

FLAC3D 5.01

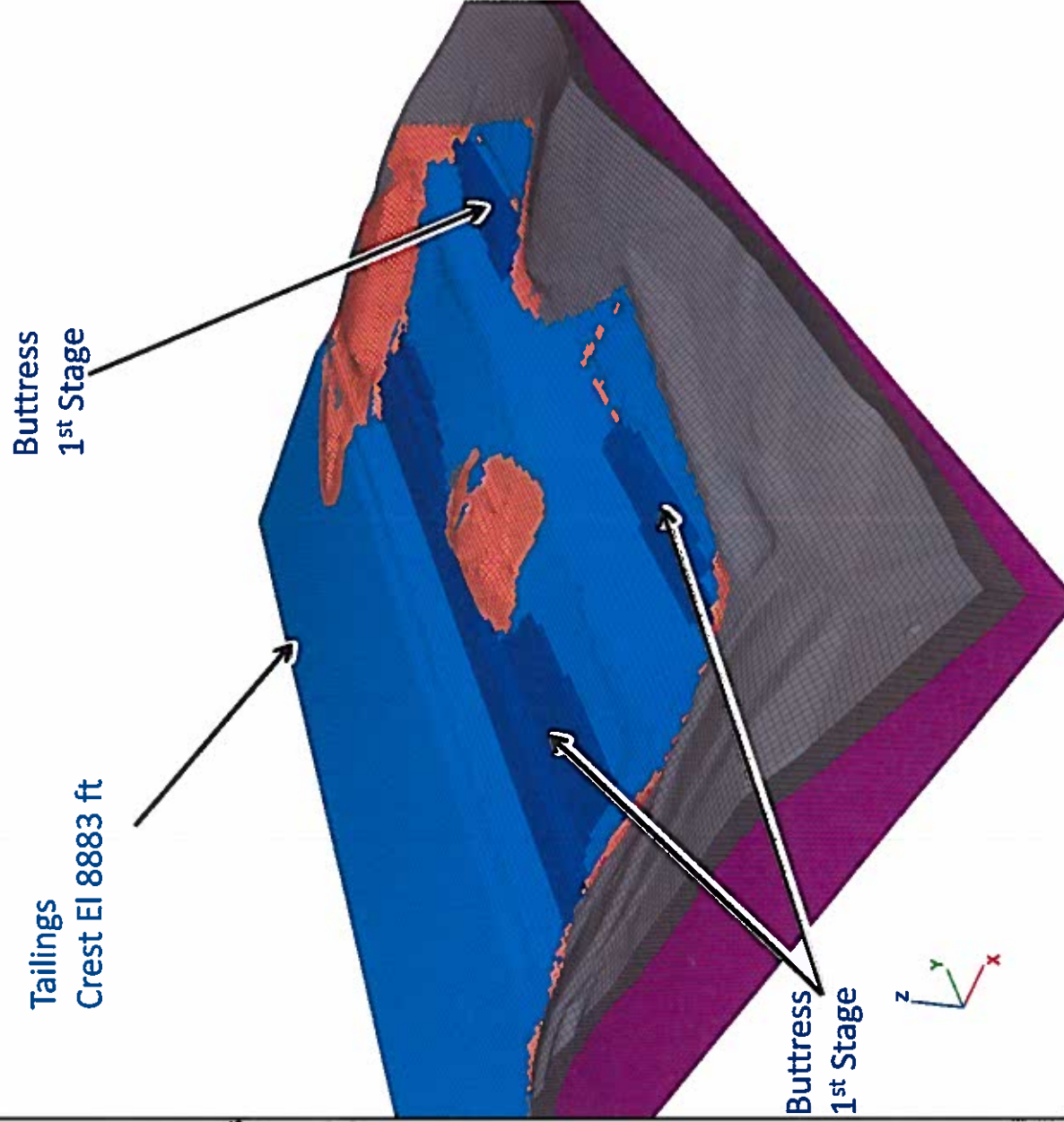
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Zone

Colorby:	Group	Any
	2015TAILINGS	
	BEDROCK	
	BEDROCK:FreeField	
	Buttress	
	End_of_DEPOSITION_TAILINGS	
	End_of_DEPOSITION_TAILINGS:FreeField	
	Finetailings	
	FOUNDATION	
	FreeField:LowerFOUNDATION	
	FreeField:UpperFOUNDATION	
	LowerFOUNDATION	
	UpperFOUNDATION	

Factor of Safety

Value = 1.41



Project No.
60551494

Henderson
3 Dam Buttress

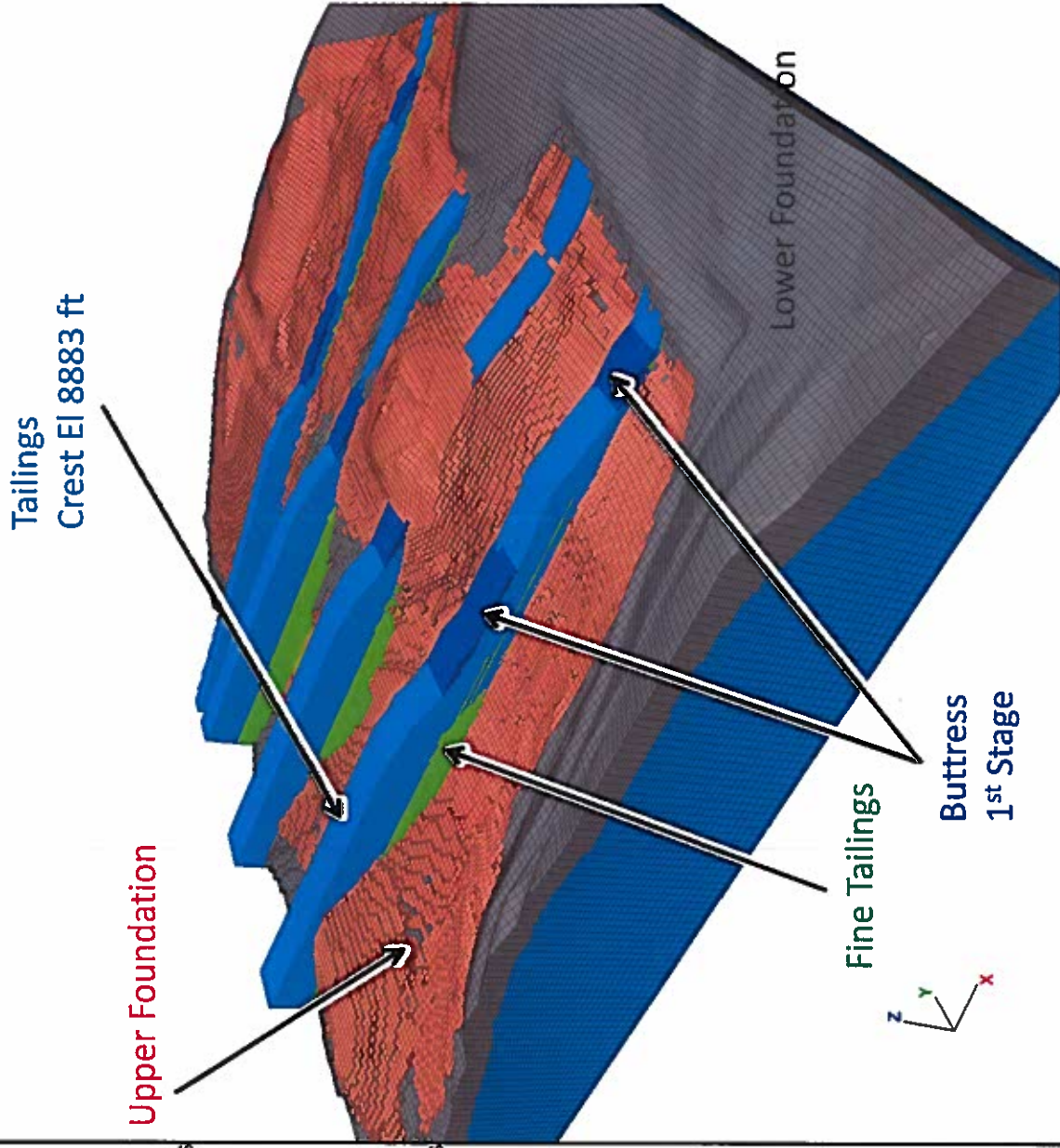
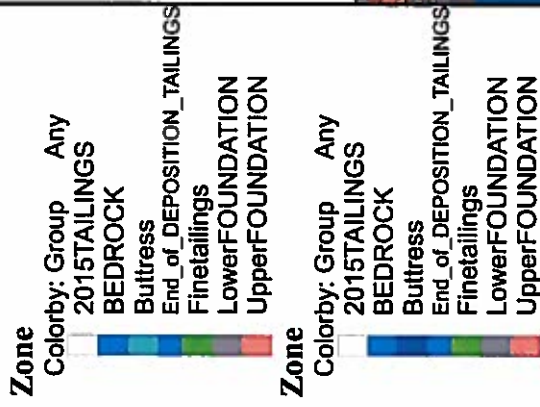
AECOM

3D Post-Earthquake Stability Analysis
with Buttress, Model Geometry
Stage 1, Crest El. 8883 ft

Figure
8

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Henderson
3 Dam Buttress

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3D Post-Earthquake Stability Analysis
with Buttress, Model Geometry with Sections
Stage 1, Crest El. 8883 ft

Figure
9

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Zone

Colorby: Group Any

2015TAILINGS

BEDROCK

BEDROCK:FreeField

Buttress

End of DEPOSITION_TAILINGS

End of DEPOSITION_TAILINGS FreeField

Finetailings

FOUNDATION

FreeField:LowerFOUNDATION

FreeField:UpperFOUNDATION

LowerFOUNDATION

UpperFOUNDATION

Factor of Safety

Value = 1.41

Water Table

Water Surface

Project No. 60551494	Henderson 3 Dam Buttress		3D Post-Earthquake Stability Analysis with Buttress, Model Geometry with Phreatic Surface Stage 1, Crest El. 8883 ft	Figure 10
	AECOM			

M:\DCS\Projects\WTR\60551494_HEN3_Butt500-Deliverables\DRMS Report\Figures\FIG 10.grt

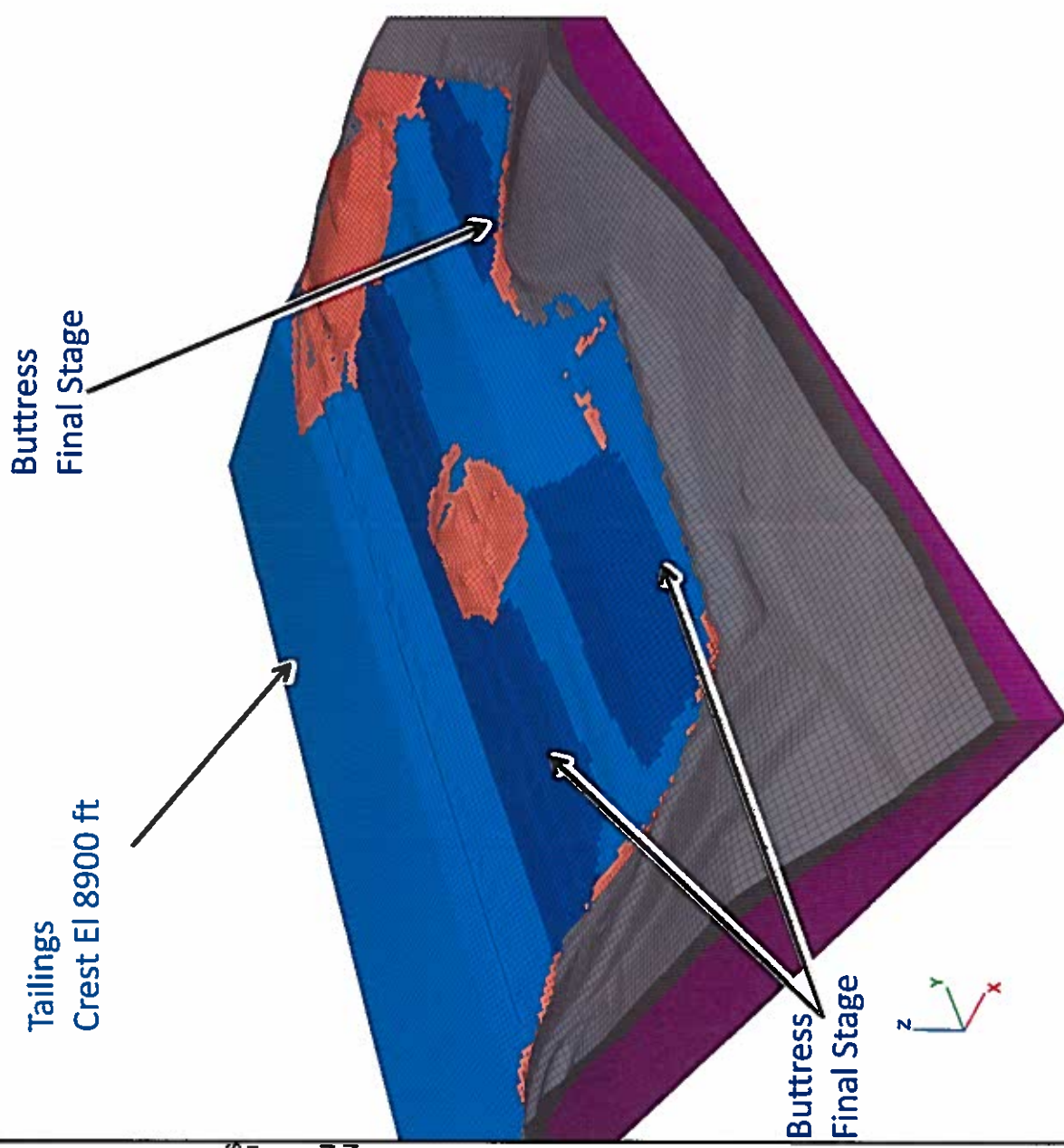
FLAC3D 5.01

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Zone
 Colorby: Group Any
 2015TAILINGS
 BEDROCK
 BEDROCK:FreeField
 Buttruss
 End_of_DEPOSITION_TAILINGS
 End_of_DEPOSITION_TAILINGS FreeField
 Finetailings
 FOUNDATION
 FreeField:LowerFOUNDATION
 FreeField:UpperFOUNDATION
 LowerFOUNDATION
 UpperFOUNDATION

Geometry
 Edge
 Node
 Polygon

Factor of Safety
 Value = 1.25



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Stability Analysis with Buttress, Model Geometry Stage 4, Crest El. 8900 ft	Figure 11
	AECOM		

FLAC3D 5.01

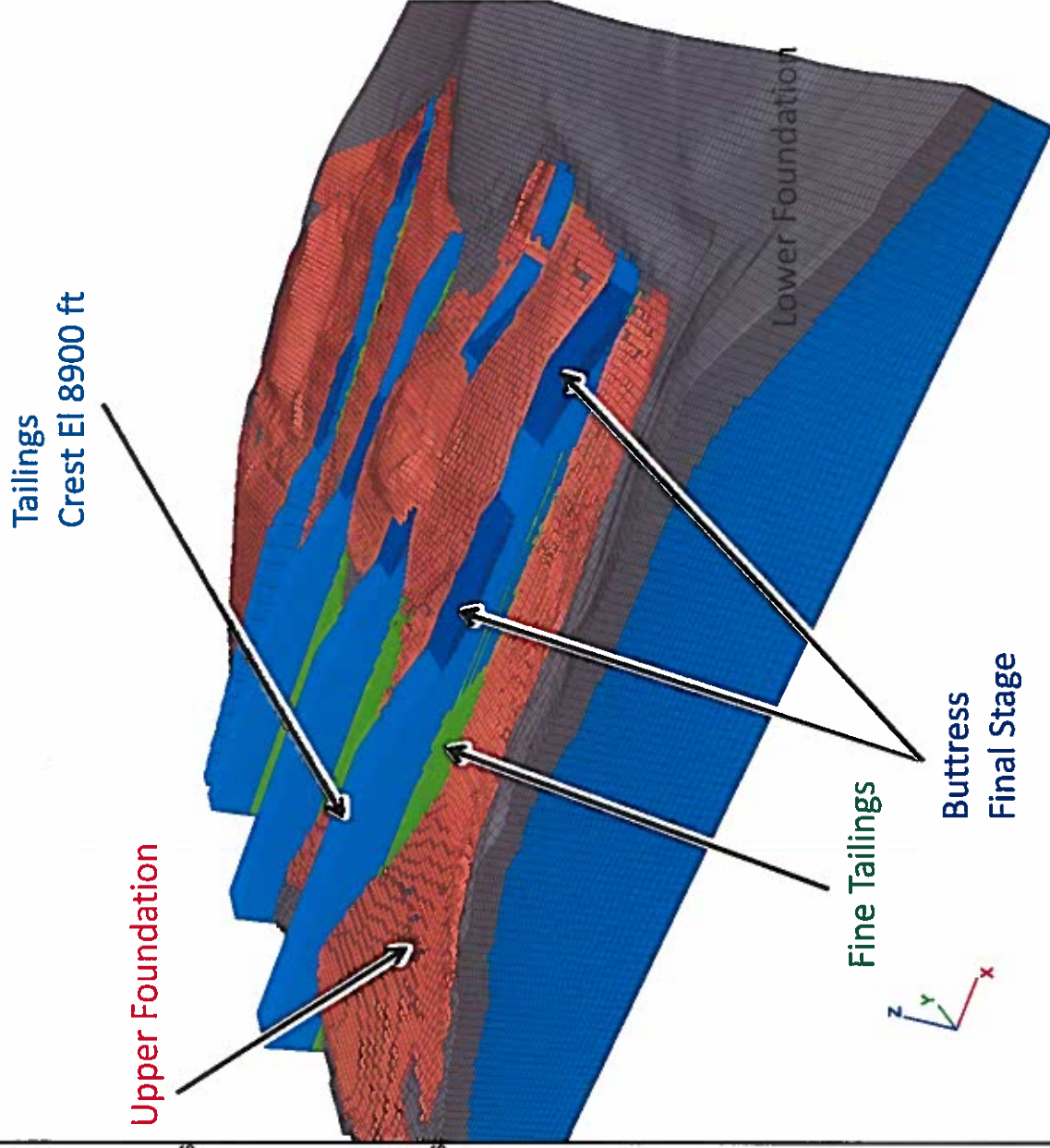
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Zone

Colorby: Group Any
 2015TAILINGS
 BEDROCK
 Buttrass
 End of DEPOSITION_TAILINGS
 Finetailings
 LowerFOUNDATION
 UpperFOUNDATION

Zone

Colorby: Group Any
 2015TAILINGS
 BEDROCK
 Buttrass
 End of DEPOSITION_TAILINGS
 Finetailings
 LowerFOUNDATION
 UpperFOUNDATION



Project No.
60551494

Henderson
3 Dam Buttrass

AECOM

3D Post-Earthquake Stability Analysis
with Buttrass, Model Geometry with Sections
Stage 4, Crest El. 8900 ft

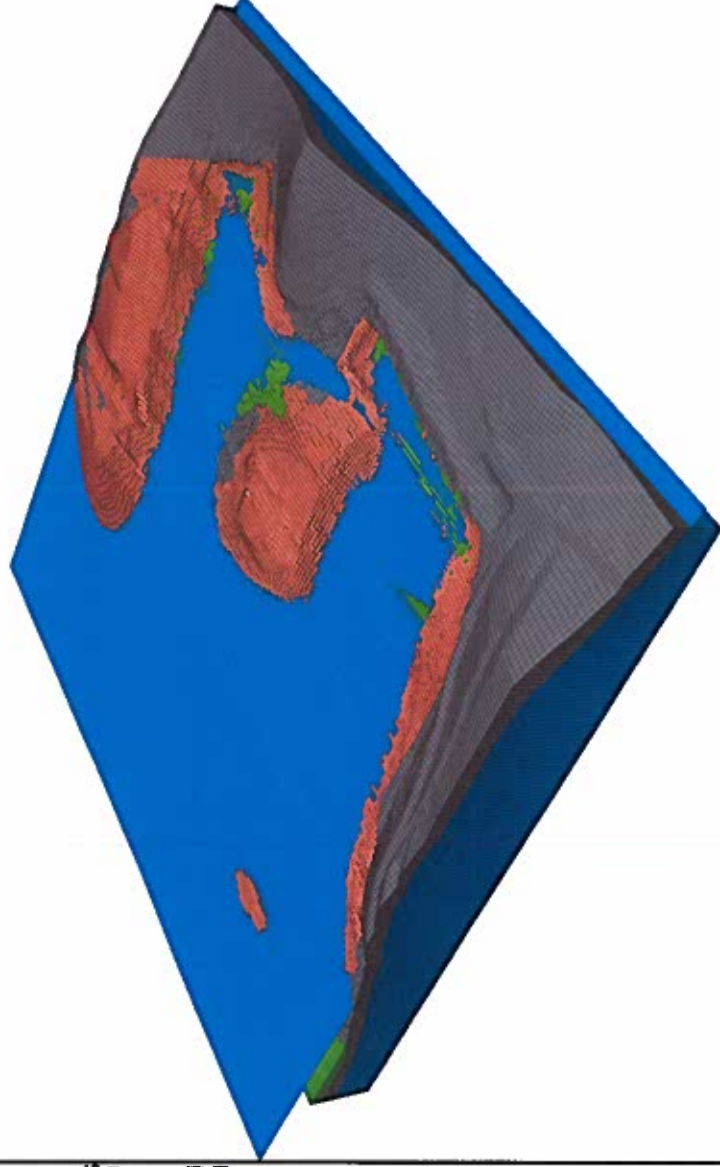
Figure
12

FLAC3D 5.01

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Zone

- Colorby: Group Any
- 2015TAILINGS
 - BEDROCK
 - BEDROCK:FreeField
 - Buttress
 - End_of_DEPOSITION_TAILINGS
 - End_of_DEPOSITION_TAILINGS:FreeField
 - Finetailings
 - Finetailings:FreeField
 - FreeField:LowerFOUNDATION
 - FreeField:UpperFOUNDATION
 - LowerFOUNDATION
 - UpperFOUNDATION
 - Water Table
 - Water Surface



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

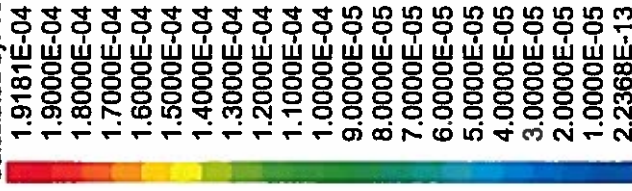
3D Post-Earthquake Stability Analysis with Buttress
Model Geometry with Phreatic Surface
Stage 4, Crest El. 8900 ft

Figure
13

FLAC3D 5.01

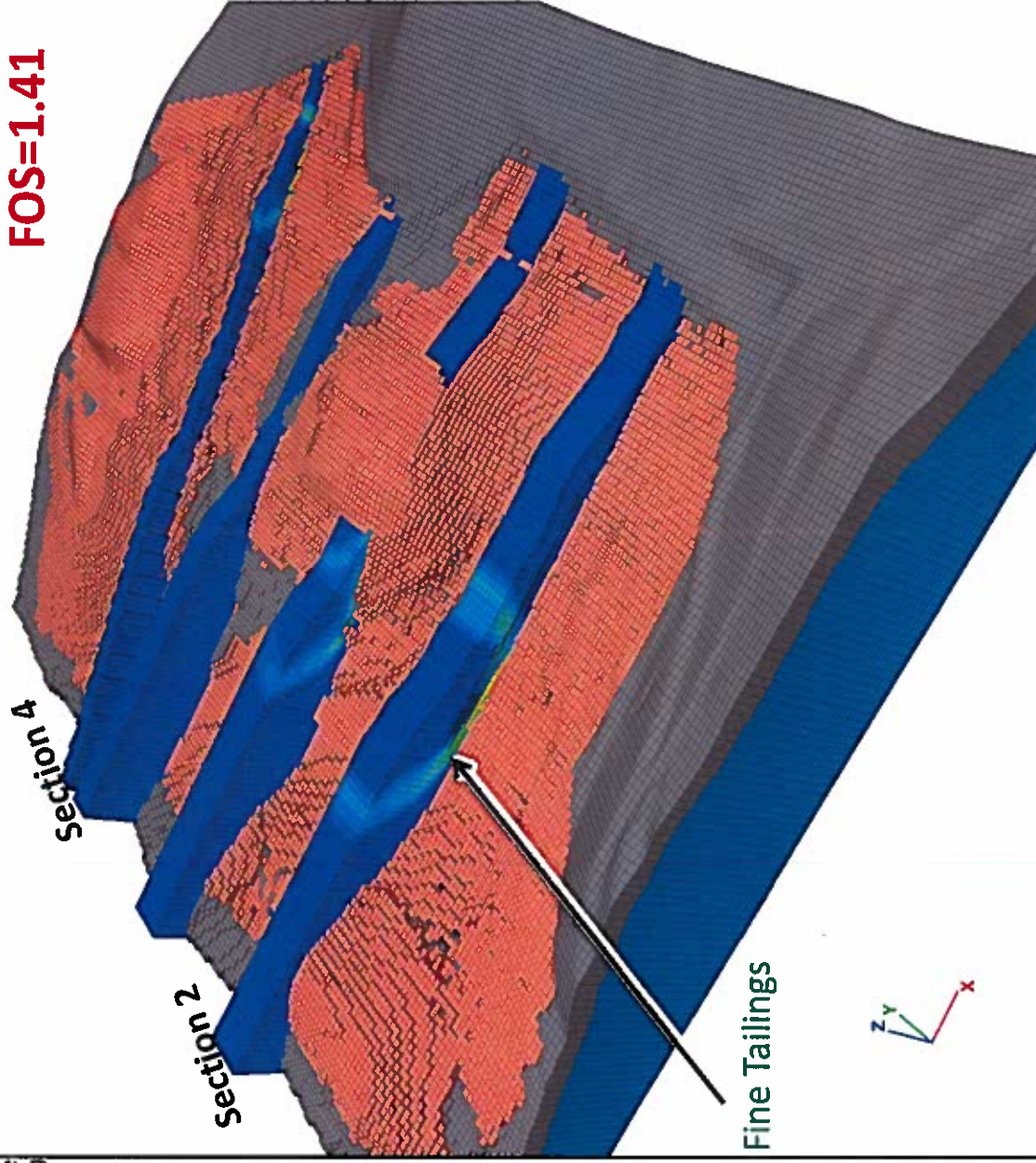
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Contour of Max. Shear Strain Rate
Calculated by: Volumetric Averaging



Factor of Safety
Value = 1.41

FOS=1.41



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

3D Post-Earthquake Stability Analysis with Buttress
Strain Contours at Failure on Cross Sections
Stage 1, Crest El. 8883 ft

Figure
14

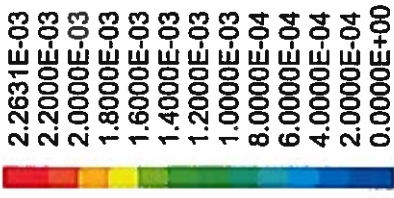
FLAC3D 5.01

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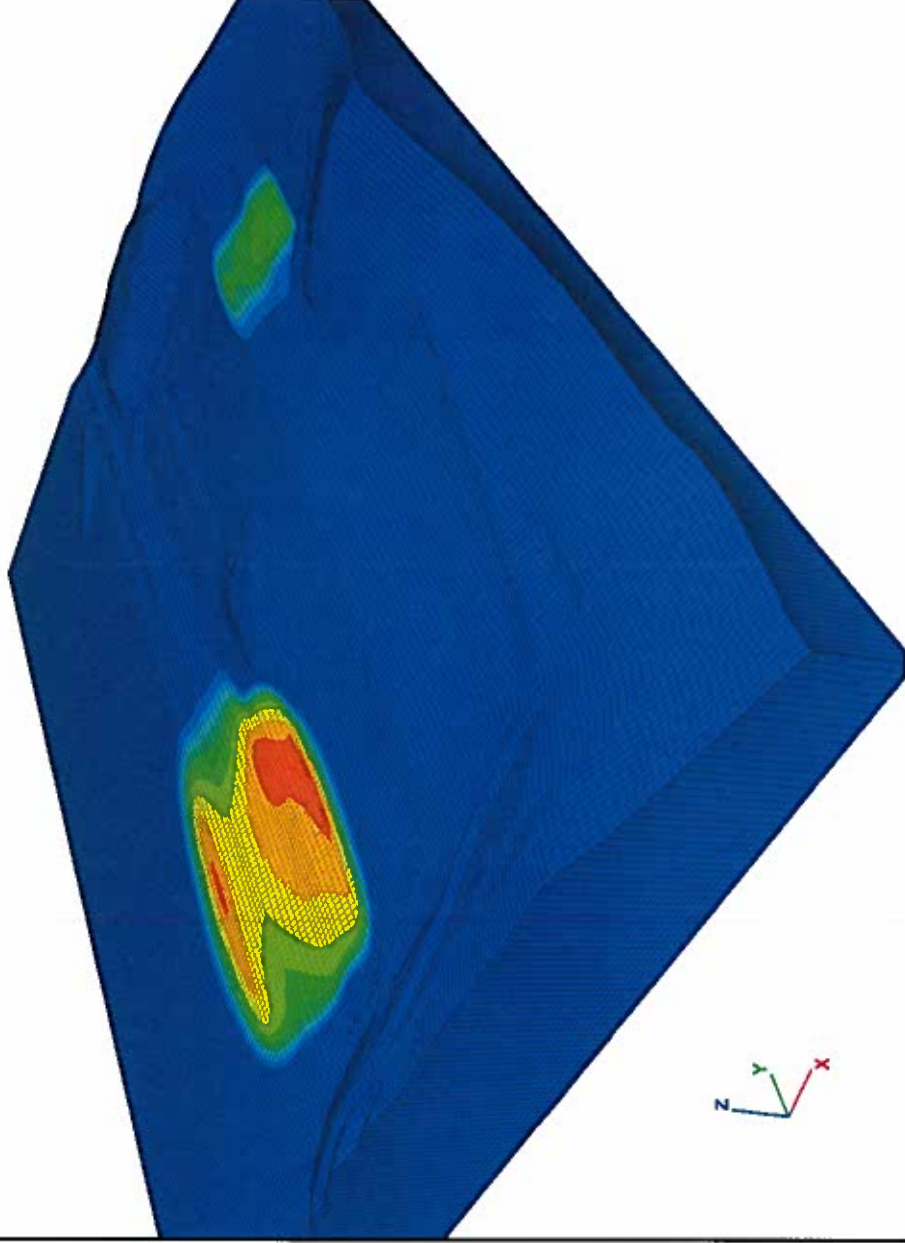
Factor of Safety

Value = 1.41

Contour Of Velocity



FOS=1.41



Project No.
60551494

Henderson
3 Dam Buttress

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3D Post-Earthquake Stability Analysis with Buttress
Velocity Contours at Failure
Stage 1, Crest El. 8883 ft

Figure
15

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Zone

- Colorby: Group Any
- 2015TAILINGS
 - BEDROCK
 - Buttress
 - End_of_DEPOSITION_TAILINGS
 - Finetailings
 - LowerFOUNDATION
 - UpperFOUNDATION

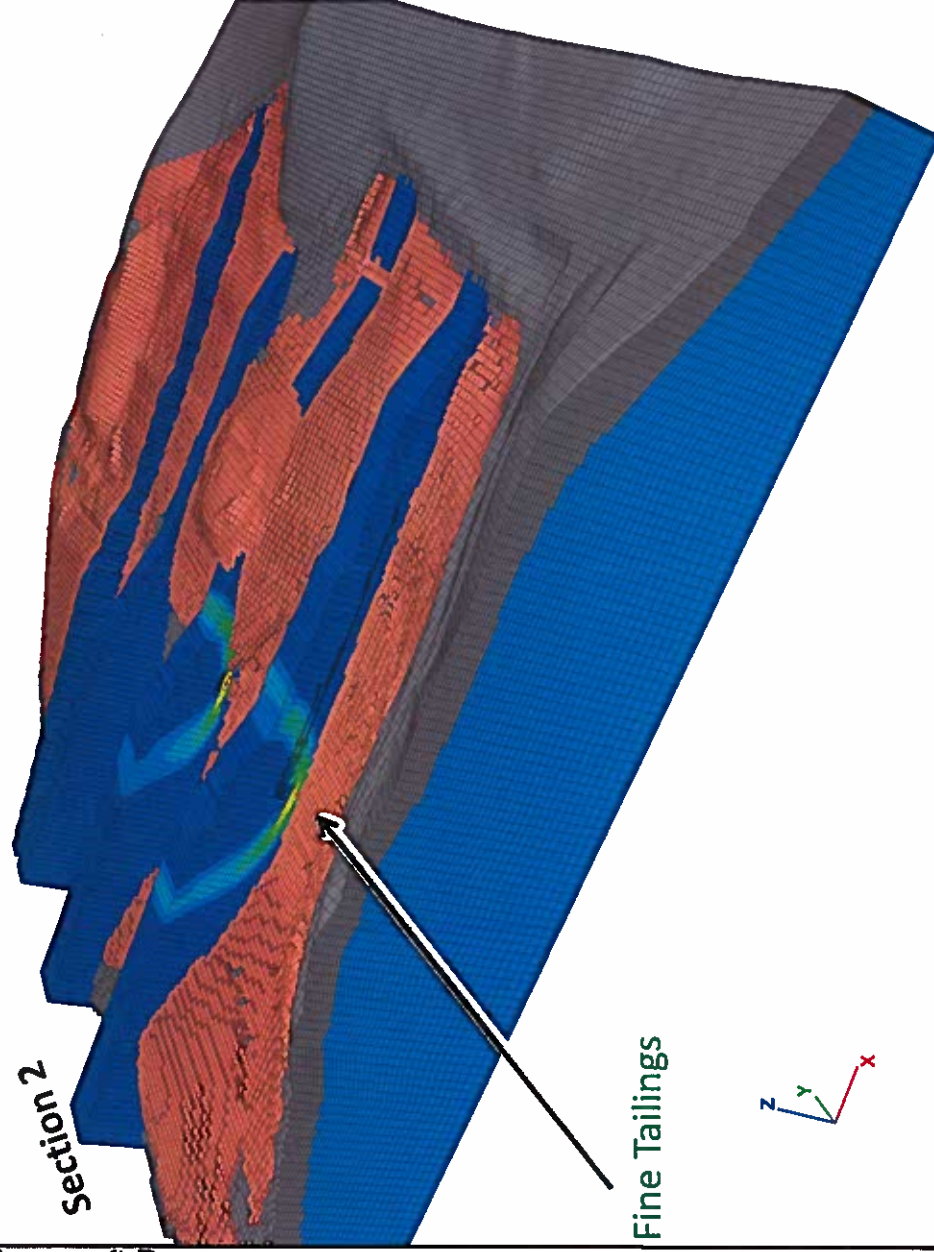
Contour of Max. Shear Strain Rate
Calculated by: Volumetric Averaging

- 1.0213E-04
- 1.0000E-04
- 9.0000E-05
- 8.0000E-05
- 7.0000E-05
- 6.0000E-05
- 5.0000E-05
- 4.0000E-05
- 3.0000E-05
- 2.0000E-05
- 1.0000E-05
- 3.3534E-13

FOS=1.25

Section 4

Section 2



Fine Tailings

Project No.
60551494

Henderson
3 Dam Buttress

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3D Post-Earthquake Stability Analysis with Buttress
Strain Contours at Failure on Cross Sections
Stage 4, Crest El. 8900 ft

Figure
16

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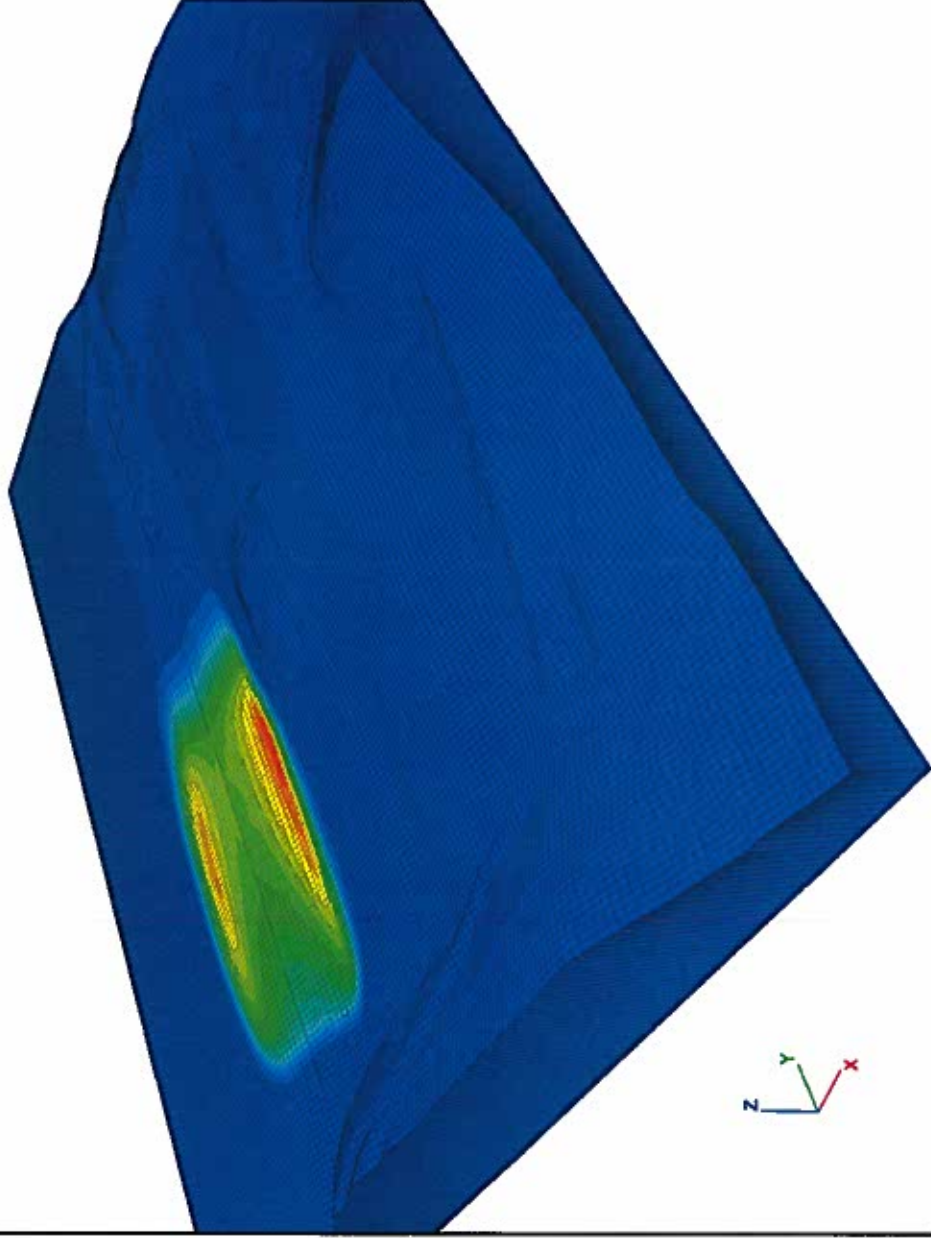
Factor of Safety

Value = 1.25

Contour Of Velocity



FOS=1.25



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

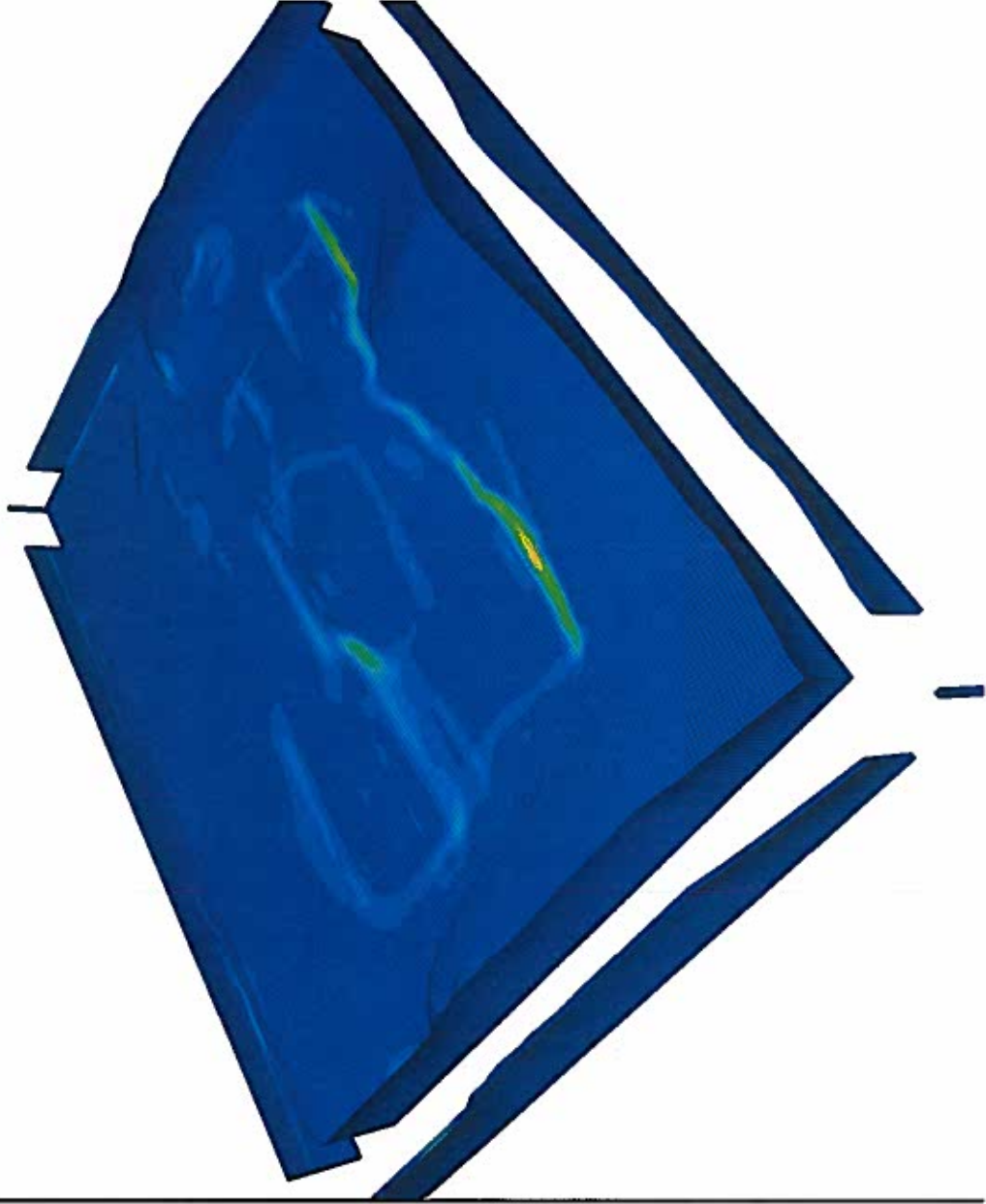
3D Post-Earthquake Stability Analysis with Buttress
Velocity Contours at Failure
Stage 4, Crest El. 8900 ft

Figure
17

FLAC3D 5.01

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Contour of Max. Shear Strain Increment
Calculated by: Volumetric Averaging



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis with Buttress Maximum Shear Strain Increment Contours Stage 1, Crest El. 8883 ft	Figure 18

AECOM

FLAC3D 5.01

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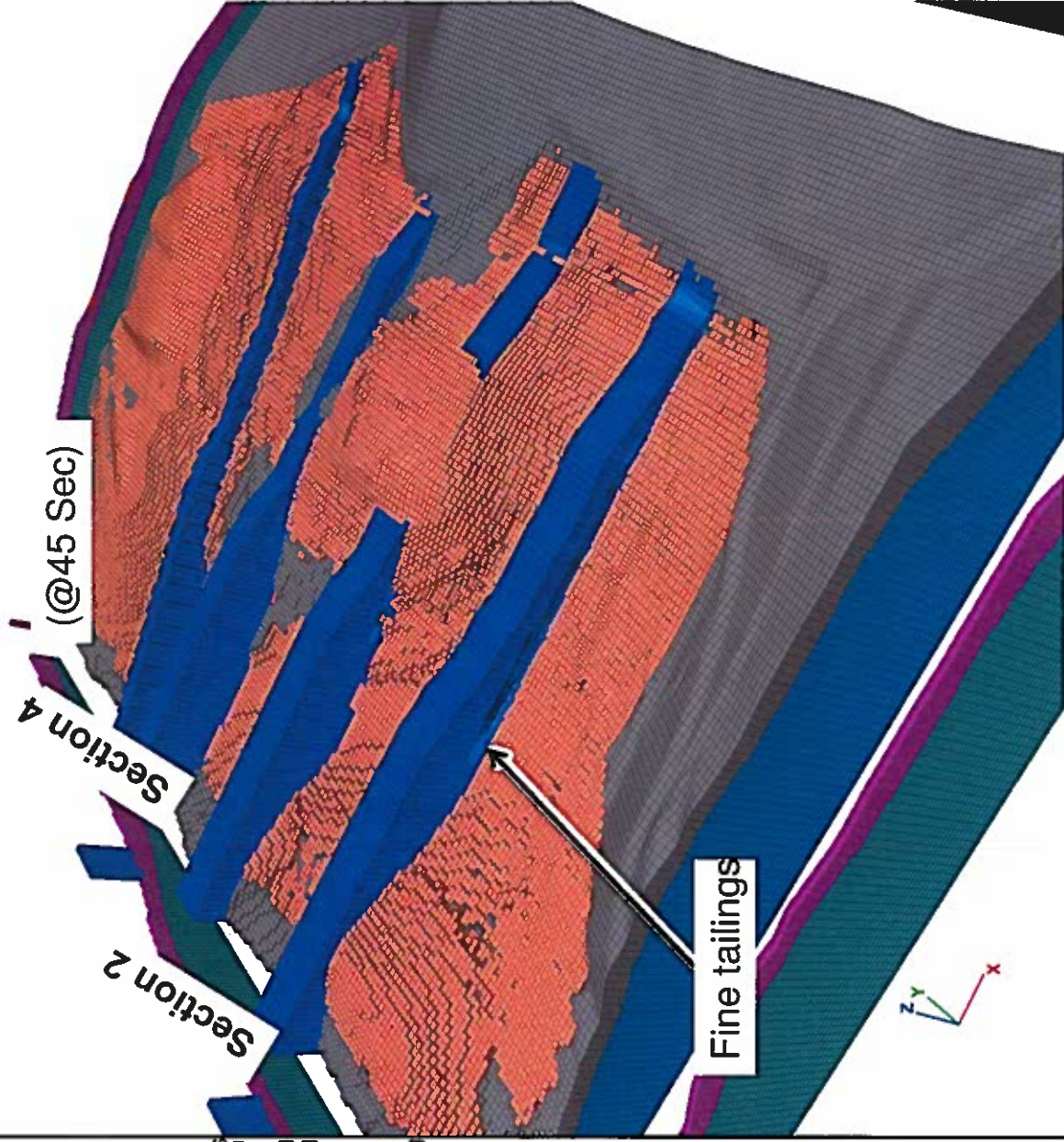
Zone

Colorby: Group Any

- BEDROCK
- BEDROCK:FreeField
- Buttress
- End of DEPOSITION_TAILINGS
- End_of_DEPOSITION_TAILINGS:FreeField
- Fine tailings
- FreeField:LowerFOUNDATION
- FreeField:UpperFOUNDATION
- LowerFOUNDATION
- UpperFOUNDATION

Contour of Max. Shear Strain Increment
Calculated by: Volumetric Averaging

- 6.8027E-01
- 6.5000E-01
- 6.0000E-01
- 5.5000E-01
- 5.0000E-01
- 4.5000E-01
- 4.0000E-01
- 3.5000E-01
- 3.0000E-01
- 2.5000E-01
- 2.0000E-01
- 1.5000E-01
- 1.0000E-01
- 5.0000E-02
- 4.6540E-07



3D Post-Earthquake Dynamic Deformation Analysis
with Buttress
Shear Strain Contours on Multiple Cross-Sections
Stage 1, Crest El. 8883 ft

Project No.
60551494

Henderson
3 Dam Buttress

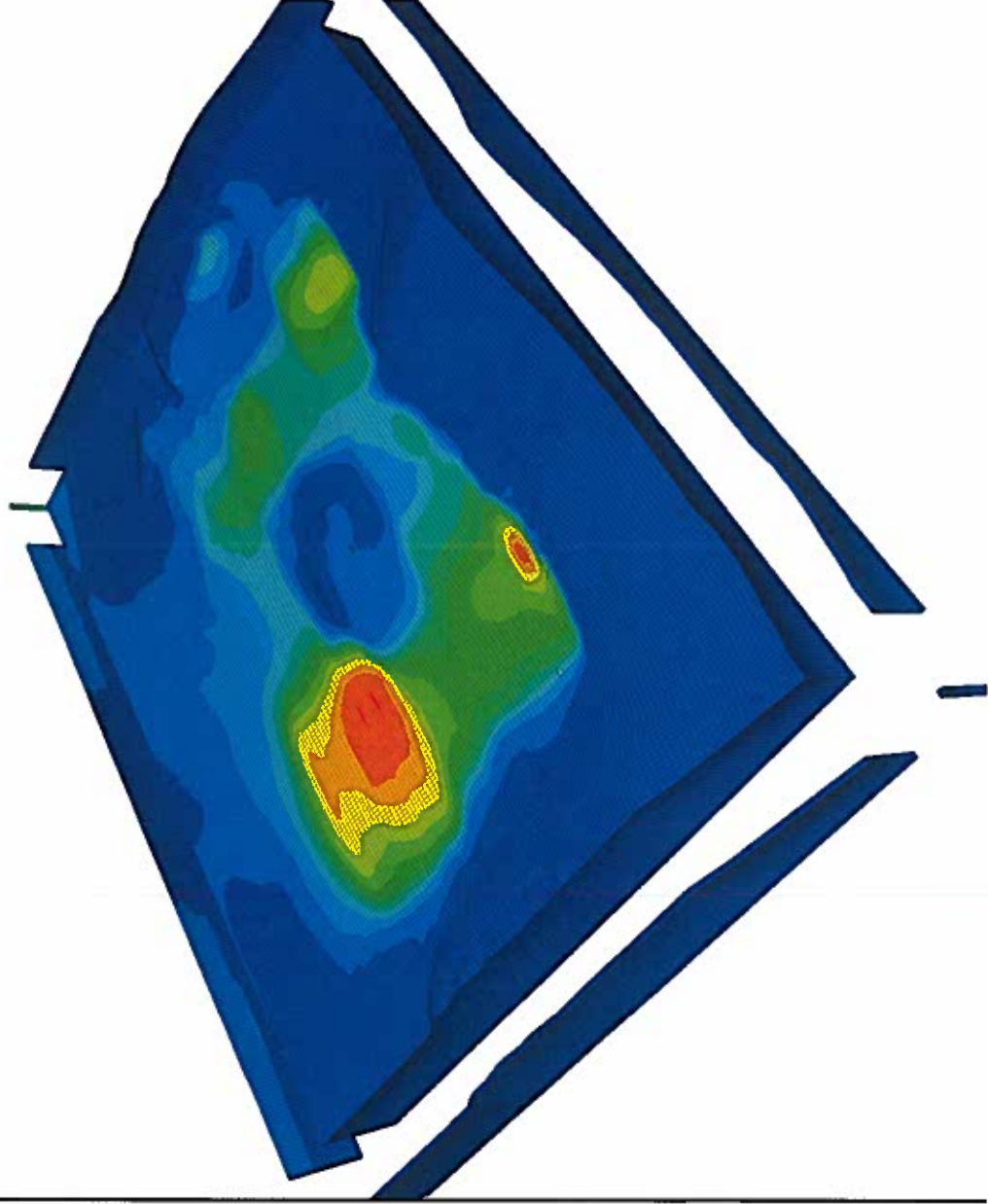
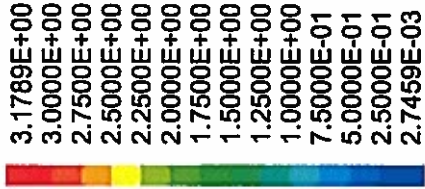
AECOM

Figure
19

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Contour Of Displacement



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

3D Post-Earthquake Dynamic Deformation Analysis
with Buttress, Displacement Contours
Stage 1, Crest El. 8883 ft

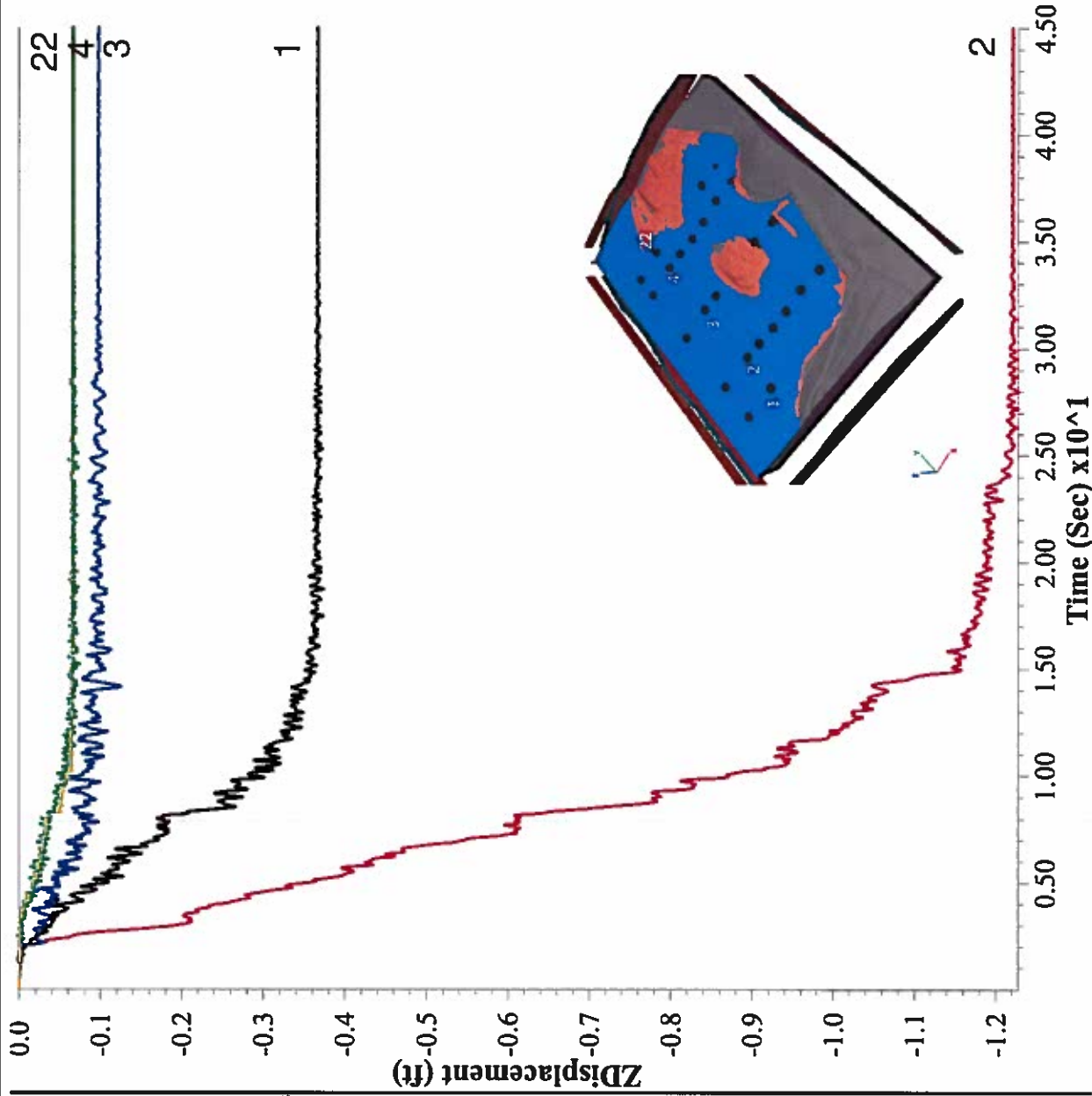
Figure
20

FLAC3D 5.01

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History

- 501 zdis_1 (FISH)
- 502 zdis_2 (FISH)
- 503 zdis_3 (FISH)
- 504 zdis_4 (FISH)
- 522 zdis_22 (FISH)
- vs. 1000 Real time for dynamic problems



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis With Buttress Stepback Crest Vertical Settlement Time Histories Stage 1, Crest El. 8883 ft	Figure 21

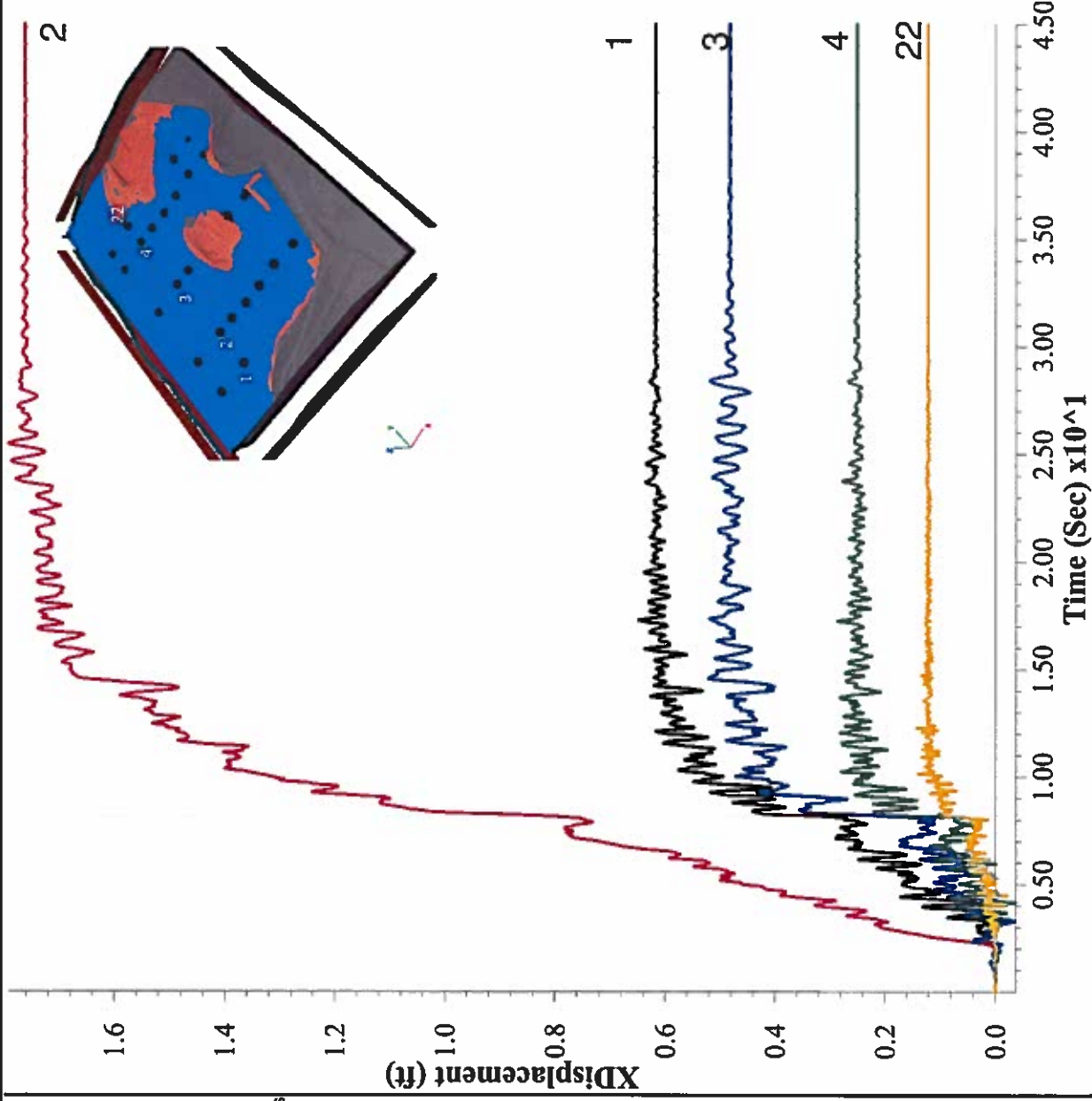
AECOM

FLAC3D 5.01

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History

- 301 xdis_1 (FISH)
- 302 xdis_2 (FISH)
- 303 xdis_3 (FISH)
- 304 xdis_4 (FISH)
- 322 xdis_22 (FISH)
- vs. 1000 Real time for dynamic problems



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

3D Post-Earthquake Dynamic Deformation Analysis
with Buttress
Stepback Crest US/DS Displacement Time Histories
Stage 1, Crest El. 8883 ft

Figure
22

FLAC3D 5.01

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Zone

Deformed Factor: 5

Colorby: Group Any

- BEDROCK
- BEDROCK:FreeField
- Buttress
- End_of_DEPOSITION_TAILINGS
- End_of_DEPOSITION_TAILINGS:FreeField
- FineTailings
- FOUNDATION
- FreeField:LowerFOUNDATION
- FreeField:UpperFOUNDATION
- LowerFOUNDATION
- UpperFOUNDATION

Geometry

- Edge
- Node
- Polygon

Factor of Safety

FOS Not Available



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis with Buttress Deformed Mesh/5 Times Exaggerated @45 Sec Stage 1, Crest El. 8883 ft	Figure 23
	AECOM		

FLAC3D 5.01

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Geometry

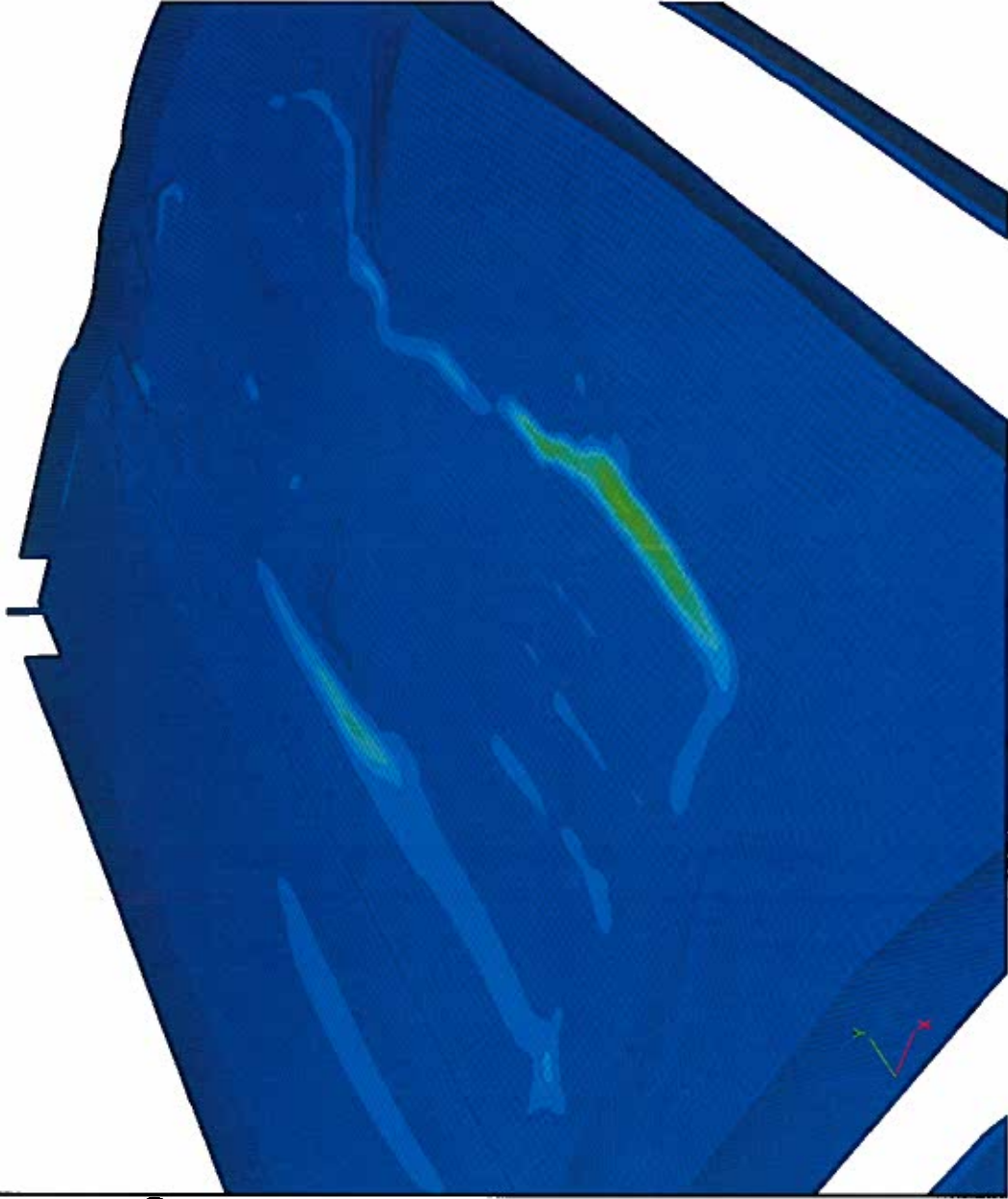
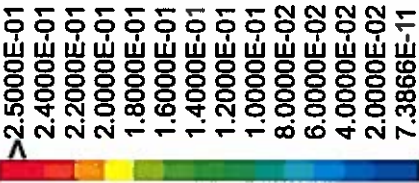
- Edge
- Node
- Polygon

Factor of Safety

FOS Not Available

Contour of Max. Shear Strain Increment

Calculated by: Volumetric Averaging



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis with Buttress Maximum Shear Strain Increment Contours Stage 4, Crest El. 8900 ft	Figure 24

AECOM

FLAC3D 5.01

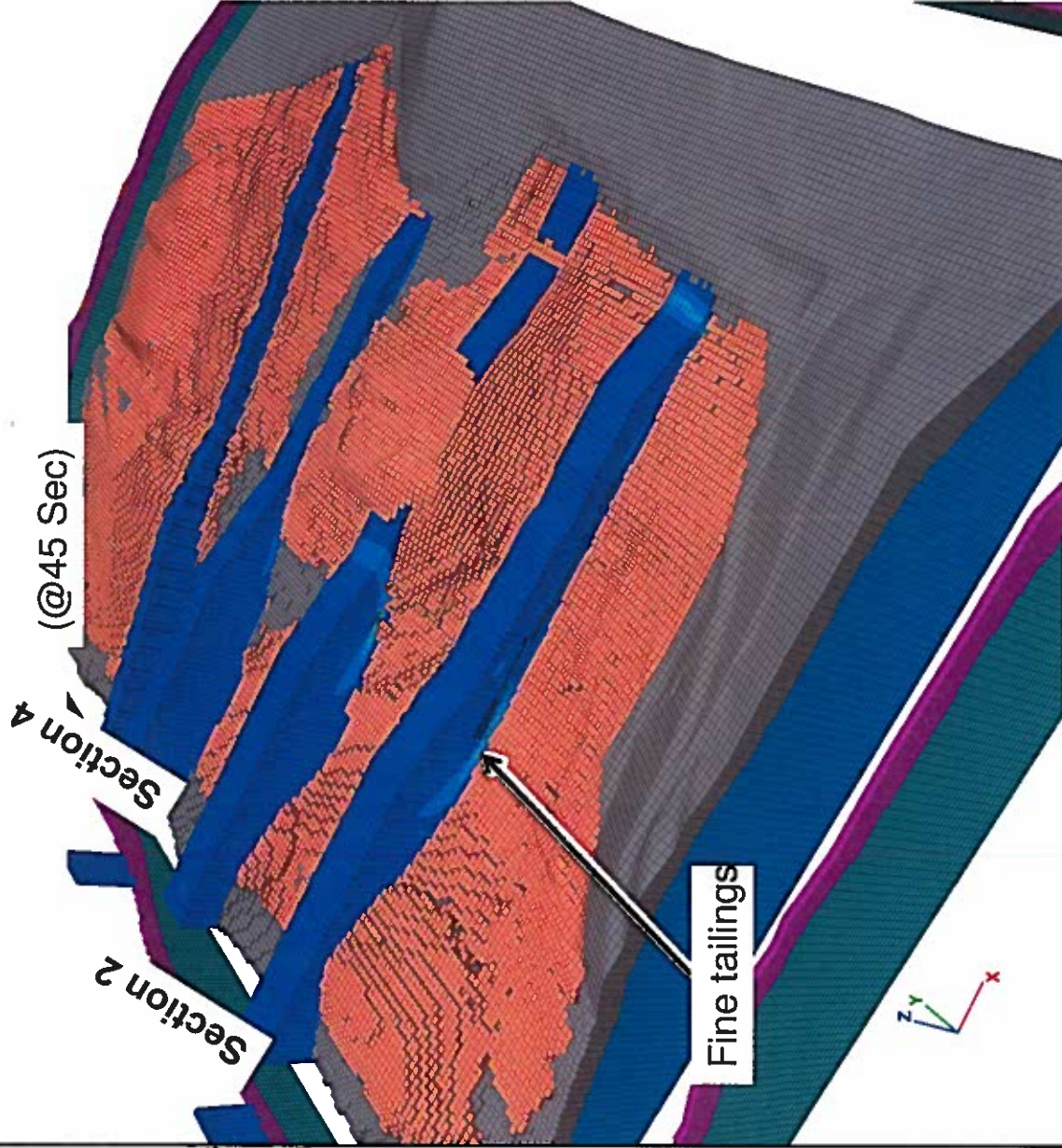
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Zone

Colorby: Group Any

BEDROCK
BEDROCK:FreeField
Buttress
End_of_DEPOSITION_TAILINGS
End_of_DEPOSITION_TAILINGS:FreeField
Finetailings
FreeField:LowerFOUNDATION
FreeField:UpperFOUNDATION
LowerFOUNDATION
UpperFOUNDATION
Contour of Max. Shear Strain Increment
Calculated by: Volumetric Averaging

6.2876E-01
6.0000E-01
5.5000E-01
5.0000E-01
4.5000E-01
4.0000E-01
3.5000E-01
3.0000E-01
2.5000E-01
2.0000E-01
1.5000E-01
1.0000E-01
5.0000E-02
2.2153E-09



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

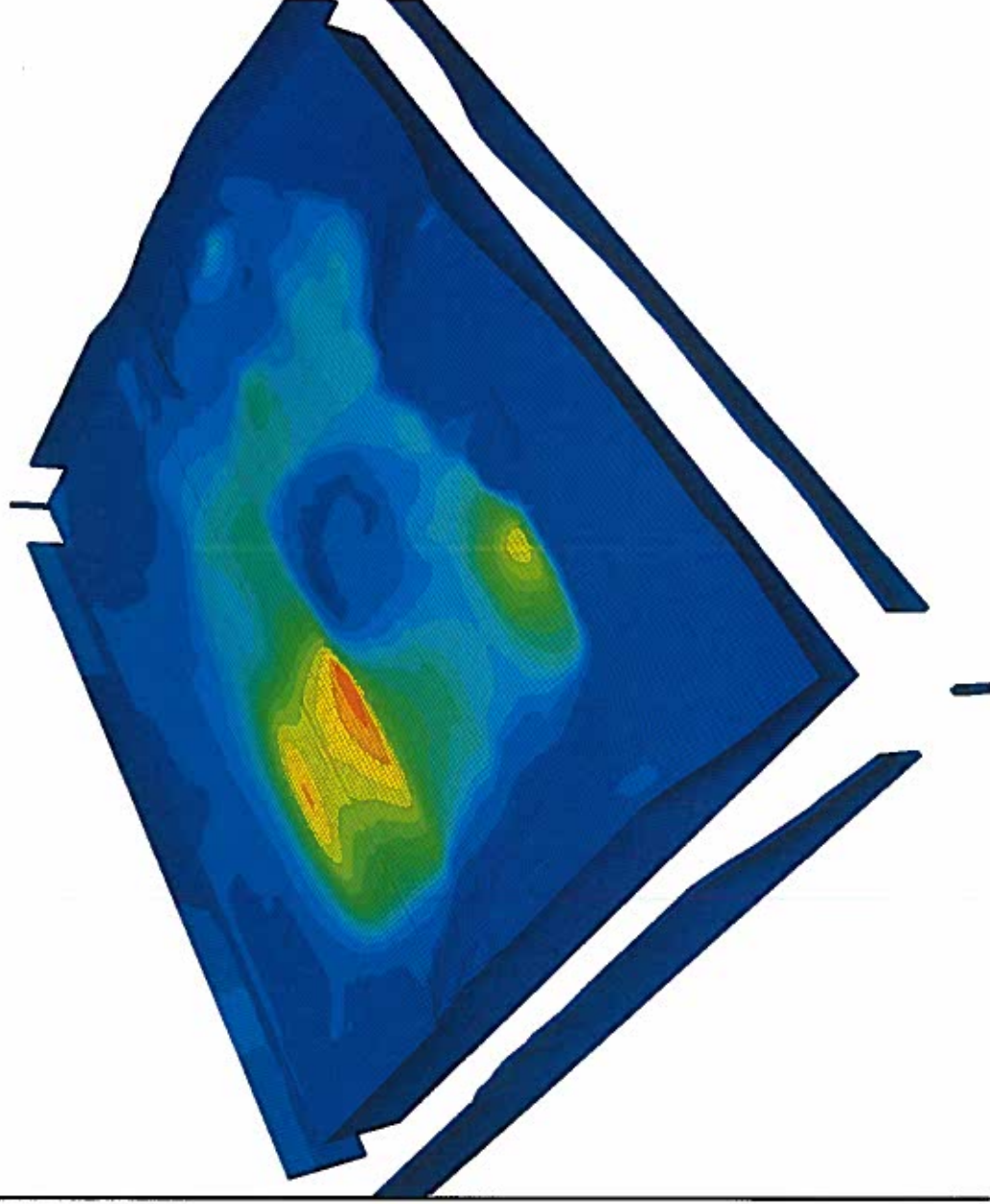
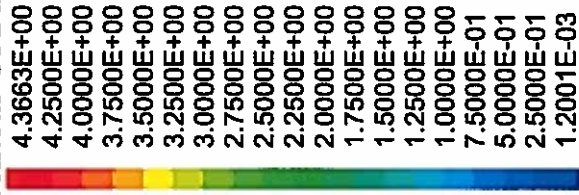
3D Post-Earthquake Dynamic Deformation Analysis
with Buttress
Shear Strain Contours on Multiple Cross-Sections
Stage 4, Crest El. 8900 ft

Figure
25

FLAC3D 5.01

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Contour Of Displacement



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

3D Post-Earthquake Dynamic Deformation Analysis
with Buttress, Displacement Contours
Stage 4, Crest El. 8900 ft

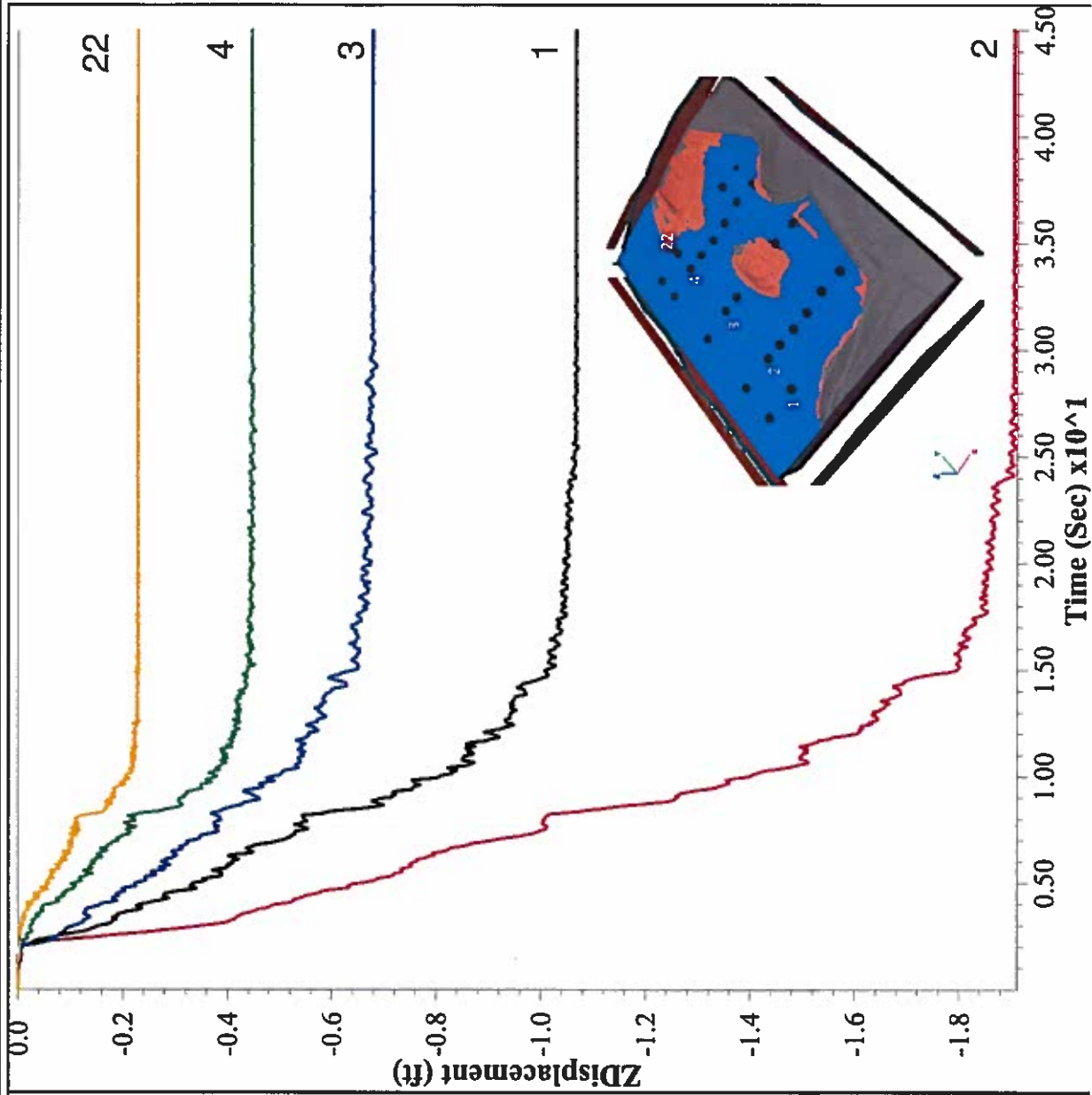
Figure
26

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History

- 501 zdis_1 (FISH)
- 502 zdis_2 (FISH)
- 503 zdis_3 (FISH)
- 504 zdis_4 (FISH)
- 522 zdis_22 (FISH)
- vs. 1000 Real time for dynamic problems



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis With Buttress Stepback Crest Vertical Settlement Time Histories Stage 4, Crest El. 8900 ft	Figure 27

AECOM

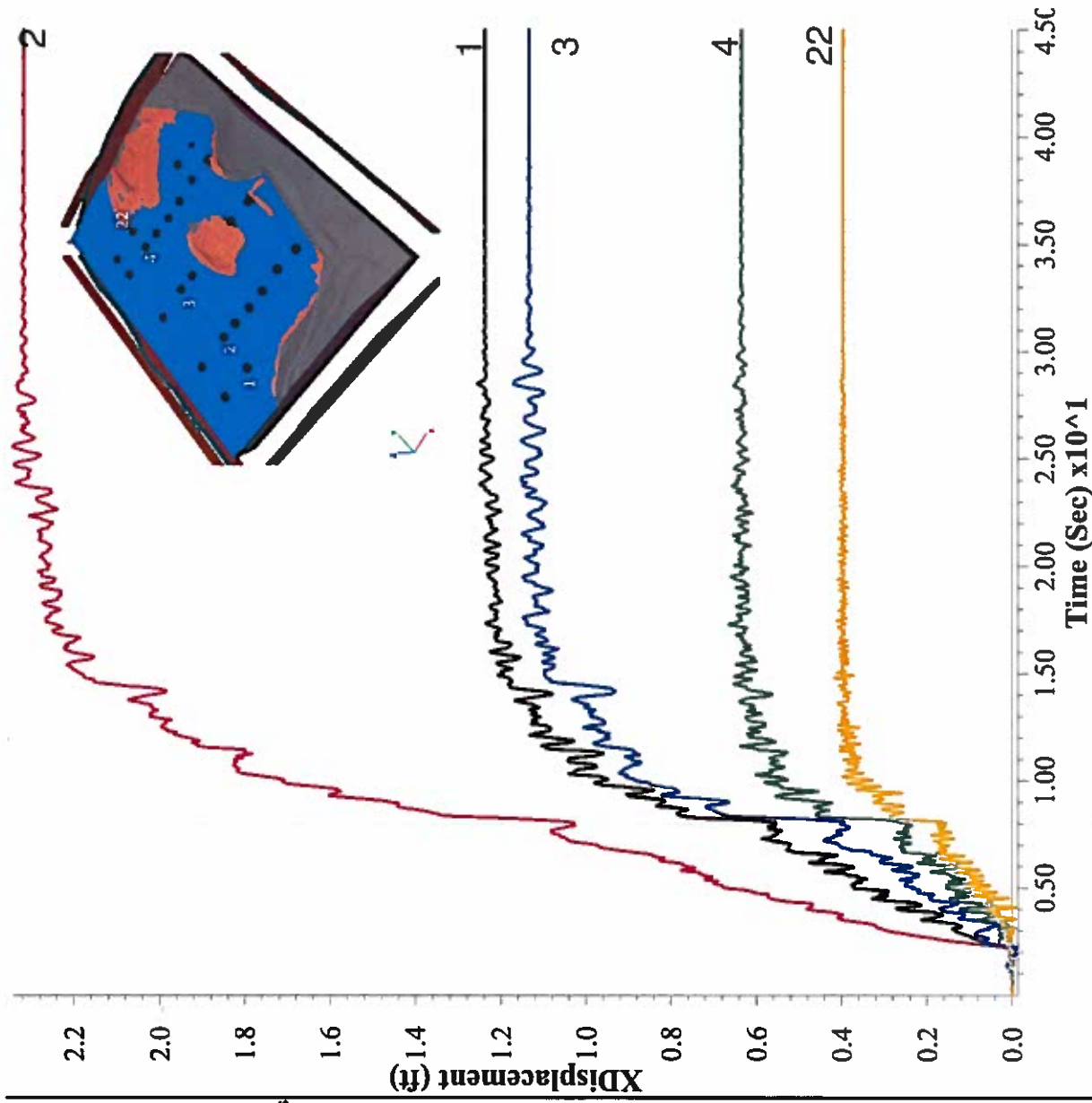
FLAC3D 5.01

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History

- 301 xdis_1 (FISH)
- 302 xdis_2 (FISH)
- 303 xdis_3 (FISH)
- 304 xdis_4 (FISH)
- 322 xdis_22 (FISH)

vs. 1000 Real time for dynamic problems



Project No.
60551494

Henderson
3 Dam Buttress

AECOM

3D Post-Earthquake Dynamic Deformation Analysis
with Buttress
Stepback Crest US/DS Displacement Time Histories
Stage 4, Crest El. 8900 ft

Figure
28

FLAC3D 5.01

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Zone

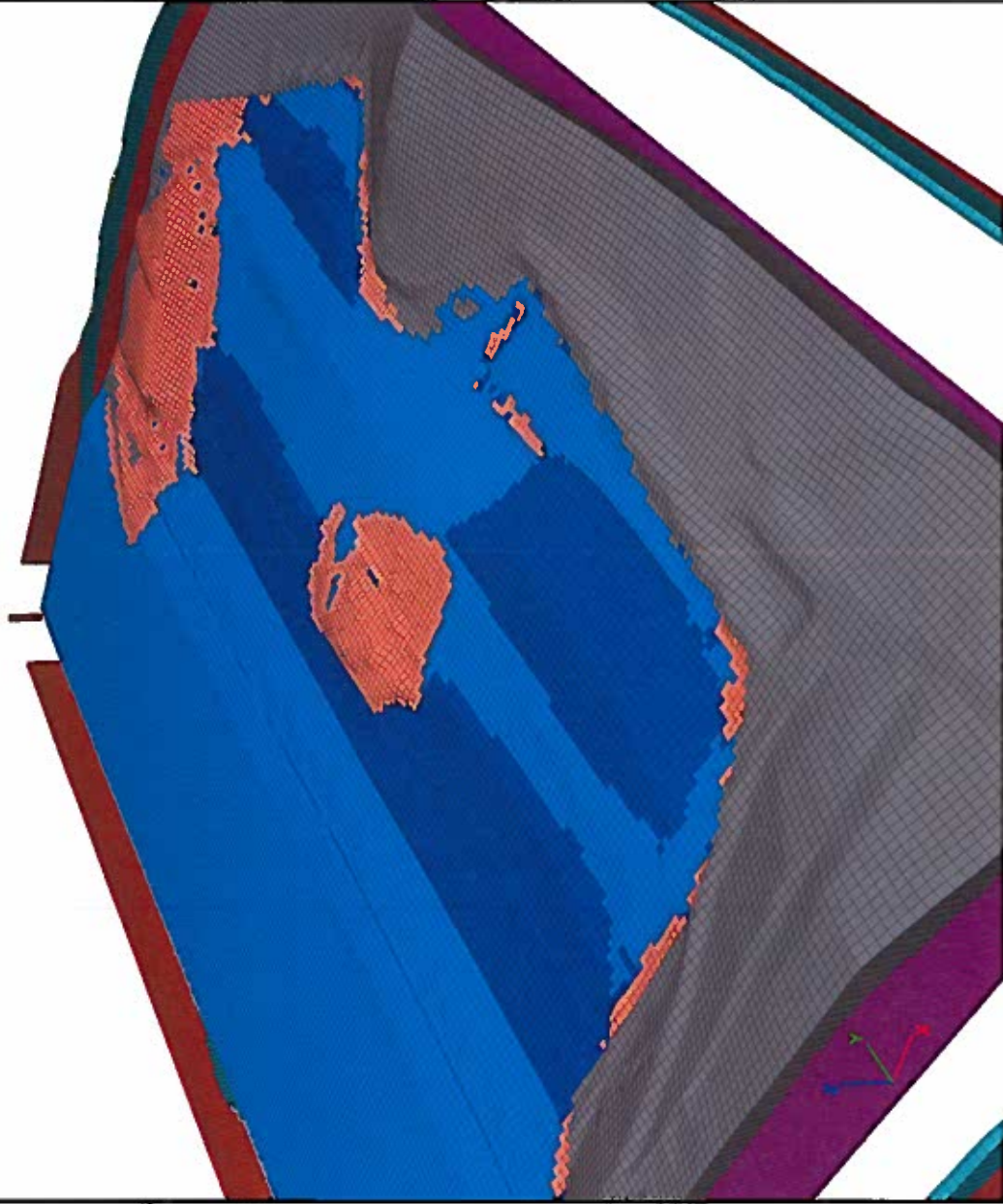
Deformed Factor: 5
Colorby: Group Any

- BEDROCK
- BEDROCK:FreeField
- Buttress
- End_of_DEPOSITION_TAILINGS
- End_of_DEPOSITION_TAILINGS:FreeField
- Finetallings
- FOUNDATION
- FreeField:LowerFOUNDATION
- FreeField:UpperFOUNDATION
- LowerFOUNDATION
- UpperFOUNDATION

Geometry

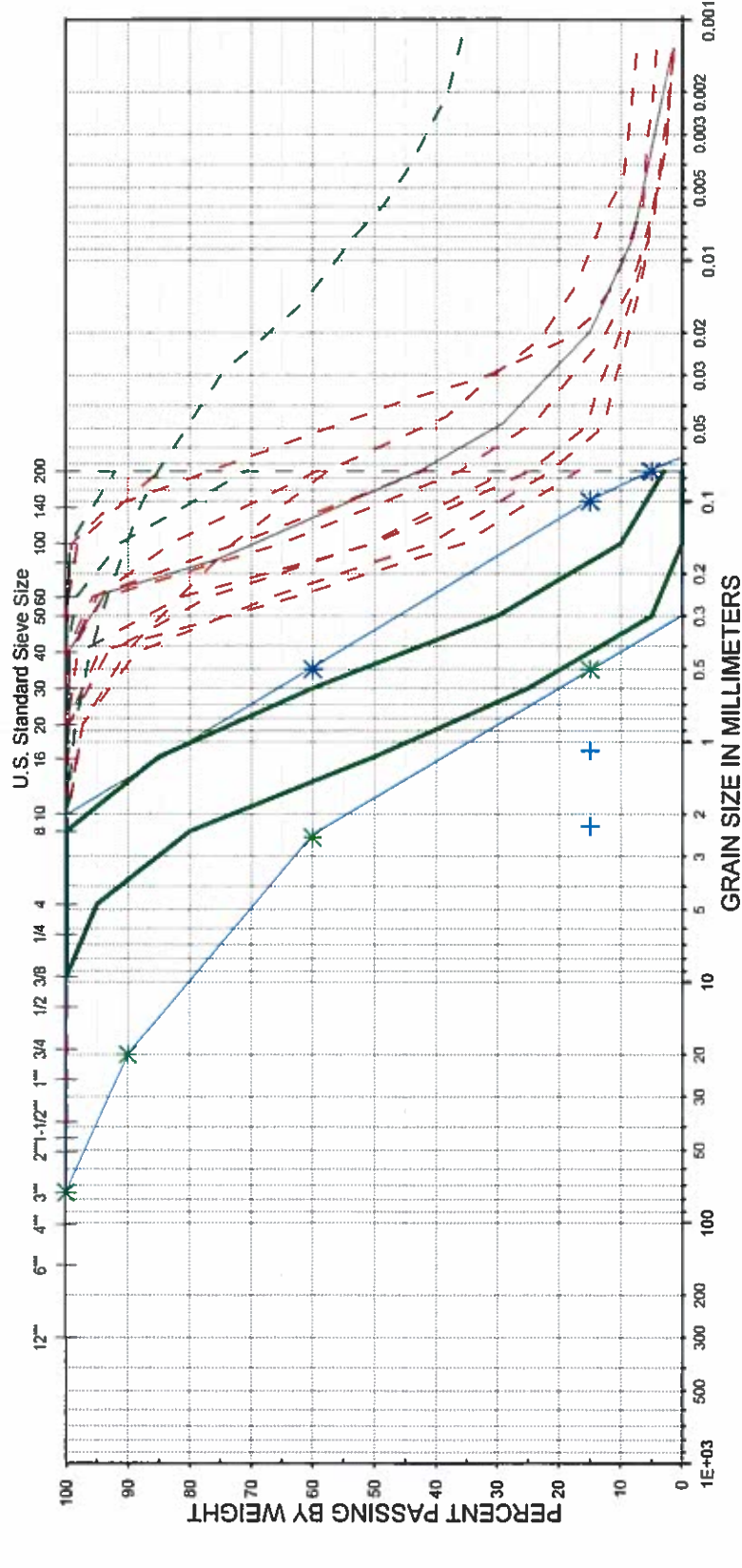
- Edge
- Node
- Polygon

Factor of Safety
FOS Not Available



Project No. 60551494	Henderson 3 Dam Buttress	3D Post-Earthquake Dynamic Deformation Analysis withButtress Deformed Mesh/5 Times Exaggerated @45 Sec Stage 4, Crest El. 8900 ft	Figure 29
AECOM			

BOULDERS		COBBLES		GRAVEL		SAND		SILT OR CLAY	
				COARSE	FINE	COARSE	MEDIUM	FINE	



PROJECT NO. 60551494	Henderson 3 Dam Buttress	Filter Compatibility and Gradation Curves for Fine and Coarse Filter Material	Figure 30
	AECOM		

Attachment A: **Drawings**