Document Title:	60% Removal Design Package for Lateral Expansion (Cell 4) Ash Stacking				
Document/RDP No.:	RDP-0114-A	Project No.:	175660047	WBS Code:	011403
Reviewed by:	Multiple	Organization:	TVA, Jacobs, GEI	Date:	Various
Response by:	Multiple	Organization:	Stantec	Date:	Various

No.	Section / Para / Page	Reviewer Comments	Response to Comment
		Jacobs Comments	
1.	SHT-01	Typo: Please verify the index of sheets – these should be 10W431-xx to match the title blocks. And Sheet 19 should be Sheet 20.	The index of sheets will be revised to read 10W431-xx. A subgrade plan has been developed which provides for a minimum 2% regrade of existing materials within the Lateral Expansion area. Pending TVA approval, this surface will be part of the 90% submittal and the subsequent sheet numbers will be revised.
2.	SHT 02	Note 2: Please revise this note to be similar to that for RDP-0113-E (clarify drawings are not an “aid”, but part of the whole set of contract documents).	Concur. Note 2 will be revised to be similar to that for RDP-0113-E.
3.	SHT 02	Notes 18-20: Combine these into one note, and just reference the specifications. These notes don’t match the specs – and they shouldn’t repeat the specs, since that is a cause for errors. Note that the 2% requirement is not in the specs. Note that the specs restrict to 12-inch lifts. See comments on the specs.	Concur. General notes 18 through 20 will be combined into a single note which addresses temporary stockpiles. The specifications will be revised as noted in response to Comment No. 9.
4.	SHT 09	These cross-sections show pre-event groundline, “current” LIDAR, and planned top grades. Show the subgrade grading surface also.	Pending TVA approval of the recently developed subgrade plan, this surface will be shown on the cross-sections as part of the 90% submittal.
5.	General	Address “stockpiles” that are LEFT IN PLACE beneath the subgrade for the ash stacking. Similar to the Dredge Cell, is this “recontouring” capable of supporting a 2% slope? What is the maximum elevation of the subgrade for ash stacking? Add a subgrade grading plan for clarity.	The recently developed subgrade plan addresses these questions. The stockpiles will be graded into the shown configuration which includes 2% slopes. The maximum subgrade elevation is 777.7 feet msl. Pending TVA approval, this surface will be part of the 90% submittal
6.	Table of Contents	Typo: Section 2300 duplicated twice (the second 2300 should be 2400).	Noted. This section number will be revised in the table of contents.

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7.	Spec 02200 Para 3.1.2.	Don Fuller is to be preparing a letter describing what materials can be LEFT IN PLACE, not removed from the Lateral Expansion. Please revise this paragraph accordingly.	The conceptual lateral expansion recontouring plan geometry (subgrade plan) will be reflected in the 90% submittal drawings and specifications.
8.	Spec 02200 Para 4.1.	This para says to shape and finish the excavation to the lines and grades shown. However, there is no subgrade grading surface shown on the drawings, so there is no way to define the required excavation. This para restricts temporary stockpiles to five feet height; currently 10 ft is allowed – is there a reason to believe that the current 10 ft is not acceptable? Suggest you delete this sentence from Spec 02200, since stockpiles are specified in Sect 02300 anyway.	The referenced "shaping and finishing of all excavation to the required lines and grades as shown on the Drawings or as directed by the QC Manager" pertains to all surfaces, not just the subgrade. Pending TVA approval of the recently developed subgrade plan, this surface will be part of the 90% submittal. See response to Comment No. 9 regarding the height of temporary stockpiles.
9.	Spec 02300 Part 2:	Drawings say 24-inch lift and 2% slope. If stockpiles are "temporary", then why only 12-inch lifts? Why restrict to 6:1 slopes, 5-ft high, when experience has shown that windrows 5-ft high are quite stable at steeper slopes? Is there a 2% minimum slope requirement, as stated on the drawings, or is that a mistake?	Based on ongoing observations and other restrictions on stockpile size and slopes, it is judged that temporary stockpile lifts can be increased from 12 inches to 24 inches. This section of the specifications will be revised accordingly. Consistent with regulatory approved stacking protocols established in the North and Central Dredge Cell (Cells 2 and 3) Ash Stacking Plan, temporary stockpile heights greater than 5 feet are allowed with QC Manager approval and sufficient instrumentation. There is a two percent minimum slope requirement and the specifications will be revised to reflect that slope.
10.	Spec 02400 Para 2.3:	Delete the requirement for large scale direct shear testing. Delete the requirement for samples of ash and stone. Use the same geotextile spec as for drainage ditches. This geotextile is for use in getting a firm base for stacking, and is at the discretion of the contractor, since no foundation has been designed. So these testing requirements are meaningless.	Large scale direct shear testing on geotextile used in subgrade improvements is required in order to check resulting interface friction angles against parameters modeled in the embankment slope stability analyses. This check is required to determine if the geotextile induces a plane of weakness in the embankment. Therefore, samples of the geotextile and adjacent materials (i.e. ash, stone, etc.) will be required. The Contractor has the latitude to suggest any material for use as a bridging layer in subgrade improvements. However, geosynthetic materials proposed for use at the site shall be subject to large scale direct shear testing prior to deployment.

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11.	Spec 02400 Para 2.4:	This geogrid is at the discretion of the contractor, since no foundation has been designed. Delete the submittal to TVA for review and the condition that unacceptable products shall be discontinued. There is no specification requirement for the geogrid, so what could constitute any basis of rejection?	This paragraph will be revised from “for review” to “for information purposes only as part of project documentation”. The use of products exhibiting shear during construction will be discontinued.
12.	Spec 02400 Para 3.1:	Suggest deleting the sentence: All such work shall be in accordance with the approved safety plan. The “SSHP” doesn’t address subgrades.	Concur. We will delete this sentence in Paragraph 3.1. Site safety is already addressed in Section 02150, Paragraph 2.1.1 of the Specifications.
13.	Spec 2400, Para 3.1	Second sentence is not the typical way field changes are initiated nor resolved. Please include some less formal ways like discuss with the QC Manager and provide FCN or RFI as documentation. Second paragraph is also not typical. Please revise to follow the FCN or RFI process.	The term “Work Plan” will be changed to “Means and Methods Plan”. Section 02400 is a performance based specification and the Means and Methods Plan is a required submittal; it is not a request for information or a field change order. The Means and Methods Plan shall be submitted prior to work occurring.

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14.	Specs, general	There are sections here that are identical to previous design packages, but that should be reconsidered for refinement or updating: • 02100-3.2.2: Silt fences are rarely used inside the dredge cell as they restrict equipment mobility. Change last sentence "shall" to "may". • 02100-3.2.4: Change the 1/3 to 1/2 to be less conservative (TN BMP standard is 1/2) • 02150-2.1.1: Delete - the contractor doesn't need to prepare a Safety Plan, since there already is a SSHP. • 02150-2.2.1: Provide for alternative means of protecting instruments besides the T-posts and orange fence material (e,g, "concrete barriers or other protective means). • 02150-2.2.2: Delete stockpile <u>locations</u> shall be approved by the QC Manager and Construction Manager. • 02150-3.1: Consider taking requirement for mowing out; why mow first when you still have to grub and segregate organics? • 02300-4.1.1: Delete – the TVA safety professional doesn't approve the stack footprint. • 02300-7.2: Consider revising need to roll every day; sealing with roller makes sense if there is a forecast chance for rain, otherwise rolling every night is not necessary. • 02410-3.4.1: Delete "or subsequent lift of fill", since you can't compact a subsequent lift before placing the underlying erosion control blanket.	• 02100-3.2.2: The last sentence will be modified to read "Silt fences may also be utilized to protect subgrade and embankment". • 02100-3.2.4: The second sentence will be modified to read "Remove sediment before it reaches ½ the height of the silt fence. • 02150-2.1.1: If the SSHP does not address subgrade construction, or construction in or around water, then Stantec suggests this omission within the SSHP be addressed with TVA safety professionals to determine whether a separate safety plan should be developed. • 02150-2.2.1: The paragraph will be modified to include "or QC Manager approved alternate". • 02150-2.2.2: The QC Manager and Construction Manager will not direct stockpile location - that is up to the Contractor to propose. This is meant as a concurrence measure. The location approval will be documented in daily field reports by the QC Manager. • 02150-3.1: Mowing is performed to reduce the volume of organic material and to allow better visual observation of the ground when scraping. Mowing also reduces continuity of organic material. Stantec suggests that mowing be performed when organic material is six inches or greater in height. Further discussions with TVA and Jacobs will be held concerning this matter. • 02300-4.1.1: The TVA safety professional is responsible for approving an area prior to stacking operations because of the potential for unsafe conditions due to saturated materials, open bodies of water, equipment utilized, method of operation etc. These conditions are beyond the scope of our analyses and should be evaluated prior to commencing work. • 02300-7.2: Sealing the surface of ash material at the end of each day is good practice for this type of construction due to the concern for excess infiltration. Please respond with the protocols that the site proposes for deciding when they seal ash surfaces versus when they don't. Is there a precipitation probability trigger or other method? • 02410-3.4.1: The phrase "subsequent lift of fill" pertains to any materials placed above the approved subgrade surface and below the erosion control blanket.

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15.	QCP, para 3.3	There are sections here that are identical to previous design packages, but that should be reconsidered for refinement or updating: • QCP-3.3: Contractor Submittals procedure is written for contractors external to TVA and who enter through procurement. Civil Projects does not process submittals through Procurement but directly to the QC Manager. • QCP-6.1: A log of incoming geotextile is not needed because procurement keeps receipts of incoming. • Provide for alternative means of protecting instruments besides the T-posts and orange fence material.	• QCP-3.3: The procedure for Contractor submittals provided in Section 3.3 is based on previous TVA directive on other site packages. Please provide confirmation that Contractor submittals are now to be provided directly to the QC Manager. • QCP-6.1: The Contractor shall provide to the QC Manager a copy of incoming receipts from delivery of geotextile. This can be performed by forwarding receipts from Procurement or during unloading of material shipments. The provided receipts will be used during quality control activities to check materials delivered to the site against that which is placed and to determine where certain rolls are utilized. • Sections pertaining to instrument protection will be modified to include "or QC Manager approved alternate". There is no intent to restrict what is used provided it is visible or provides a hard protective barrier.
		GEI Consultants Comments	
16.	List of Specs	Section 02400 – Subgrade Improvements This section should be expanded upon to address fill placement through standing water. This will occur at the east upstream end of the Dike C fill where new fill will be placed in the Ash Pond. Please define the type of fill, compaction method for the fill placed below the water surface. Is it possible that the ash pond water be lowering during fill placement? We doubt this can occur, but suggest you ask. This is an important issue if Cell 5 is to be backfilled and what the procedure will be used. What will the fill slope angle be below standing water? Will there be slope erosion protection at water line?	TVA has decided, based on the results of the attached stability analyses, to not lower the ash pond water surface elevation at this time (i.e. to support planned embankment construction in the Lateral Expansion area). It is noted that based on available survey data, the depth of standing water across the planned filling limits ranges from zero to a maximum of three feet and occurs in a limited area (northeast portion of the site; the area between the embankment footprint and Dike C). Discussions on ash placement below water will be referenced in Section 02300. The slope angle of fill placed below the water surface will be 10H:1V.Due to the anticipated short duration of time between commencement of the lateral expansion work and subsequent drawdown, no slope erosion protection at the waterline is anticipated. If conditions develop during construction they will be addressed in accordance with the site wide SWMP.
17.	Calc Package	Exhibits 01 through 05 No comments.	Noted.

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18.	Calc Package	Exhibit 06 We generally concur with design methodology. However, the critical cross section to be analyzed is at perpendicular to Baseline Station 77+00, through Flume 10. We suggest the following computed factors of safety (FS) be presented: These include potential failure surfaces greater than 10 feet deep, deep circular failure surface to the bottom of sluiced ash and a deep wedge block surface which runs along the base of the sluiced ash. This location has the steepest relative slope for this 40 feet embankment fill above the base of the ash pond. We also suggest a deep failure surface be analyzed at Cross Section D-D' to show the fill has no adverse impact on Dike C. This should be quantitative rather than a qualitative analysis.	Concur. The suggested analyses will be performed.
19.	Calc Package	Exhibit 07 Please add a stability section between B-B' and C-C' east of Baseline Station 77+00 at the Flume 10. This is the steepest section to top of slope to base. (Same comments as for Exhibit 06)	Concur. The suggested analyses will be performed.
20.	Calc Package	Exhibit 08 Run the undrained analysis at Station 77+00 for the reasons described above. The ash pond is the closest to the new fill at this location. We suggest a hand computed undrained analysis similar to what was performed for the North and Central Dredge Cell (Cells 2 and 3) and presented within Stantec's letter dated January 4, 2011 and commented in the GEI review letter dated January 21, 2011.	Concur. The suggested analyses will be performed.
21.	Calc Package	Exhibit 09 See comment for Exhibit 06.	Concur. The suggested analyses will be performed.
22.	Calc Package	Exhibit 10 No comments.	Noted.

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23.	QC Plan	Paragraph 5.3 Does Stantec want to consider compaction to 95% of the maximum dry density per Standard Proctor based on EI test results for sluiced ash from Cell 1? The ash at 95% Standard Proctor density is more dilative than for 90% Standard Proctor compaction.	We understand that the compacted ash may exhibit much improved dynamic response, with less tendency to liquefy, if the ash is compacted to 95% of the standard Proctor maximum dry density. However, this would not have a substantial impact on the seismic stability of the closed landfill, because the existing, hydraulically placed ash would not be affected. Looking at the stability cross sections, substantial lengths of the critical failure surfaces pass through the existing uncompacted ash. In the relic area, nearly all of the ash landfill will consist of material that was hydraulically placed prior to the 2008 failure. In general, the design for the perimeter stabilization can support the landfill when all of the saturated ash is liquefied, regardless of the degree of compaction in the stacked ash. The specified 90% maximum dry density has been achieved over the course of the winter and during wet periods (with some degree of difficulty). We are reluctant to increase the compaction specification, as that would require drying the ash even further and could cause significant project delays. Consistent with current approved site practices, it is our position that compaction criteria for ash embankment materials remain at a minimum of 90% of standard Proctor maximum dry density.
24.	QC Plan	Paragraph 5.4 We assume nuclear density testing is routinely calibrated to sand cone tests to ensure correct in-situ densities.	Random drive tube samples are currently collected and subjected to laboratory density and moisture testing in order to calibrate the nuclear density gauge. Sand cone testing is problematic due to ongoing site activities (e.g. equipment vibration etc.. The Lateral Expansion will have a high volume of equipment operation and a shutdown of activities around the testing area is not practicable due to the far ranging effects of equipment vibration. Stantec will collect Shelby Tube samples of ash in conjunction with drive tube samples to perform a testing comparison. Stantec will compare the test results of sampling by the two methods to determine if densification occurs in the drive tube sampling. If test results are notably different, then Stantec will review the calibration methodology. The QC Plan will be modified to note this procedure.

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25.	QC Plan	Table – Quality Control Plan Add sand cone density test (ASTM D-1556) for ash fill stacking operations (Ash Fill).	The table will be revised to include the laboratory density and moisture testing used to calibrate the nuclear density gauge.
26.	Drawings	Drawing 10W431-01 – Cover Sheet No comments.	Noted.
27.	Drawings	Drawing 10W431-02 – General Notes No comments.	Noted.
28.	Drawings	Drawing 10W431-03 – Existing Conditions We understand that the locations of the existing instrumentation, existing soil boring and existing CPTu soundings are being verified and will be added to the drawing for the 90% submittal.	Locations of the existing instrumentation, soil borings and CPTu soundings within the Lateral Expansion area will be added to the drawing for the 90% submittal.
29.	Drawings	Drawing 10W431-04 – Ash Stacking Plan Since fill be placed in standing water at the east end of new buttress fill against the upstream side of Dike C, we suggest Stantec add a cross-section on how to treat subgrade for fill placed through a water column. Please label the width of the sloping bench drive at El 765 feet around the perimeter of Cell 4 fill.	Please see response No.16. Stacking within the subject area will be placed on prepared subgrade exposed in association with planned ash pond drawdown. The referenced bench width will be labeled.
30.	Drawings	Drawing 10W431-04 – Ash Stacking Plan Please show the future alignment and width of approximate 100-foot wide soil-cement buttress containment structure. Will the soil-cement containment buttress be within the 200-foot wide setback area between the Phase II Dike and Dike C?	Design of this segment of the perimeter was initiated only recently, so we are not yet in a position where we can show the conceptual stabilized footprint on the 60% drawings. We anticipate being able to show this on the 90% Drawings. We anticipate that the stabilized width will be 100 feet, maybe less. We plan to place the outboard limit of stabilization (soil-cement walls) along the Dike C bench, above the Stage 1 armoring. The toe of the ash stack in this area of the site will be about 200 feet inboard of the current crest of Dike C, so there will be sufficient room to construct the stabilized perimeter without encroaching upon the ash stack.

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31.	Drawings	Drawing 10W431-04 – Ash Stacking Plan Please indicate more clearly on Drawing 10W431-04 the locations where the cross-sections on Drawing 10W431-09 were cut from.	Please note that these are not typical cross sections. These are cross sections cut along and perpendicular to the baseline. Additional cross sections (located every 100 feet along the project baseline) will be included in the 90% submittal.
32.	Drawings	Drawing 10W431-05 – Instrumentation Plan Add a note stating that all existing piezometers, inclinometers and monitoring wells installed by TVA, AECOM and Stantec shall be protected. If damaged, they will be replaced at no cost to TVA and at a location acceptable to TVA and Stantec.	It should be noted that in the Technical Specifications, Section 02150 – Site Preparation, Paragraph 2.2 and in the Drawings on Sheet 10W431-02 – General Notes, Note 7, the Contractor is directed to protect the instrumentation. Since Civil Projects is a TVA entity, we cannot use the statement “at no cost to TVA”.
33.	Drawings	Drawing 10W431-05 – Instrumentation Plan The legend term Piezometer (proposed) should mean multi-level piezometers buried in the wet ash and underlying alluvium.	Concur. As illustrated in Detail 6/21, all piezometers will be multi-level vibrating wire piezometers set in the foundation ash and soil layers.
34.	Drawings	Drawing 10W431-05 – Instrumentation Plan Please add a settlement plate at top edge of fill to match every toe of fill slope inclinometer. This will ensure the Stantec’s QA personnel and instrumentation engineers can compare the ratio of lateral movements in the inclinometers versus vertical movements at the settlement plates.	Concur. A settlement plate has been shown in the 60% submittal at the top edge of fill for every slope inclinometer located at the toe.
35.	Drawings	Drawing 10W431-05 – Instrumentation Plan Please indicate more clearly on the drawing the locations where the cross-sections on Drawing 10W431-09 were cut from.	As noted in response No. 31, these are not typical cross sections. These are cross sections cut along and perpendicular to the baseline. Additional cross sections (located every 100 feet along the project baseline) will be included in the 90% submittal.
36.	Drawings	Drawing 10W431-06 – Profile – Project Baseline Show pond water levels in ash collection pond (El. 760.2 feet) and mean Watts Bar Reservoir level (El. 741.0 feet).	Concur. The Ash Pond and Watts Bar Lake pool levels will be added to the project baseline profile.
37.	Drawings	Drawing 10W431-07 – Profile – Ditches No comments.	Noted.
38.	Drawings	Drawing 10W431-08 – Profile – Flumes No comments.	Noted.
39.	Drawings	Drawing 10W431-09 – Cross-Section Show mean ash collection pond water levels in ash pond (El. 760.2 feet) and mean ash settling Pond level (El. 754.6 feet).	Concur. The Ash Pond and Stilling Basin pool levels will be added to the cross-sections.

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40.	Drawings	Drawing 10W431-09 – Cross-Section Show where the soil-cement containment system location on the cross-sections.	Please see the response to No. 30. Design of this segment of the perimeter was initiated only recently, so we are not yet in a position where we can show the stabilized footprint on this cross section.
41.	Drawings	Drawing 10W431-20 – Details No comments.	Noted.
42.	Drawings	Drawing 10W431-21 – Details Add a fill placement cross-section to show how to place new fill below ash pond water surface. Will you use bottom ash, or granular fill with Geogrid? What will the slope angle below the water surface? Will there be wave erosion protection riprap along the waterline?	See response to No. 16. Also, given the small volume of material and depths of fill placement, no cross-section is needed.
43.	Summary	This 60% submittal should follow the ash stack fill protocols that were developed and successfully executed for Test Embankment A and for the ongoing ash stack construction over failed fly ash in the former Dredge Cell 2 and 3 footprints.	Noted.