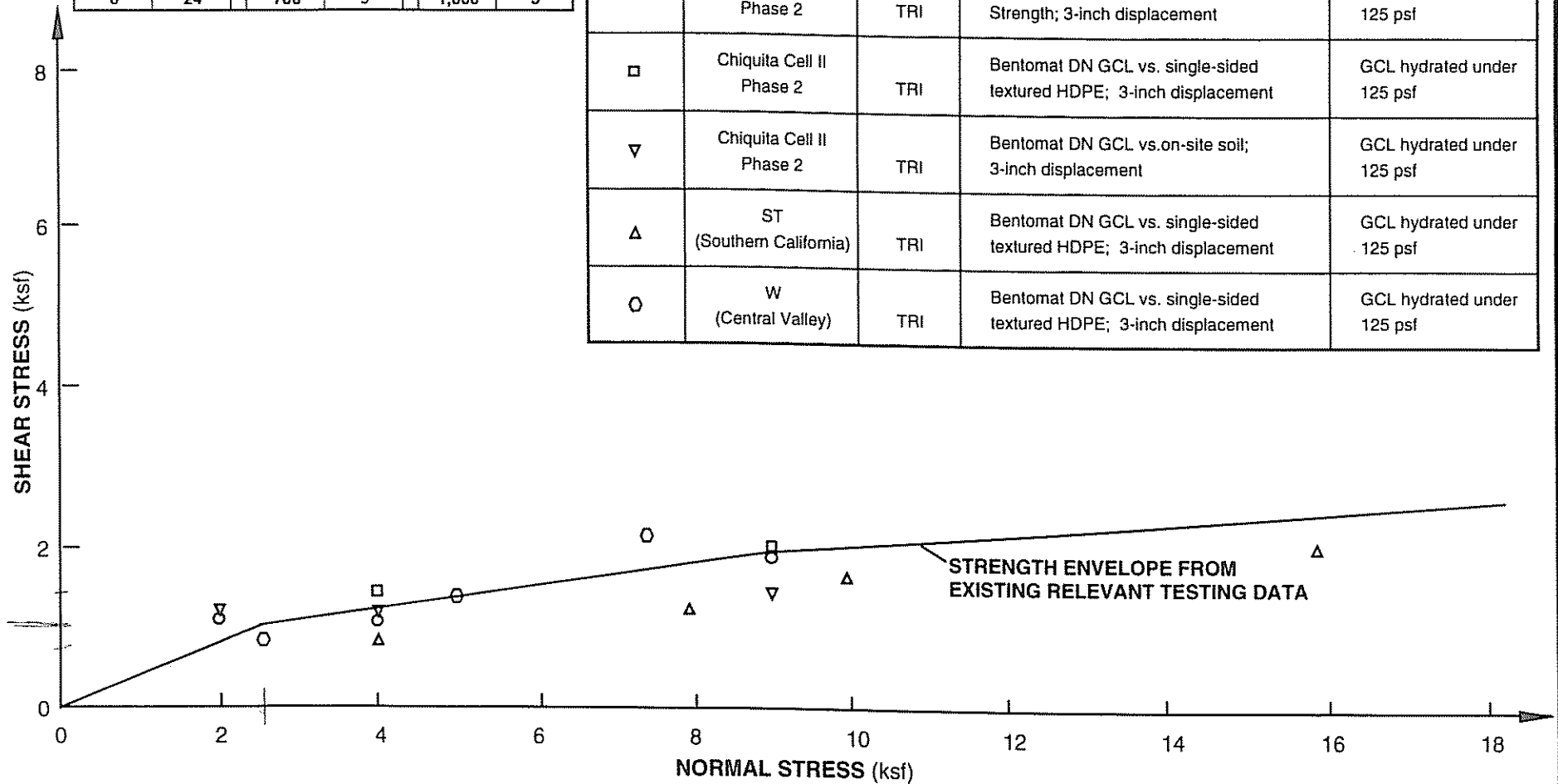
CANYON	BASE LINER	STRENGTH (1)				SIDESLOPE LINER	STRENGTH (1)			
		<u>Refuse Ht (ft)</u>	<u>c (psf)</u>	<u>φ (deg)</u>			<u>Refuse Ht (ft)</u>	<u>c (psf)</u>	<u>φ (deg)</u>	
A	Admixture (alluvium & 9% Smectite); 1 ft; 95% compaction @ 2% wet of the optimum moisture content	—	0	18	[2]	Smooth HDPE on subgrade	—	0	22	[3]
D	Similar to Canyon A	Same as Canyon A				Similar to Canyon A	Same as Canyon A			
C - Cell I (C/I)	Composite (2-ft bentonite admix underlying single-sided textured HDPE (textured side down)	—	0	18	[3], [4]	Smooth HDPE on subgrade	—	0	22	[3]
C - Cell II Phase 1 (C/II/1)	Double-sided textured HDPE on GCL[CLAYMAX]	<40 >40	0 835	20 3.4	[5]	Single-sided textured HDPE (textured side down) on GCL [CLAYMAX]	<40 >40	0 835	20 3.4	[5]
C - Cell II Phase 2A (C/II/2A) [7]	Double-sided textured HDPE on GCL[BENTOMAT]	<40 40-130 >130	0 700 1,600	24 9 3	[6]	Single-sided textured HDPE (textured side down) on GCL [BENTOMAT]	<40 40-130 >130	0 700 1,600	24 9 3	[6]
						Geotextile on top of HDPE for the upper 1/3 of the sideslope		0	8	[5]
C - Cell II Phase 2B (C/II/2B) [8]	Similar to Cell II, Phase 2A	Same as Cell II, Phase 2A				Similar to Cell II, Phase 2A	Same as Cell II, Phase 2A			

NOTES:

- [1] Shear strength at the weakest interface of the liner
- [2] Assumed value considering a φ of 18 deg between admixture and textured HDPE [See NOTE 3], and a φ of 19 deg between admixture and textured HDPE under normal loads ranging from 2,000 to 20,000 psf [See NOTE 4]
- [3] EMCON (1994a)
- [4] 12-inch by 12 inch direct shear box testing between admixture and textured HDPE under normal loads from 2,000 to 20,000 psf by Dr. J. D. Scott (EMCON 1995a)
- [5] EMCON (1996)
- [6] Based on relevant testing data from Burns & McDonnell (May 1997) as discussed in Section 3.1.2
- [7] Liner constructed in May 1997
- [8] Liner currently under construction

Approx. Normal Stress Range					
0 - 2.7 ksf		2.7 - 9 ksf		> 9 ksf	
c (psf)	ϕ (deg)	c (psf)	ϕ (deg)	c (psf)	ϕ (deg)
0	24	700	9	1,600	3

SYMBOL	PROJECT SITE	SOURCE	TESTED INTERFACE	CONDITIONING
○	Chiquita Cell II Phase 2	TRI	Bentomat DN GCL Internal Shear Strength; 3-inch displacement	GCL hydrated under 125 psf
□	Chiquita Cell II Phase 2	TRI	Bentomat DN GCL vs. single-sided textured HDPE; 3-inch displacement	GCL hydrated under 125 psf
▽	Chiquita Cell II Phase 2	TRI	Bentomat DN GCL vs. on-site soil; 3-inch displacement	GCL hydrated under 125 psf
△	ST (Southern California)	TRI	Bentomat DN GCL vs. single-sided textured HDPE; 3-inch displacement	GCL hydrated under 125 psf
○	W (Central Valley)	TRI	Bentomat DN GCL vs. single-sided textured HDPE; 3-inch displacement	GCL hydrated under 125 psf



DATE 9/97
 DWN S.E.R.
 APPR _____
 REV _____
 PROJECT NO.
 20976-003.026

FIGURE 4
 CHIQUITA CANYON LANDFILL, INC
 CHIQUITA CANYON LANDFILL
 LOS ANGELES COUNTY, CALIFORNIA
**STRENGTH ENVELOPE FOR
 EXISTING GCL (BENTOMAT) / TEXTURED HDPE**

Figure 1
CANYONS A & D AND CANYON 3 (CELL 1) SHEAR STRENGTH PROFILES

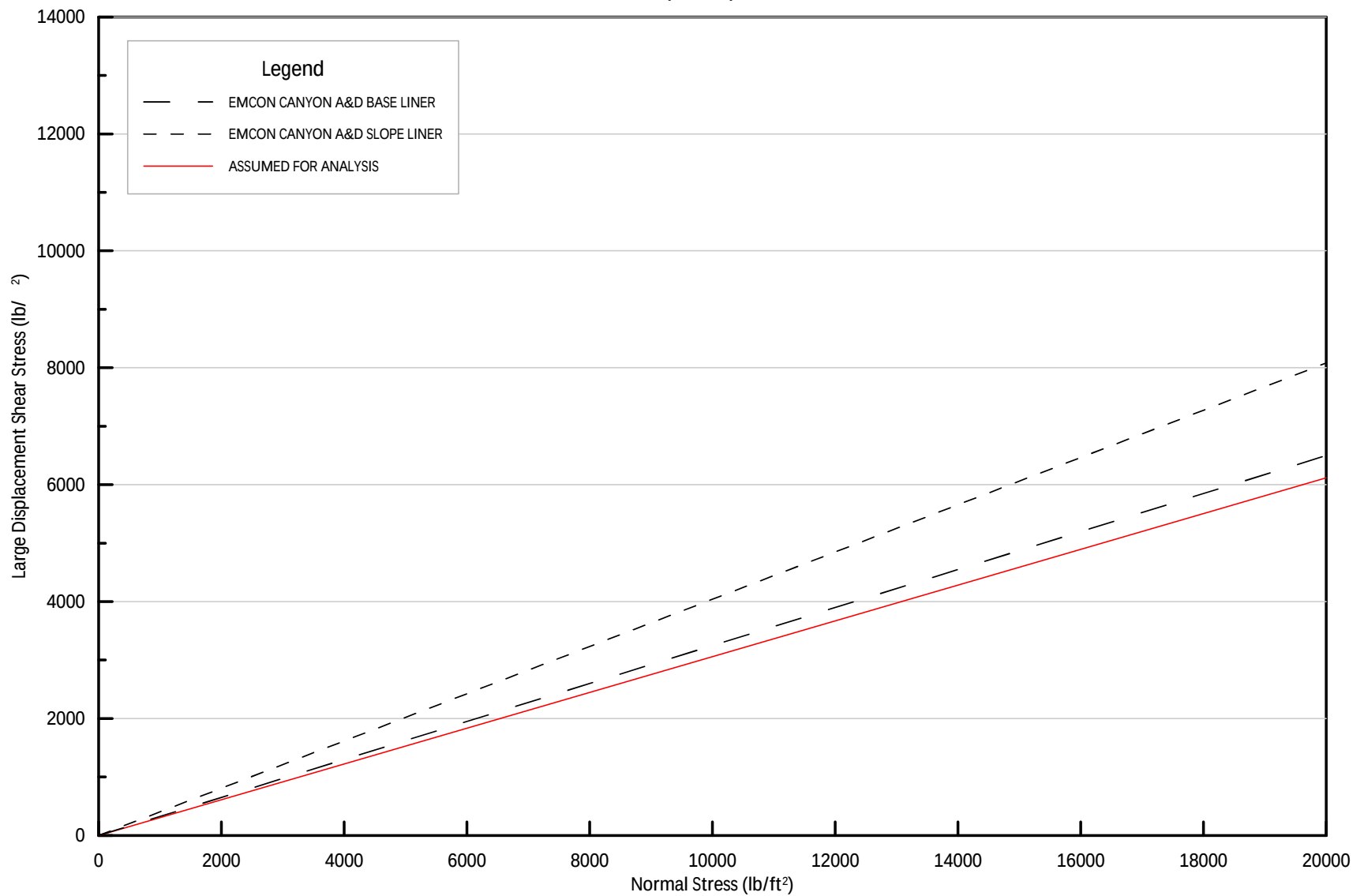


Figure 2
CANYON C (CELL 2) PHASES 1, 2A, 2B SHEAR STRENGTH PROFILE

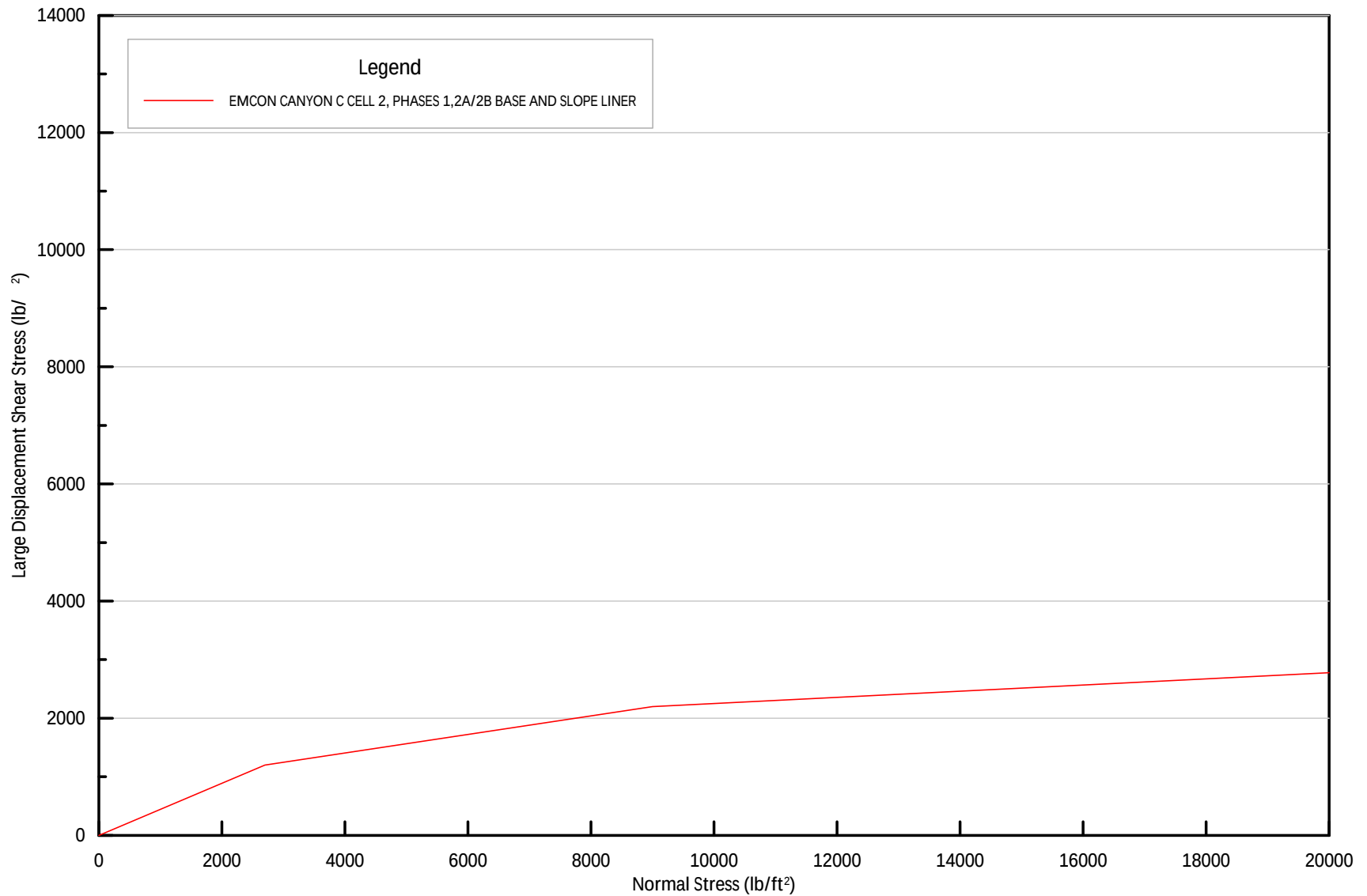


Figure 3
CELL 1/2A AND MODULES 2B, 3, AND 4

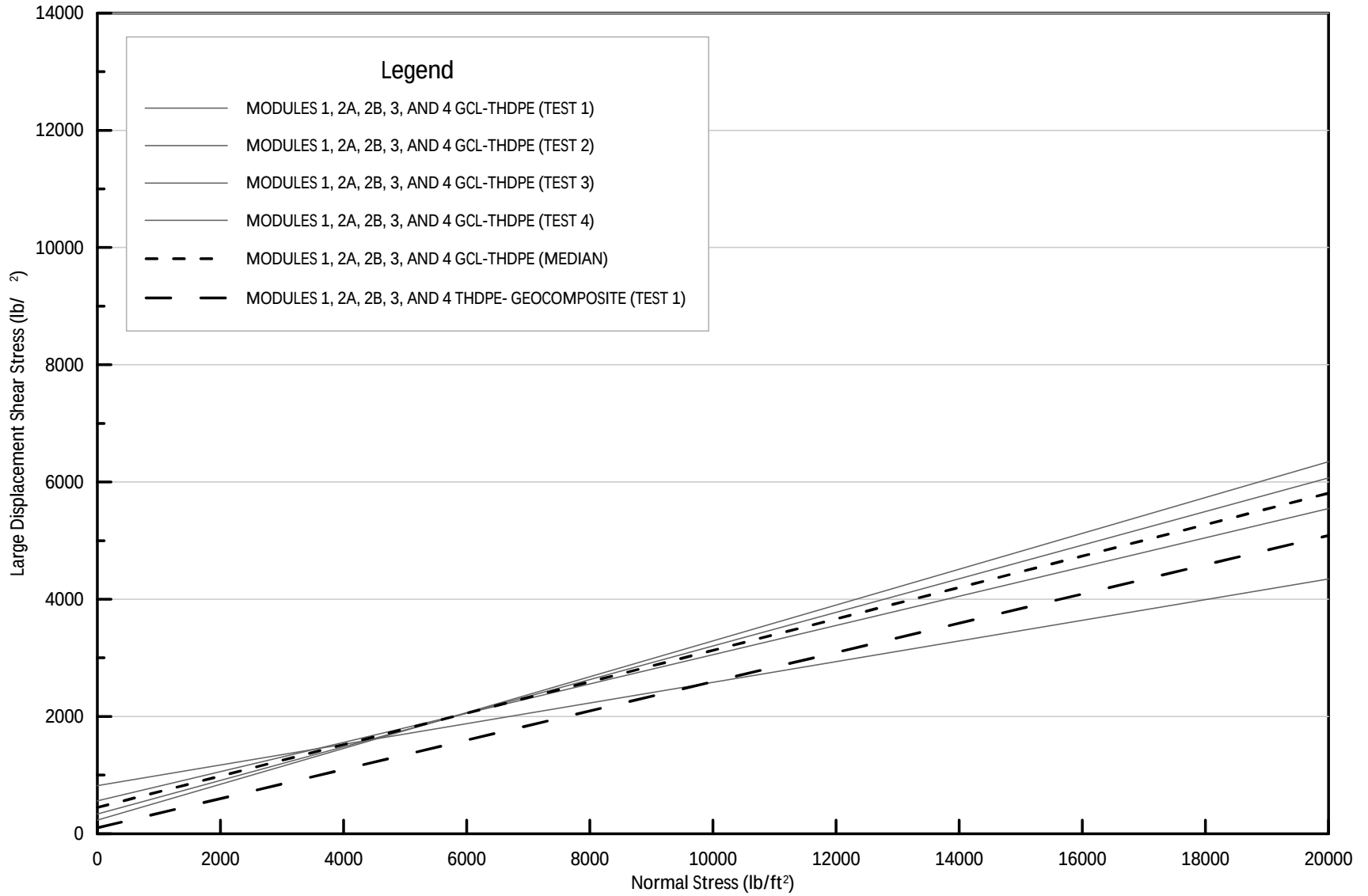


Figure 4
MODULE 5 SHEAR STRENGTH DATA

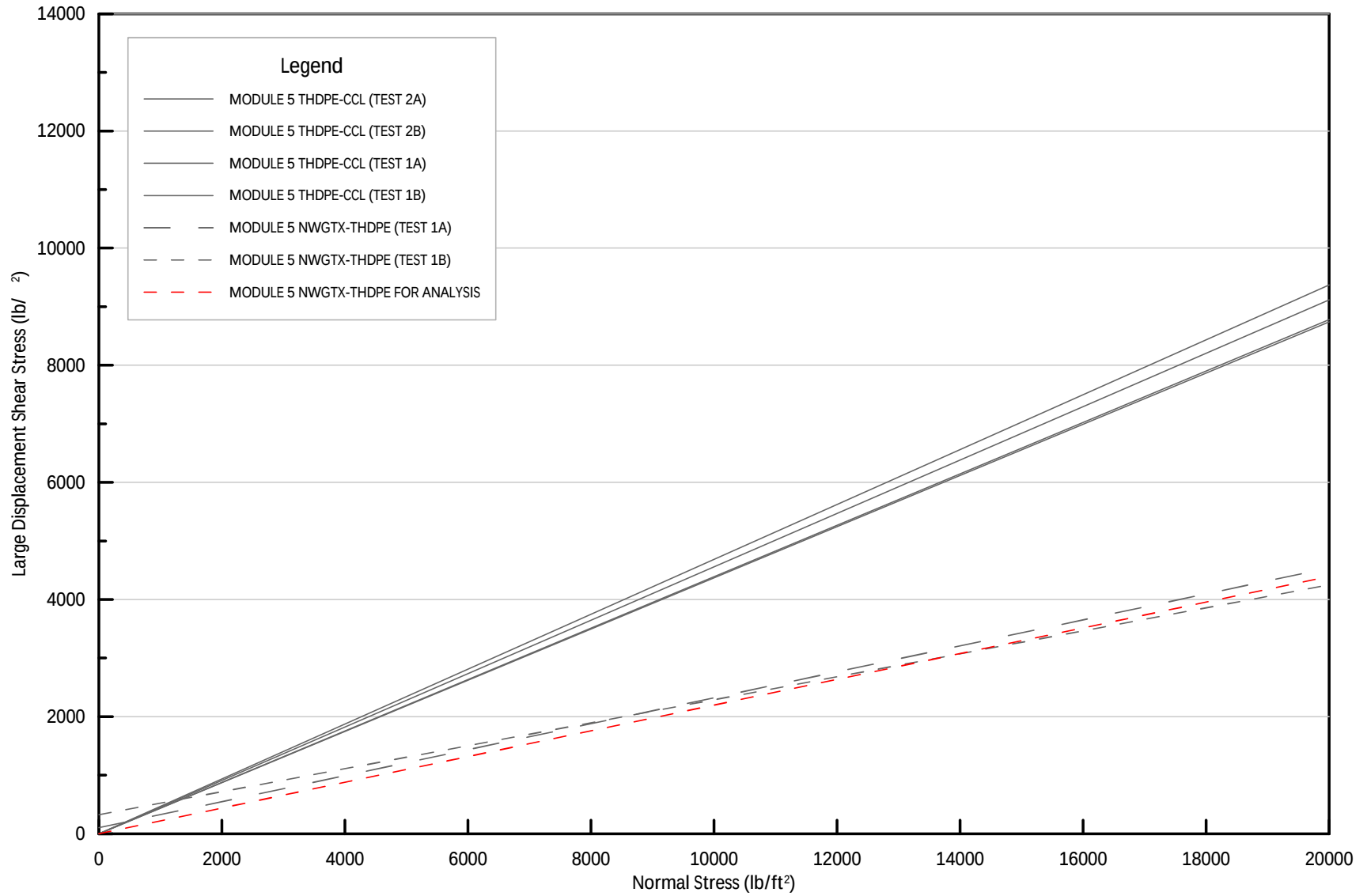
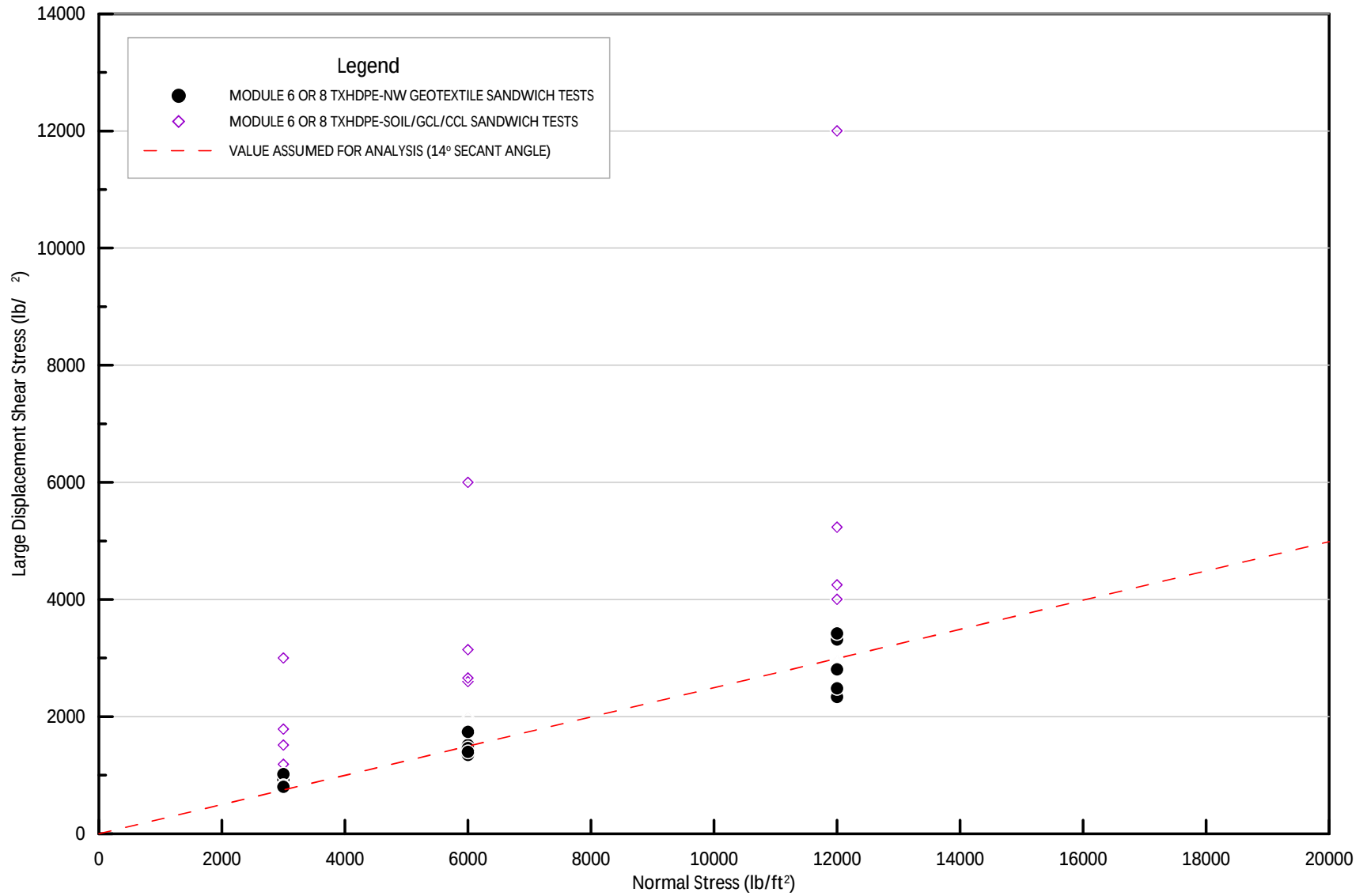


Figure 5
MODULES 6 AND 8 SHEAR STRENGTH DATA



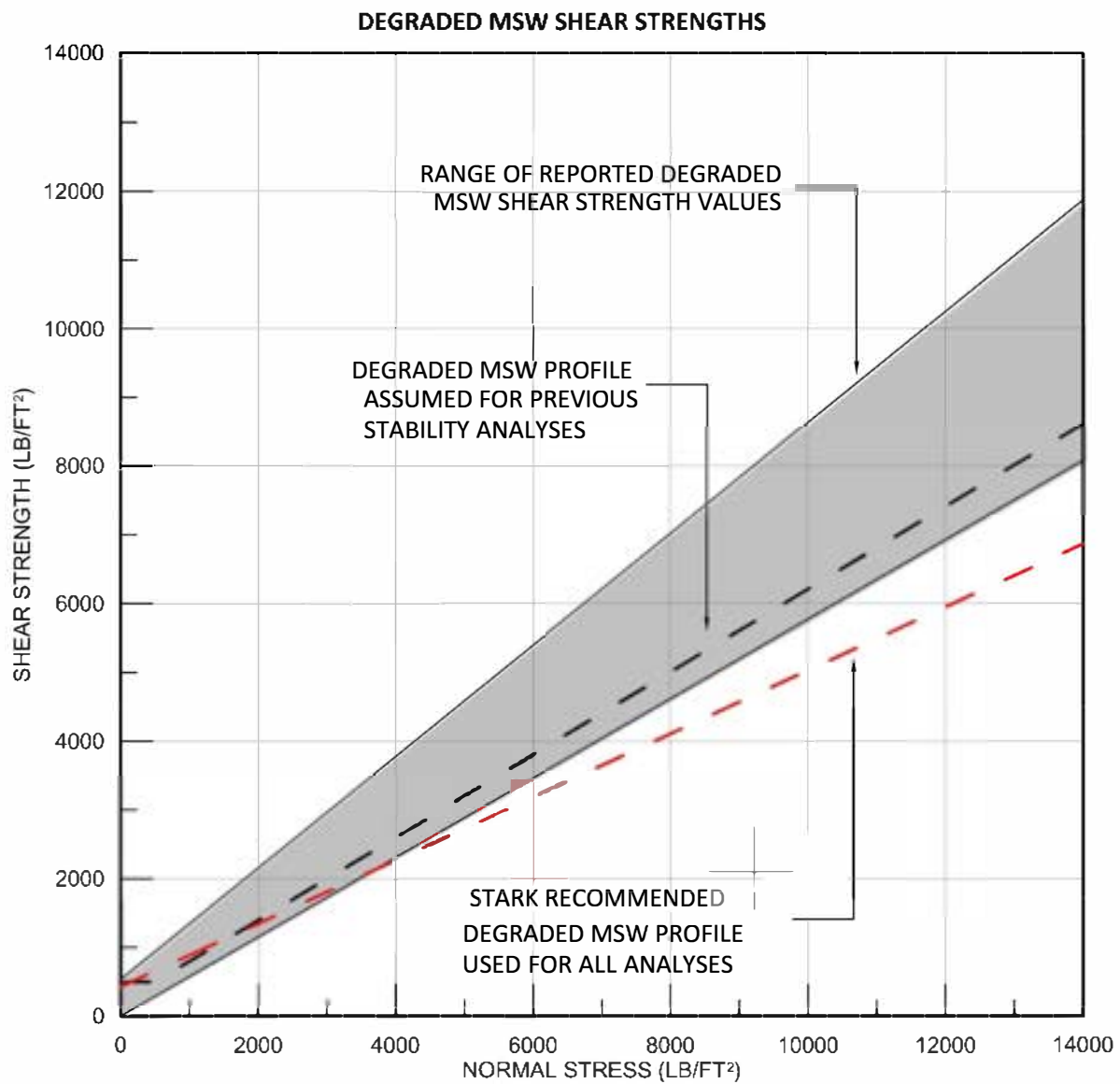


FIGURE 6

REPRESENTATIVE DEGRADED MSW STRENGTH

UPDATED STABILITY EVALUATION
CHIQUITA CANYON LANDFILL
LOS ANGELES COUNTY, CA

Geo-Logic
ASSOCIATES

DRAWN BY: RM DATE: SEPTEMBER 2024 JOB NO. RM22.1077

Appendix G
CEC JULY 2026 WEST SLOPE MITIGATION DRAWINGS

WASTE CONNECTIONS CHIQUITA CANYON LANDFILL

29201 HENRY MAY DR.
CASTAIC, CALIFORNIA

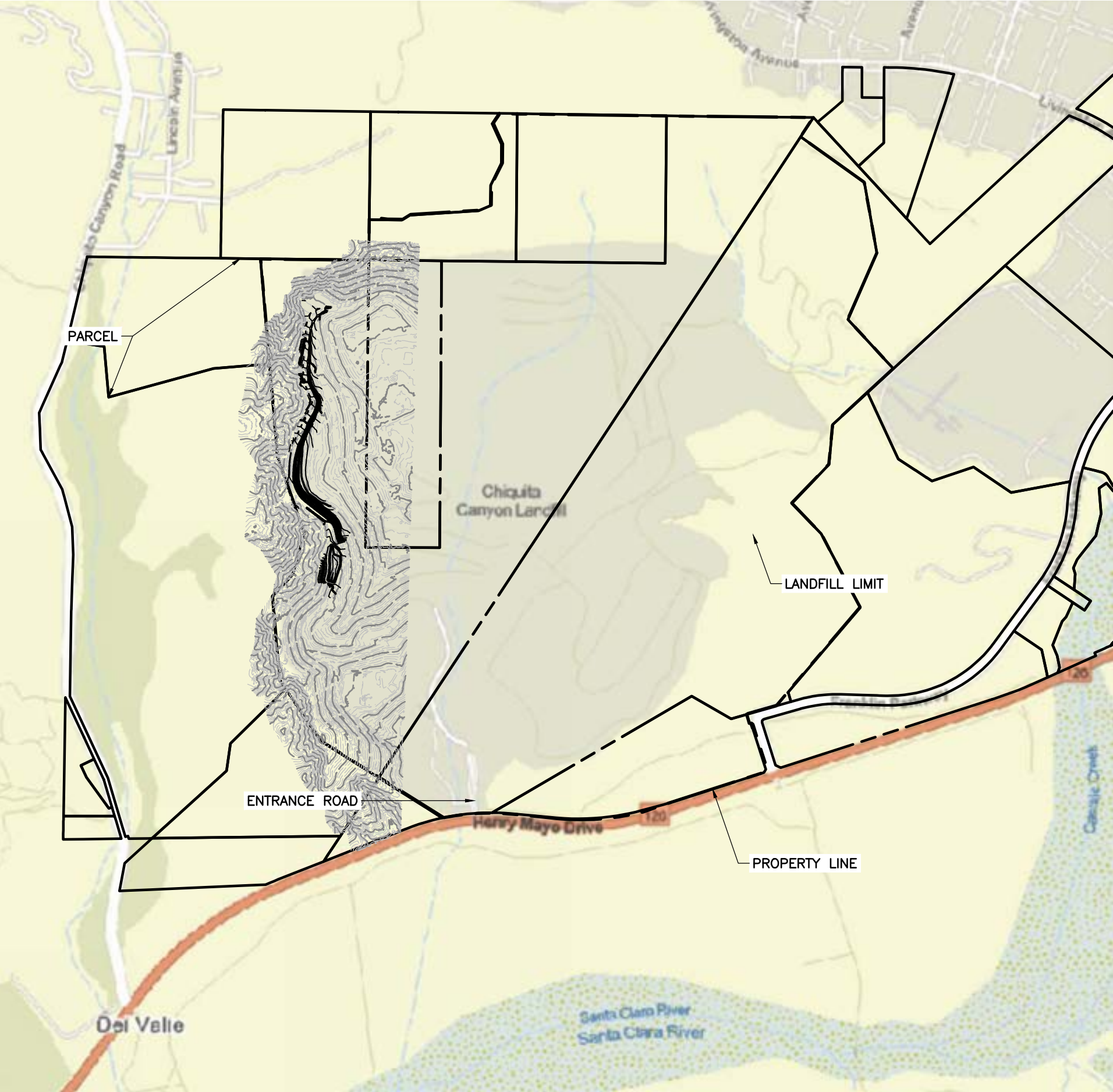
WEST SLOPE MITIGATION

JULY 2026



REGIONAL MAP
NTS

SHEET LIST TABLE		
Drawing Number	Sheet Number	Sheet Title
1	C000	COVER SHEET
2	C001	GENERAL NOTES
3	C010	GEOMETRIC LAYOUT
4	C100	OVERALL LOWER BUTTRESS PLAN AND PROFILE
5	C101	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 1+00 TO 5+50
6	C102	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 5+50 TO 10+00
7	C103	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 10+00 TO 15+00
8	C104	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 15+00 TO 20+00
9	C105	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 20+00 TO 25+00
10	C106	LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 25+00 TO 30+00
11	C107	GP-14 MSE WALL PLAN AND PROFILE
12	C108	GP-14 MSE WALL SECTIONS 1 OF 2
13	C109	GP-14 MSE WALL SECTIONS 2 OF 2
14	C110	GP-14 MSE WALL DETAILS
15	C113	SOUTH BASIN PLAN
16	C115	OVERALL UPPER BUTTRESS PLAN
17	C116	UPPER BUTTRESS PLAN STA. 1+00 TO 5+50
18	C117	UPPER BUTTRESS PLAN STA. 5+50 TO 10+00
19	C118	UPPER BUTTRESS PLAN STA. 10+00 TO 15+00
20	C119	UPPER BUTTRESS PLAN STA. 15+00 TO 20+00
21	C120	UPPER BUTTRESS PLAN STA. 20+00 TO 25+00
22	C300	BUTTRESS CROSS SECTIONS STA. 1+00 TO STA. 3+50
23	C301	BUTTRESS CROSS SECTIONS STA. 4+00 TO STA. 6+50
24	C302	BUTTRESS CROSS SECTIONS STA. 7+00 TO STA. 9+50
25	C303	BUTTRESS CROSS SECTIONS STA. 10+00 TO STA. 12+50
26	C304	BUTTRESS CROSS SECTIONS STA. 13+00 TO STA. 15+50
27	C305	BUTTRESS CROSS SECTIONS STA. 16+00 TO STA. 28+50
28	C306	BUTTRESS CROSS SECTIONS STA. 19+00 TO STA. 21+50
29	C307	BUTTRESS CROSS SECTIONS STA. 22+00 TO STA. 24+50
30	C308	BUTTRESS CROSS SECTIONS STA. 25+00 TO STA. 27+50
31	C309	BUTTRESS CROSS SECTIONS STA. 28+00 TO STA. 30+00
32	C500	DETAILS 1 OF 2
33	C501	DETAILS 2 OF 2



SITE PLAN



VICINITY MAP

NTS

BASIS OF BEARING

XYZ

XYZ

BASIS OF ELEVATION

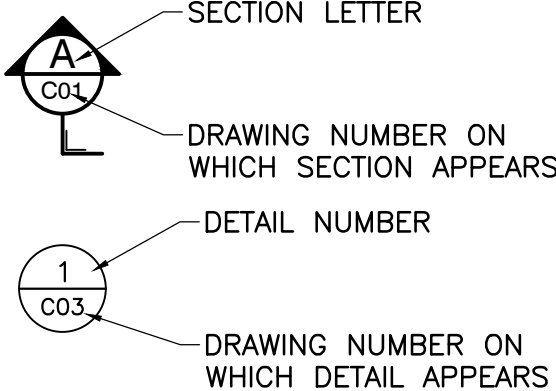
PROJECT QUANTITIES

XYZ

FACILITY AREA

XYZ

SYMBOLS



OWNER/TEAM INFORMATION

CIVIL ENGINEER

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
2356 GOLD MEADOW WAY, SUITE 120
GOLD RIVER, CA 95670
PH: (949) 396-8439
CONTACTS: ROBERT VAN HYNING, PE

OWNER

WASTE CONNECTIONS
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR.
CASTAIC, CA 91384
PH: (661) 964-5821
CONTACT: BILL HALEY

PROJECT PURPOSE

DRAFT

2356 Gold Meadow Way
Suite 120
Gold River, CA 95670
Ph: 916.503.0050
www.cecinc.com

CEC
Civil & Environmental
Consultants, Inc.

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

COVER SHEET

DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	AS NOTED	CHECKED BY:	CJM
PROJECT NO.:	350-750	APPROVED BY:	RJH

DRAWING NO.:
C000

SHEET 1 OF 1

DRAFT

DRAWING NO.:

C001

SHEET 2 OF --

GENERAL NOTES

DATE:	JULIUS 2026	DRAWN BY:	JAT
DWG SCALE:	AS NOTED	CHECKED BY:	CJM
PROJECT NO:	350-750		
APPROVED BY:	RVH		

**WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIKUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384**



Civil & Environmental
Consultants, Inc.

2356 Gold Meadow Way
Suite 120
Gold River, CA 95670
Ph: 916.503.0050
www.cecinc.com

SUBMITTAL RECORD

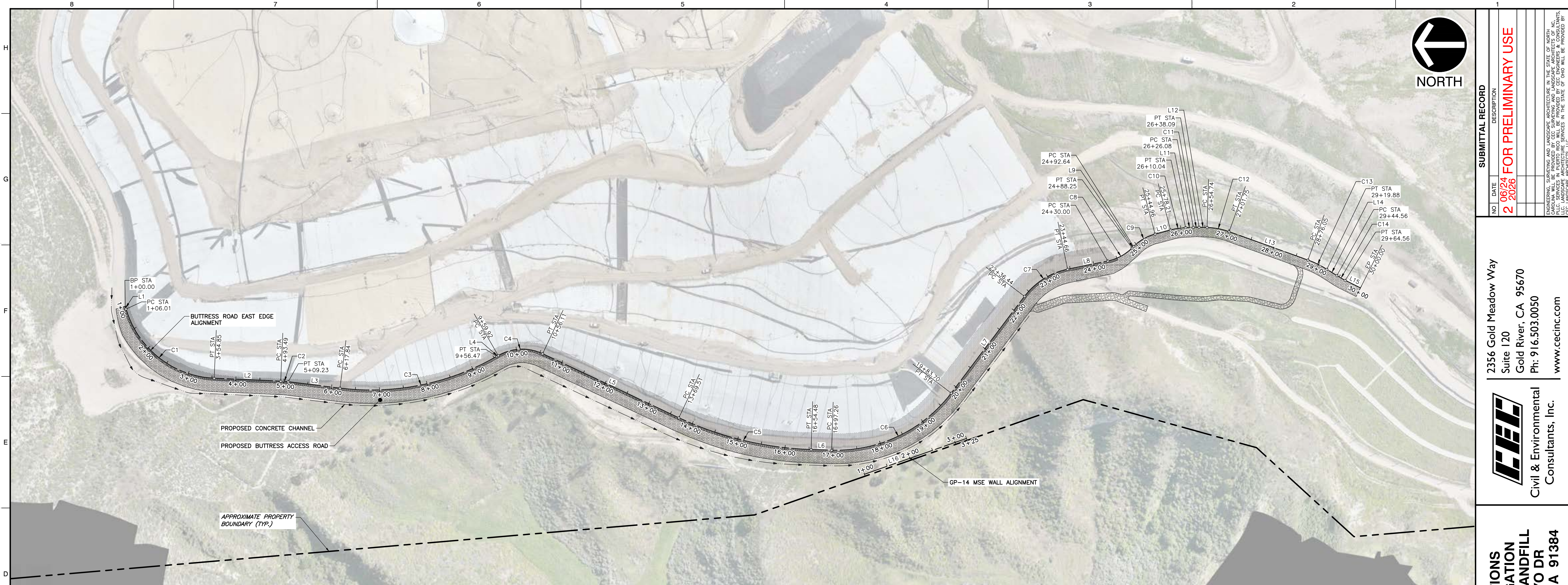
NO	DATE	DESCRIPTION
2	06/24/2026	FOR PRELIMINARY USE

LEGEND

	EXISTING UNPAVED ROADS
	EXISTING LIGHT POLE
	EXISTING INDEX (MAJOR) CONTOUR
	EXISTING INTERMEDIATE (MINOR) CONTOUR
	EXISTING WATERLINE
	EXISTING OVERHEAD WIRE
	EXISTING STORMWATER CULVERT
	EXISTING CURB
	EXISTING ELECTRIC POLE
	EXISTING GROUNDWATER WELL
	EXISTING GAS EXTRACTION WELL
	EXISTING PERIMETER GAS COLLECTION
	EXISTING CONDENSATE SUMP
	EXISTING LEACHATE SUMP
	EXISTING LEACHATE EXTRACTION PIPE
	EXISTING PERIMETER GAS PROBE
	PROPOSED INDEX (MAJOR) CONTOUR
	PROPOSED INTERMEDIATE (MINOR) CONTOUR
	EXISTING PROPERTY LINE
	EXISTING EASEMENT
	PROPOSED PARCEL LINE

ABBREVIATIONS

AC	ACRE
APPROX.	APPROXIMATE
CS	CONDENSATE SUMP
Ø	DIAMETER
EL	ELEVATION
GEW	GAS EXTRACTION WELL
GCL	GEOSYNTHETIC CLAY LINER
HDPE	HIGH DENSITY POLYETHYLENE
I.D.	INNER DIAMETER
LEP	LEACHATE EXTRACTION PIPE
MAX	MAXIMUM
MIN	MINIMUM
MNPT	MALE NATIONAL PIPE THREAD
NAD 83	NORTH AMERICAN DATUM OF 1983
NAVD 88	NORTH AMERICAN VERTICAL DATUM OF 1988
O.C.	ON CENTER
PGC	PERIMETER GAS COLLECTION
TYP	TYPICAL



GEOMETRIC LAYOUT PLAN
SCALE: 1" = 100'

CHIQUITA CANYON – WEST SLOPE MITIGATION – BUTTRESS ROAD EAST EDGE ALIGNMENT – LINE TABLE				
LINE #	BEARING	LENGTH	START POINT	END POINT
L1	S 73° 47' 39.08" W	6.01'	STA: 1+00.00 N: 1,982,039.68; E: 6,365,352.31	STA: 1+06.01 N: 1,982,038.00; E: 6,365,346.54
L2	S 02° 30' 21.64" W	138.64'	STA: 3+54.85 N: 1,981,854.69; E: 6,365,202.55	STA: 4+93.49 N: 1,981,716.19; E: 6,365,196.49
L3	S 07° 00' 57.33" W	108.61'	STA: 5+09.23 N: 1,981,700.51; E: 6,365,195.18	STA: 6+17.84 N: 1,981,592.71; E: 6,365,181.92
L4	S 29° 56' 25.62" E	3.45'	STA: 9+56.47 N: 1,981,266.56; E: 6,365,248.05	STA: 9+59.92 N: 1,981,263.57; E: 6,365,249.77
L5	S 25° 10' 22.86" W	313.40'	STA: 10+56.11 N: 1,981,171.12; E: 6,365,253.62	STA: 13+69.51 N: 1,980,887.48; E: 6,365,120.31
L6	S 01° 50' 52.02" W	42.77'	STA: 16+54.48 N: 1,980,612.31; E: 6,365,054.20	STA: 16+97.26 N: 1,980,569.56; E: 6,365,052.82
L7	S 52° 51' 28.47" E	252.75'	STA: 19+83.70 N: 1,980,320.74; E: 6,365,171.52	STA: 22+36.44 N: 1,980,168.14; E: 6,365,373.00
L8	S 11° 31' 10.57" E	85.33'	STA: 23+44.66 N: 1,980,078.52; E: 6,365,429.41	STA: 24+30.00 N: 1,979,994.91; E: 6,365,446.45
L9	S 44° 53' 40.62" E	4.39'	STA: 24+88.25 N: 1,979,944.30; E: 6,365,473.59	STA: 24+92.64 N: 1,979,941.19; E: 6,365,476.69
L10	S 14° 55' 05.08" E	33.25'	STA: 25+44.96 N: 1,979,896.35; E: 6,365,502.48	STA: 25+78.21 N: 1,979,864.22; E: 6,365,511.04
L11	S 02° 45' 37.62" E	16.04'	STA: 26+10.04 N: 1,979,832.83; E: 6,365,515.92	STA: 26+26.08 N: 1,979,816.80; E: 6,365,516.70
L12	S 01° 49' 32.56" W	16.65'	STA: 26+38.09 N: 1,979,804.80; E: 6,365,516.79	STA: 26+54.74 N: 1,979,788.15; E: 6,365,516.26
L13	S 19° 46' 52.63" W	174.30'	STA: 27+01.75 N: 1,979,742.17; E: 6,365,507.49	STA: 28+76.05 N: 1,979,578.16; E: 6,365,448.50
L14	S 32° 20' 18.33" W	24.69'	STA: 29+19.88 N: 1,979,538.86; E: 6,365,429.28	STA: 29+44.56 N: 1,979,518.00; E: 6,365,416.08
L15	S 26° 36' 33.11" W	35.44'	STA: 29+64.56 N: 1,979,500.60; E: 6,365,406.24	STA: 30+00.00 N: 1,979,468.91; E: 6,365,390.37

CHIQUITA CANYON – WEST SLOPE MITIGATION – BUTTRESS ROAD EAST EDGE ALIGNMENT – CURVE TABLE										
CURVE #	RADIUS	LENGTH	CHORD BEARING	START POINT	END POINT	PI	DELTA	DEGREE OF CURVE	TANGENT	MID ORDINATE
C1	200.00	248.84	S 38° 09' 00.36" W	STA: 1+06.01 N: 1,982,038.00; E: 6,365,346.54	STA: 3+54.85 N: 1,981,854.69; E: 6,365,202.55	STA: 2+49.43 N: 1,981,997.98; E: 6,365,208.82	071° 17' 17"	028° 38' 52"	143.42	37.47
C2	200.00	15.74	S 04° 45' 39.49" W	STA: 4+93.49 N: 1,981,716.19; E: 6,365,196.49	STA: 5+09.23 N: 1,981,700.51; E: 6,365,195.18	STA: 5+01.36 N: 1,981,708.32; E: 6,365,196.15	004° 30' 36"	028° 38' 52"	7.88	0.15
C3	525.00	338.63	S 11° 27' 44.14" E	STA: 6+17.84 N: 1,981,592.71; E: 6,365,181.92	STA: 9+56.47 N: 1,981,266.56; E: 6,365,248.05	STA: 7+93.28 N: 1,981,418.58; E: 6,365,160.49	036° 57' 23"	010° 54' 49"	175.44	27.07
C4	100.00	96.19	S 02° 23' 01.38" E	STA: 9+59.92 N: 1,981,263.57; E: 6,365,249.77	STA: 10+56.11 N: 1,981,171.12; E: 6,365,253.62	STA: 10+12.10 N: 1,981,218.35; E: 6,365,275.82	055° 06' 48"	057° 17' 45"	52.18	11.34
C5	700.00	284.97	S 13° 30' 37.44" W	STA: 13+69.51 N: 1,980,887.48; E: 6,365,120.31	STA: 16+54.48 N: 1,980,612.31; E: 6,365,054.20	STA: 15+14.00 N: 1,980,756.72; E: 6,365,058.85	023° 19' 31"	008° 11' 06"	144.49	14.45
C6	300.00	286.44	S 25° 30' 18.23" E	STA: 16+97.26 N: 1,980,569.56; E: 6,365,052.82	STA: 19+83.70 N: 1,980,320.74; E: 6,365,171.52	STA: 18+52.45 N: 1,980,414.45; E: 6,365,047.81	054° 42' 20"	019° 05' 55"	155.19	33.54
C7	150.00	108.22	S 32° 11' 19.52" E	STA: 22+36.44 N: 1,980,168.14; E: 6,365,373.00	STA: 24+30.00 N: 1,979,994.91; E: 6,365,446.45	STA: 22+93.03 N: 1,980,133.97; E: 6,365,418.10	041° 20' 18"	038° 11' 50"	56.59	9.65
C8	100.00	58.25	S 28° 12' 25.59" E	STA: 24+30.00 N: 1,979,944.91; E: 6,365,446.45	STA: 24+88.25 N: 1,979,944.30; E: 6,365,473.59	STA: 24+59.97 N: 1,979,965.53; E: 6,365,452.43	033° 22' 30"	057° 17' 45"	29.98	4.21
C9	100.00	52.32	S 29° 54' 22.85" E	STA: 24+92.64 N: 1,979,941.19; E: 6,365,476.69	STA: 25+44.96 N: 1,979,896.35; E: 6,365,502.48	STA: 25+19.41 N: 1,979,922.22; E: 6,365,495.59	029° 58' 36"	057° 17' 45"	26.77	3.40
C10	150.00	31.83	S 08° 50' 21.35" E	STA: 25+78.21 N: 1,979,864.22; E: 6,365,511.04	STA: 26+10.04 N: 1,979,832.83; E: 6,365,515.92	STA: 25+94.18 N: 1,979,848.78; E: 6,365,515.15	012° 09' 27"	038° 11' 50"	15.97	0.84
C11	150.00	12.01	S 00° 28' 02.53" E	STA: 26+26.08 N: 1,979,816.80; E: 6,365,516.70	STA: 26+38.09 N: 1,979,804.80; E: 6,365,516.79	STA: 26+32.09 N: 1,979,810.80; E: 6,365,516.98	004° 35' 10"	038° 11' 50"	6.01	0.12
C12	150.00	47.01	S 10° 48' 12.60" W	STA: 26+54.74 N: 1,979,788.15; E: 6,365,516.26	STA: 27+01.75 N: 1,979,742.17; E: 6,365,507.49	STA: 26+78.44 N: 1,979,764.47; E: 6,365,515.51	017° 57' 20"	038° 11' 50"	23.70	1.84
C13	200.00	43.83	S 26° 03' 35.48" W	STA: 28+76.05 N: 1,979,578.16; E: 6,365,448.50	STA: 29+19.88 N: 1,979,538.86; E: 6,365,429.28	STA: 28+98.05 N: 1,979,557.45; E: 6,365,441.05	012° 33' 26"	028° 38' 52"	22.00	1.20
C14	200.00	20.00	S 29° 28' 25.72" W	STA: 29+44.56 N: 1,979,518.00; E: 6,365,416.08	STA: 29+64.56 N: 1,979,500.60; E: 6,365,406.24	STA: 29+54.57 N: 1,979,509.55; E: 6,365,410.72	005° 43' 45"	028° 38' 52"	10.01	0.25

CHIQUITA CANYON – WEST SLOPE MITIGATION – GP-14 MSE WALL ALIGNMENT – LINE TABLE				
LINE #	BEARING	LENGTH	START POINT	END POINT
L16	S 19° 19' 16.00" E	225.00'	STA: 1+00.00 N: 1,980,501.29; E: 6,365,002.81	STA: 3+25.00 N: 1,980,288.96; E: 6,365,077.25

- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

SCALE IN FEET
0 100 200

DRAFT

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NO	DATE	DESCRIPTION
2	2026	06/24 FOR PRELIMINARY USE

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Gold River, CA 95670
Ph: 916.503.0050
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WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

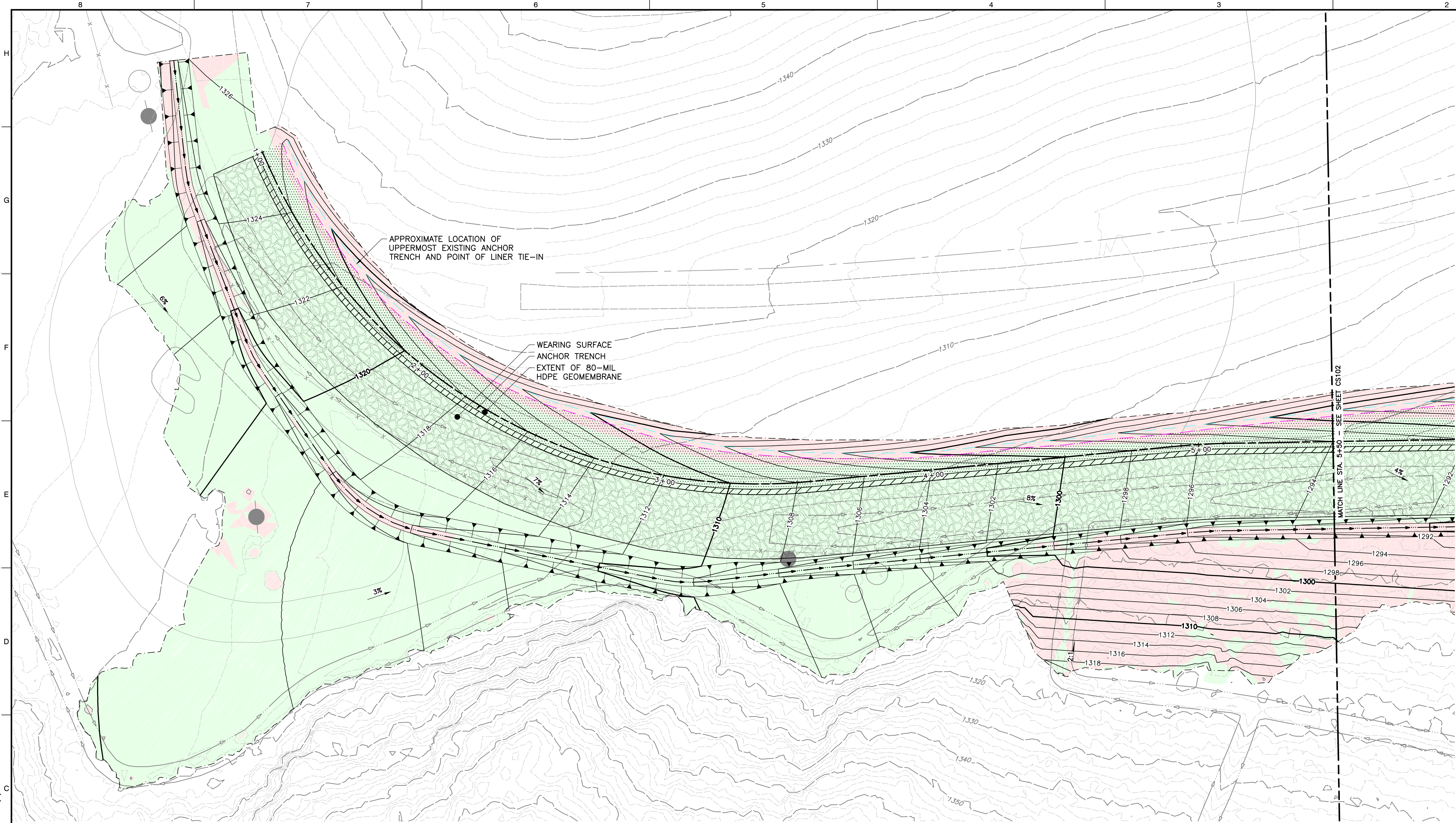
GEOMETRIC LAYOUT

DATE: JULY 2026
DWG SCALE: 1" = 100'
PROJECT NO: 350-750
APPROVED BY: RYH

JAT
CJM
350-750
RYH

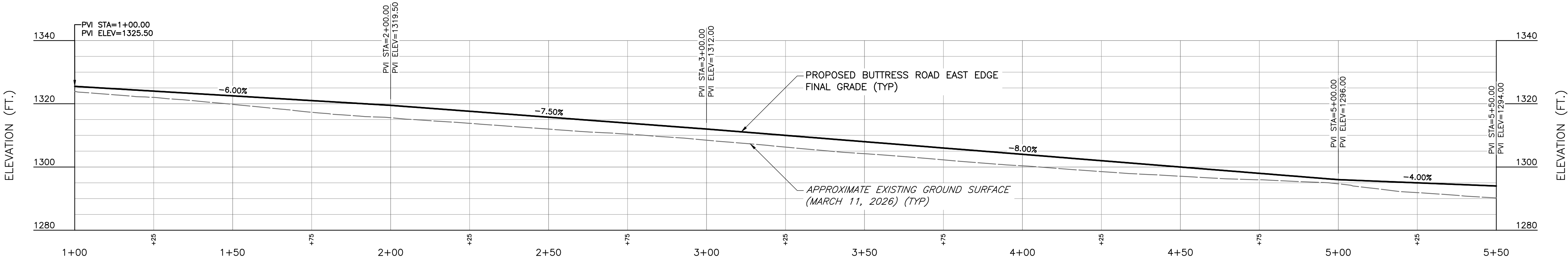
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SHEET 3 OF 3



LOWER BUTTRESS AND BACKCUT - STA. 1+00 TO 5+50 PLAN

SCALE: 1" = 20'



BUTTRESS ROAD - EAST EDGE - STA. 1+00 TO 5+50 PROFILE

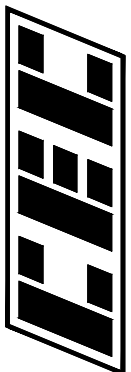
SCALE: H:1"=20'; V:1"=20'



NOTES:

1. XXX

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LOWER BUTTRESS AND
BACKCUT PLAN AND PROFILE
STA. 1+00 TO 5+50

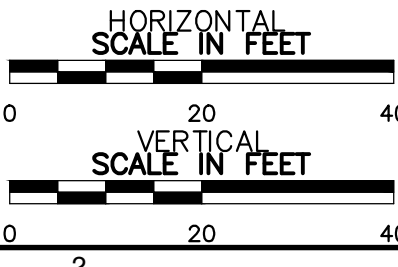
DATE: JULY 2026
DRAWN BY: JAT
CHECKED BY: CJM
PROJECT NO.: 350-750
APPROVED BY: RVH

DRAWING NO.:

C101

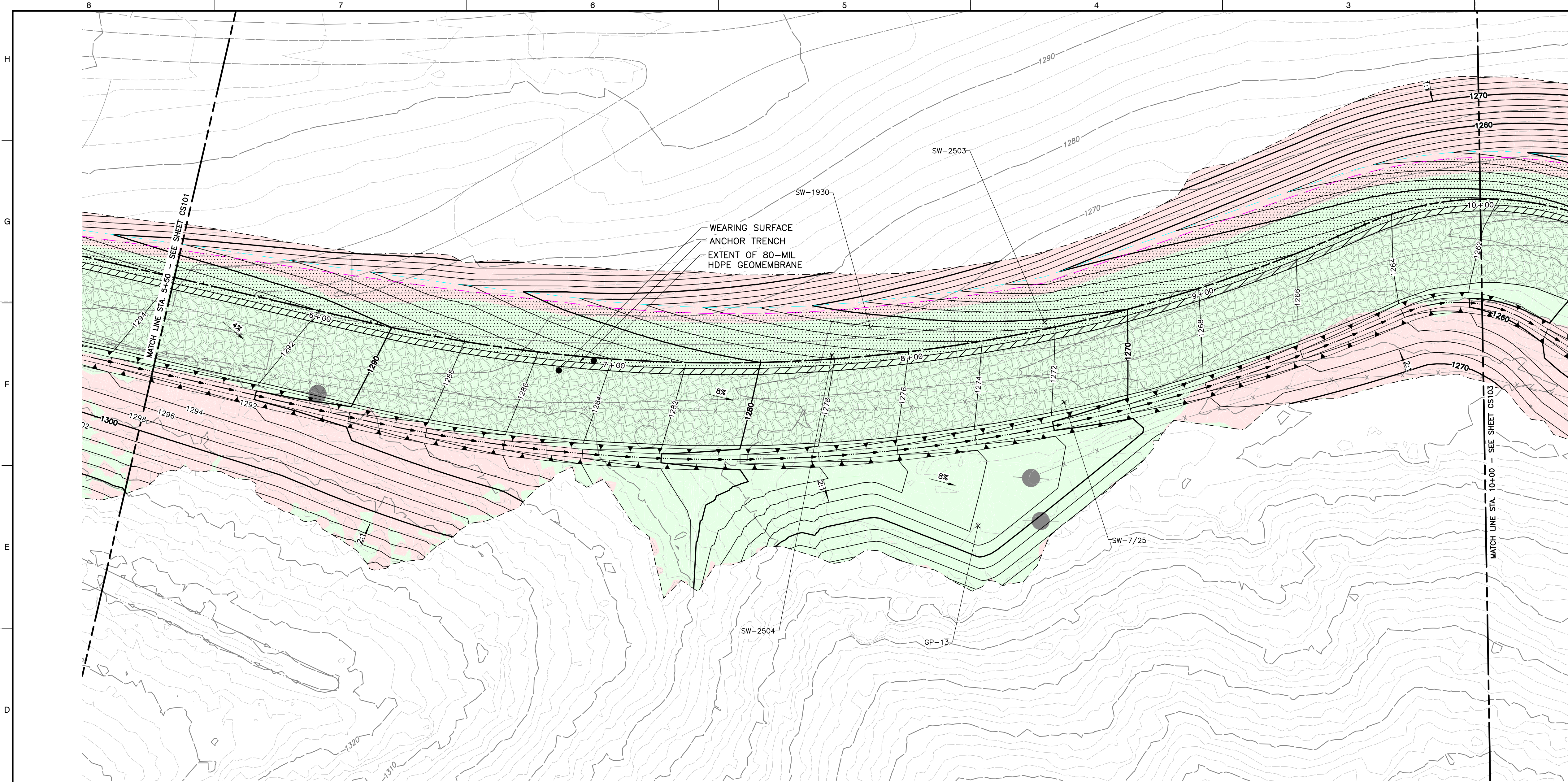
SHEET 5 OF 11

DRAFT



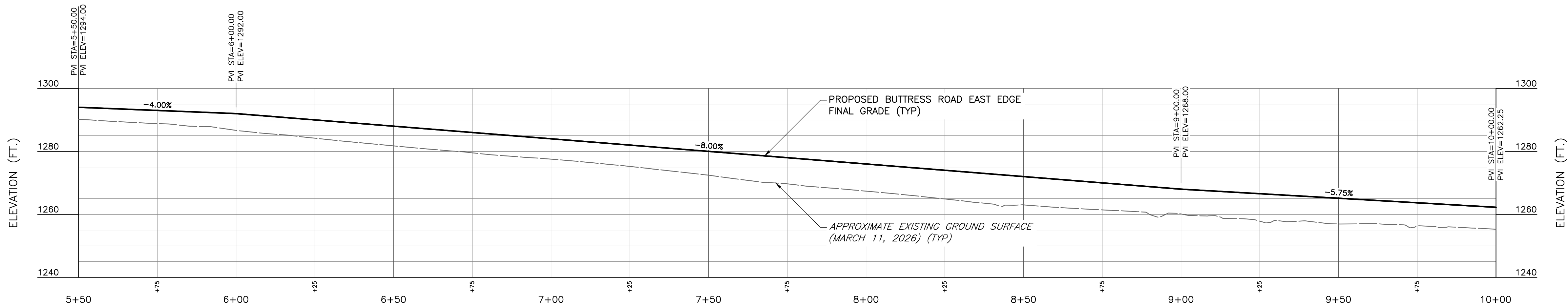
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LOWER BUTRESS AND BACKCUT - STA. 5+50 TO 10+00 PLAN

SCALE: 1" = 20'

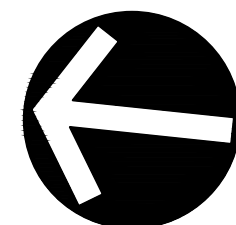


BUTRESS ROAD - EAST EDGE - STA. 5+50 TO 10+00 PROFILE

SCALE: H:1"=20'; V:1"=20'

REFERENCE

- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



NORTH

NOTES:

- XXX

SUBMITTAL RECORD

NO	DATE	DESCRIPTION
2	06/24/2026	FOR PRELIMINARY USE

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LOWER BUTRESS AND
BACKCUT PLAN AND PROFILE
STA. 5+50 TO 10+00

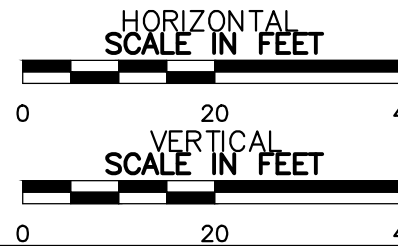
DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	H: 1"=20'; V: 1"=20'	CHECKED BY:	CJM
PROJECT NO.:	350-750	APPROVED BY:	RJH

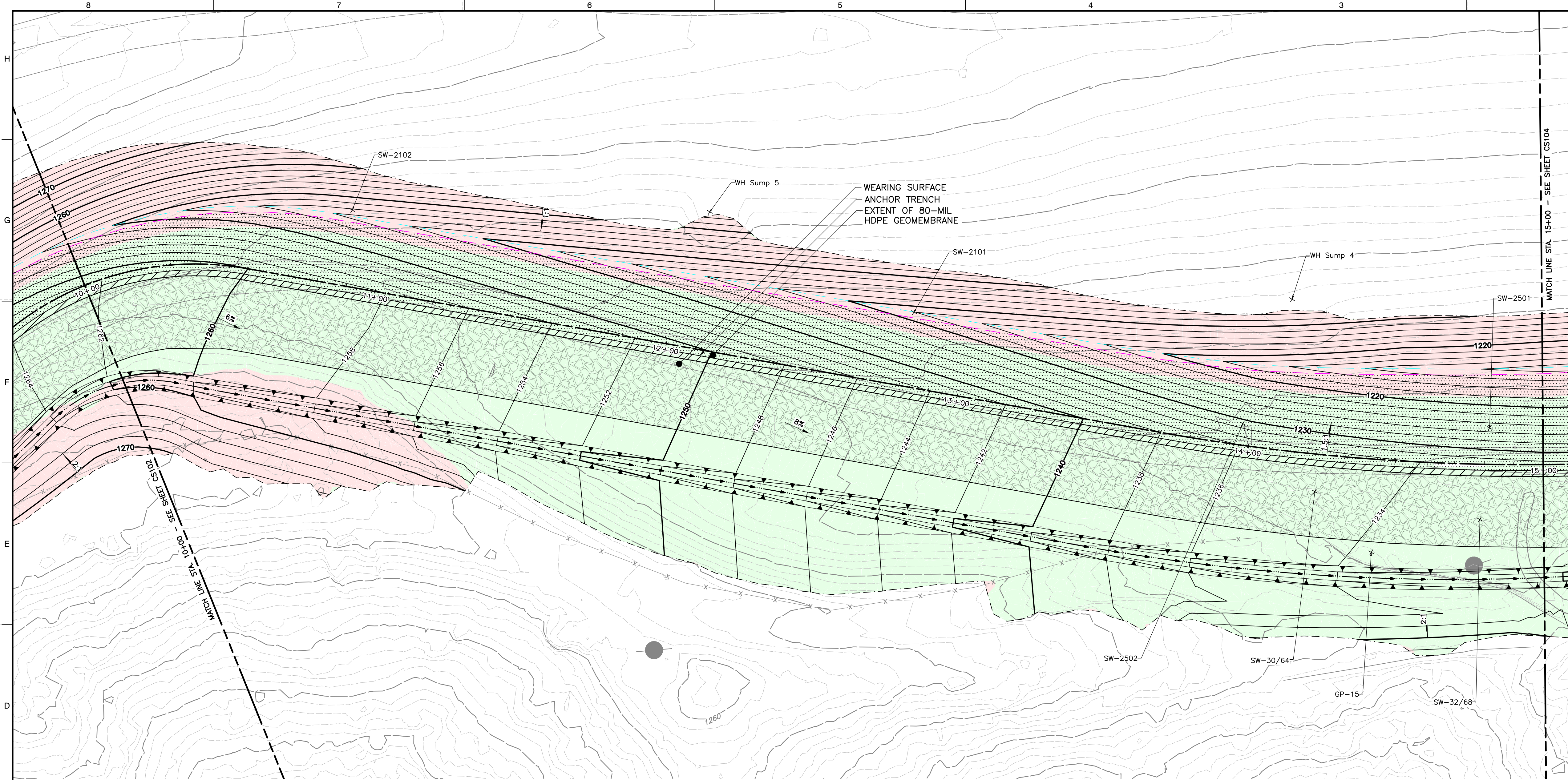
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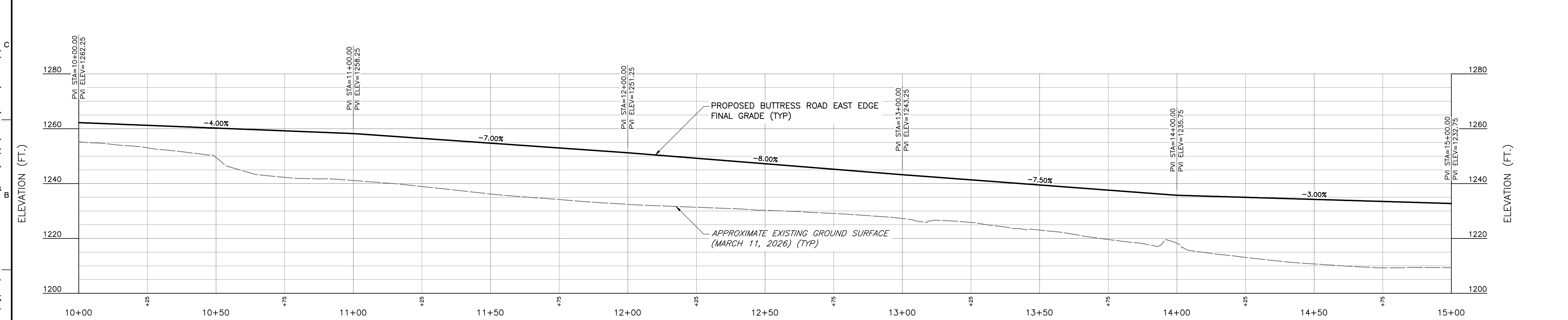
SHEET 6 OF 11

DRAFT





LOWER BUTTRESS AND BACKCUT - STA. 10+00 TO 15+00 PLAN
SCALE: 1" = 20'



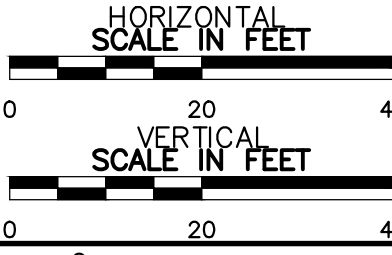
BUTTRESS ROAD - EAST EDGE - STA. 10+00 TO 15+00 PROFILE
SCALE: H:1"=20'; V:1"=20'



NOTES:
1. XXX

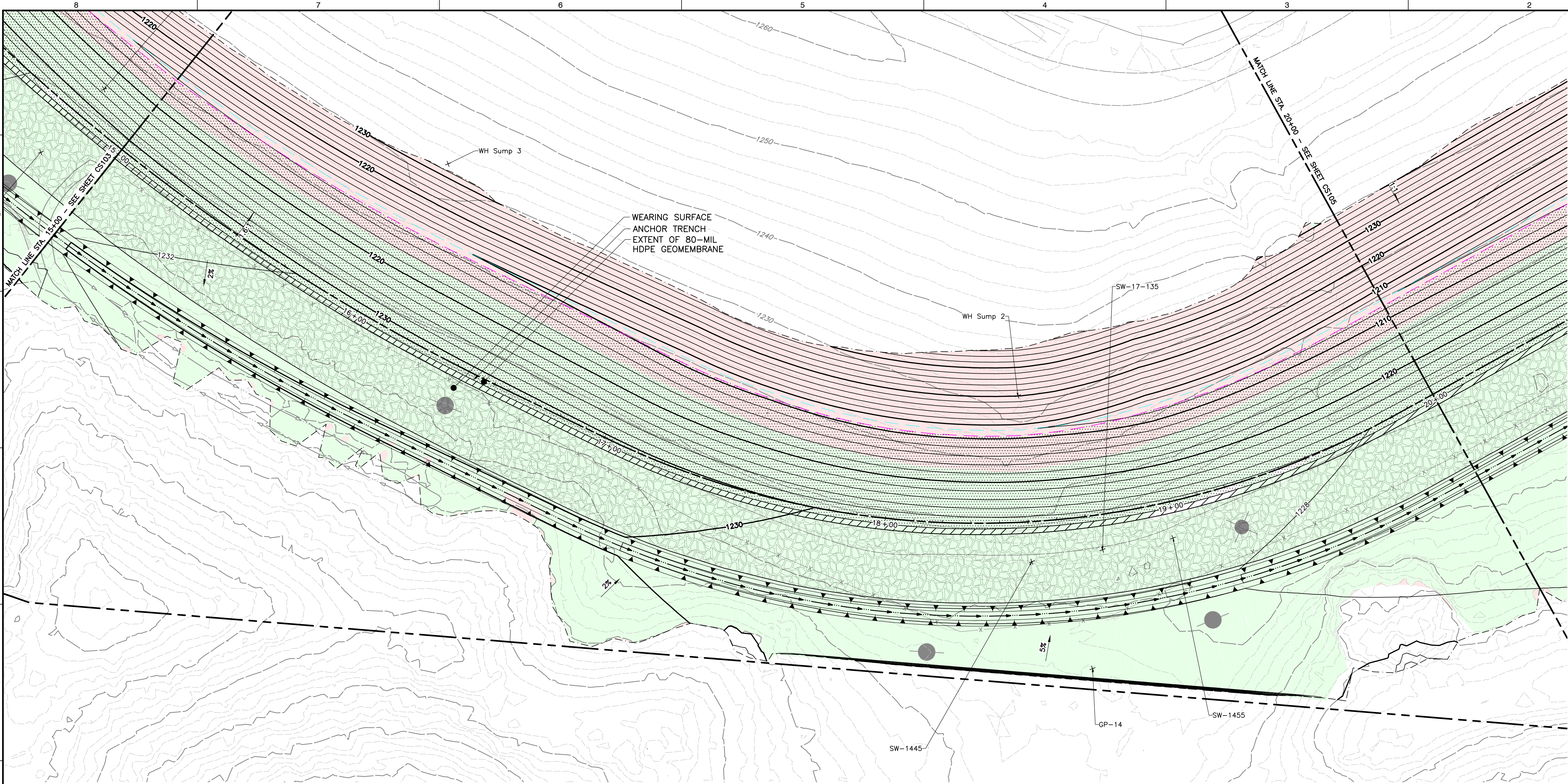
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- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

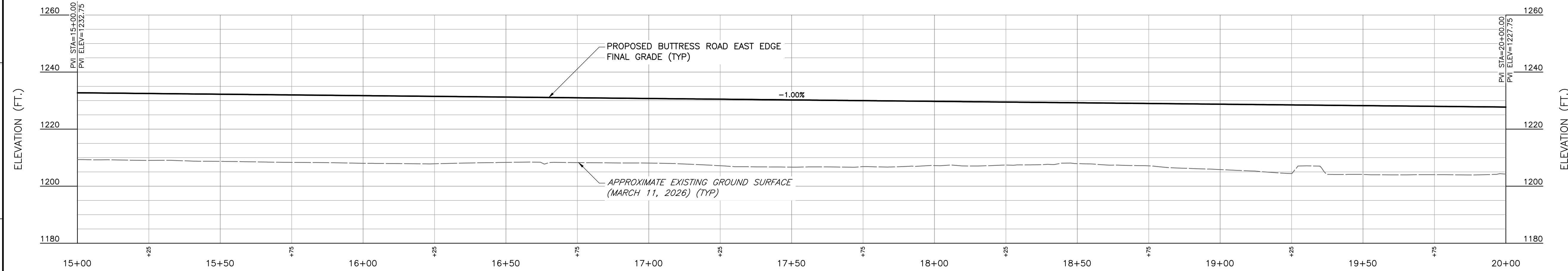


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SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
DATE: 06/24/2026	
DRAWING NO.: C103	
SHEET 1 OF 1	
PROJECT NO.: 350-750	
APPROVED BY: RWH	
DATE: JULY 2026 (DRAWN BY: CJM)	
DWG SCALE: H: 1"=20'; V: 1"=20' (CHECKED BY: CJM)	
PROJECT NO.: 350-750	
APPROVED BY: RWH	
WASTE CONNECTIONS WEST SLOPE MITIGATION CHIQUITA CANYON LANDFILL 29201 HENRY MAYO DR CASTAIC, CALIFORNIA 91384	
Civil & Environmental Consultants, Inc.	
2356 Gold Meadow Way Suite 120 Gold River, CA 95670 Ph: 916.503.0050 www.cecinc.com	



LOWER BUTTRESS AND BACKCUT - STA. 15+00 TO 20+00 PLAN
SCALE: 1" = 20'



BUTTRESS ROAD - EAST EDGE - STA. 15+00 TO 20+00 PROFILE
SCALE: H:1"=20'; V:1"=20'



NOTES:

1. XXX

SUBMITTAL RECORD	
NO	DATE
2	06/24/2026
FOR PRELIMINARY USE	

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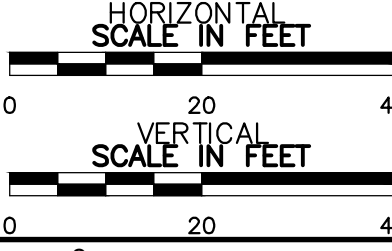


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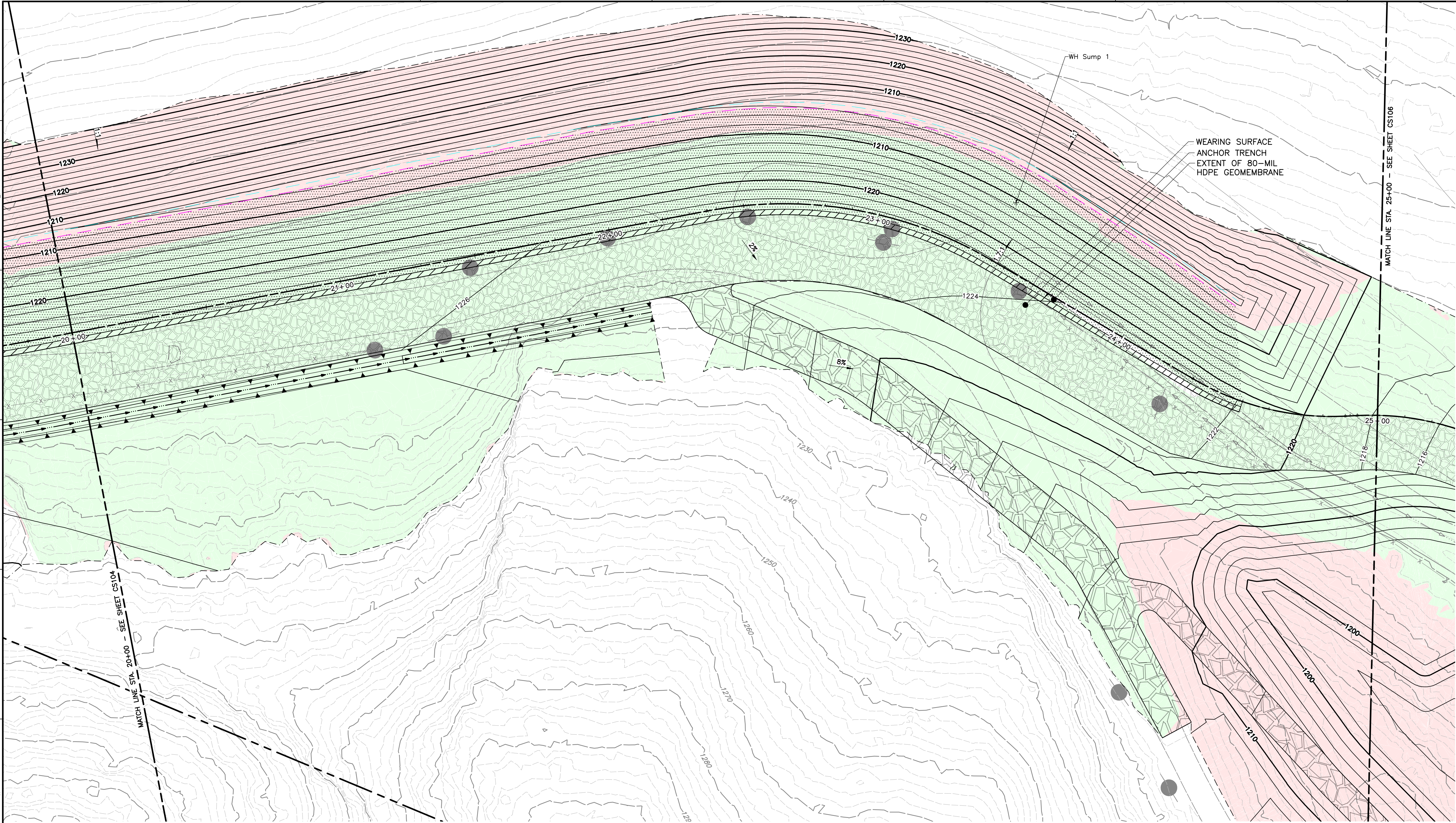
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DATE:	JULY 2026
DWG SCALE:	H: 1"=20'; V: 1"=20'
PROJECT NO.:	350-750
APPROVED BY:	RWH
DRAWING NO.:	C104
SHEET	1 OF 1

DRAFT



- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

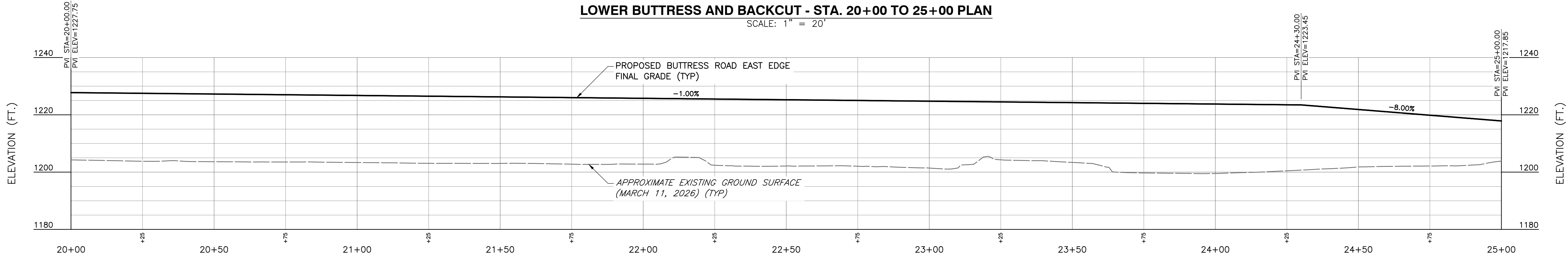
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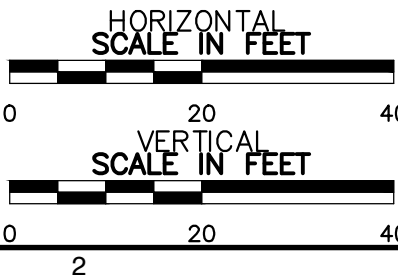


LOWER BUTRESS AND BACKCUT - STA. 20+00 TO 25+00 PLAN
SCALE: 1" = 20'



BUTRESS ROAD - EAST EDGE - STA. 20+00 TO 25+00 PROFILE
SCALE H:1"=20'; V:1"=20'

- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



DRAFT

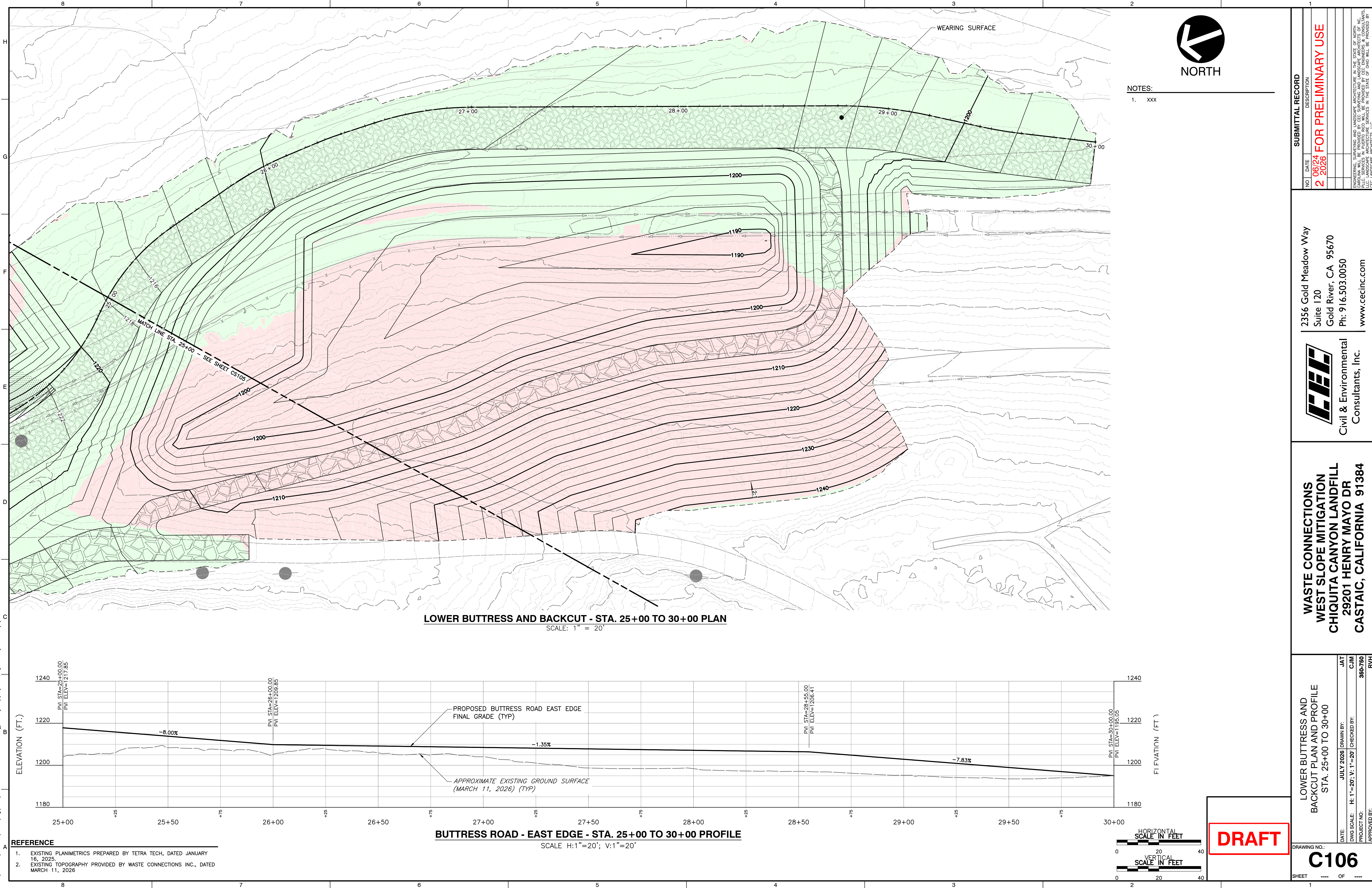
SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
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29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

LOWER BUTRESS AND BACKCUT PLAN AND PROFILE STA. 20+00 TO 25+00	
DATE: JULY 2026	DRAWN BY: JAT
DWG SCALE: H: 1"=20'; V: 1"=20'	CHECKED BY: CJM
PROJECT NO: 350-750	APPROVED BY: RVH
DRAWING NO.: C105	
SHEET 5 OF 11	



NOTES:

- XXX

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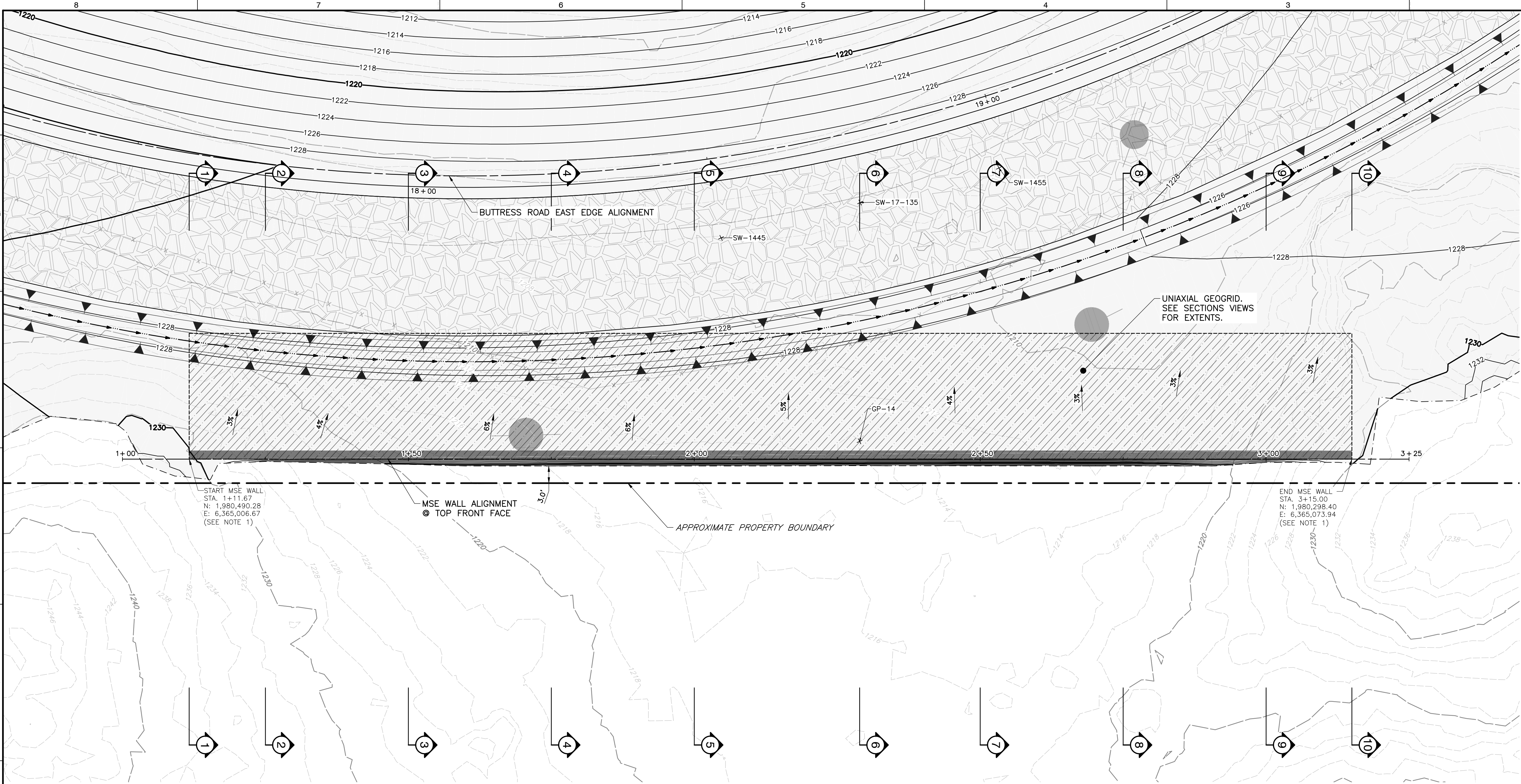
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WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

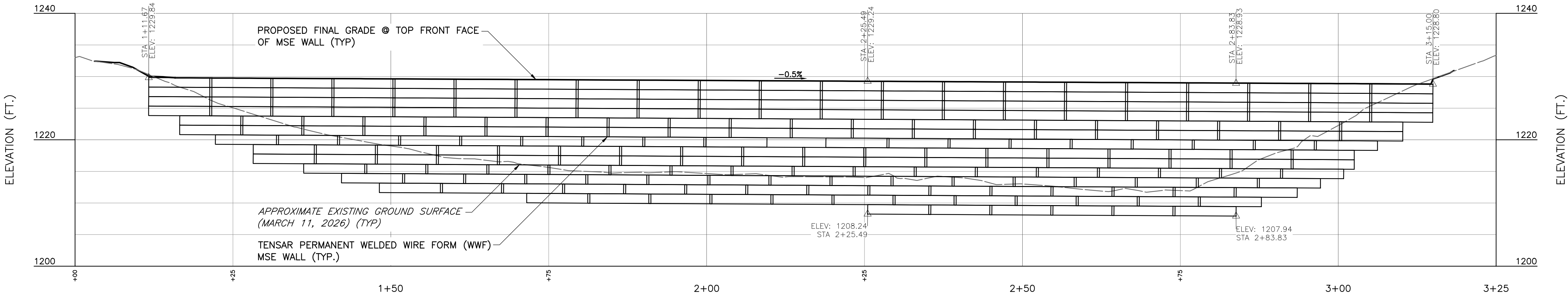
LOWER BUTTRESS AND BACKCUT PLAN AND PROFILE STA. 25+00 TO 30+00	
DATE:	JULY 2026 [DRAWN BY: JAT]
DWG SCALE:	H: 1"=20'; V: 1"=20' [CHECKED BY: CJM]
PROJECT NO.:	350-750
APPROVED BY:	RJH
DRAWING NO.: C106	
SHEET --- OF ---	

DRAFT

P:\350-750\350-750-CADD\DWG\C107\350750-C107-RETAINING WALL.dwg (P:\350-750-CADD\DWG\C107\350750-C107-RETAINING WALL.dwg) - LP: 7/18/2026 1:21 PM



GP-14 MSE WALL PLAN
SCALE: 1" = 10'



GP-14 MSE WALL PROFILE
SCALE: H:1"=10'; V:1"=10'

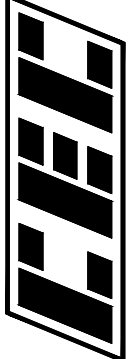


NOTES:

1. THE CONTROL LINE FOR THE RETAINING WALL IS THE FRONT FACE OF THE UPPERMOST CAGE. AS SUCH, THE CONTROL POINT SHOWN IN THE NORTHWESTERN CORNER OF THE NORTHERNMOST CAGE. CONTRACTOR SHALL CONFIRM THE LOCATION OF BOTTOM-MOST CAGES RELATIVE TO PROPERTY BOUNDARY IN THE FIELD.

SUBMITTAL RECORD	
NO.	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
DATE	2026
ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	

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Ph: 916.503.0050
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Civil & Environmental
Consultants, Inc.

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

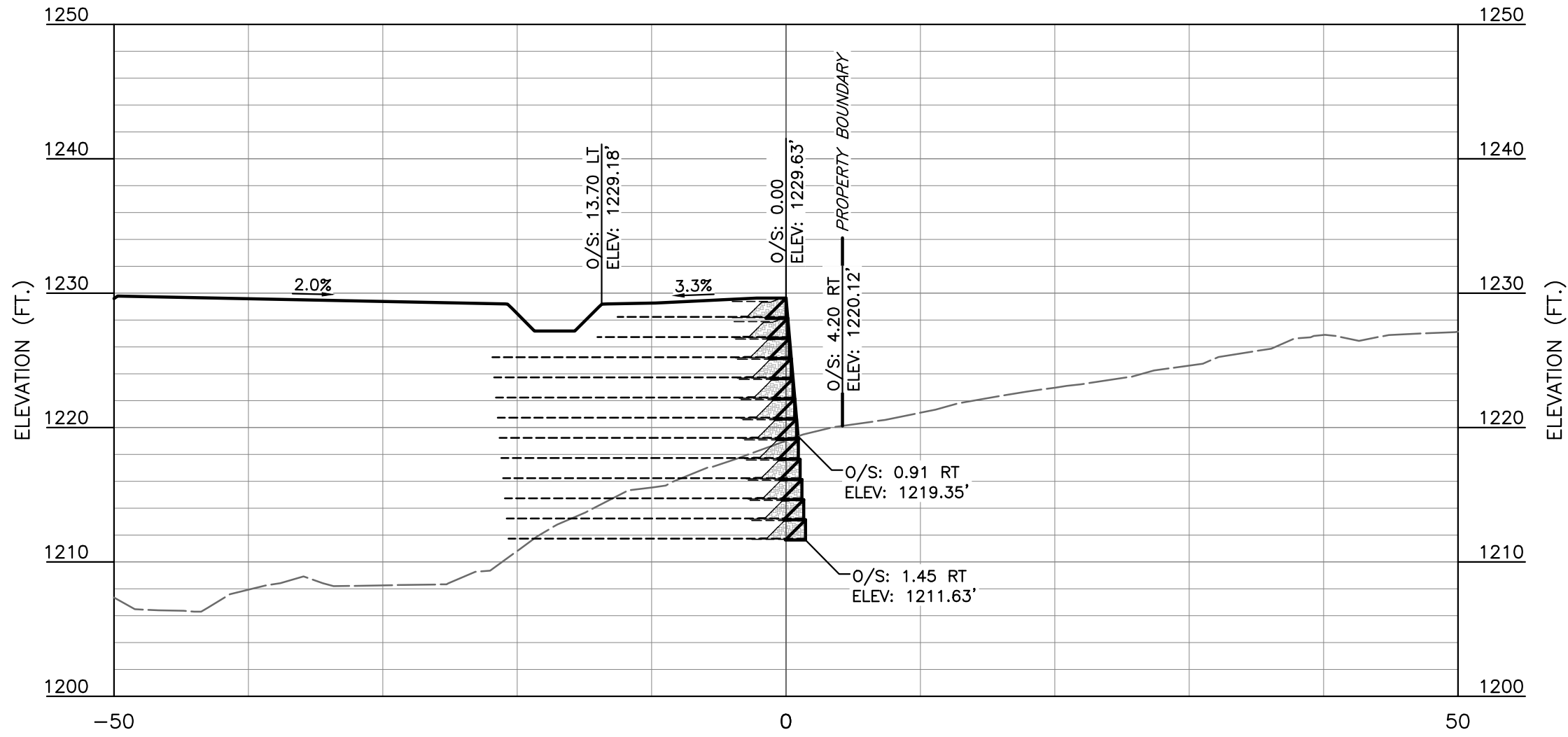
DRAWING NO.: C107	DATE:	JULY 2026	DRAWN BY:	JAT
	DWG SCALE:	H: 1"=10'; V: 1"=10'	CHECKED BY:	CJM
	PROJECT NO.:	350-750	APPROVED BY:	RJH
	SHEET --- OF ---			

DRAFT

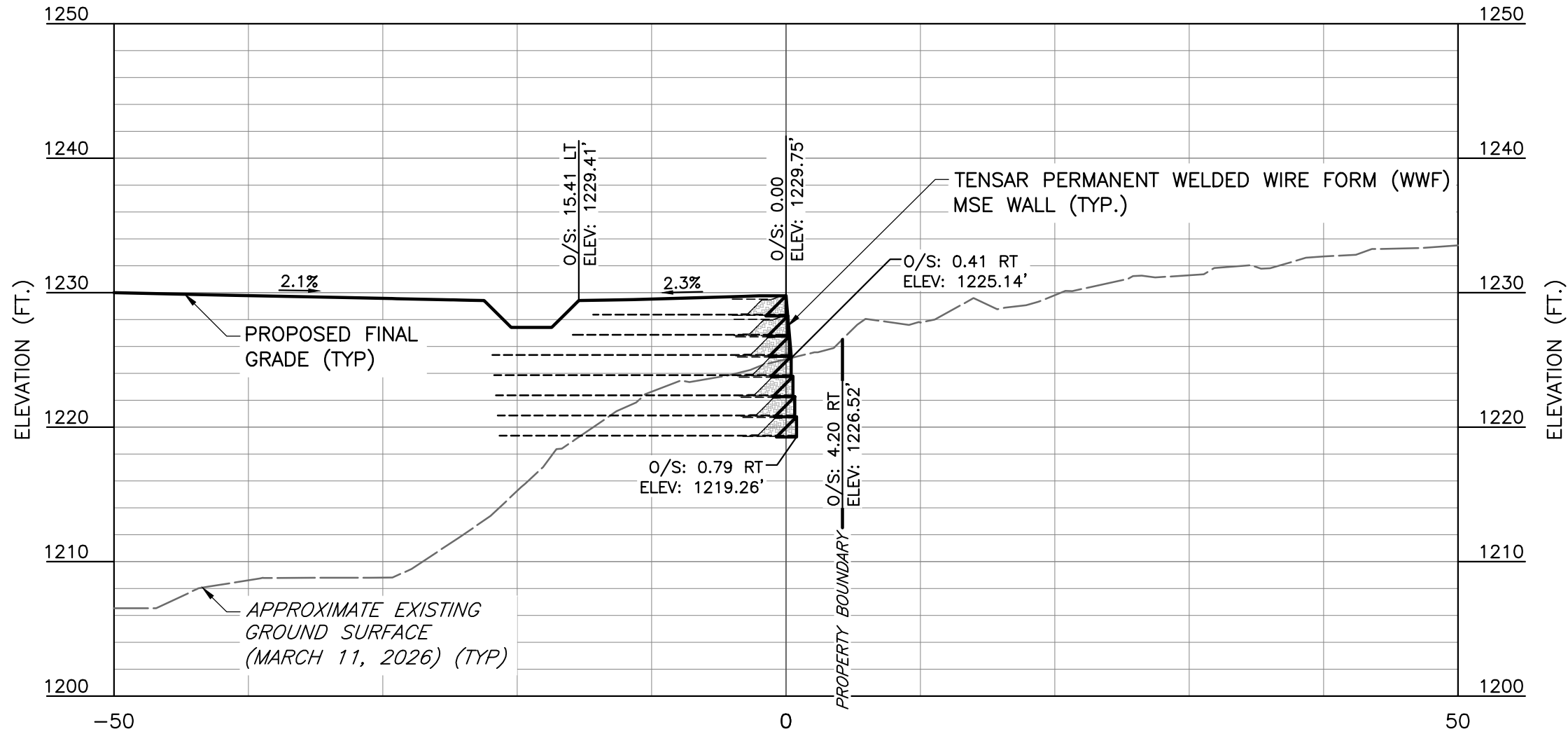
P:\350-750\350-750-CADD\DWG\C107-RETAINING WALL.dwg|WALL SECTIONS 1 | LS(7/3/2026 - email@waste) - LP: 7/8/2026 1:21 PM

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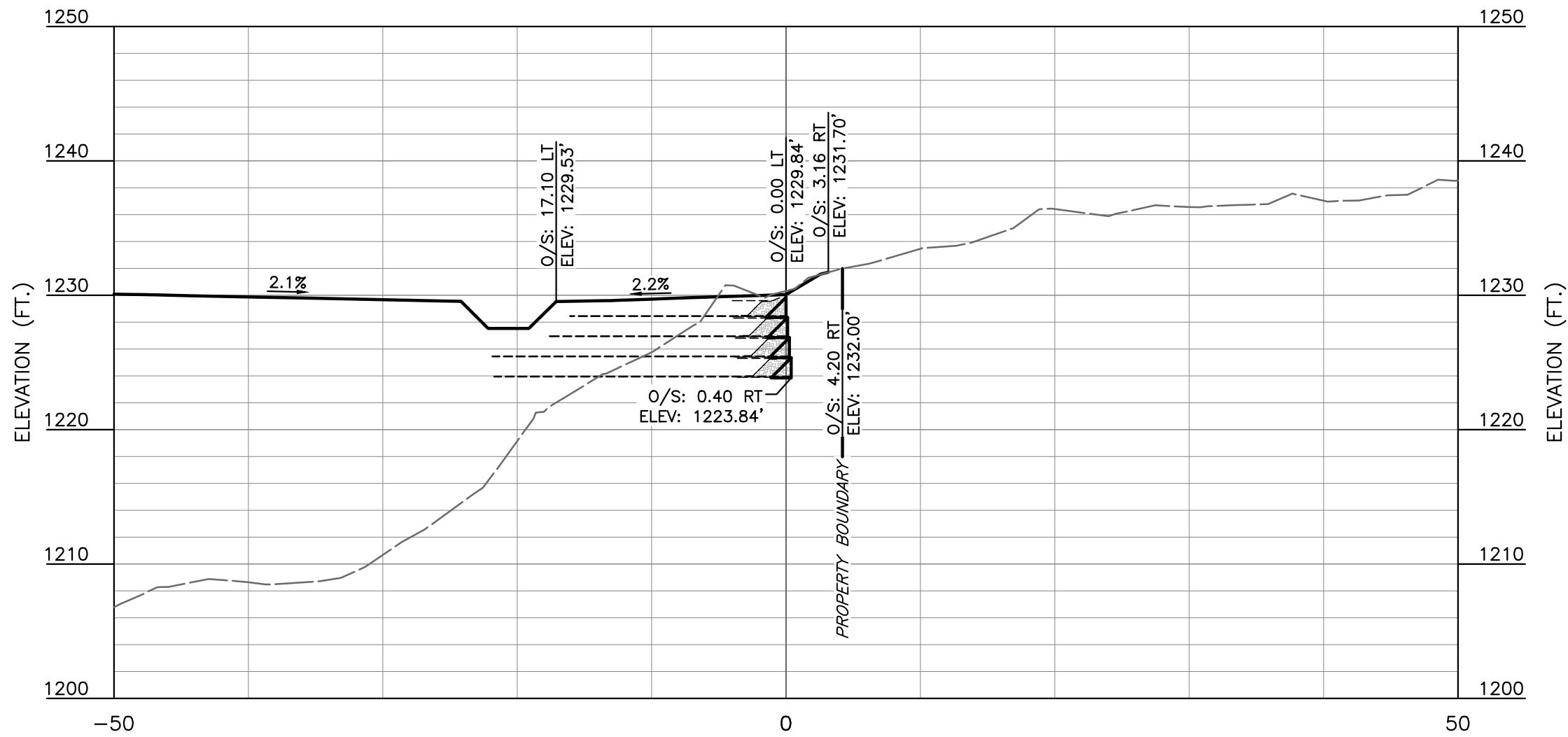
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



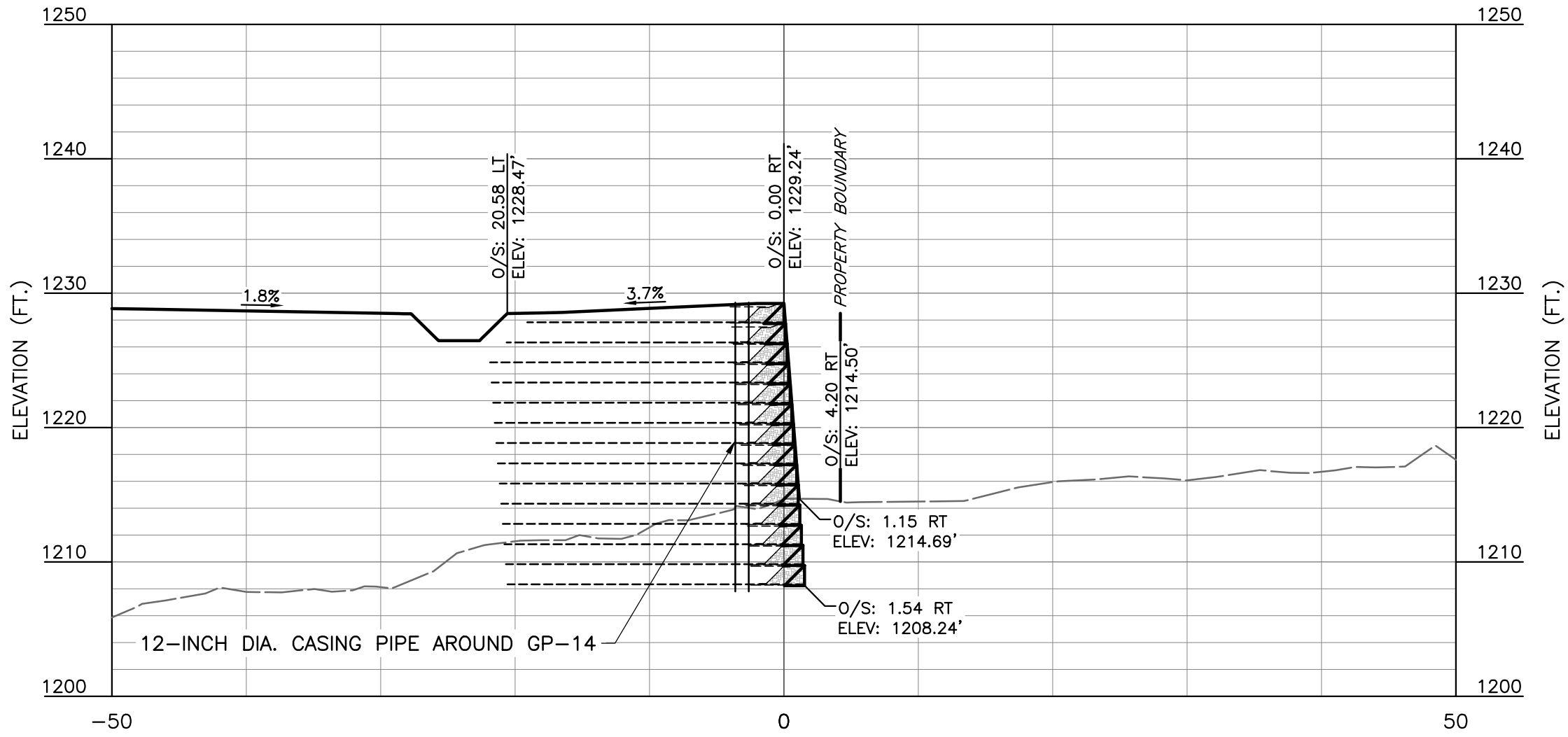
GP-14 MSE WALL STA 1+50
SECTION 3



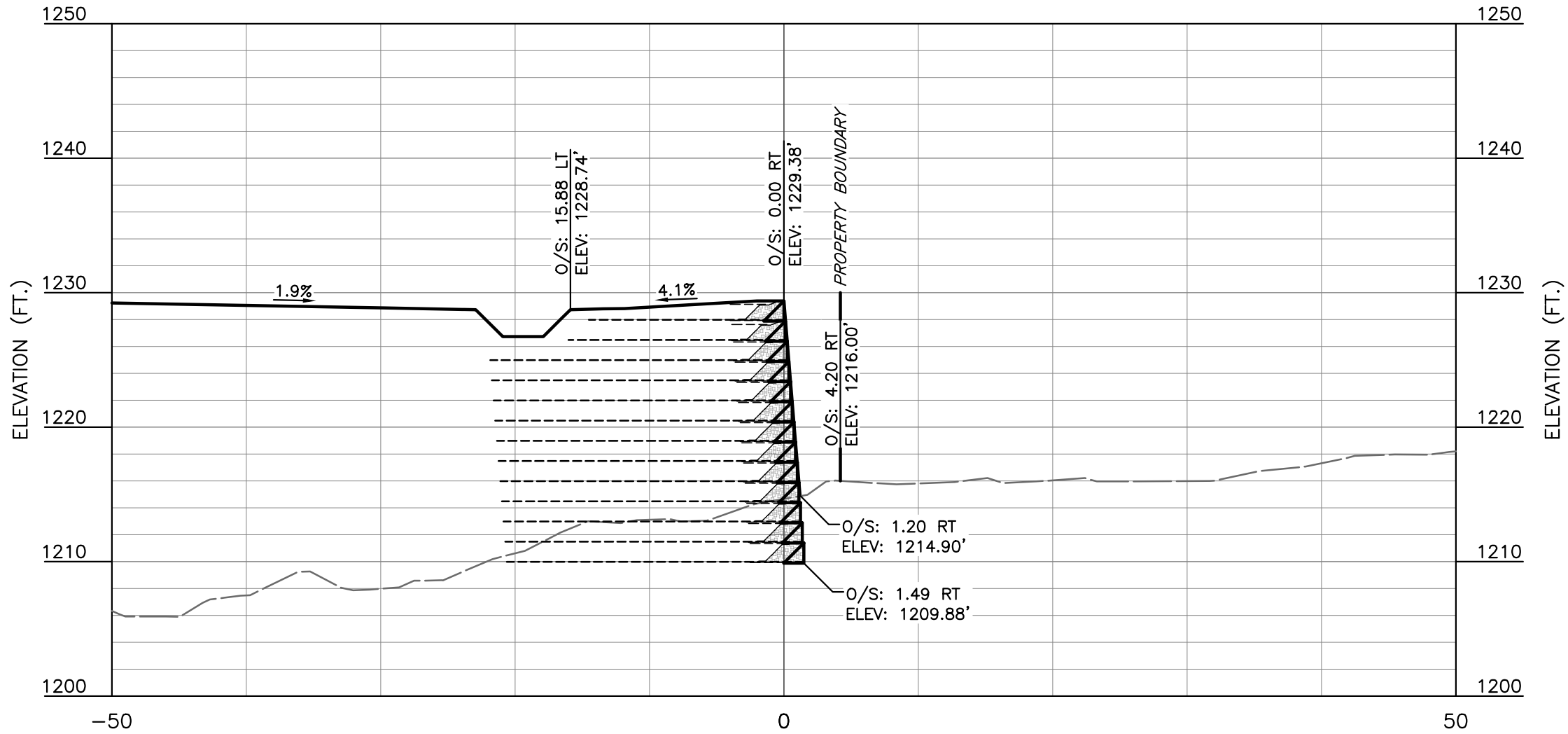
GP-14 MSE WALL STA 1+25
SECTION 2



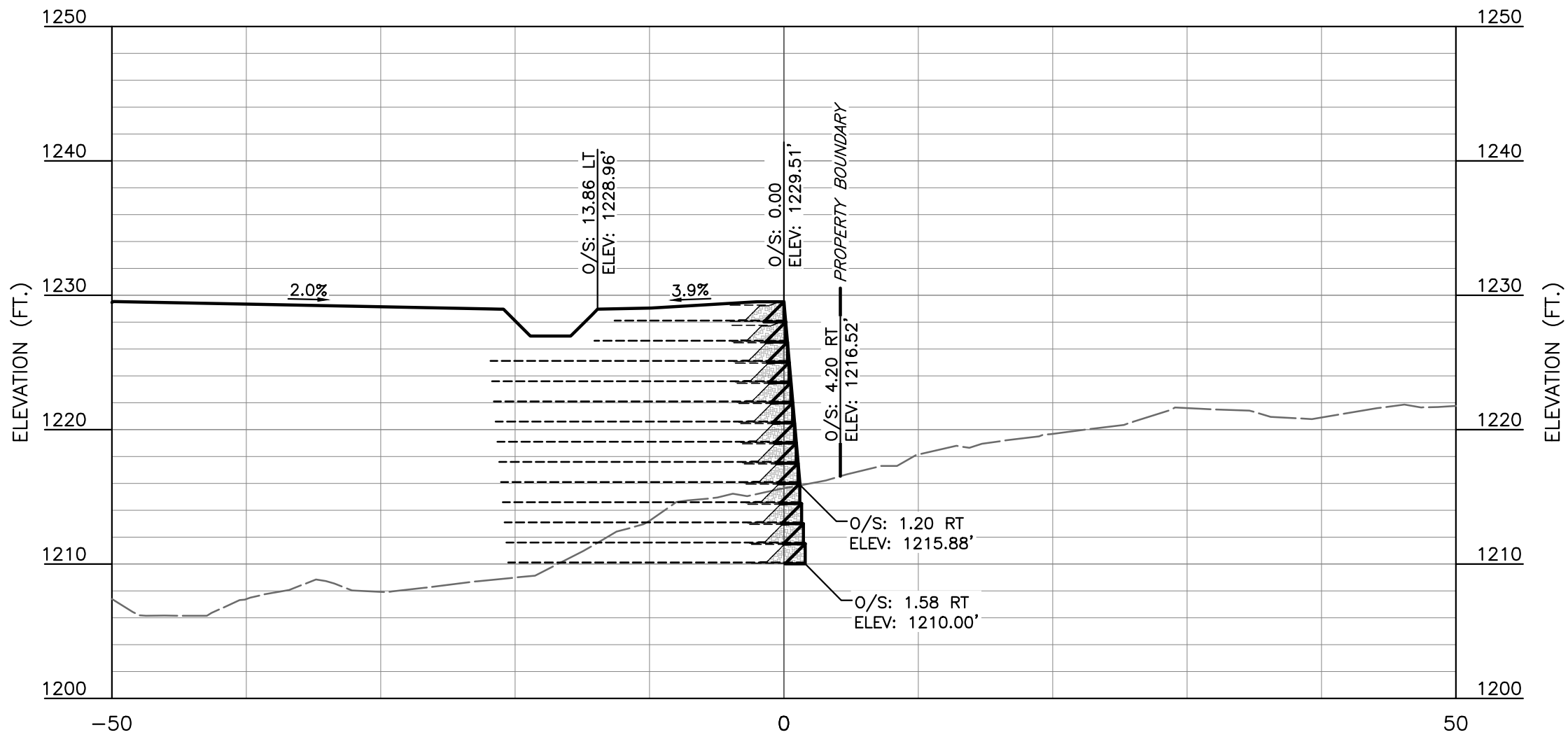
GP-14 MSE WALL STA 1+11.67
SECTION 1



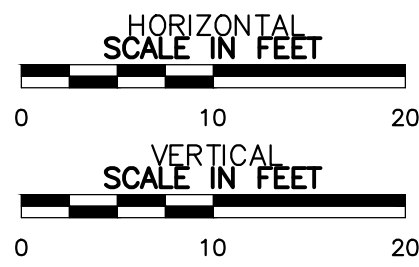
GP-14 MSE WALL STA 2+28.91
SECTION 6



GP-14 MSE WALL STA 2+00
SECTION 5



GP-14 MSE WALL STA 1+75
SECTION 4



DRAFT

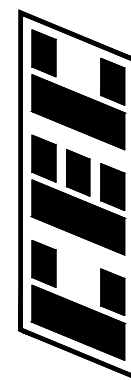
DRAWING NO.:
C108

SHEET --- OF ---

GP-14 MSE WALL
SECTIONS 1 OF 2

DATE: JULY 2026 [DRAWN BY: JAT]
DWG SCALE: H: 1"= 10'; V: 1"= 10' [CHECKED BY: CJM]
PROJECT NO.: 350-750
APPROVED BY: RVH

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384



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Suite 120
Gold River, CA 95670
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SUBMITTAL RECORD

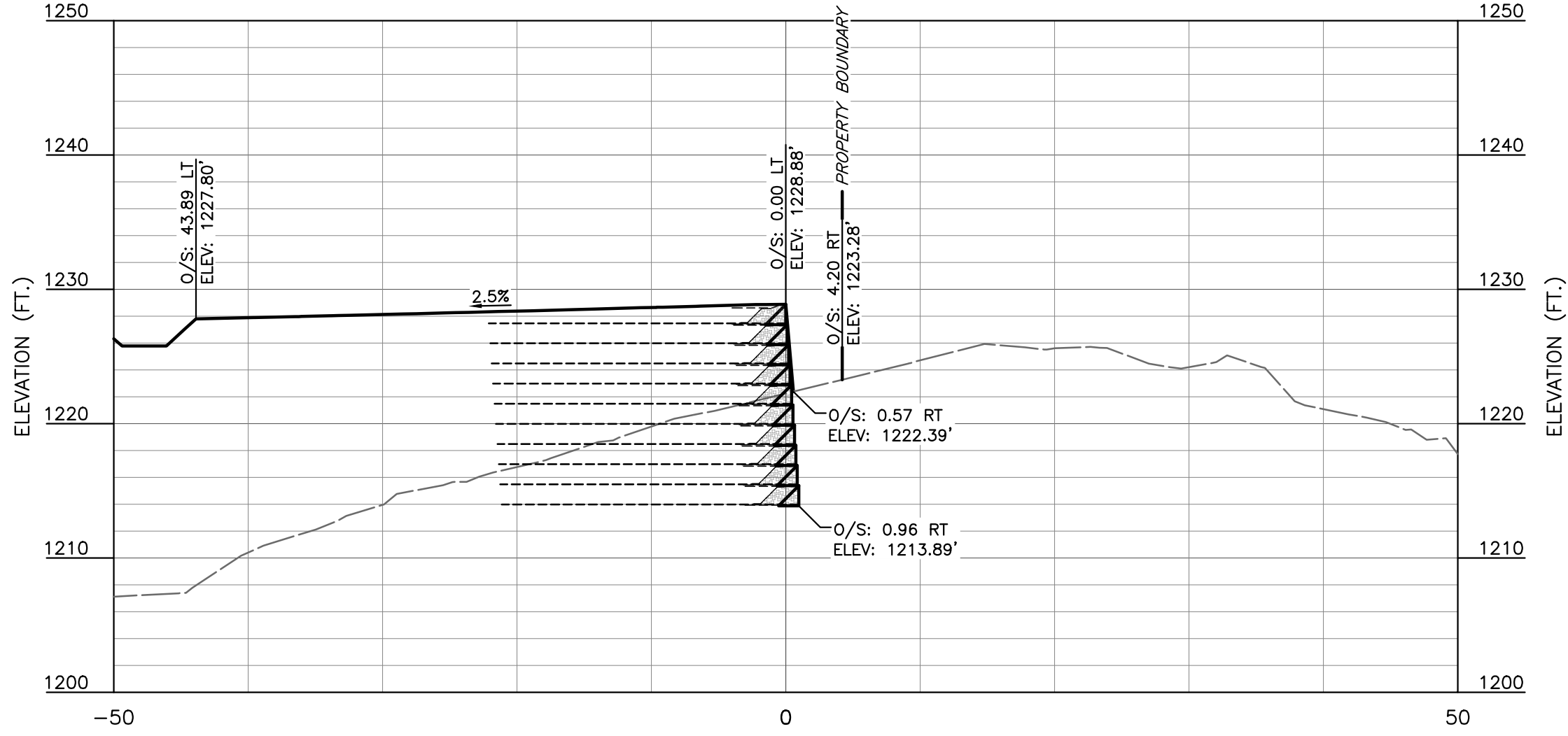
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ENGINEERING: SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.

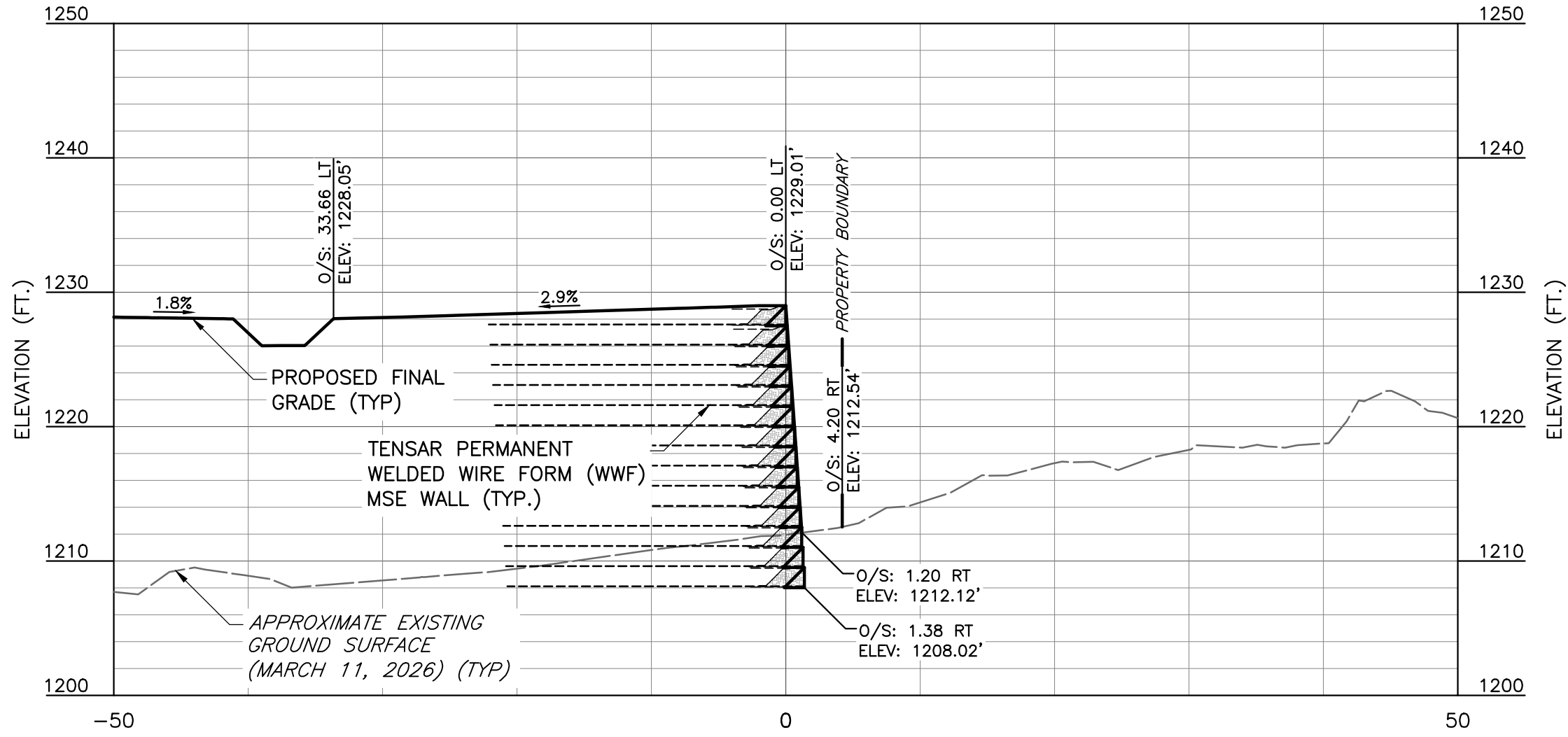
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REFERENCE

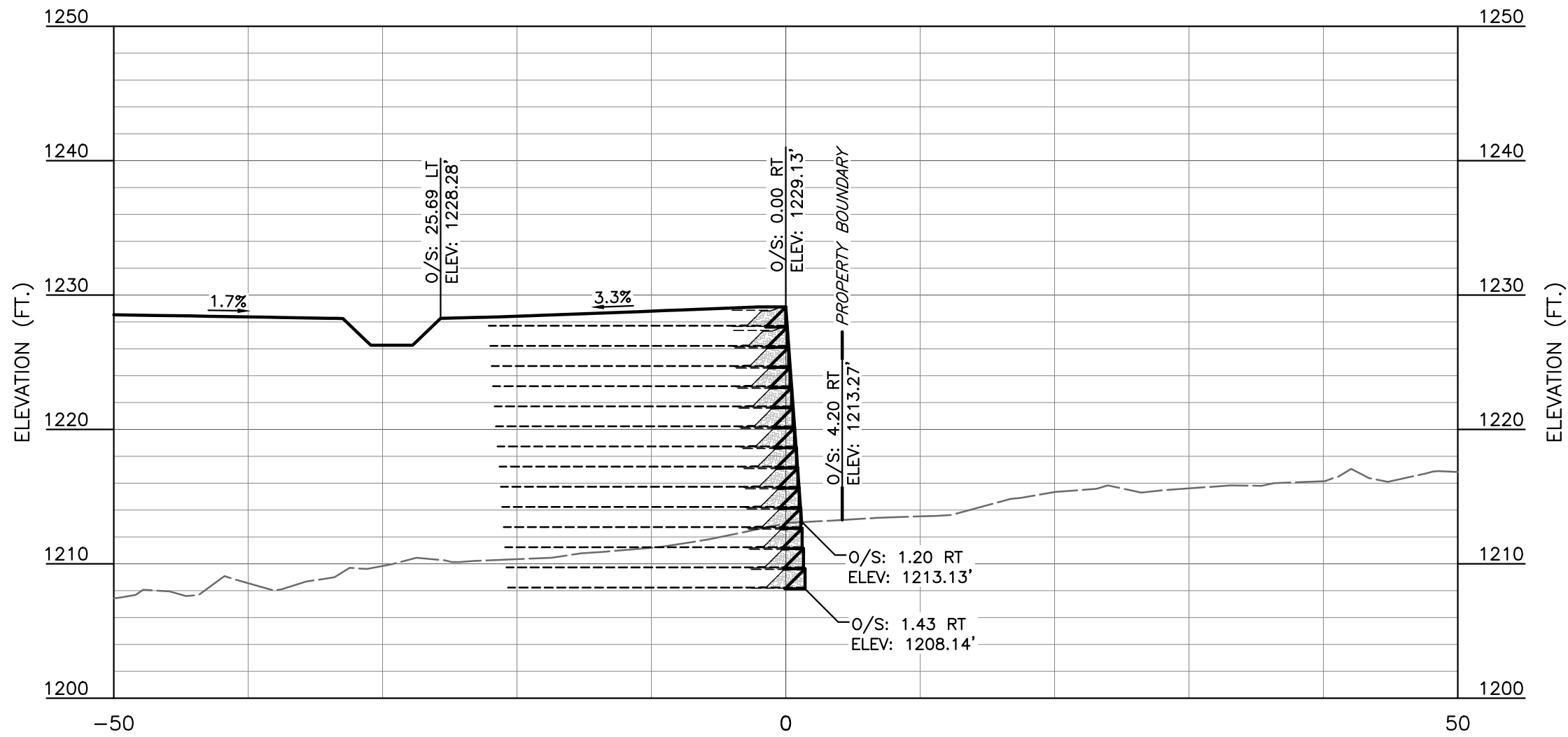
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- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



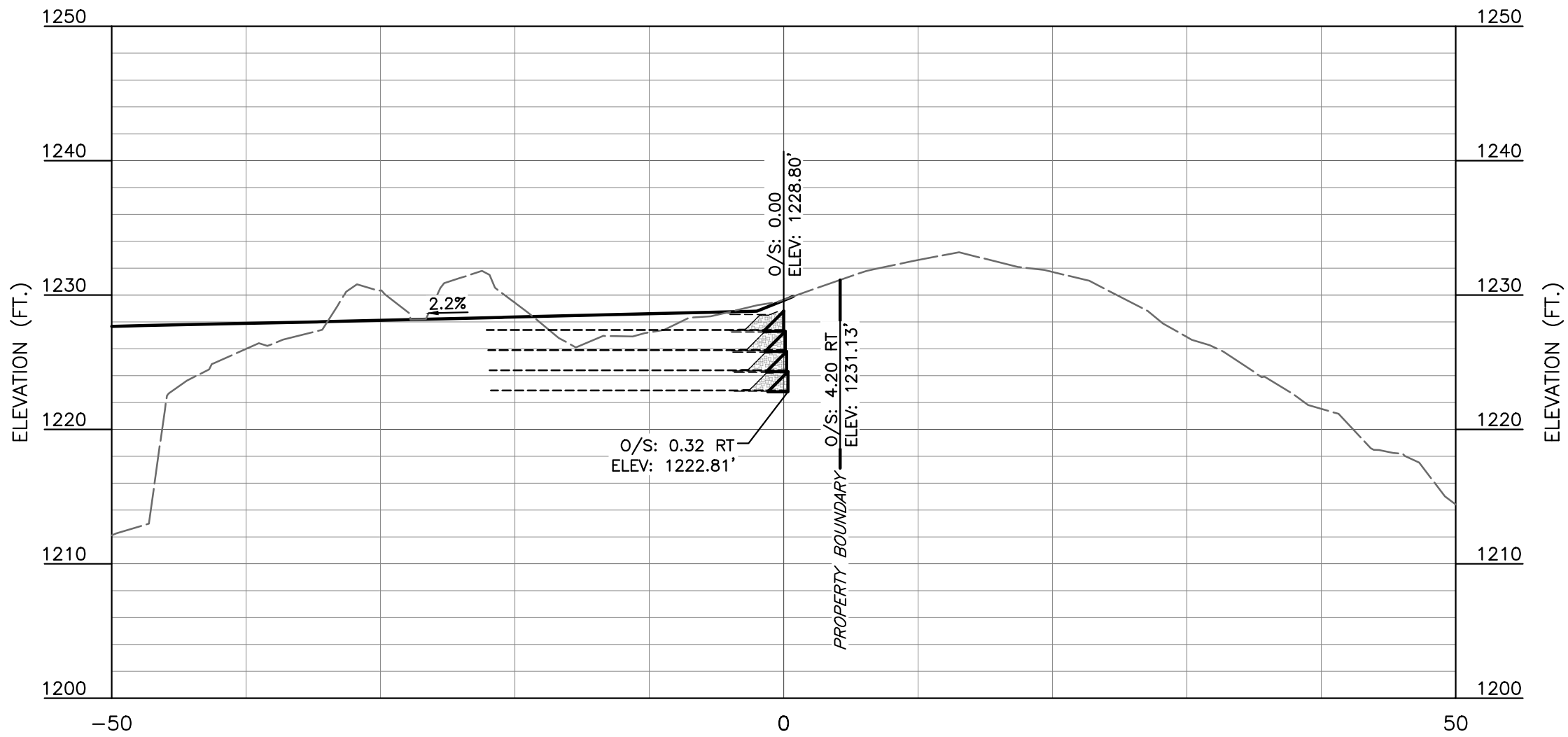
GP-14 MSE WALL STA 3+00
SECTION 9



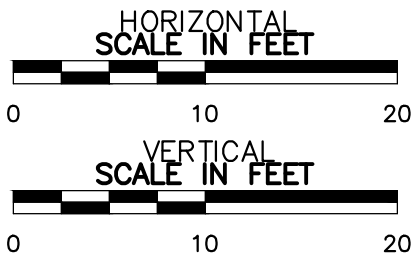
GP-14 MSE WALL STA 2+75
SECTION 8



GP-14 MSE WALL STA 2+50
SECTION 7



GP-14 MSE WALL STA 3+15
SECTION 10



DRAFT

DRAWING NO.:
C109

SHEET --- OF ---

GP-14 MSE WALL
SECTIONS 2 OF 2

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384



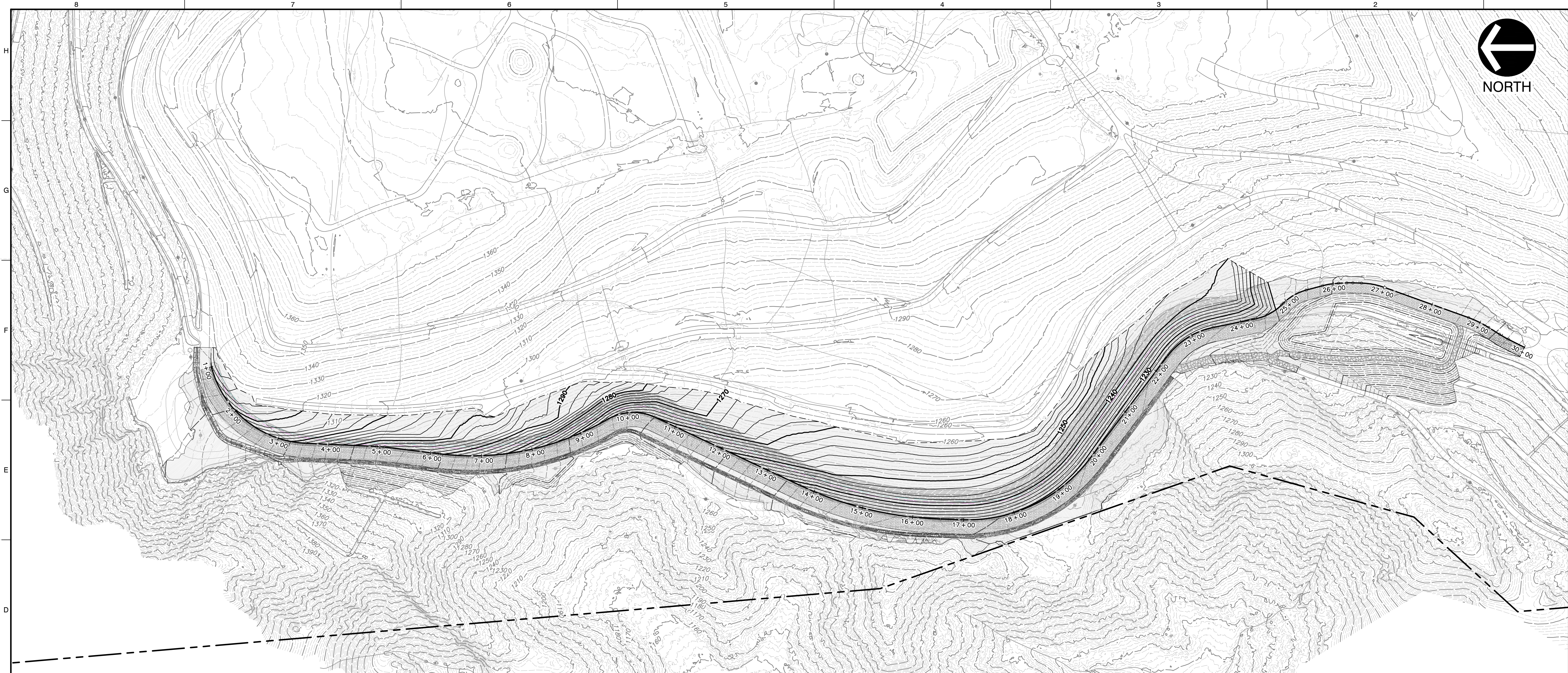
Civil & Environmental
Consultants, Inc.

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Suite 120
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Ph: 916.503.0050
www.cecinc.com

SUBMITTAL RECORD

NO	DATE	DESCRIPTION
2	06/24/2026	FOR PRELIMINARY USE

ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.



UPPER BUTTRESS PLAN
SCALE: 1" = 100'

SCALE IN FEET
0 100 200

DRAFT

REFERENCE

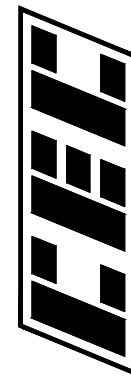
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

NOTES:

- UPPER BUTTRESS VOLUMES*
CUT - 30 CU. YD.
FILL - 86,600 CU. YD.
NET - 86,570 CU. YD (FILL)
*COMBINED EXISTING SURFACE WITH LOWER BUTTRESS AND BACKCUT SURFACE COMPARED TO UPPER BUTTRESS GRADING.
- LINED SURFACE AREA
2D LINED AREA - 223,310 SQ. FT.
3D LINED AREA - 229,800 SQ. FT.

SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
ENGINEERING: SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	

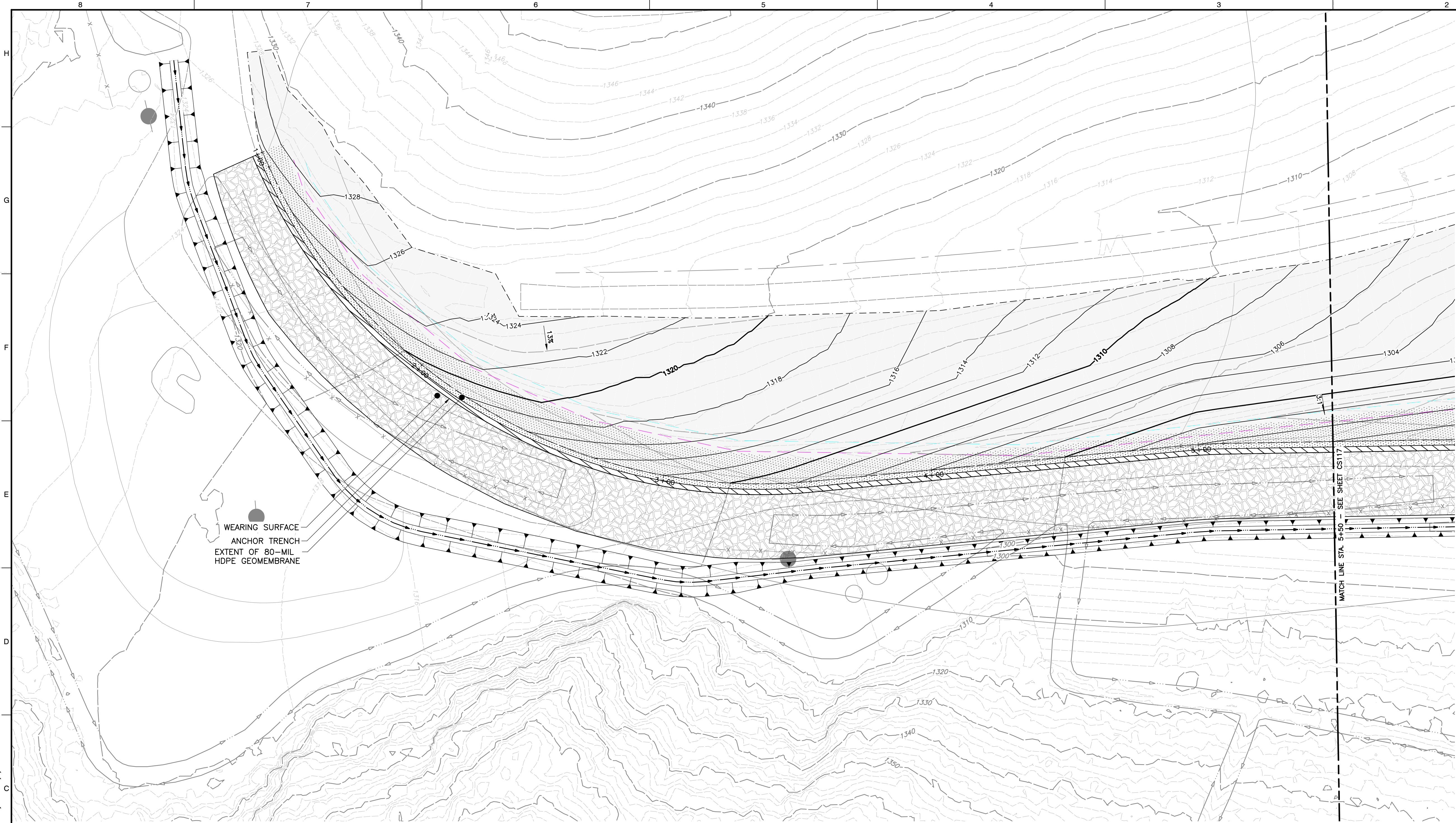
2356 Gold Meadow Way
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WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHICUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

OVERALL UPPER BUTTRESS PLAN	
DATE:	JULY 2026 [DRAWN BY: JAT]
DWG SCALE:	1"=100' [CHECKED BY: CJM]
PROJECT NO:	350-750
APPROVED BY:	RJH
DRAWING NO.: C115	
SHEET	OF



UPPER BUTTRESS - STA. 1+00 TO 5+50 PLAN
SCALE: 1" = 20'

- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

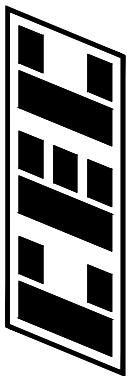
NOTES:
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DRAFT

SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	

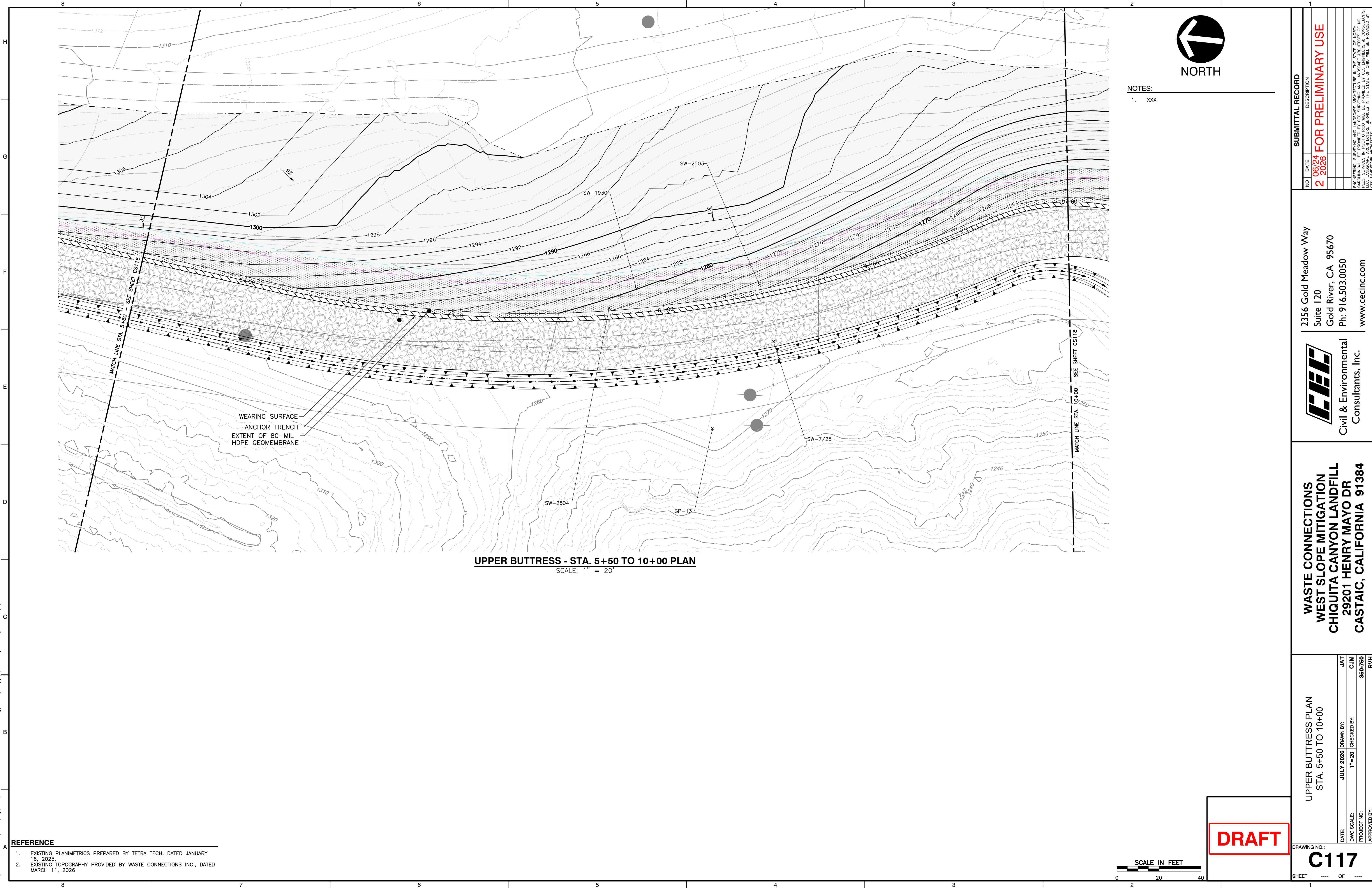
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Suite 120
Gold River, CA 95670
Ph: 916.503.0050
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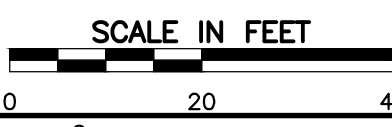
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WEST SLOPE MITIGATION
CHICUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

UPPER BUTTRESS PLAN STA. 1+00 TO 5+50	
DATE:	JULY 2026 [DRAWN BY: JAT]
DWG SCALE:	1"=20' [CHECKED BY: CJM]
PROJECT NO:	350-750
APPROVED BY:	RWH
DRAWING NO.: C116	
SHEET	1 OF 1



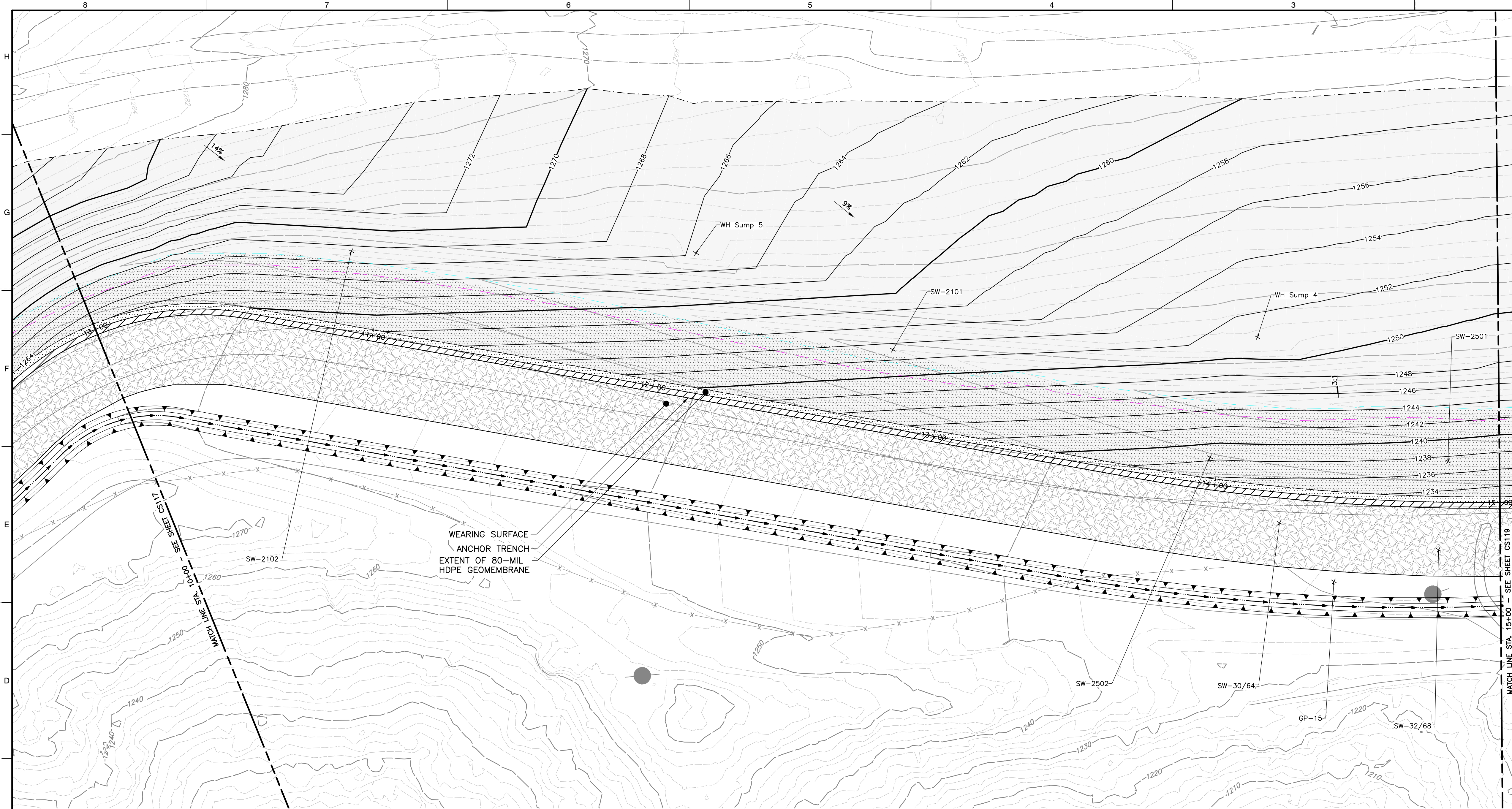
NOTES:
1. XXX



DRAFT

- REFERENCE**
1. EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 2. EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

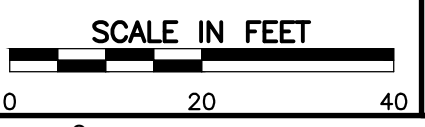
UPPER BUTTRESS PLAN STA. 5+50 TO 10+00		WASTE CONNECTIONS WEST SLOPE MITIGATION CHIQUITA CANYON LANDFILL 29201 HENRY MAYO DR CASTAIC, CALIFORNIA 91384		 Civil & Environmental Consultants, Inc.		2356 Gold Meadow Way Suite 120 Gold River, CA 95670 Ph: 916.503.0050 www.cecinc.com		SUBMITTAL RECORD NO. DATE DESCRIPTION 2 2026 06/24 FOR PRELIMINARY USE		ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	
DRAWING NO.: C117		DATE: JULY 2026 [DRAWN BY: JAT] DWG SCALE: 1"=20' [CHECKED BY: CJM] PROJECT NO: 350-750 APPROVED BY: RVH		SHEET --- OF ---							



UPPER BUTTRESS - STA. 10+00 TO 15+00 PLAN
SCALE: 1" = 20'



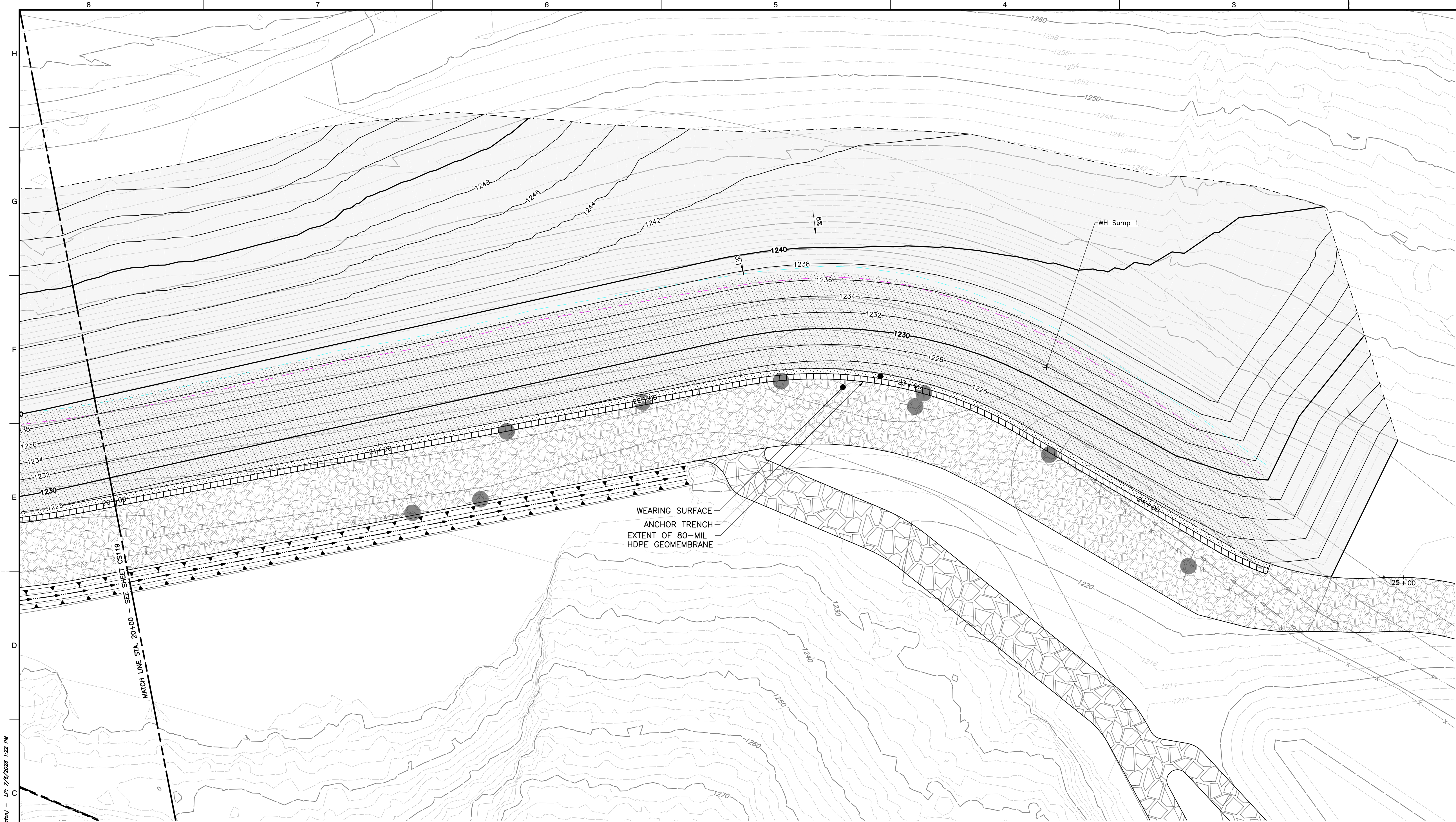
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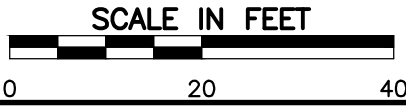
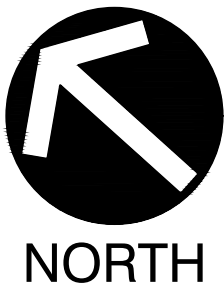
- REFERENCE**
1. EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 2. EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

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UPPER BUTTRESS PLAN STA. 10+00 TO 15+00		WASTE CONNECTIONS WEST SLOPE MITIGATION CHIQUITA CANYON LANDFILL 29201 HENRY MAYO DR CASTAIC, CALIFORNIA 91384		 Civil & Environmental Consultants, Inc.		2356 Gold Meadow Way Suite 120 Gold River, CA 95670 Ph: 916.503.0050 www.cecinc.com		SUBMITTAL RECORD <table><thead><tr><th>NO</th><th>DATE</th><th>DESCRIPTION</th></tr></thead><tbody><tr><td>2</td><td>06/24/2026</td><td>FOR PRELIMINARY USE</td></tr></tbody></table>		NO	DATE	DESCRIPTION	2	06/24/2026	FOR PRELIMINARY USE
NO	DATE	DESCRIPTION													
2	06/24/2026	FOR PRELIMINARY USE													
DRAWING NO.: C118		DATE: JULY 2026 [DRAWN BY: JAT]		PROJECT NO.: 350-750		APPROVED BY: RVH		ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.							



NOTES:
1. xxx



- REFERENCE**
1. EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 2. EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026

DRAFT

SUBMITTAL RECORD	
NO.	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
DATE	2026
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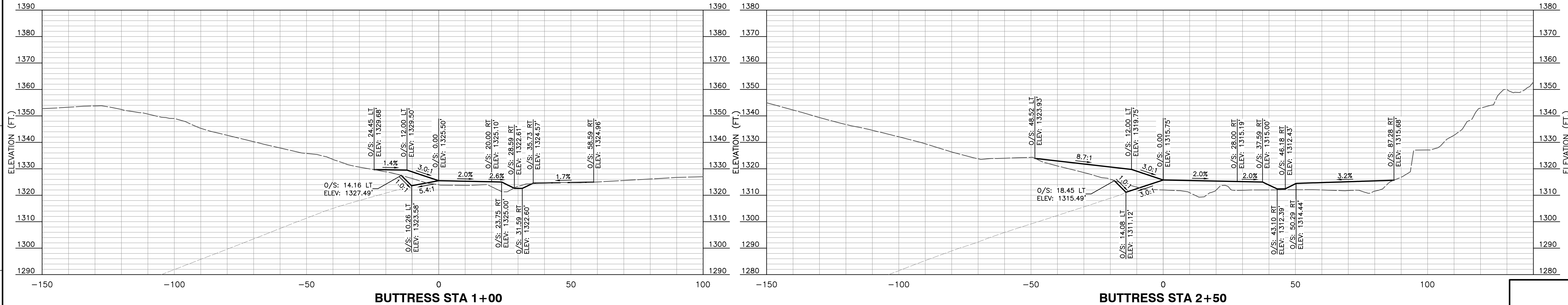
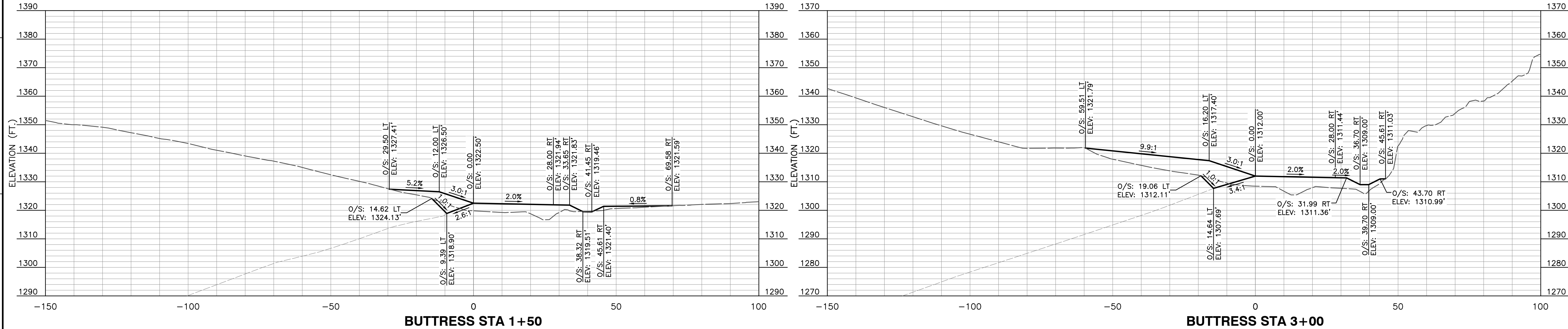
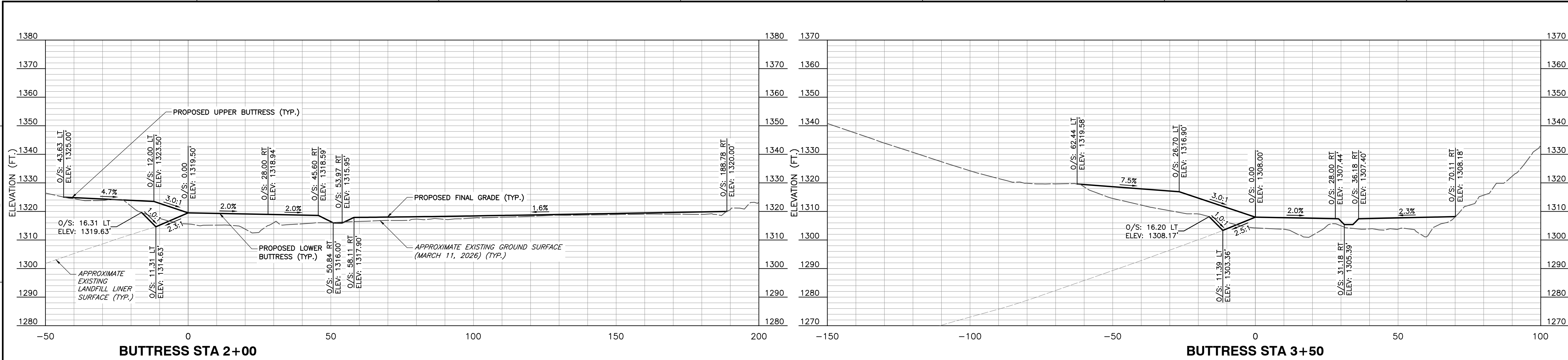
WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHICUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

UPPER BUTTRESS PLAN STA. 20+00 TO 25+00	
DATE:	JULY 2026 [DRAWN BY: JAT]
DWG SCALE:	1"=20'
PROJECT NO.	350-750
APPROVED BY:	RJH

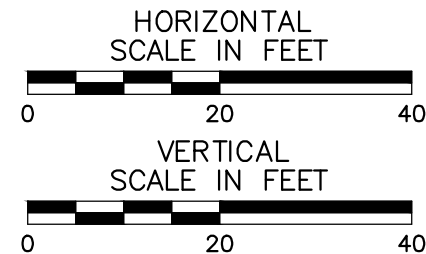
DRAWING NO.: **C120**

SHEET 1 OF 1

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- REFERENCE
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



DRAFT

SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
DATE	2026
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**WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384**

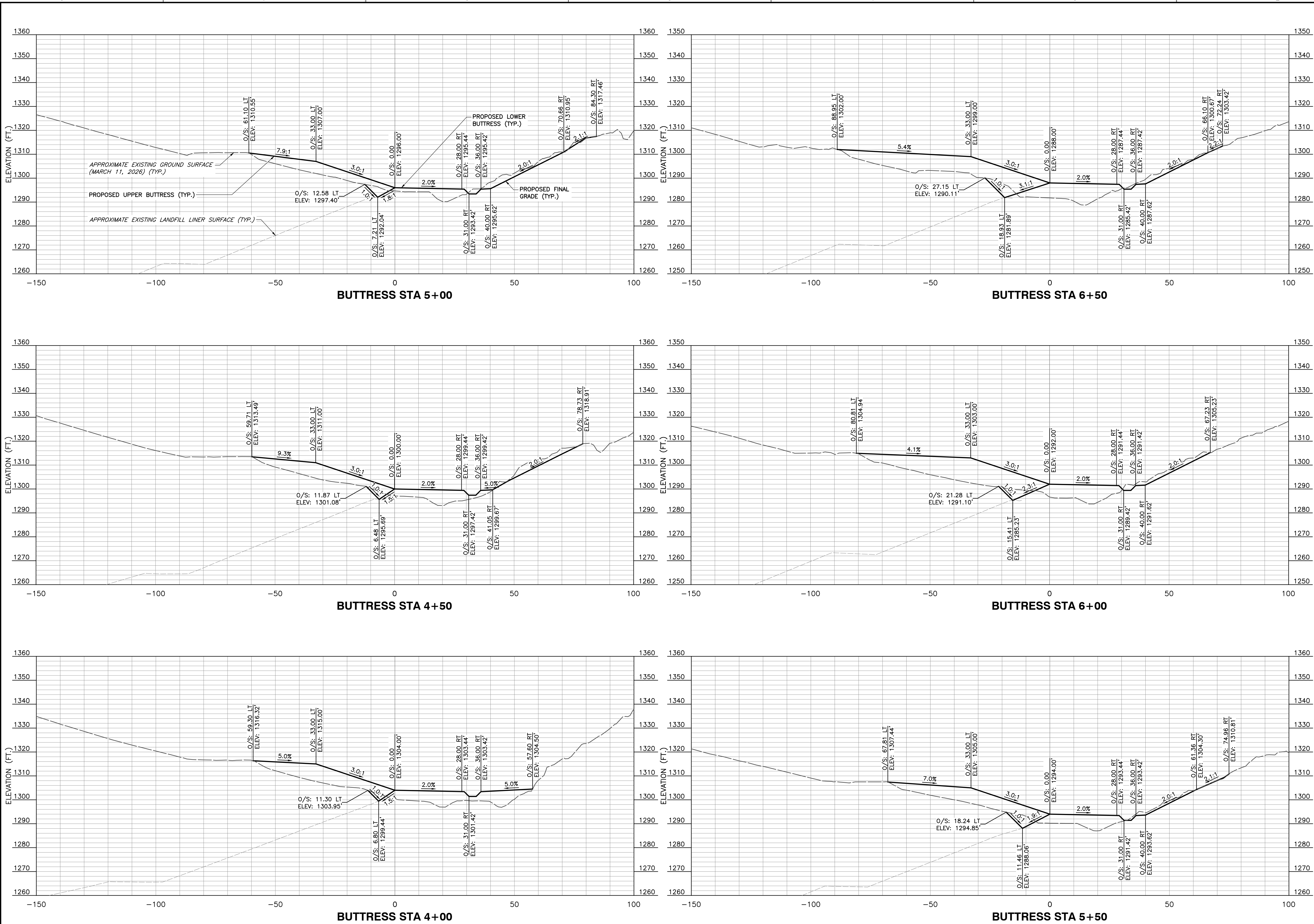
BUTRESS CROSS SECTIONS
STA. 1+00 TO STA. 3+50

DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	H: 1"=20'; V: 1"=20'	CHECKED BY:	CJM
PROJECT NO:	350-750	APPROVED BY:	RWH

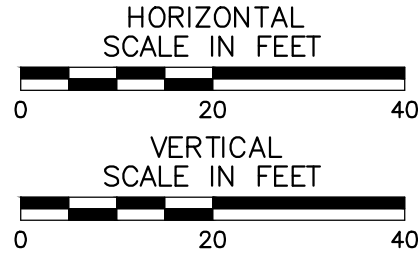
DRAWING NO.: **C300**

SHEET --- OF ---

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- REFERENCE**
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
 - EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



DRAFT

SUBMITTAL RECORD	
NO	DESCRIPTION
2	06/24 FOR PRELIMINARY USE
DATE: 2 2026	
ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	

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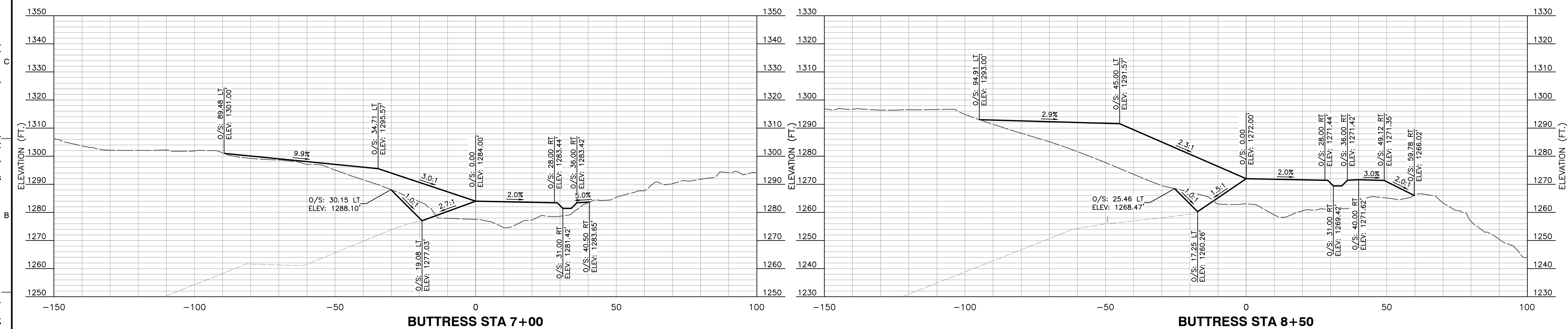
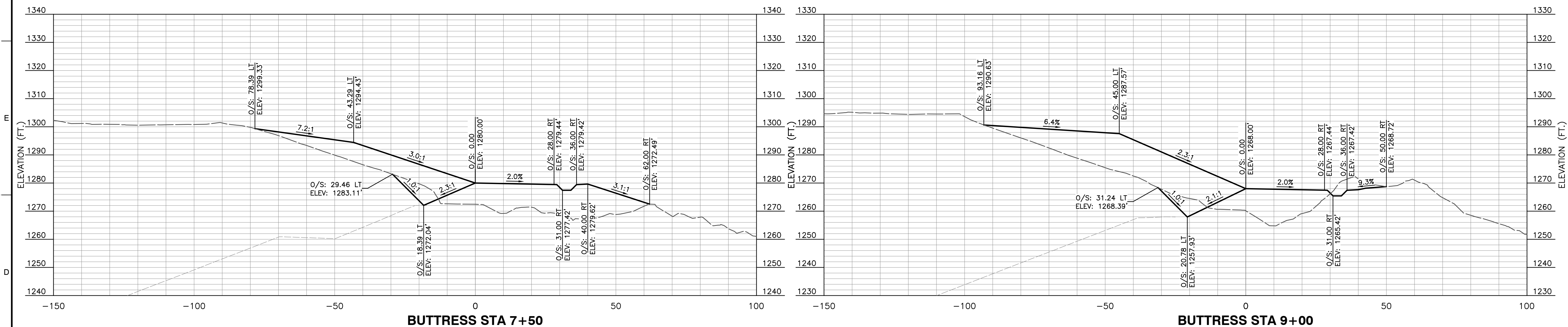
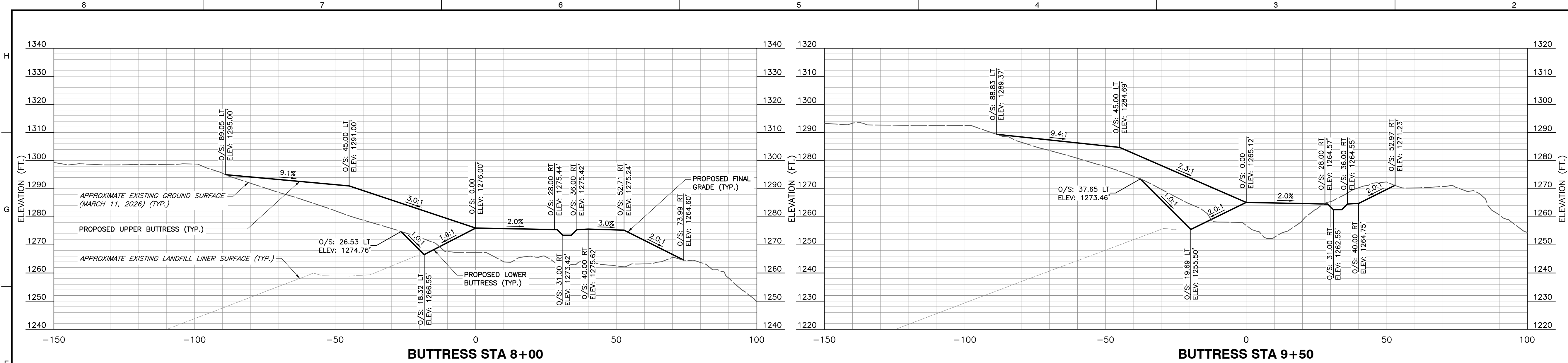
WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

BUTRESS CROSS SECTIONS
STA. 4+00 TO STA. 6+50

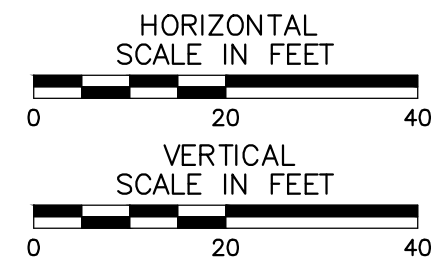
DRAWING NO.: **C301**

SHEET --- OF ---

DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	H: 1"=20'; V: 1"=20'	CHECKED BY:	CJM
PROJECT NO.:	350-750	APPROVED BY:	RWH



REFERENCE	
1.	EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
2.	EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



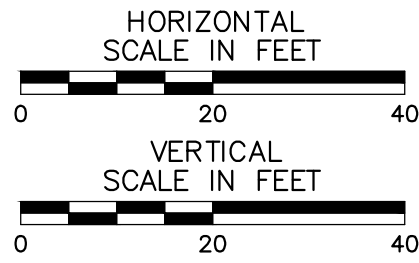
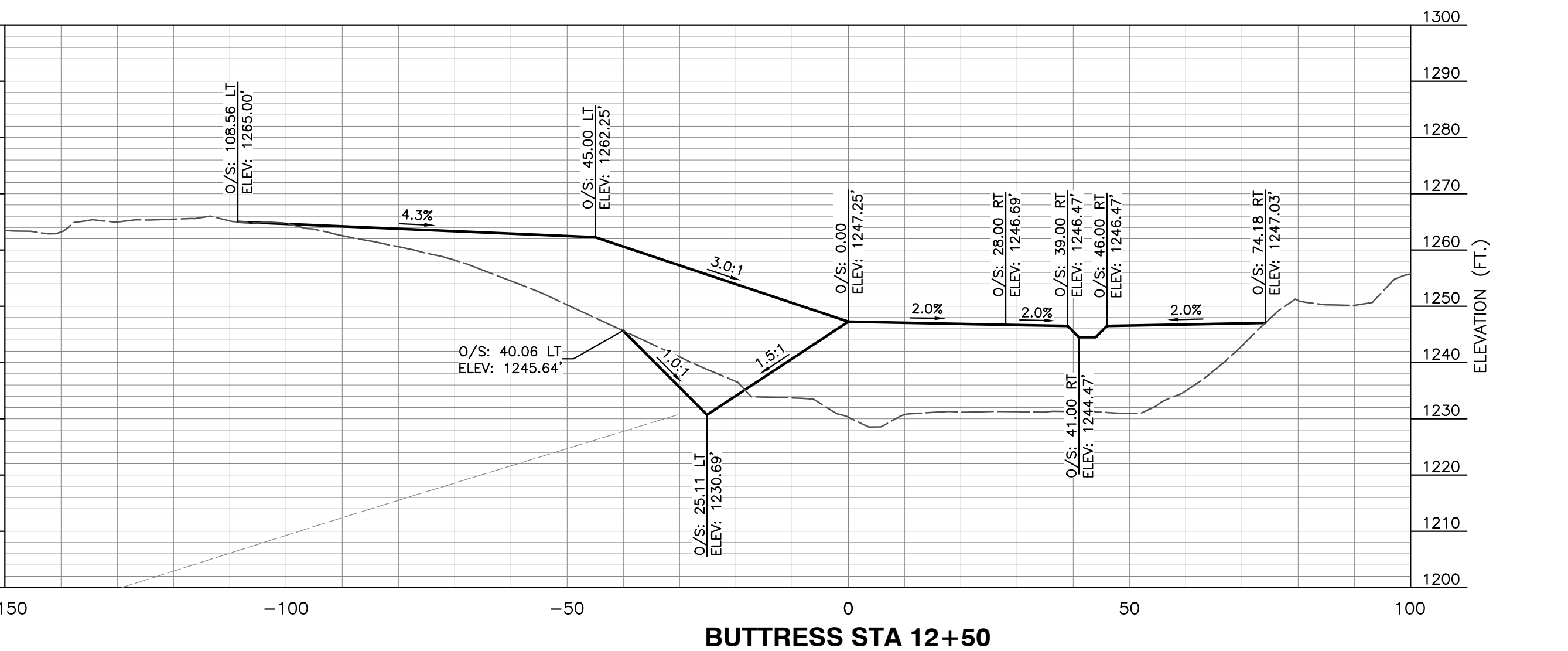
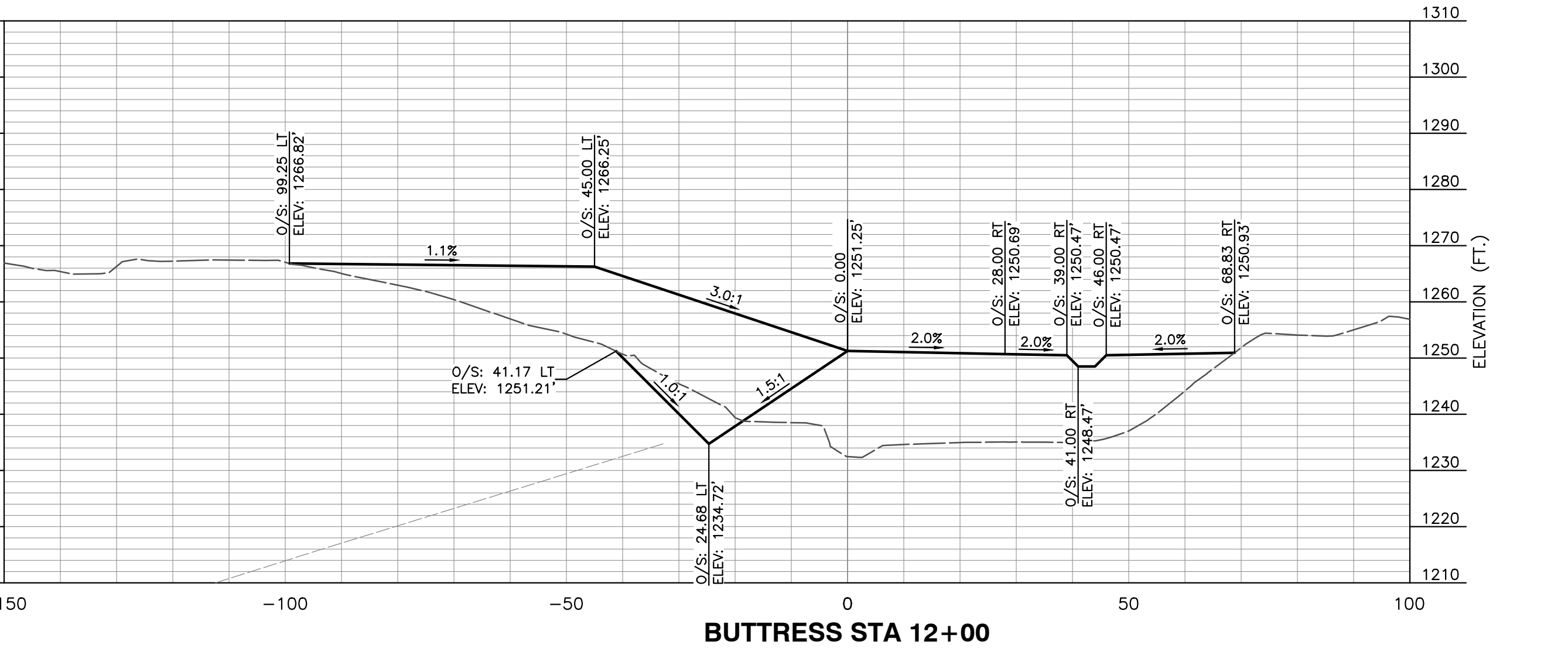
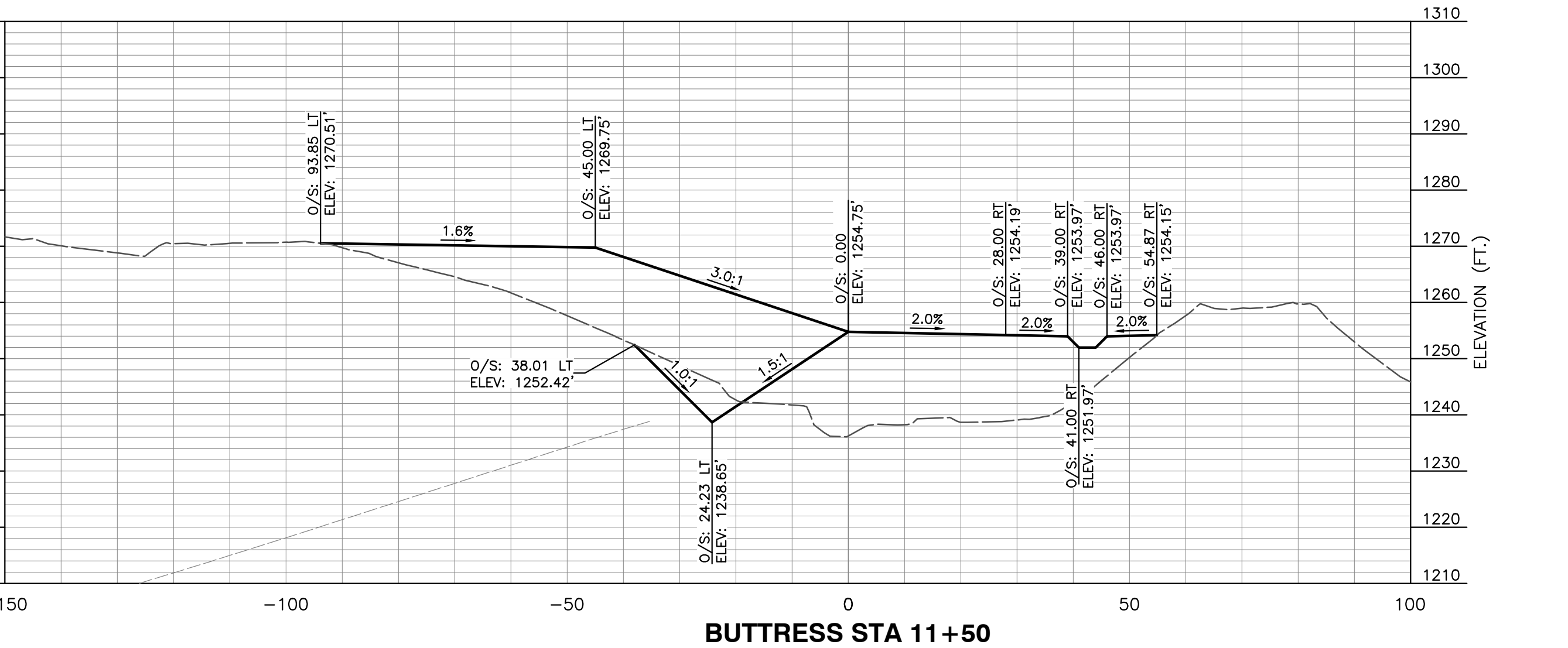
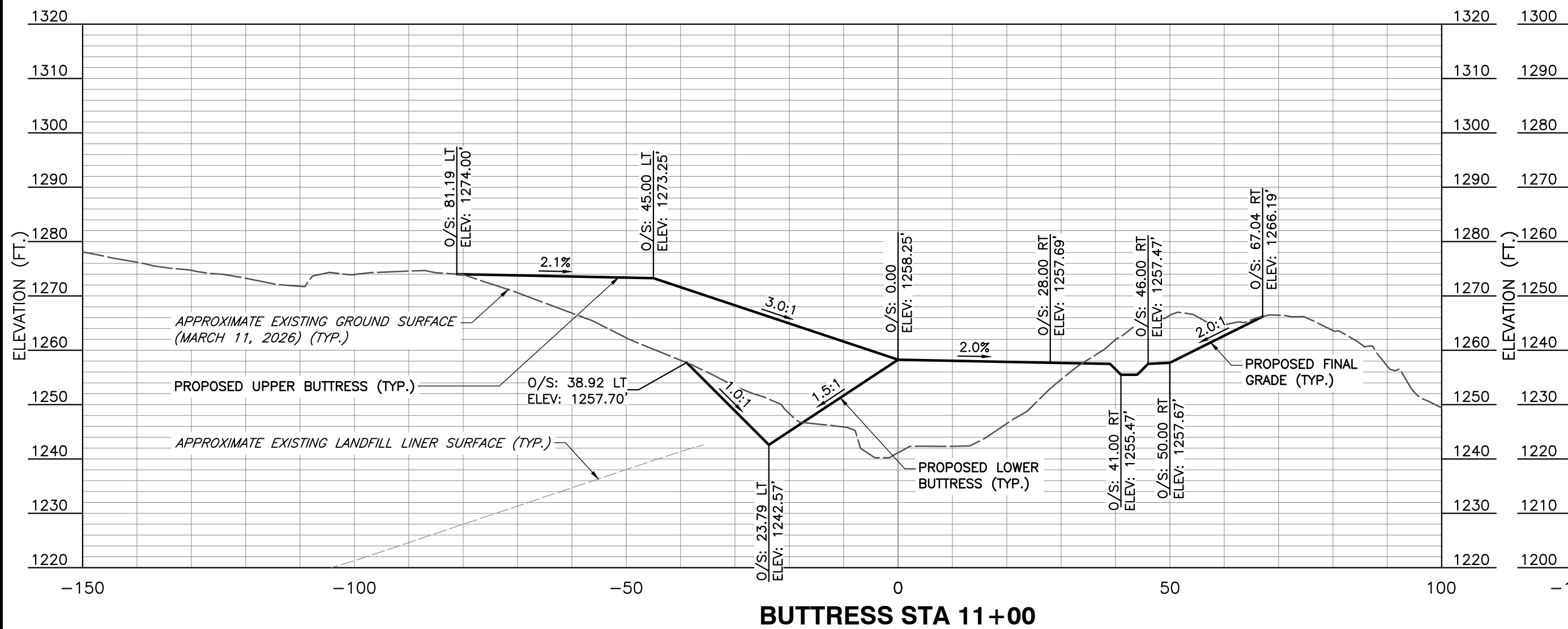
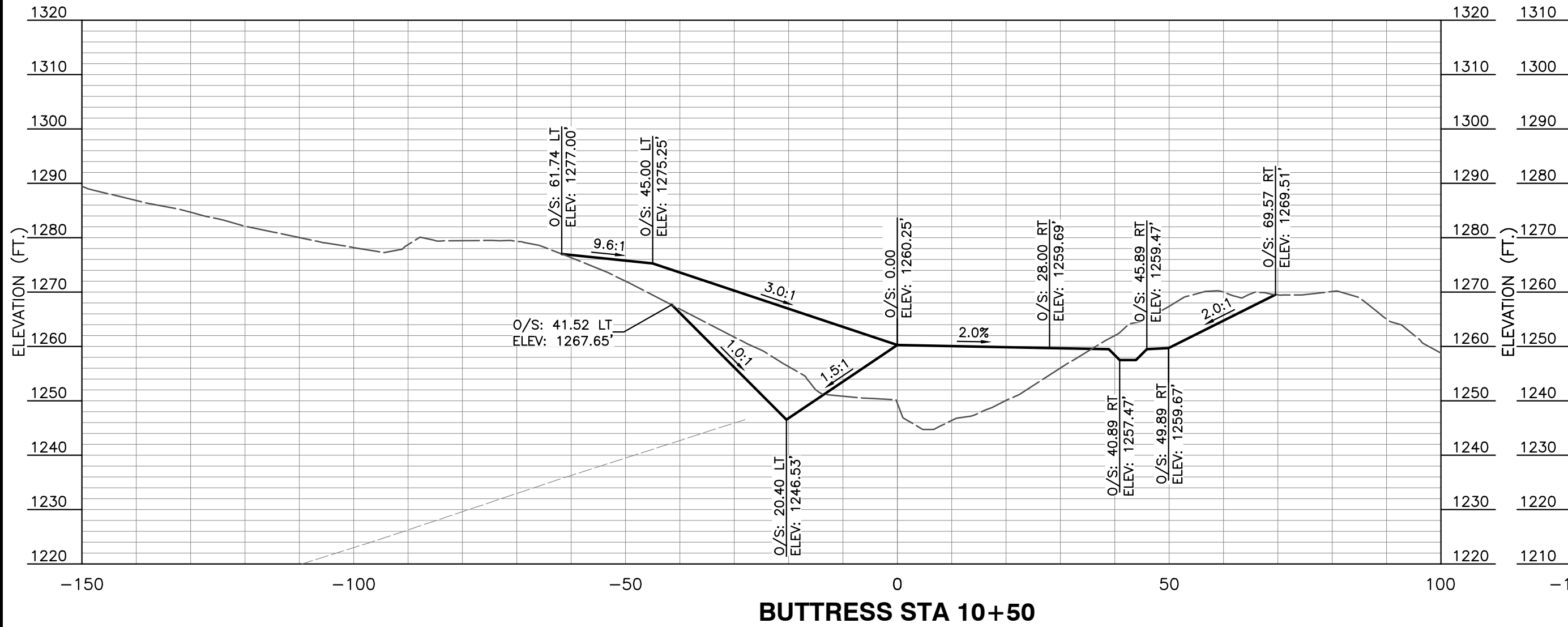
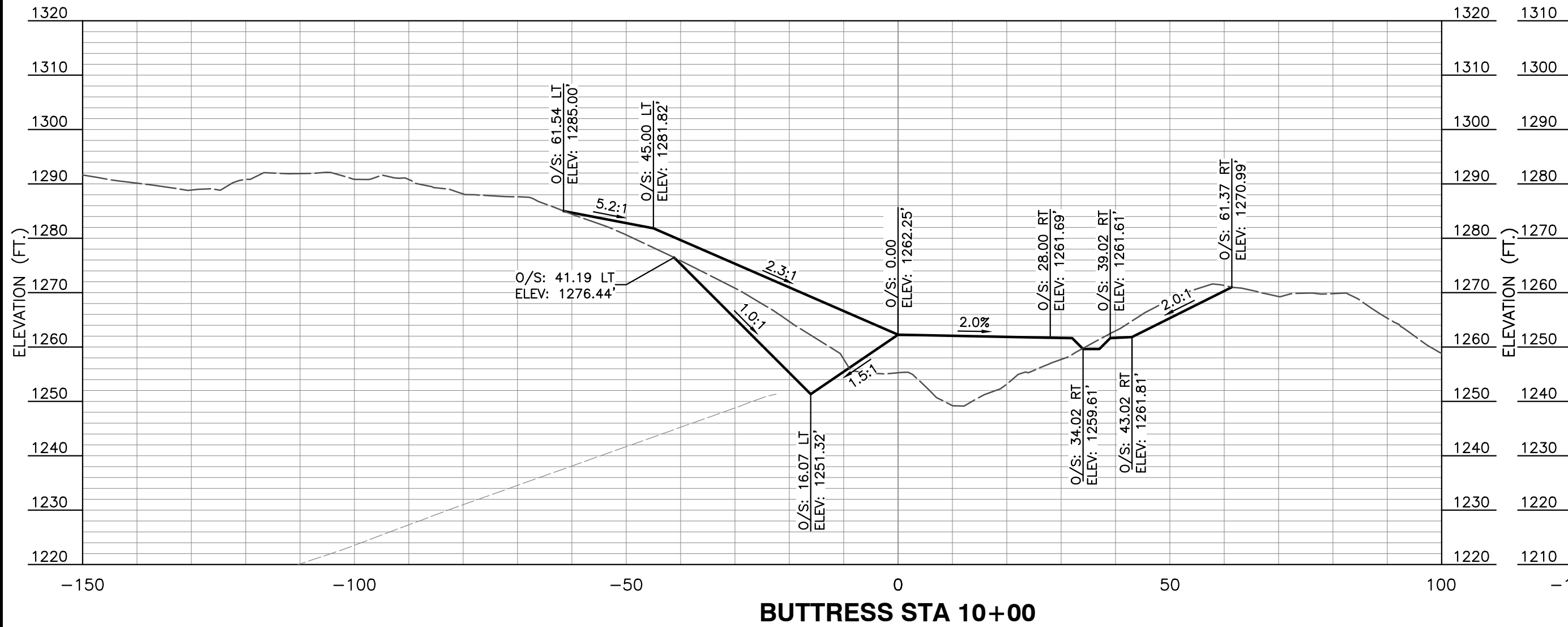
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BUTTRESS CROSS SECTIONS STA. 7+00 TO STA. 9+50	DATE: JULY 2026 DWG SCALE: H: 1"=20'; V: 1"=20' PROJECT NO: 360-750 APPROVED BY:	JAT CJM 360-750 RVH	WASTE CONNECTIONS WEST SLOPE MITIGATION CHIQUITA CANYON LANDFILL 29201 HENRY MAYO DR CASTAIC, CALIFORNIA 91384		Civil & Environmental Consultants, Inc.	2356 Gold Meadow Way Suite 120 Gold River, CA 95670 Ph: 916.503.0050 www.cecinc.com	2	06/24 2026	FOR PRELIMINARY USE	SUBMITTAL RECORD
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REFERENCE

- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



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SHEET	OF
BUTRESS CROSS SECTIONS STA. 10+00 TO STA. 12+50	
DATE: JULY 2026	DRAWN BY: JAT
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PROJECT NO: 350-750	
APPROVED BY:	RWH

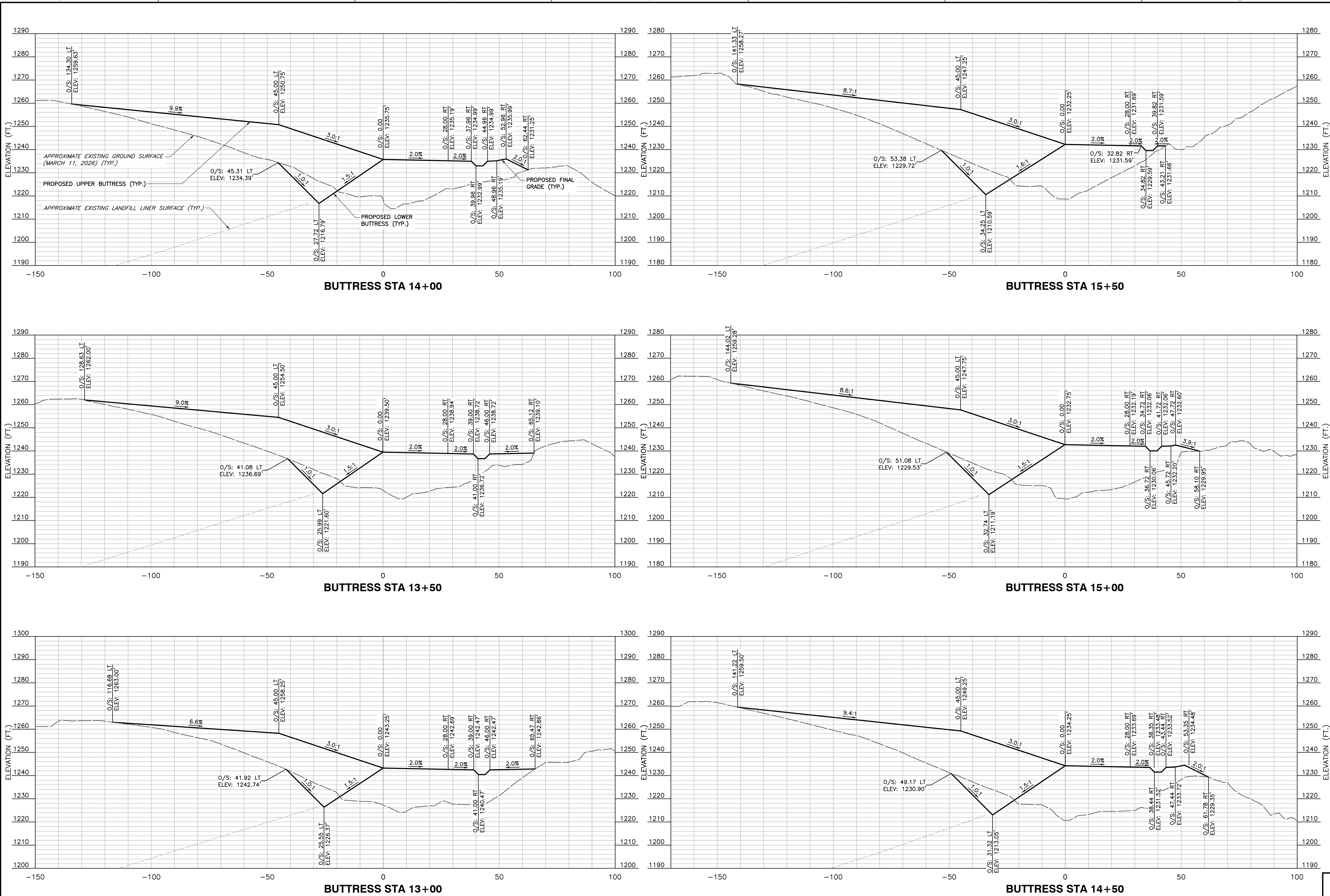
WASTE CONNECTIONS
WEST SLOPE MITIGATION
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29201 HENRY MAYO DR
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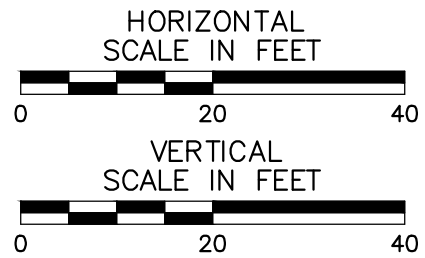
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NO	DATE
06/24 FOR PRELIMINARY USE	
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ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.	

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- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



DRAFT

BUTTRESS CROSS SECTIONS
STA. 13+00 TO STA. 15+50

DRAWING NO.:

C304

SHEET

OF

DATE: JULY 2026 [DRAWN BY: JAT]
DWG SCALE: H: 1"=20'; V: 1"=20' [CHECKED BY: CJM]
PROJECT NO: 350-750
APPROVED BY: RVH

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384



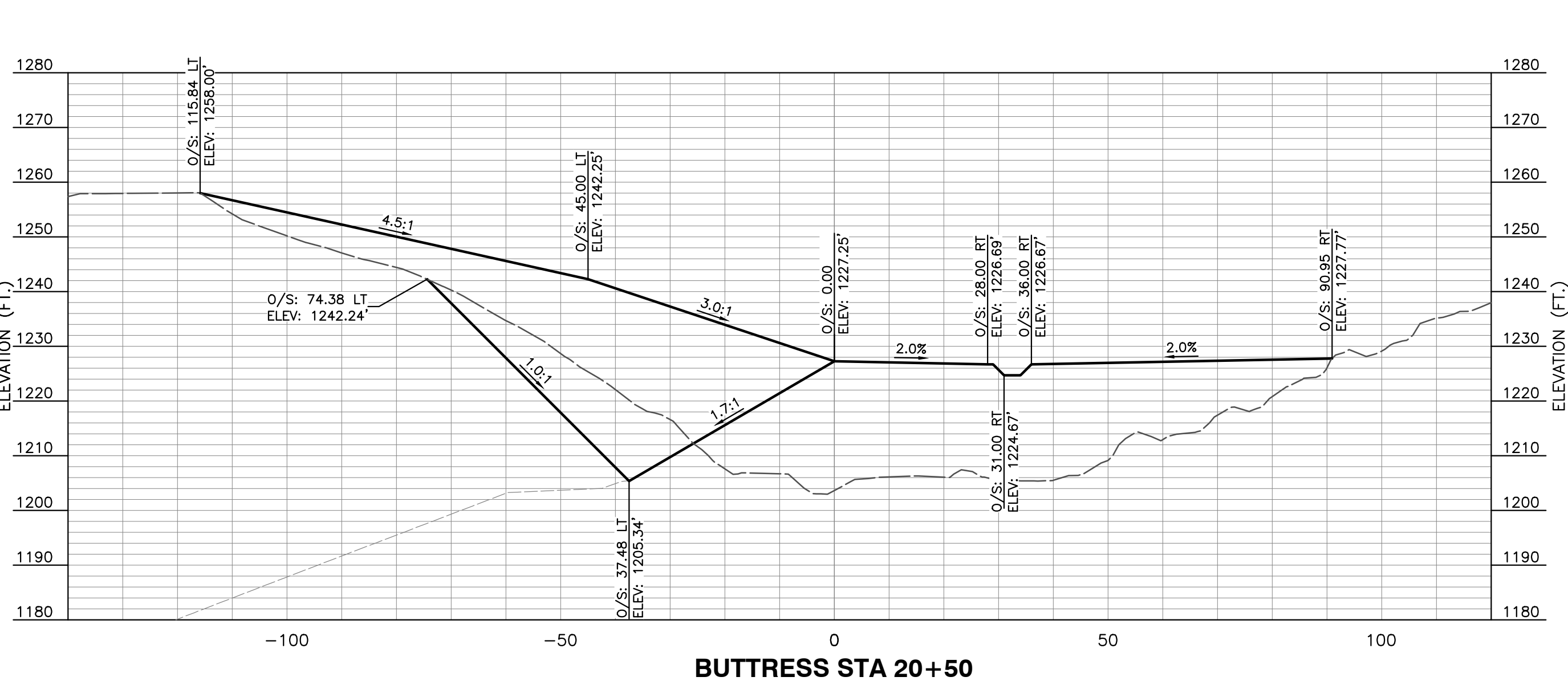
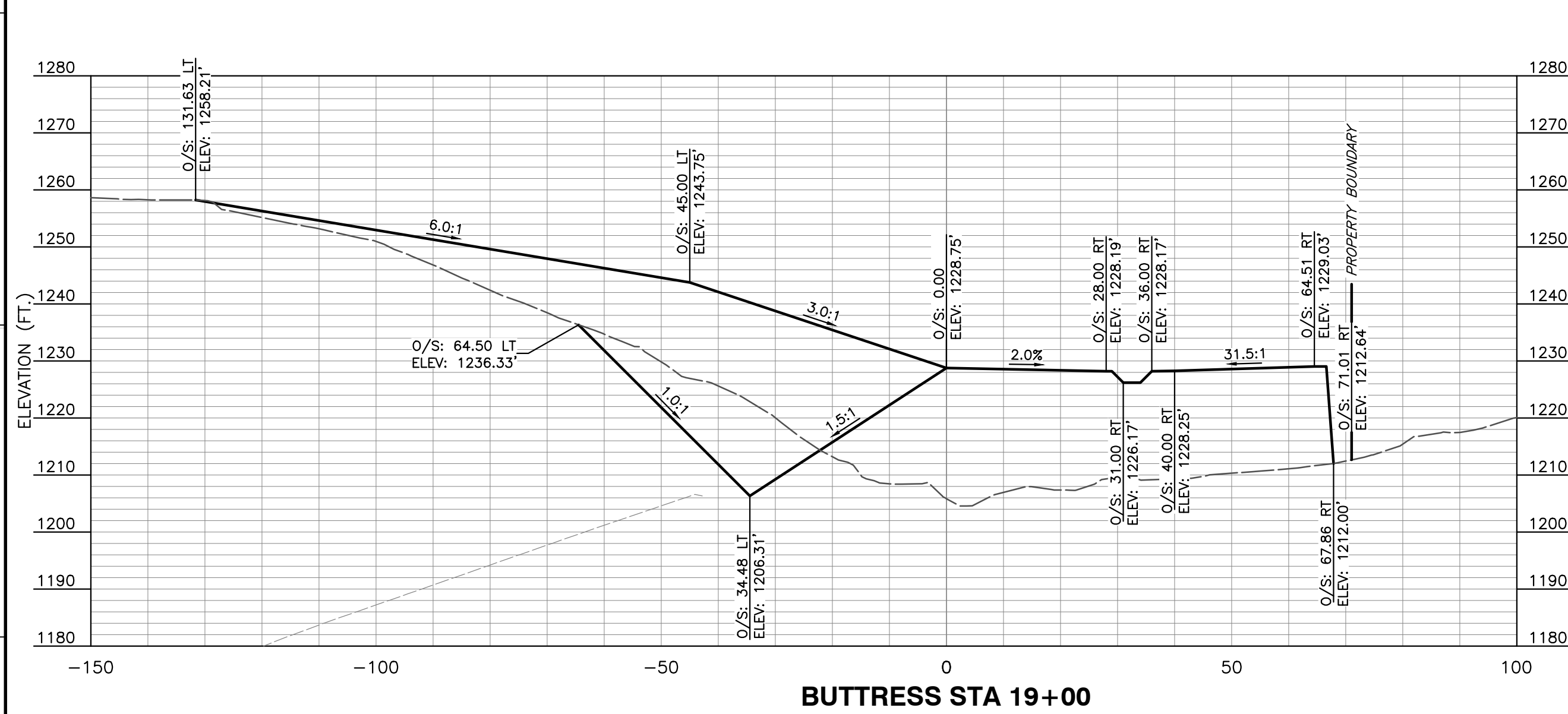
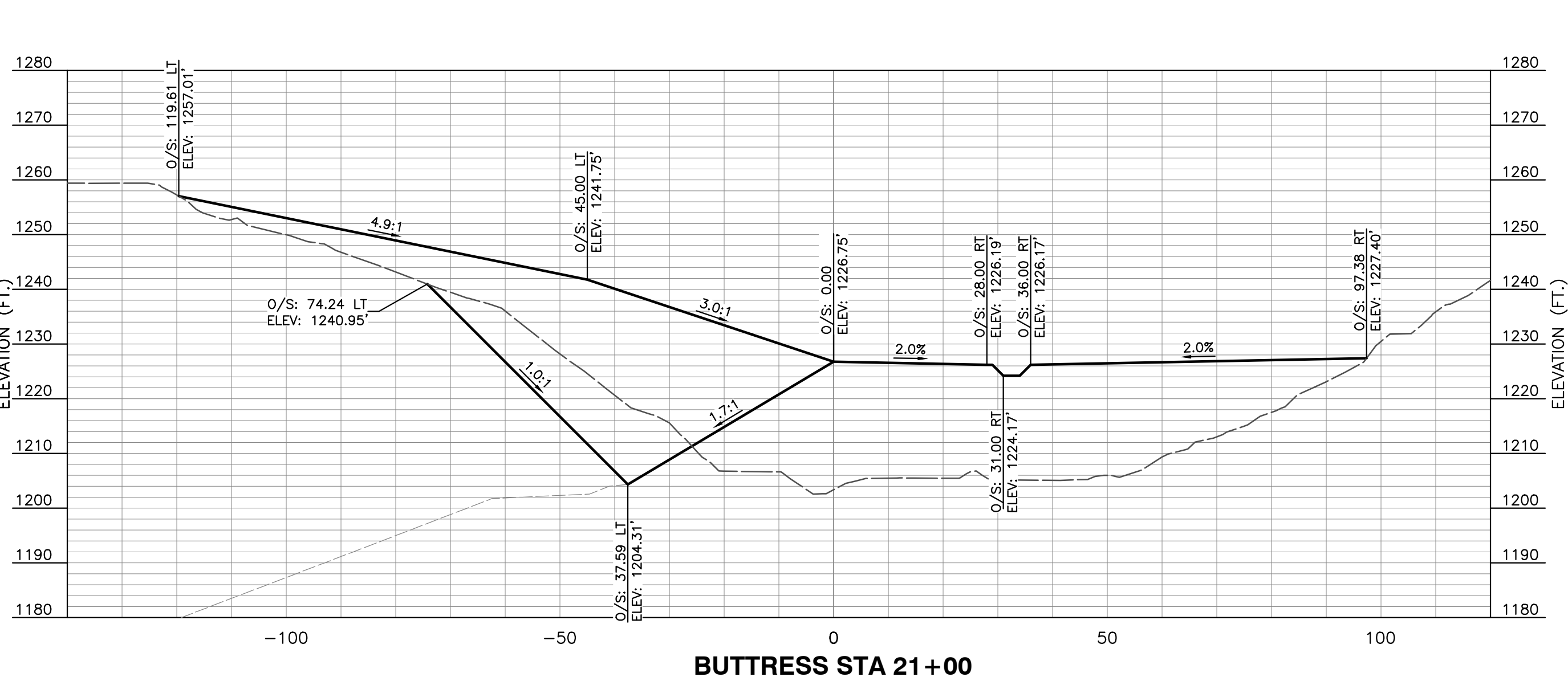
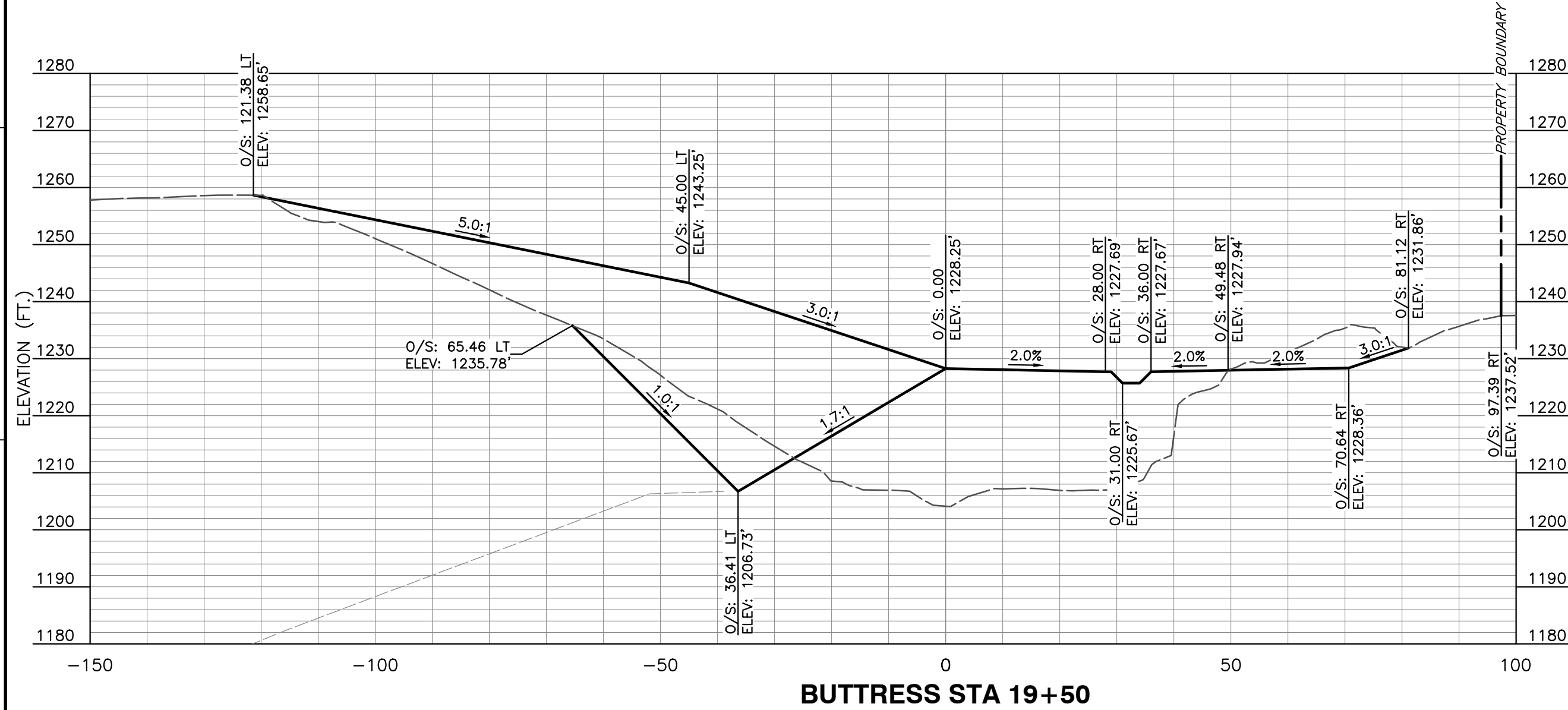
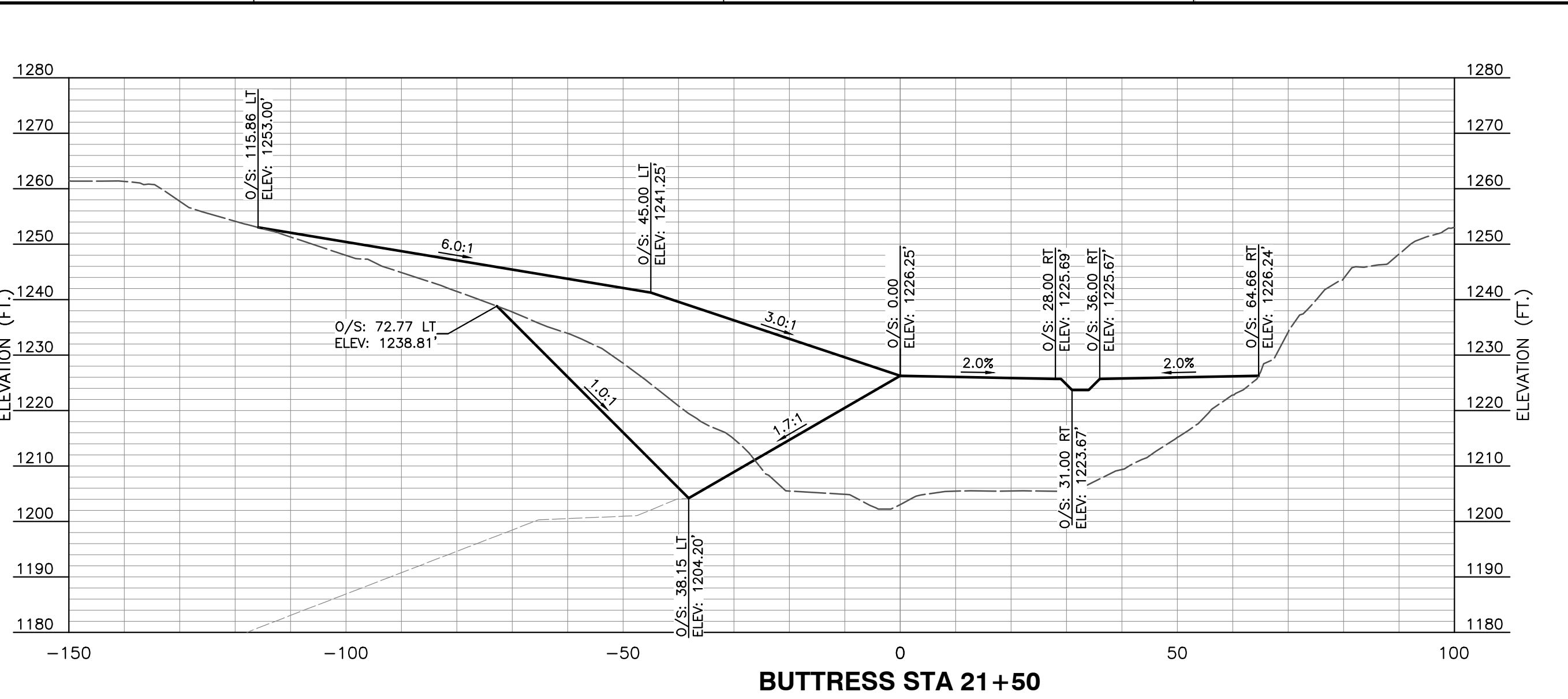
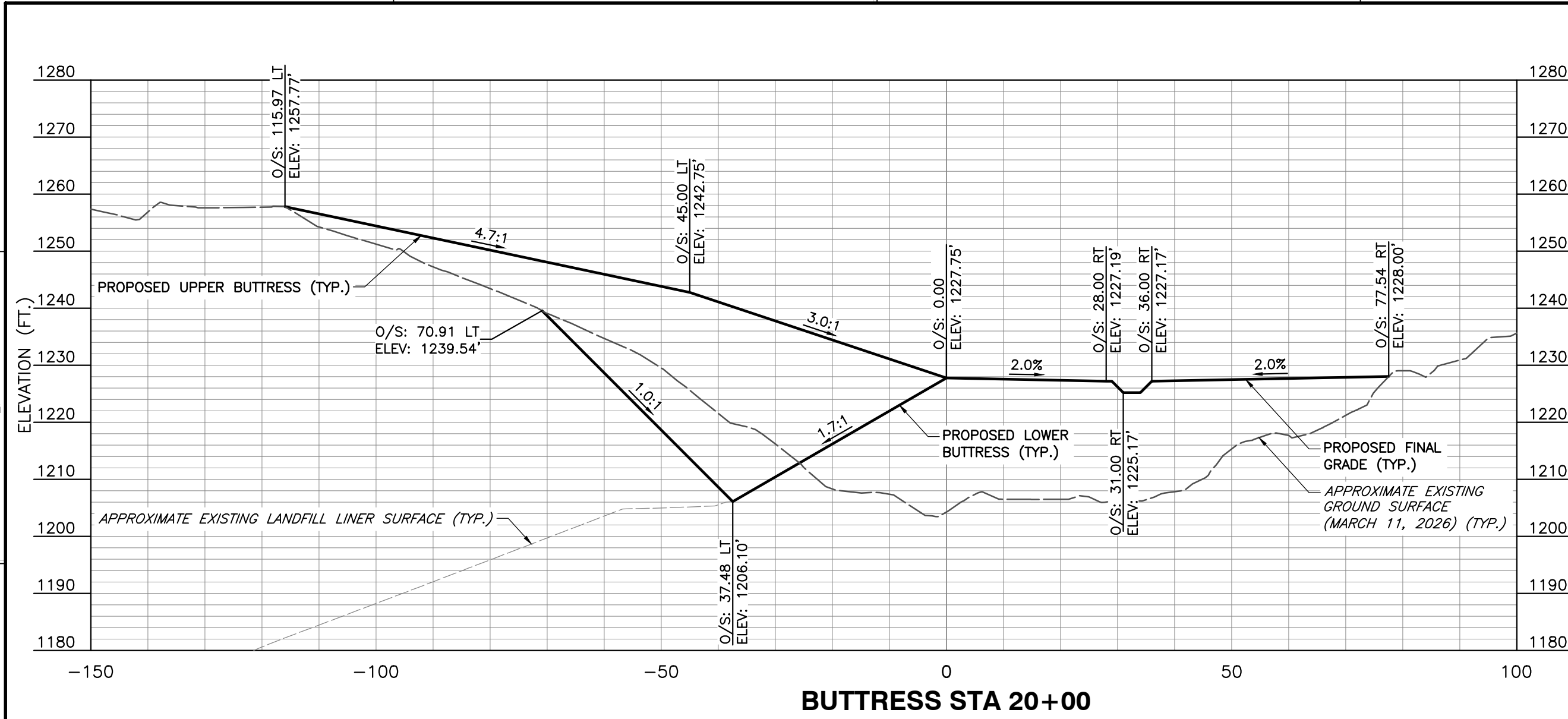
Civil & Environmental
Consultants, Inc.

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Gold River, CA 95670
Ph: 916.503.0050
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SUBMITTAL RECORD
NO. DATE DESCRIPTION
2 06/24 FOR PRELIMINARY USE 2026

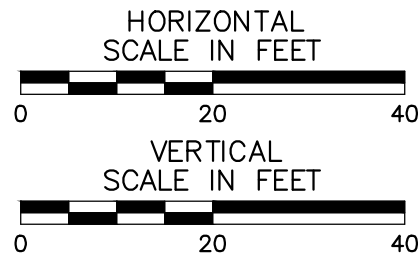
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REFERENCE

- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



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BUTTRESS CROSS SECTIONS
STA. 19+00 TO STA. 21+50

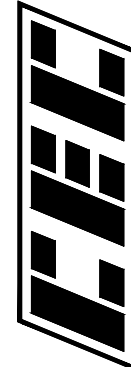
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C306

SHEET

OF

WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384



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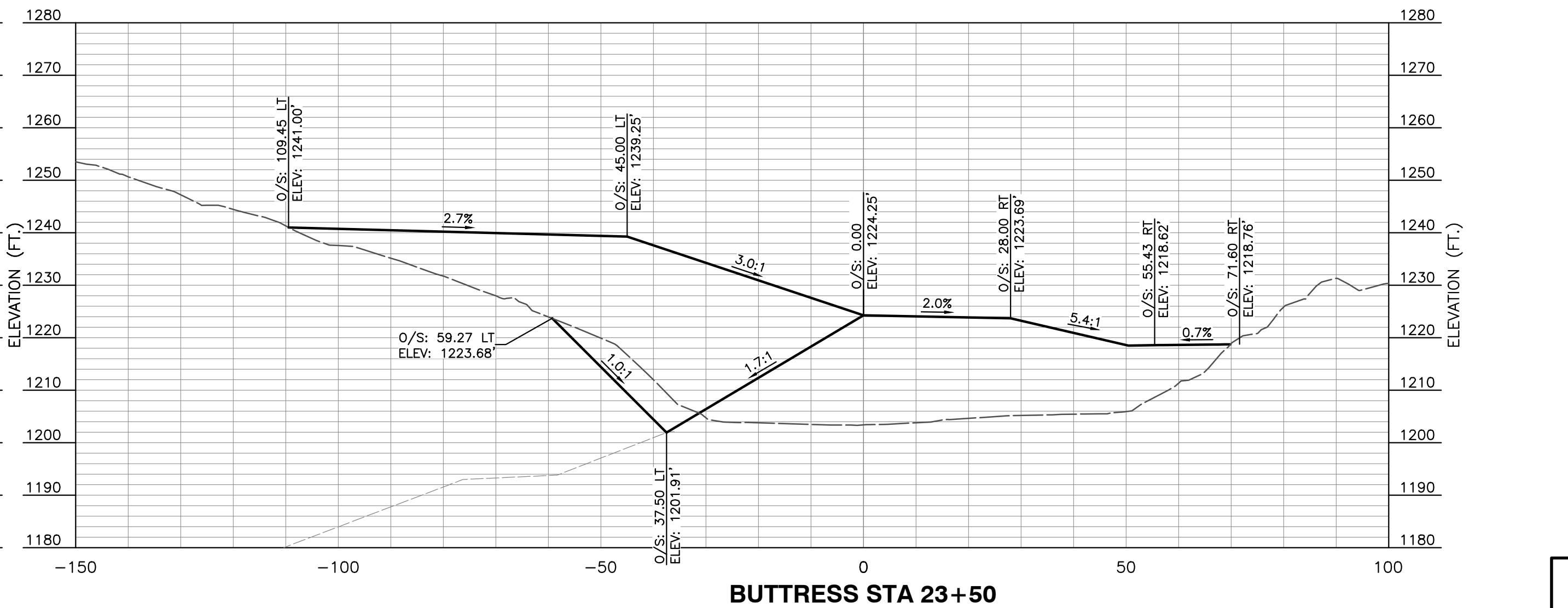
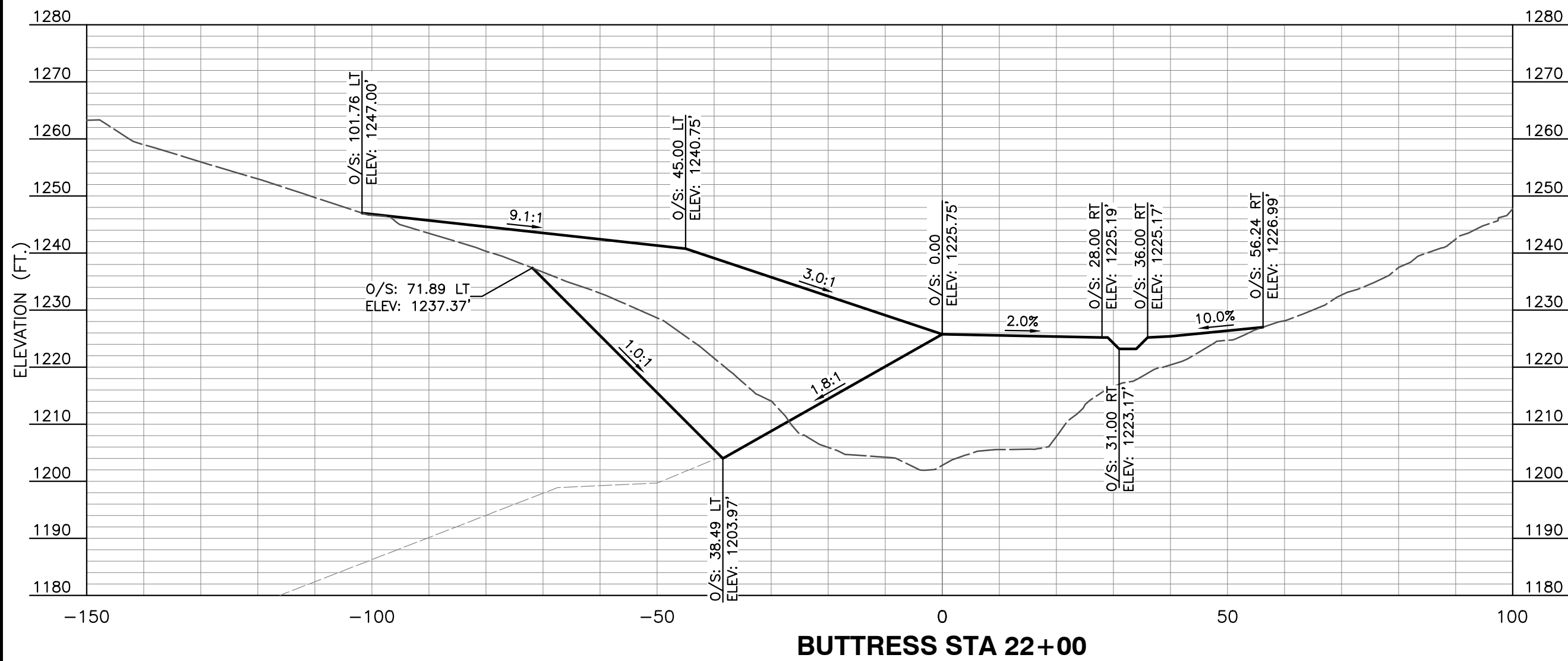
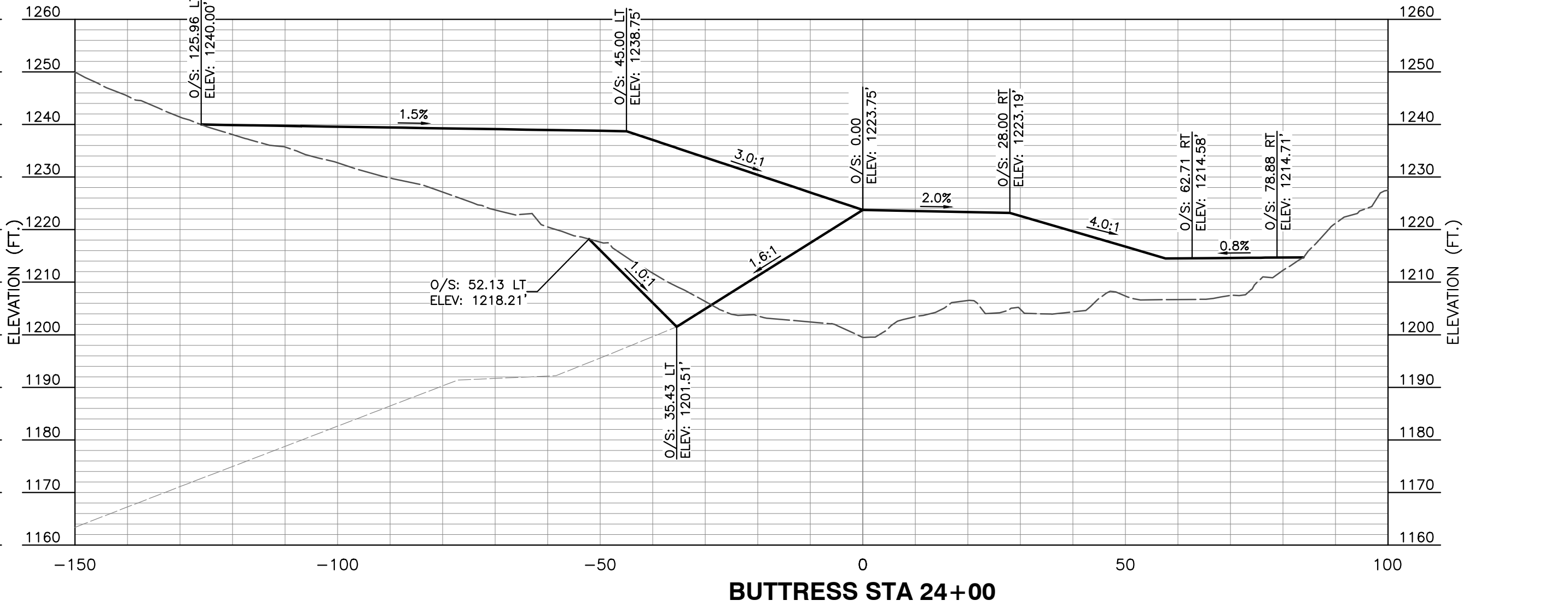
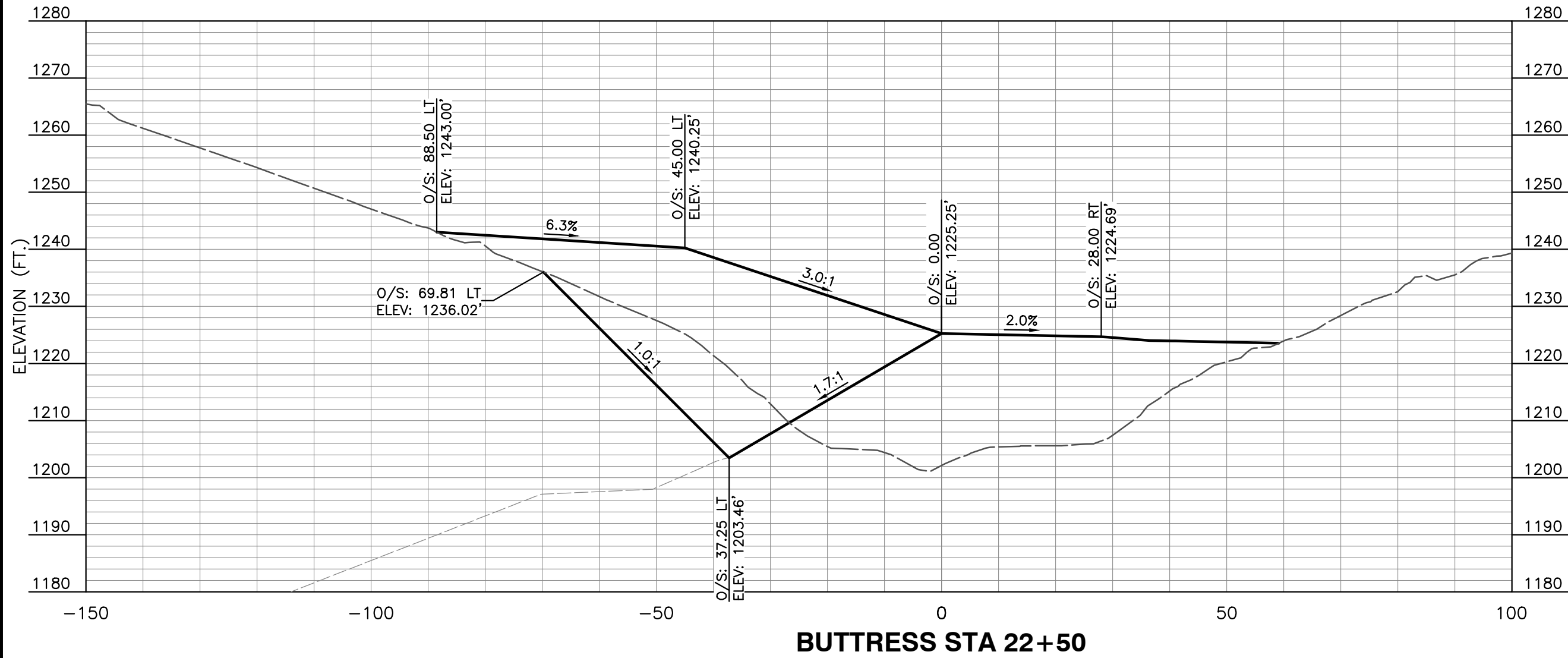
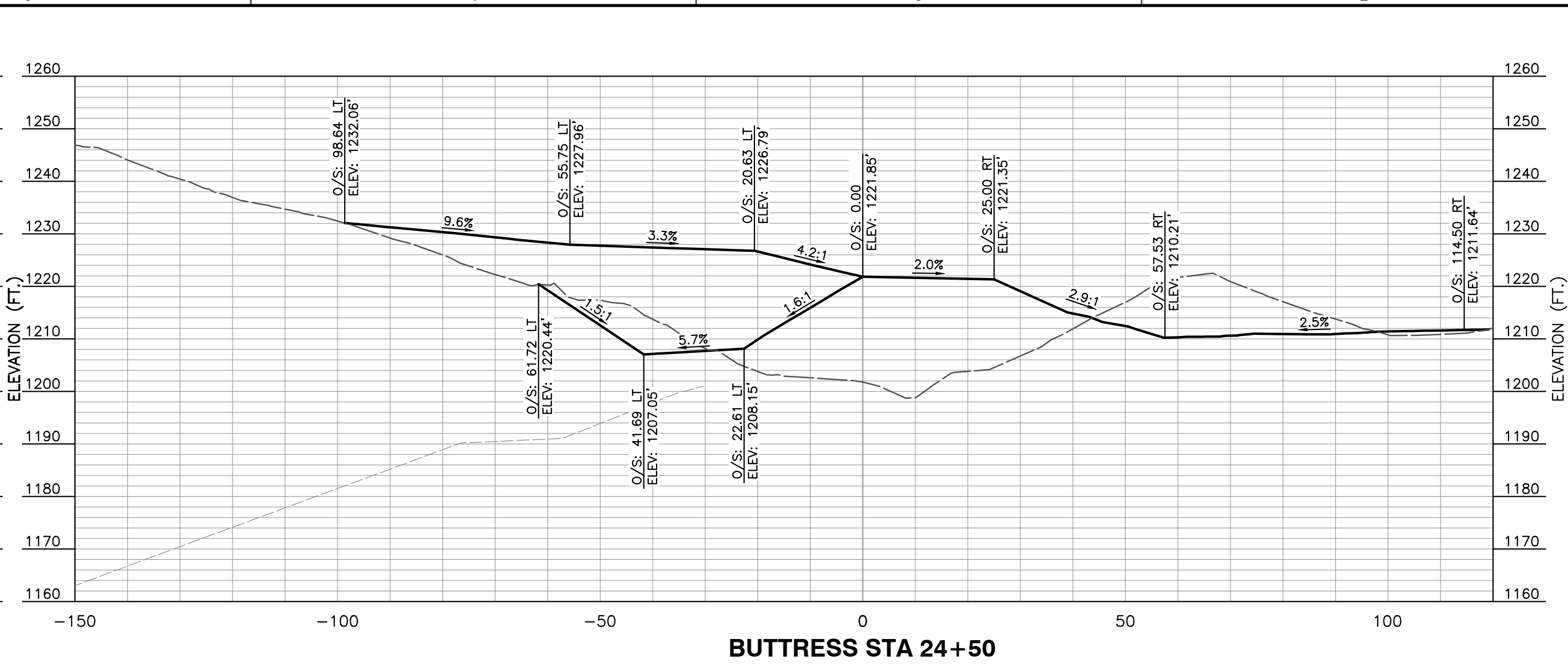
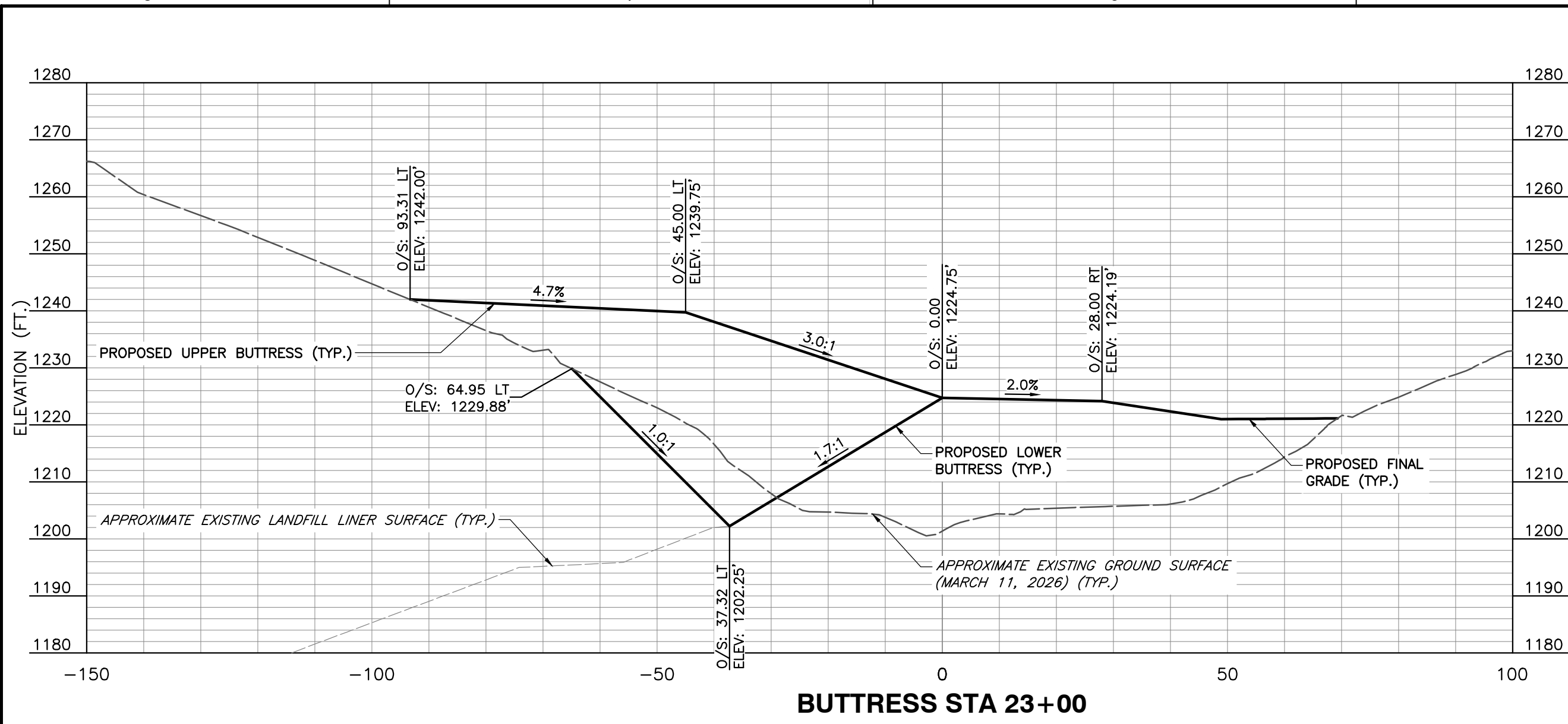
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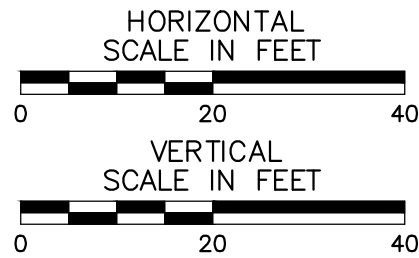
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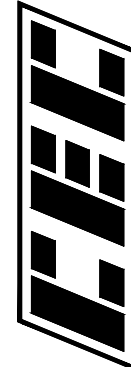
- EXISTING PLANIMETRICS PREPARED BY TETRA TECH, DATED JANUARY 16, 2025.
- EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



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NO	DESCRIPTION
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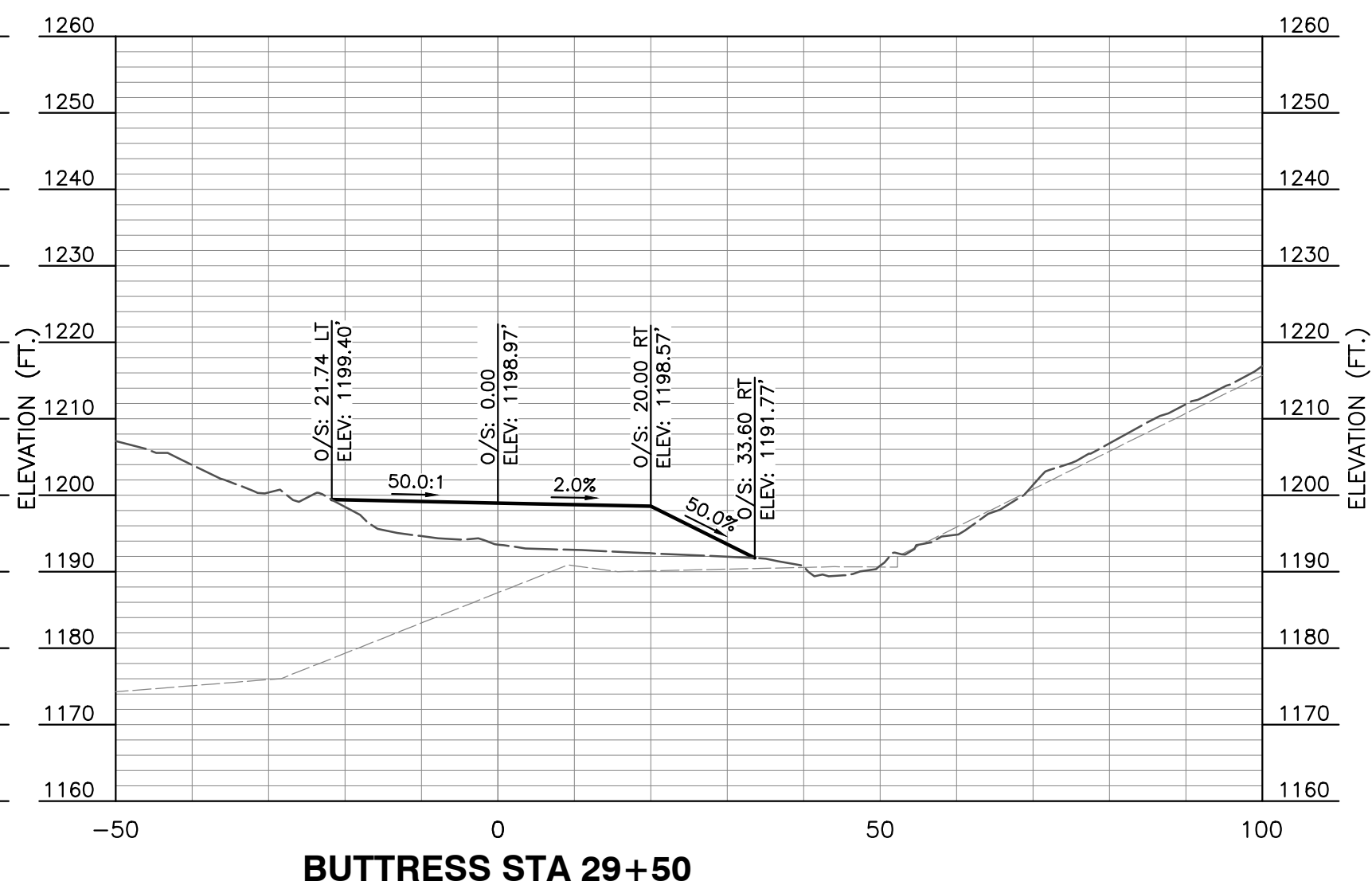
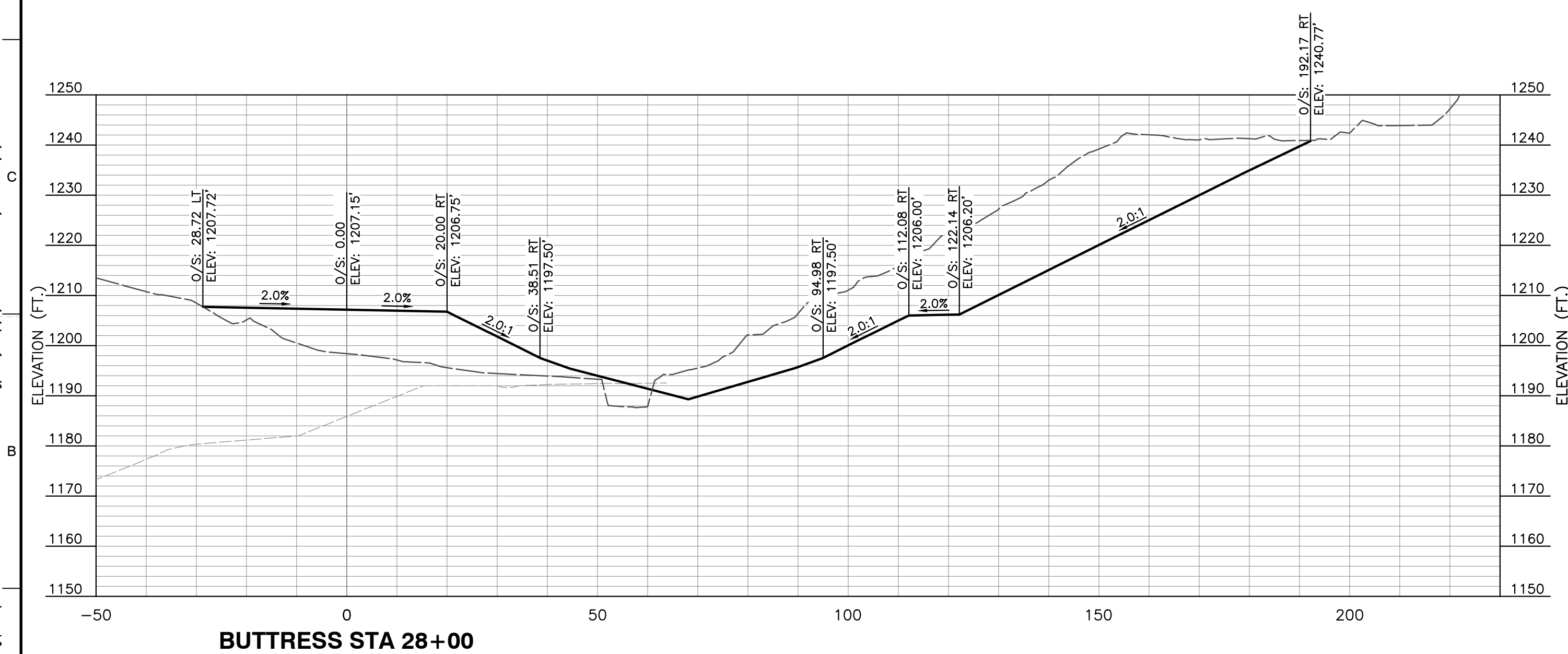
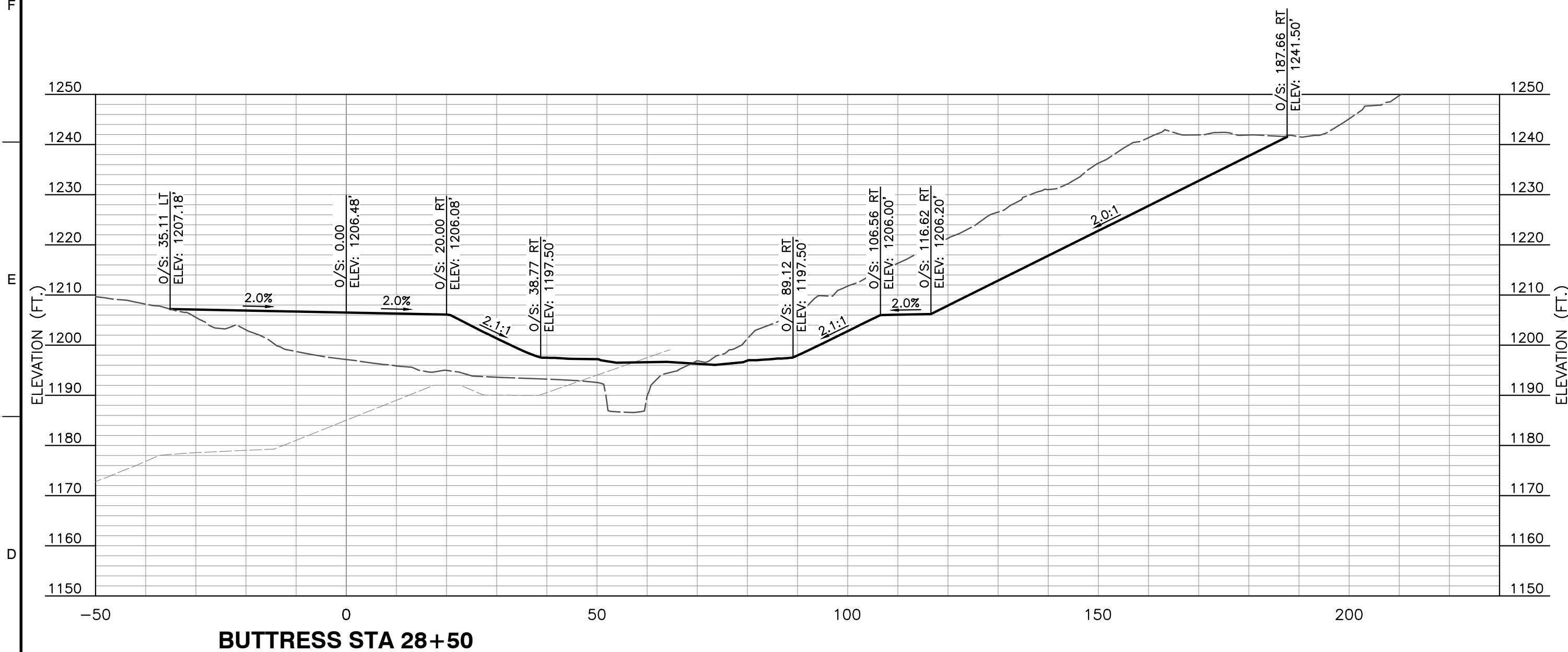
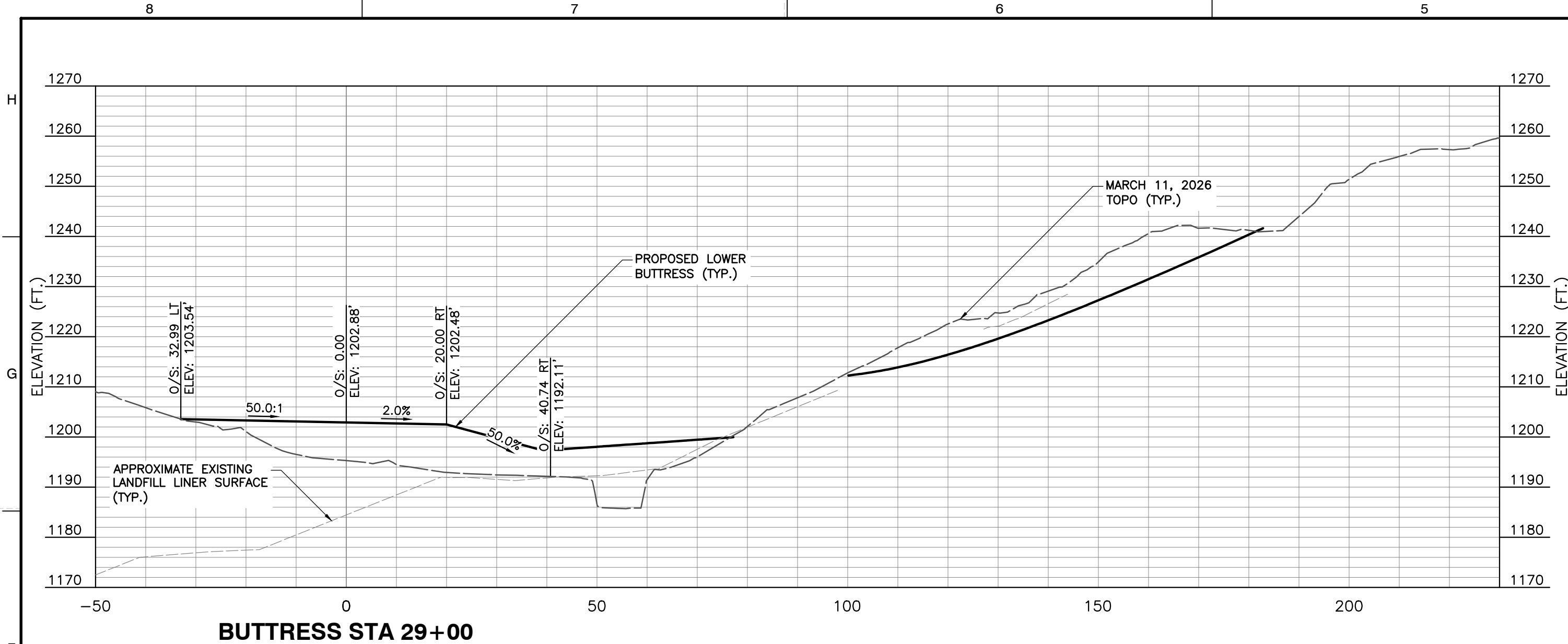
BUTTRESS CROSS SECTIONS
STA. 22+00 TO STA. 24+50

DRAWING NO.:

C307

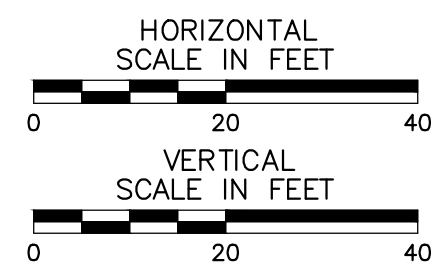
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DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	H: 1"=20'; V: 1"=20'	CHECKED BY:	CJM
PROJECT NO.:	350-750	APPROVED BY:	RWH



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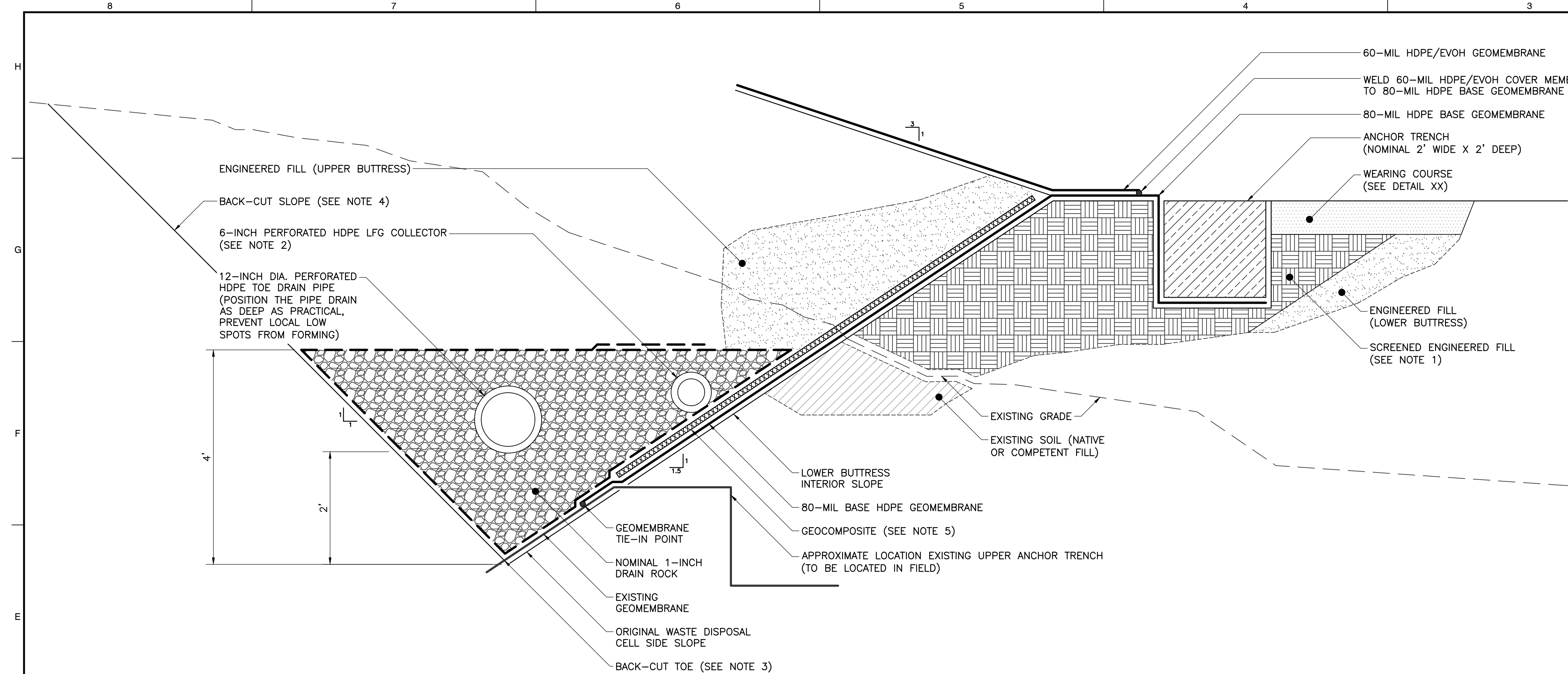
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2. EXISTING TOPOGRAPHY PROVIDED BY WASTE CONNECTIONS INC., DATED MARCH 11, 2026



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1
C500
TYPICAL TOE DRAIN SCHEMATIC DETAIL
NOT TO SCALE

- NOTES:
- SCREENED FILL TO HAVE A MAXIMUM PARTICLE SIZE OF 1-INCH. THE INTENT OF MATERIAL IS TO ENSURE THAT THERE ARE NO LARGE SOIL PARTICLES PUSHING AGAINST THE GEOMEMBRANE. THE SCREENED MATERIAL THICKNESS CAN BE AS SMALL AS 6-INCHES (MEASURED NORMAL TO THE SLOPE). THE DETAIL SHOWS THE MATERIAL PLACED APPROXIMATELY 8- FEET WIDE (APPROXIMATELY THE WIDTH OF A PIECE OF EQUIPMENT).
 - LFG COLLECTOR MUST BE PLACED WITHIN TOE DRAIN GRAVEL PACK, BUT ITS POSITION WITHIN THE PACK CAN BE ADJUSTED TO FACILITATE CONSTRUCTION.
 - THE PURPOSE OF THE BACK-CUT IS TO EXPOSE THE HIGHEST PORTION OF THE EXISTING GEOMEMBRANE LINER AND TO CREATE THE SPACE WITHIN WHICH A NEW TOE DRAIN CAN BE CONSTRUCTED. THE DEPTH OF THE BACK-CUT IS THE MINIMUM NECESSARY TO EXPOSE THE EXISTING GEOMEMBRANE PLUS THE ADDITIONAL SPACE NECESSARY TO ALLOW THE NEW GEOMEMBRANE TO BE WELDED TO THAT EXISTING GEOMEMBRANE.
 - THE BACK-CUT SLOPE SHALL BE A STEEP AS PRACTICAL, LIMITED BY INSTRUCTION FROM THE GEOTECHNICAL ENGINEER, SAFE CONSTRUCTION PRACTICES, AND FIELD CONDITIONS OBSERVED DURING CONSTRUCTION BY SITE PERSONNEL AND MONITORING EQUIPMENT.
 - THE PRIMARY FUNCTION OF THE GEOCOMPOSITE IS TO PROTECT THE 80-MIL BASE GEOMEMBRANE DURING PLACEMENT AND COMPACTION OF THE UPPER BUTTRESS FILL. THE SECONDARY FUNCTION OF THE GEOCOMPOSITE IS TO PROVIDE A PREFERRED DRAINAGE PATHWAY DOWN THE INTERIOR FACE OF THE LOWER BUTTRESS. IT IS NOT EXPECTED ANY SIGNIFICANT QUANTITY OF LIQUID WILL REACH THIS LOCATION. THE GEOCOMPOSITE CAN BE REPLACED BY A 16-OUNCE NON-WOVEN GEOTEXTILE IF THAT MATERIAL IS MORE CONVENIENTLY AVAILABLE. CONTRACTOR SHALL SECURE GEOCOMPOSITE OR GEOTEXTILE IN PLACE DURING CONSTRUCTION, IT DOES NOT NEED TO BE SECURED IN THE ANCHOR TRENCH.

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NO	DATE	2 06/24 FOR PRELIMINARY USE 2026	
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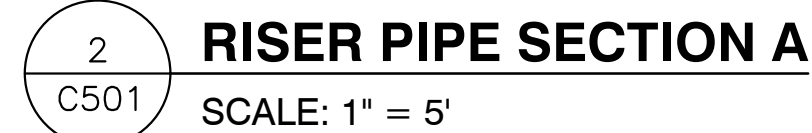
WASTE CONNECTIONS
WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384

DETAILS 1 OF 2

DRAWING NO.:
C500

SHEET --- OF ---

DATE:	JULY 2026	DRAWN BY:	JAT
DWG SCALE:	NOT TO SCALE	CHECKED BY:	CJM
PROJECT NO.:	350-750	APPROVED BY:	RVH



1. LFG COLLECTORS TO BE CONNECTED TO PERIMETER HEADER SYSTEM AT SURFACE VIA LATERALS. LATERALS TO BE SPACED NO FURTHER THAN 200 FEET. SURFACE CONNECTION DETAILS TO BE PROVIDED BY OTHERS.
2. THE SLOT CUT IS INTENDED TO PROVIDE ROOM FOR THE HORIZONTAL SUMP PIPE AND END CAP. ALLOW 6-INCHES CLEARANCE ON SIDES AND ENDS. WALLS OF SLOT CUT SHOULD BE AS STEEP AS PRACTICAL CONSISTENT WITH FIELD CONDITIONS AND SAFE WORK PRACTICES. PLACE GEOTEXTILE, DRAIN ROCK, PIPE, AND OTHER APPURTENANCES IMMEDIATELY UPON MAKING SLOT CUT TO RESTORE THE SLOPE AS QUICKLY AS POSSIBLE.
3. THE LFG COLLECTOR IS SHOWN BROKEN INTO DISCRETE SECTIONS. AT THE OWNER'S DISCRETION, THE LFG COLLECTOR CAN BE INSTALLED CONTINUOUSLY WITHIN THE TOE DRAIN BY LAYING THE LFG COLLECTOR ACROSS THE SUMP RISERS AND CLEANOUTS WHERE NECESSARY. ENSURE THAT NO LOCAL LOW SPOTS ARE ALLOWED TO FORM THAT ARE NOT PROVIDED WITH THE MEANS TO DRAIN CONDENSATE.
4. THE FITTING IS INTENDED TO ALLOW INSERTION AND REMOVAL OF A PUMP FROM THE SURFACE. CONTRACTOR TO SUBMIT A SHOP DRAWING OF THE PROPOSED FITTING FOR APPROVAL BY CONSTRUCTION MANAGER. THE FITTING SHALL CONSIST OF AT LEAST 3 SECTIONS AND BE A LONG RADIUS ELBOW WITH A DEFLECTION ANGLE OF 33.7 DEGREES TO CREATE A TRANSITION FROM THE 1.5:1 SLOPE TO THE HORIZONTAL ORIENTATION SHOWN.

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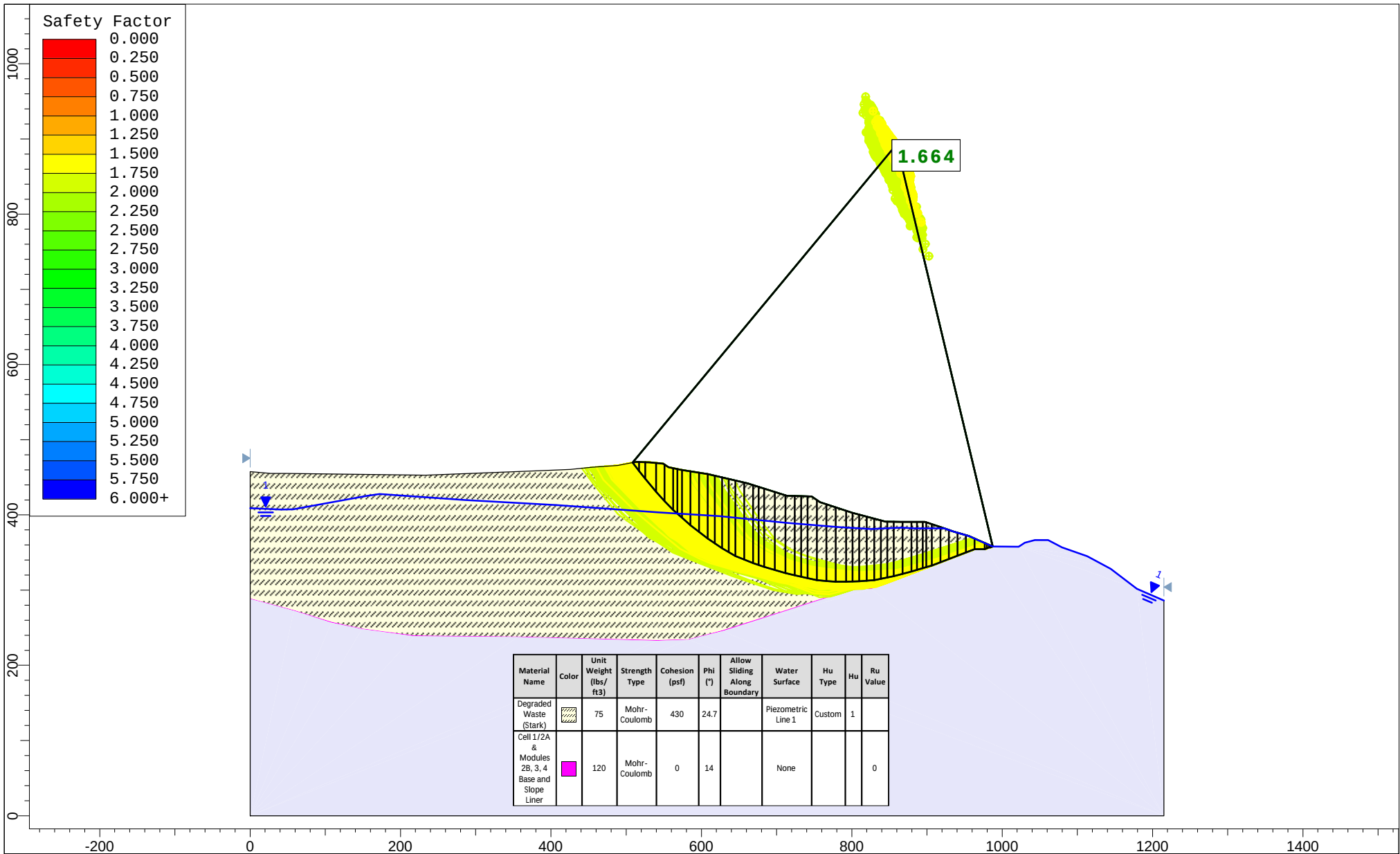
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WEST SLOPE MITIGATION
CHIQUITA CANYON LANDFILL
29201 HENRY MAYO DR
CASTAIC, CALIFORNIA 91384**

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C501
SHEET --- OF ---

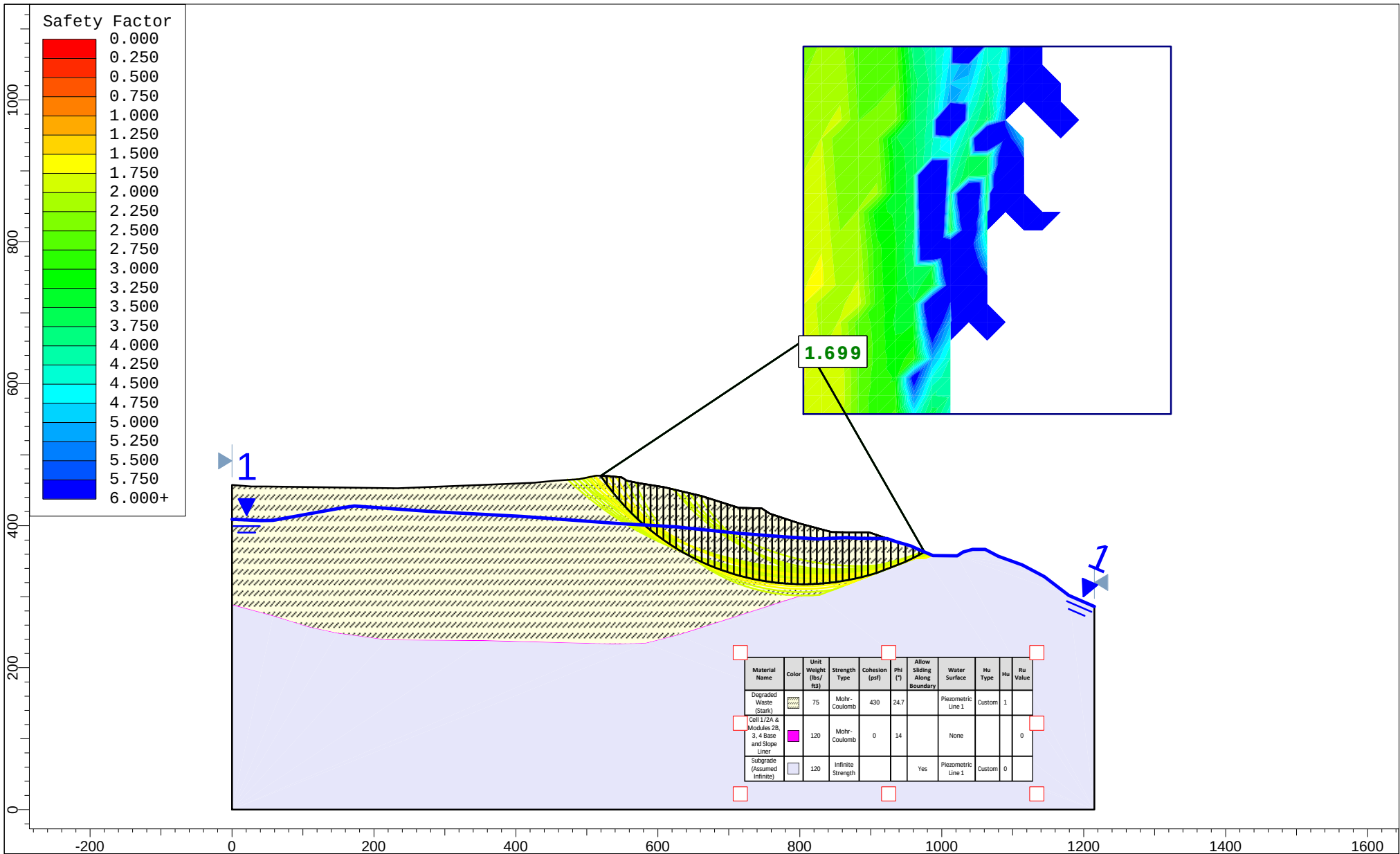
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Appendix H

STABILITY ANALYSIS OUTPUT



Project		COMPREHENSIVE STABILITY EVALUATION	
Group	Section 9+00 (Pre-Buttress)	Scenario	Static Safety Factor (Non-Circular)
Drawn By	R. Mitchell	Company	GLA
Date	9/1/2026	File Name	West Slope Cross Sections +5.slm



Project

COMPREHENSIVE STABILITY EVALUATION

Group

Section 9+00 (Pre-Buttress)

Scenario

Static Safety Factor (Circular)

Drawn By

R. Mitchell

Company

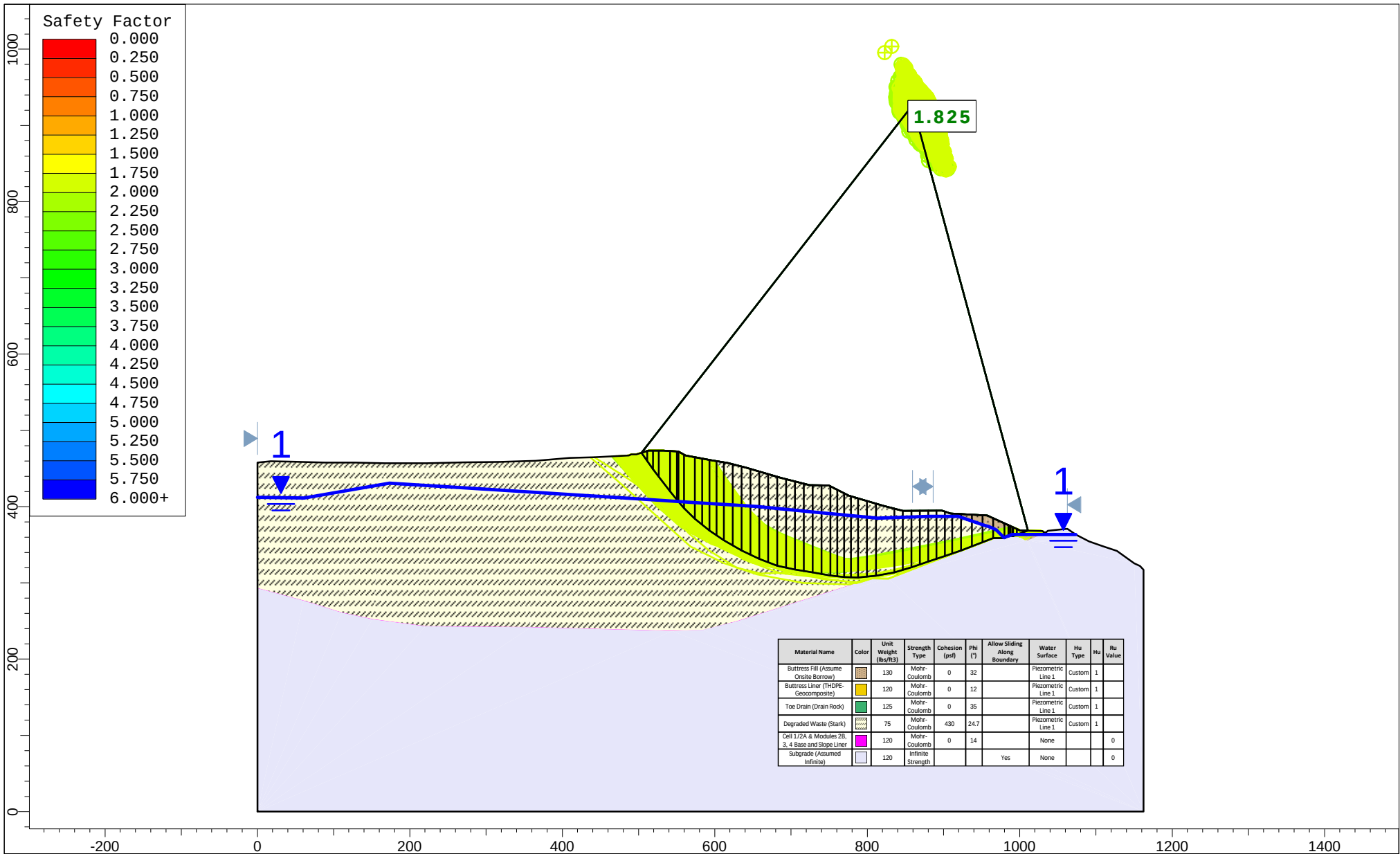
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Date

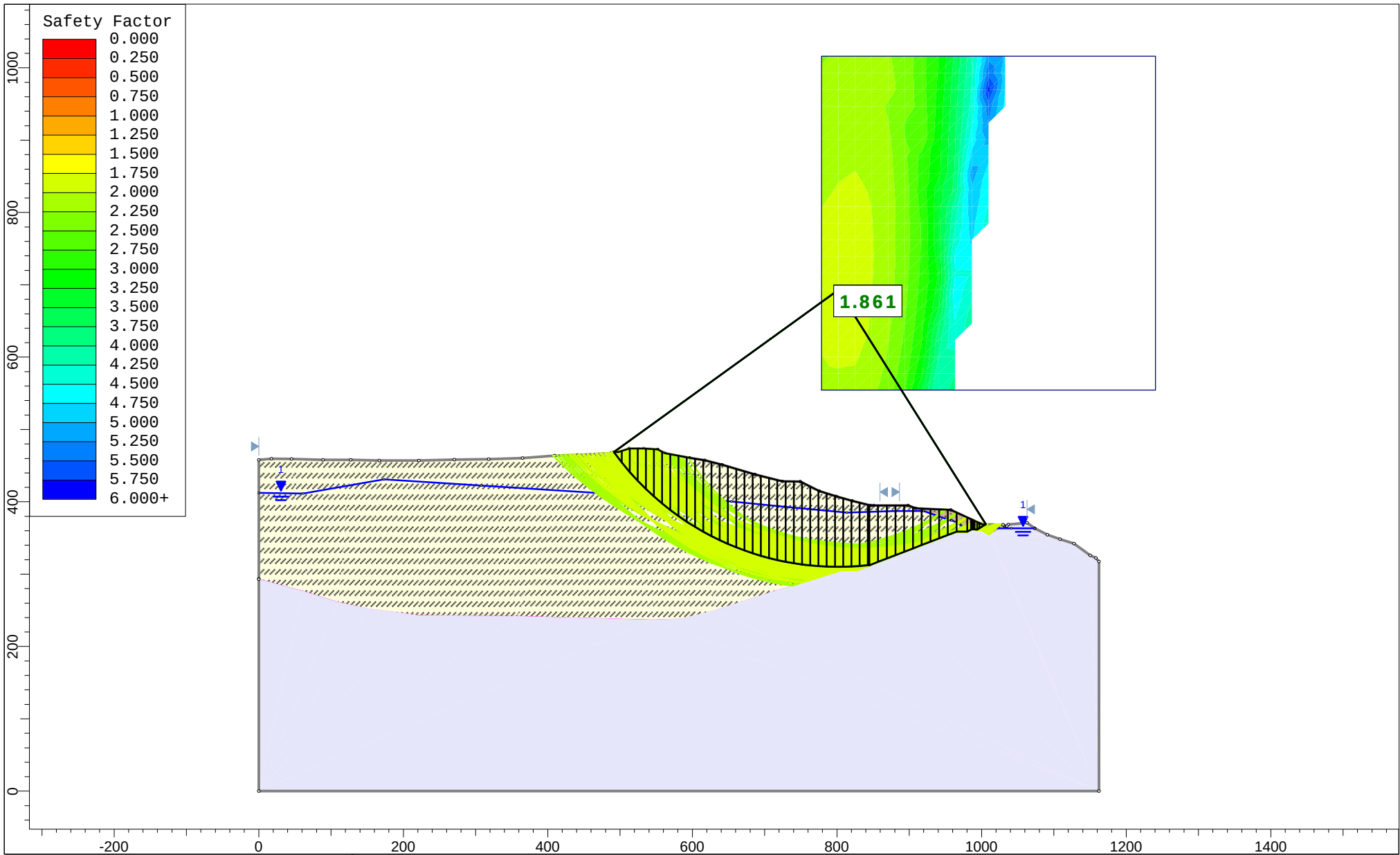
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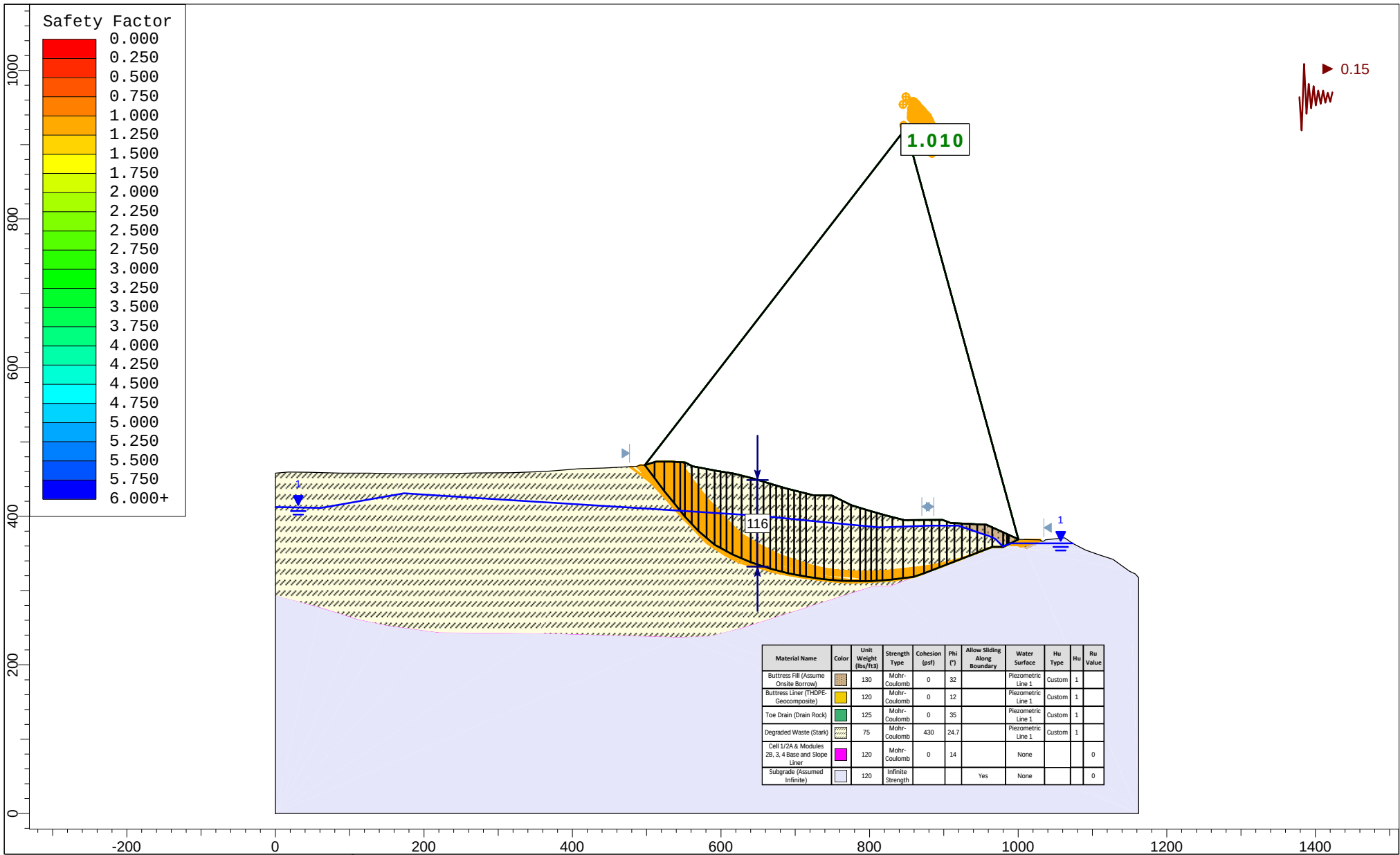
West Slope Cross Sections +5.slmld



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Date		9/1/2026		File Name		West Slope Cross Sections +5.slmf	

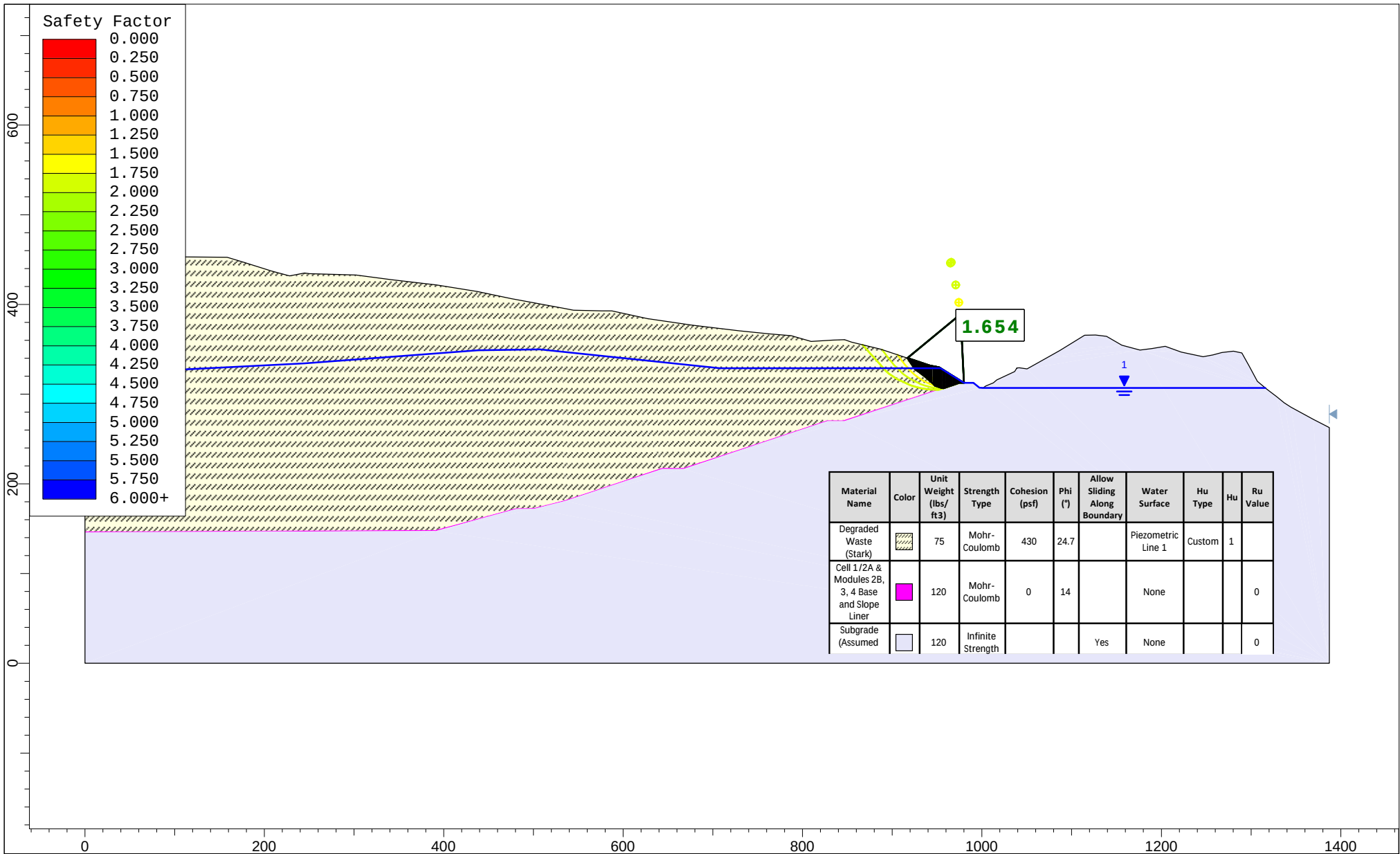


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	Drawn By		R. Mitchell	Company		GLA
	Date		9/1/2026	File Name		West Slope Cross Sections +5.slm

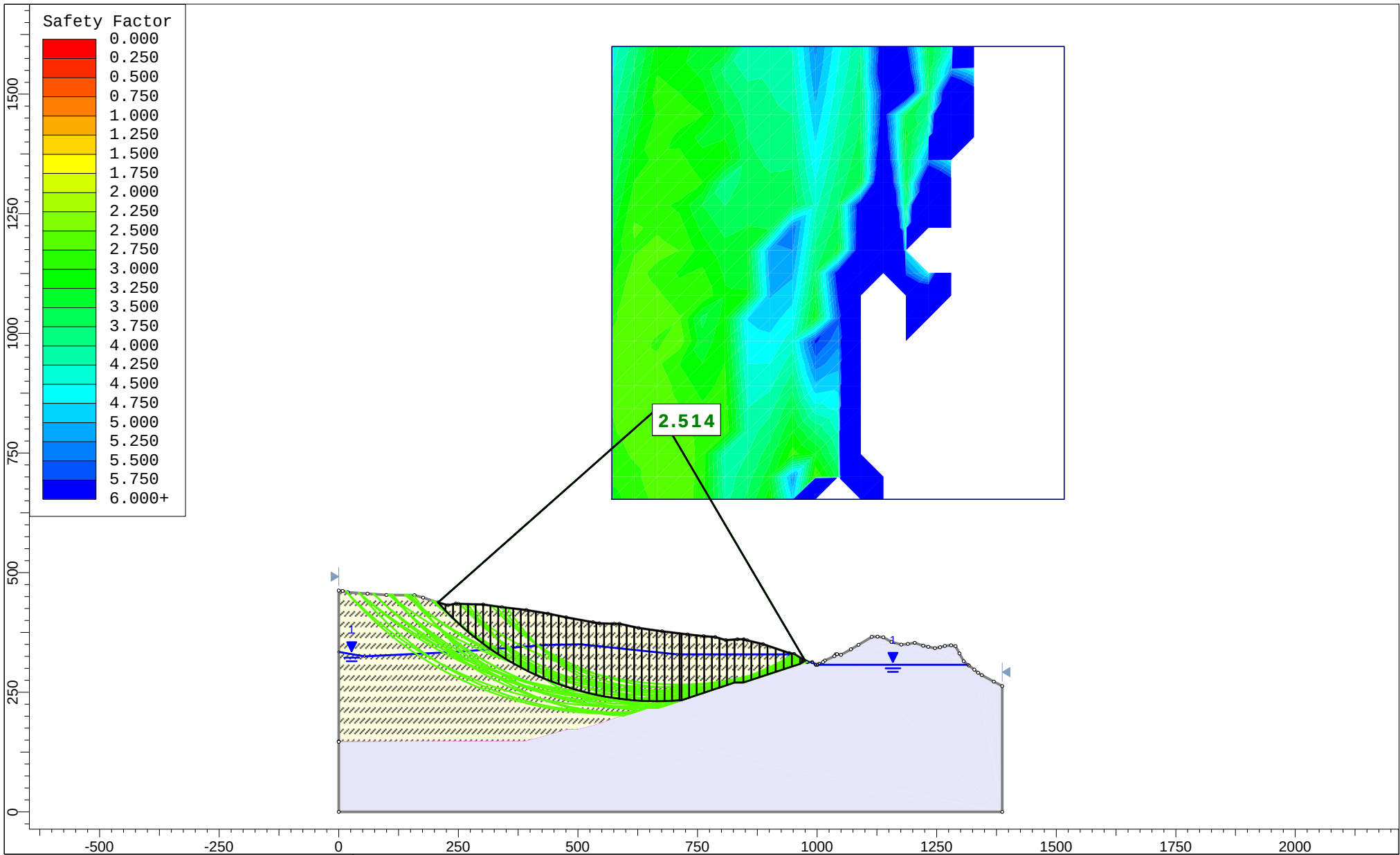


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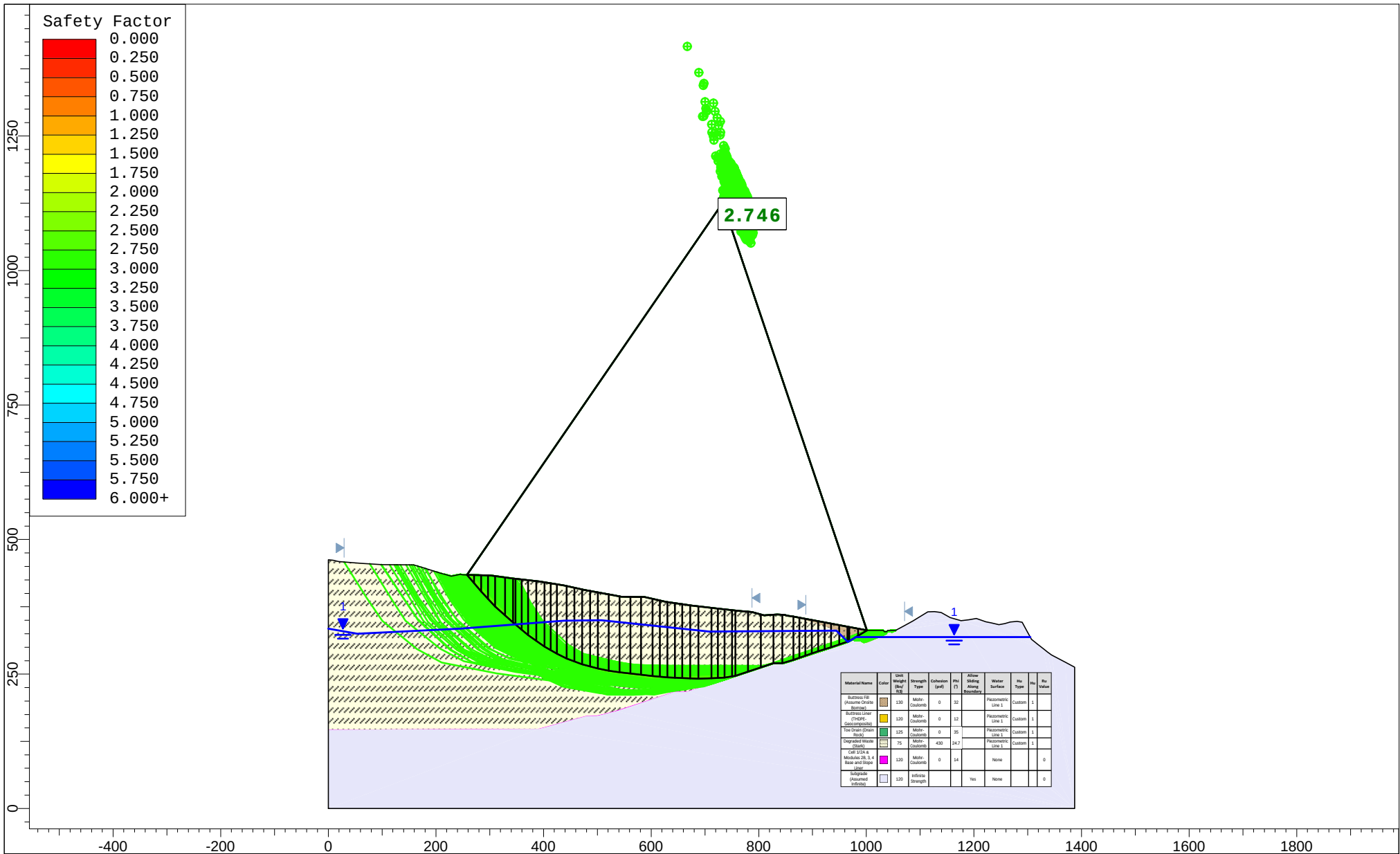
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Group		Section 9+00	Scenario		
Drawn By		R. Mitchell	Company		
Date		9/1/2026	File Name		
			Yield Acceleration		
			GLA		
			West Slope Cross Sections +5.slm		



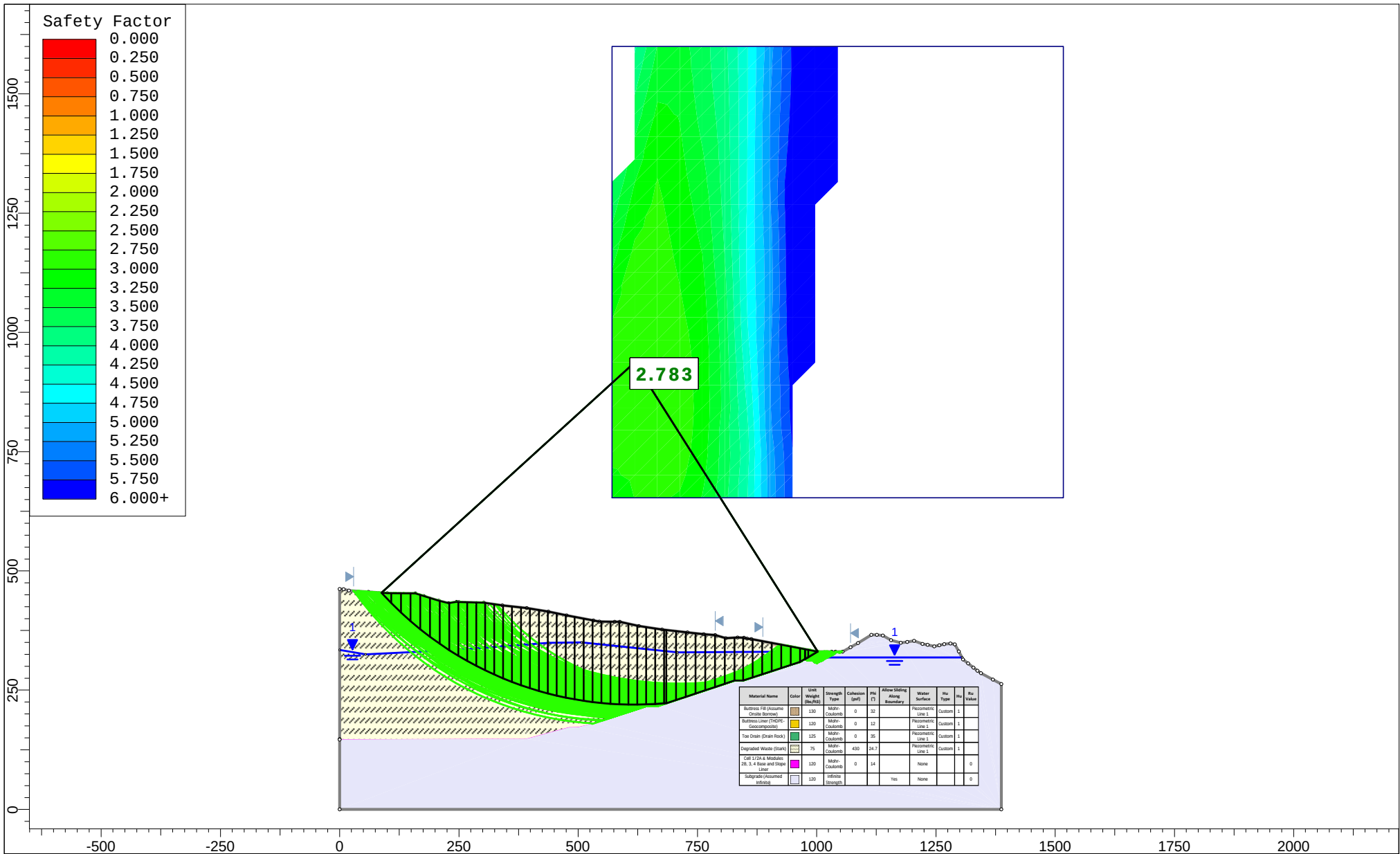
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	Group	Section 16+00 (Pre-Buttress)	Scenario	Static Safety Factor (Non-Circular)
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmf
	SLIDEINTERPRET 9.044			



	Project		COMPREHENSIVE STABILITY EVALUATION	
	Group	Section 16+00 (Pre-Buttress)	Scenario	Static Safety Factor (Circular)
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slm

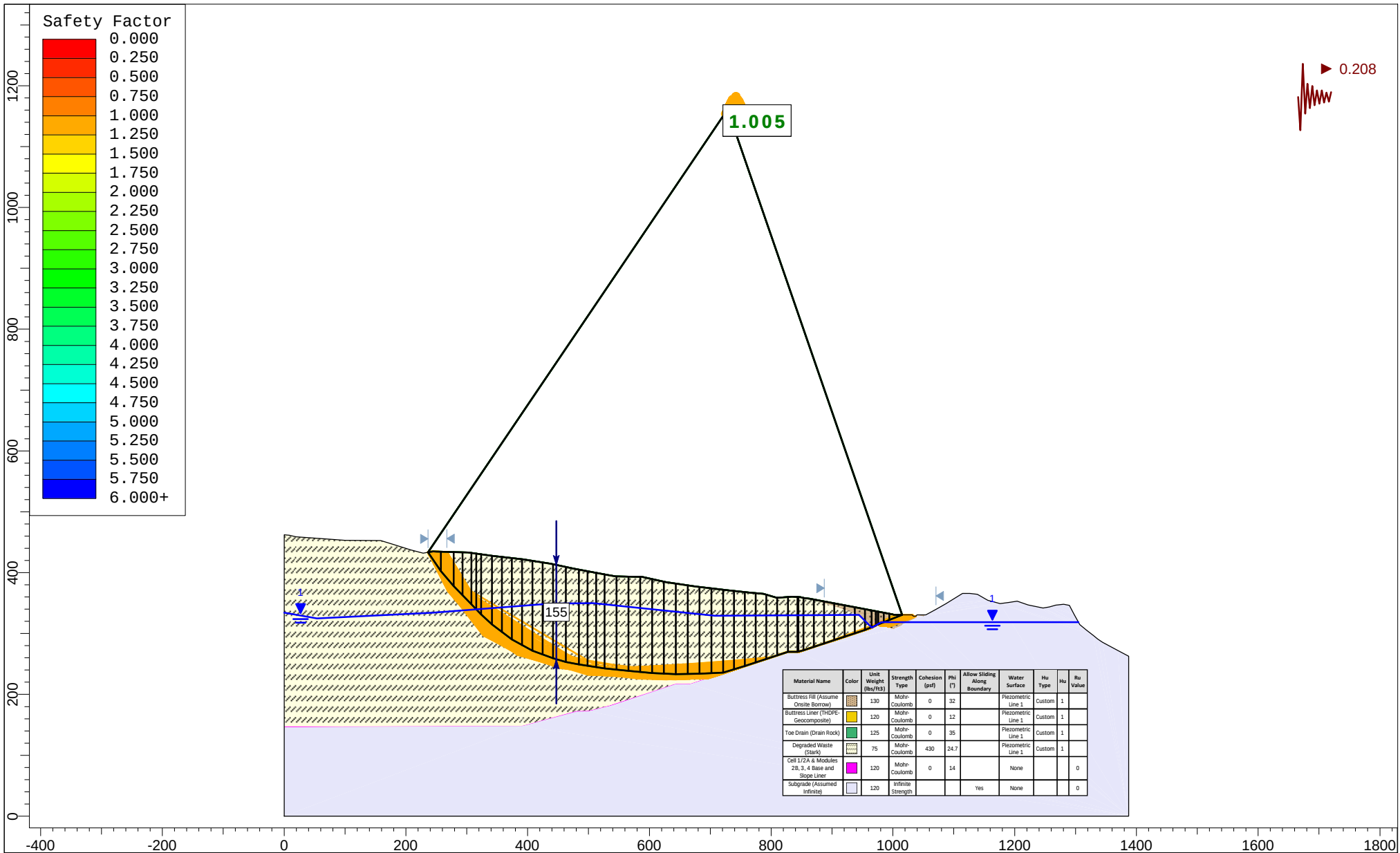


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	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmf

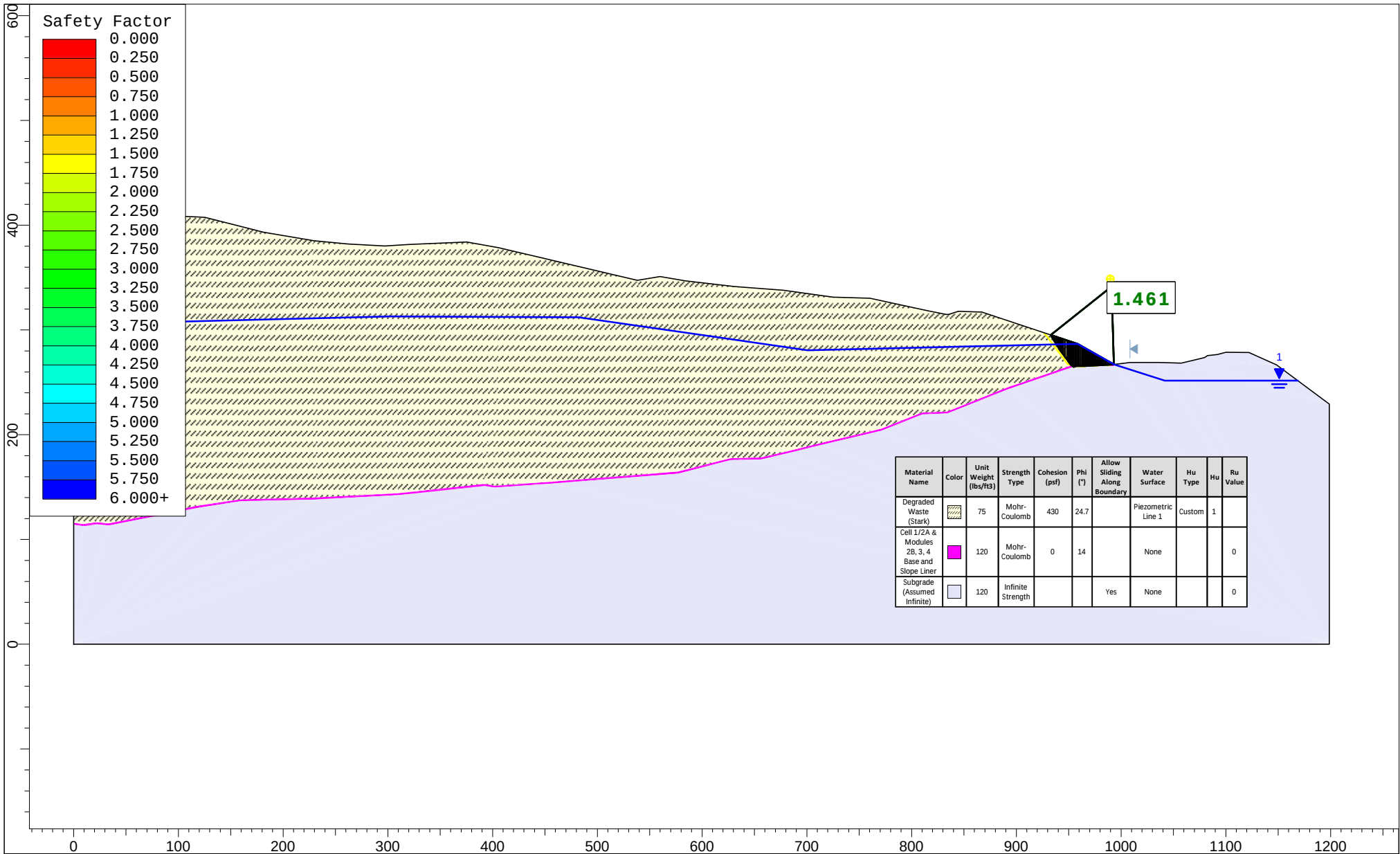


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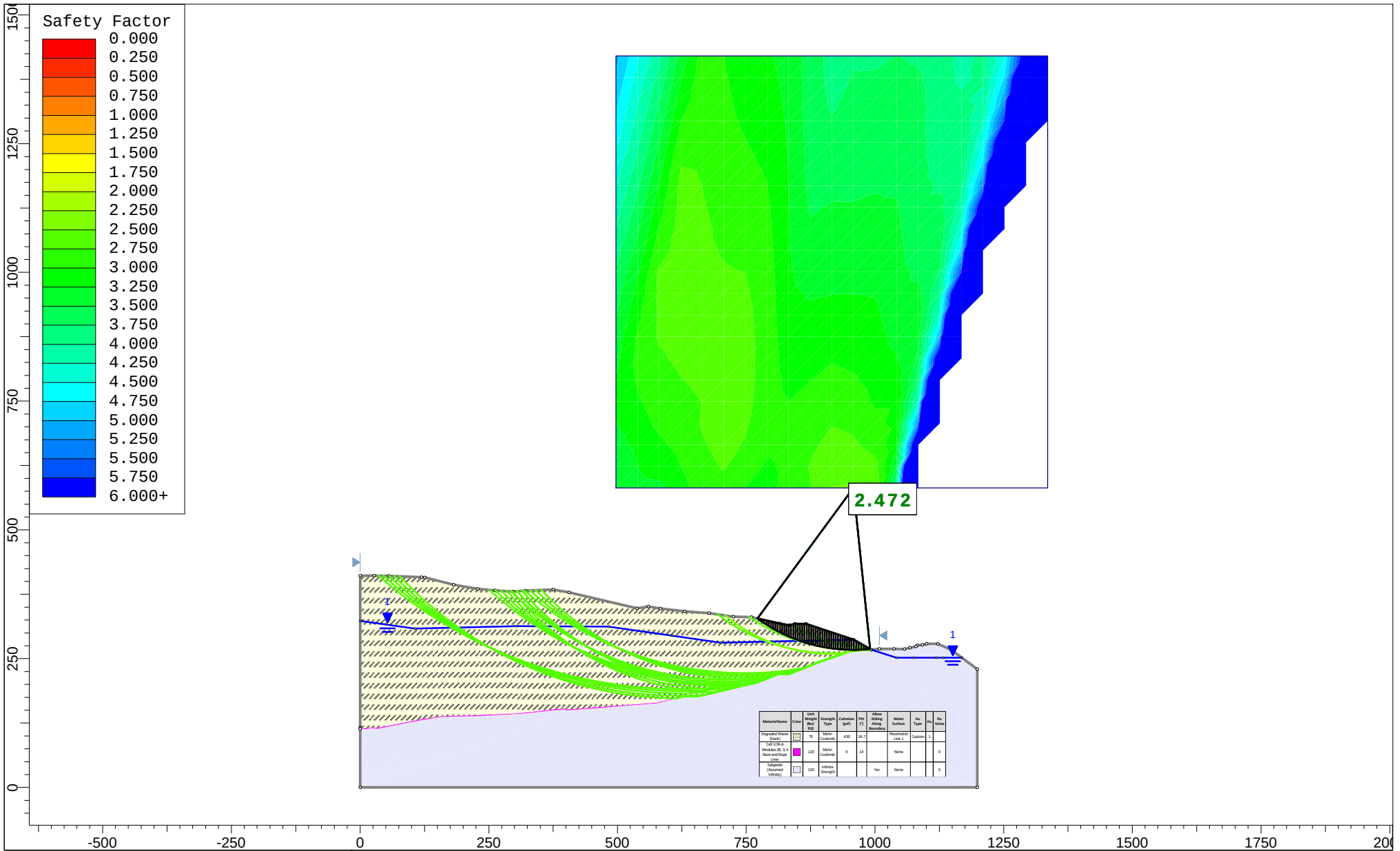
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COMPREHENSIVE STABILITY EVALUATION			
Group	Section 16+00		Scenario Static Safety Factor (Circular)
Drawn By	R. Mitchell		Company GLA
Date	9/1/2026		File Name West Slope Cross Sections +5.slmld



	Project		COMPREHENSIVE STABILITY EVALUATION	
	Group	Section 16+00	Scenario	Yield Acceleration
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmf

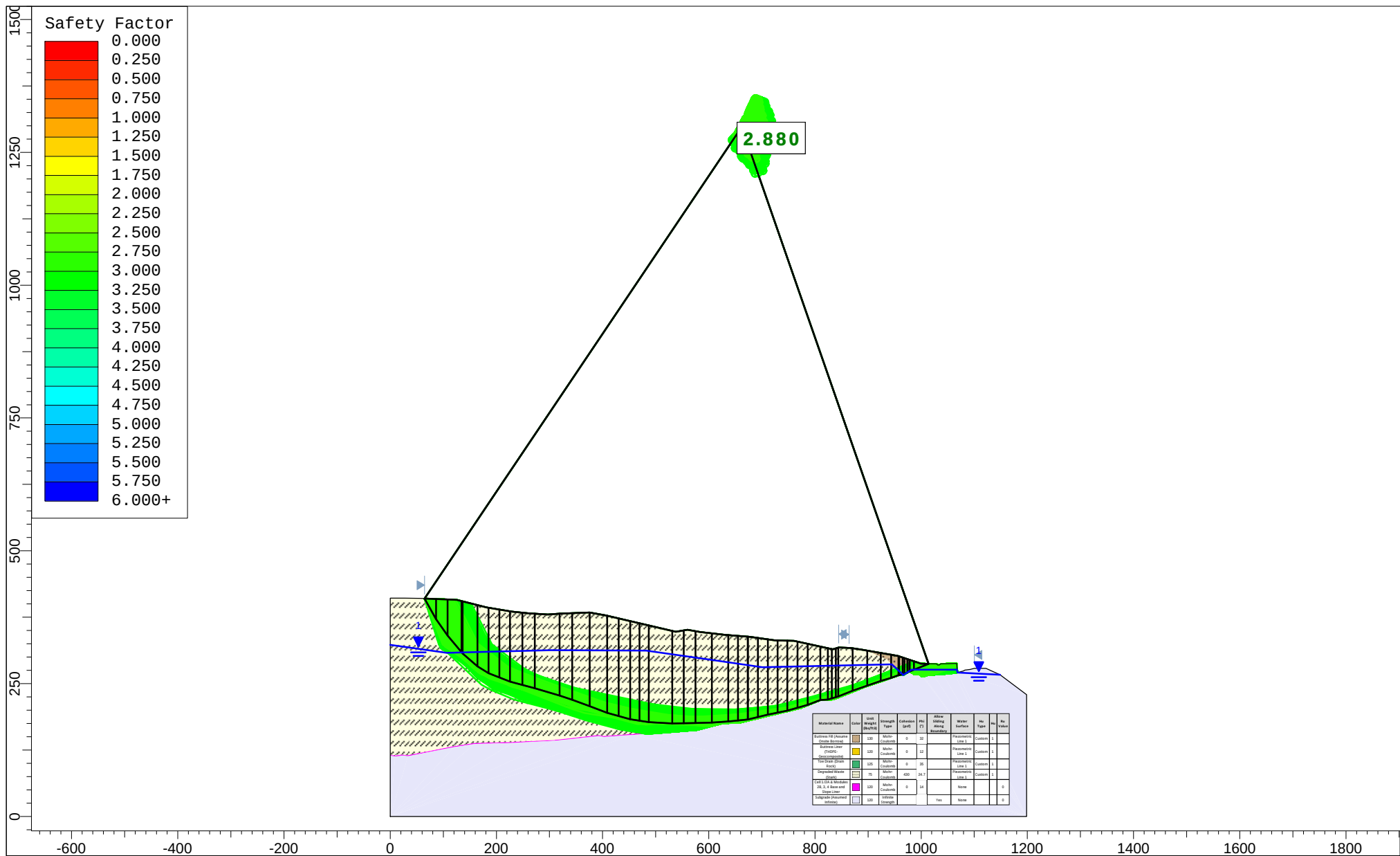


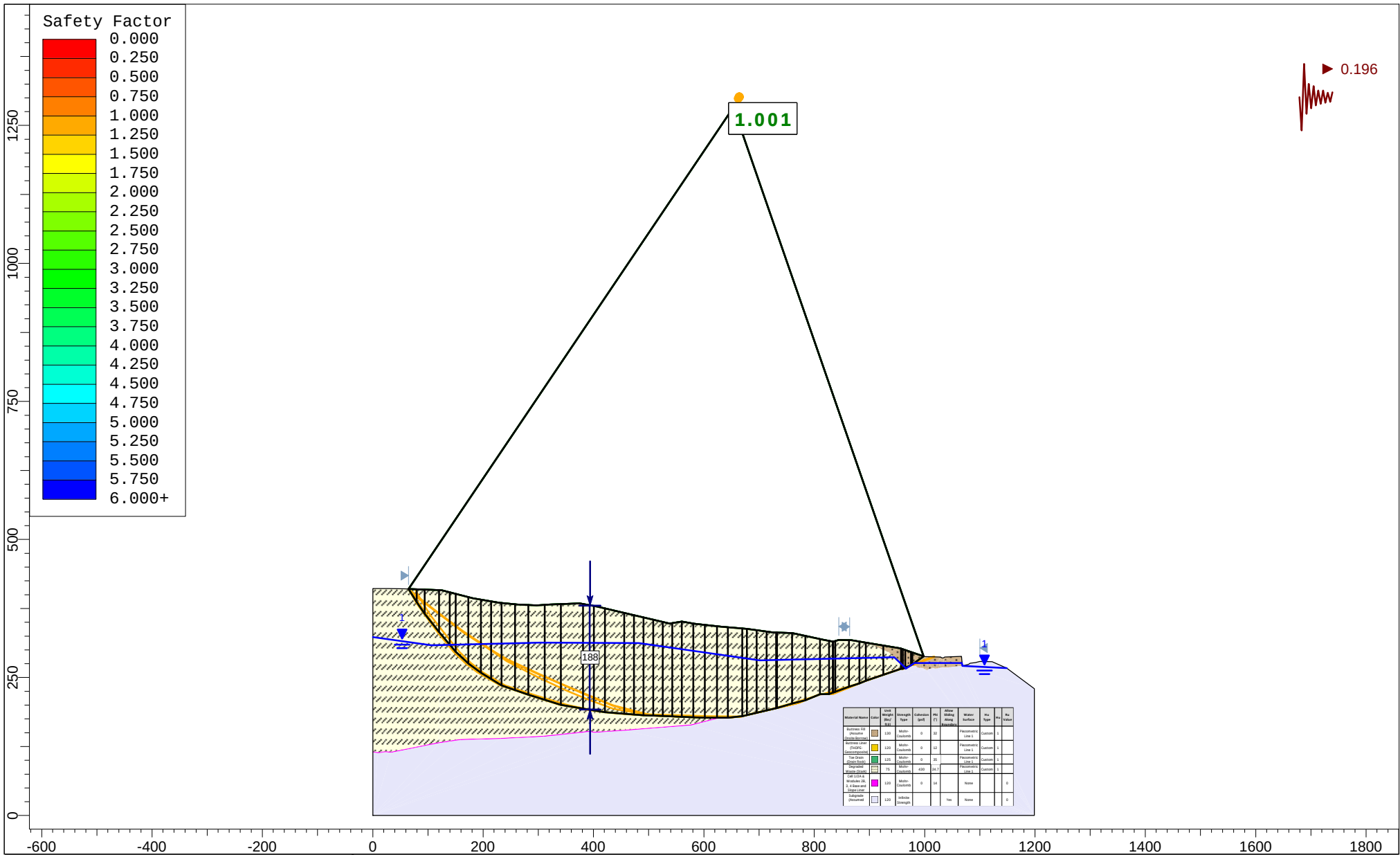
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	Group	Section 19+00 (Pre-Buttress)	Scenario	Static Safety Factor (Non-Circular)
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slm
	SLIDEINTERPRET 9.044			



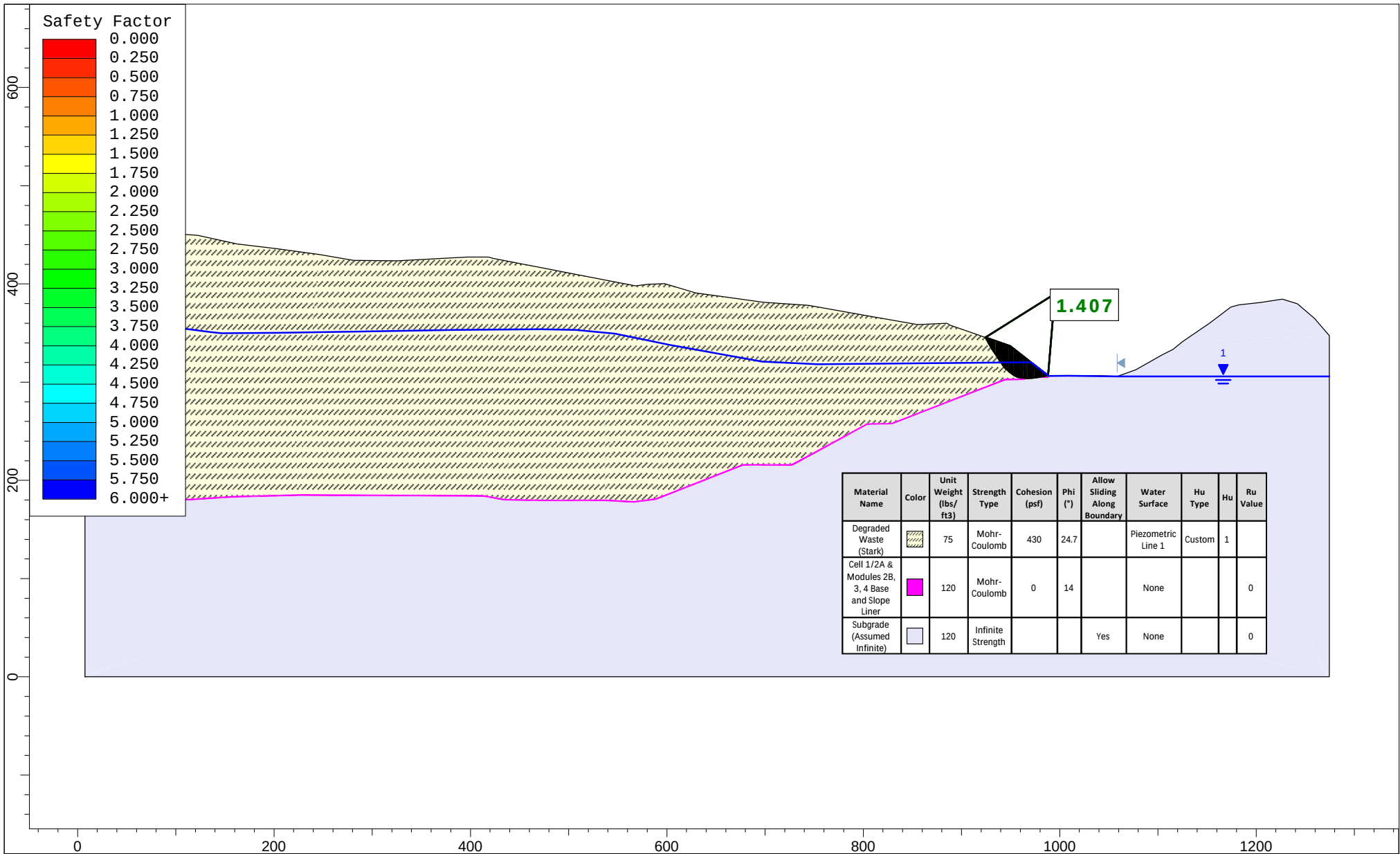
SLIDEINTERPRET 9.044

Project			
COMPREHENSIVE STABILITY EVALUATION			
Group	Section 19+00 (Pre-Buttress)		Scenario
			Static Safety Factor (Circular)
Drawn By	R. Mitchell		Company
			GLA
Date	9/1/2026		File Name
			West Slope Cross Sections +5.slm

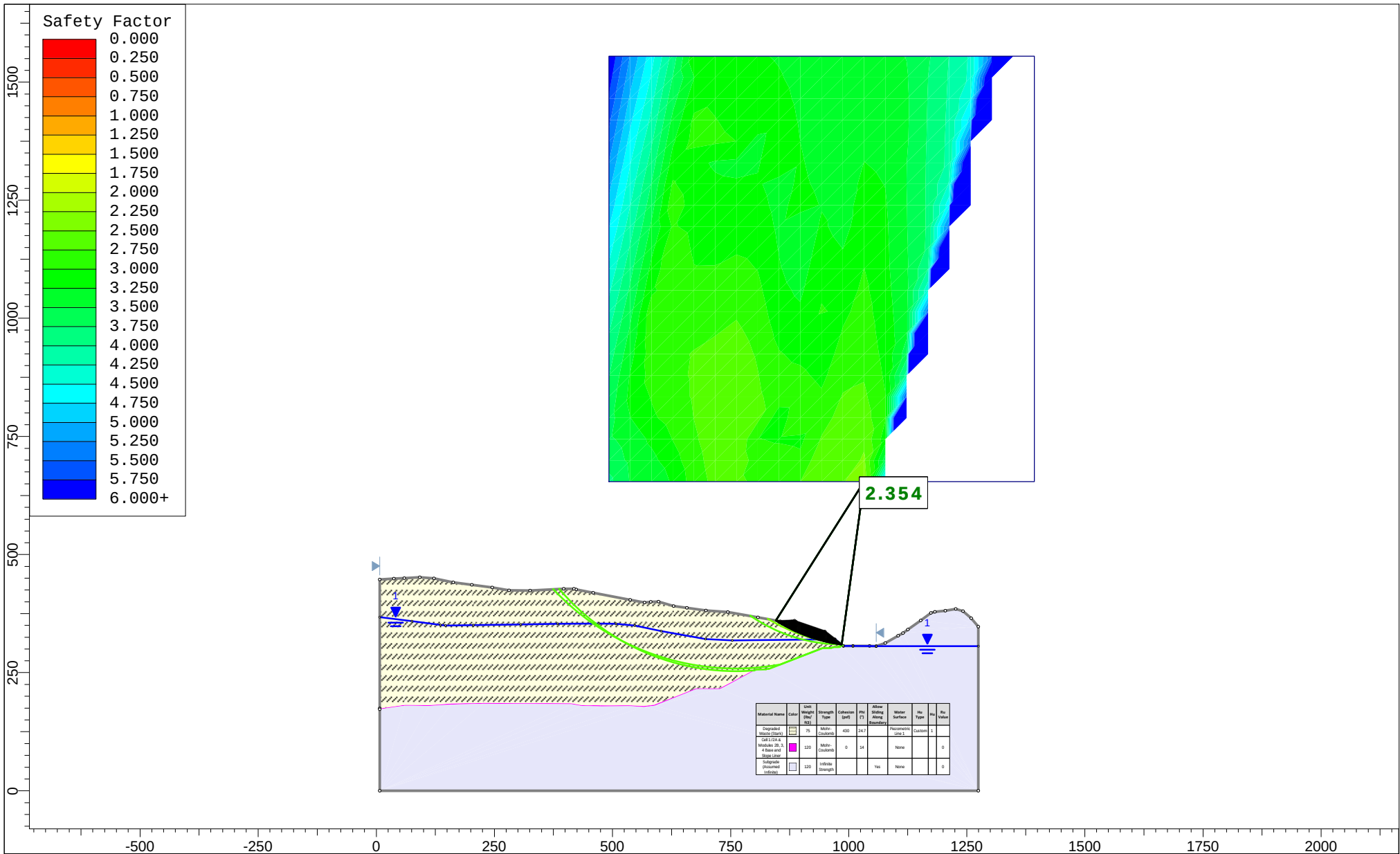




	Project		COMPREHENSIVE STABILITY EVALUATION	
	Group	Section 19+00	Scenario	Yield Acceleration
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmld



	Project		COMPREHENSIVE STABILITY EVALUATION	
	Group	Section 21+00 (Pre-Buttress)	Scenario	Static Safety Factor (Non-Circular)
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slm
	SLIDEINTERPRET 9.044			



Project

COMPREHENSIVE STABILITY EVALUATION

Group

Section 21+00 (Pre-Buttress)

Scenario

Static Safety Factor (Circular)

Drawn By

R. Mitchell

Company

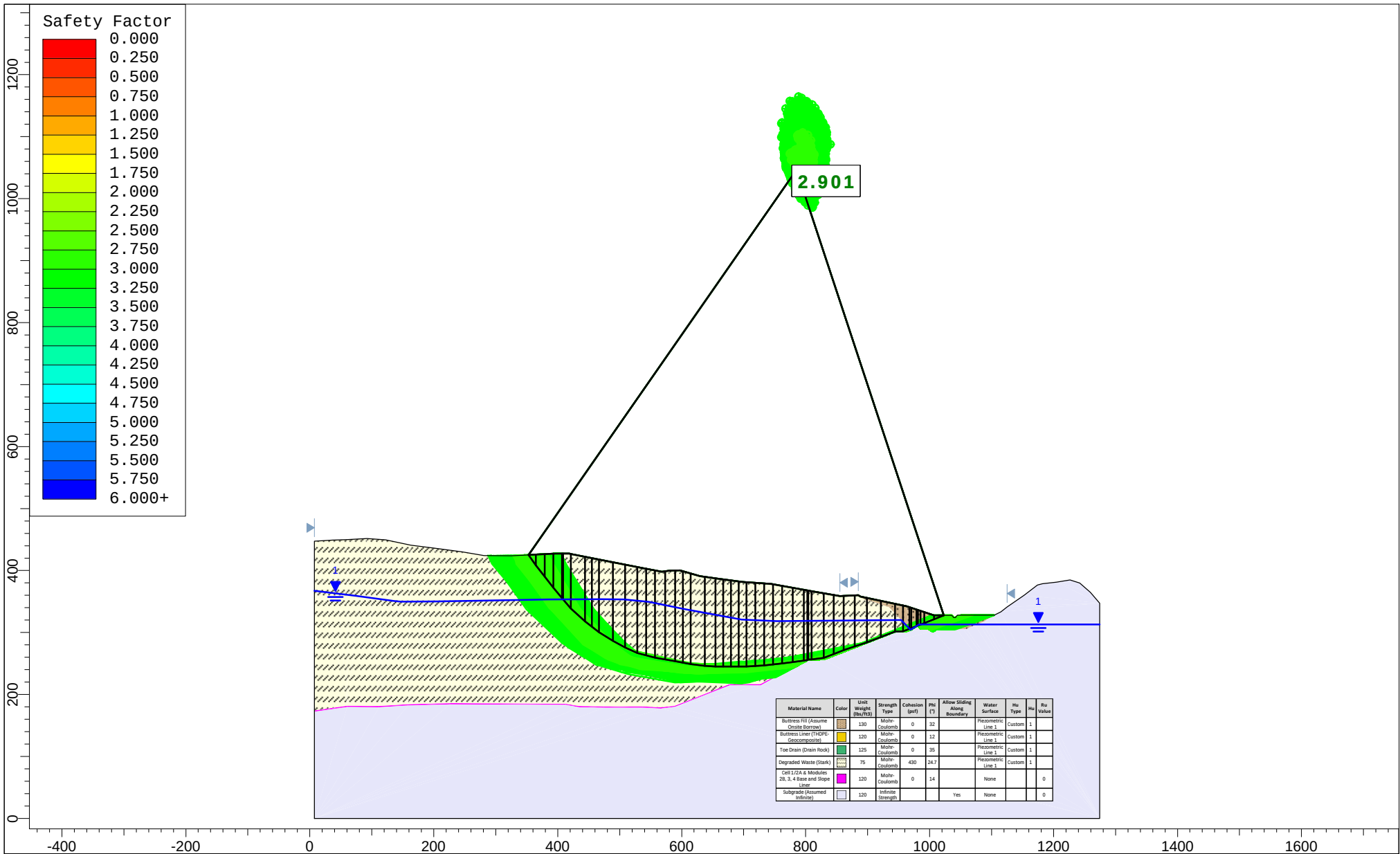
GLA

Date

9/1/2026

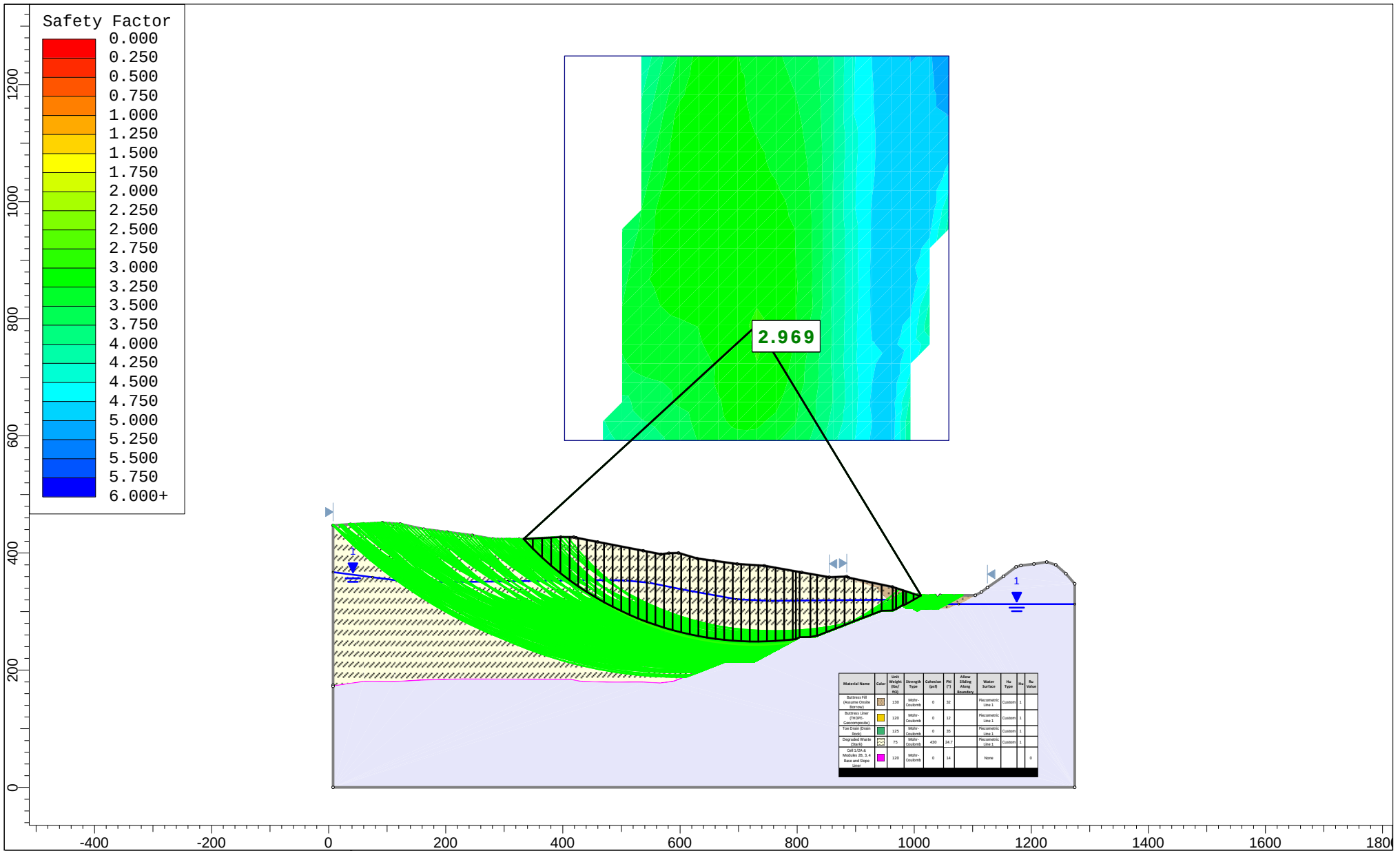
File Name

West Slope Cross Sections +5.slmld



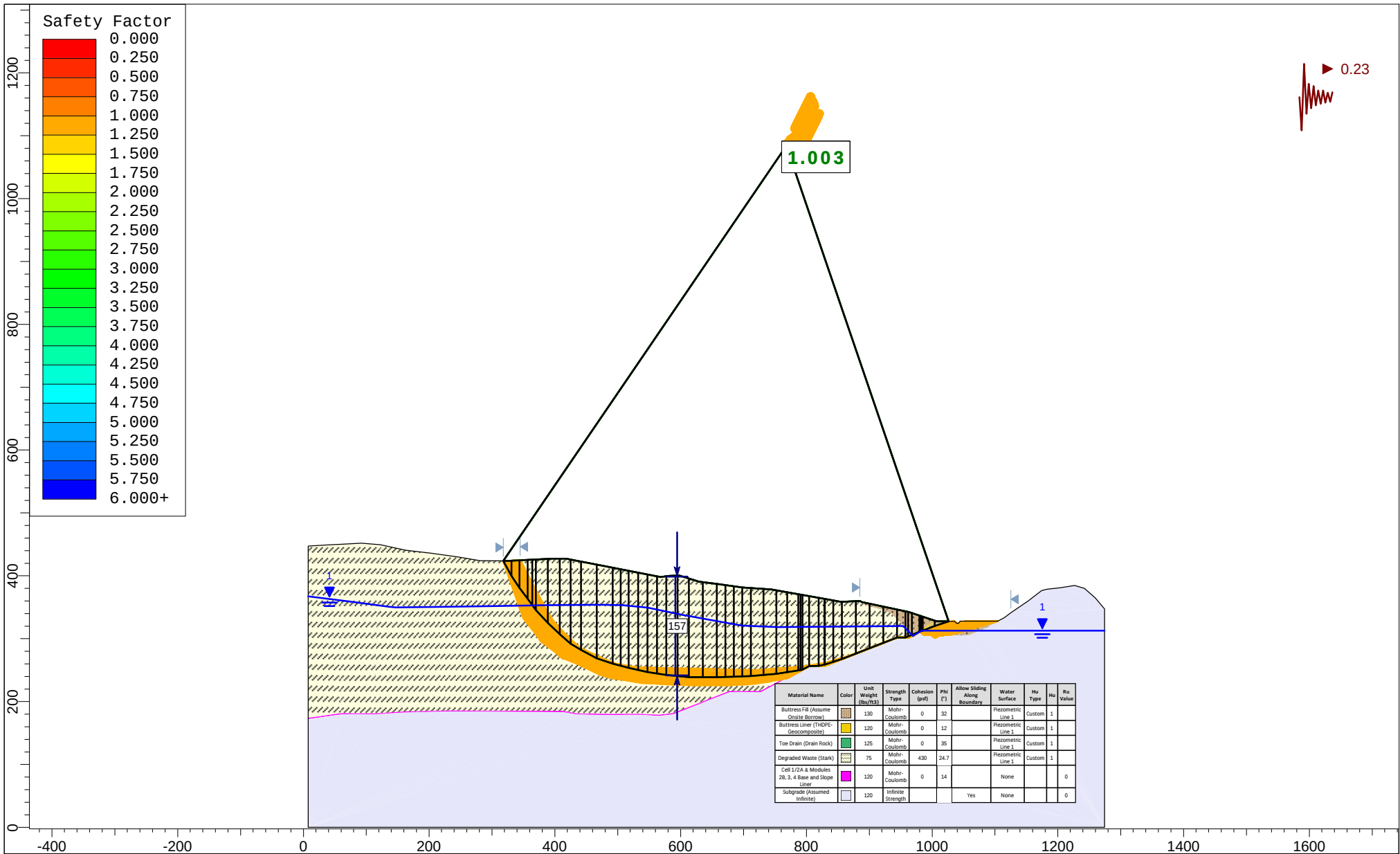
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	COMPREHENSIVE STABILITY EVALUATION			
	Group		Section 21+00	Scenario
	Drawn By		R. Mitchell	Company
	Date		9/1/2026	File Name
		Static Safety Factor (Non-Circular)		
		GLA		
		West Slope Cross Sections +5.slmf		

SLIDEINTERPRET 9.044

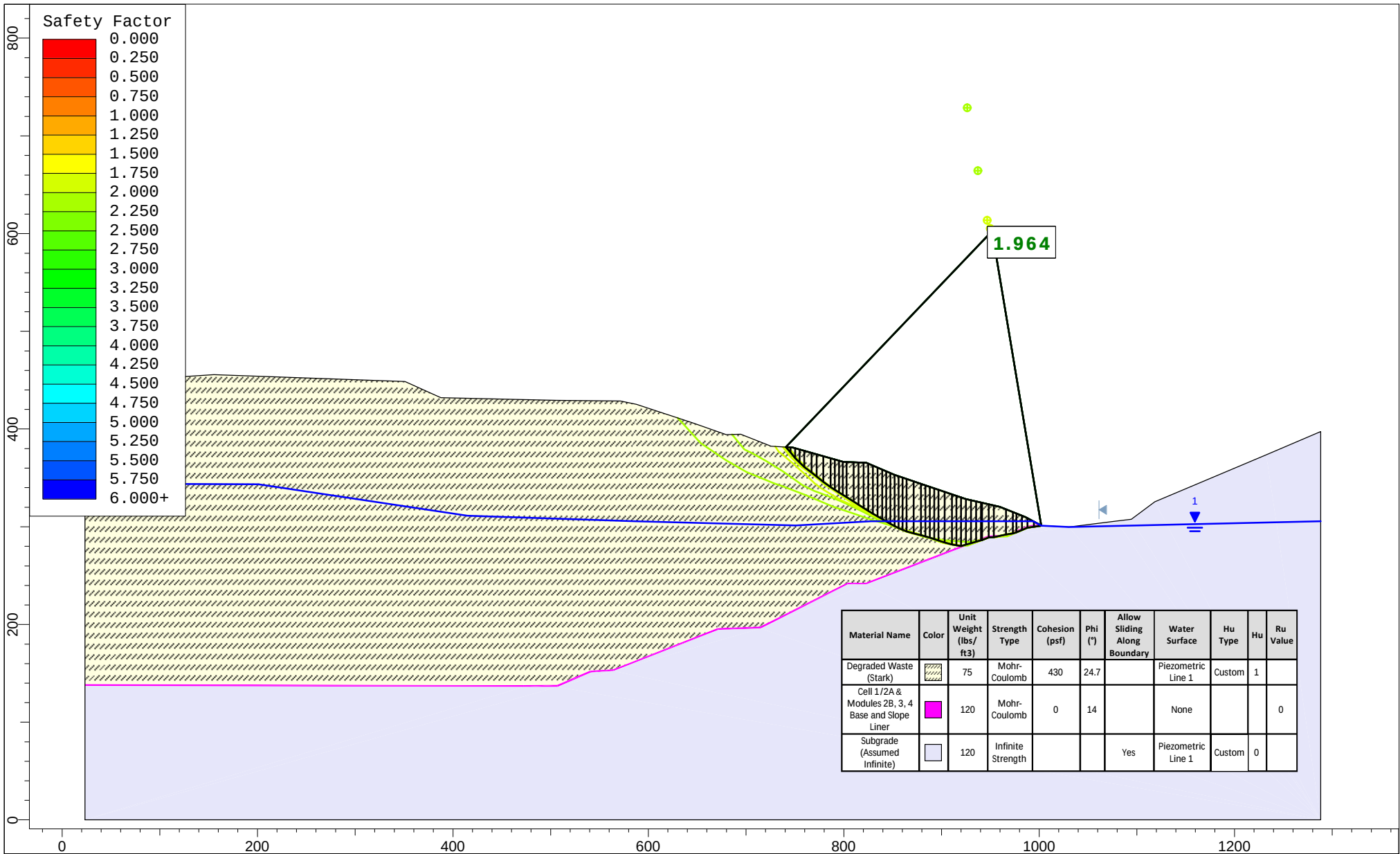


	Project				
	COMPREHENSIVE STABILITY EVALUATION				
	Group		Section 21+00	Scenario	Static Safety Factor (Circular)
	Drawn By		R. Mitchell	Company	GLA
	Date		9/1/2026	File Name	West Slope Cross Sections +5.slmld

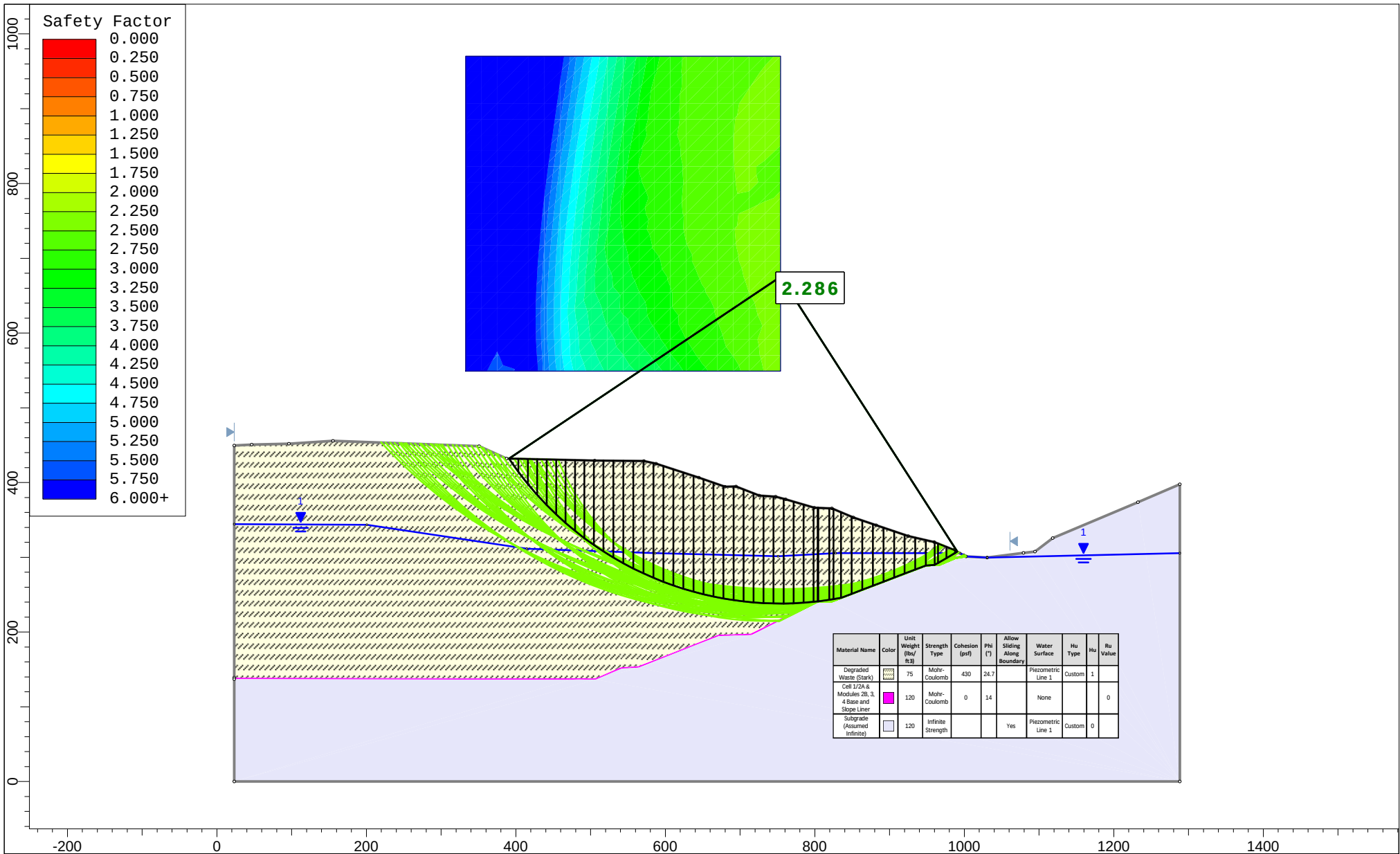
SLIDEINTERPRET 9.044



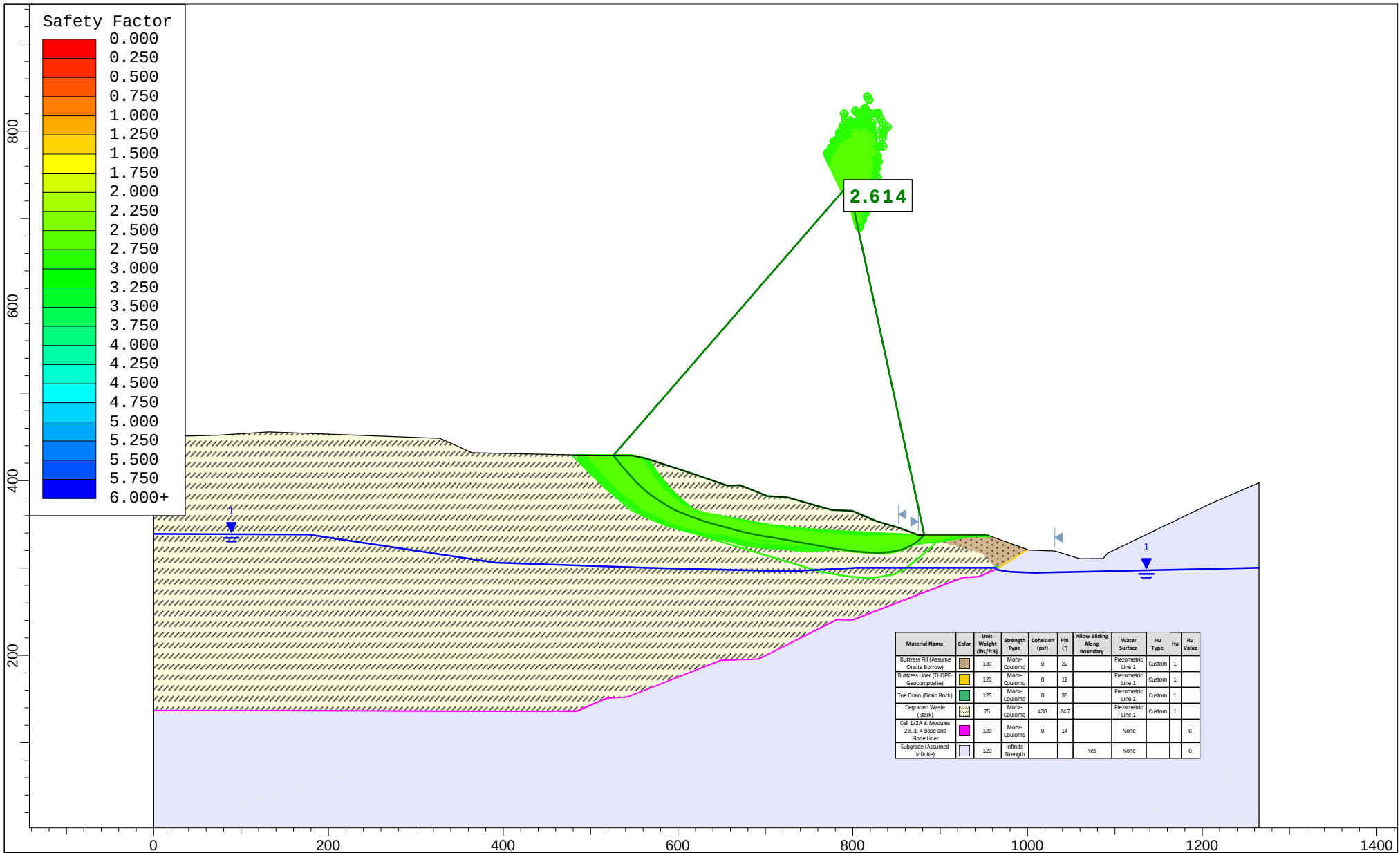
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	Group	Section 21+00	Scenario	Yield Acceleration
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmf



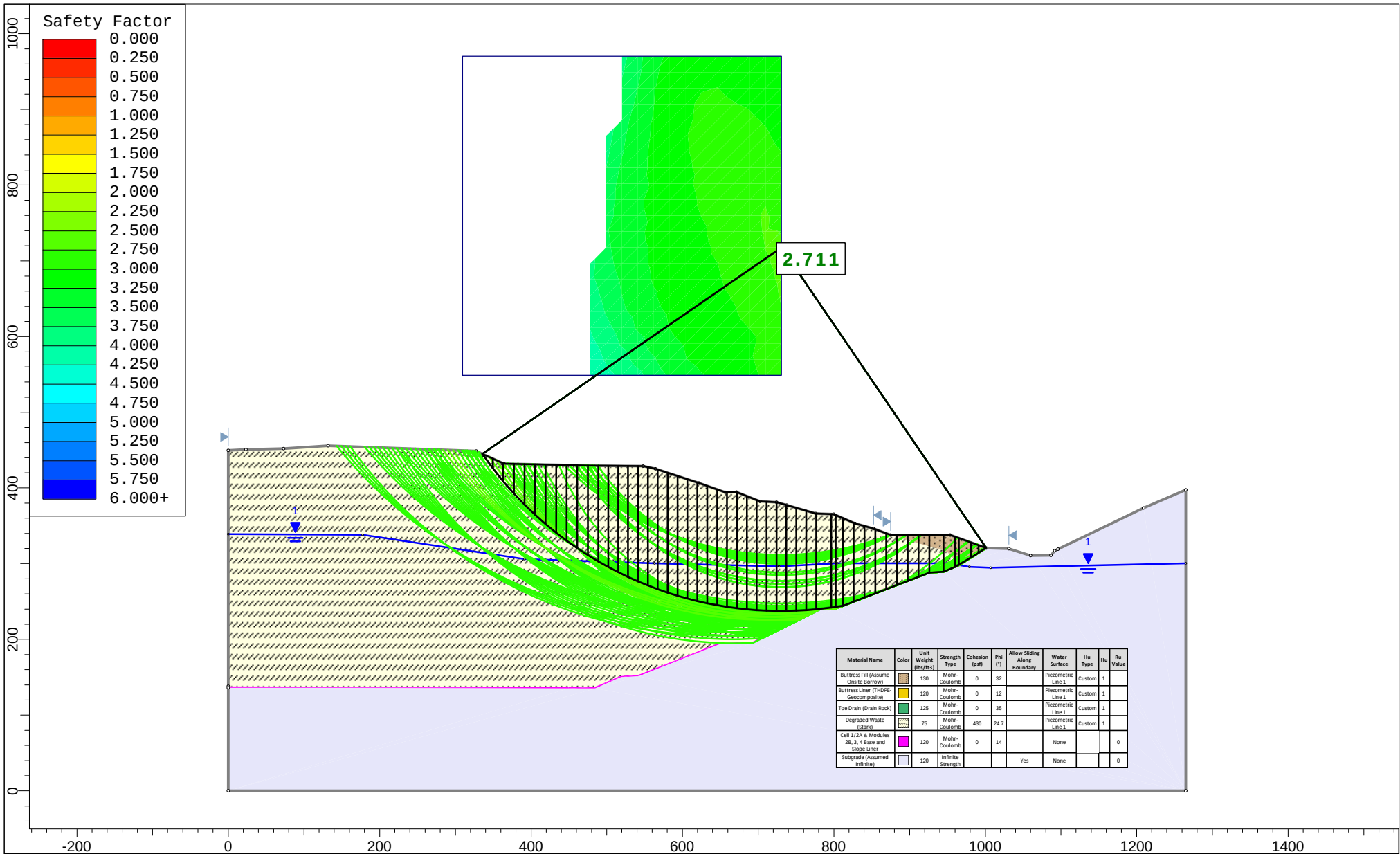
Project			COMPREHENSIVE STABILITY EVALUATION		
Group		Section 24+00 (Pre-Buttress)	Scenario		
Drawn By		R. Mitchell	Company		
Date		9/1/2026	File Name		
			Static Safety Factor (Non-Circular)		
			GLA		
			West Slope Cross Sections +5.slm		



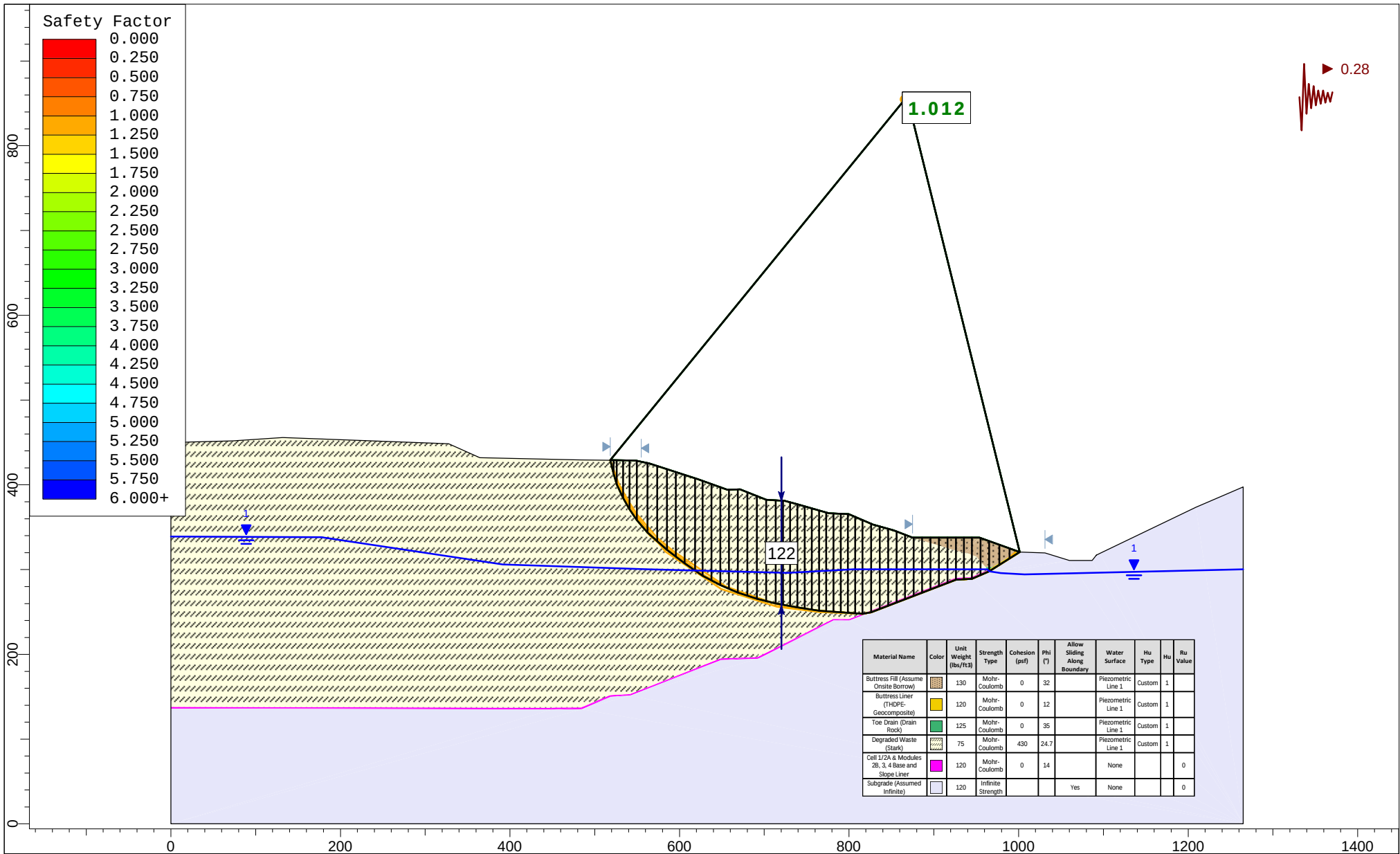
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	Group	Section 24+00 (Pre-Buttress)	Scenario	Static Safety Factor (Circular)
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slmld



Project				COMPREHENSIVE STABILITY EVALUATION			
Group		Section 24+00		Scenario		Static Safety Factor (Non-Circular)	
Drawn By		R. Mitchell		Company		GLA	
Date		9/1/2026		File Name		West Slope Cross Sections +5.slmld	

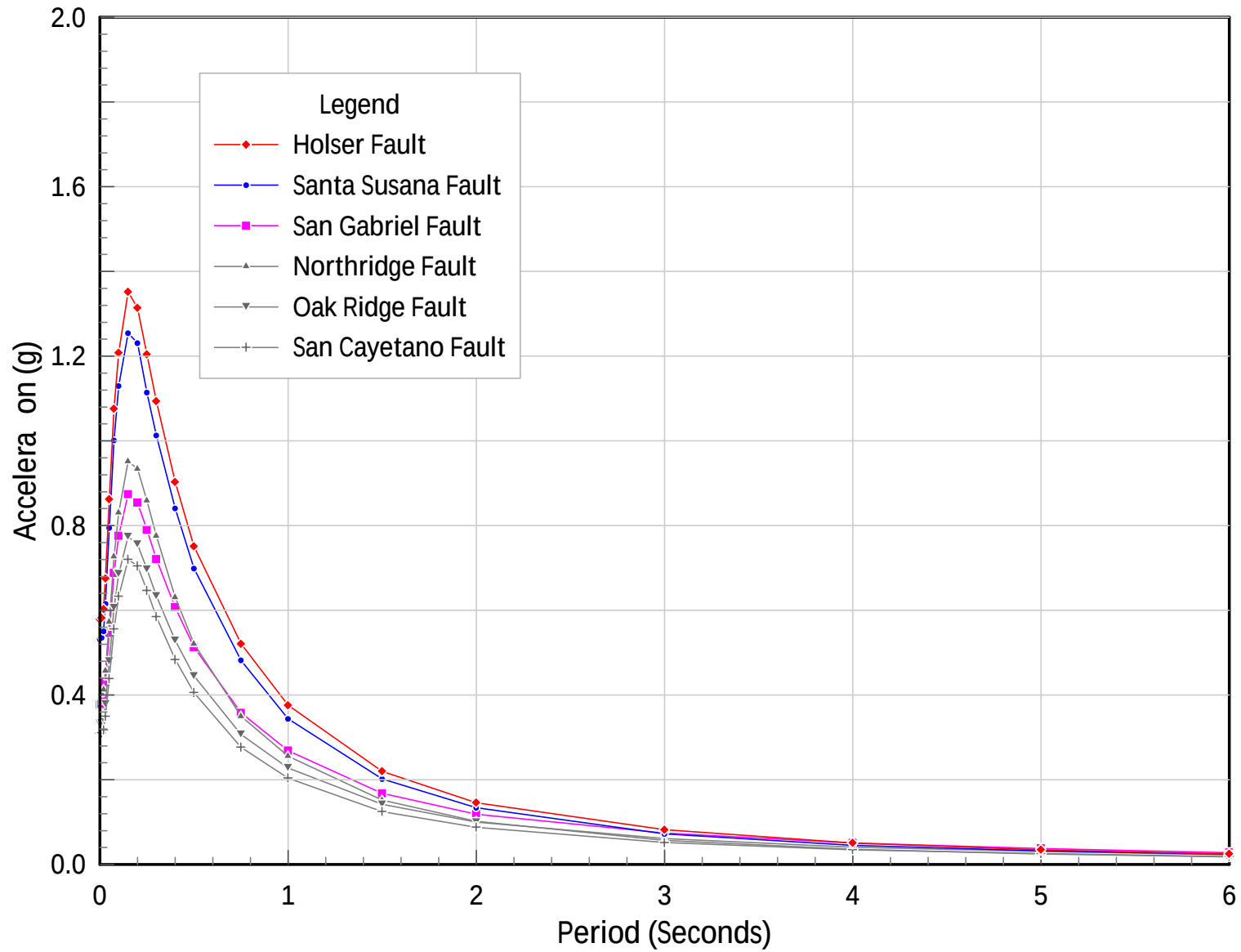


 SLIDEINTERPRET 9.044	<i>Project</i> COMPREHENSIVE STABILITY EVALUATION					
	<i>Group</i> Section 24+00			<i>Scenario</i> Static Safety Factor (Circular)		
	<i>Drawn By</i> R. Mitchell			<i>Company</i> GLA		
	<i>Date</i> 9/1/2026			<i>File Name</i> West Slope Cross Sections +5.slmld		



	Project		COMPREHENSIVE STABILITY EVALUATION	
	Group	Section 24+00	Scenario	Yield Acceleration
	Drawn By	R. Mitchell	Company	GLA
	Date	9/1/2026	File Name	West Slope Cross Sections +5.slm
	SLIDEINTERPRET 9.044			

Fault Spectral Accelerations (See Table 6)



Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.15	
Initial Fundamental Period (T_s) ^(b)	0.48	seconds
Degraded Period ($1.3T_s$)	0.62	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.60	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters

Non-Zero Seismic Displacement Est (D)	10.1 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results

Probability of Negligible Displ. ($P(D=0)$)	0.00	
D1	4.8	cm
D2	10.1	cm
D3	20.9	cm
$P(D > d_{threshold})$	0.07	

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h_1)(V_{s1}) + (h_2)(V_{s2})]/(h_1 + h_2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)

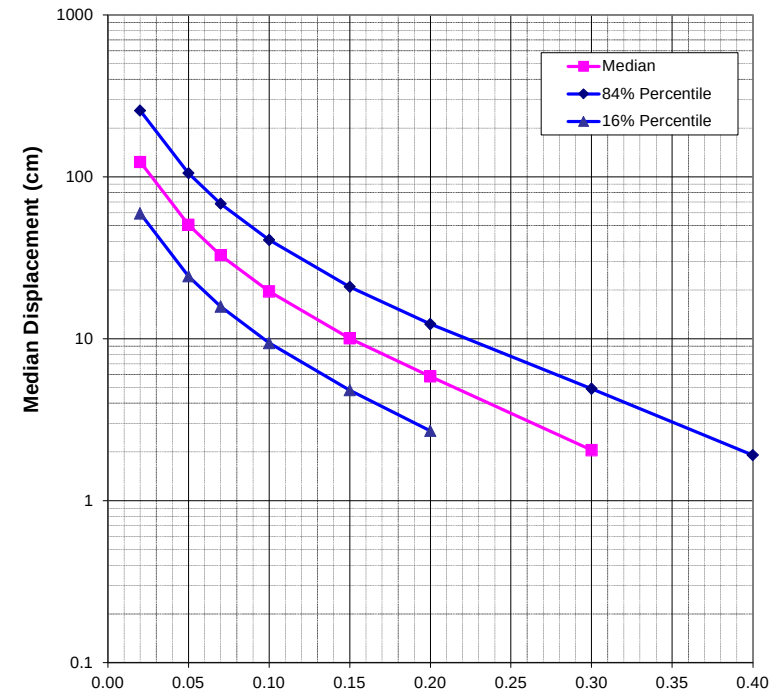
calc. using eq. (11)

calc. using eq. (11)

calc. using eq. (11)

eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	123.4	123.4	256.7	59.4
0.05	0.000	50.6	50.6	105.1	24.3
0.07	0.000	32.8	32.8	68.3	15.8
0.1	0.000	19.6	19.6	40.7	9.4
0.15	0.002	10.1	10.1	20.9	4.8
0.2	0.024	6.0	5.9	12.3	2.7
0.3	0.222	2.7	2.1	4.9	<0.5
0.4	0.546	1.4	<0.5	1.91	<0.5



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SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters			
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Select Ordinary or Pulse or Combined Equations	
Yield Coefficient (k_y) ^(a)	0.21	(a) Based on pseudostatic analysis (b) 1D: $T_s=4H/V_s$ 2D: $T_s=2.6H/V_s$ (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it. (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it. (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction	
Initial Fundamental Period (T_s) ^(b)	0.61		seconds
Degraded Period ($1.3T_s$)	0.79		seconds
Moment Magnitude (M_w)	6.8		
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.48		g
PGV Information	Both Ordinary & Pulse Motions		
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s	
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions		
Additional Input Parameters			
Probability of Exceedance #1 (P1)	84 %		
Probability of Exceedance #2 (P2)	50 %		
Probability of Exceedance #3 (P3)	16 %		
Displacement Threshold (d_threshold)	30 cm		
Intermediate Calculated Parameters			
Non-Zero Seismic Displacement Est (D)	4.4 cm		
Standard Deviation of Non-Zero Seismic D	0.736		
Results			
Probability of Negligible Displ. (P(D=0))	0.06		
D1	1.8	cm	
D2	4.1	cm	
D3	8.8	cm	
P(D>d_threshold)	0.00		

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)

calc. using eq. (11)

calc. using eq. (11)

calc. using eq. (11)

eq. (11)

k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	117.8	117.8	244.9	56.7
0.05	0.000	45.0	45.0	93.5	21.6
0.07	0.000	28.5	28.5	59.2	13.7
0.1	0.000	16.5	16.5	34.3	7.9
0.15	0.005	8.2	8.2	17.1	3.9
0.2	0.042	4.8	4.6	9.8	2.0
0.3	0.315	2.1	1.3	3.6	<0.5
0.4	0.666	1.1	<0.5	1.14	<0.5

The graph plots Displacement (cm) on a logarithmic y-axis (from 10 to 1000) against the yield coefficient k_y on the x-axis (from 0.020 to 0.4). Three curves are shown: Median (pink squares), 84% Percentile (blue diamonds), and 16% Percentile (blue triangles). All curves show a decreasing trend as k_y increases. The 84% Percentile curve is the highest, followed by the Median, and then the 16% Percentile curve.

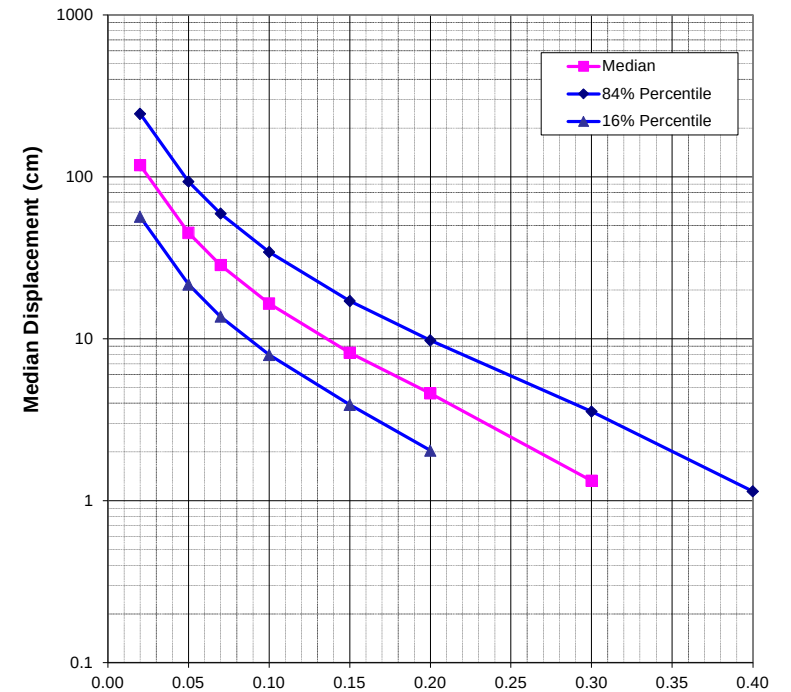
k_y	Median (cm)	84% Percentile (cm)	16% Percentile (cm)
0.020	117.8	117.8	56.7
0.05	45.0	45.0	21.6
0.07	28.5	28.5	13.7
0.1	16.5	16.5	7.9
0.15	8.2	8.2	3.9
0.2	4.8	4.6	2.0
0.3	2.1	1.3	<0.5
0.4	1.1	<0.5	<0.5

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
 calc. using eq. (11)
 calc. using eq. (11)
 calc. using eq. (11)
 eq. (11)



SECTION 19+00

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobalistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.20	
Initial Fundamental Period (T_s) ^(b)	0.70	seconds
Degraded Period ($1.3T_s$)	0.91	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.42	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters	
Non-Zero Seismic Displacement Est (D)	4.2 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results		
Probability of Negligible Displ. ($P(D=0)$)	0.05	
D1	1.7	cm
D2	4.0	cm
D3	8.5	cm
$P(D > d_{threshold})$	0.00	

Notes

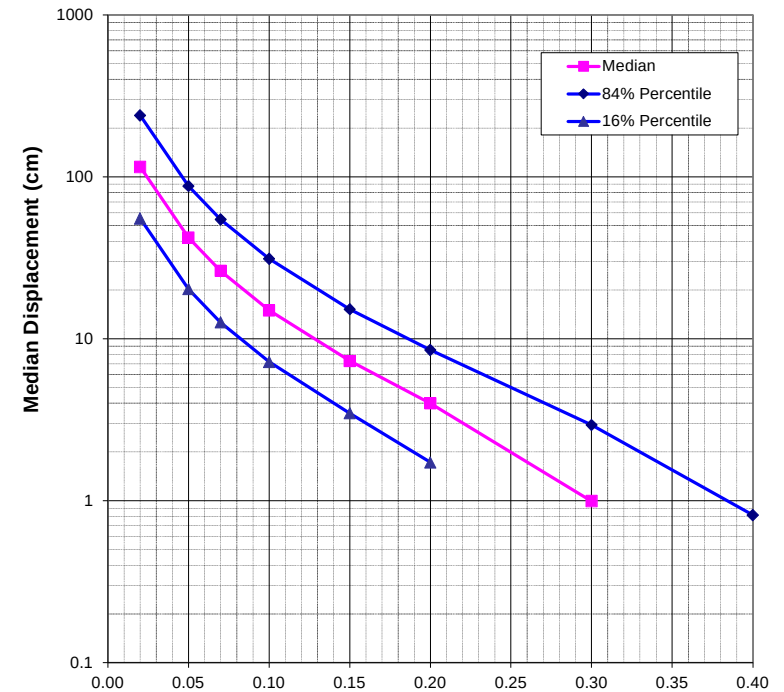
- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	115.0	115.0	239.2	55.3
0.05	0.000	42.1	42.1	87.5	20.2
0.07	0.000	26.2	26.2	54.6	12.6
0.1	0.000	15.0	15.0	31.1	7.2
0.15	0.006	7.3	7.3	15.2	3.5
0.2	0.053	4.2	4.0	8.5	1.7
0.3	0.367	1.8	1.0	2.9	<0.5
0.4	0.721	0.9	<0.5	0.82	<0.5



SECTION 21+00

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Select Ordinary or Pulse or Combined Equations
Yield Coefficient (k_y) ^(a)	0.23	(a) Based on pseudostatic analysis
Initial Fundamental Period (T_s) ^(b)	0.61	(b) 1D: $T_s=4H/V_s$ 2D: $T_s=2.6H/V_s$
Degraded Period ($1.3T_s$)	0.79	(c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
Moment Magnitude (M_w)	6.8	(d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
Spectral Acceleration ($S_d(1.3T_s)$) ^(c)	0.48	
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	(e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)	84 %	
Probability of Exceedance #2 (P2)	50 %	
Probability of Exceedance #3 (P3)	16 %	
Displacement Threshold (d_threshold)	30 cm	
Intermediate Calculated Parameters		
Non-Zero Seismic Displacement Est (D)	3.6 cm	
Standard Deviation of Non-Zero Seismic D	0.736	
Results		
Probability of Negligible Displ. (P(D=0))	0.10	
D1	1.2	cm
D2	3.3	cm
D3	7.2	cm
P(D>d_threshold)	0.00	

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)

calc. using eq. (11)

calc. using eq. (11)

calc. using eq. (11)

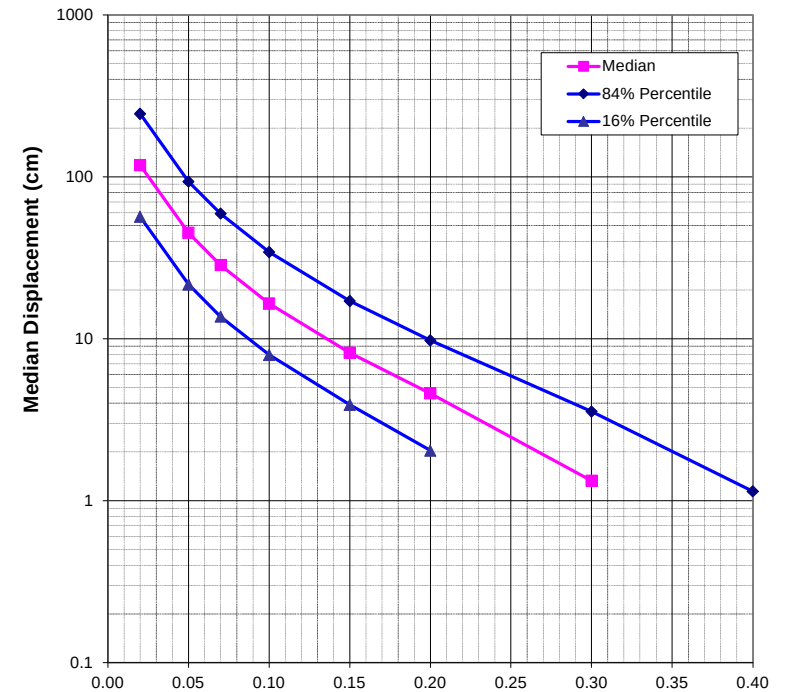
eq. (11)

Dependence on k_y	k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
	0.020	0.000	117.8	117.8	244.9	56.7
	0.05	0.000	45.0	45.0	93.5	21.6
	0.07	0.000	28.5	28.5	59.2	13.7
	0.1	0.000	16.5	16.5	34.3	7.9
	0.15	0.005	8.2	8.2	17.1	3.9
	0.2	0.042	4.8	4.6	9.8	2.0
	0.3	0.315	2.1	1.3	3.6	<0.5
	0.4	0.666	1.1	<0.5	1.14	<0.5

k_y	Median (cm)	84% Percentile (cm)	16% Percentile (cm)
0.02	117.8	244.9	56.7
0.05	45.0	93.5	21.6
0.07	28.5	59.2	13.7
0.1	16.5	34.3	7.9
0.15	8.2	17.1	3.9
0.2	4.8	9.8	2.0
0.3	2.1	3.6	<0.5
0.4	1.1	1.14	<0.5

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$



SECTION 24+00

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.28	
Initial Fundamental Period (T_s) ^(b)	0.51	seconds
Degraded Period ($1.3T_s$) ^(b)	0.66	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.60	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters	
Non-Zero Seismic Displacement Est (D)	3.3 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results		
Probability of Negligible Displ. ($P(D=0)$)	0.15	
D1	0.7	cm
D2	2.8	cm
D3	6.4	cm
$P(D > d_{threshold})$	0.00	

Notes

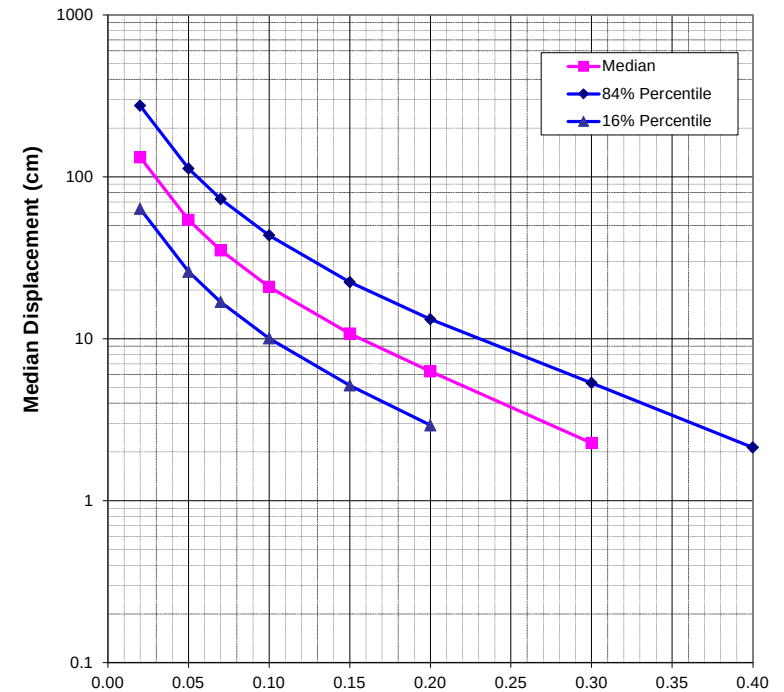
- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h_1)(V_{s1}) + (h_2)(V_{s2})]/(h_1 + h_2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	132.1	132.1	274.6	63.5
0.05	0.000	54.1	54.1	112.4	26.0
0.07	0.000	35.1	35.1	73.1	16.9
0.1	0.000	20.9	20.9	43.5	10.1
0.15	0.002	10.8	10.8	22.4	5.2
0.2	0.020	6.4	6.3	13.2	2.9
0.3	0.200	2.9	2.3	5.3	<0.5
0.4	0.519	1.6	<0.5	2.13	<0.5



SECTION NS-03

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters

Case	Deterministic-Pseudoprobalistic (EQ8&9)	
Yield Coefficient (k_y) ^(a)	0.13	
Initial Fundamental Period (T_s) ^(b)	0.77	seconds
Degraded Period ($1.3T_s$) ^(b)	1.00	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.38	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	

Additional Input Parameters

Probability of Exceedance #1 (P1)	84 %
Probability of Exceedance #2 (P2)	50 %
Probability of Exceedance #3 (P3)	16 %
Displacement Threshold ($d_{threshold}$)	30 cm

Intermediate Calculated Parameters

Non-Zero Seismic Displacement Est (D)	8.7 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results

Probability of Negligible Displ. ($P(D=0)$)	0.00	
D1	4.2	cm
D2	8.7	cm
D3	18.1	cm
$P(D > d_{threshold})$	0.05	

Notes

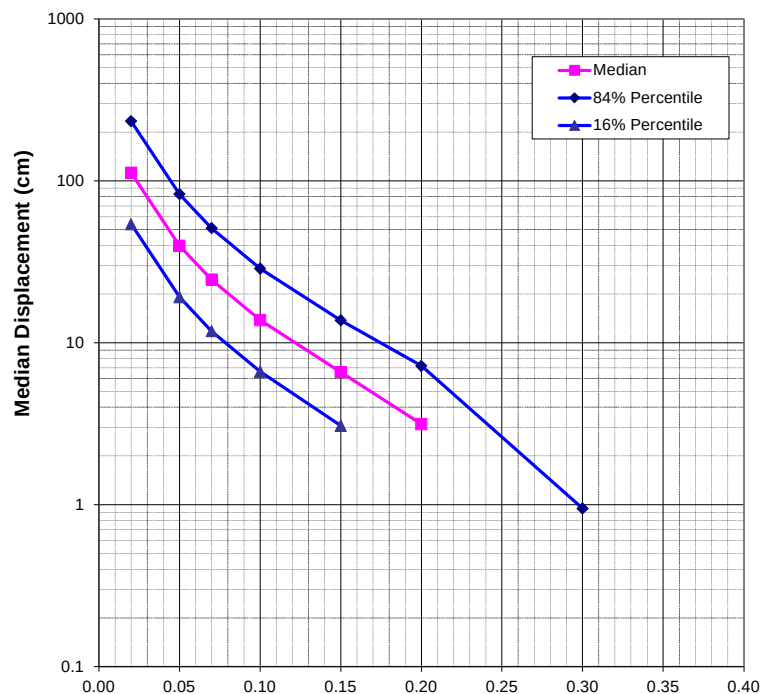
- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s=4H/V_s$ 2D: $T_s=2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	112.2	112.2	233.2	54.0
0.05	0.000	39.8	39.8	82.7	19.1
0.07	0.000	24.5	24.5	51.0	11.8
0.1	0.000	13.8	13.8	28.7	6.6
0.15	0.015	6.7	6.6	13.8	3.1
0.2	0.168	3.8	3.1	7.2	<0.5
0.3	0.789	1.6	<0.5	0.9	<0.5
0.4	0.983	0.8	<0.5	<0.5	<0.5



SECTION SS-01

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.09	
Initial Fundamental Period (T_s) ^(b)	0.76	seconds
Degraded Period ($1.3T_s$)	0.99	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.38	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters	
Non-Zero Seismic Displacement Est (D)	16.2 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results		
Probability of Negligible Displ. ($P(D=0)$)	0.00	
D1	7.8	cm
D2	16.2	cm
D3	33.6	cm
$P(D > d_{threshold})$	0.20	

Notes

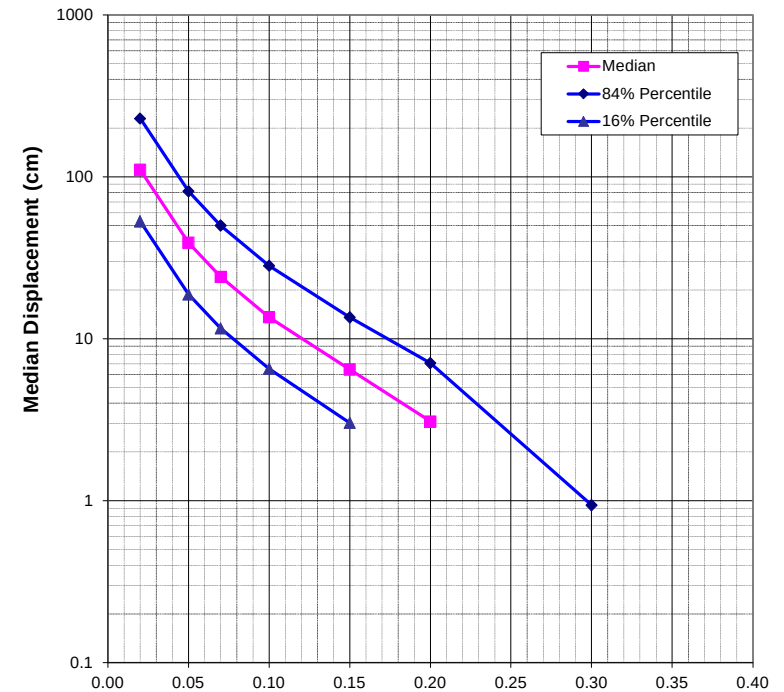
- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	$P(D="0")$	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	110.2	110.2	229.2	53.0
0.05	0.000	39.1	39.1	81.3	18.8
0.07	0.000	24.1	24.1	50.1	11.6
0.1	0.000	13.6	13.6	28.2	6.5
0.15	0.015	6.6	6.5	13.5	3.0
0.2	0.167	3.7	3.1	7.1	<0.5
0.3	0.789	1.6	<0.5	0.9	<0.5
0.4	0.983	0.8	<0.5	<0.5	<0.5



SECTION SS-02

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobalistic (EQ8&9)	* Select Ordinary or Pulse or Combined Equations
Yield Coefficient (k _y) ^(a)	0.13	(a) Based on pseudostatic analysis
Initial Fundamental Period (T _s) ^(b)	0.64	(b) 1D: T _s =4H/V _s 2D: T _s =2.6H/V _s
Degraded Period (1.3T _s)	0.83	(c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
Moment Magnitude (M _w)	6.8	
Spectral Acceleration (S _a (1.3T _s)) ^(c)	0.42	(d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	(e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold (d_threshold)		30 cm
Intermediate Calculated Parameters		
Non-Zero Seismic Displacement Est (D)		8.5 cm
Standard Deviation of Non-Zero Seismic D		0.736
Results		
Probability of Negligible Displ. (P(D=0))	0.00	
D1	4.0	cm
D2	8.5	cm
D3	17.6	cm
P(D>d_threshold)	0.04	

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)

calc. using eq. (11)

calc. using eq. (11)

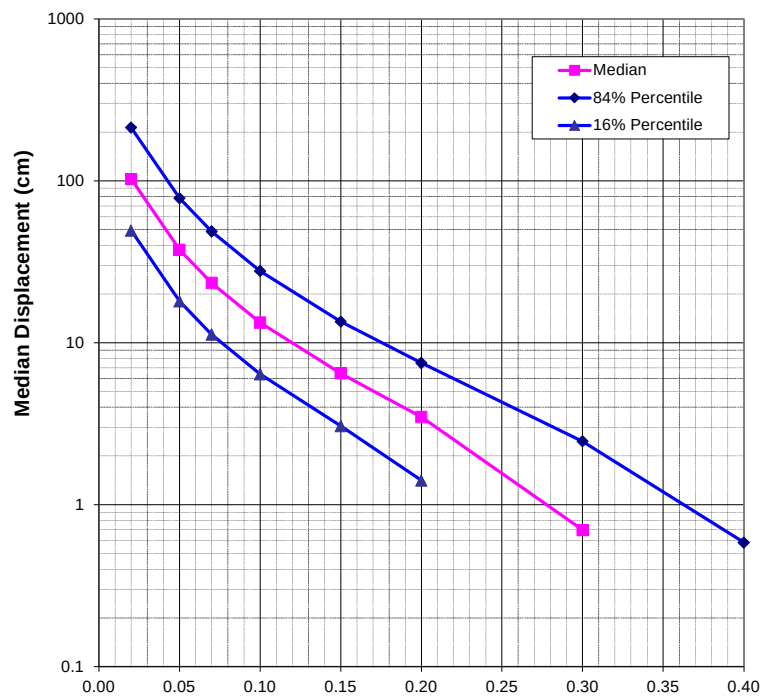
calc. using eq. (11)

eq. (11)

k _y	Median (cm)	84% Percentile (cm)	16% Percentile (cm)
0.020	102.4	213.0	49.3
0.05	37.5	77.9	18.0
0.07	23.4	48.6	11.2
0.1	13.3	27.7	6.4
0.15	6.5	13.5	3.1
0.2	3.7	7.5	1.4
0.3	1.6	2.5	<0.5
0.4	0.8	<0.5	<0.5

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$



SECTION SS-03

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.13	
Initial Fundamental Period (T_s) ^(b)	0.95	seconds
Degraded Period ($1.3T_s$)	1.24	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.40	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters	
Non-Zero Seismic Displacement Est (D)	12.9 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results		
Probability of Negligible Displ. ($P(D=0)$)	0.00	
D1	6.2	cm
D2	12.9	cm
D3	26.9	cm
$P(D > d_{threshold})$	0.13	

Notes

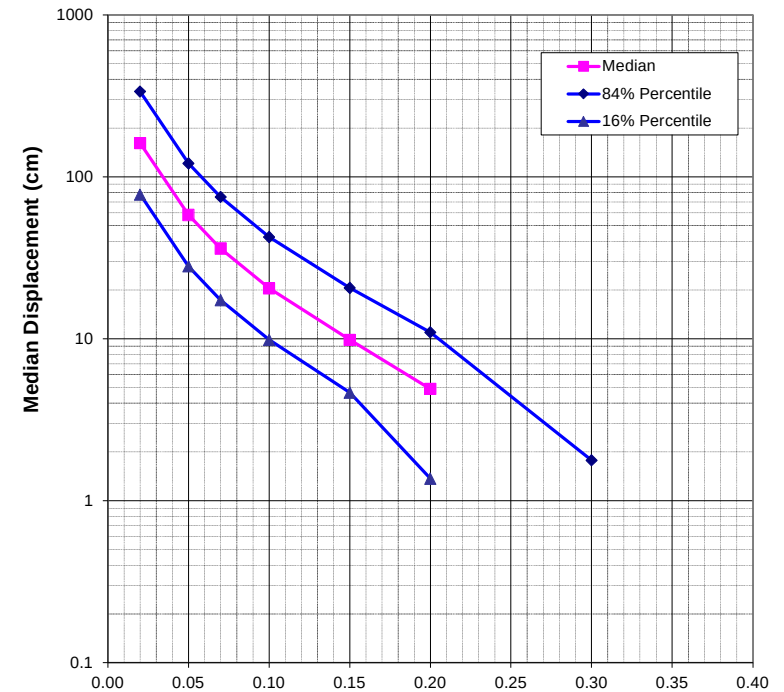
- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	161.4	161.4	335.6	77.6
0.05	0.000	58.2	58.2	120.9	28.0
0.07	0.000	36.1	36.1	75.0	17.3
0.1	0.000	20.5	20.5	42.5	9.8
0.15	0.011	9.9	9.9	20.6	4.7
0.2	0.137	5.7	4.9	11.0	1.4
0.3	0.757	2.4	<0.5	1.8	<0.5
0.4	0.979	1.2	<0.5	<0.5	<0.5



SECTION SS-04

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobalistic (EQ8&9)	* Select Ordinary or Pulse or Combined Equations
Yield Coefficient (k_y) ^(a)	0.09	(a) Based on pseudostatic analysis
Initial Fundamental Period (T_s) ^(b)	0.76	(b) 1D: $T_s=4H/V_s$ 2D: $T_s=2.6H/V_s$
Degraded Period ($1.3T_s$)	0.99	(c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
Moment Magnitude (M_w)	6.8	(d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.38	(e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)	84 %	
Probability of Exceedance #2 (P2)	50 %	
Probability of Exceedance #3 (P3)	16 %	
Displacement Threshold (d_threshold)	30 cm	
Intermediate Calculated Parameters		
Non-Zero Seismic Displacement Est (D)	16.2 cm	
Standard Deviation of Non-Zero Seismic D	0.736	
Results		
Probability of Negligible Displ. (P(D=0))	0.00	
D1	7.8	cm
D2	16.2	cm
D3	33.6	cm
P(D>d_threshold)	0.20	

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)

calc. using eq. (11)

calc. using eq. (11)

calc. using eq. (11)

eq. (11)

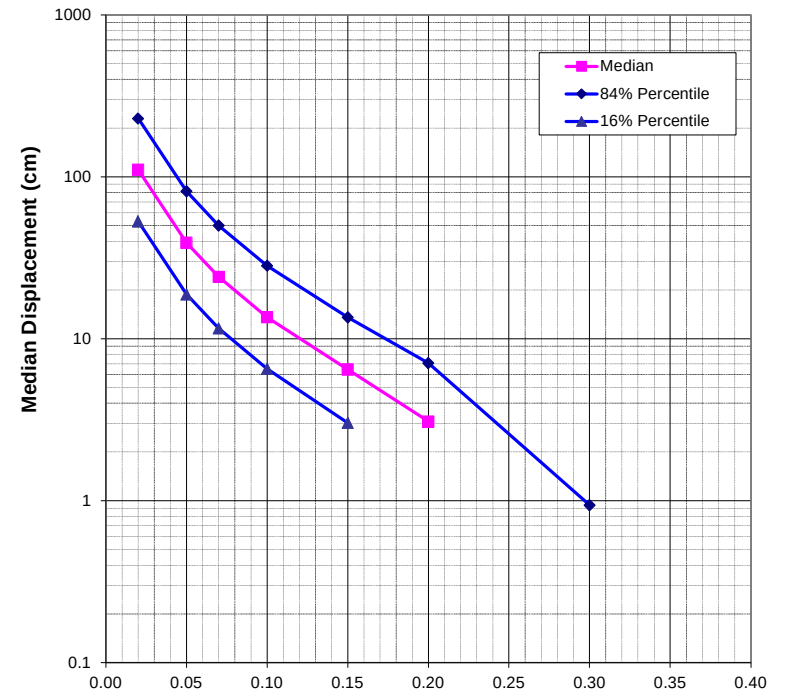
Dependence on k_y	k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
	0.020	0.000	110.2	110.2	229.2	53.0
	0.05	0.000	39.1	39.1	81.3	18.8
	0.07	0.000	24.1	24.1	50.1	11.6
	0.1	0.000	13.6	13.6	28.2	6.5
	0.15	0.015	6.6	6.5	13.5	3.0
	0.2	0.167	3.7	3.1	7.1	<0.5
	0.3	0.789	1.6	<0.5	0.9	<0.5
	0.4	0.983	0.8	<0.5	<0.5	<0.5

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)



SECTION SS-05

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes

by Jonathan D. Bray and Jorge Macedo, UC Berkeley and Georgia Tech

Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes, ASCE JGGE, 2019, 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143

SEE NOTES BELOW FOR GUIDANCE IN THE USE OF SPREADSHEET

Input Parameters		
Case	Deterministic-Pseudoprobabilistic (EQ8&9)	* Seismicity
Yield Coefficient (k_y) ^(a)	0.10	
Initial Fundamental Period (T_s) ^(b)	0.85	seconds
Degraded Period ($1.3T_s$)	1.11	seconds
Moment Magnitude (M_w)	6.8	
Spectral Acceleration ($S_a(1.3T_s)$) ^(c)	0.34	g
PGV Information	Both Ordinary & Pulse Motions	
Peak Ground Velocity (PGV) ^(d)	40.0	cm/s
Percentile (if Pulse ground Motion) ^(e)	Both Ordinary & Pulse Motions	
Additional Input Parameters		
Probability of Exceedance #1 (P1)		84 %
Probability of Exceedance #2 (P2)		50 %
Probability of Exceedance #3 (P3)		16 %
Displacement Threshold ($d_{threshold}$)		30 cm

Intermediate Calculated Parameters	
Non-Zero Seismic Displacement Est (D)	12.5 cm
Standard Deviation of Non-Zero Seismic D	0.736

Results		
Probability of Negligible Displ. ($P(D=0)$)	0.00	
D1	6.0	cm
D2	12.5	cm
D3	26.0	cm
$P(D > d_{threshold})$	0.12	

Notes

- Values highlighted in blue are input parameters, and results are presented in the table with the yellow heading.
- Probability of Exceedance is the desired probability of exceeding a particular displacement value.
- Displacements D1, D2, and D3 correspond to P1, P2, and P3, respectively.
(e.g., the probability of exceeding displacement D1 is P1 and it is referred to as the (100% - P1) percentile value.
- The 16%, 50%, and 84% percentile displacement values at selected k_y values are shown to the right.
- Calculated seismic displacements are due to deviatoric deformation only (add in volumetrically induced movement).
- k_y may range between 0.01 and 0.8, T_s between 0 and 2 s, S_a between 0.002 and 4.5 g, M_w between 5.5 and 8.2
- Rigid slope is assumed for $T_s < 0.05$ s, i.e. $T_s = 0.0$. If T_s is just less than 0.05 s, set $T_s = 0.050$ s
- When a value for D is not calculated, D is < 0.5 cm
- k_y should be estimated with a slope stability program; the simplified equations shown below in Fig. 14.1 provide approximate values.
- Examples of how T_s is estimated are shown below in Fig. 14.4 and Fig. 3.
- V_s = weighted avg. shear wave velocity for the sliding mass, e.g., for 2 layers, $V_s = [(h1)(V_{s1}) + (h2)(V_{s2})]/(h1 + h2)$

- * Select Ordinary or Pulse or Combined Equations**
- (a) Based on pseudostatic analysis
- (b) 1D: $T_s = 4H/V_s$ 2D: $T_s = 2.6H/V_s$
- (c) Input the Spectral Acceleration (g) at the base of the sliding mass assuming there is no material above it.
- (d) PGV (cm/s) is required for near-fault pulse motions & for EQ9 when PGV > 115 cm/s; it is estimated at the base of sliding mass assuming no material above it.
- (e) If Pulse motion the percentile is given as either D100 or D50. D100 should be used for fault-normal direction

eq. (3) or (5) or (7) or (9)

eq. (2) or (4) or (6) or (8)
calc. using eq. (11)
calc. using eq. (11)
calc. using eq. (11)
eq. (11)

Dependence on k_y					
k_y	P(D="0")	D (cm)	Dmedian (cm)	D-84% (cm)	D-16% (cm)
0.020	0.000	108.1	108.1	224.8	52.0
0.05	0.000	37.0	37.0	77.0	17.8
0.07	0.000	22.5	22.5	46.8	10.8
0.1	0.000	12.5	12.5	26.0	6.0
0.15	0.033	6.0	5.8	12.2	2.6
0.2	0.261	3.3	2.4	6.0	<0.5
0.3	0.873	1.4	<0.5	<0.5	<0.5
0.4	0.993	0.7	<0.5	<0.5	<0.5

