

APPENDIX C

TABLE C1: – KINEMATIC FEASIBILITY ASSESSMENT

Table C1: Summary of Kinematic Feasibility Assessment							
General Feature Configuration	Strike (°)	Dip Direction (°)	Dip Angle (°) bench / (overall)	Defect Type	Kinematically Feasible		
					Toppling	Planar Sliding	Wedge
Highwall 1	123	213	55/(38)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(N)	Y(Y)
				Joint >60°	Y(Y)	N(N)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	Y(Y)	N(N)	Y(Y)
				Crush Zone	N(N)	Y(N)	Y(Y)
Highwall 2	024	114	55/(38)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	N(N)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	Y(Y)
				Crush Zone	N(N)	N(N)	Y(Y)
Highwall 3	204	294	55/(38)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(N)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	N(N)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)

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General Feature Configuration	Strike (°)	Dip Direction (°)	Dip Angle (°) bench / (overall)	Defect Type	Kinematically Feasible		
					Toppling	Planar Sliding	Wedge
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	Y(Y)
				Crush Zone	N(N)	Y(N)	Y(N)

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General Feature Configuration	Strike (°)	Dip Direction (°)	Dip Angle (°) bench / (overall)	Defect Type	Kinematically Feasible		
					Toppling	Planar Sliding	Wedge
Highwall 4	303	033	55/(38)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(N)	Y(N)	Y(Y)
				Joint >60°	Y(Y)	N(N)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	Y(Y)
				Crush Zone	Y(N)	N(N)	N(N)
West sump (North Wall)	095	185	55/(45)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	Y(Y)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	N(N)
				BCM Crush Zone	Y(Y)	Y(Y)	Y(Y)
				BCM Crush Zone	N(N)	N(N)	N(N)
West Sump (West Wall)	020	110	55/(45)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	Y(Y)	Y(Y)
				Fracture 30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	Y(Y)	N(N)	N(N)

Table C1: Summary of Kinematic Feasibility Assessment

General Feature Configuration	Strike (°)	Dip Direction (°)	Dip Angle (°) bench / (overall)	Defect Type	Kinematically Feasible		
					Toppling	Planar Sliding	Wedge
				BCM Crush Zone	Y(Y)	Y(Y)	Y(Y)
				BSM Crush Zone	N(N)	N(N)	N(N)
West Sump (East Wall)	020	290	55/(45)	Bedding	Y(Y)	N(N)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	Y(Y)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	Y(N)
				BCM Crush Zone	Y(Y)	Y(Y)	Y(Y)
				BSM Crush Zone	Y(Y)	N(N)	N(N)
West Sump (South Wall)	095	005	55/(45)	Bedding	Y(Y)	Y(Y)	Y(Y)
				Joint <30°	N(N)	Y(Y)	Y(Y)
				Joint 30-60°	Y(Y)	Y(Y)	Y(Y)
				Joint >60°	Y(Y)	Y(Y)	Y(Y)
				Fracture <30°	N(N)	Y(Y)	Y(Y)
				Fracture 30-60°	Y(Y)	Y(Y)	Y(Y)
				Fracture >60°	Y(Y)	N(N)	Y(Y)
				Fault	N(N)	N(N)	Y(N)
				BCM Crush Zone	Y(Y)	N(N)	N(N)
				BSM Crush Zone	Y(Y)	Y(Y)	Y(Y)

Notes:

1. The orientations given are generalised but represent the majority of the highwall / fault orientations.
2. Highwalls dip angles are as per overall slope design.
3. Bench angle (Overall Slope angle)

TABLE C2: - SUMMARY OF JOINT SETS

Table C2: Summary of Joint Picks Identified in Downhole Geophysical Data					
Group	Lithology	Defect Type	No. Poles	Joint Set Orientations	
				Dip Angle (°) ¹	Dip Direction (°) ¹
BCM	All Units	JT Set 1 (<30°)	49	3	048
		JT Set 1-2 (30-60°)	116	44	162
				11	346
		JT Set 1-2 (60+°)	200	70	342
				72	164
		JT Set 3-4 (60+°)	200	76	097
				67	264
BCM	Sandstone (Capstone)	JT Set 1 (<30°)	12	1	108
		JT Set 1-2 (30-60°)	10	51	299
				42	122
		JT Set 1-2 (60+°)	100	65	340
				64	277
		JT Set 3-4 (60+°)	12	65	242
				72	101
BCM	Coal	JT Set 1 (<30°)	5	5	350
		JT Set 1-2 (30-60°)	16	44	021
				34	246
		JT Set 1-2 (30-60°)	16	39	137
				43	327
		JT Set 1-2 (60+°)	10	73	241
				65	040
		JT Set 3-4 (60+°)	7	71	296
				75	146
BCM	Carbonaceous Mudstone	JT Set 1 (<30°)	10	13	108
		JT Set 1-2 (30-60°)	17	47	203
				45	350
		JT Set 1-2 (60+°)	7	66	248
				64	083
		JT Set 3-4 (60+°)	15	68	328
				77	113
BCM		JT Set 1-2 (<30°)	3	22	095

Table C2: Summary of Joint Picks Identified in Downhole Geophysical Data

Group	Lithology	Defect Type	No. Poles	Joint Set Orientations	
				Dip Angle (°) ¹	Dip Direction (°) ¹
	Basal Sandstone	JT Set 1-2 (30-60°)	7	45	056
				40	290
		JT Set 1-2 (60+°)	10	71	345
				62	171
		JT Set 3-4 (60+°)	8	64	146
				64	287
BSM	Greenland Group Greywacke	JT Set 1-2 (<30°)	15	10	036
		JT Set 1-2 (30-60°)	14	44	305
				54	133
		JT Set 1-2 (60+°)	9	63	254
				47	098
		JT Set 3-4 (60+°)	9	67	023
				62	182
		Notes:			
1. Joint pairs based on approximate average orientations.					

TABLE C3: SUMMARY OF FRACTURE SETS

Table C3: Summary of Fracture Picks Identified in Downhole Geophysical Data					
Group	Lithology	Defect Type	No. Poles	Fracture Orientations	
				Dip Angle (°) ¹	Dip Direction (°) ¹
BCM	BCM All Units	Fracture Set 1 (<30°)	298	4	114
		Fracture Set 1-2 (30-60°)	392	35	181
				47	355
		Fracture Set 3-4 (30-60°)	392	47	265
				48	074
		Fracture Set 1-2 (60°+)	203	74	242
				71	078
		Fracture Set 3 (60°+)	203	71	002
BCM	Sandstone (Caprock)	Fracture Set 1 (<30°)	130	3	087
		Fracture Set 1-2 (30-60°)	166	6	060
				37	189
		Fracture Set 3-4 (30-60°)			
		Fracture Set 1-2 (60°+)	35	71	024
				69	193
		Fracture Set 3 (60°+)	33	67	305
BCM	Coal	Fracture Set 1 (<30°)	4	17	195
		Fracture Set 1-2 (30-60°)	10	45	018
				33	166
		Fracture Set 3-4 (30-60°)	5	54	099
				60	227
		Fracture Set 1-2 (60°+)	17	69	352
				70	145
		Fracture Set 3 (60°+)	8	69	055
BCM	Carbonaceous Mudstone	Fracture Set 1 (<30°)	24	21	306
				16	115
		Fracture Set 1-2 (30-60°)	26	40	230
				48	072
		Fracture Set 1-2 (60°+)	7	66	222
				78	060
		Fracture Set 3 (60°+)	2	71	170

Table C3: Summary of Fracture Picks Identified in Downhole Geophysical Data

Group	Lithology	Defect Type	No. Poles	Fracture Orientations	
				Dip Angle (°) ¹	Dip Direction (°) ¹
BCM	Basal Sandstone	Fracture Set 2 (<30°)			
		Fractures Set 1-2 (30-60°)	20	40	114
				38	319
		Fractures Set 1-2 (60+°)	20	74	340
				73	129
		Fractures Set 3 (60+°)	17	78	246
				63	050
BSM	Greenland Group Greywacke	Fracture Set 1-2 (<30°)	3	28	287
				18	109
		Fracture Set 1-2 (30-60°)	7	37	355
				51	152
		Fracture Set 1-2 (60+°)	3	64	105
		Fracture Set 3 (60+°)	1	75	351

Notes:

1. Fracture pairs based approximate average orientation.

Highwall 1 – BCM - Bedding - Overall Slope

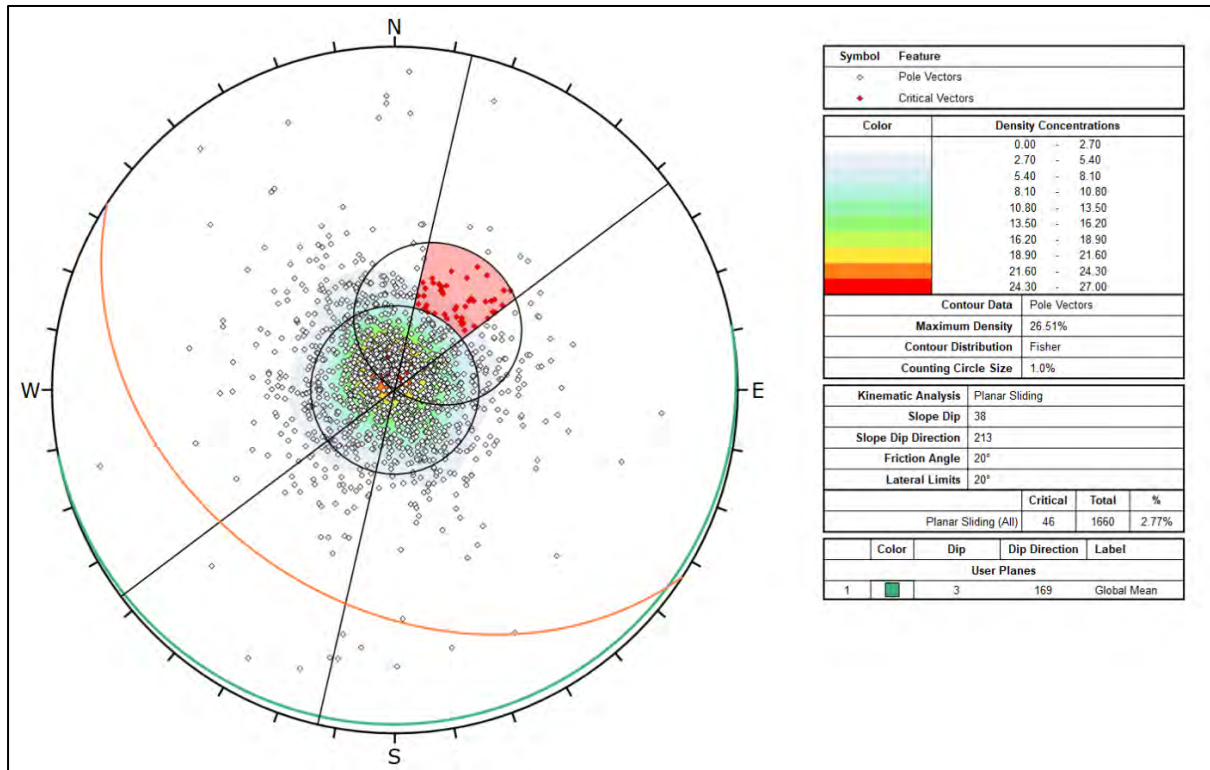


Figure: C1- Kinematic Analysis (BCM Bedding) - Highwall 1 (Overall Slope) – Planar Sliding.

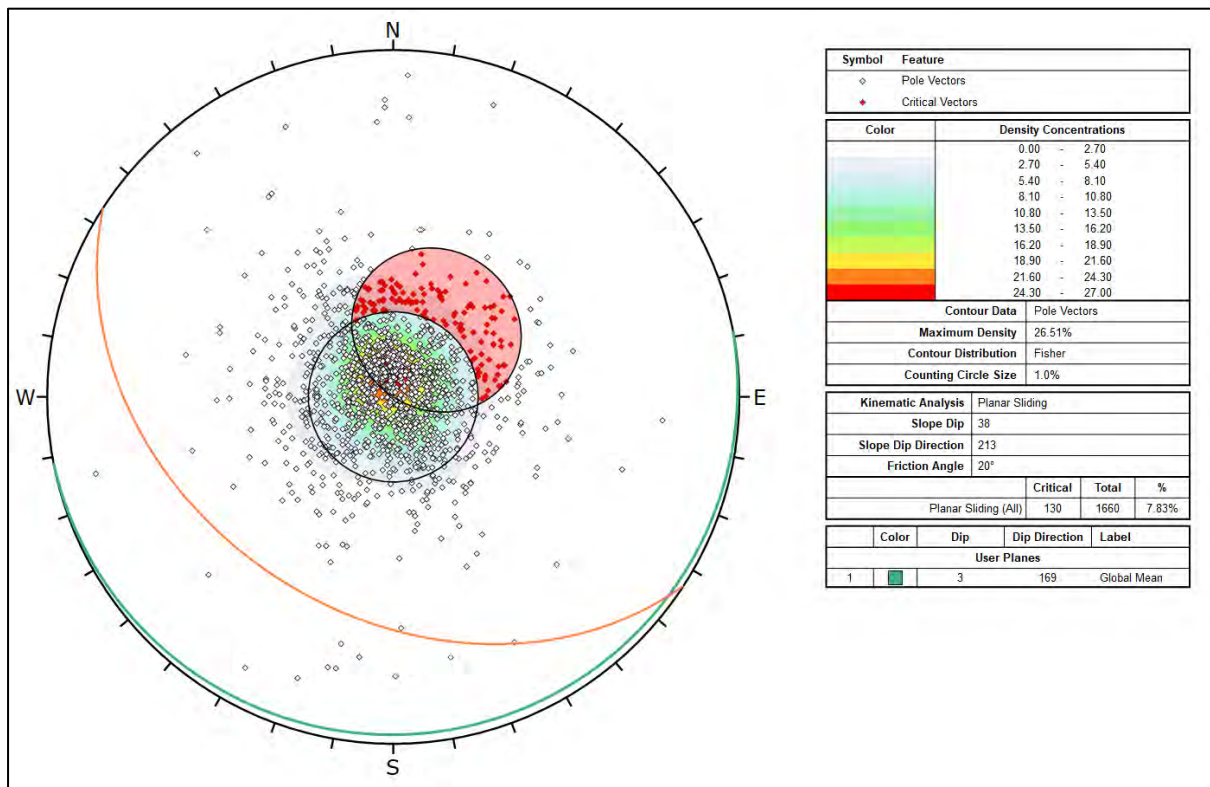
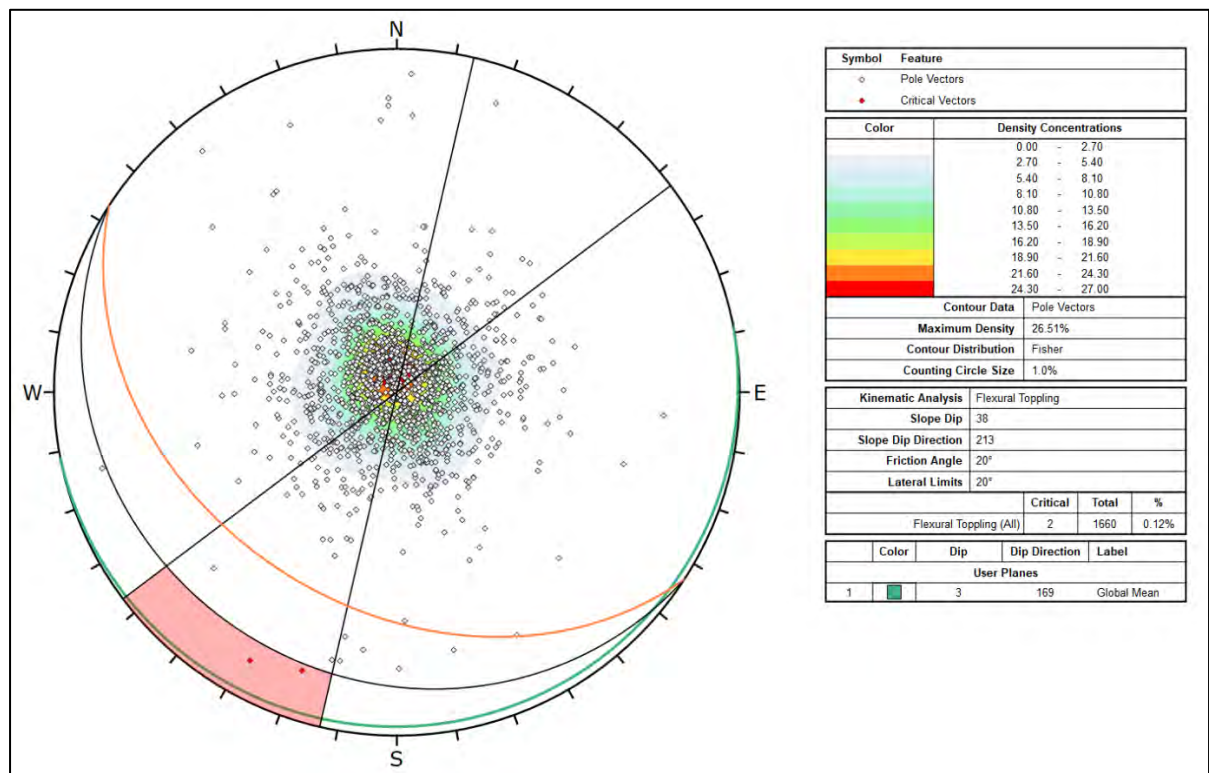


Figure: C2- Kinematic Analysis (BCM Bedding) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).



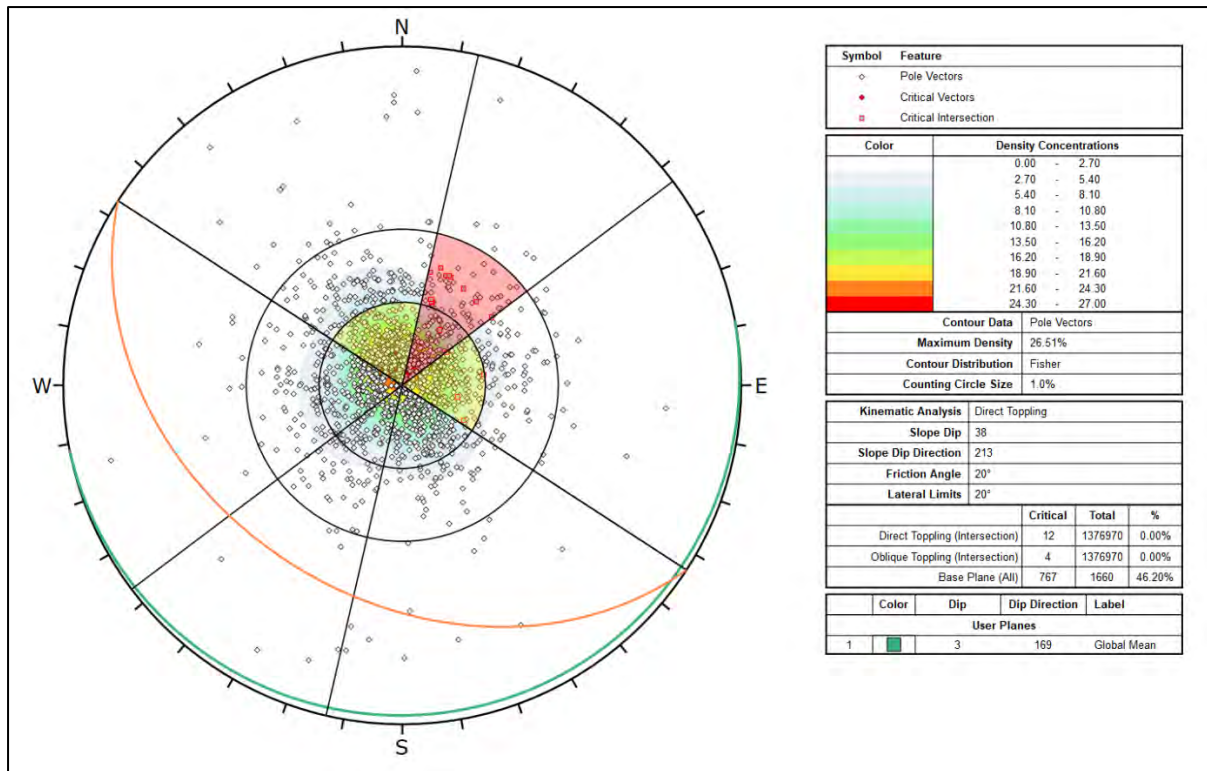


Figure: C5- Kinematic Analysis (BCM Bedding) - Highwall 1 (Overall Slope) – Direct Toppling.

Highwall 2 – BCM - Bedding - Overall Slope

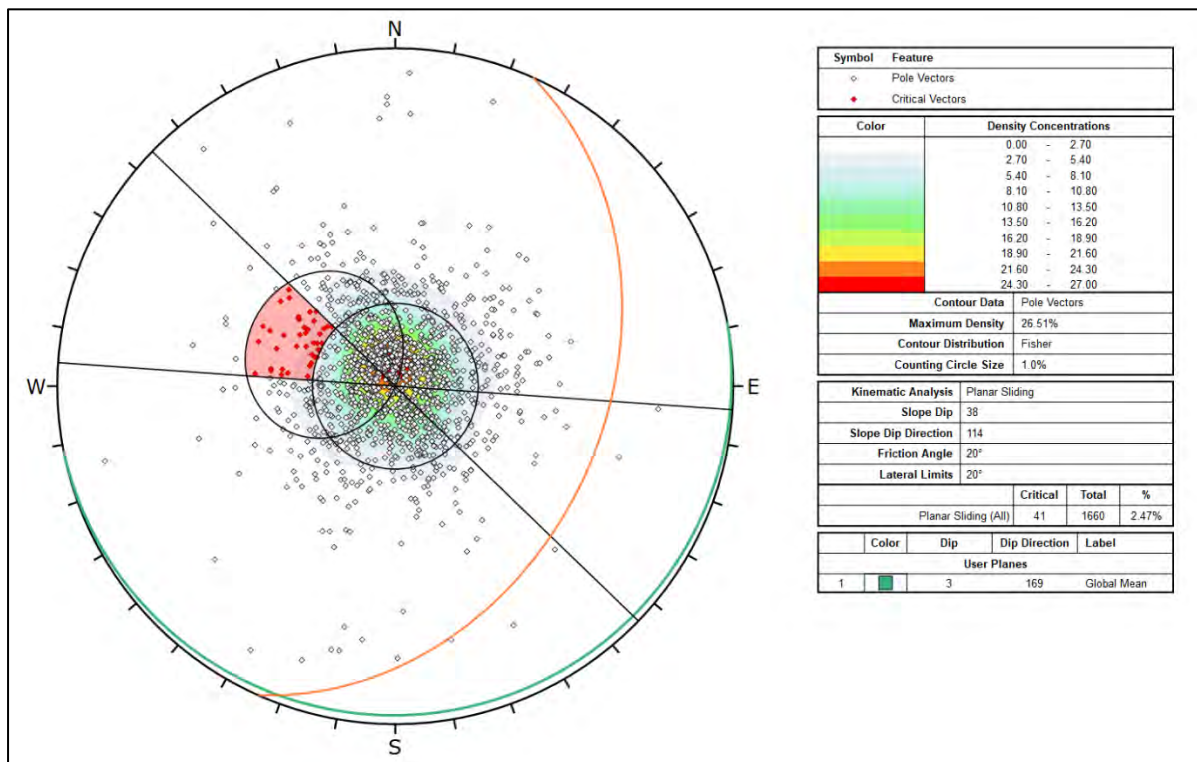


Figure: C6- Kinematic Analysis (BCM Bedding) - Highwall 2 (Overall Slope) – Planar Sliding.

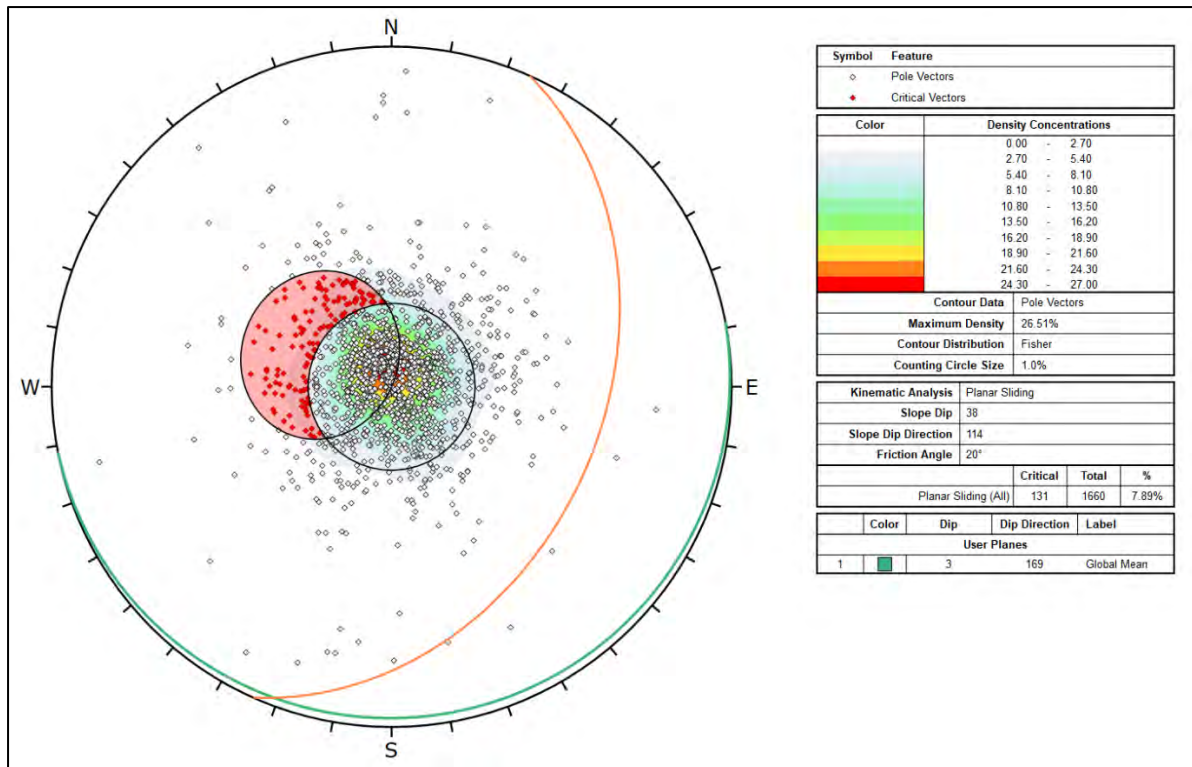


Figure: C7- Kinematic Analysis (BCM Bedding) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

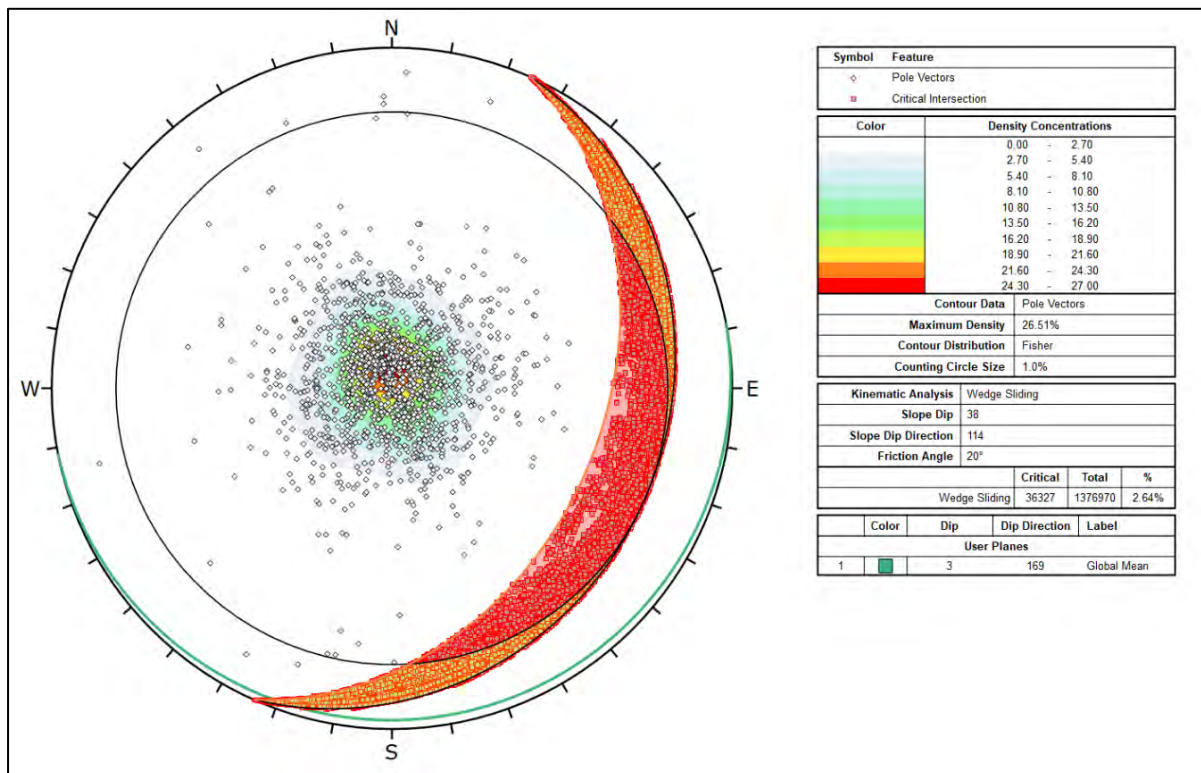


Figure: C8- Kinematic Analysis (BCM Bedding) - Highwall 2 (Overall Slope) – Wedge Sliding.

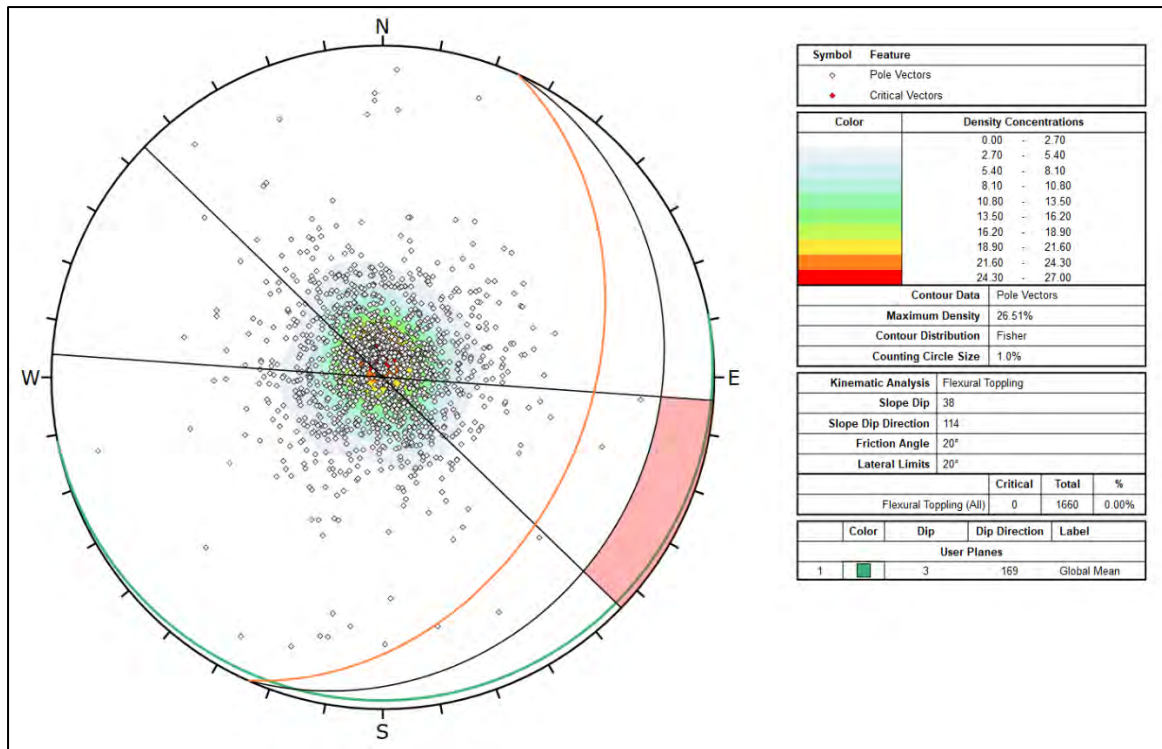


Figure: C9- Kinematic Analysis (BCM Bedding) - Highwall 2 (Overall Slope) – Flexural Toppling.

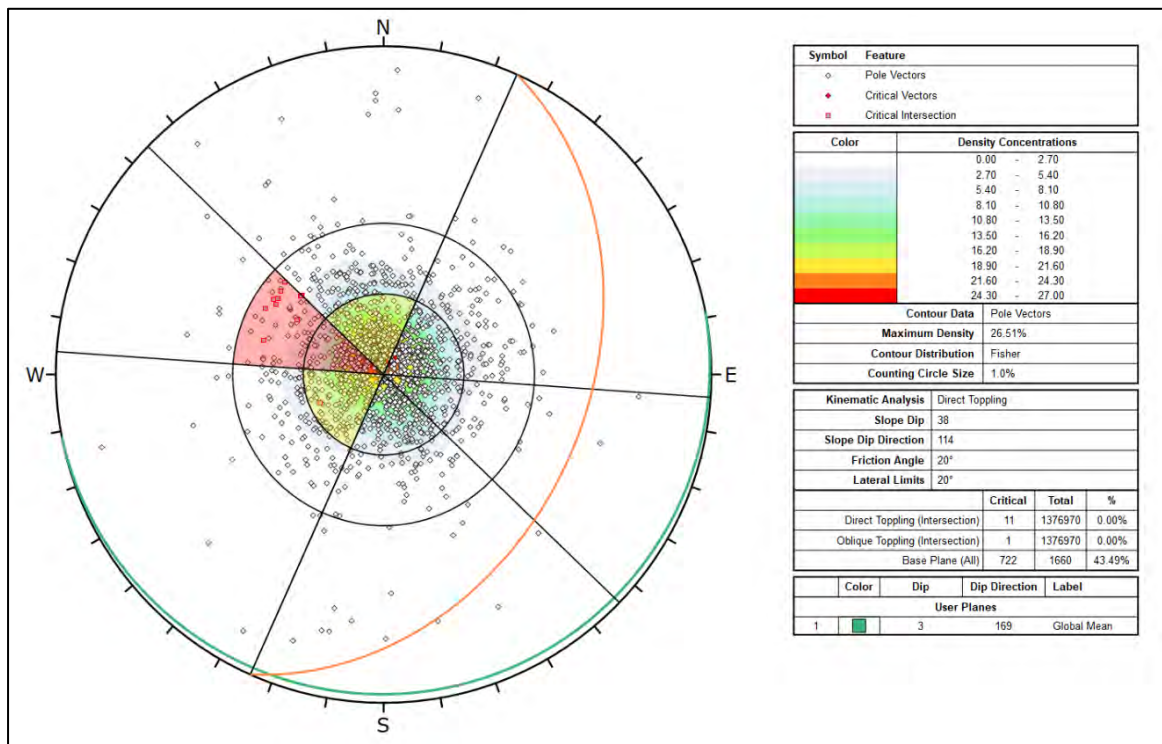


Figure: C10- Kinematic Analysis (BCM Bedding) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3 – BCM - Bedding - Overall Slope

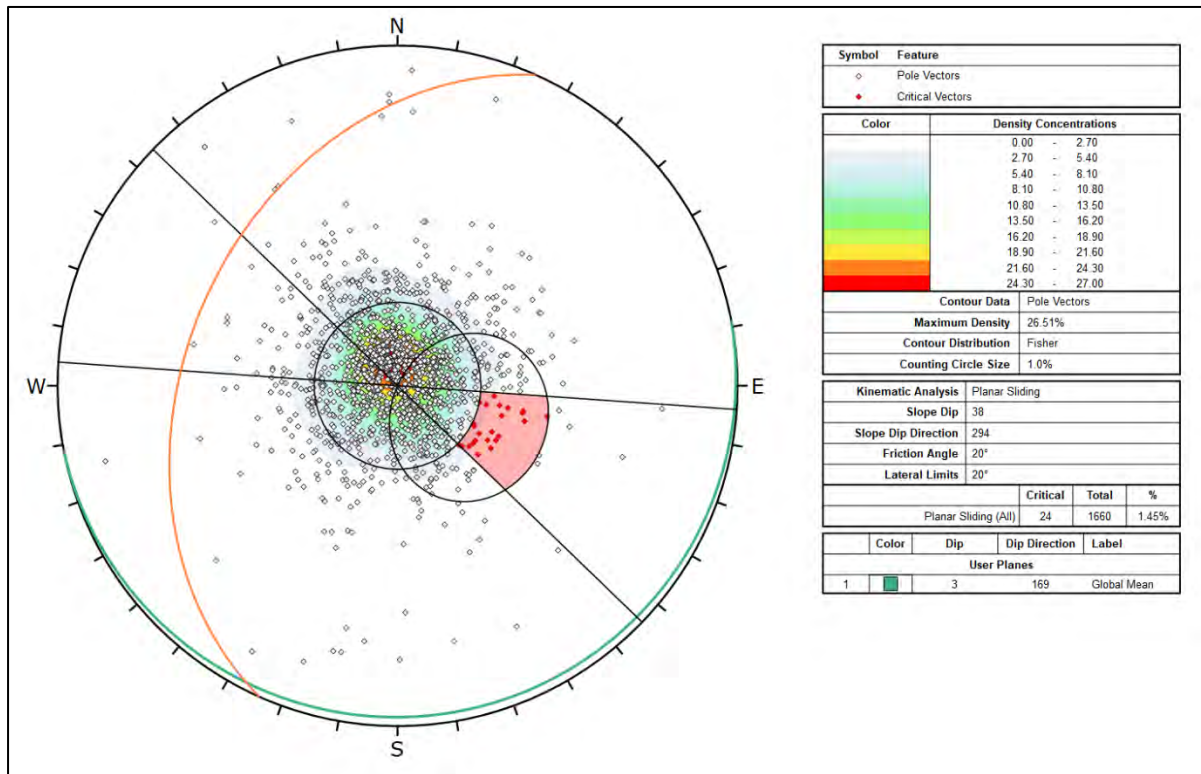


Figure: C11- Kinematic Analysis (BCM Bedding) - Highwall 3 (Overall Slope) – Planar Sliding.

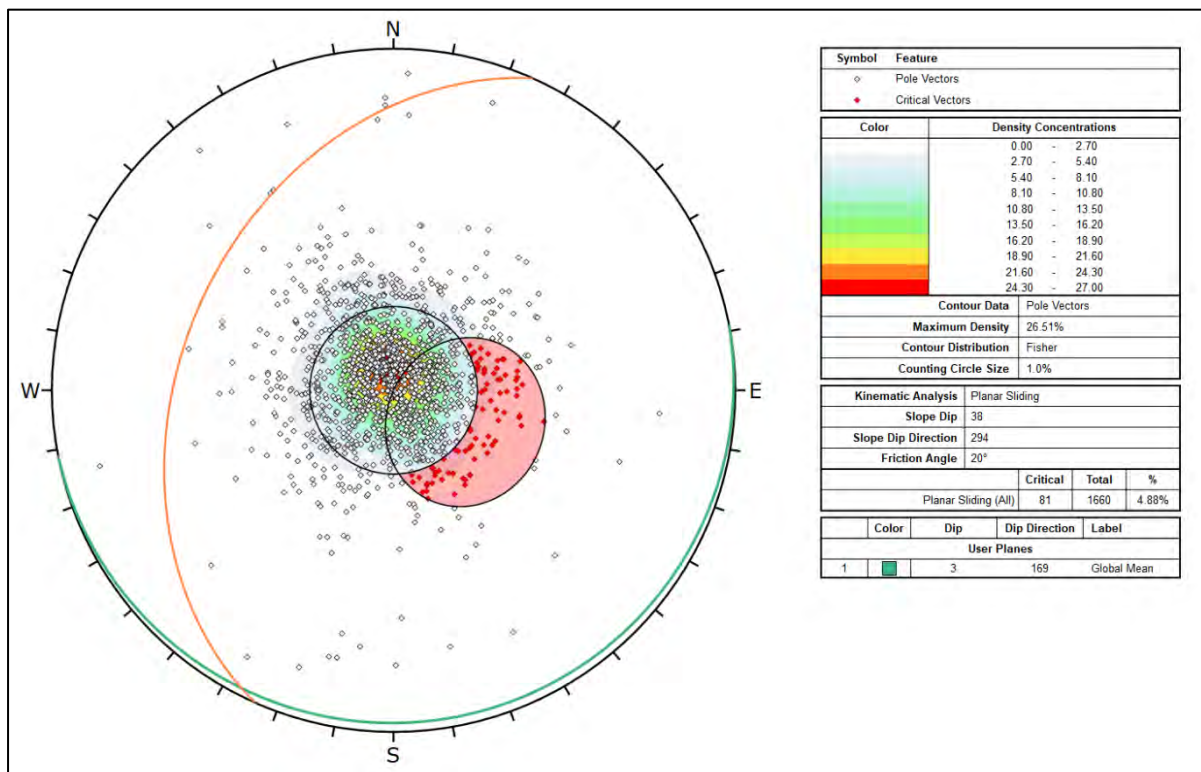


Figure: C12- Kinematic Analysis (BCM Bedding) - Highwall 3 (Overall Slope) – Planar Sliding. (No Limits).

Symbol	Feature
○	Pole Vectors
★	Critical Vectors

Color	Density Concentrations
	0.00 ~ 2.70
	2.70 ~ 5.40
	5.40 ~ 8.10
	8.10 ~ 10.80
	10.80 ~ 13.50
	13.50 ~ 16.20
	16.20 ~ 18.90
	18.90 ~ 21.60
	21.60 ~ 24.30
	24.30 ~ 27.00

Contour Data	Pole Vectors
Maximum Density	26.51%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Topping
Slope Dip	38
Slope Dip Direction	294
Friction Angle	20°
Lateral Limits	20°

	Critical	Total	%
Flexural Topping (All)	0	1660	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1		3	169	Global Mean

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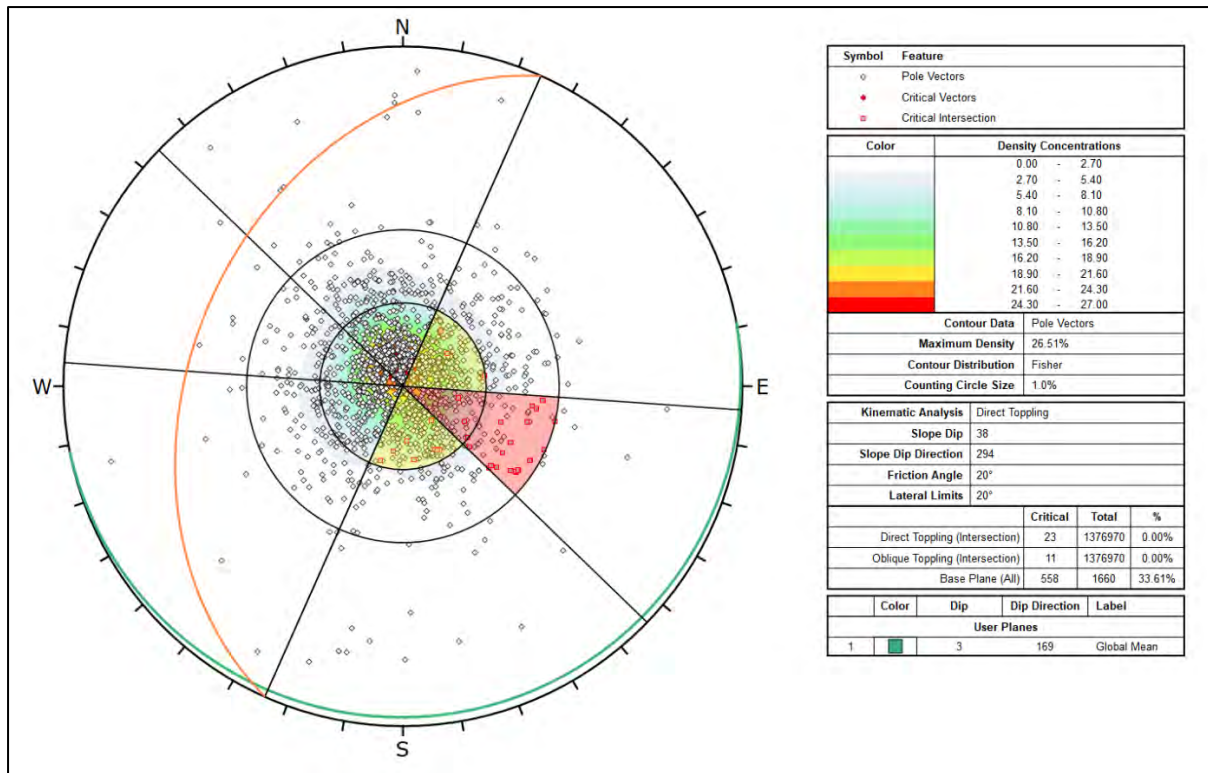


Figure: C15- Kinematic Analysis (BCM Bedding) - Highwall 3 (Overall Slope) – Direct Toppling.

Highwall 4 – BCM Bedding - Overall Slope

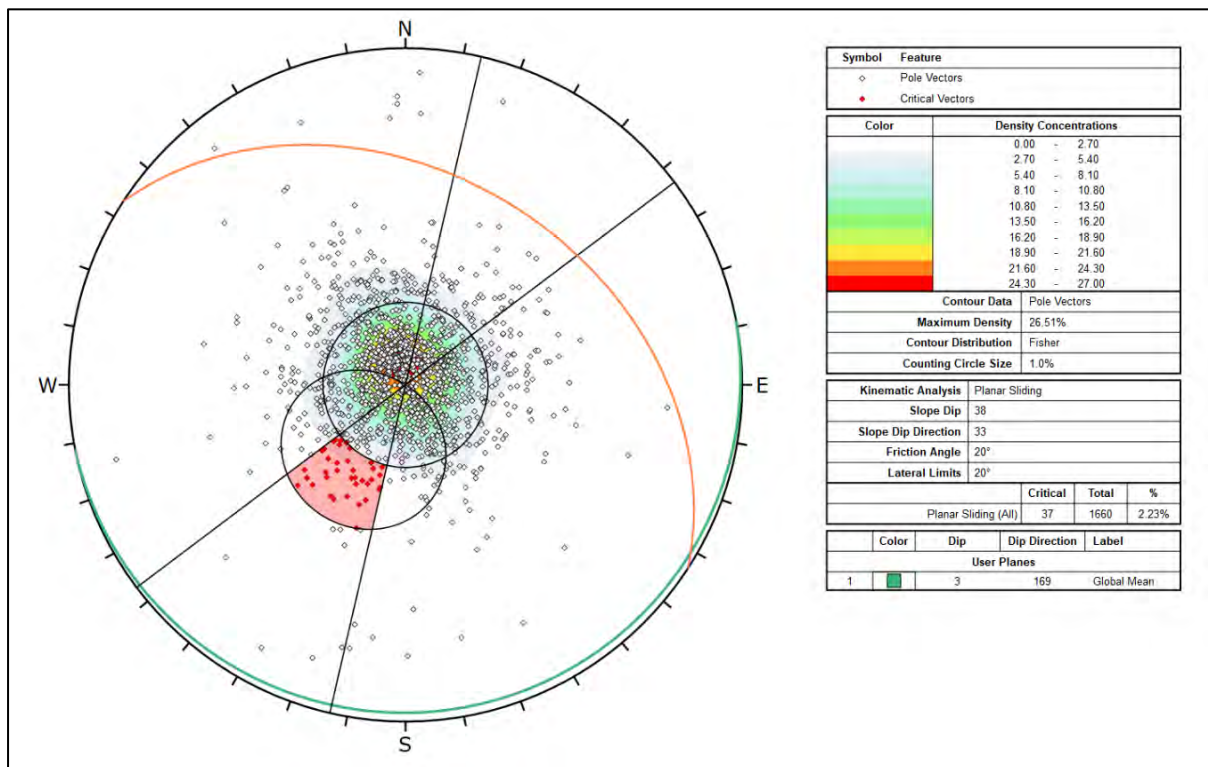


Figure: C16- Kinematic Analysis (BCM Bedding) - Highwall 4 (Overall Slope) – Planar Sliding.

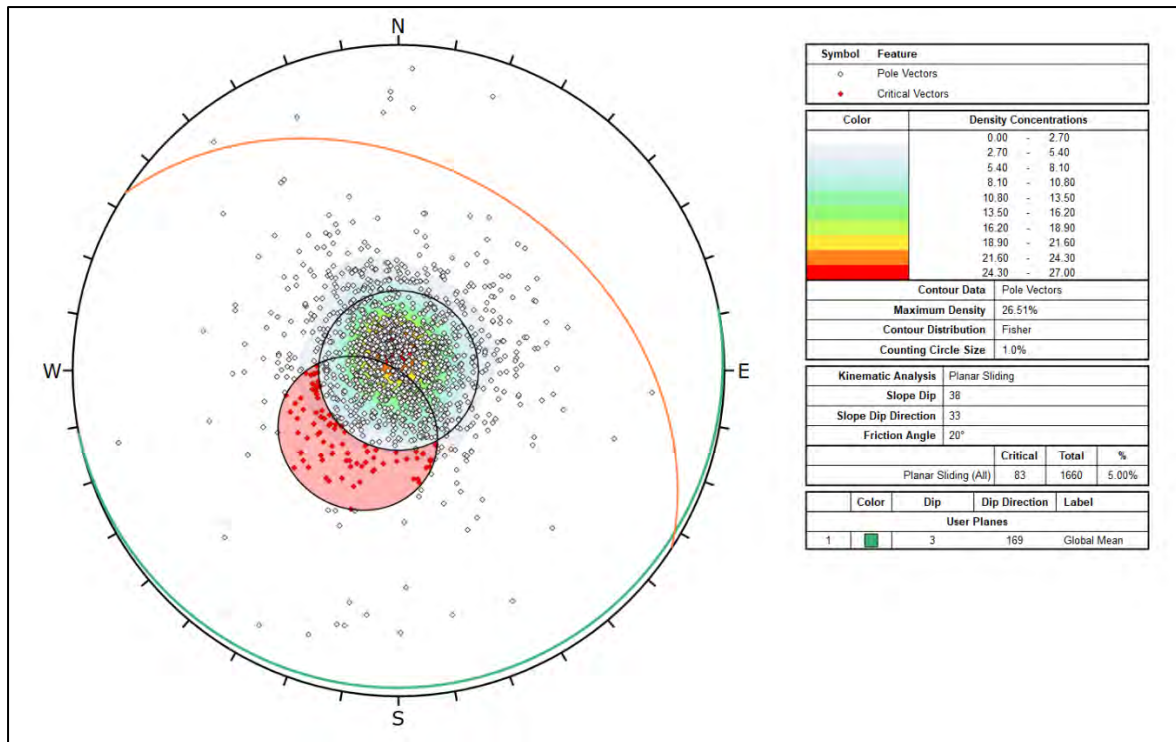


Figure: C17- Kinematic Analysis (BCM Bedding) - Highwall 4 (Overall Slope) – Planar Sliding. (No Limits).

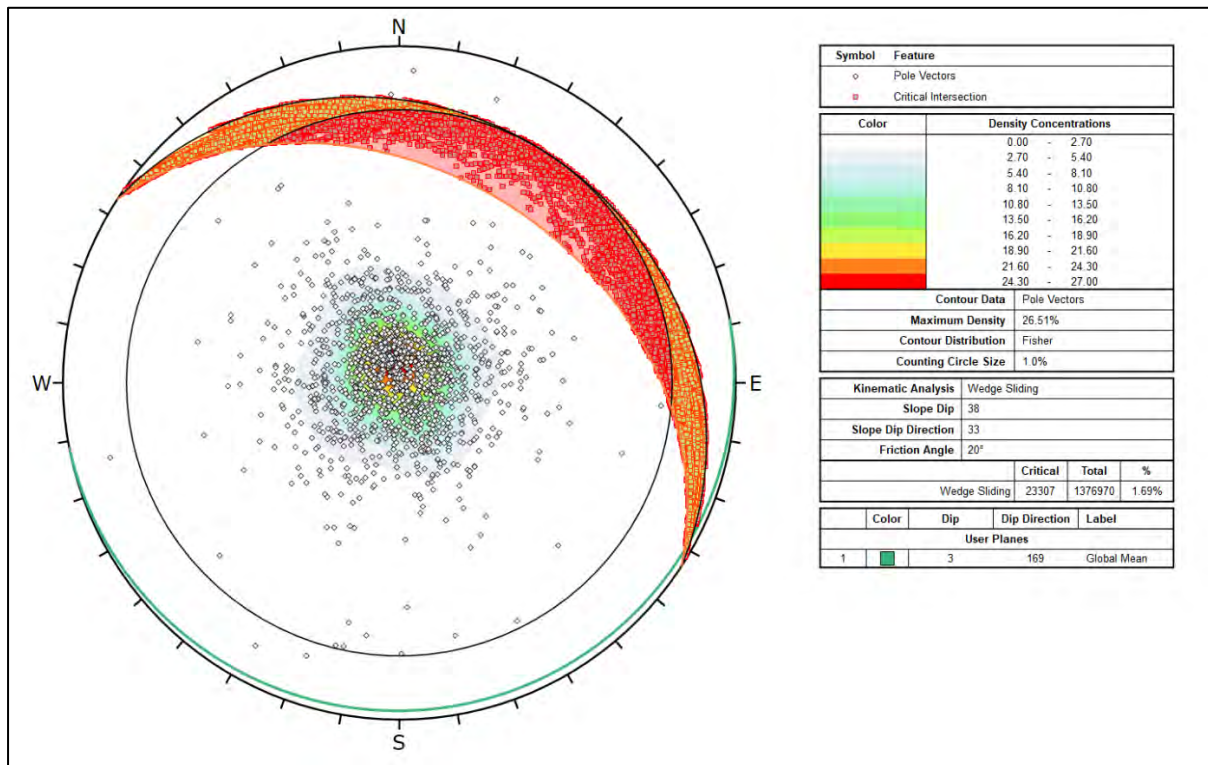


Figure: C18- Kinematic Analysis (BCM Bedding) - Highwall 4 (Overall Slope) – Wedge Sliding.

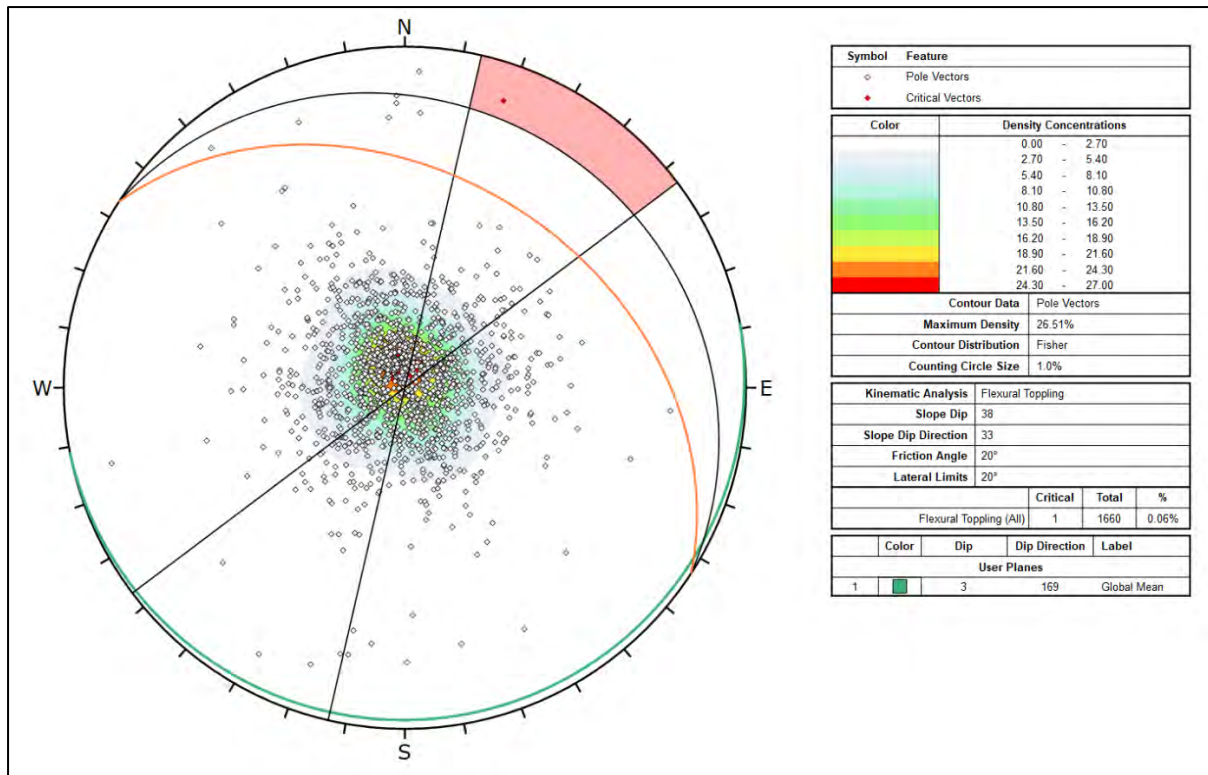


Figure: C19- Kinematic Analysis (BCM Bedding) - Highwall 4 (Overall Slope) – Flexural Toppling.

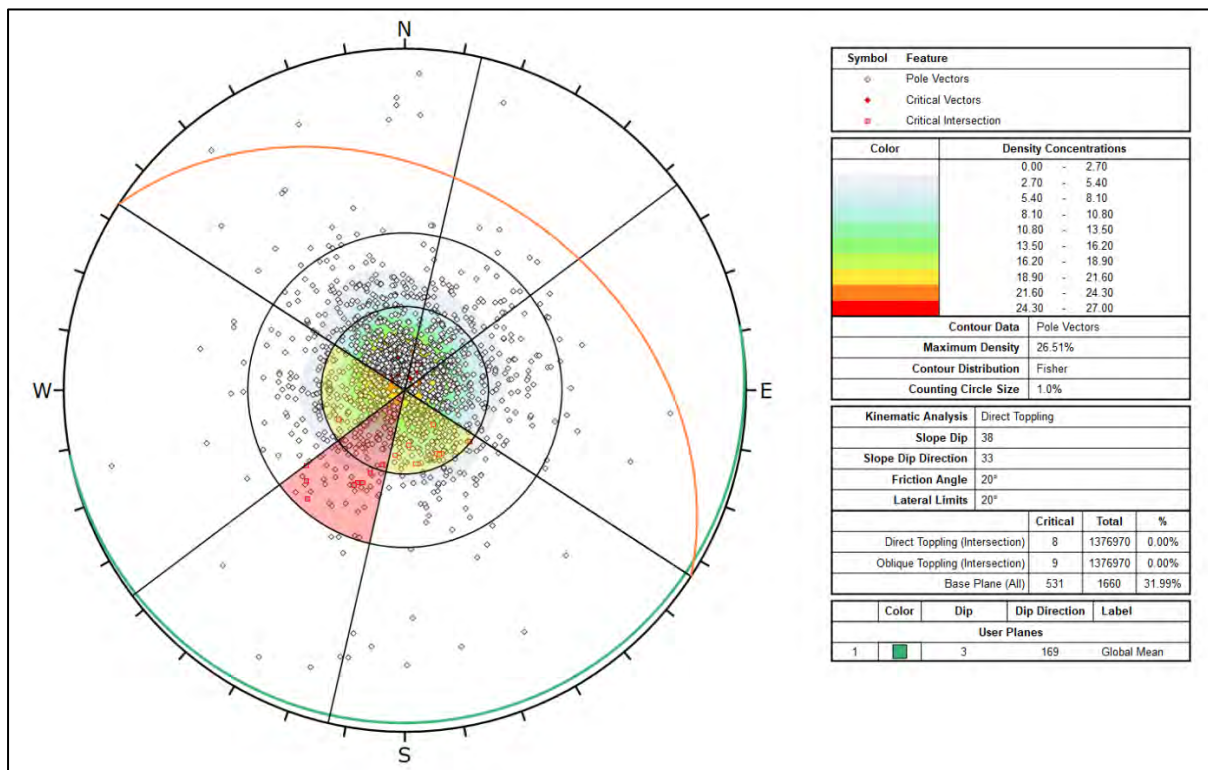


Figure: C20- Kinematic Analysis (BCM Bedding) - Highwall 4 (Overall Slope) – Direct Toppling.

Highwall 1 – BCM Bedding - Bench Slope

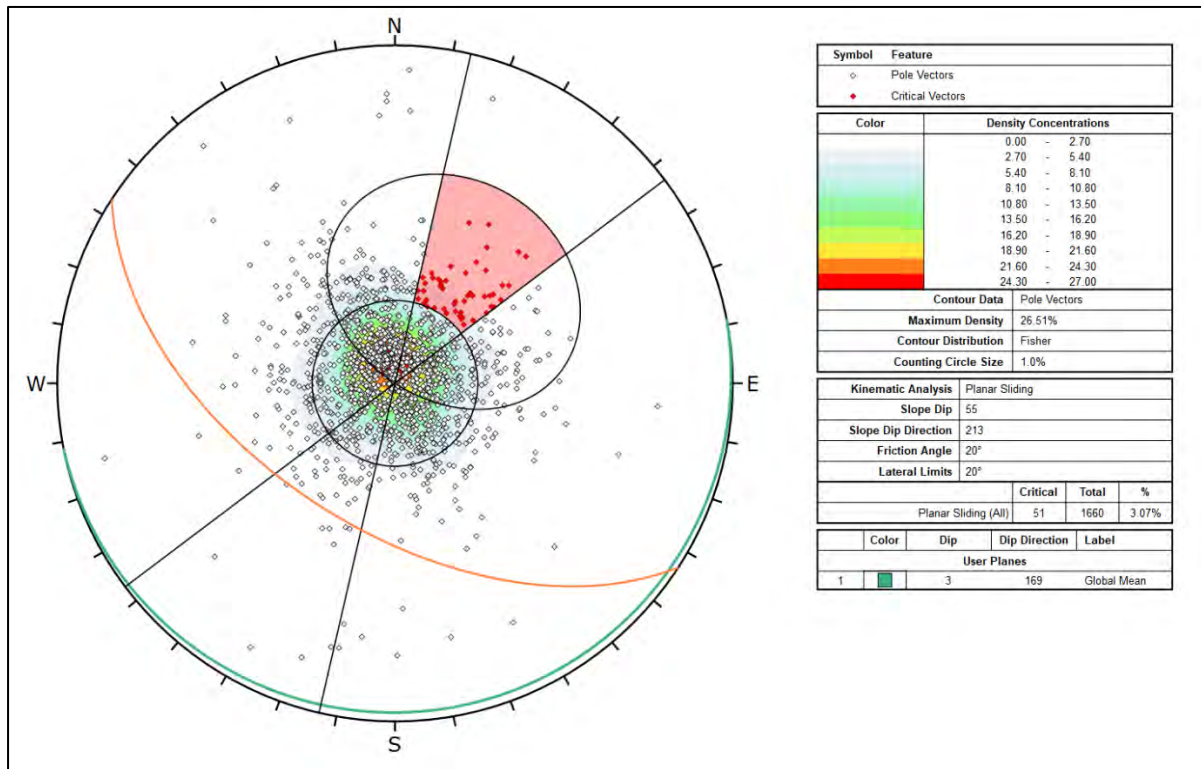


Figure: C21- Kinematic Analysis (BCM Bedding) - Highwall 1 (Bench Slope) – Planar Sliding.

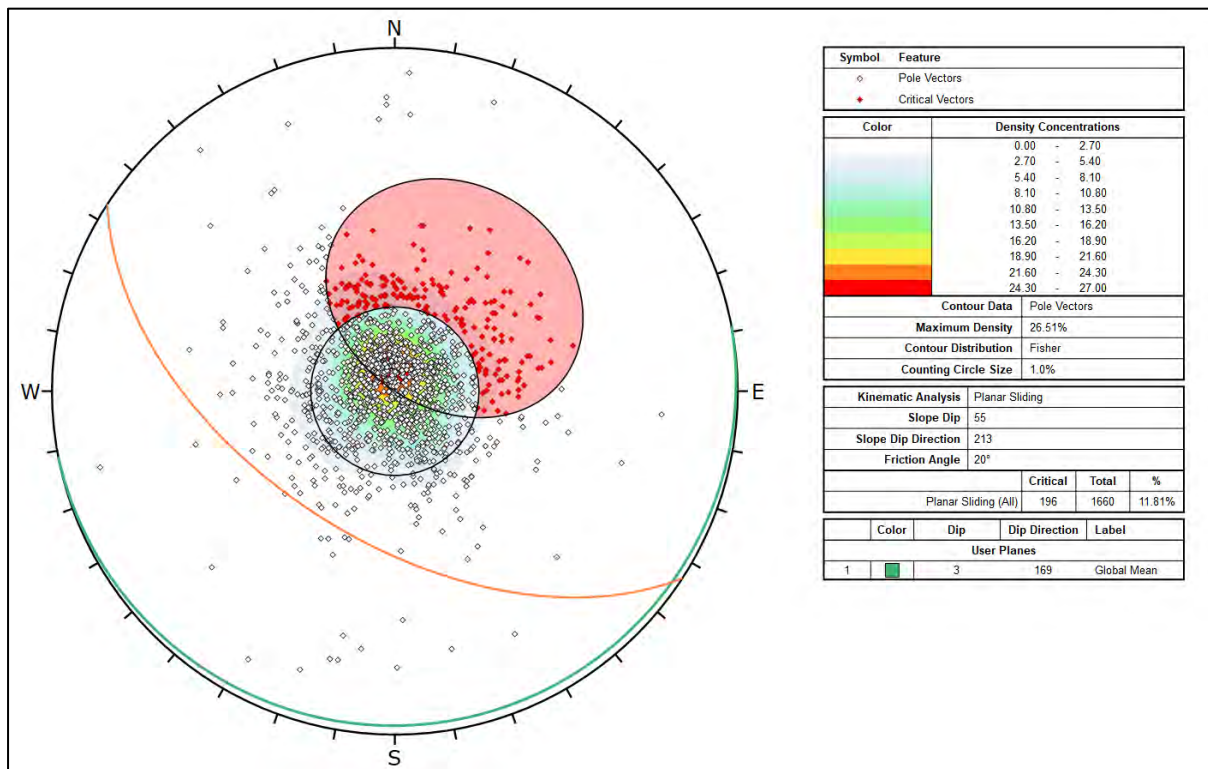


Figure: C22- Kinematic Analysis (BCM Bedding) - Highwall 1 (Bench Slope) – Planar Sliding (No limits).

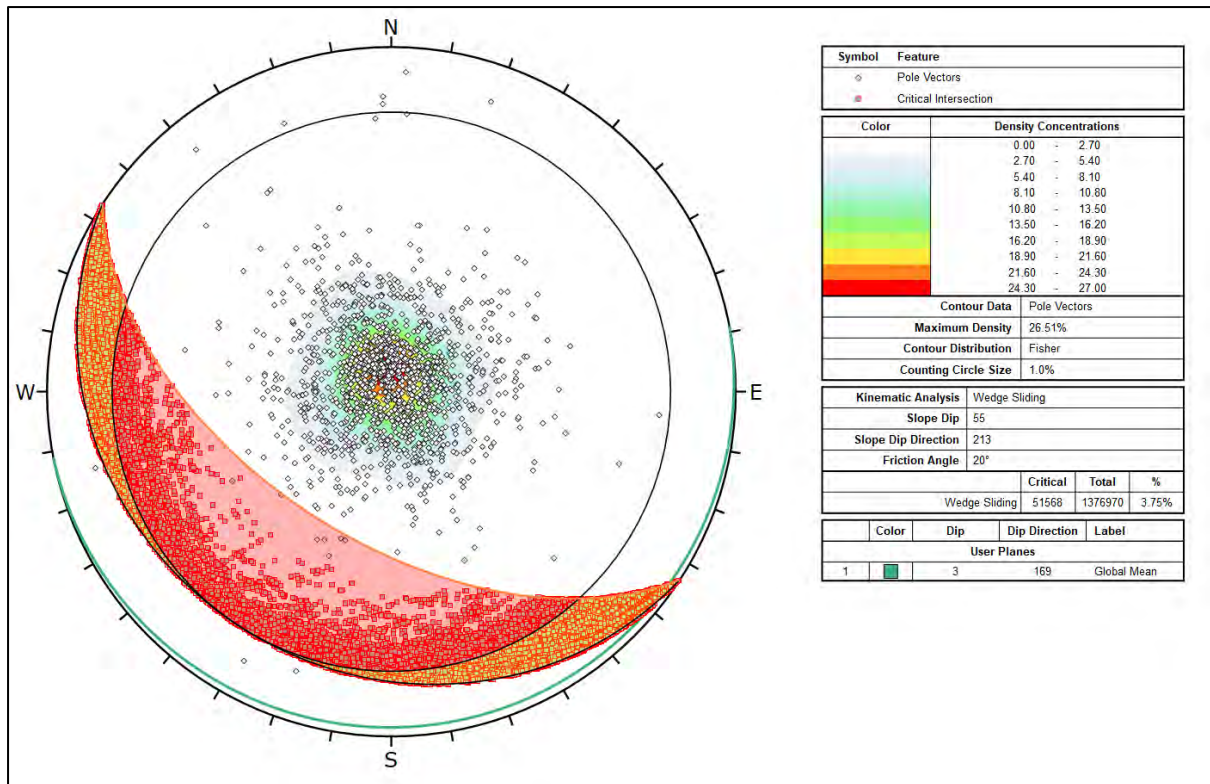


Figure: C23- Kinematic Analysis (BCM Bedding) - Highwall 1 (Bench Slope) – Wedge Sliding.

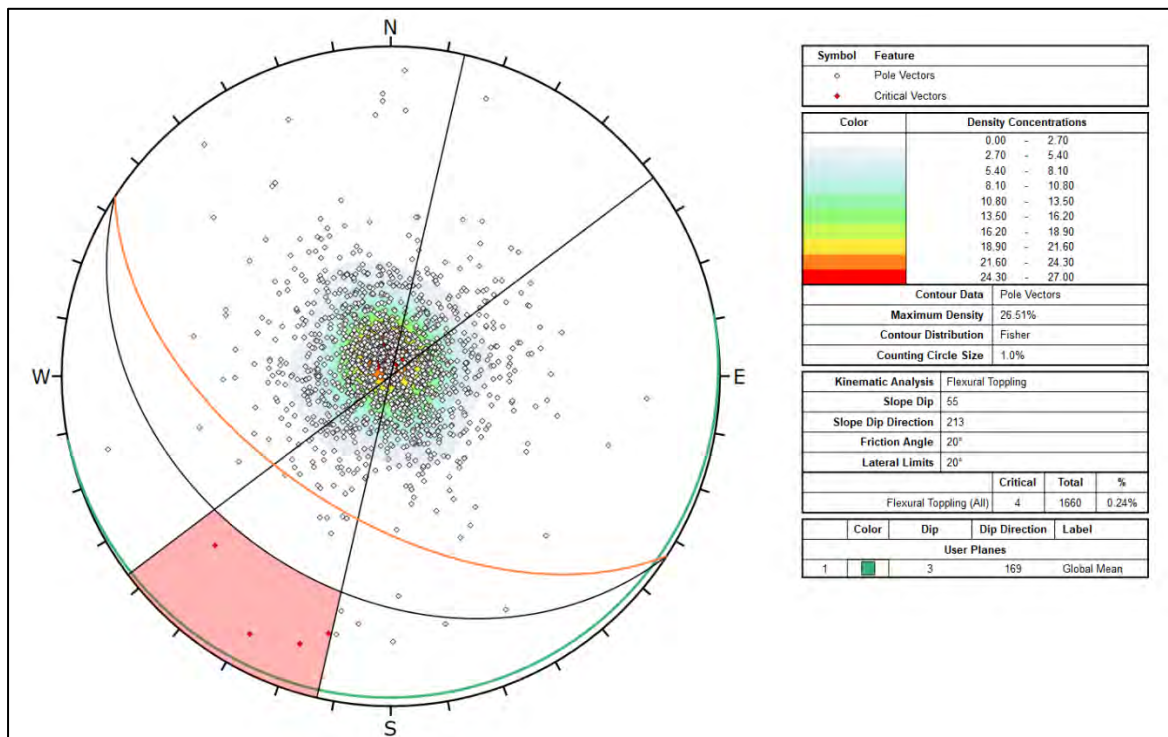


Figure: C24- Kinematic Analysis (BCM Bedding) - Highwall 1 (Bench Slope) – Flexural Toppling.

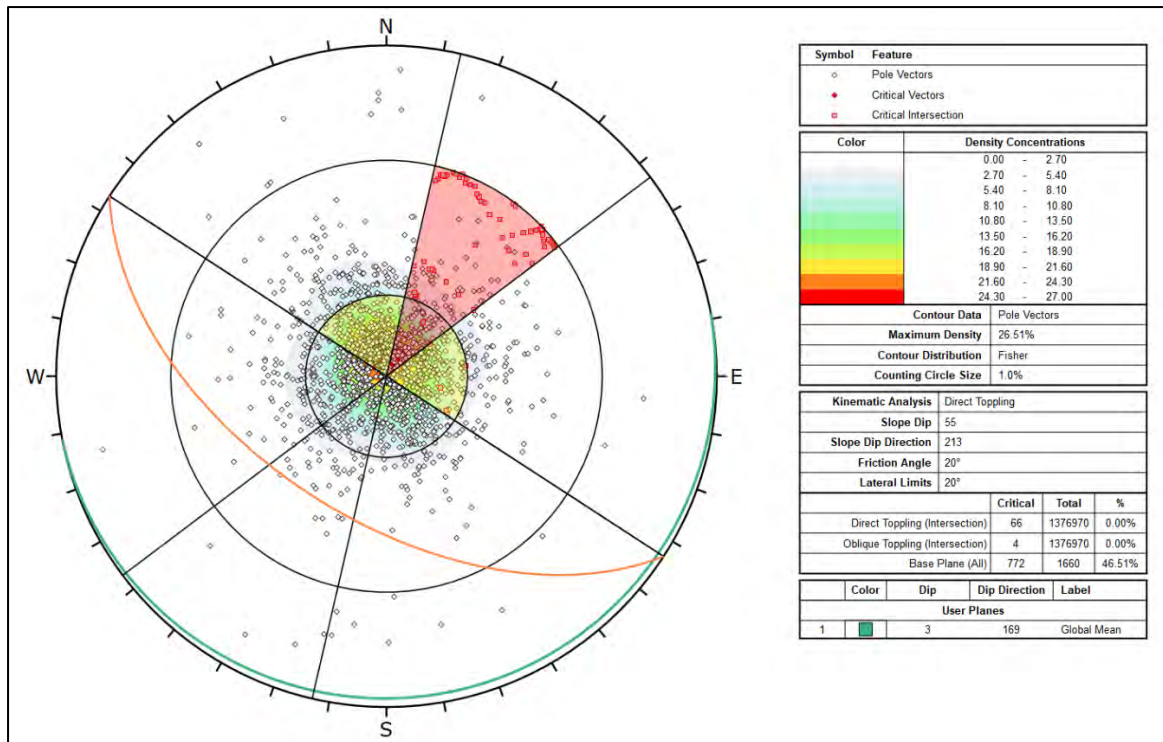


Figure: C25- Kinematic Analysis (BCM Bedding) - Highwall 1 (Bench Slope) – Direct Toppling.

Highwall 2 – BCM Bedding - Bench Slope

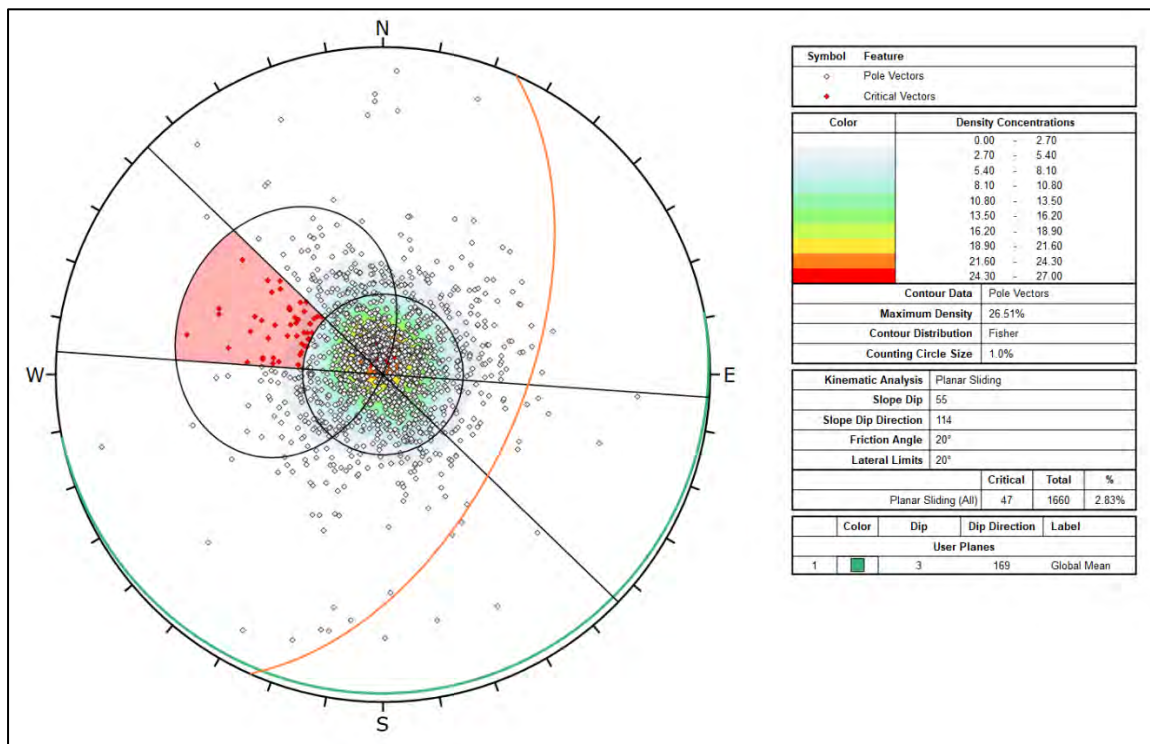


Figure: C26- Kinematic Analysis (BCM Bedding) - Highwall 2 (Bench Slope) – Planar Sliding.

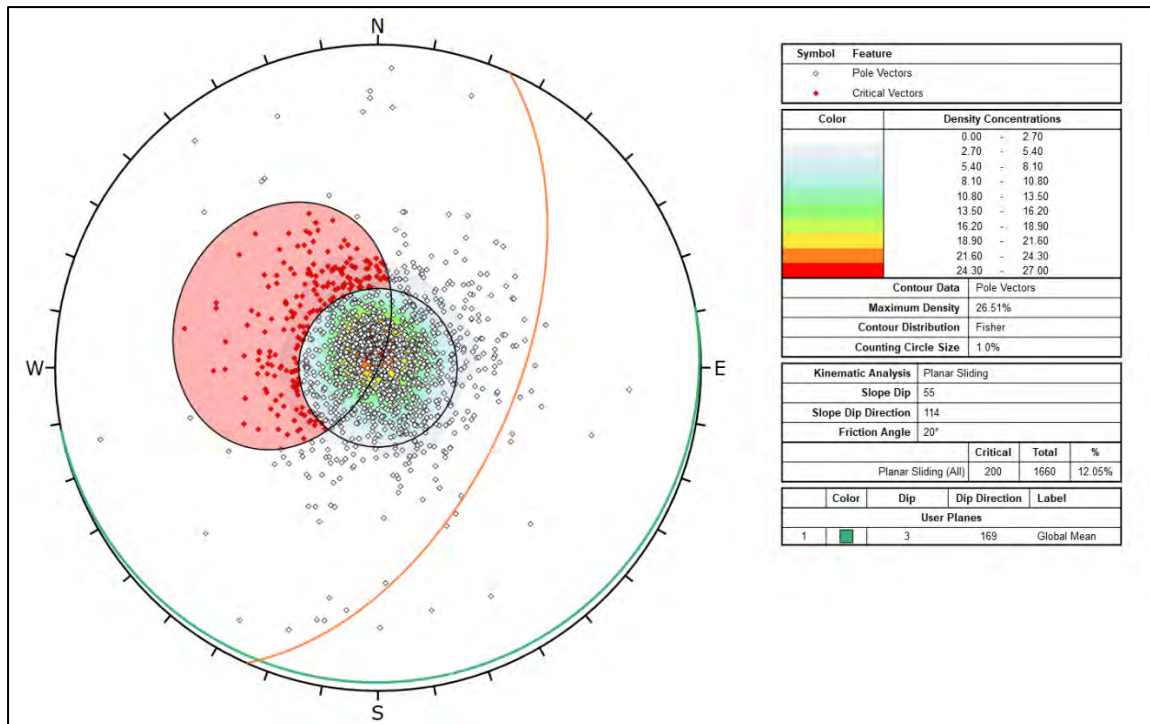


Figure: C27- Kinematic Analysis (BCM Bedding) - Highwall 2 (Bench Slope) – Planar Sliding (No Limits).

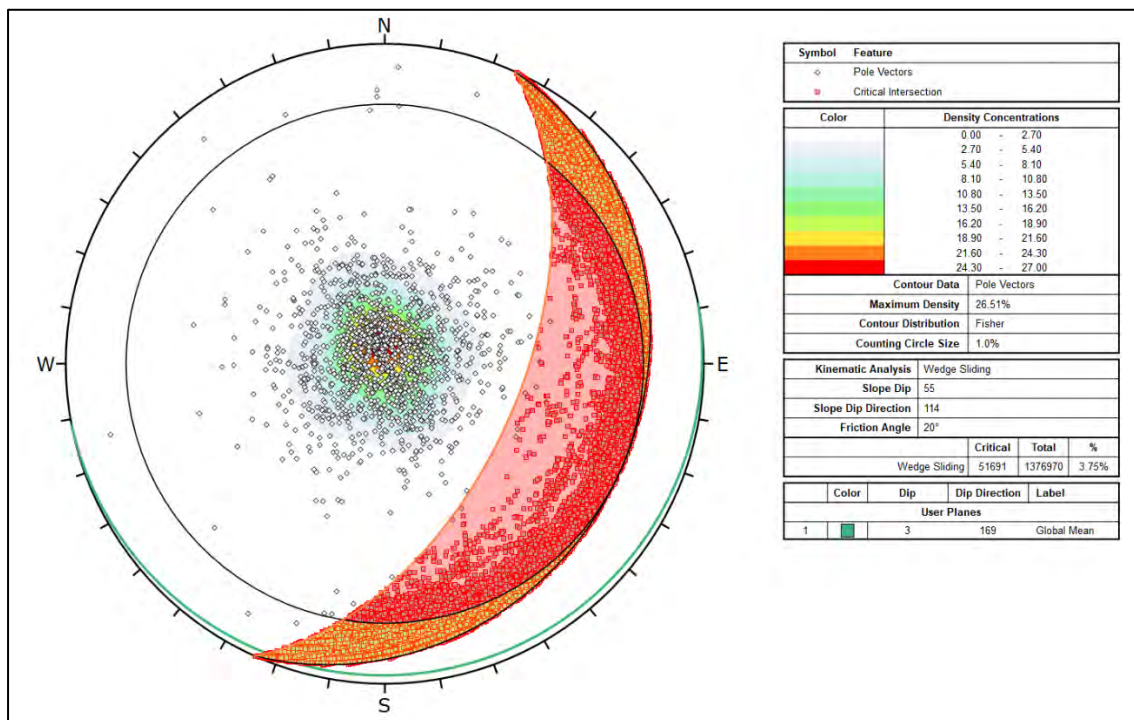


Figure: C28- Kinematic Analysis (BCM Bedding) - Highwall 2 (Bench Slope) – Wedge Sliding.

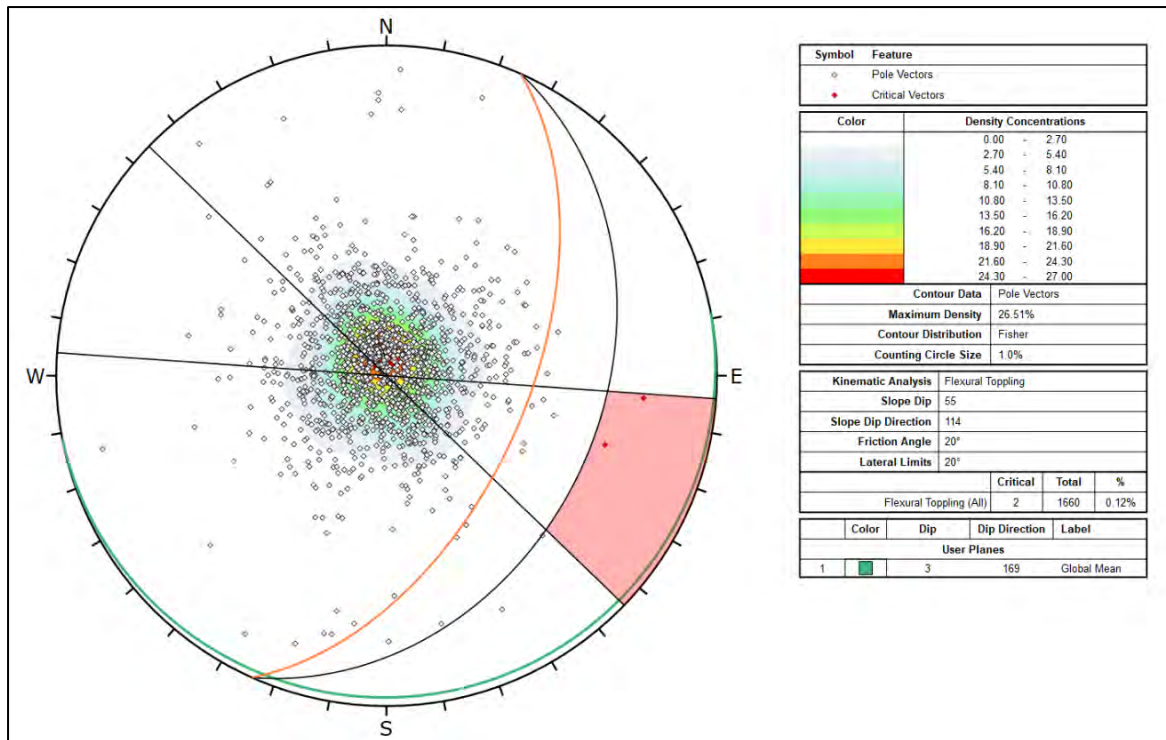


Figure: C29- Kinematic Analysis (BCM Bedding) - Highwall 2 (Bench Slope) – Flexural Toppling.

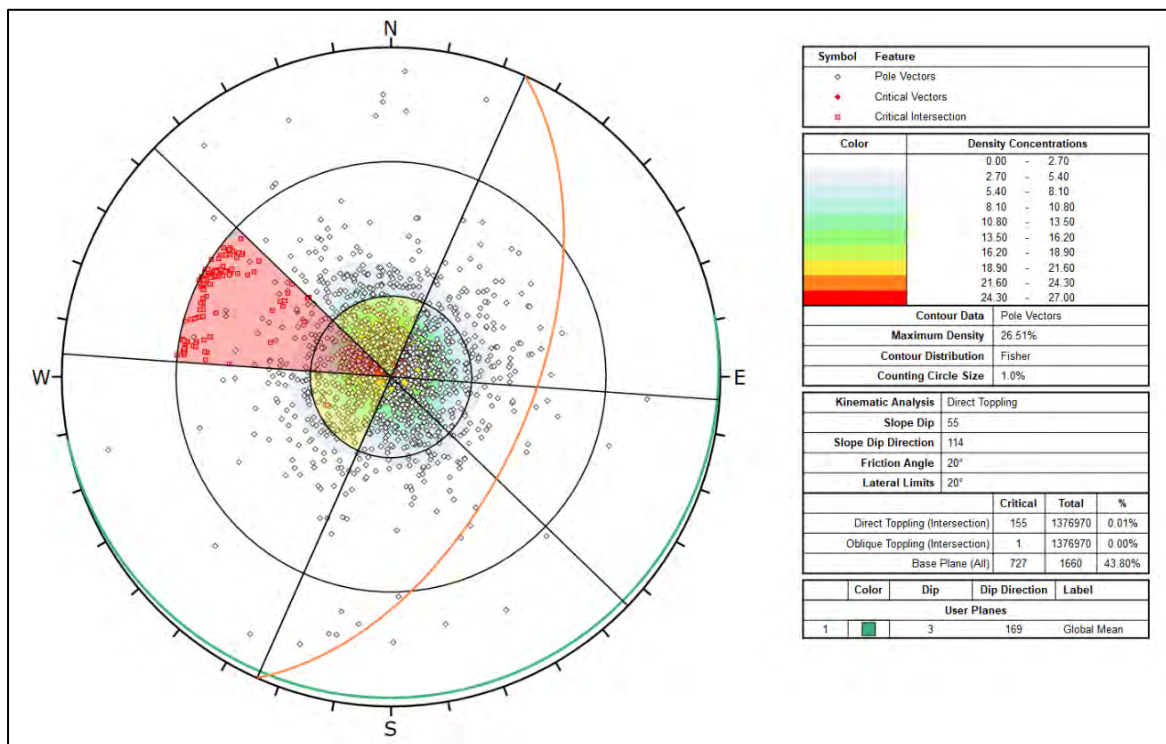


Figure: C30- Kinematic Analysis (BCM Bedding) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – BCM Bedding - Bench Slope

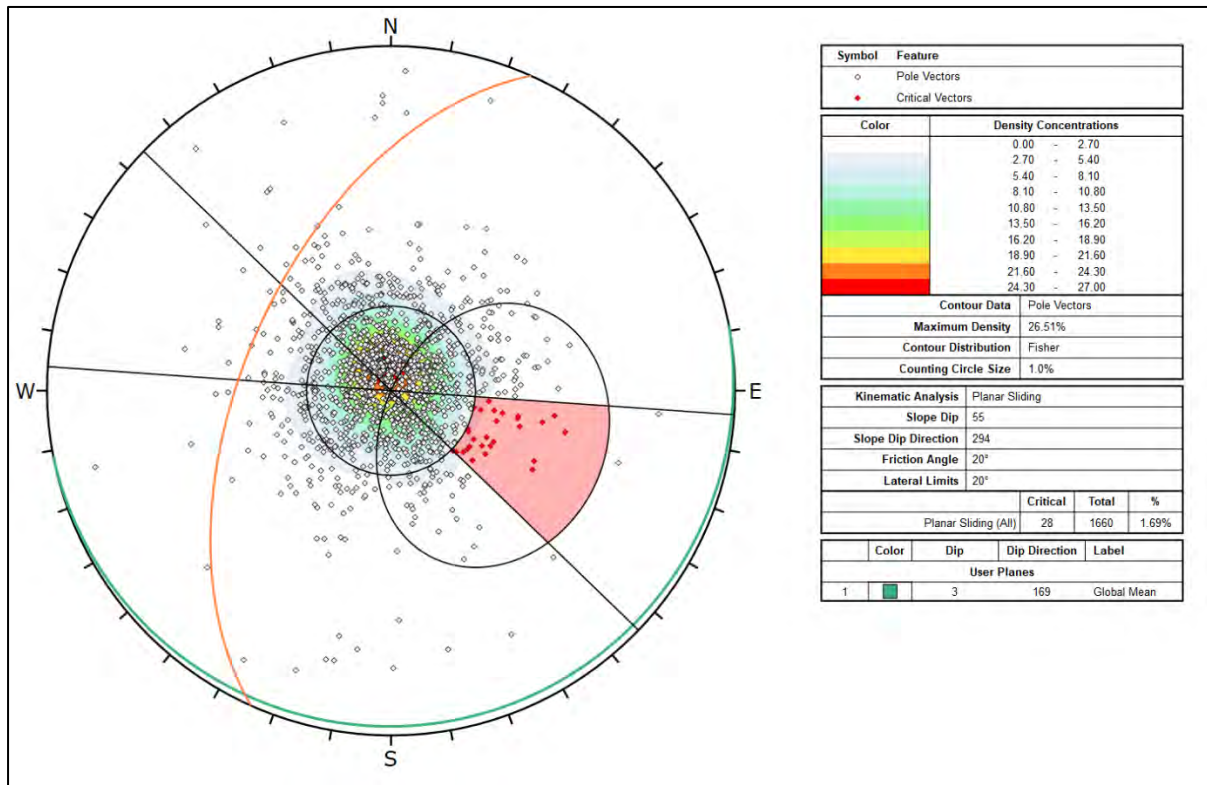


Figure: C31- Kinematic Analysis (BCM Bedding) - Highwall 3 (Bench Slope) – Planar Sliding.

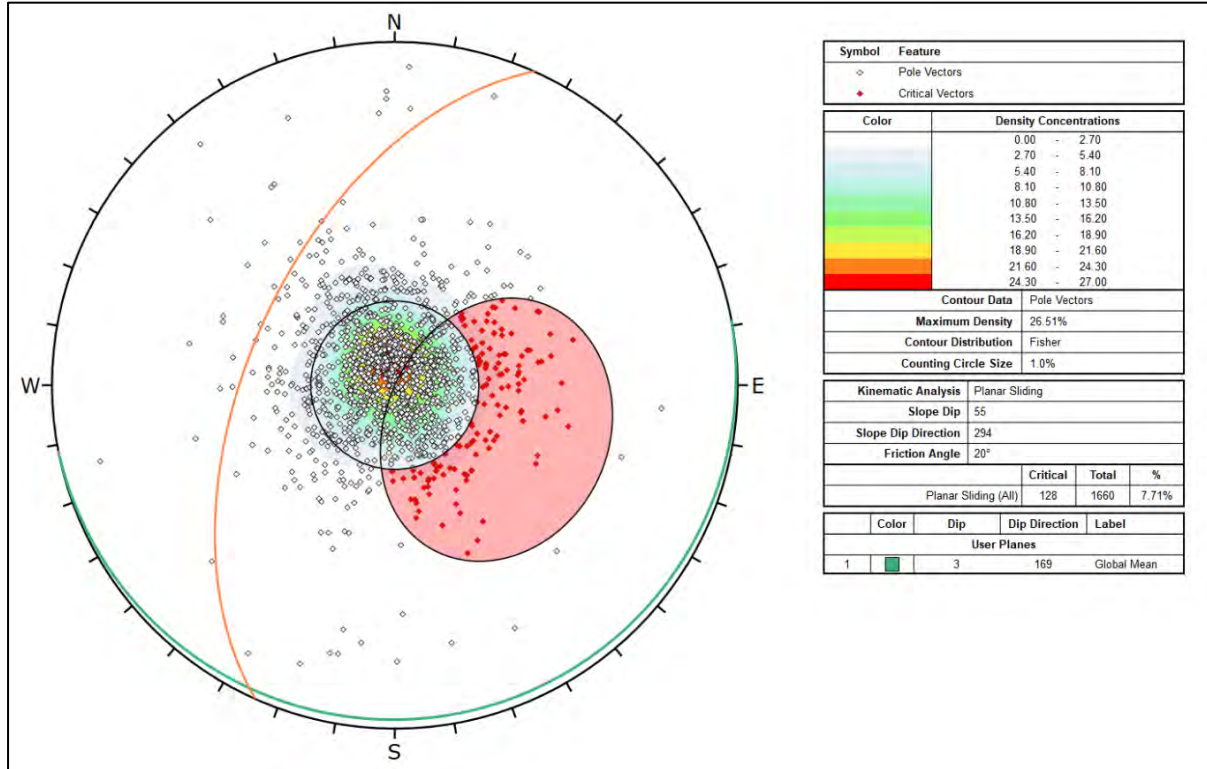


Figure: C32- Kinematic Analysis (BCM Bedding) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

Symbol	Feature
○	Pole Vectors
●	Critical Vectors

Color	Density Concentrations
	0.00 - 2.70
	2.70 - 5.40
	5.40 - 8.10
	8.10 - 10.80
	10.80 - 13.50
	13.50 - 16.20
	16.20 - 18.90
	18.90 - 21.60
	21.60 - 24.30
	24.30 - 27.00

Contour Data	Pole Vectors
Maximum Density	26.51%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Topping
Slope Dip	55
Slope Dip Direction	294
Friction Angle	20°
Lateral Limits	20°

	Critical	Total	%
Flexural Topping (All)	1	1660	0.06%

	Color	Dip	Dip Direction	Label
User Planes				
1		3	169	Global Mean

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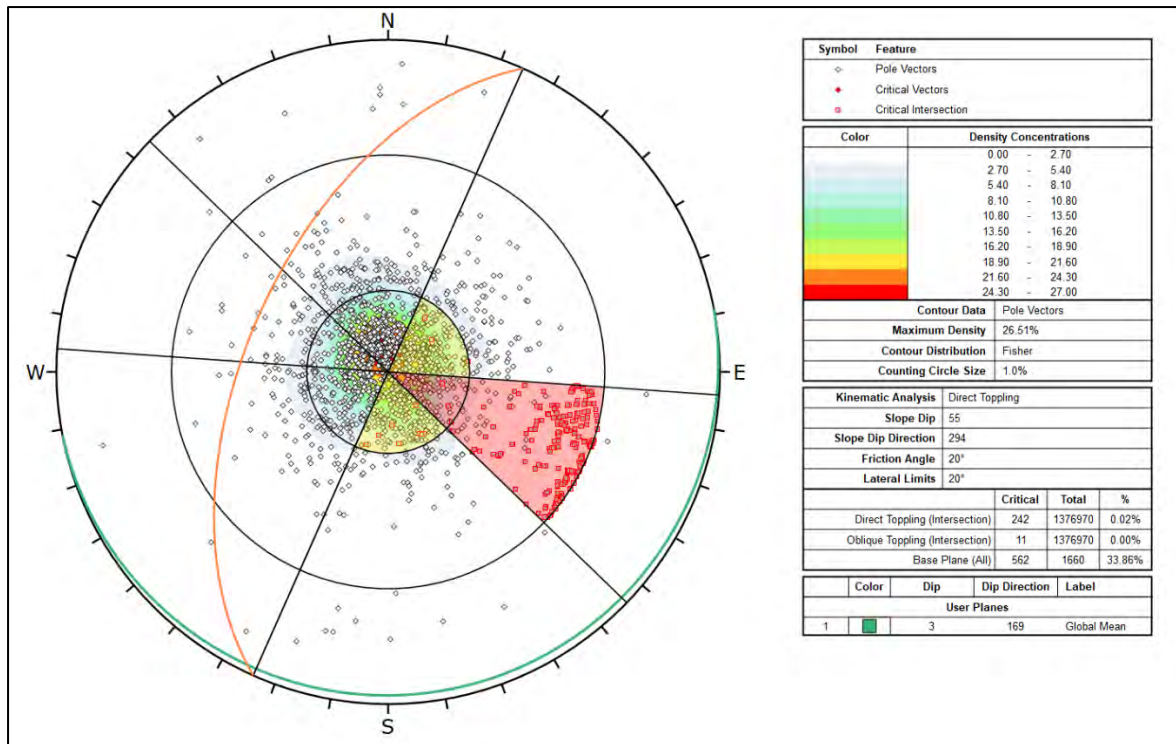


Figure: C35- Kinematic Analysis (BCM Bedding) - Highwall 3 (Bench Slope) – Direct Toppling.

Highwall 4 – BCM Bedding - Bench Slope

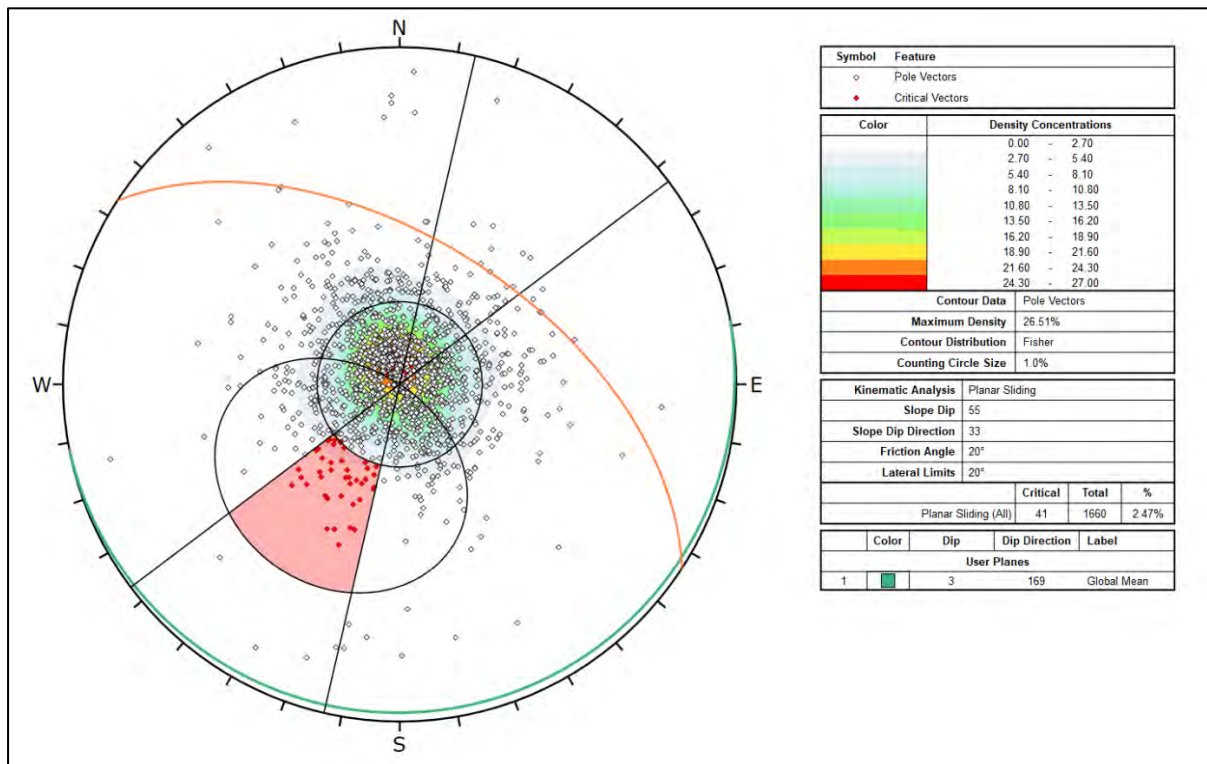


Figure: C36- Kinematic Analysis (BCM Bedding) - Highwall 4 (Bench Slope) – Planar Sliding.

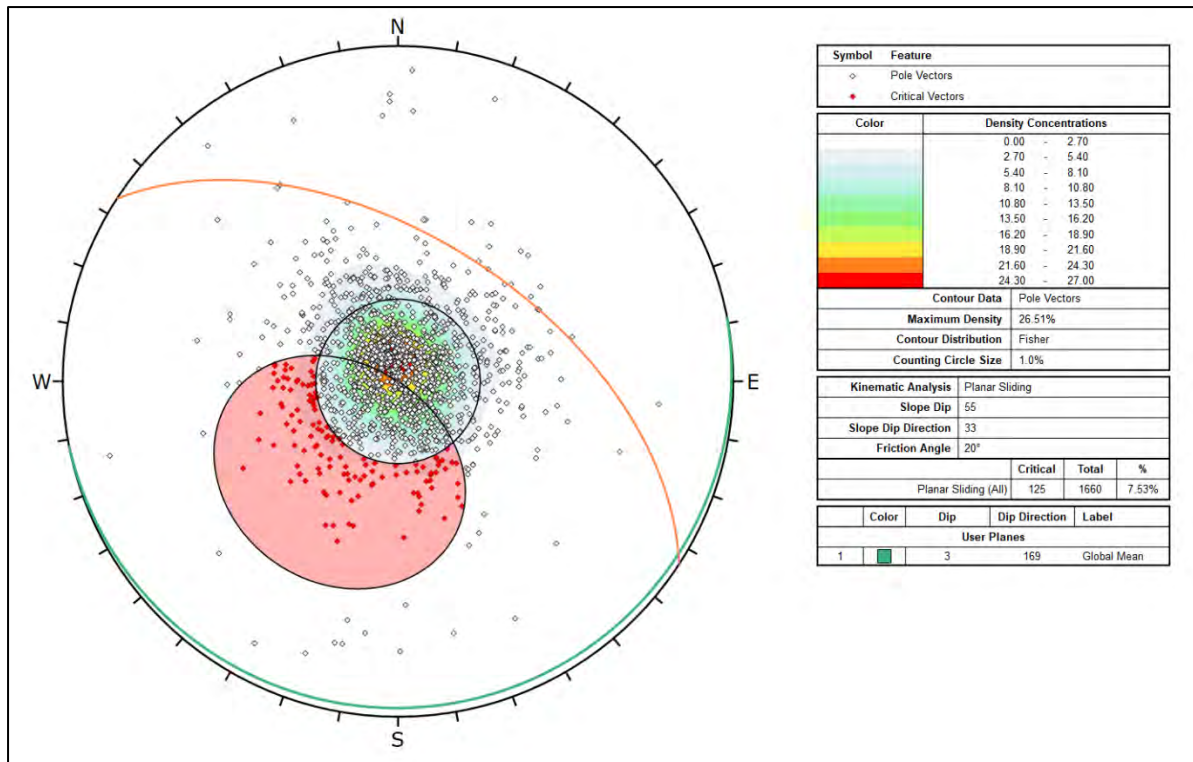


Figure: C37- Kinematic Analysis (BCM Bedding) - Highwall 4 (Bench Slope) – Planar Sliding (No Limits).

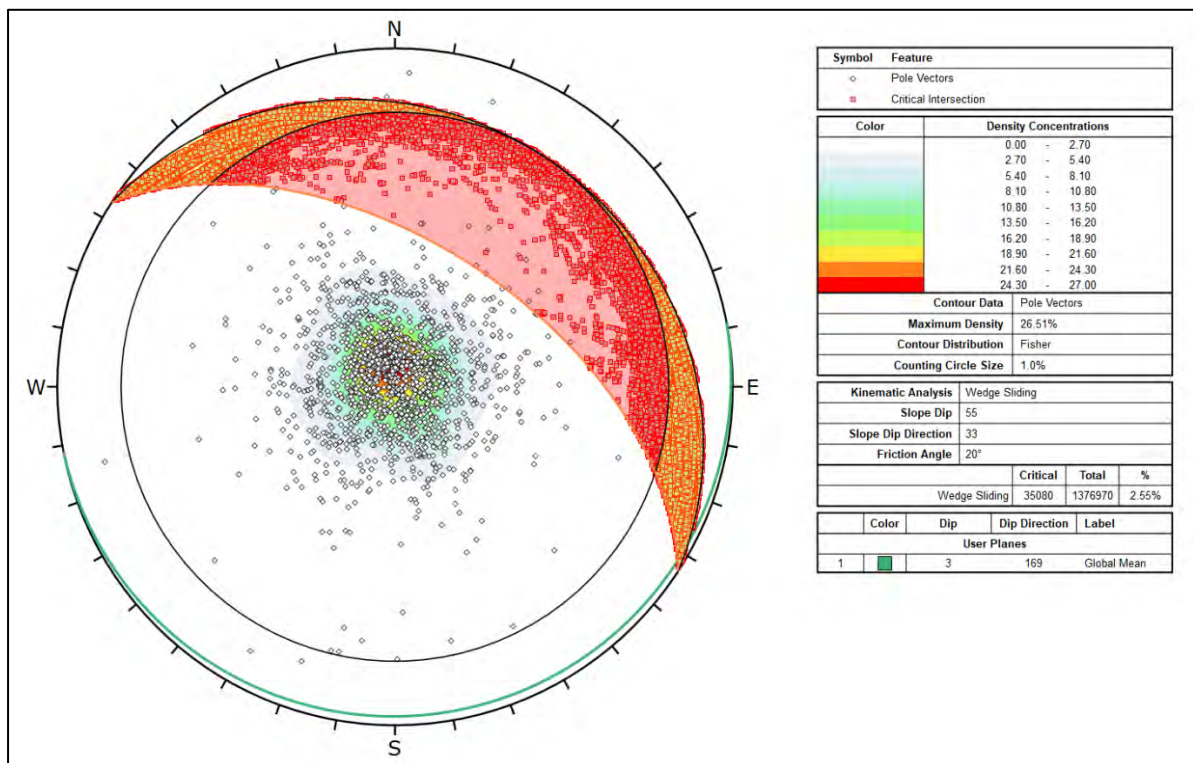


Figure: C38- Kinematic Analysis (BCM Bedding) - Highwall 4 (Bench Slope) – Wedge Sliding.

Symbol **Feature**

- Pole Vectors
- ◆ Critical Vectors
- Critical Intersection

Color **Density Concentrations**

	0.00 - 2.70
	2.70 - 5.40
	5.40 - 8.10
	8.10 - 10.80
	10.80 - 13.50
	13.50 - 16.20
	16.20 - 18.90
	18.90 - 21.60
	21.60 - 24.30
	24.30 - 27.00

Contour Data **Pole Vectors**

Maximum Density 26.51%

Contour Distribution Fisher

Counting Circle Size 1.0%

Kinematic Analysis **Direct Toppling**

Slope Dip 55

Slope Dip Direction 33

Friction Angle 20°

Lateral Limits 20°

	Critical	Total	%
Direct Toppling (Intersection)	165	1376970	0.01%
Oblique Toppling (Intersection)	9	1376970	0.00%
Base Plane (All)	534	1660	32.17%

User Planes

	Color	Dip	Dip Direction	Label
1	Green	3	169	Global Mean

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Highwall 1 – Joints <30° - Overall Slope

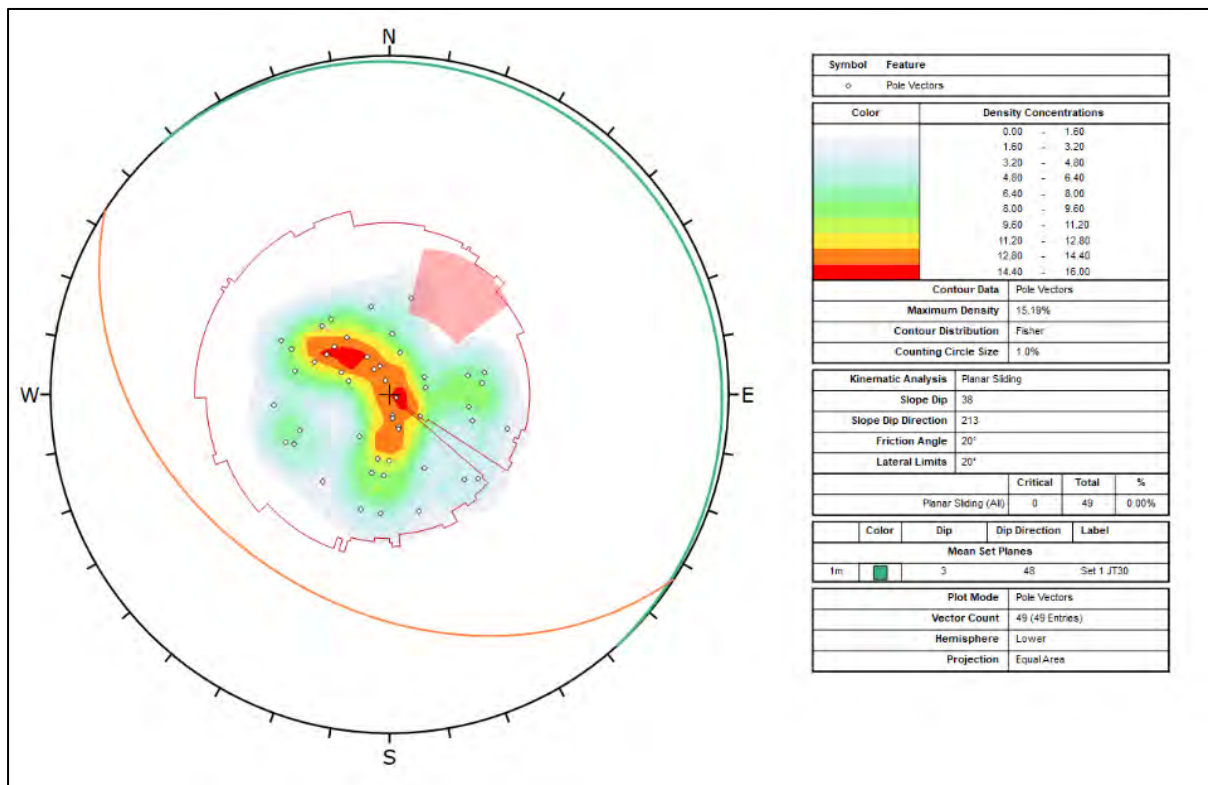


Figure: C41- Kinematic Analysis (Joints <30°) - Highwall 1 (Overall Slope) – Planar Sliding.

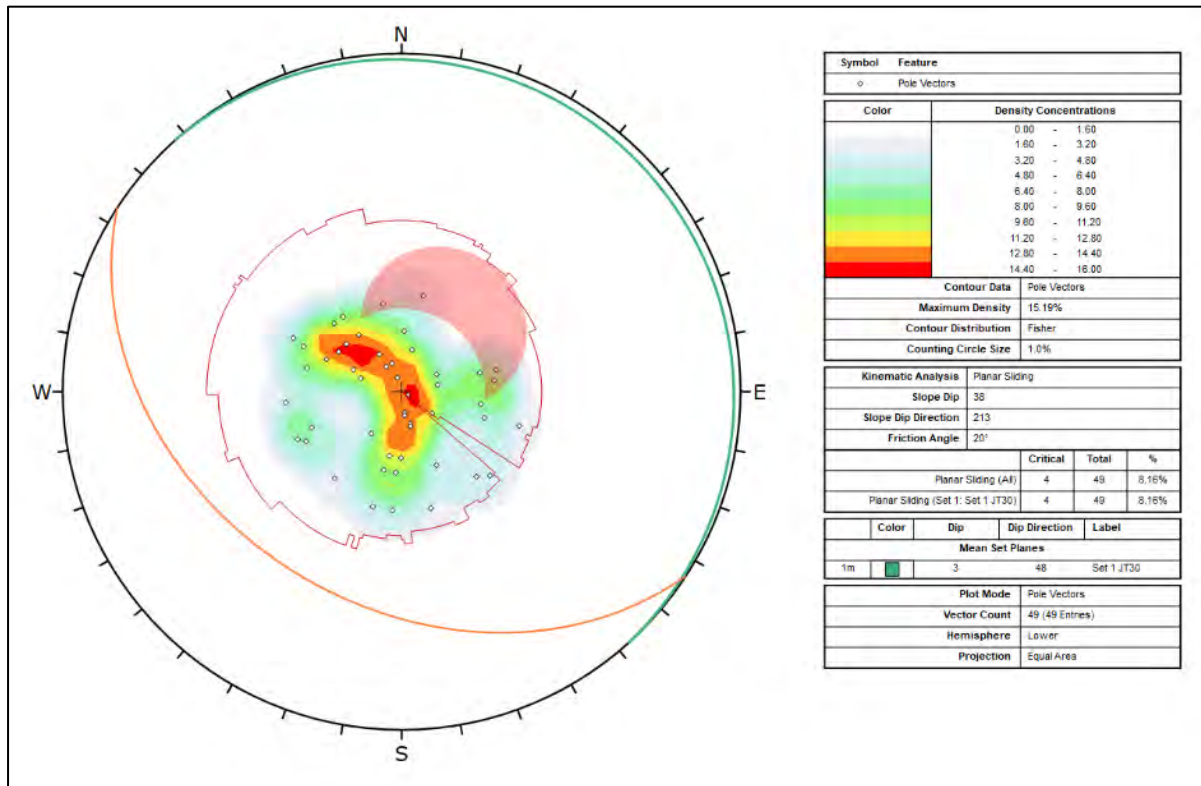


Figure: C42- Kinematic Analysis (Joints <30°) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).

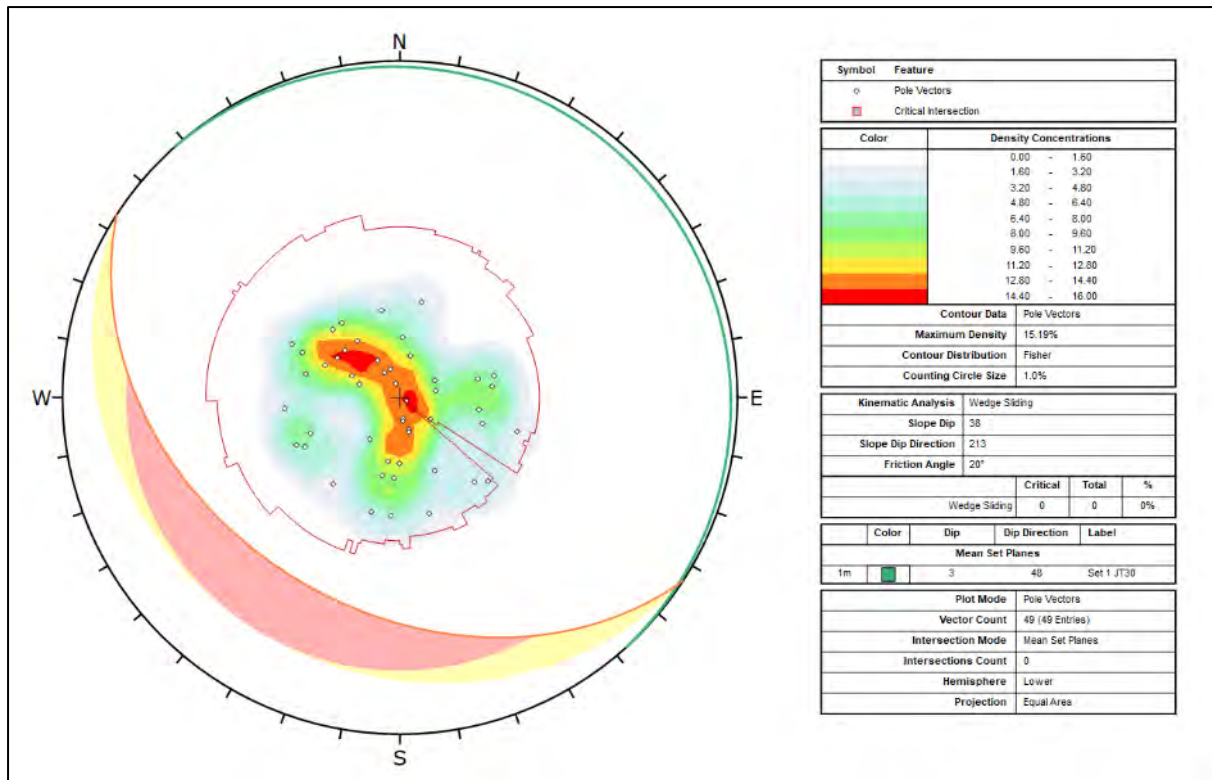


Figure: C43- Kinematic Analysis (Joints <30°) - Highwall 1 (Overall Slope) – Wedge Sliding.

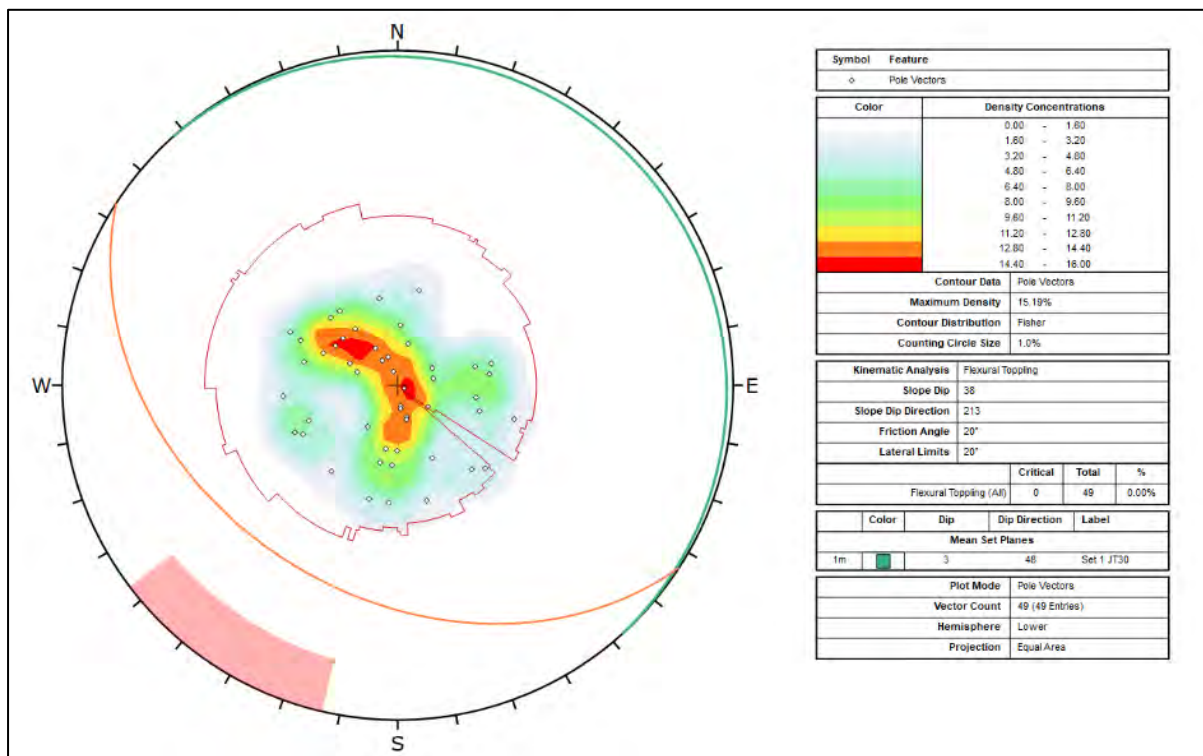


Figure: C44- Kinematic Analysis (Joints <30°) - Highwall 1 (Overall Slope) – Flexural Toppling.

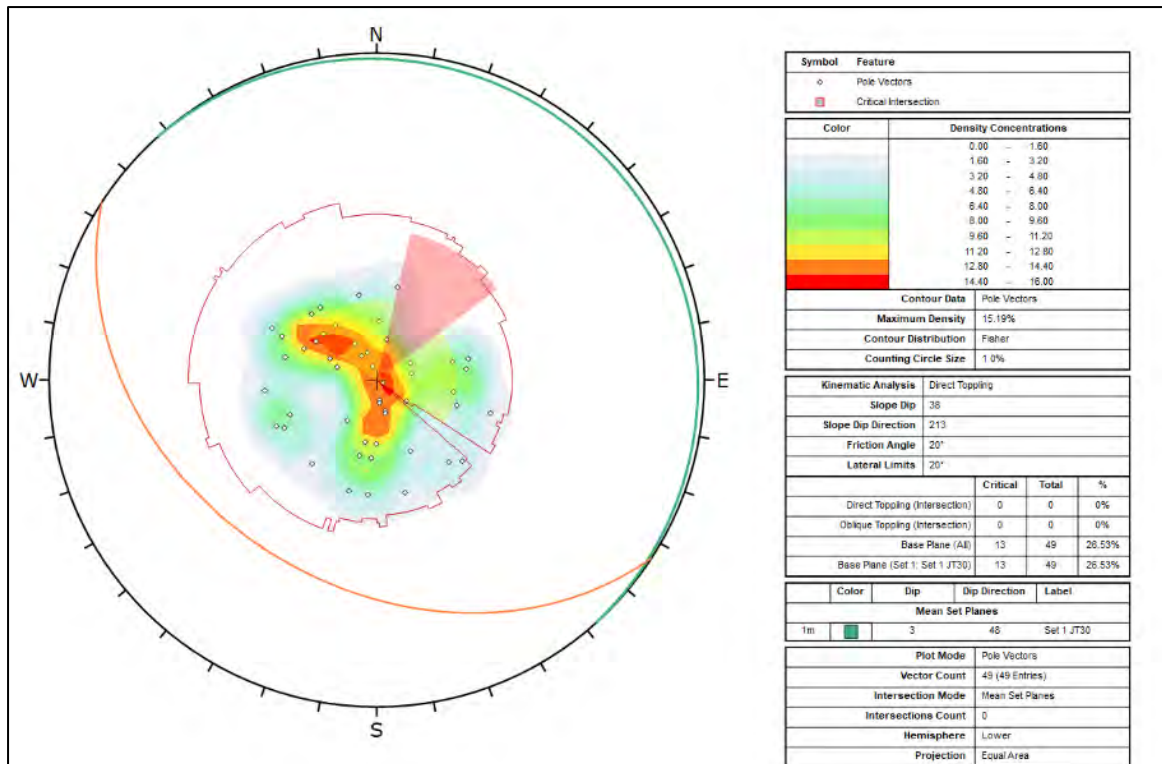


Figure: C45- Kinematic Analysis (Joints <30°) - Highwall 1 (Overall Slope) – Direct Toppling.

Highwall 2 – Joints <30° - Overall Slope

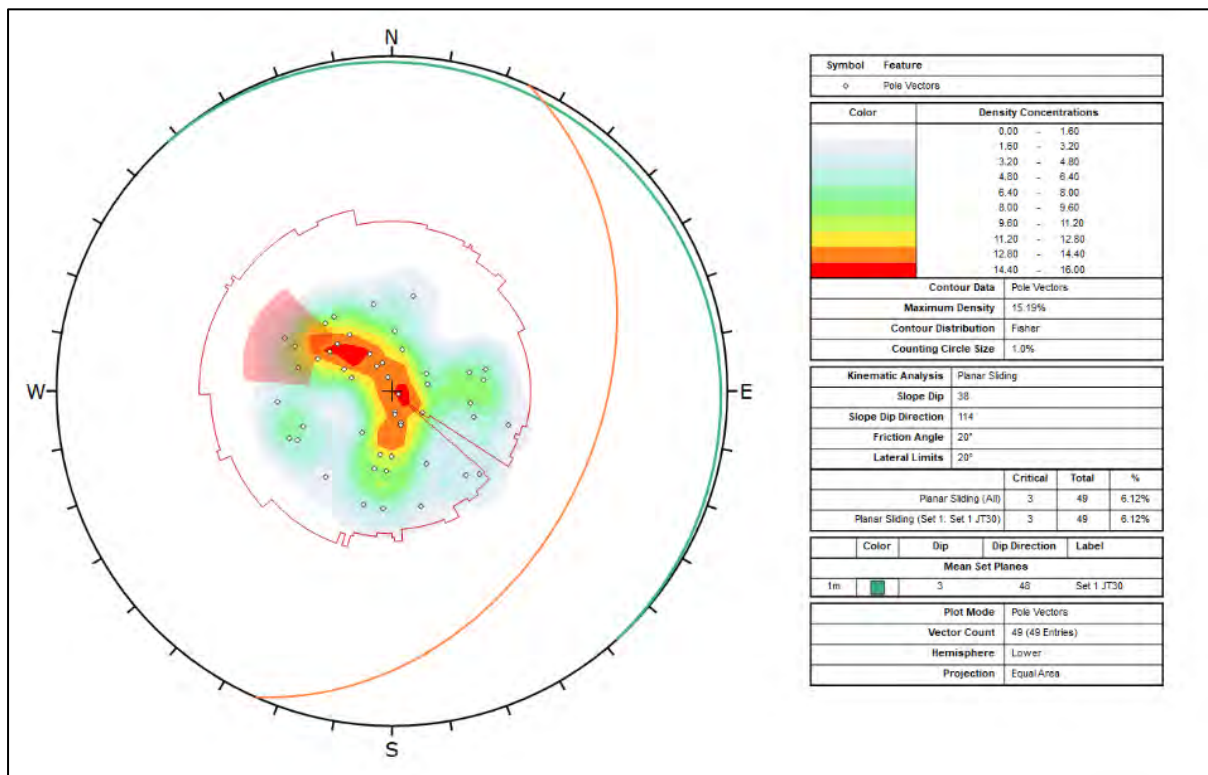


Figure: C46- Kinematic Analysis (Joints <30°) - Highwall 2 (Overall Slope) – Planar Sliding.

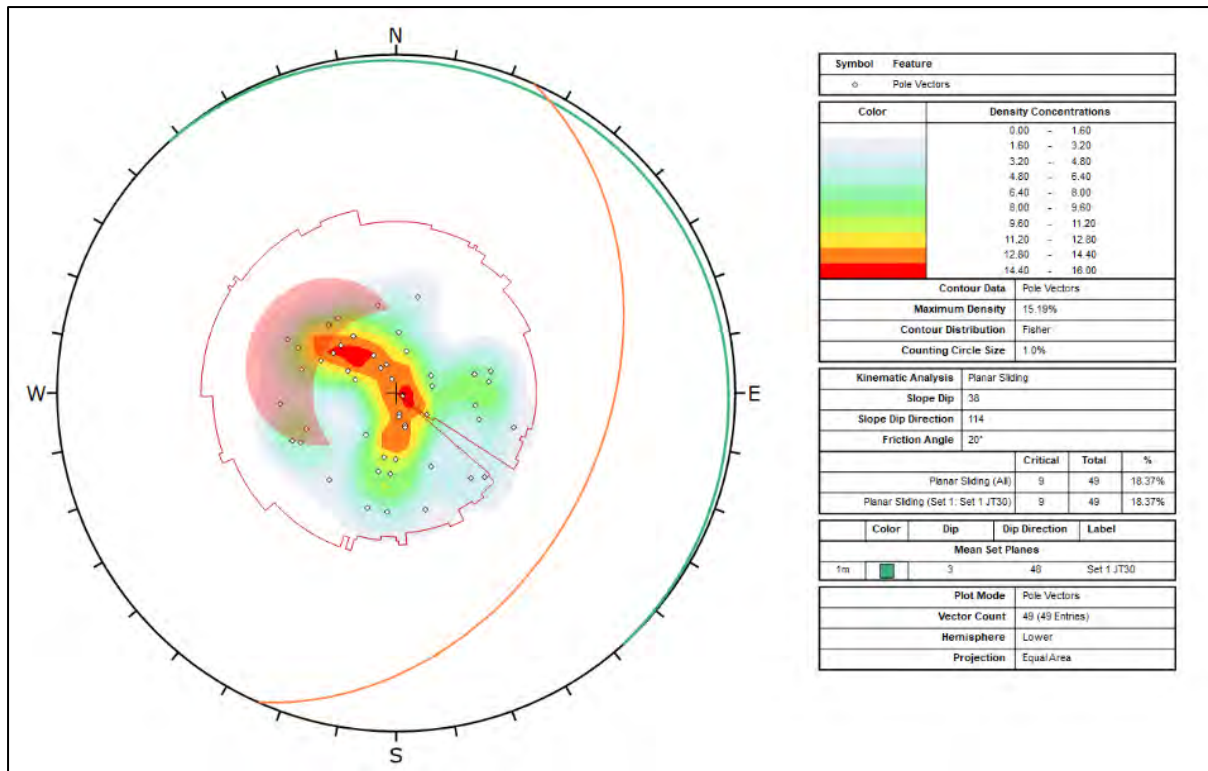


Figure: C47- Kinematic Analysis (Joints <30°) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

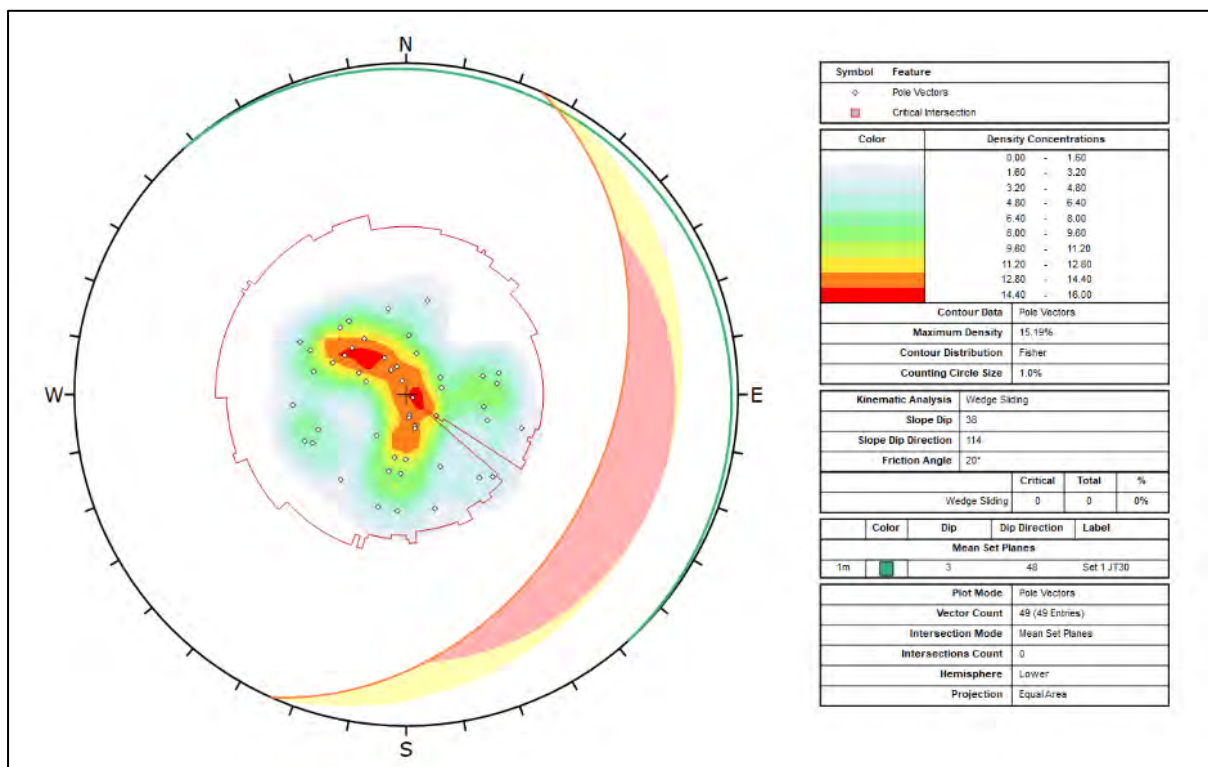


Figure: C48- Kinematic Analysis (Joints <30°) - Highwall 2 (Overall Slope) – Wedge Sliding

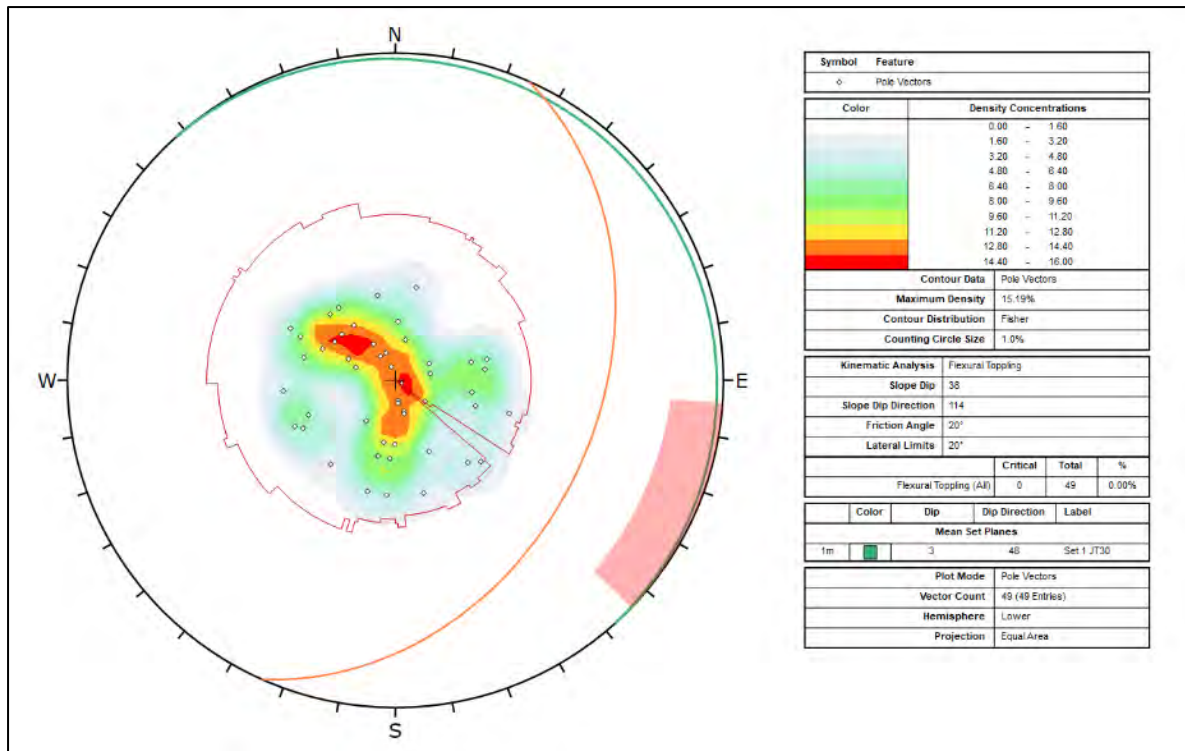


Figure: C49- Kinematic Analysis (Joints <30°) - Highwall 2 (Overall Slope) – Flexural Toppling.

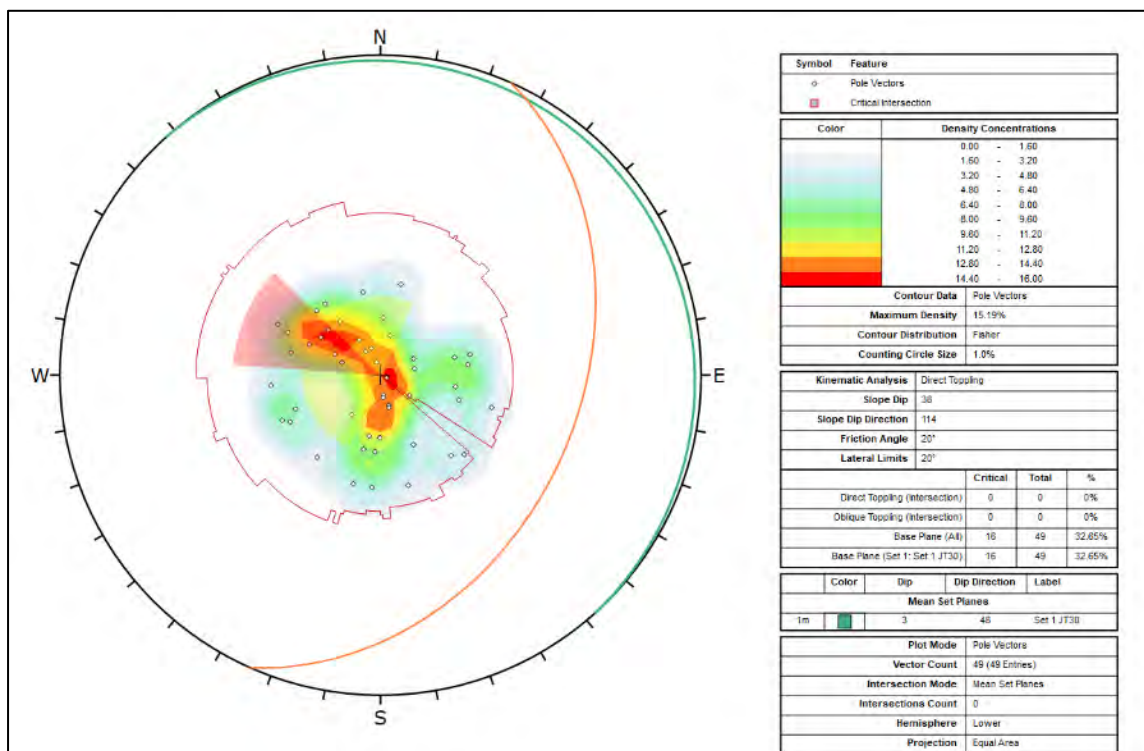


Figure: C50 - Kinematic Analysis (Joints <30°) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3 – Joints <30° - Overall Slope

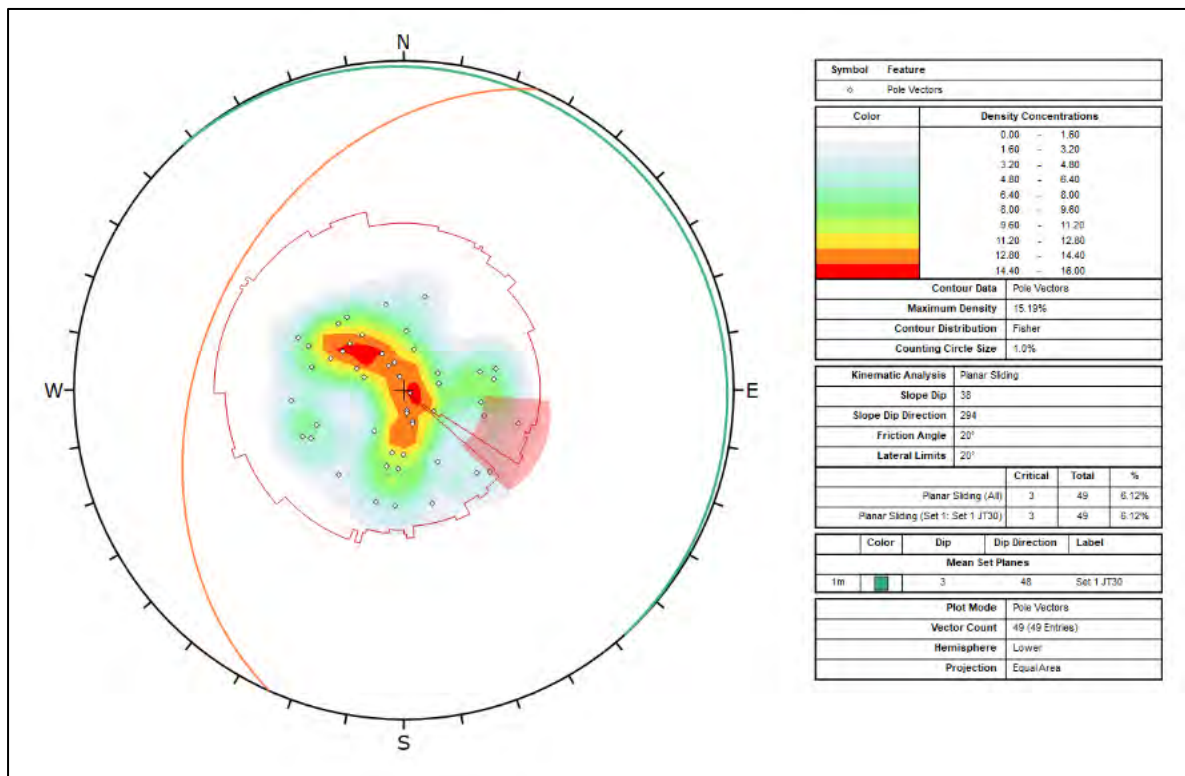


Figure: C51 - Kinematic Analysis (Joints <30°) - Highwall 3 (Overall Slope) – Planar Sliding.

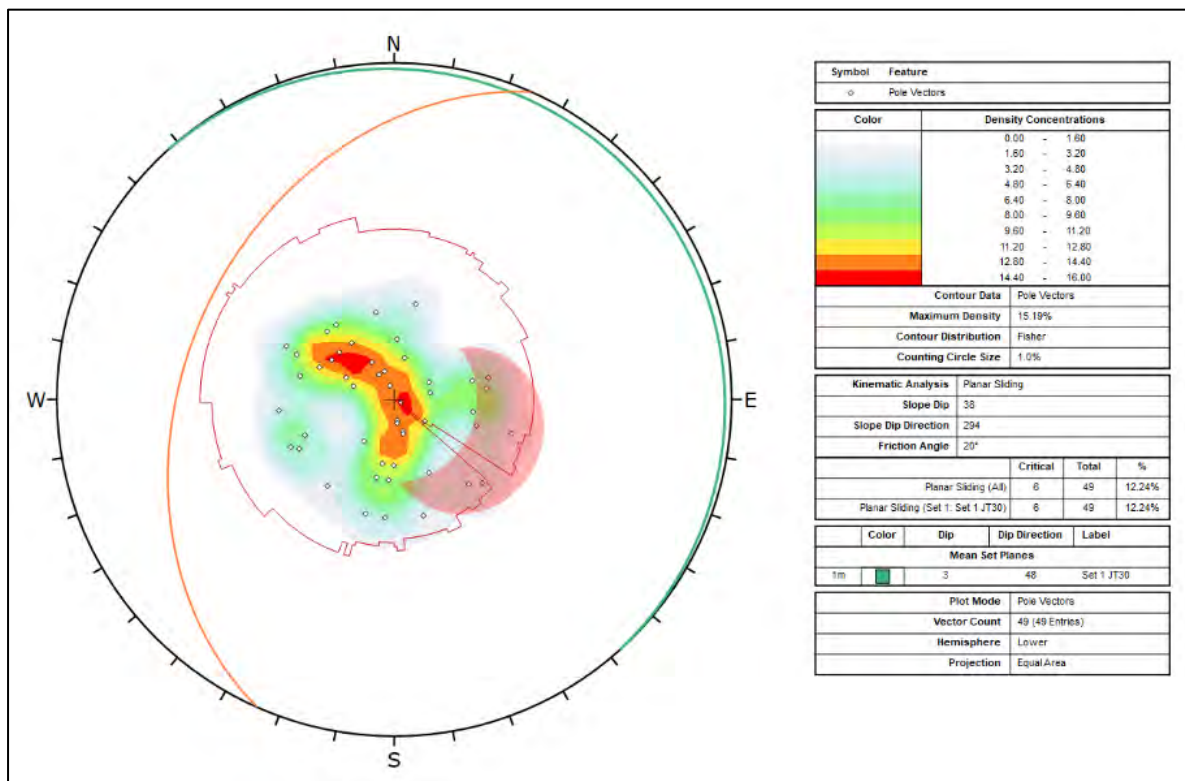
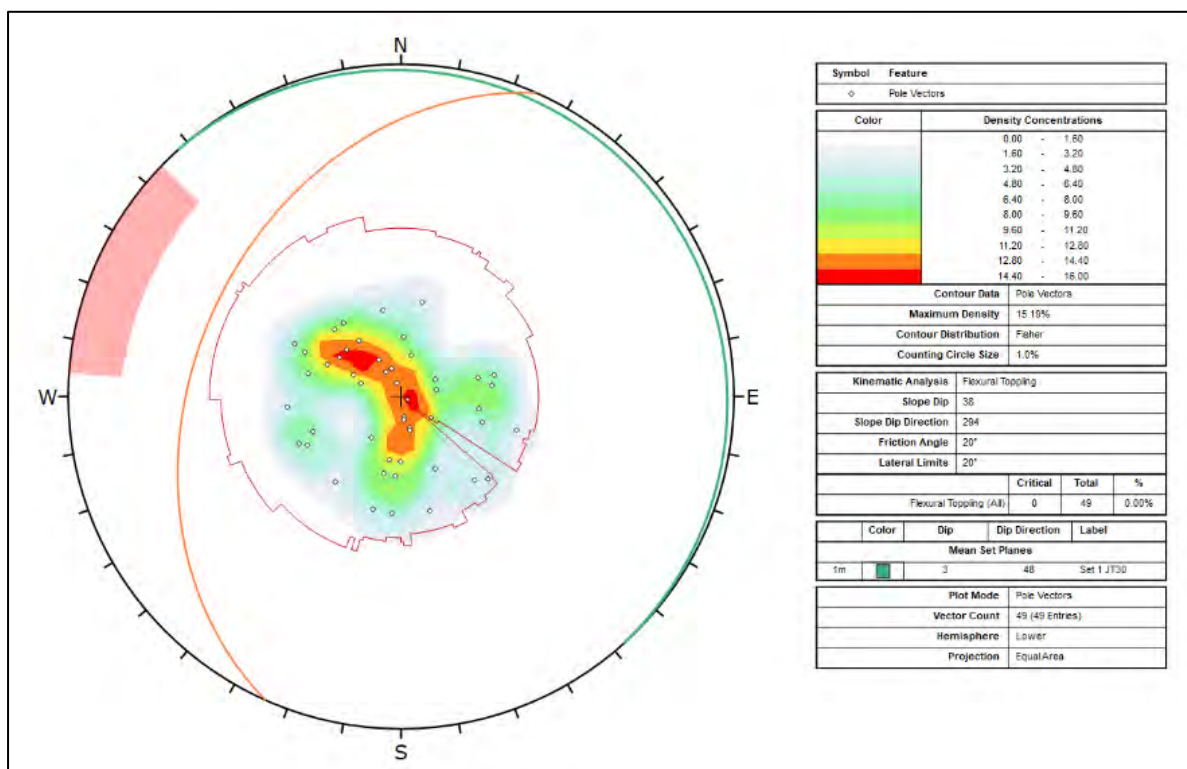
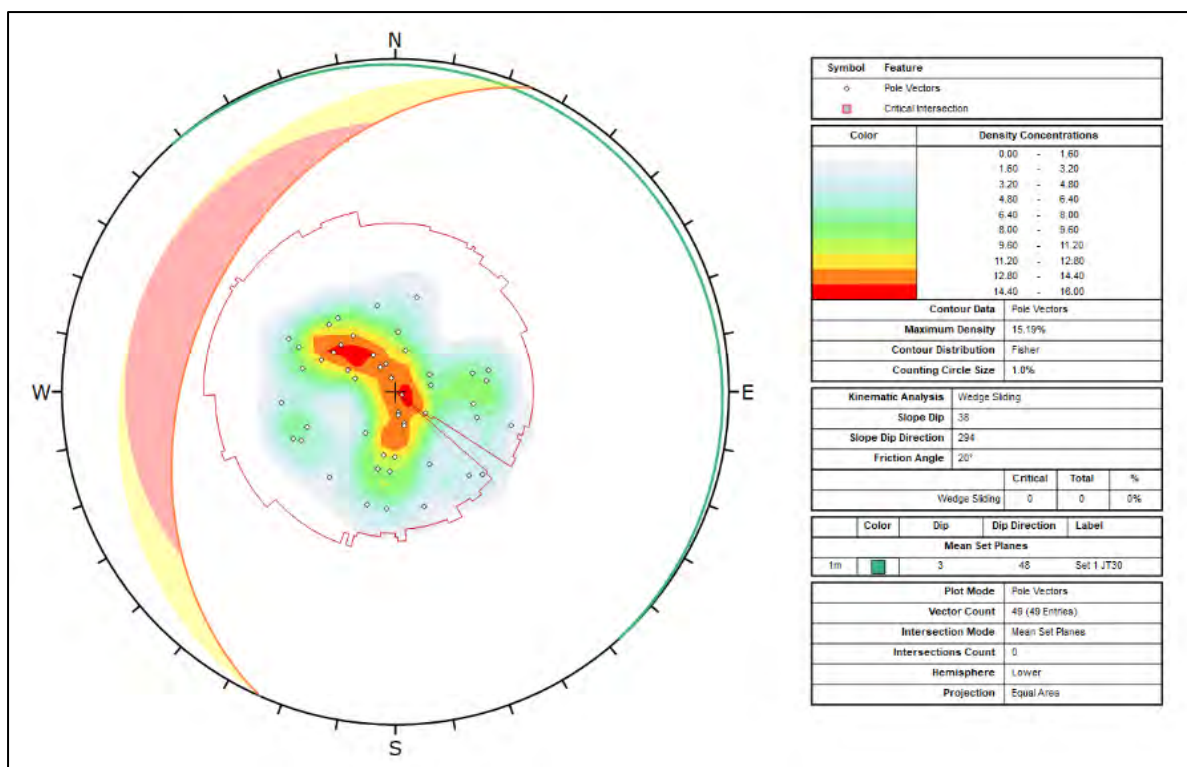


Figure: C52 - Kinematic Analysis (Joints <30°) - Highwall 3 (Overall Slope) – Planar Sliding (No Limits).



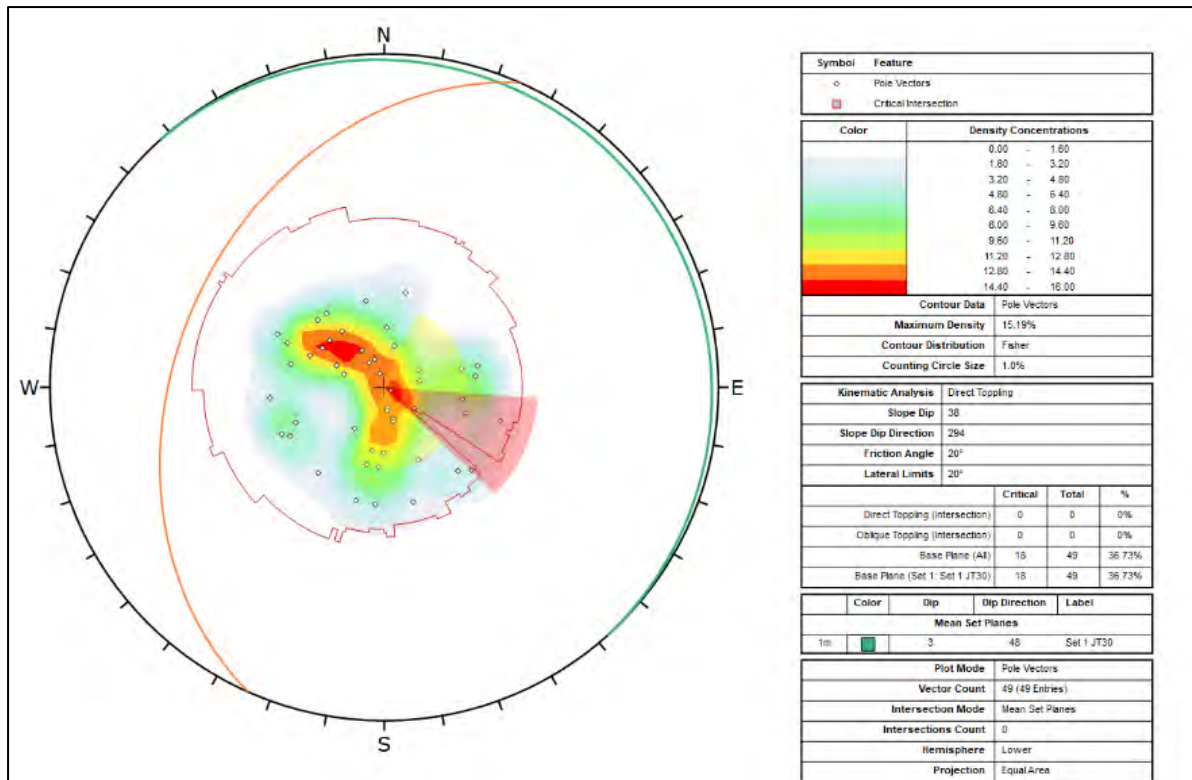


Figure: C55 - Kinematic Analysis (Joints <30°) - Highwall 3 (Overall Slope) – Direct Toppling.

Highwall 4 – Joints <30° - Overall Slope

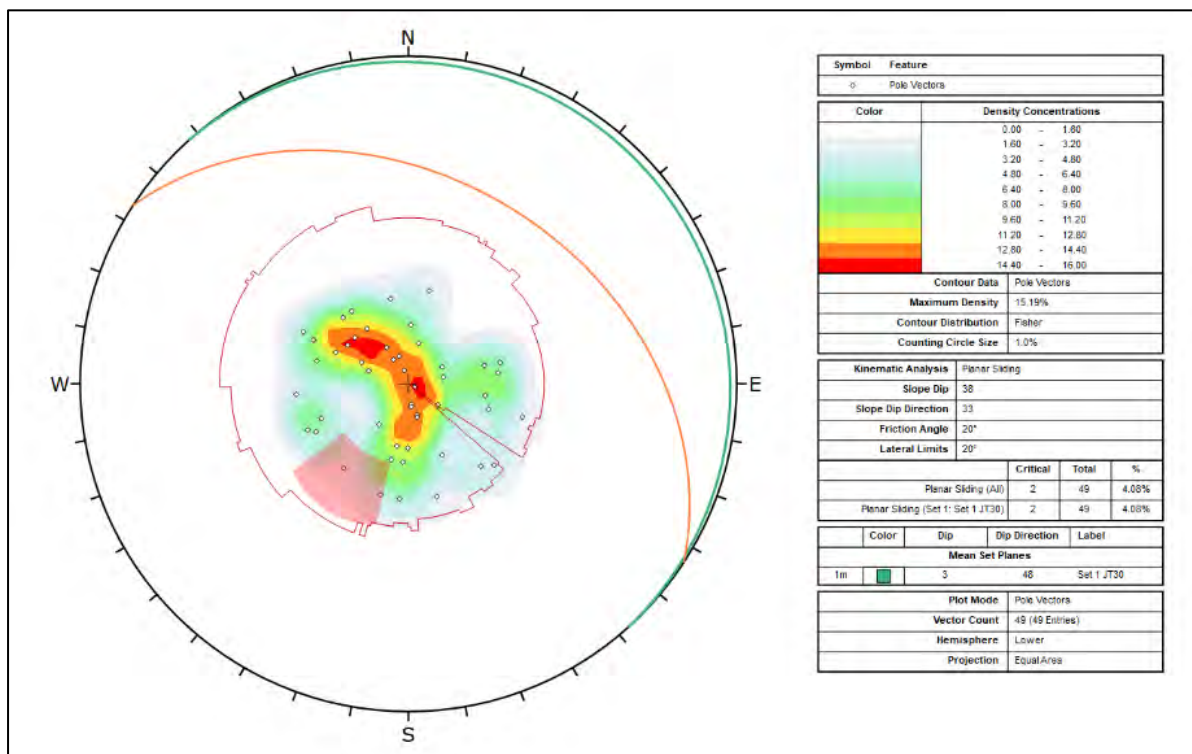


Figure: C56 - Kinematic Analysis (Joints <30°) - Highwall 4 (Overall Slope) – Planar Sliding.

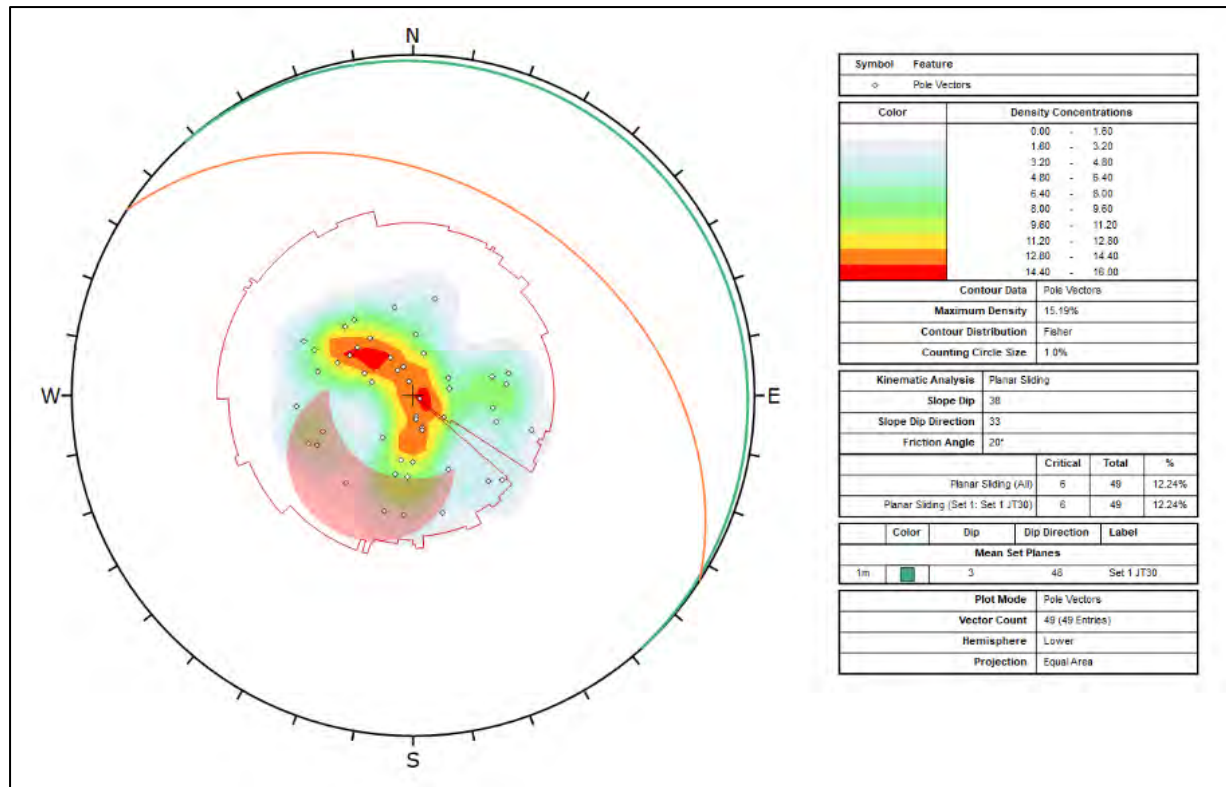


Figure: C57 - Kinematic Analysis (Joints $<30^\circ$) - Highwall 4 (Overall Slope) – Planar Sliding (No Limits).

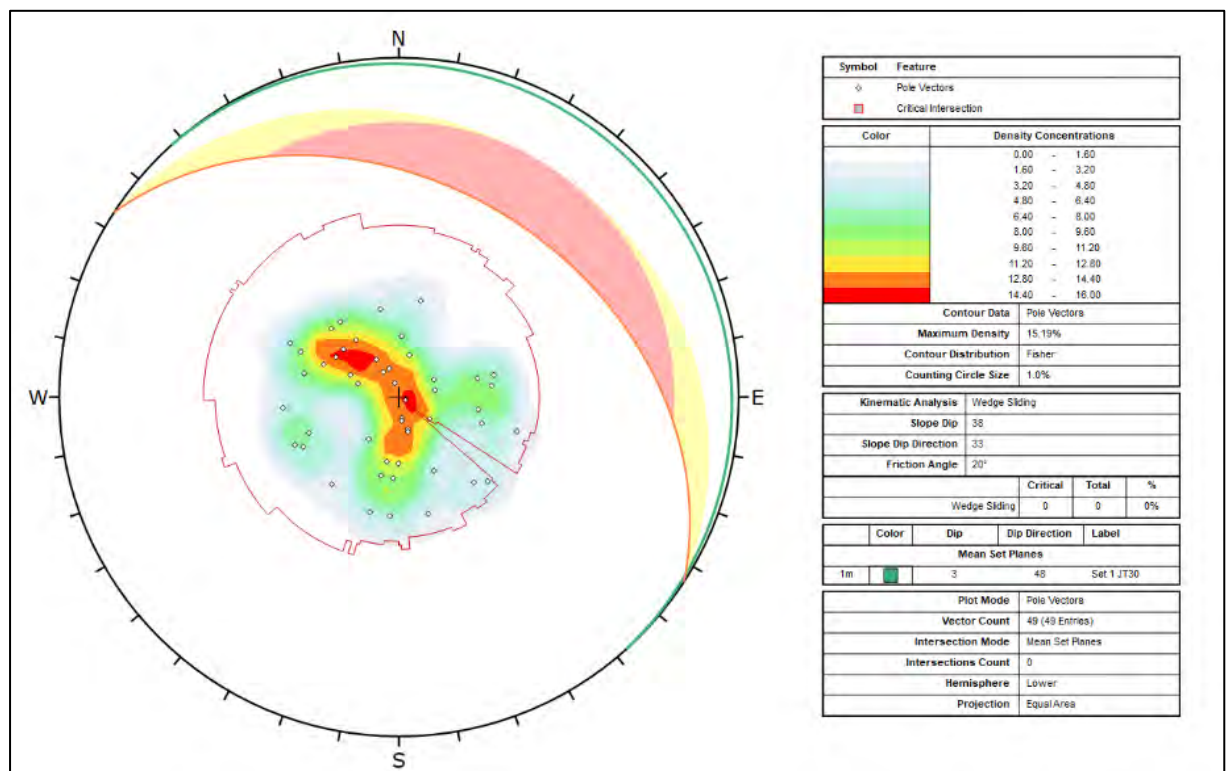


Figure: C58 - Kinematic Analysis (Joints $<30^\circ$) - Highwall 4 (Overall Slope) – Wedge Sliding.

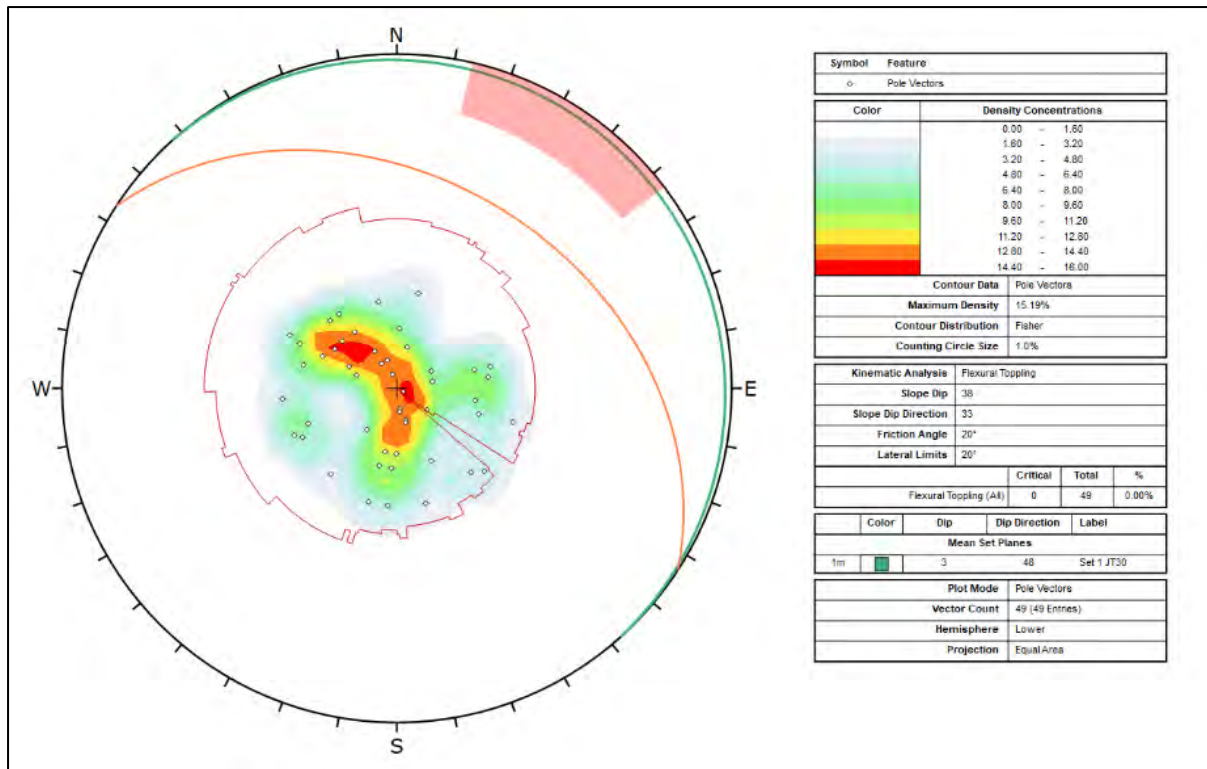


Figure: C59 - Kinematic Analysis (Joints <30°) - Highwall 4 (Overall Slope) – Flexural Topping.

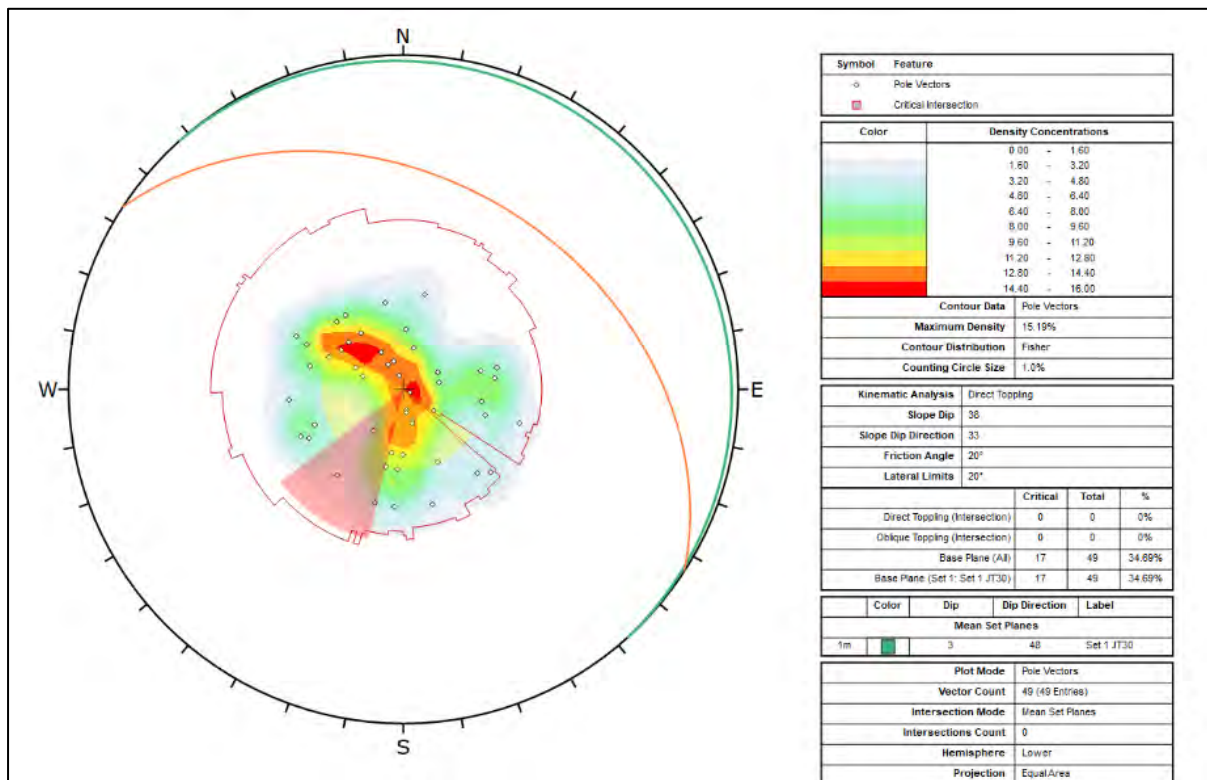


Figure: C60 - Kinematic Analysis (Joints <30°) - Highwall 4 (Overall Slope) – Direct Topping.

Highwall 1 – Joints <30° - Bench Slope

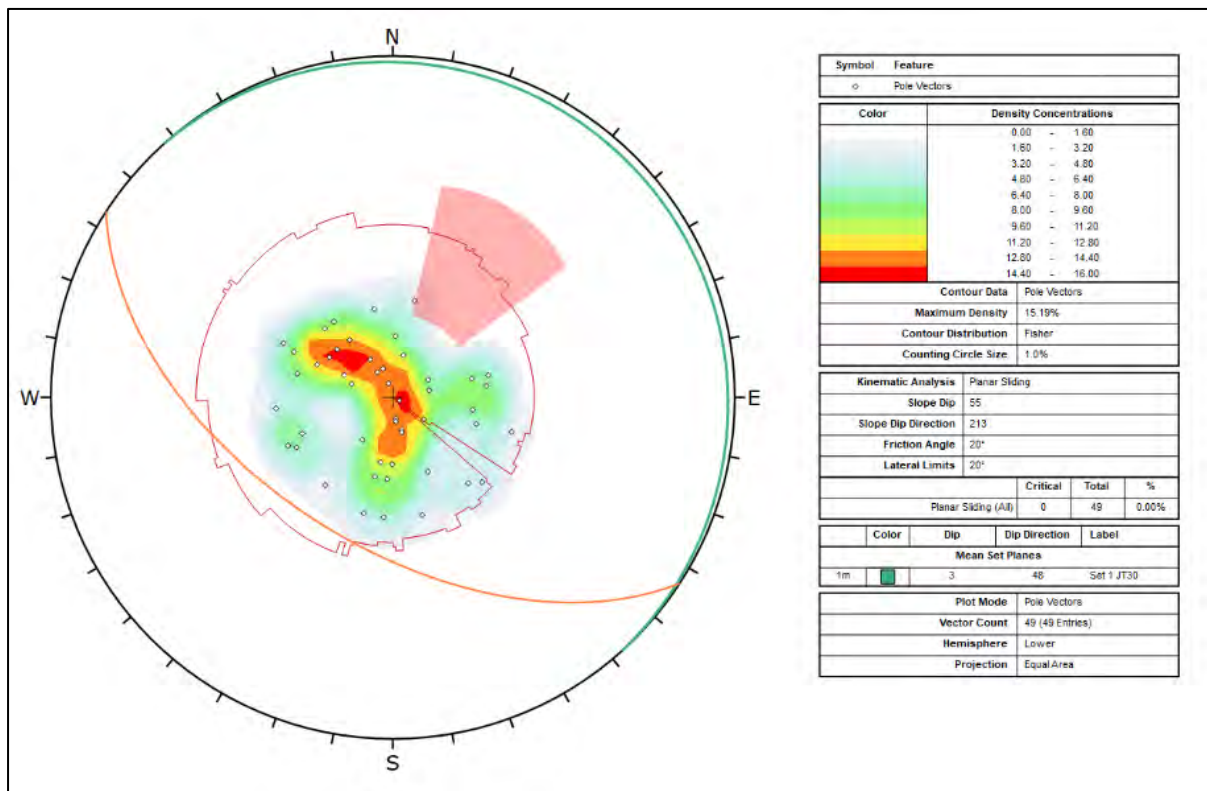


Figure: C61 - Kinematic Analysis (Joints <30°) - Highwall 1 (Bench Slope) – Planar Sliding.

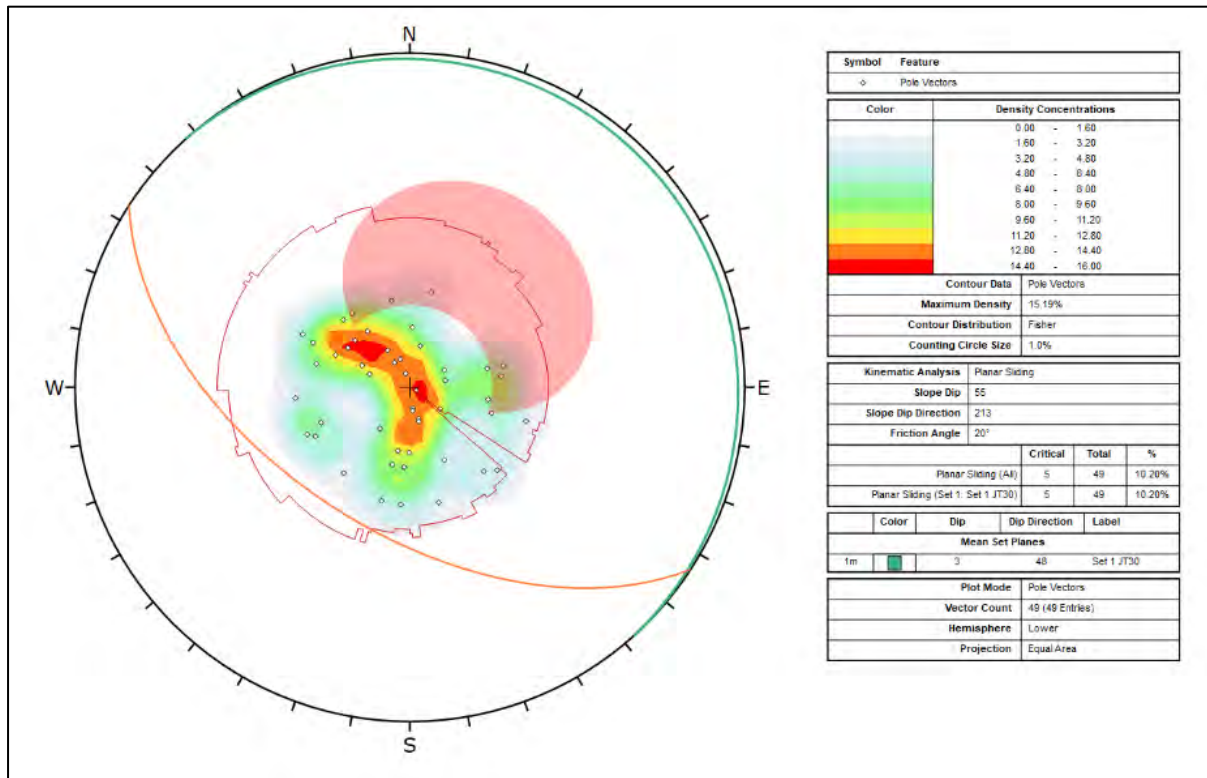


Figure: C62 - Kinematic Analysis (Joints <30°) - Highwall 1 (Bench Slope) – Planar Sliding (No Limits).

Symbol	Feature
○	Pole Vectors

Color	Density Concentrations
	0.00 ~ 1.60
	1.60 ~ 3.20
	3.20 ~ 4.80
	4.80 ~ 6.40
	6.40 ~ 8.00
	8.00 ~ 9.60
	9.60 ~ 11.20
	11.20 ~ 12.80
	12.80 ~ 14.40
	14.40 ~ 16.00

Contour Data	Pole Vectors
Maximum Density	15.19%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis		Flexural Topping		
Slope Dip	55			
Slope Dip Direction	213			
Friction Angle	20°			
Lateral Limits	20°			
		Critical	Total	%
	Flexural Topping (All)	0	49	0.00%

	Color	Dip	Dip Direction	Label
Mean Set Planes				
1m		3	48	Set 1 JT30

Plot Mode		Pole Vectors
Vector Count	49 (49 Entries)	
Hemisphere	Lower	
Projection	Equal Area	

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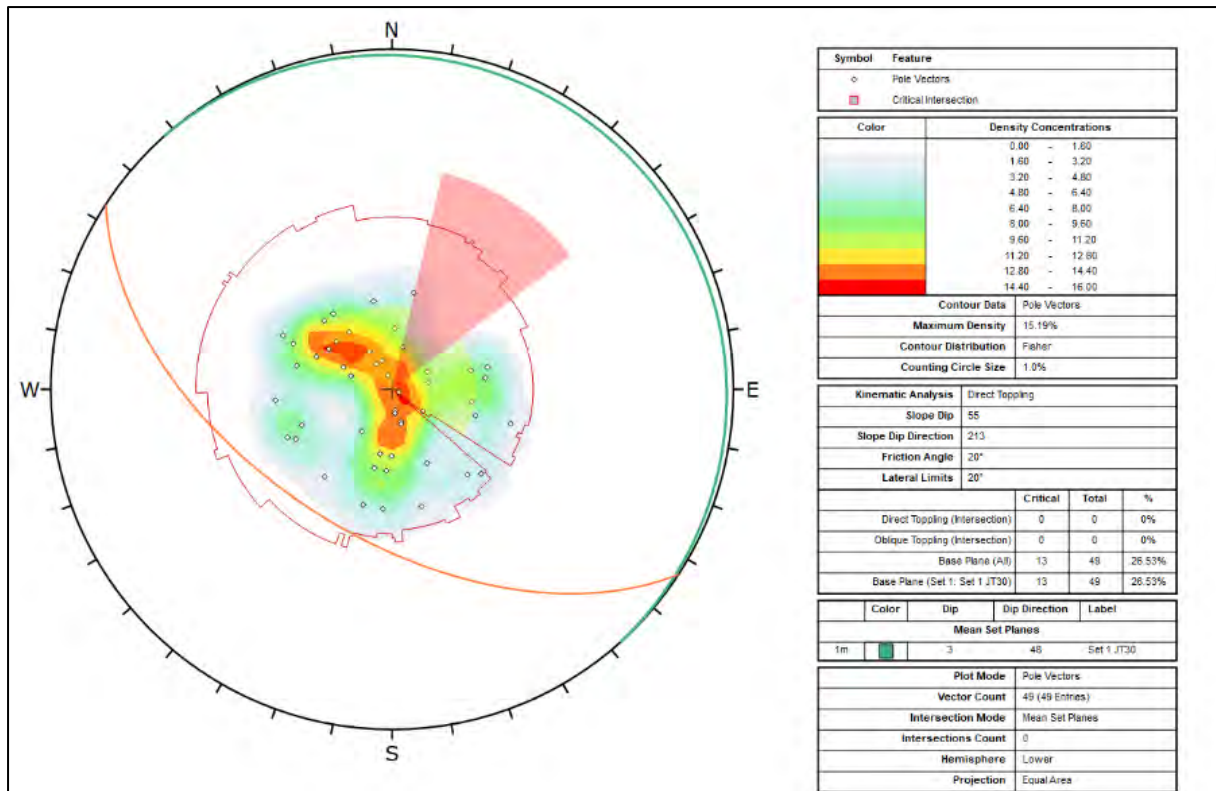


Figure: C65 - Kinematic Analysis (Joints <30°) - Highwall 1 (Bench Slope) – Direct Toppling.

Highwall 2 – Joints <30° - Bench Slope

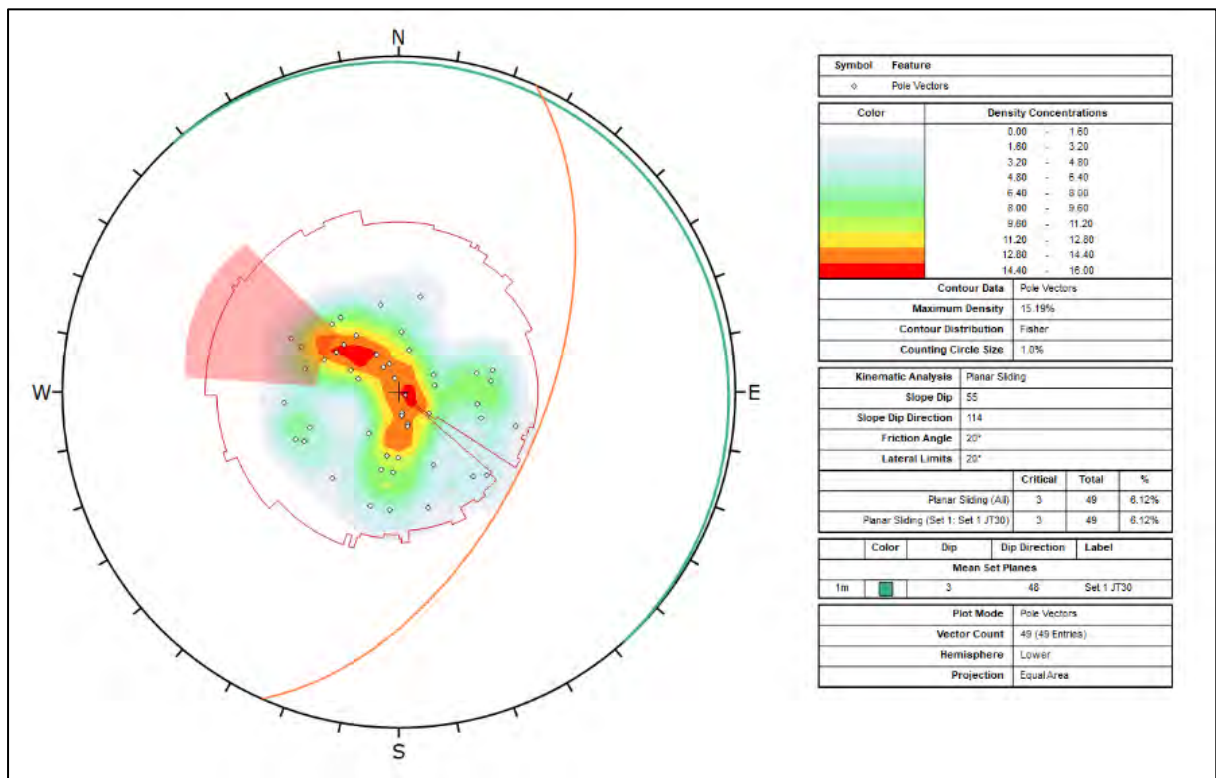


Figure: C66 - Kinematic Analysis (Joints <30°) - Highwall 2 (Bench Slope) – Planar Sliding.

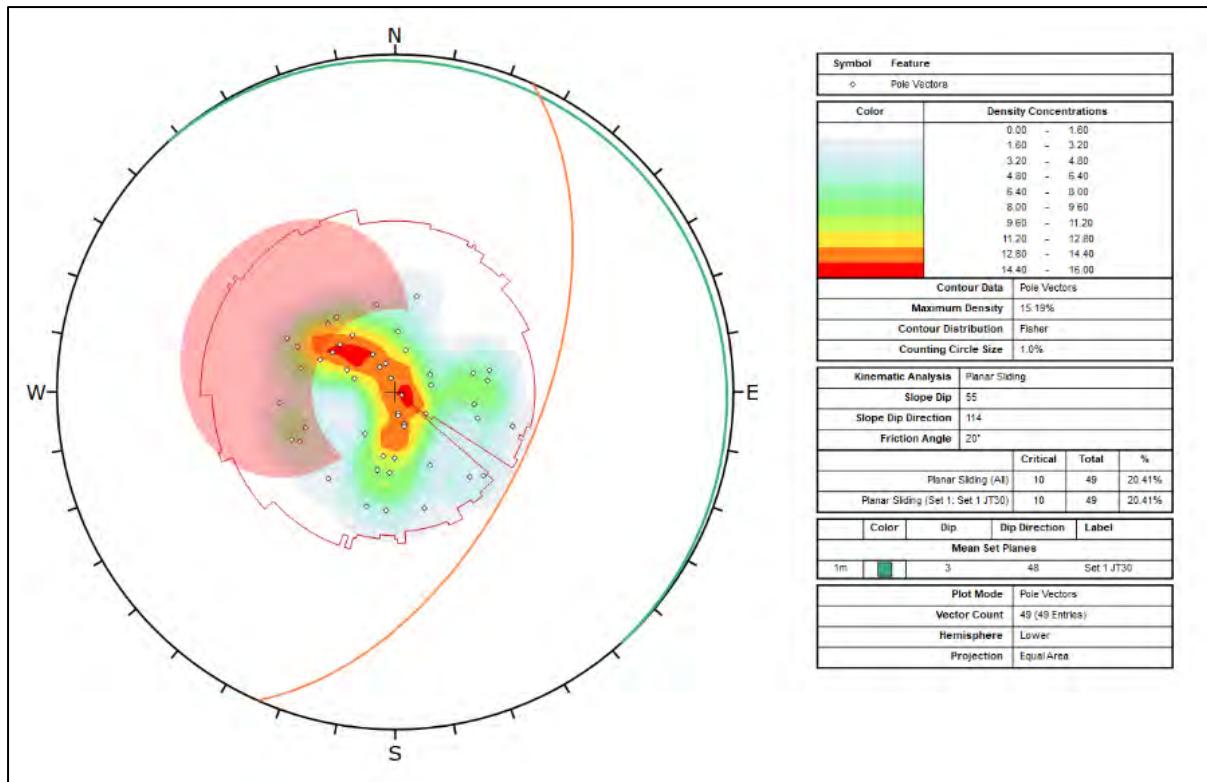


Figure: C67 - Kinematic Analysis (Joints <30°) - Highwall 2 (Bench Slope) – Planar Sliding (No Limits).

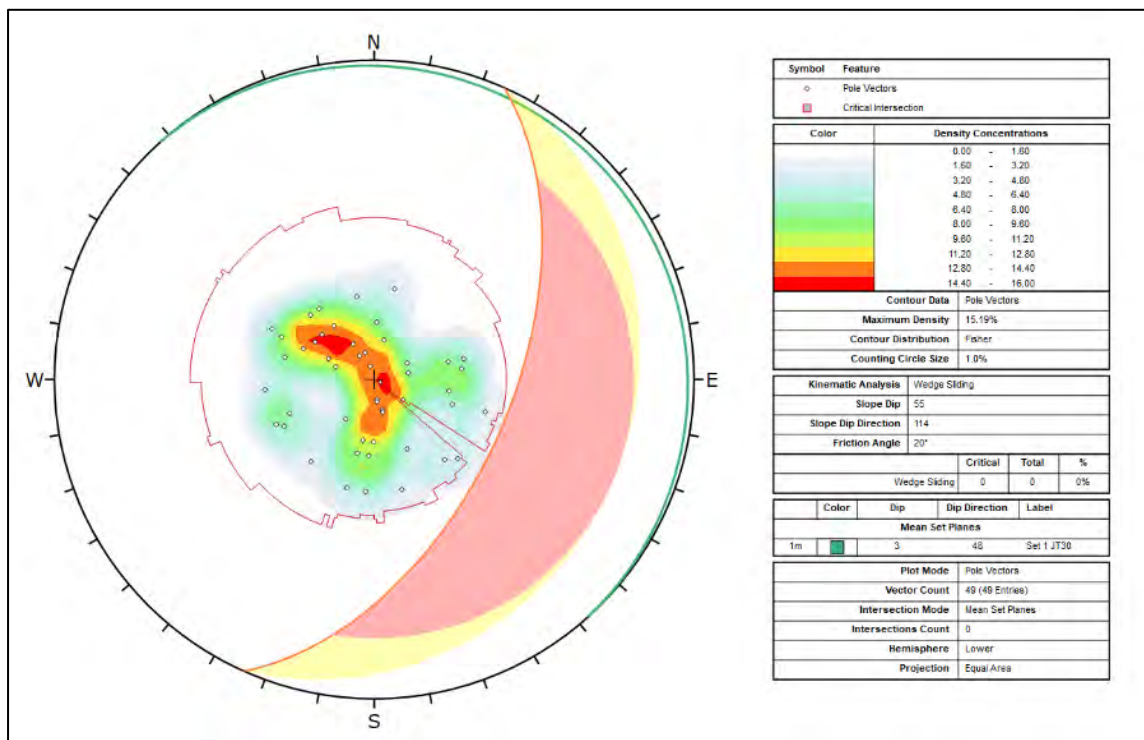


Figure: C68 - Kinematic Analysis (Joints <30°) - Highwall 2 (Bench Slope) – Wedge Sliding.

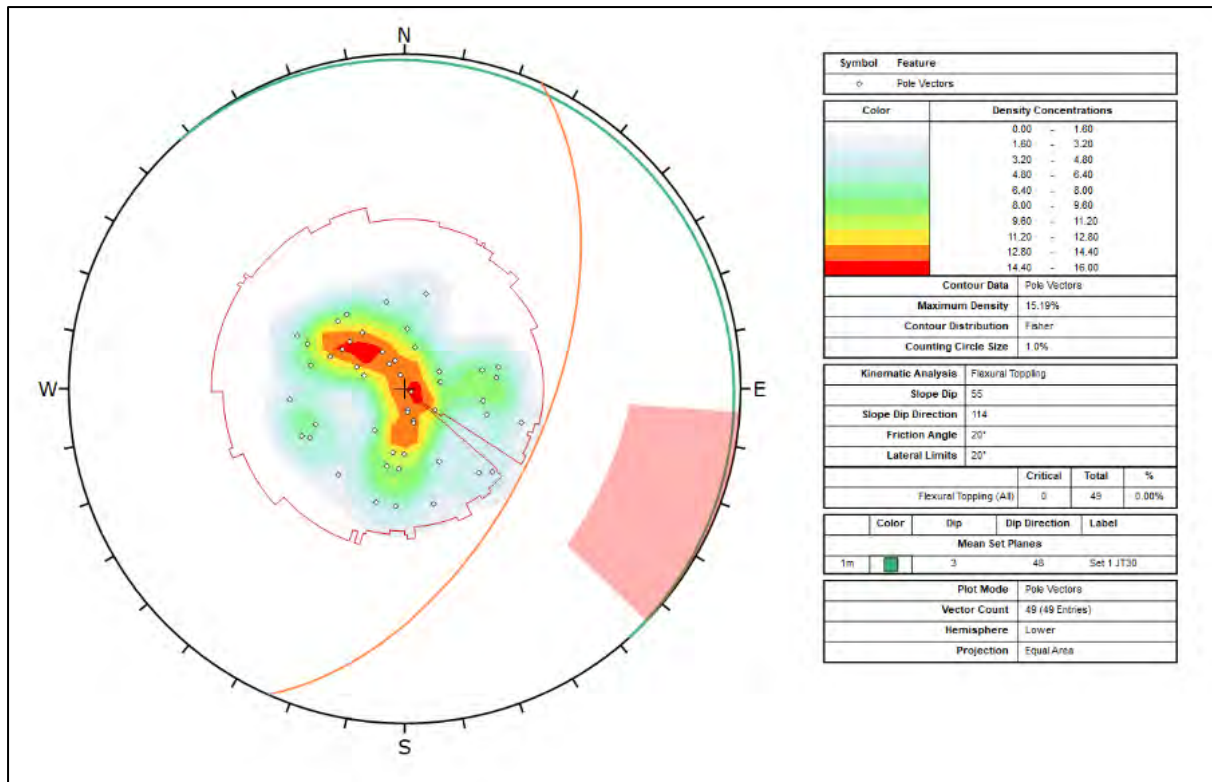


Figure: C69 - Kinematic Analysis (Joints <30°) - Highwall 2 (Bench Slope) – Flexural Toppling.

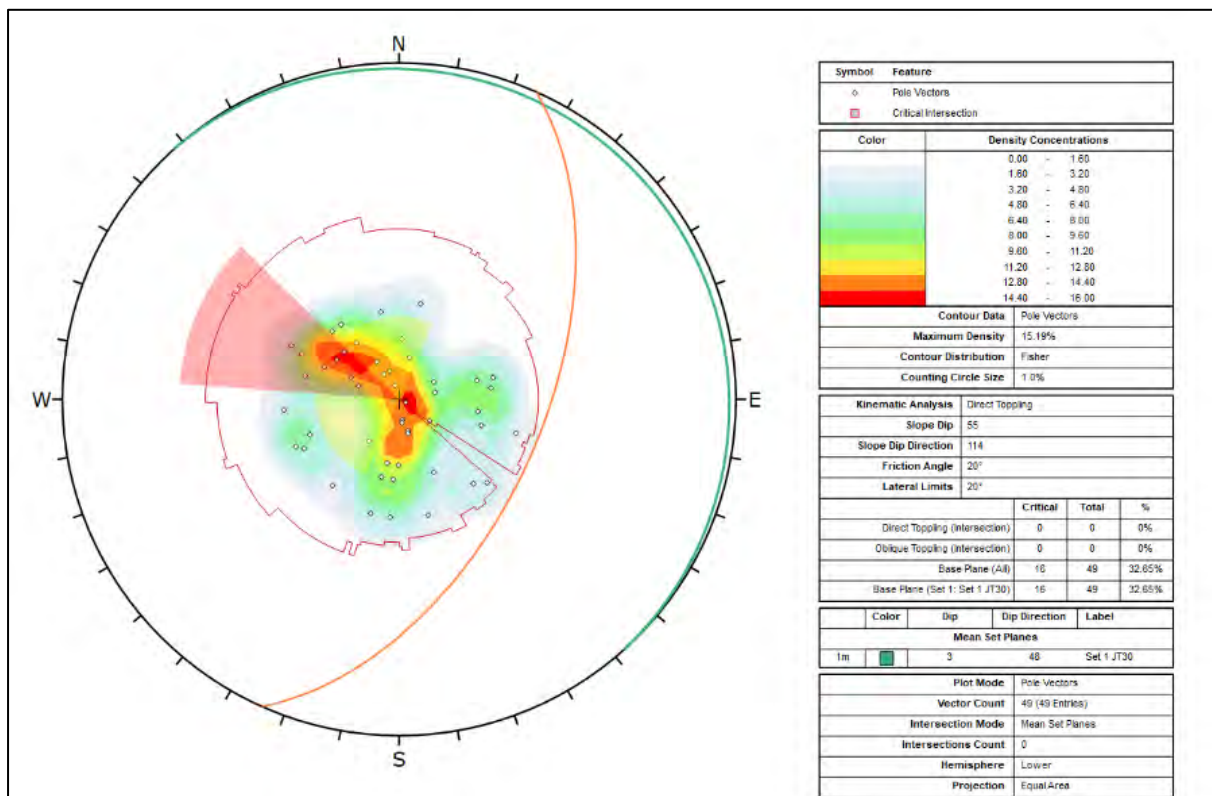


Figure: C70 - Kinematic Analysis (Joints <30°) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – Joints <30° - Bench Slope

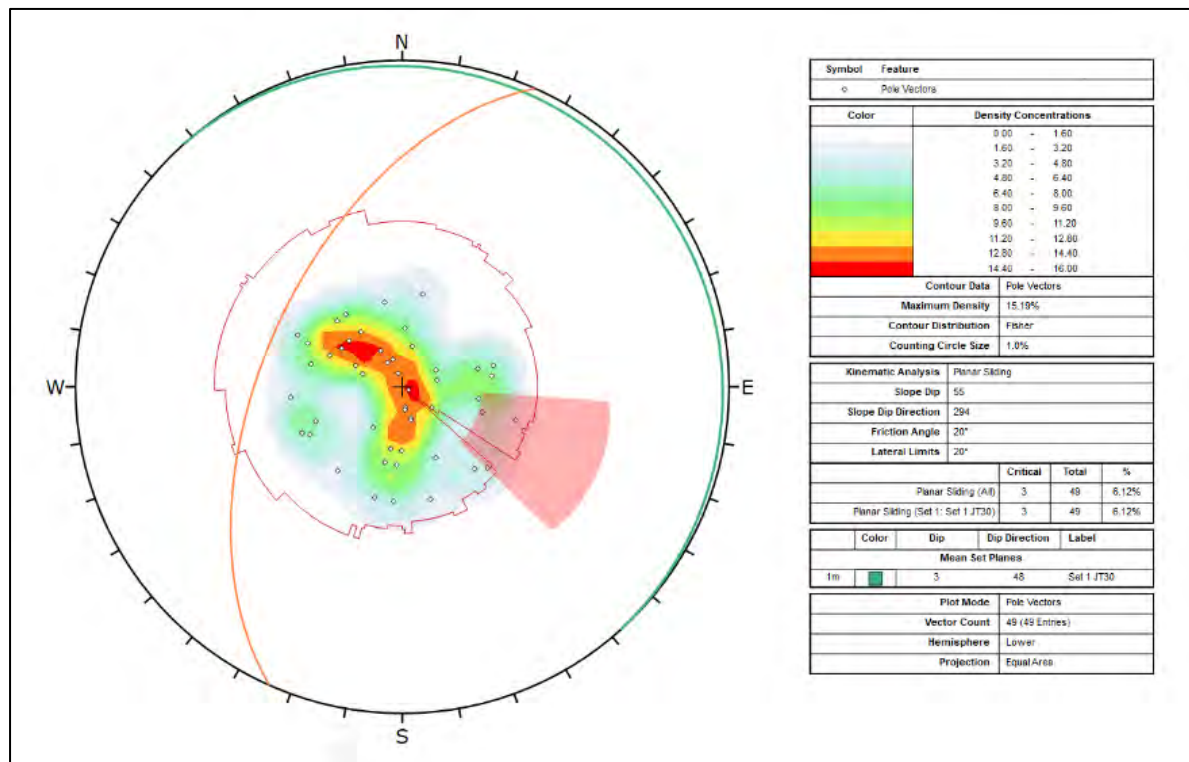


Figure: C71 - Kinematic Analysis (Joints <30°) - Highwall 3 (Bench Slope) – Planar Sliding.

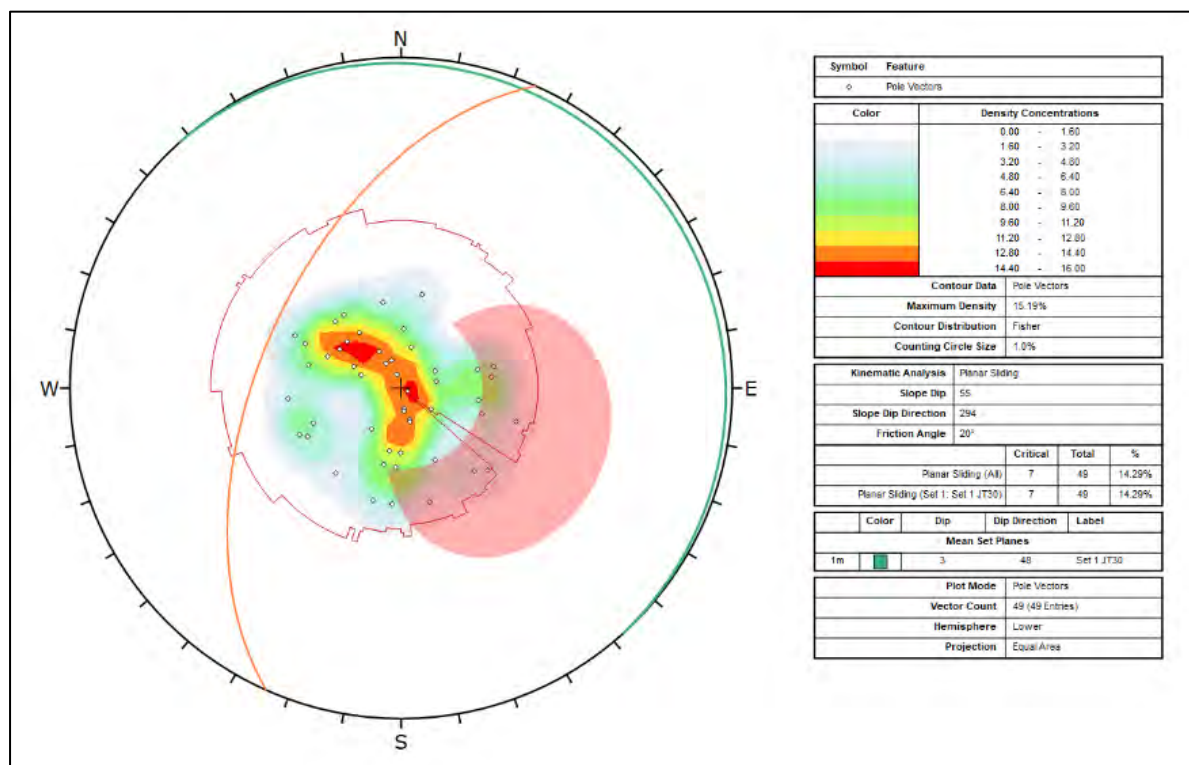


Figure: C72 - Kinematic Analysis (Joints <30°) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

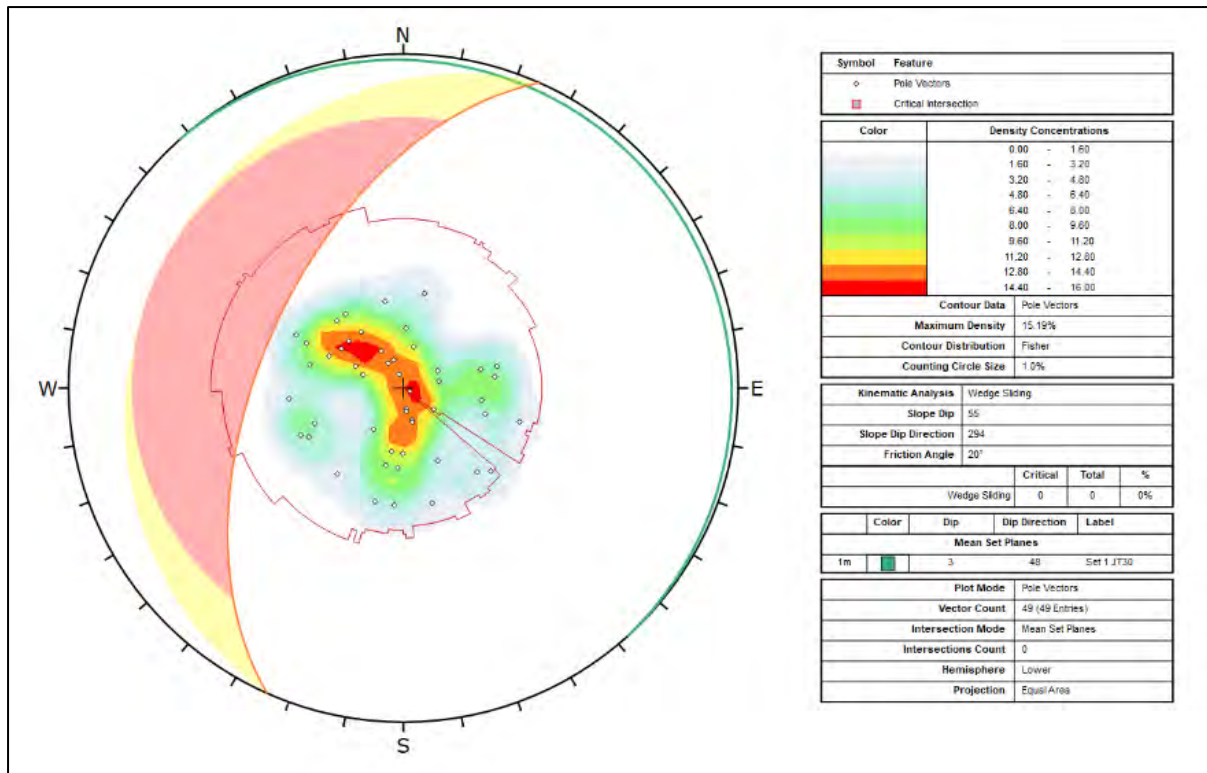


Figure: C73 - Kinematic Analysis (Joints <30°) - Highwall 3 (Bench Slope) – Wedge Sliding.

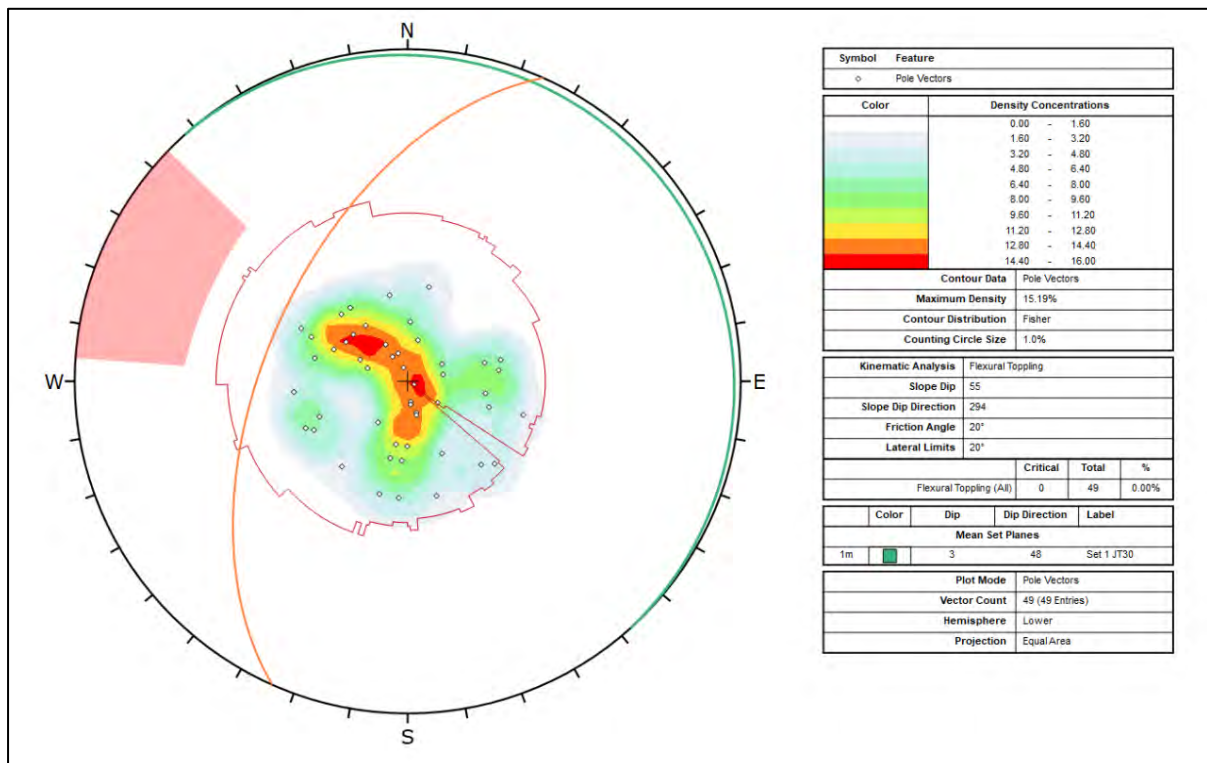


Figure: C74 - Kinematic Analysis (Joints <30°) - Highwall 3 (Bench Slope) – Flexural Toppling.

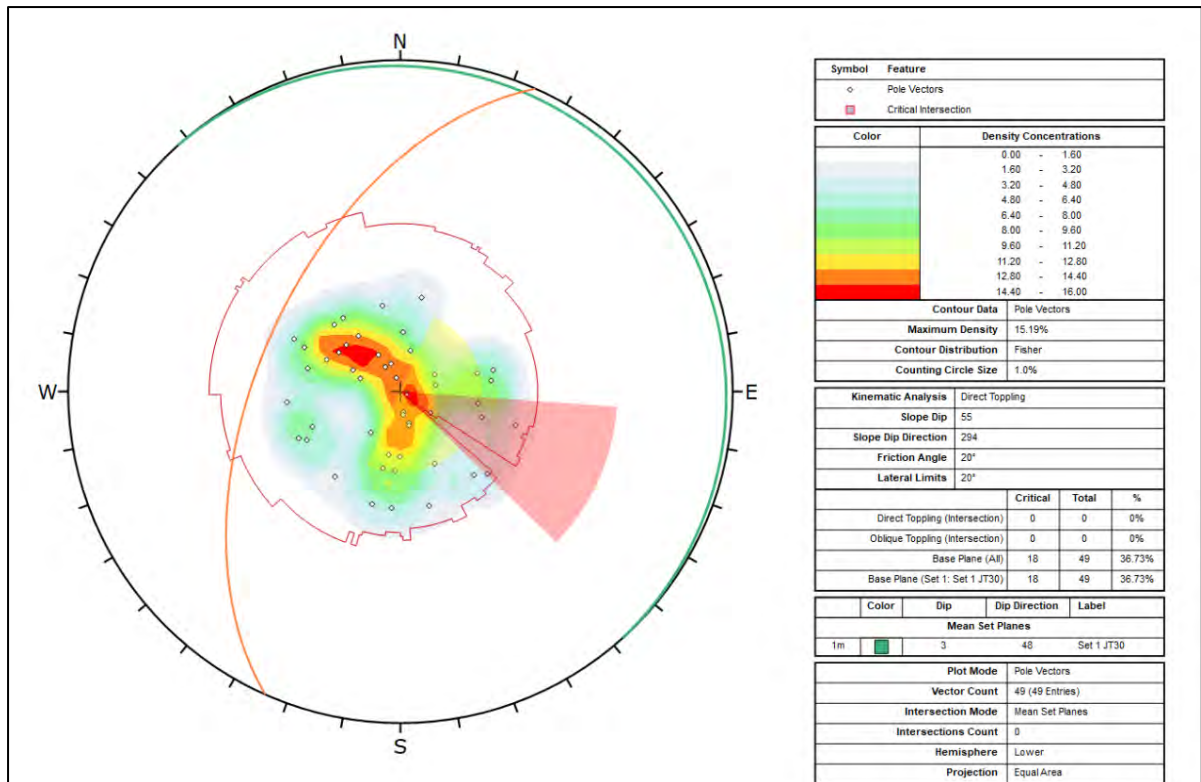


Figure: C75 - Kinematic Analysis (Joints <30°) - Highwall 3 (Bench Slope) – Direct Toppling.

Highwall 3 – Joints <30° - Bench Slope

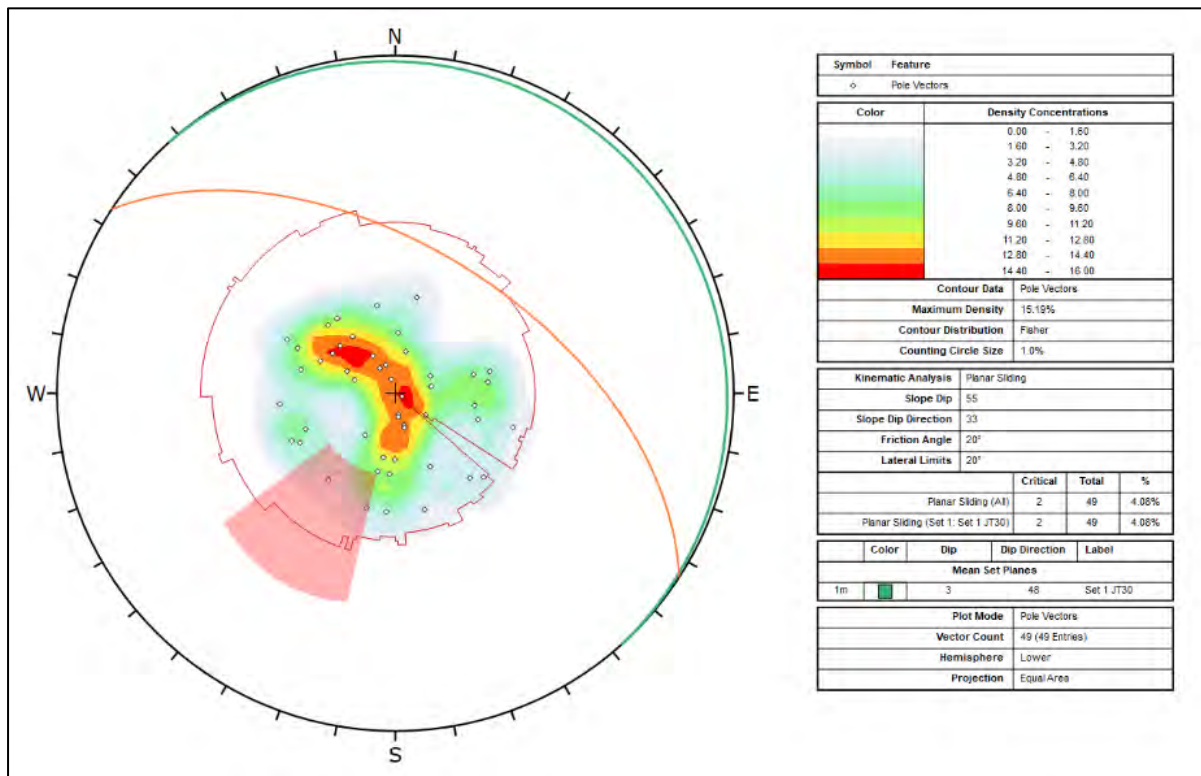


Figure: C76 - Kinematic Analysis (Joints <30°) - Highwall 4 (Bench Slope) – Planar Sliding.

Symbol	Feature
○	Pole Vectors
■	Critical Intersection

Color	Density Concentrations
	0.00 ~ 1.60
	1.60 ~ 3.20
	3.20 ~ 4.80
	4.80 ~ 6.40
	6.40 ~ 8.00
	8.00 ~ 9.60
	9.60 ~ 11.20
	11.20 ~ 12.80
	12.80 ~ 14.40
	14.40 ~ 16.00

Contour Data	Pole Vectors
Maximum Density	15.19%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	55
Slope Dip Direction	33
Friction Angle	20°

	Critical	Total	%
Wedge Sliding	0	0	0%

	Color	Dip	Dip direction	Label
Mean Set Planes				
1m		3	48	Set 1 JT30

Plot Mode	Pole Vectors
Vector Count	49 (49 Entries)
Intersection Mode	Mean Set Planes
Intersections Count	0
Hemisphere	Lower
Projection	Equal Area

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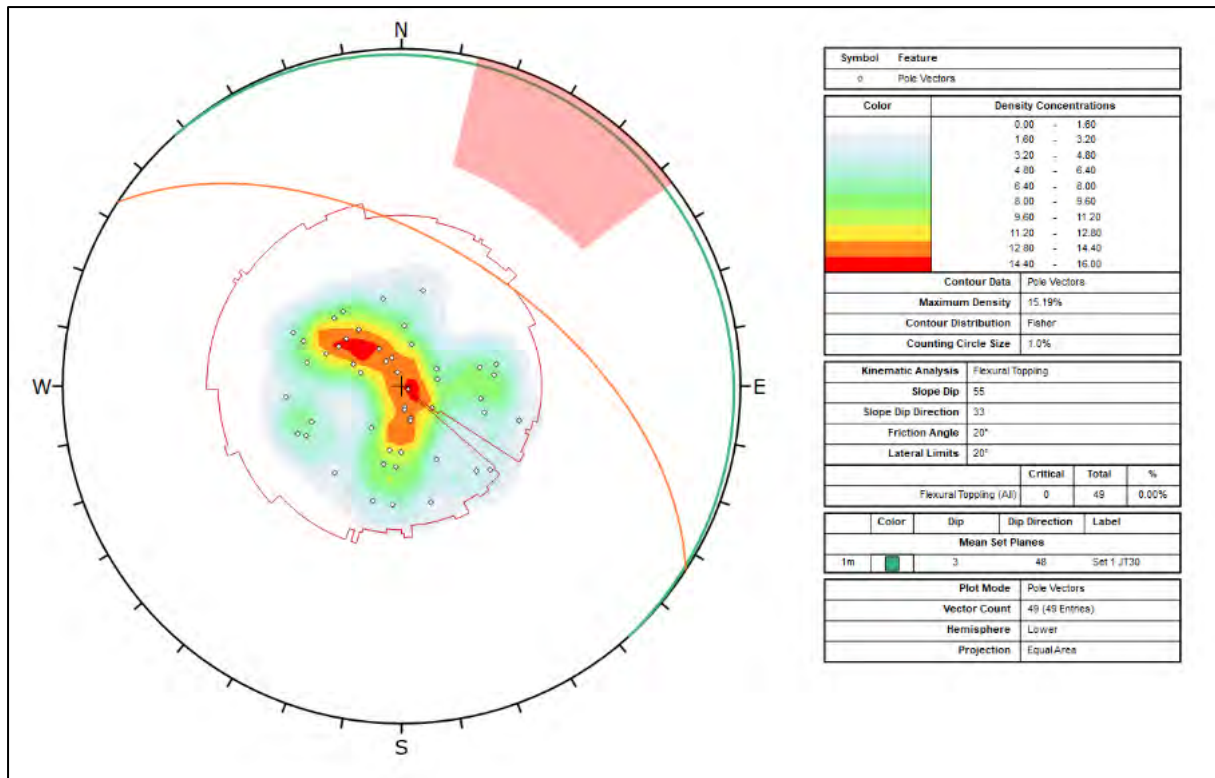


Figure: C79 - Kinematic Analysis (Joints <30°) - Highwall 4 (Bench Slope) – Flexural Toppling.

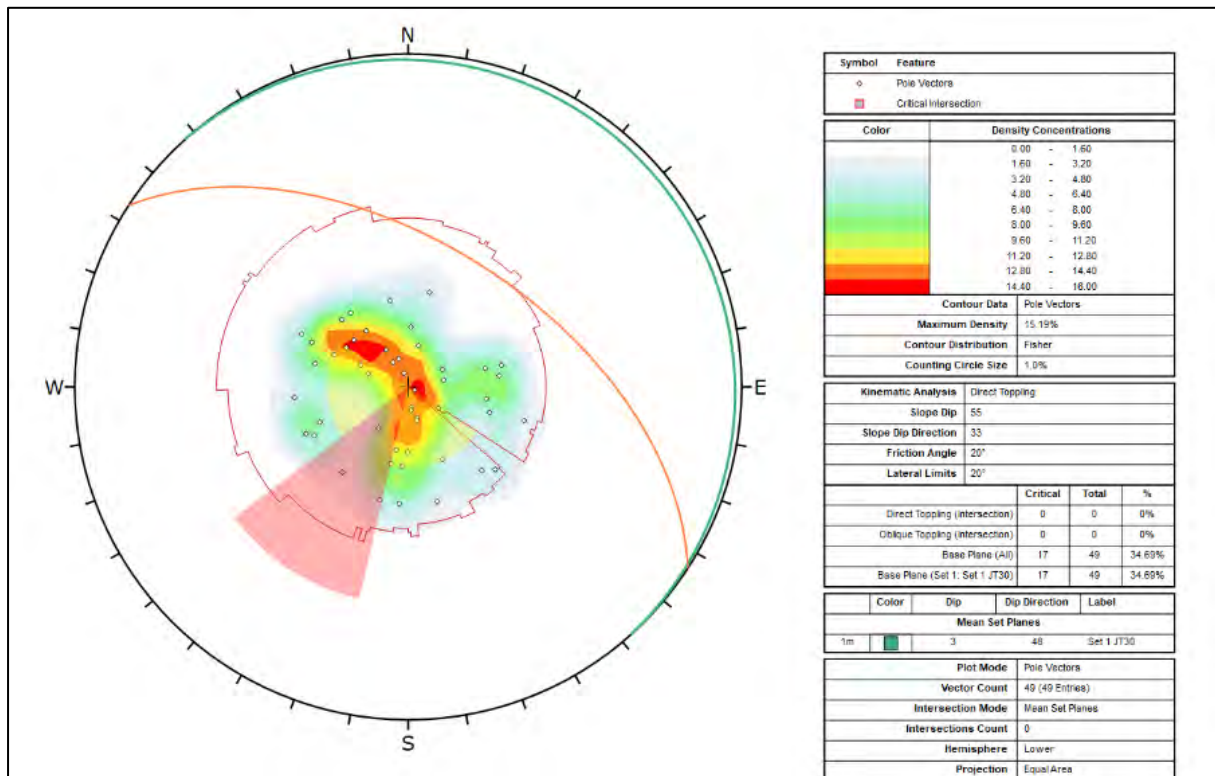


Figure: C80 - Kinematic Analysis (Joints <30°) - Highwall 4 (Bench Slope) – Direct Toppling.

Highwall 1 – Joints >30°- <60° - Overall Slope

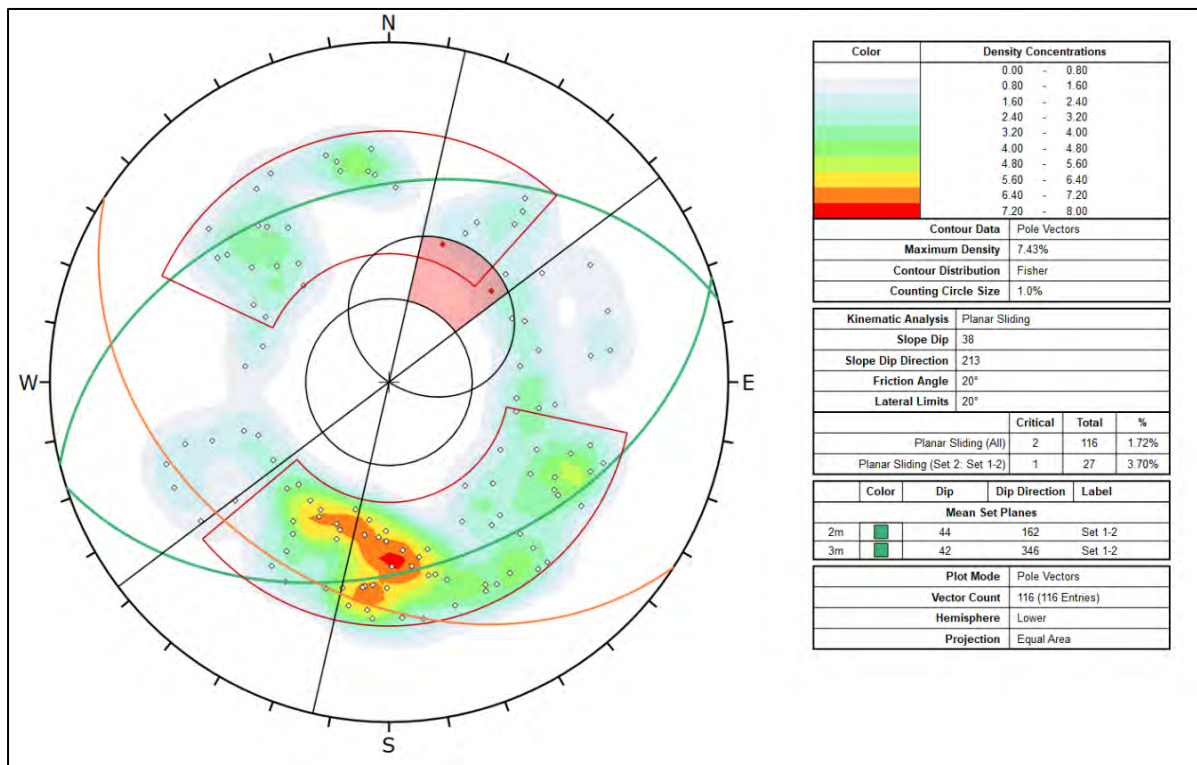


Figure: C81 - Kinematic Analysis (Joints >30°- <60°) - Highwall 1 (Overall Slope) – Planar Sliding.

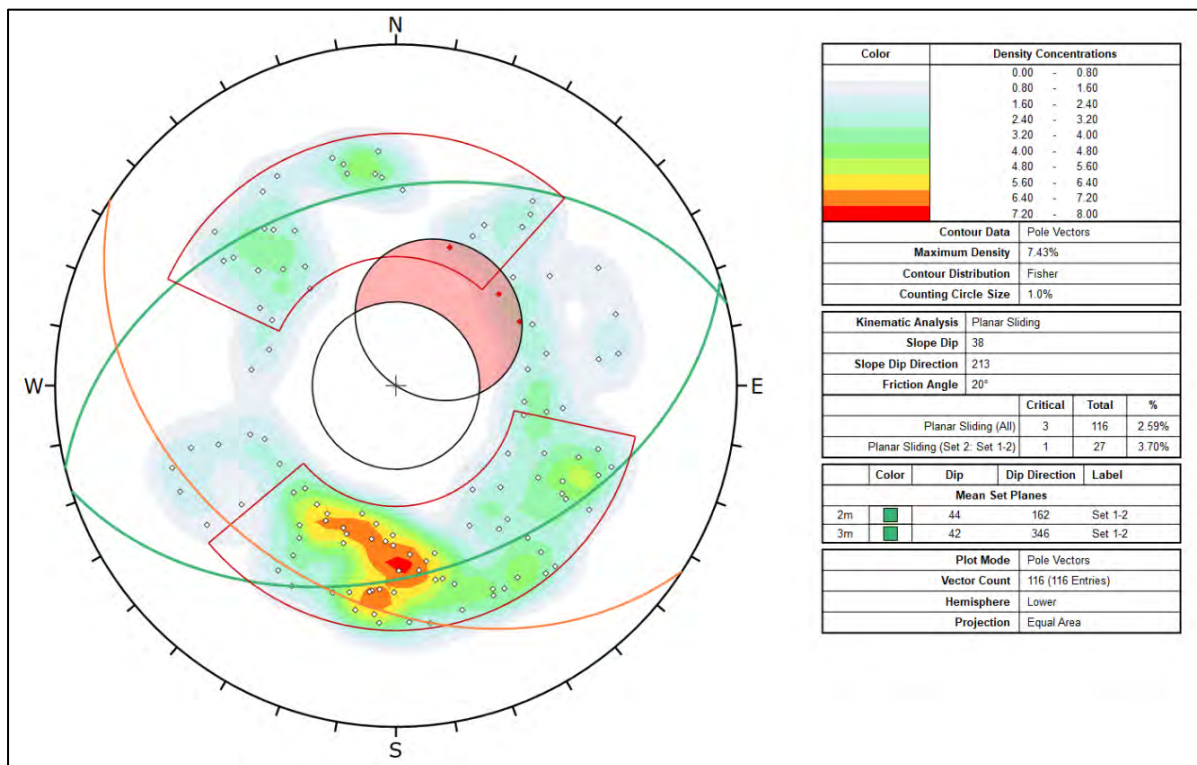


Figure: C82 - Kinematic Analysis (Joints >30°- <60°) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).

Density Concentrations

Color	Density Concentrations
	0.00 - 0.80
	0.80 - 1.60
	1.60 - 2.40
	2.40 - 3.20
	3.20 - 4.00
	4.00 - 4.80
	4.80 - 5.60
	5.60 - 6.40
	6.40 - 7.20
	7.20 - 8.00

Contour Data

Contour Data	Pole Vectors
Maximum Density	7.43%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis

Kinematic Analysis	Flexural Topping
Slope Dip	38
Slope Dip Direction	213
Friction Angle	20°
Lateral Limits	20°

Flexural Topping (All)

Critical	Total	%
0	116	0.00%

Mean Set Planes

	Color	Dip	Dip Direction	Label
2m	[Green]	44	162	Set 1-2
3m	[Green]	42	346	Set 1-2

Plot Mode

Plot Mode	Pole Vectors
Vector Count	116 (116 Entries)
Hemisphere	Lower
Projection	Equal Area

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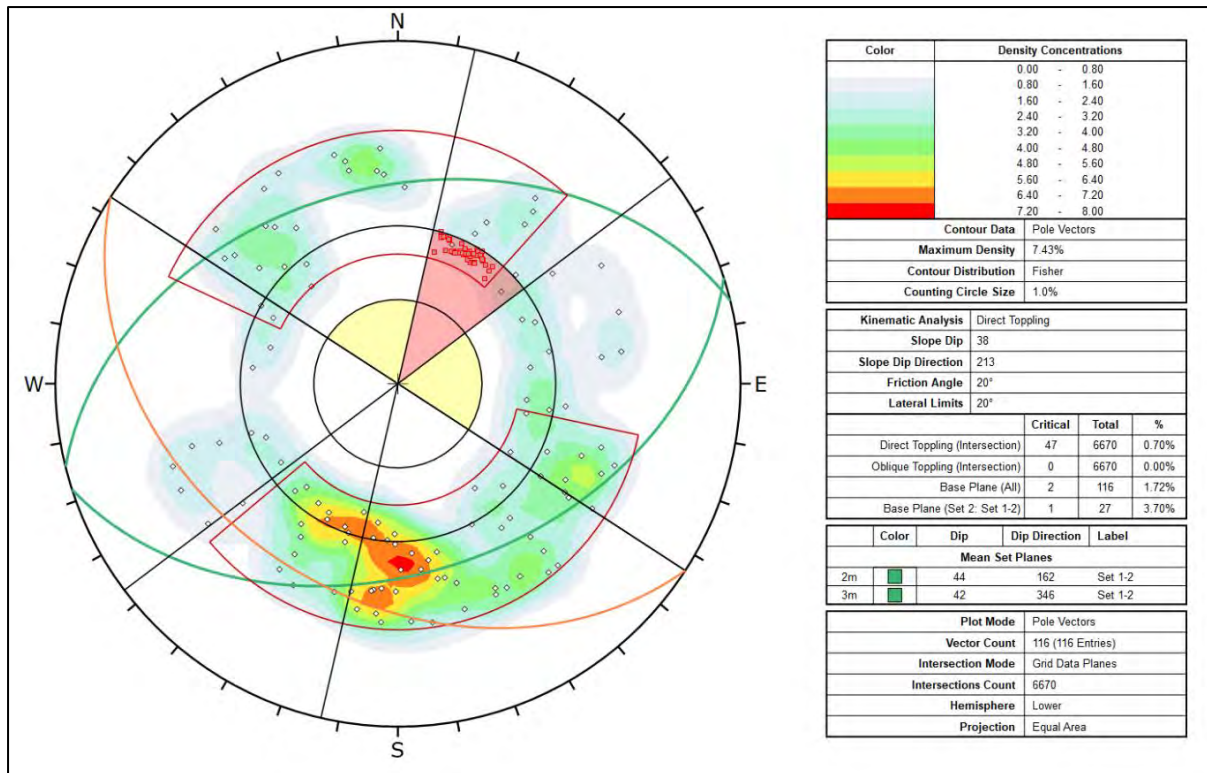


Figure: C85 - Kinematic Analysis (Joints >30° - <60°) - Highwall 1 (Overall Slope) – Direct Toppling.

Highwall 2 – Joints >30°- <60° - Overall Slope

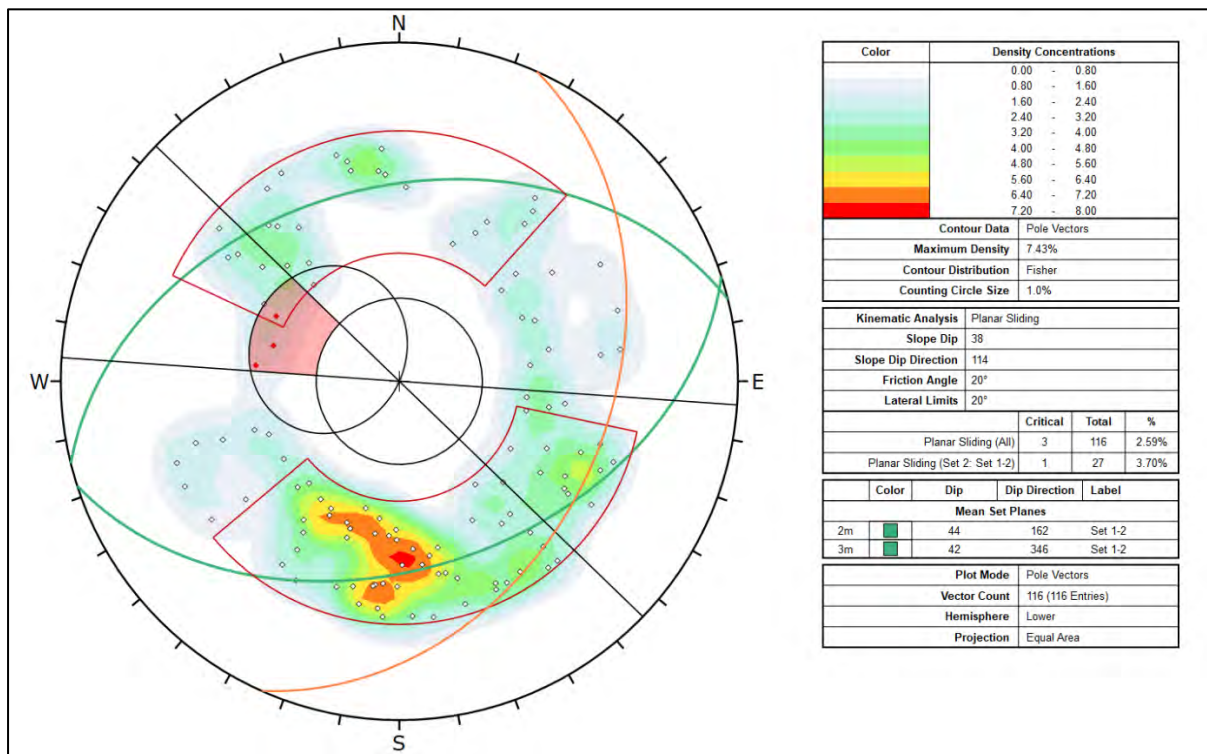


Figure: C86 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Overall Slope) – Planar Sliding.

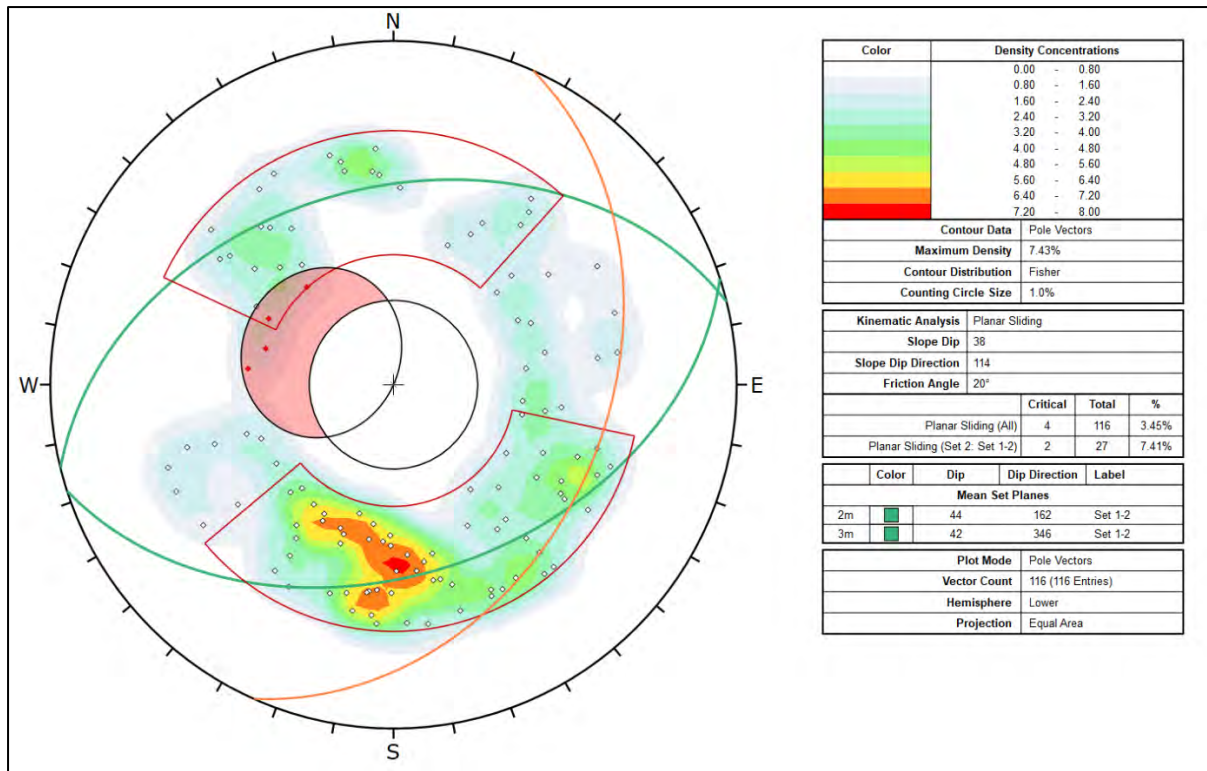


Figure: C87 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

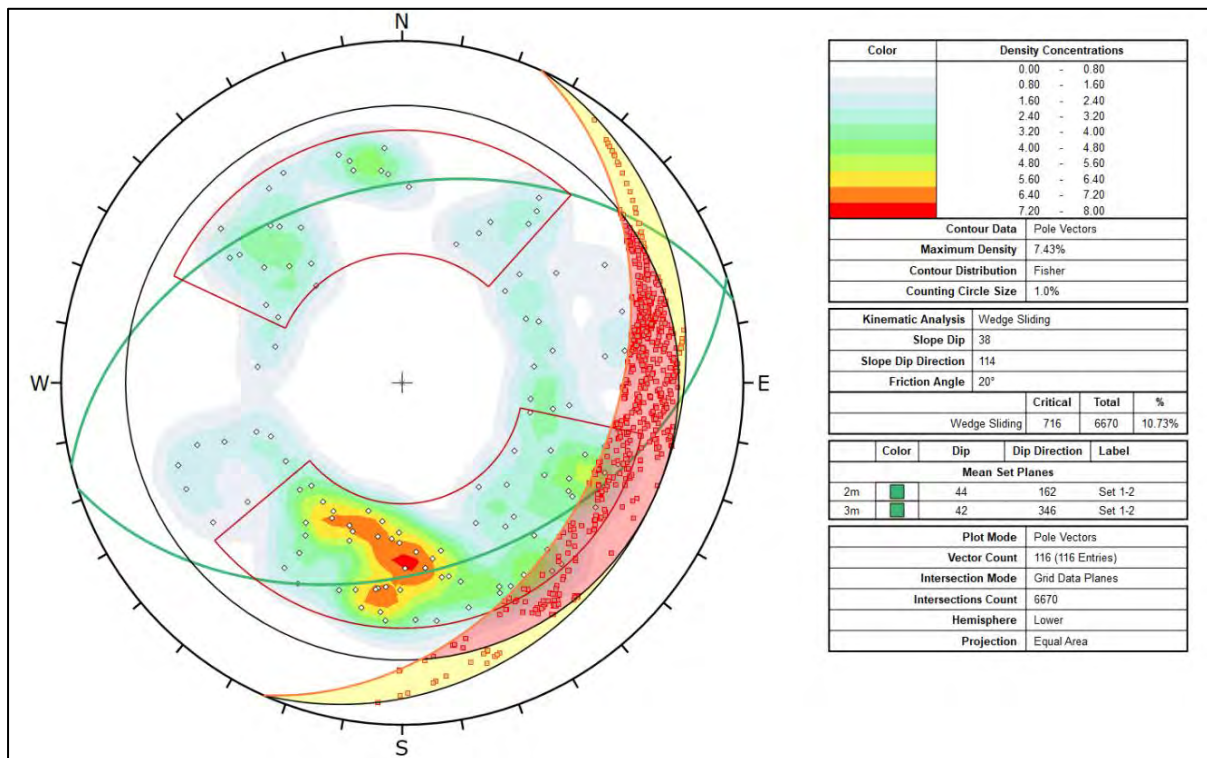


Figure: C88 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Overall Slope) – Wedge Sliding.

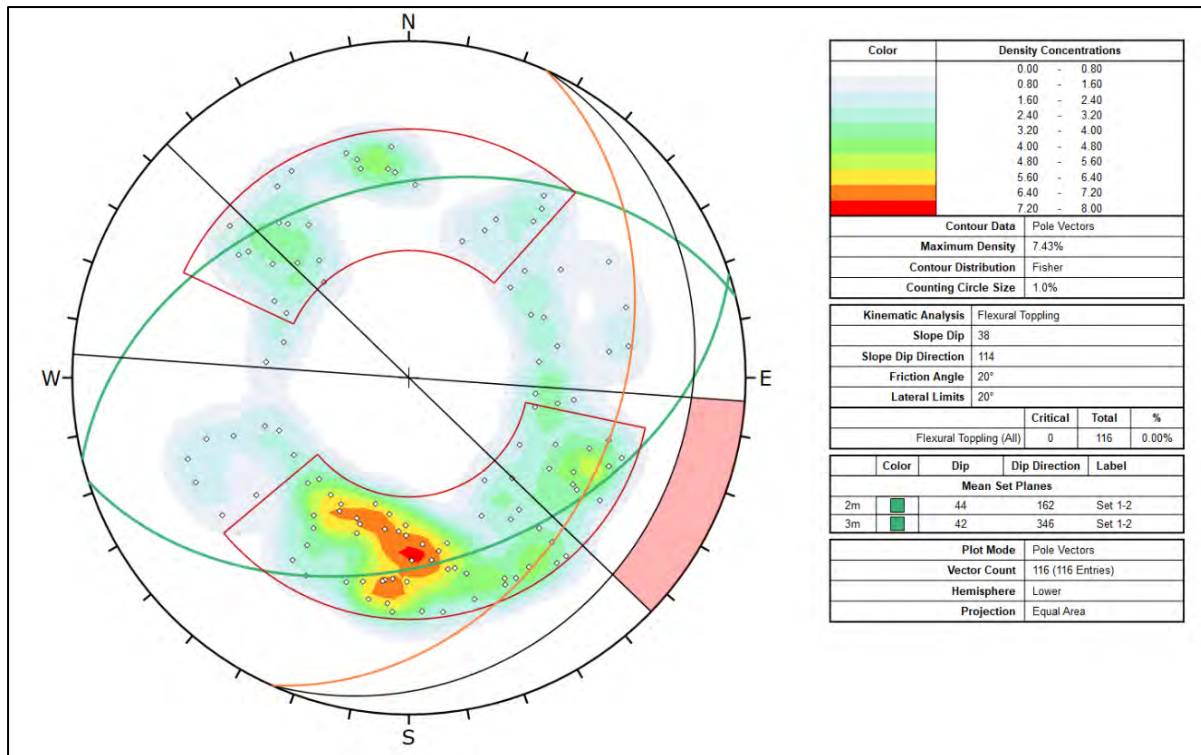


Figure: C89 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Overall Slope) – Flexural Toppling.

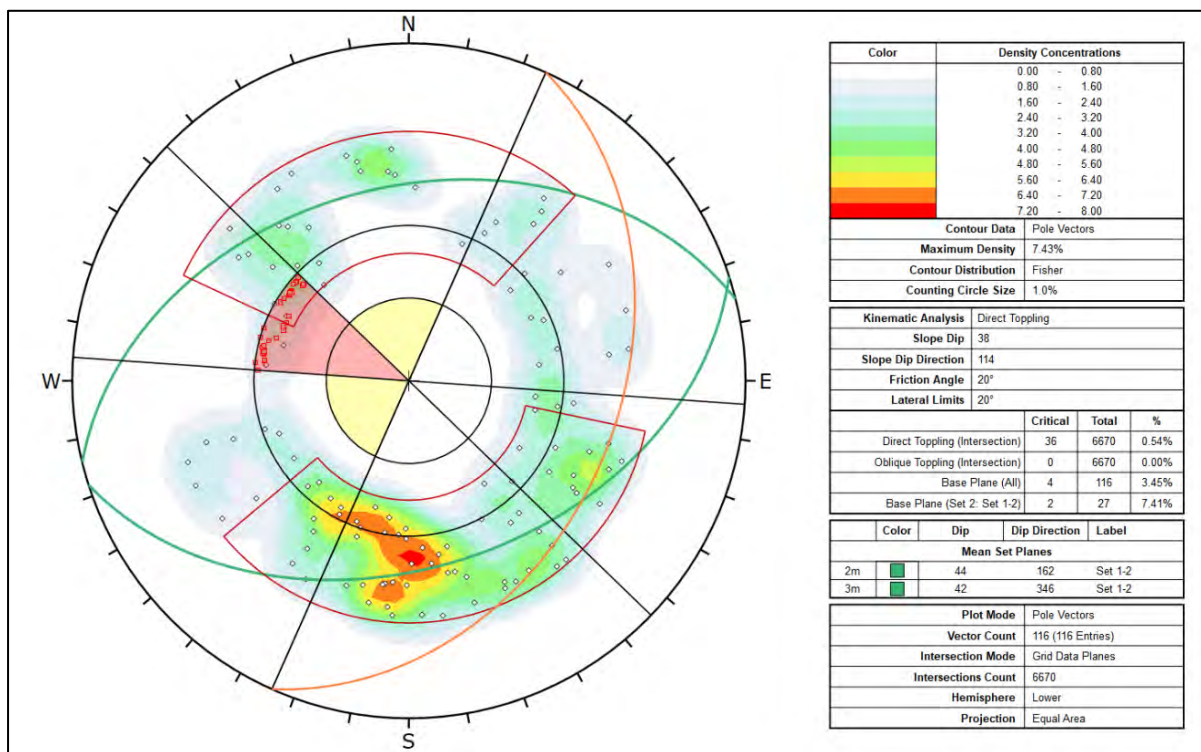


Figure: C90 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3 – Joints >30°- <60° - Overall Slope

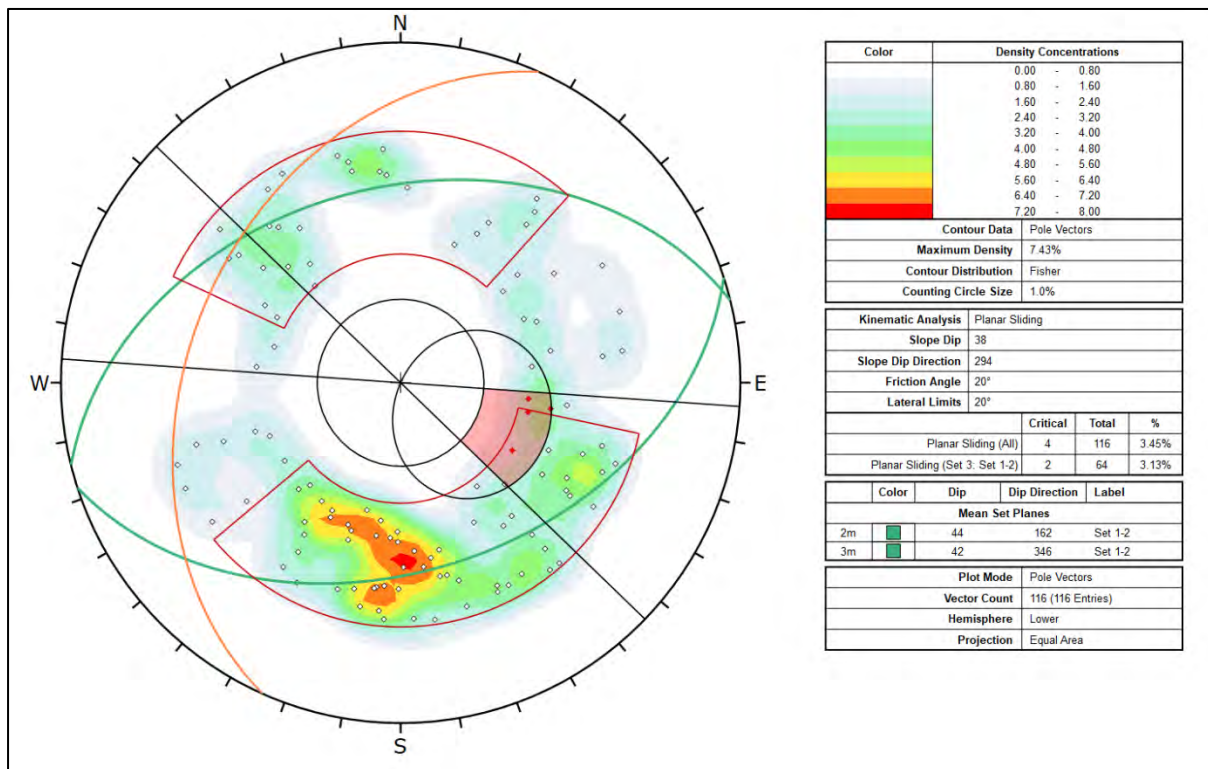


Figure: C91 - Kinematic Analysis (Joints >30°- <60°) - Highwall 3 (Overall Slope) – Planar Sliding.

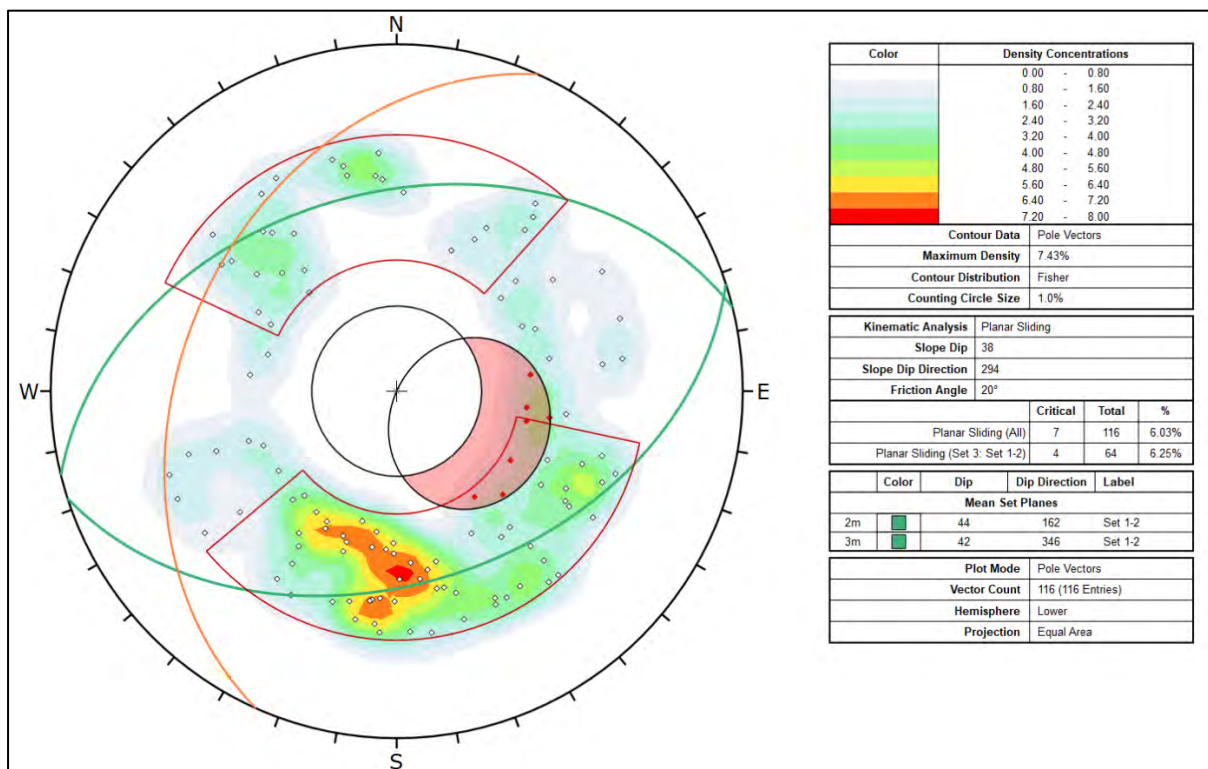
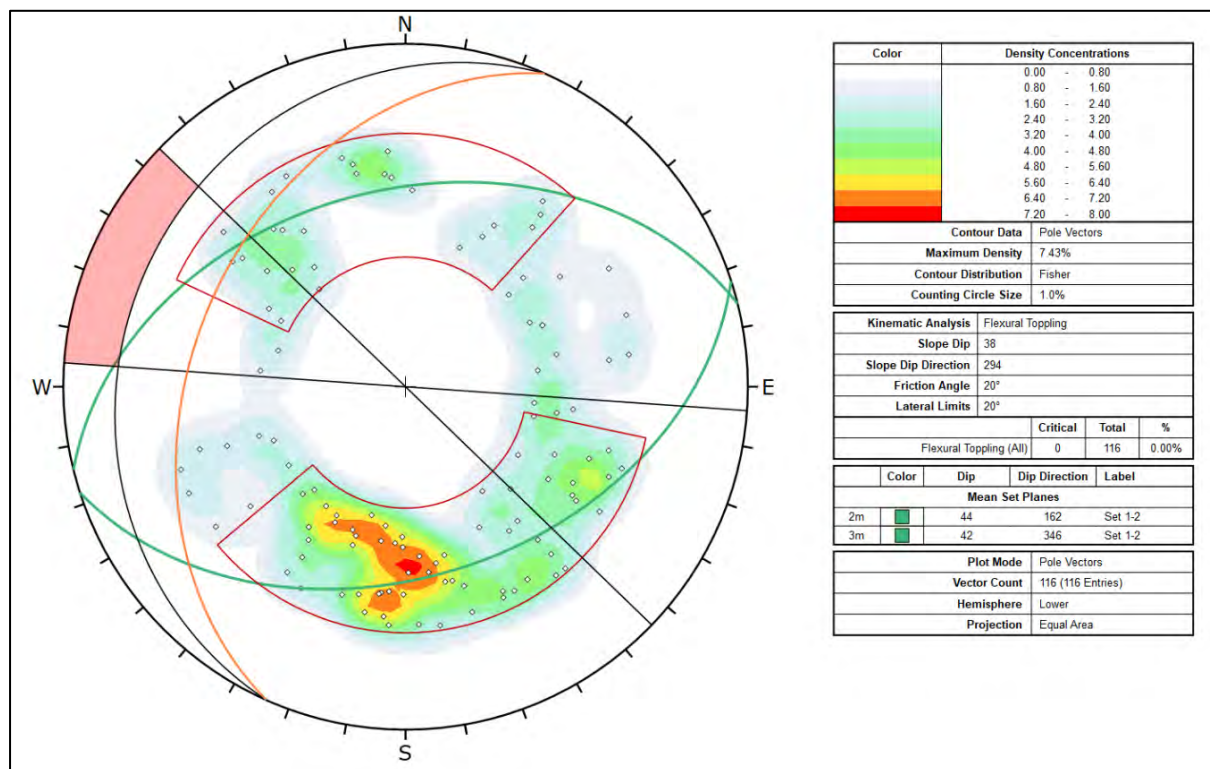


Figure: C92 - Kinematic Analysis (Joints >30°- <60°) - Highwall 3 (Overall Slope) – Planar Sliding (No Limits).



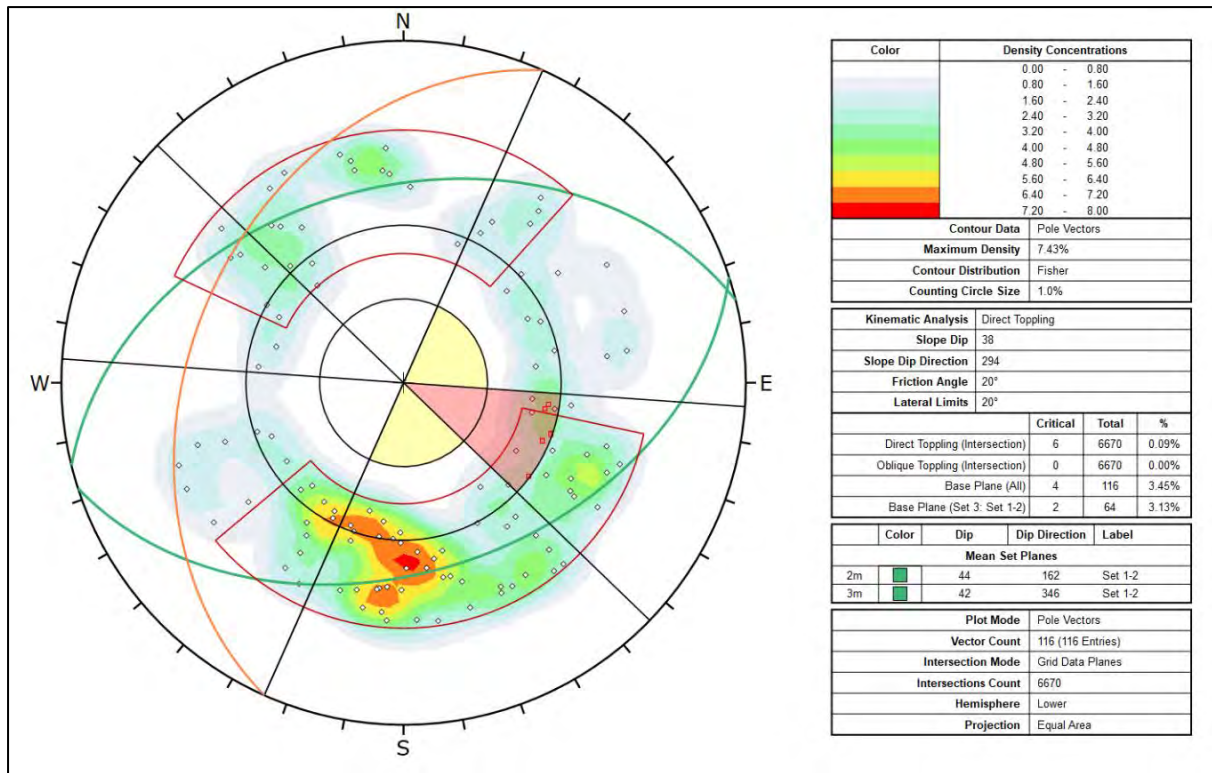


Figure: C95 - Kinematic Analysis (Joints >30° - <60°) - Highwall 3 (Overall Slope) – Direct Toppling.

Highwall 4 – Joints >30°- <60° - Overall Slope

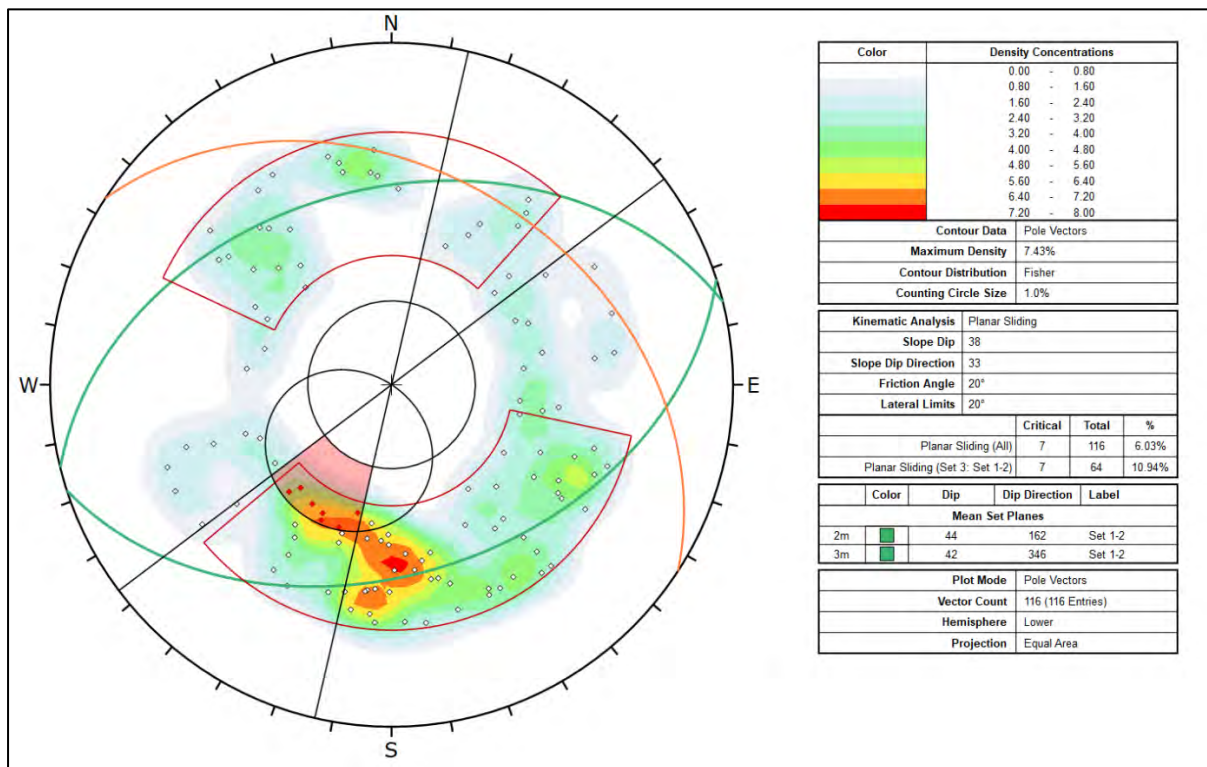


Figure: C96 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Overall Slope) – Planar Sliding.

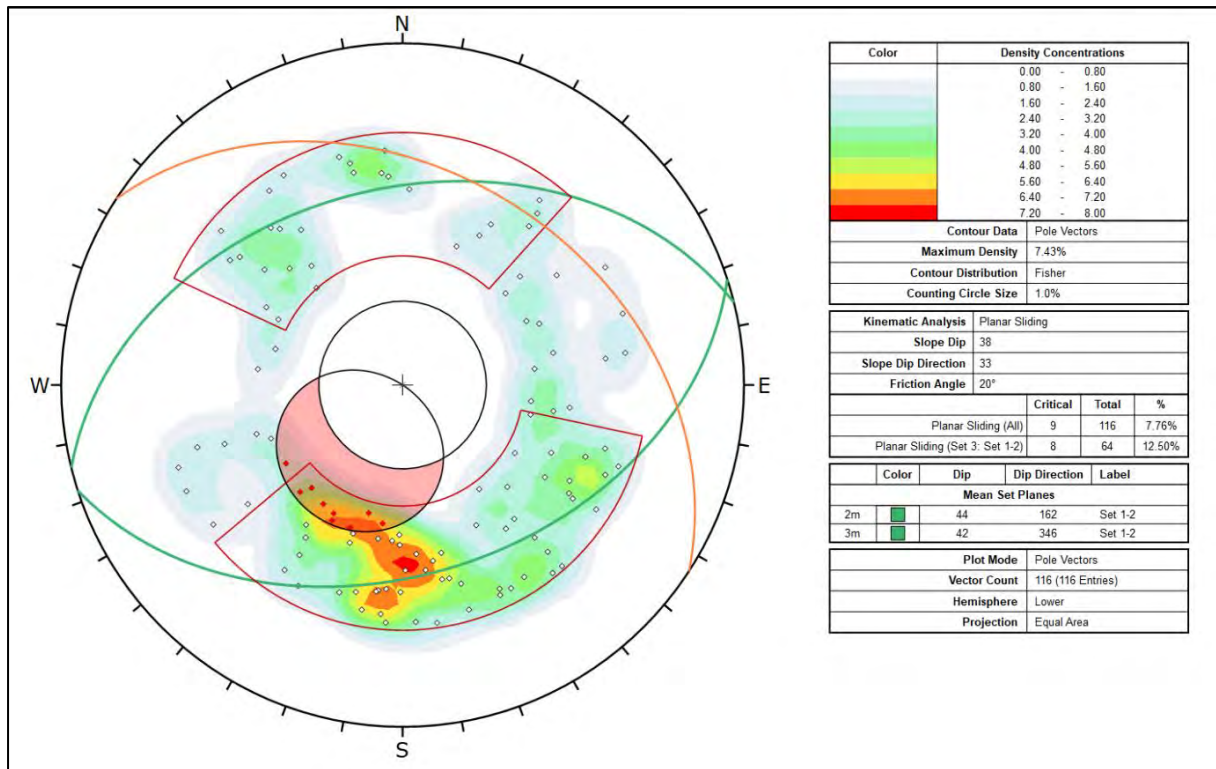


Figure: C97 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Overall Slope) – Planar Sliding (No Limits).

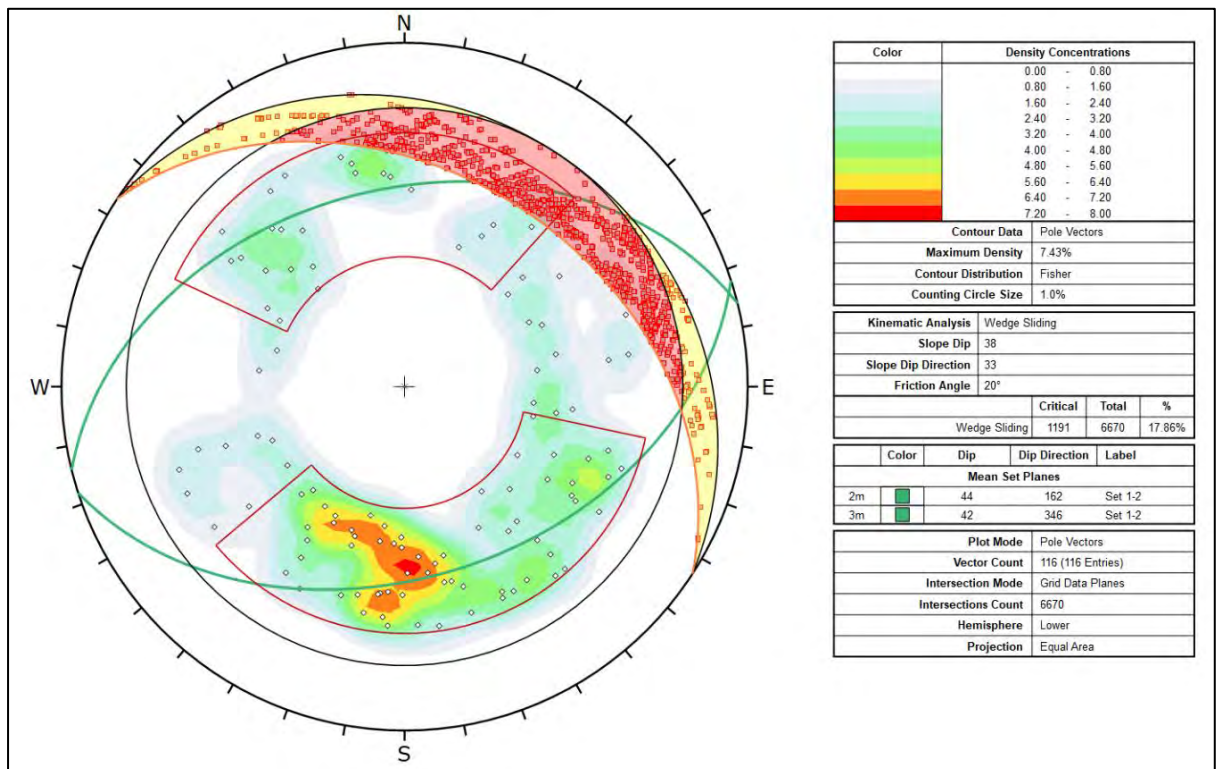


Figure: C98 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Overall Slope) – Wedge Sliding.

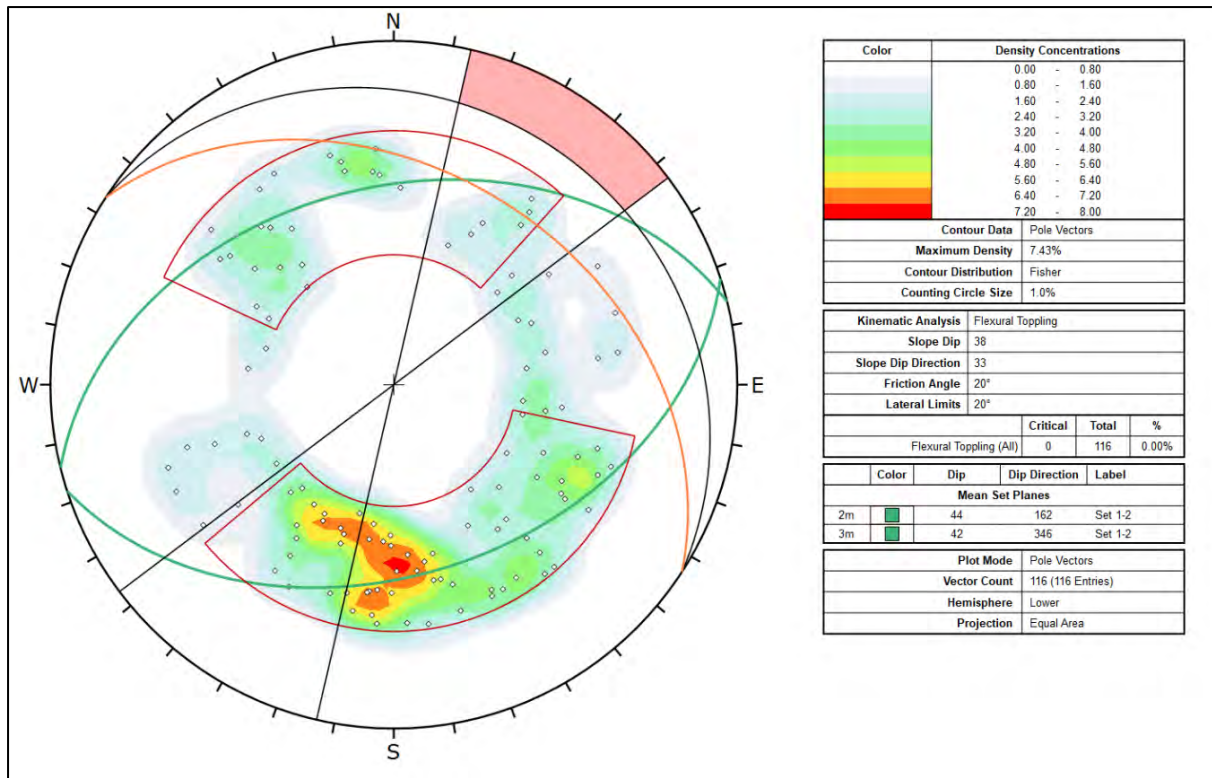


Figure: C99 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Overall Slope) – Flexural Toppling.

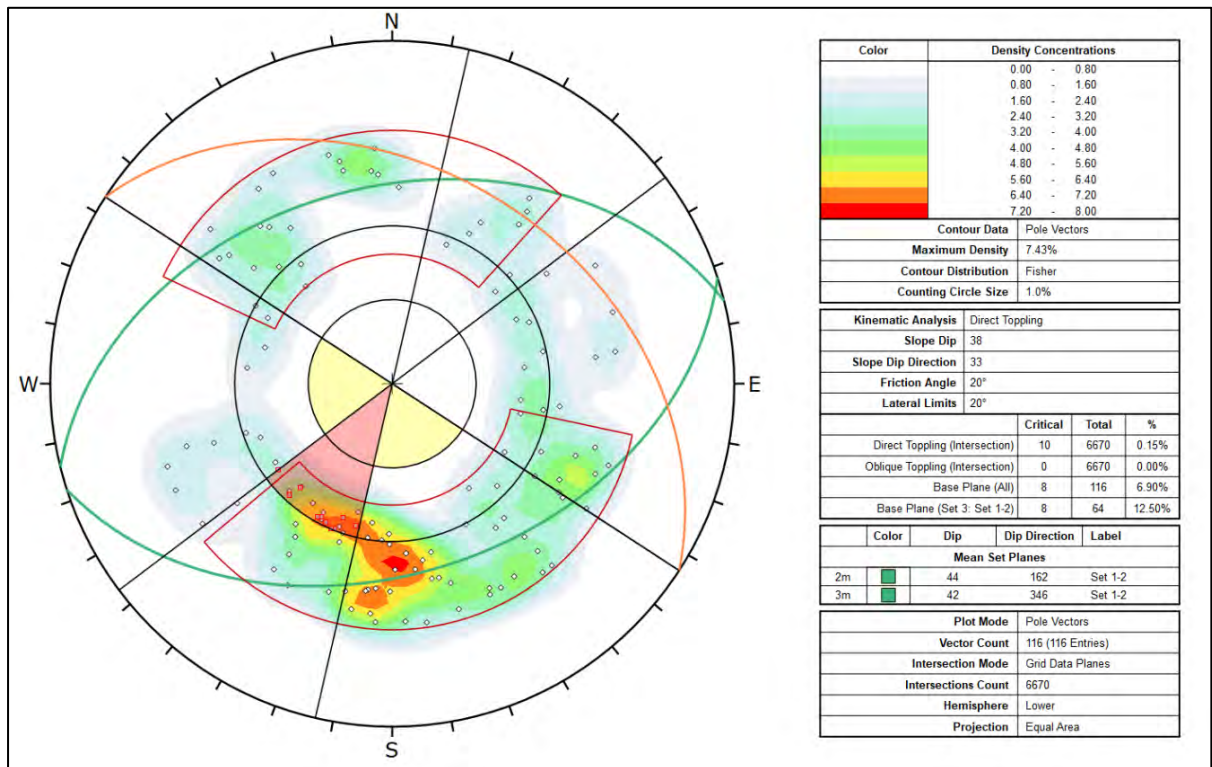


Figure: C100 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Overall Slope) – Direct Toppling.

Highwall 1 – Joints >30°- <60° - Bench Slope

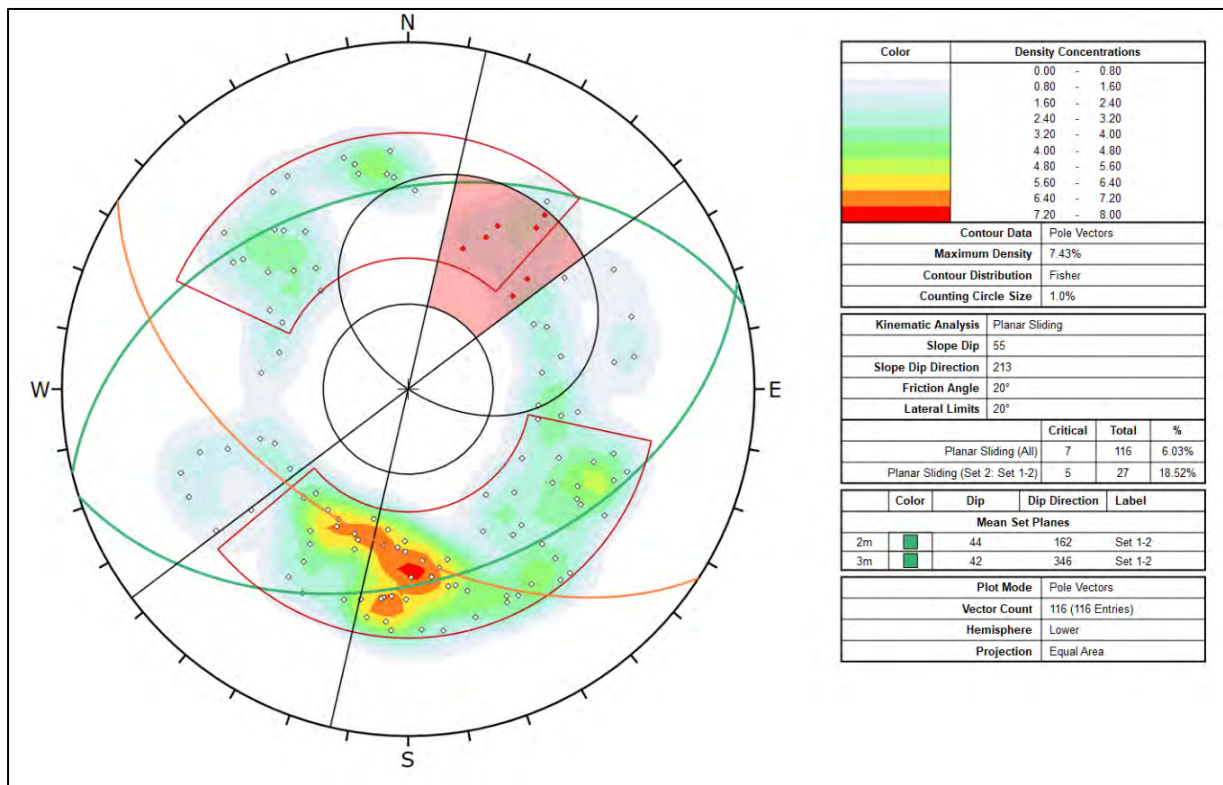


Figure: C101 - Kinematic Analysis (Joints >30°- <60°) - Highwall 1 (Bench Slope) – Planar Sliding.

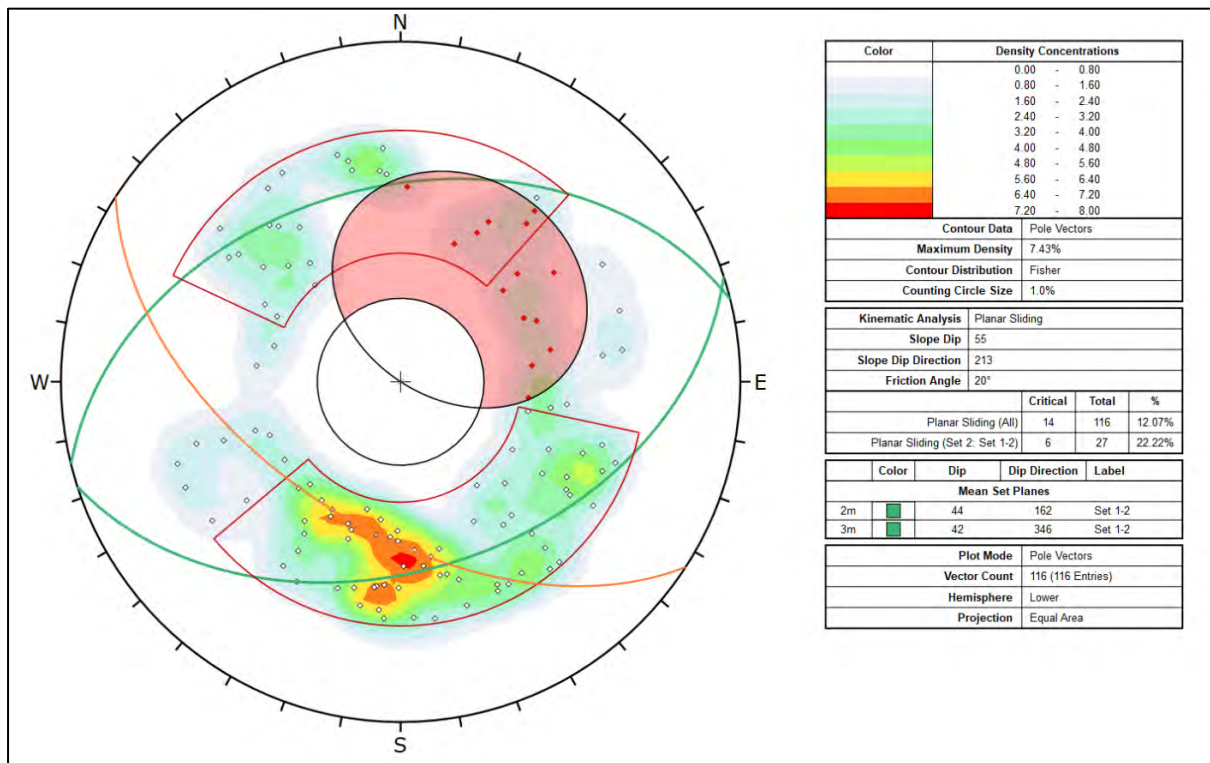


Figure: C102 - Kinematic Analysis (Joints >30°- <60°) - Highwall 1 (Bench Slope) – Planar Sliding (No Limits).

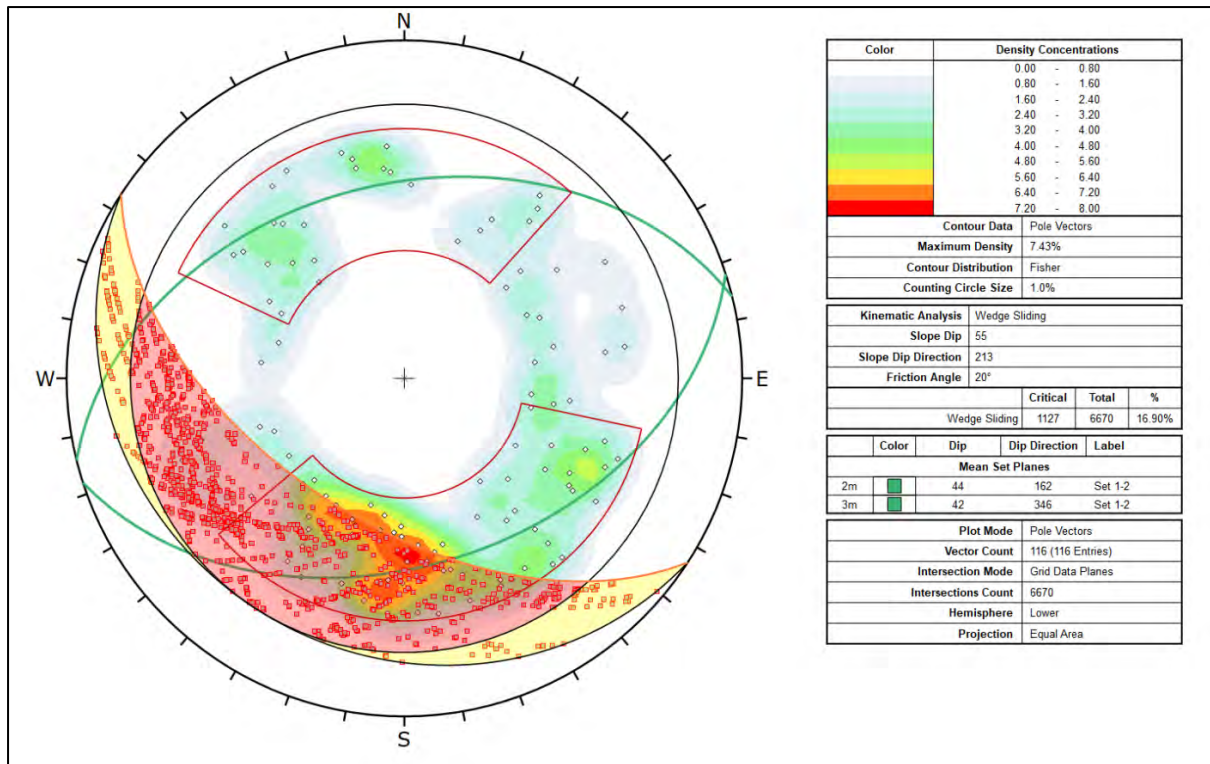


Figure: C103 - Kinematic Analysis (Joints >30° - <60°) - Highwall 1 (Bench Slope) – Wedge Sliding.

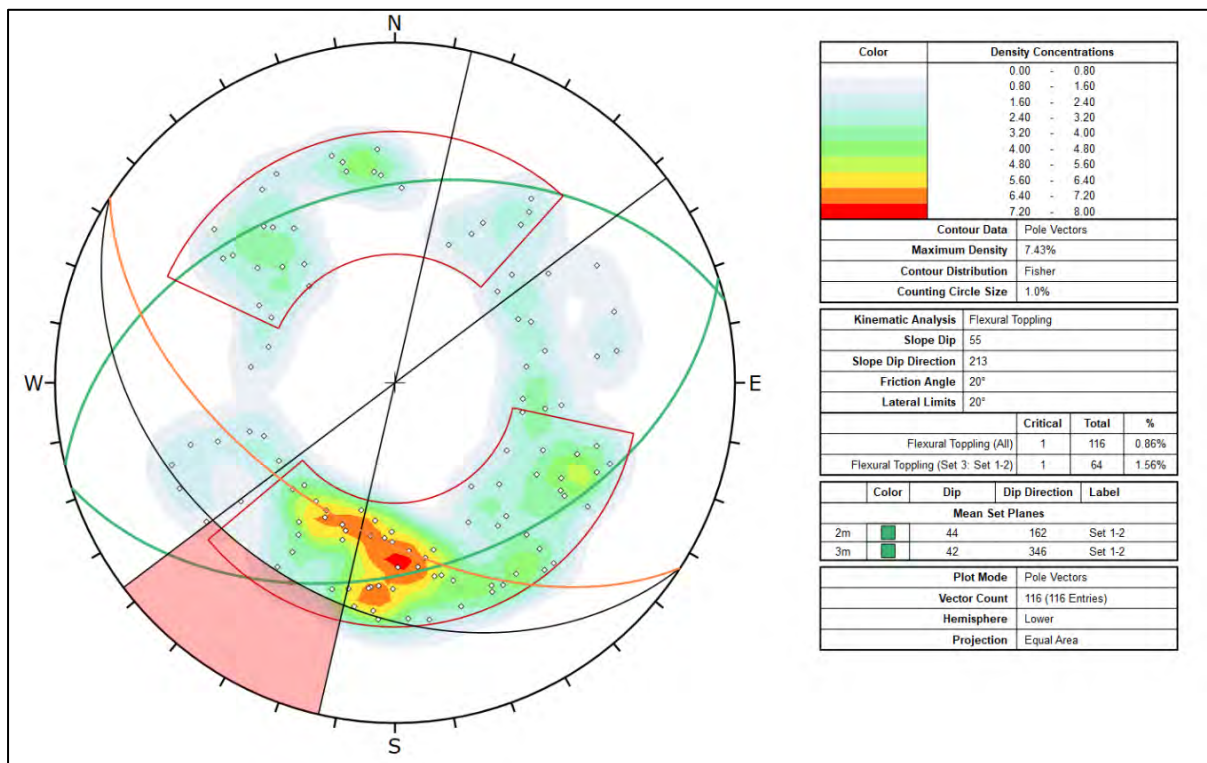


Figure: C104 - Kinematic Analysis (Joints >30° - <60°) - Highwall 1 (Bench Slope) – Flexural Toppling.

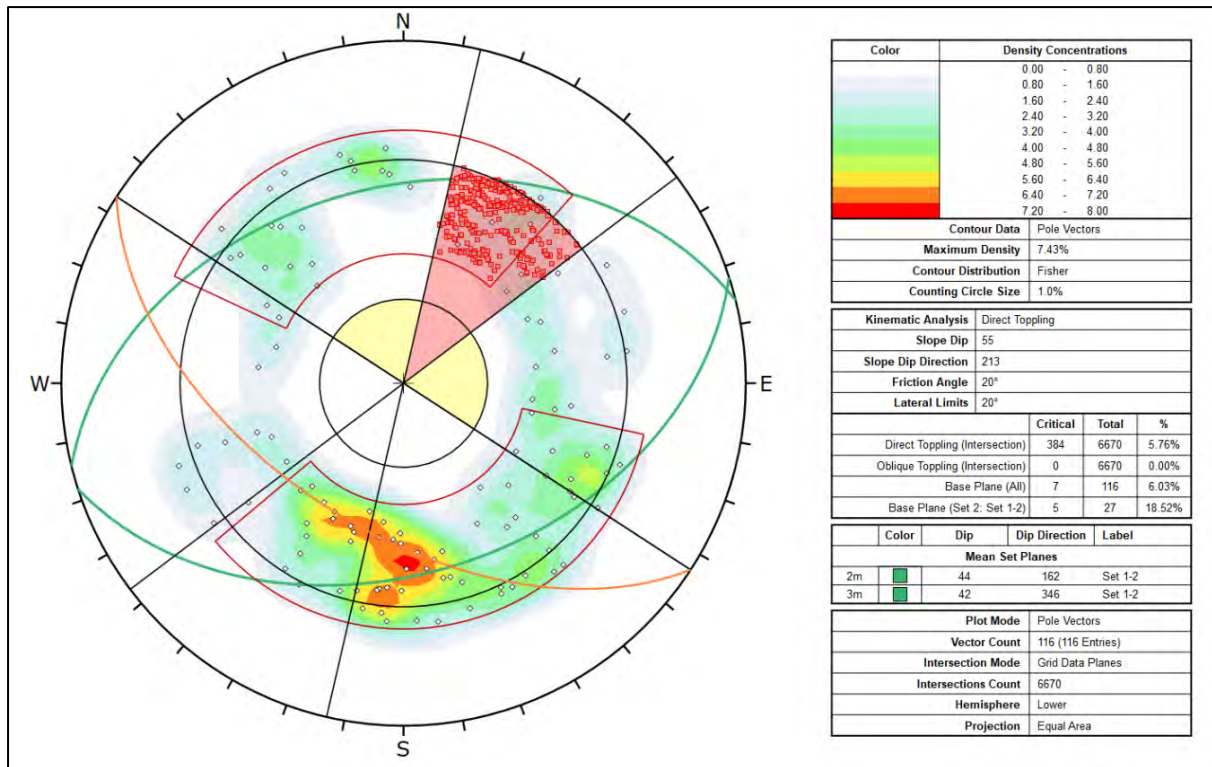


Figure: C105 - Kinematic Analysis (Joints >30°- <60°) - Highwall 1 (Bench Slope) – Direct Toppling.

Highwall 2 – Joints >30°- <60° - Bench Slope

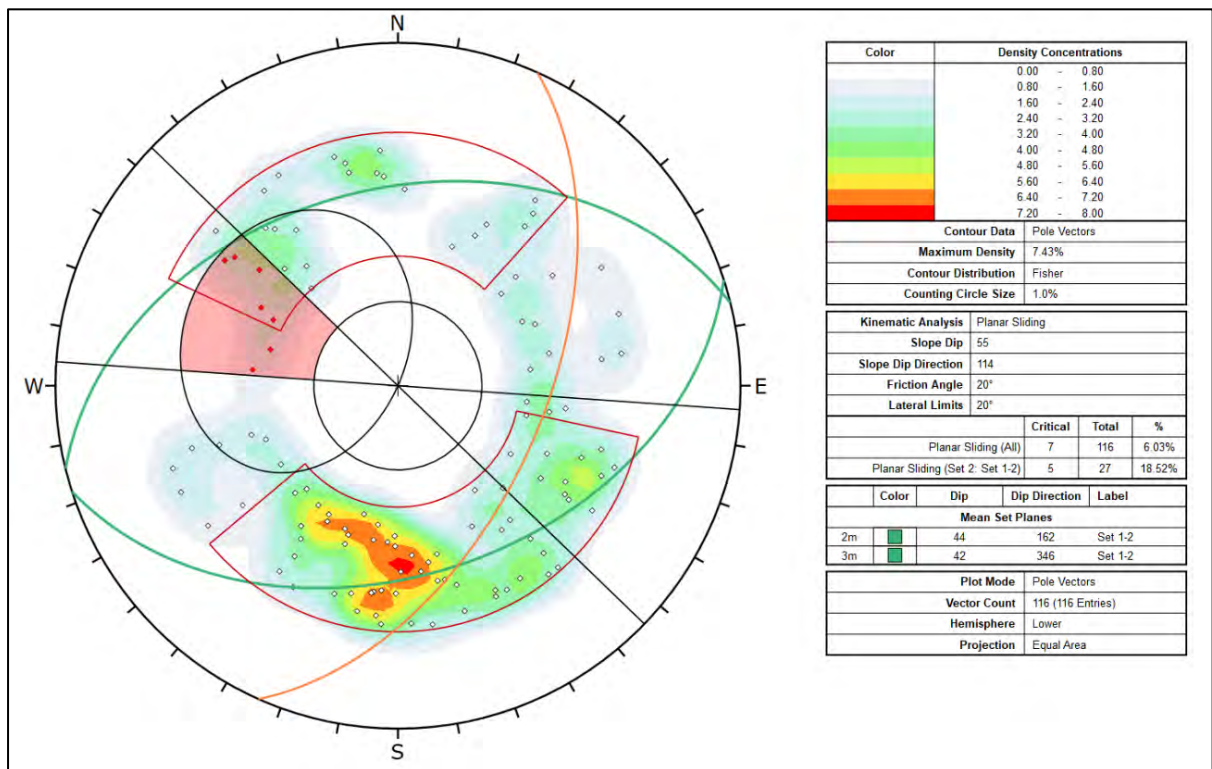


Figure: C106 - Kinematic Analysis (Joints >30°- <60°) - Highwall 2 (Bench Slope) – Planar Sliding.

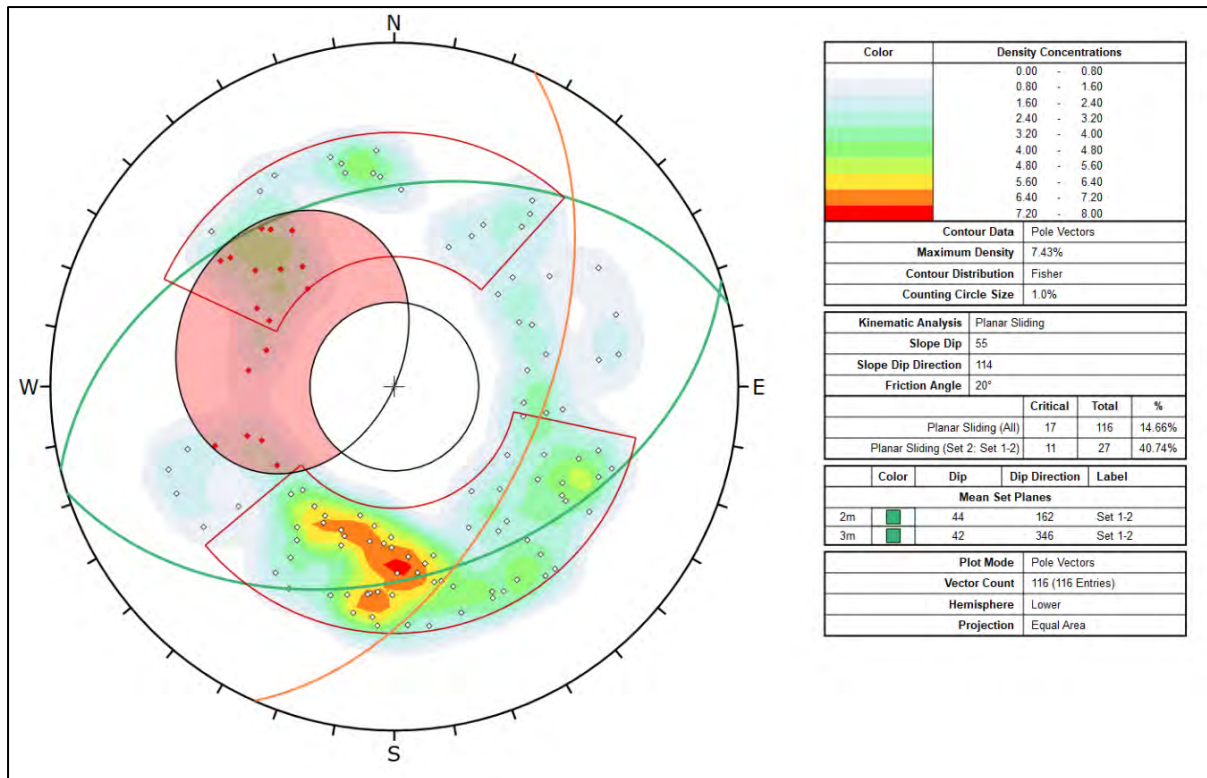


Figure: C107 - Kinematic Analysis (Joints >30°- <60°) - Highwall 2 (Bench Slope) – Planar Sliding (No Limits).

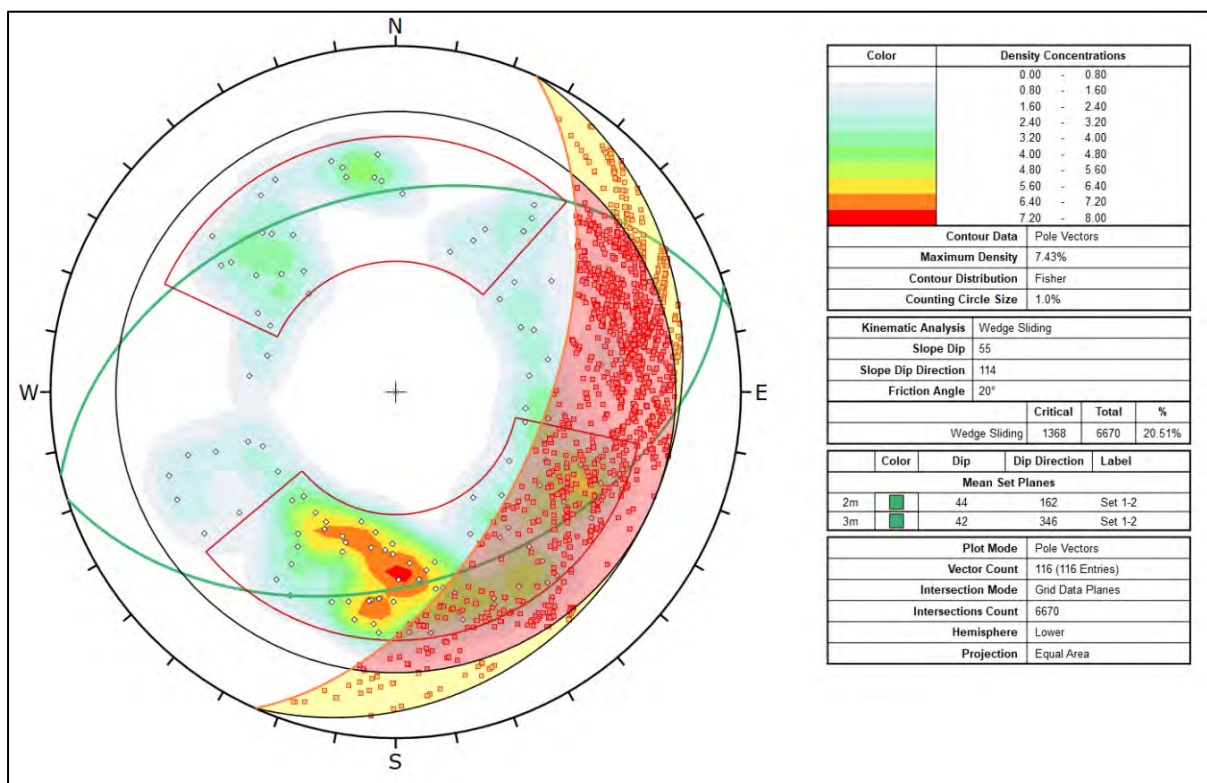


Figure: C108 - Kinematic Analysis (Joints >30°- <60°) - Highwall 2 (Bench Slope) – Wedge Sliding.

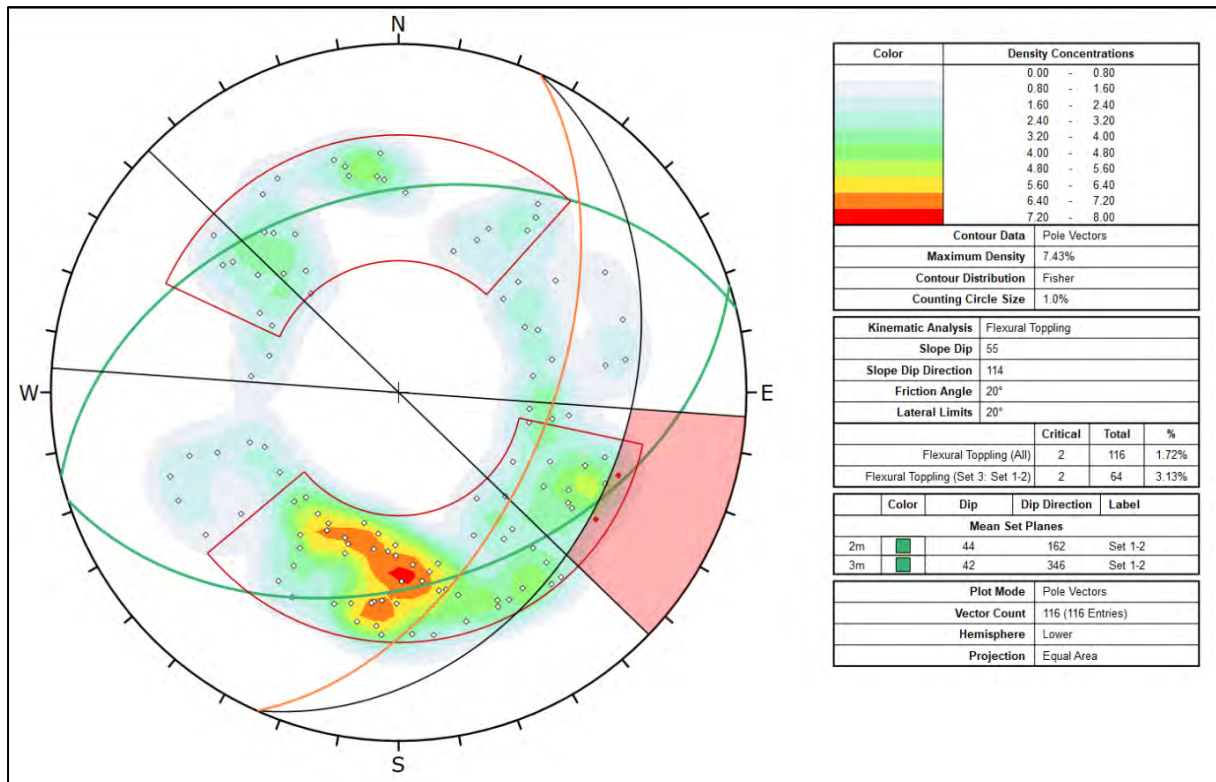


Figure: C109 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Bench Slope) – Flexural Toppling.

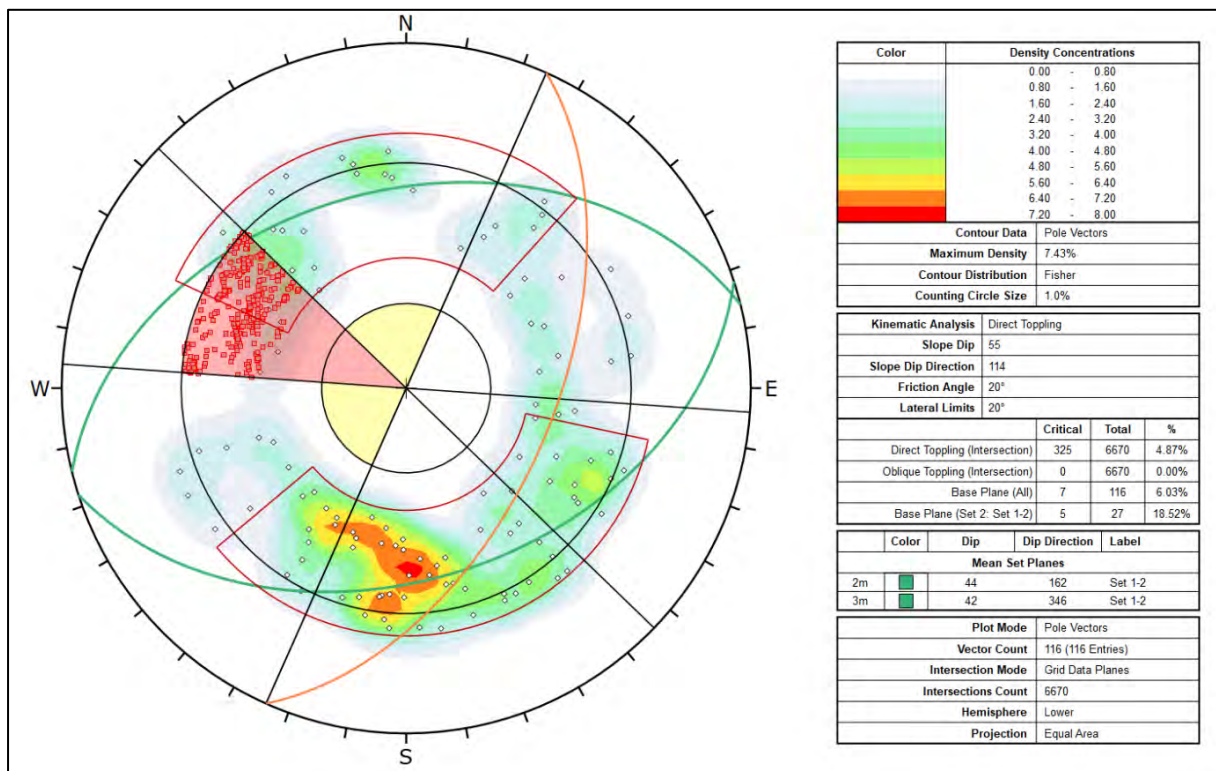


Figure: C110 - Kinematic Analysis (Joints >30° - <60°) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – Joints >30°- <60° - Bench Slope

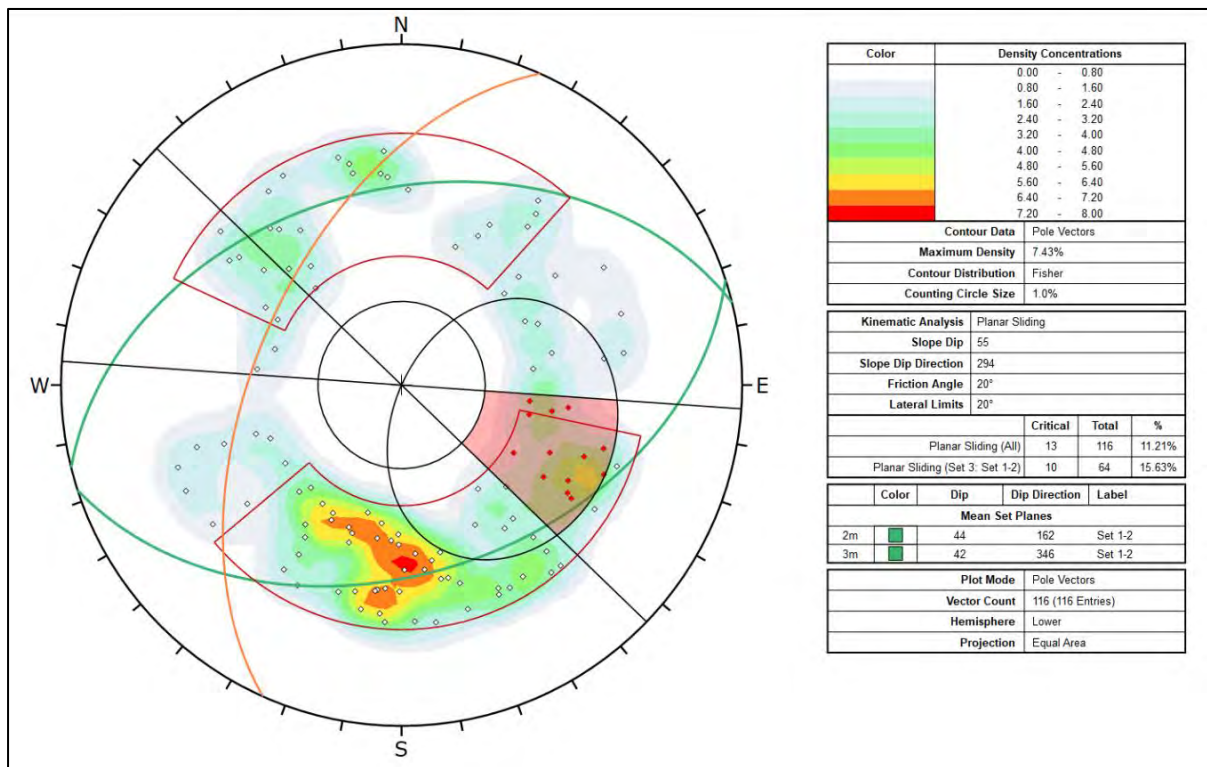


Figure: C111 - Kinematic Analysis (Joints >30°- <60°) - Highwall 3 (Bench Slope) – Planar Sliding.

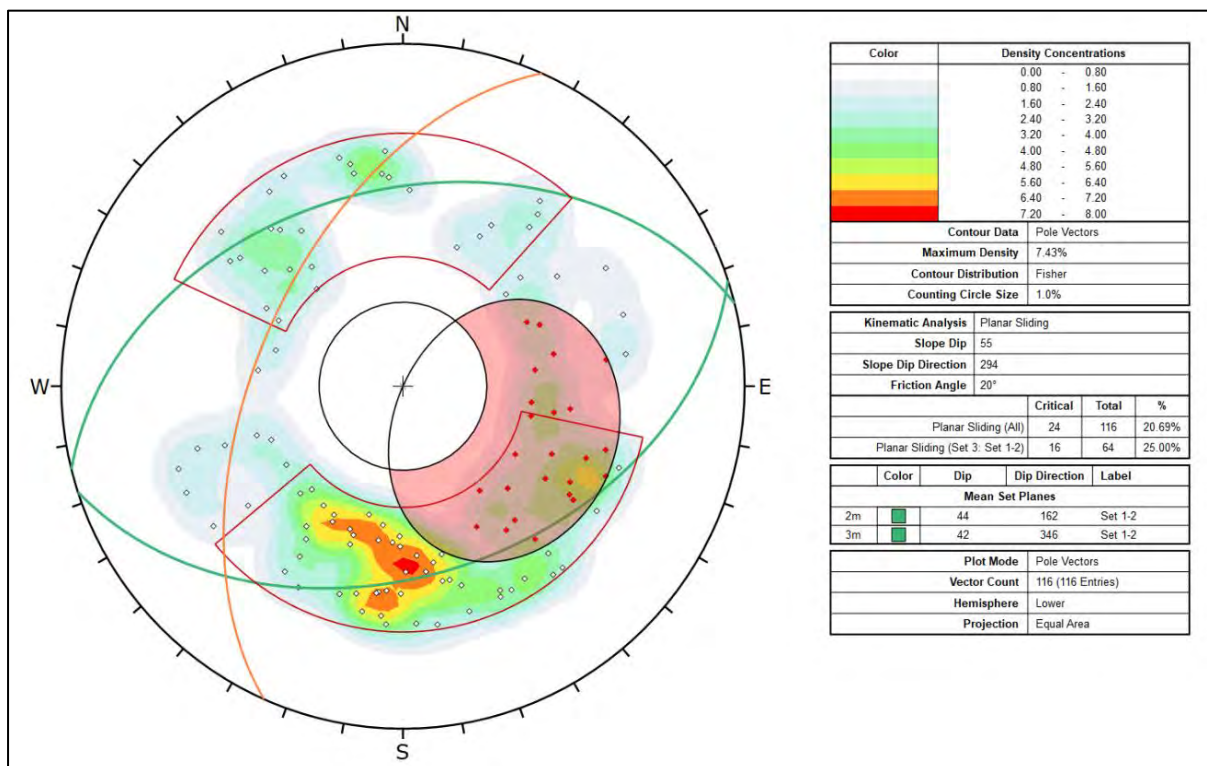


Figure: C112 - Kinematic Analysis (Joints >30°- <60°) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

Color

Density Concentrations	
	0.00 - 0.80
	0.80 - 1.60
	1.60 - 2.40
	2.40 - 3.20
	3.20 - 4.00
	4.00 - 4.80
	4.80 - 5.60
	5.60 - 6.40
	6.40 - 7.20
	7.20 - 8.00

Contour Data Pole Vectors

Maximum Density 7.43%

Contour Distribution Fisher

Counting Circle Size 1.0%

Kinematic Analysis Flexural Topping

Slope Dip 55

Slope Dip Direction 294

Friction Angle 20°

Lateral Limits 20°

	Critical	Total	%
Flexural Topping (All)	1	116	0.86%
Flexural Topping (Set 2: Set 1-2)	1	27	3.70%

Color **Dip** **Dip Direction** **Label**

Mean Set Planes

2m	44	162	Set 1-2
3m	42	346	Set 1-2

Plot Mode Pole Vectors

Vector Count 116 (116 Entries)

Hemisphere Lower

Projection Equal Area

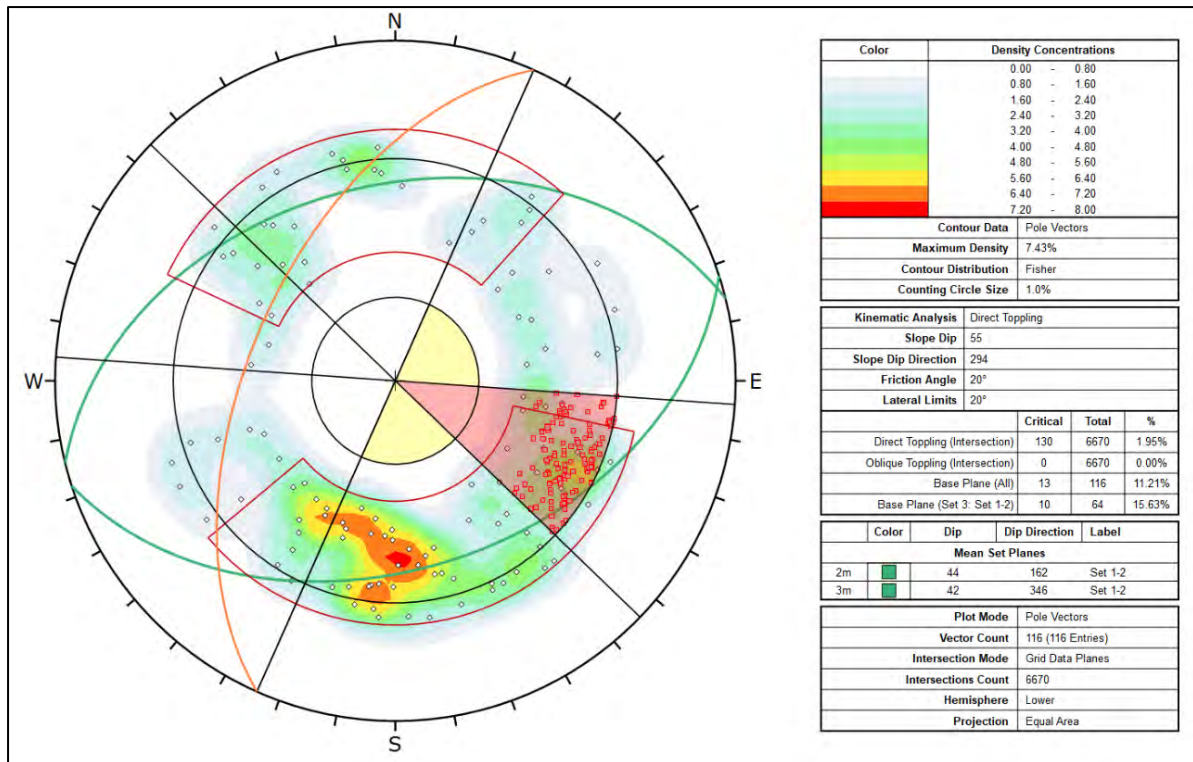


Figure: C115 - Kinematic Analysis (Joints >30° - <60°) - Highwall 3 (Bench Slope) – Direct Toppling.

Highwall 4 – Joints >30° - <60° - Bench Slope

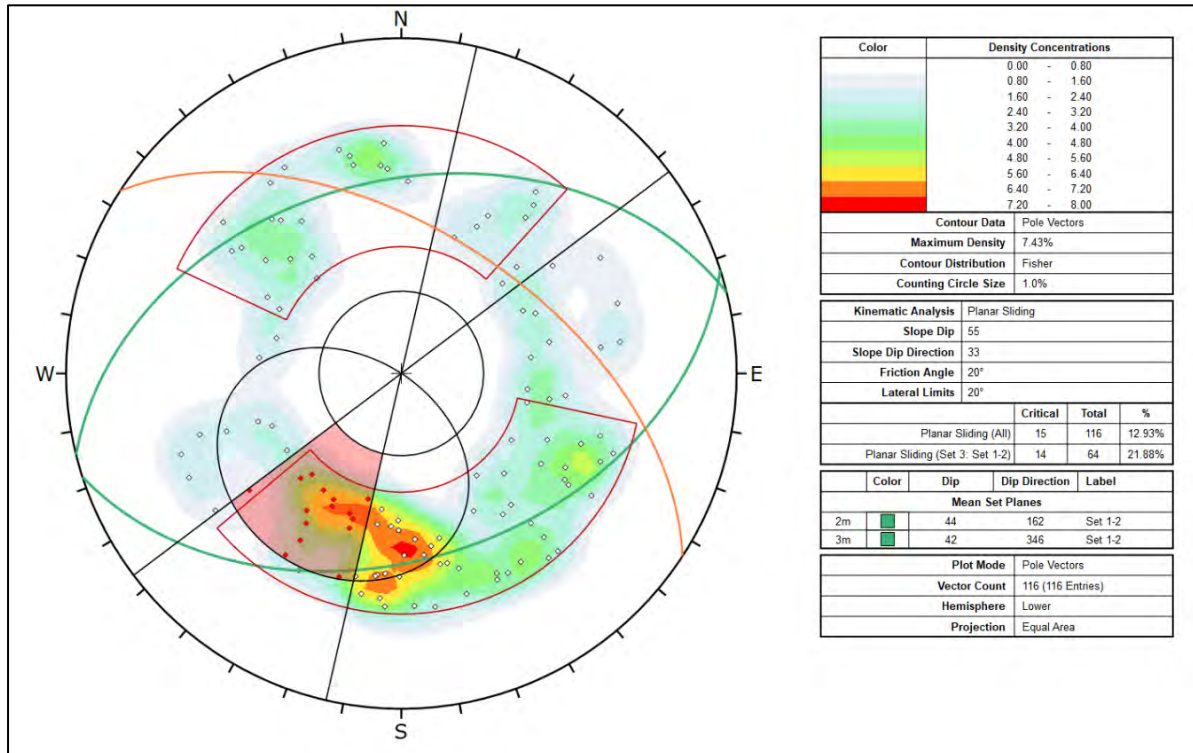


Figure: C116 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Bench Slope) – Planar Sliding.

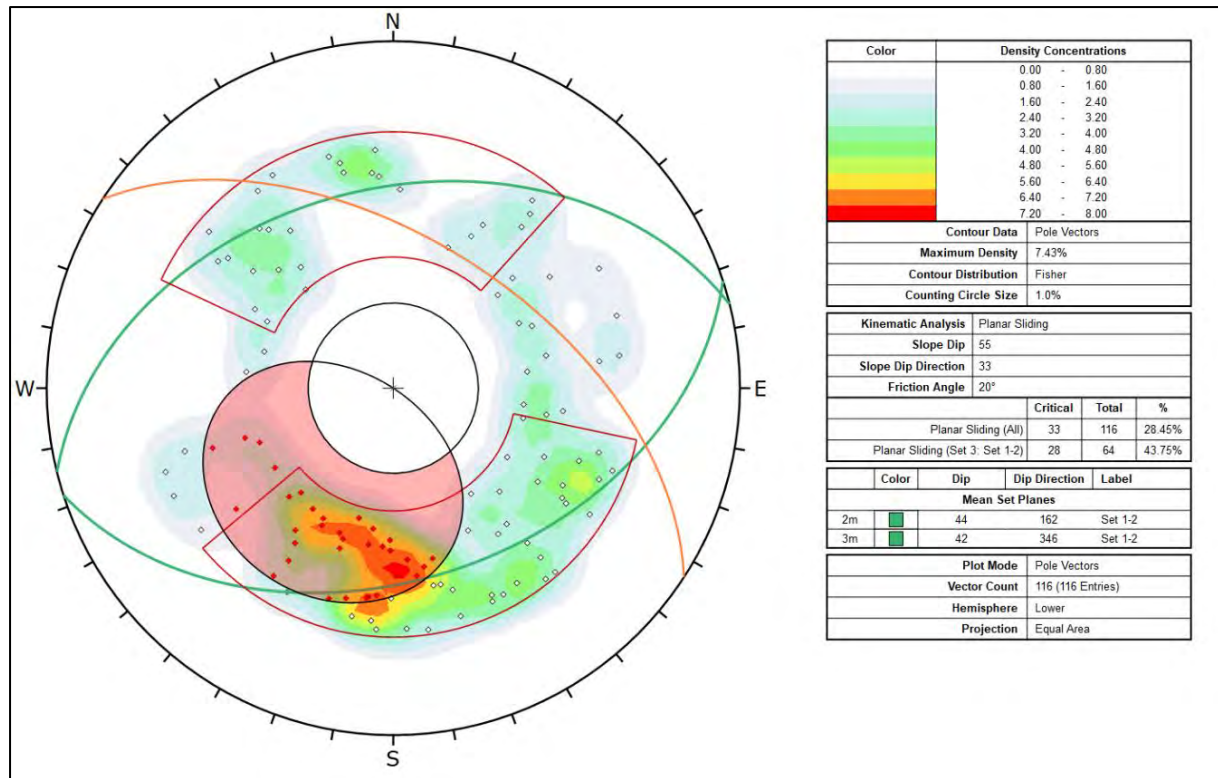


Figure: C117 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Bench Slope) – Planar Sliding (No Limits).

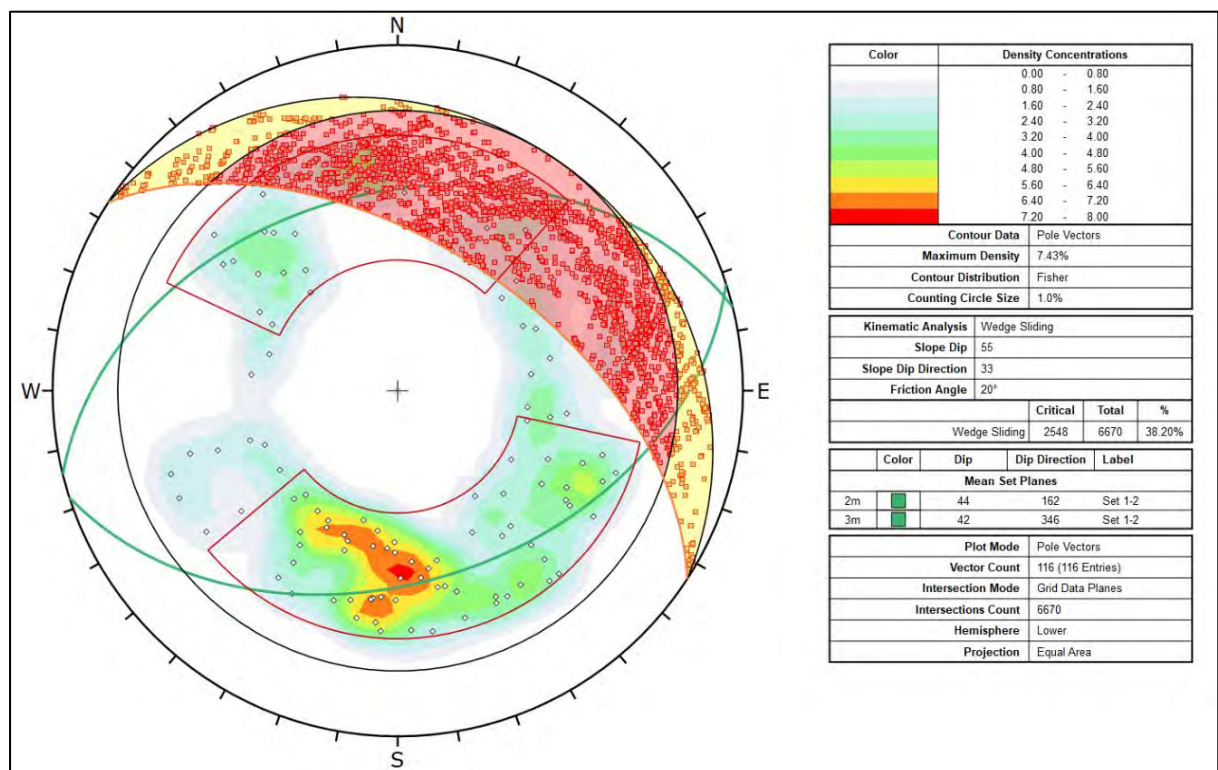


Figure: C118 - Kinematic Analysis (Joints >30° - <60°) - Highwall 4 (Bench Slope) – Wedge Sliding.

Highwall 1 – Joints >60° - Overall Slope

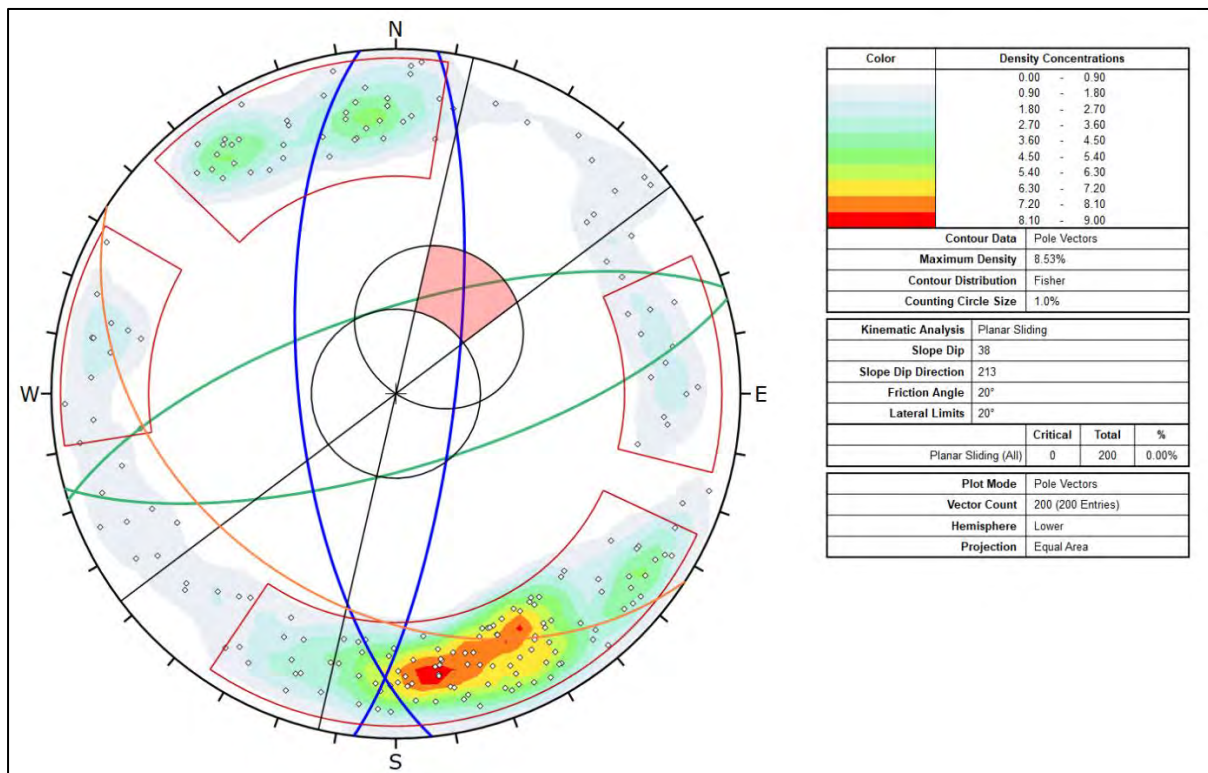


Figure: C121 - Kinematic Analysis (Joints >60°) - Highwall 1 (Overall Slope) – Planar Sliding.

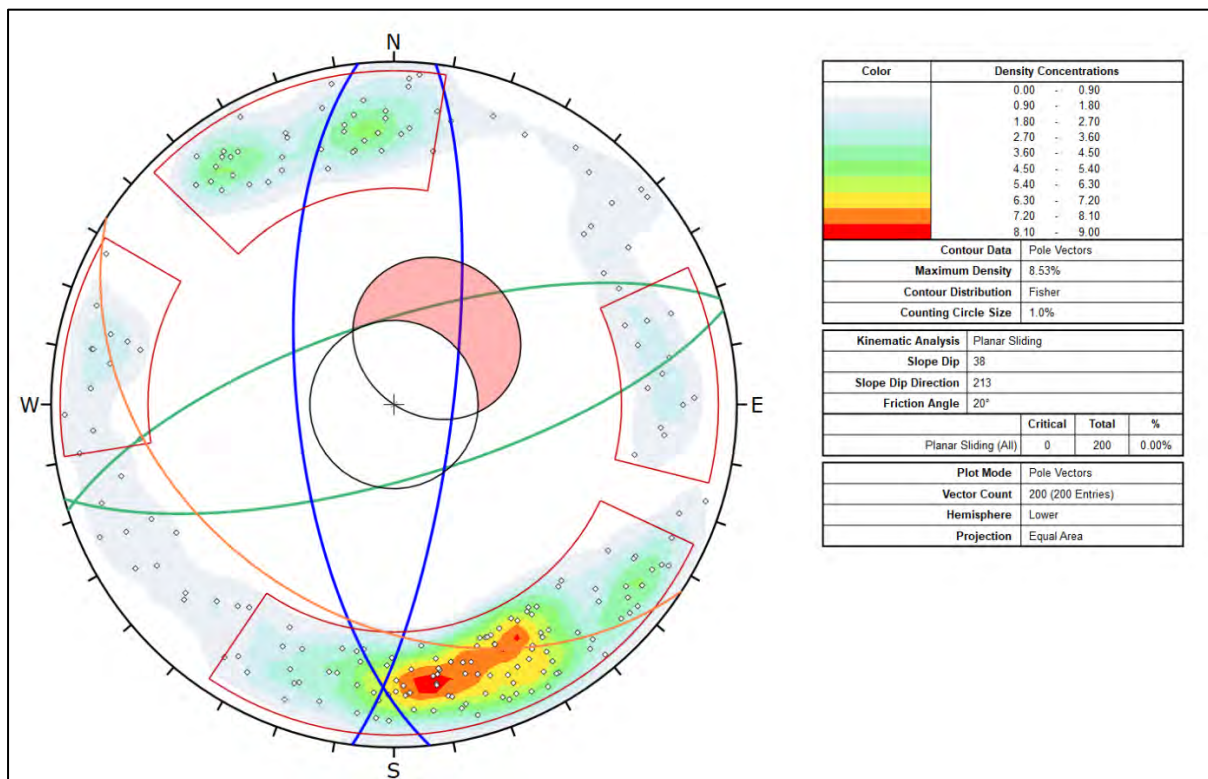


Figure: C122 - Kinematic Analysis (Joints >60°) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).

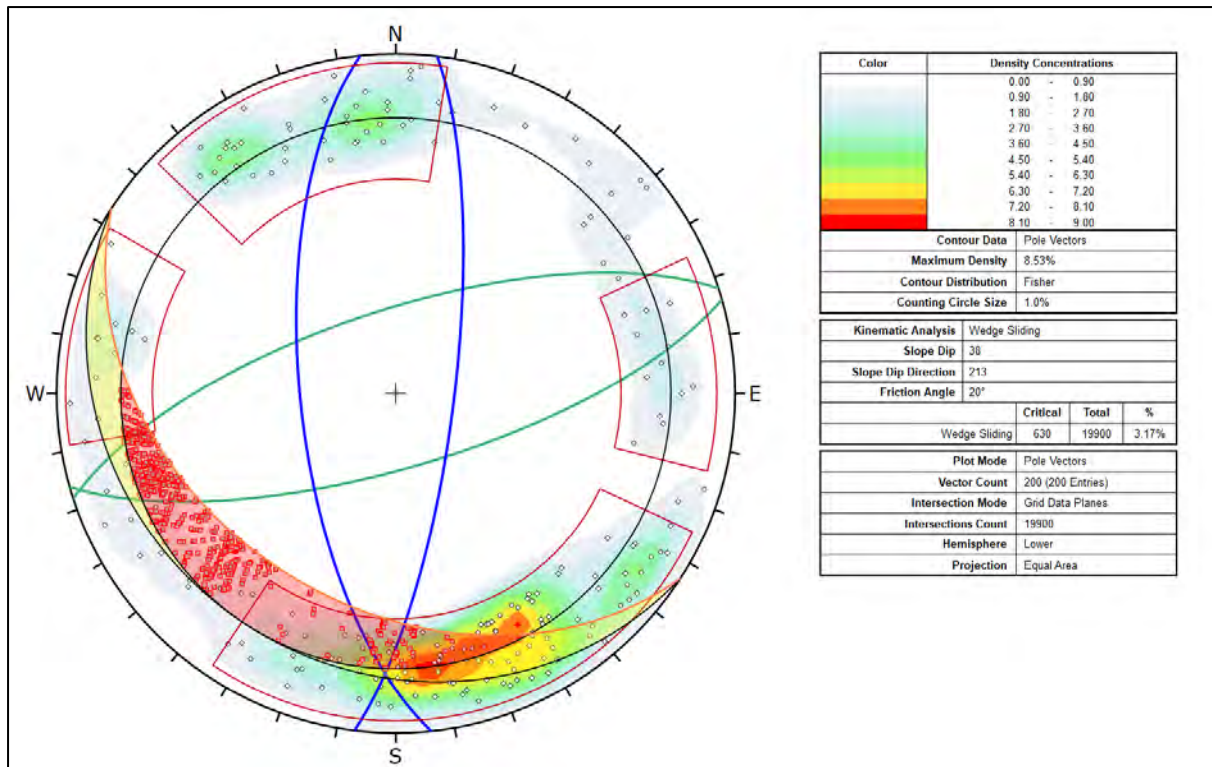


Figure: C123 - Kinematic Analysis (Joints >60°) - Highwall 1 (Overall Slope) – Wedge Sliding.

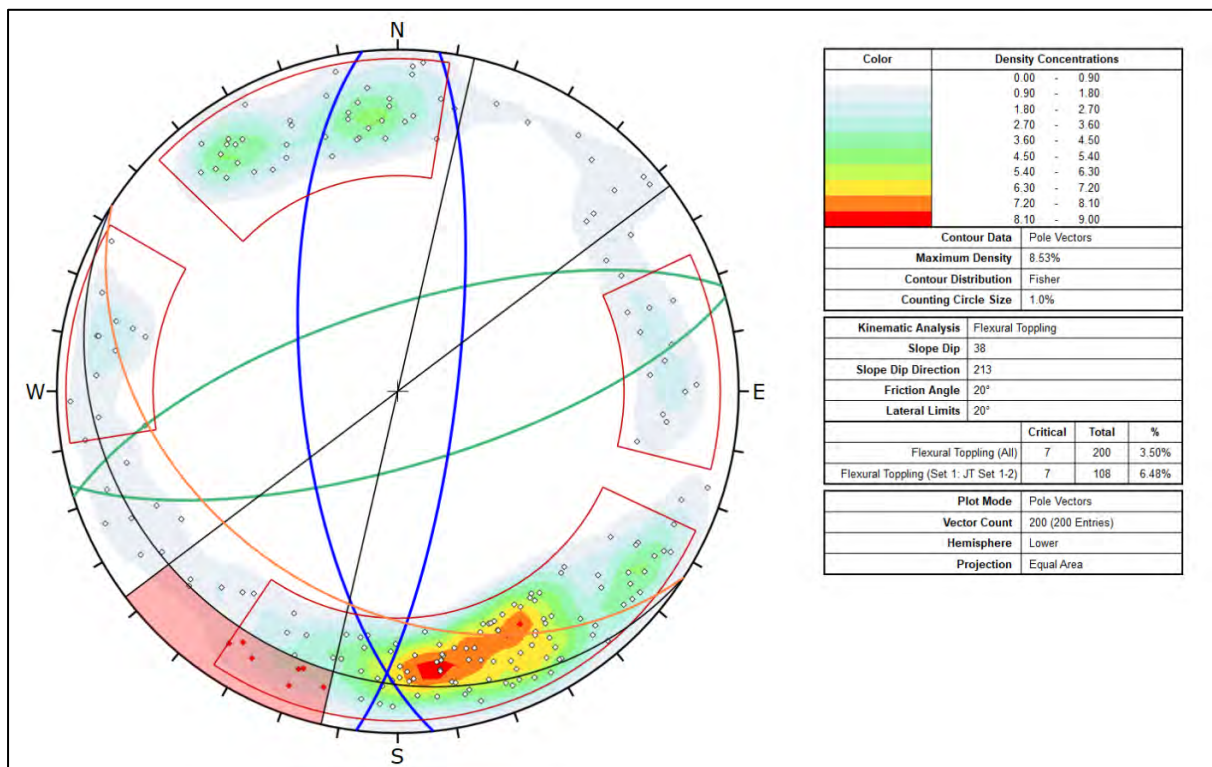


Figure: C124 - Kinematic Analysis (Joints >60°) - Highwall 1 (Overall Slope) – Flexural Toppling.

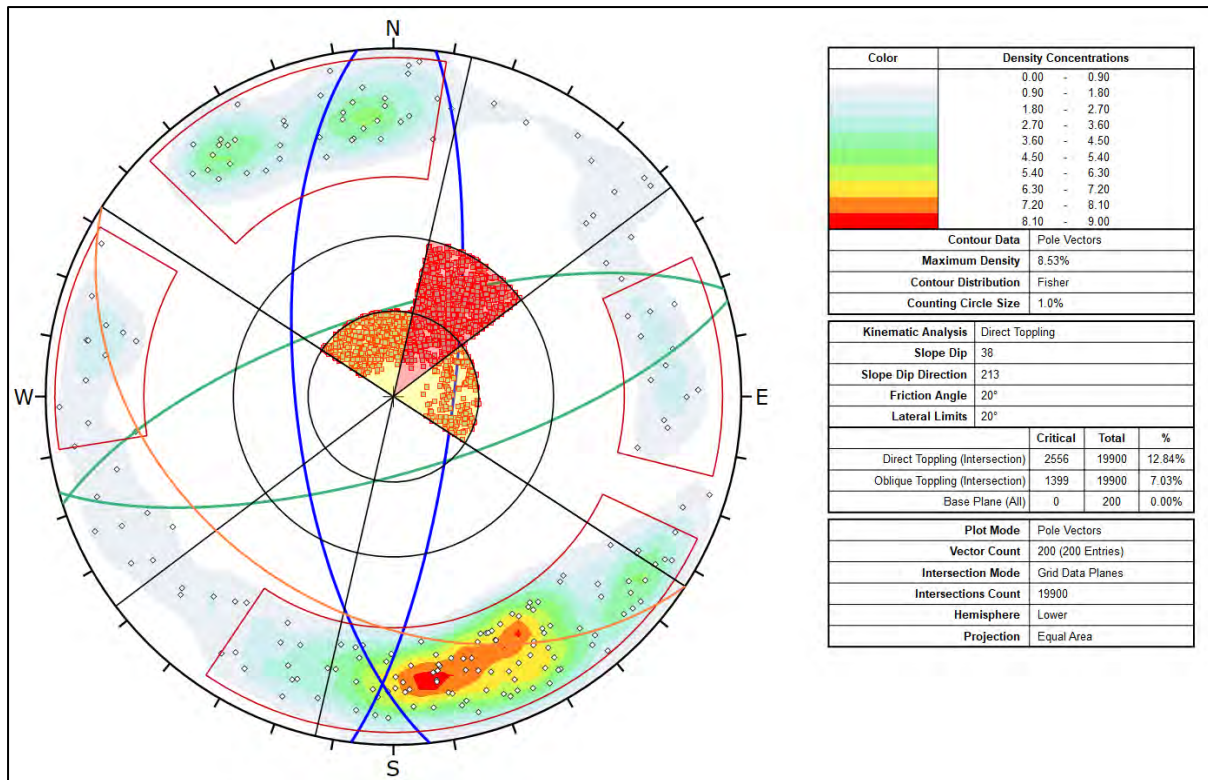


Figure: C125 - Kinematic Analysis (Joints >60°) - Highwall 1 (Overall Slope) – Direct Toppling.

Highwall 2 – Joints >60° - Overall Slope

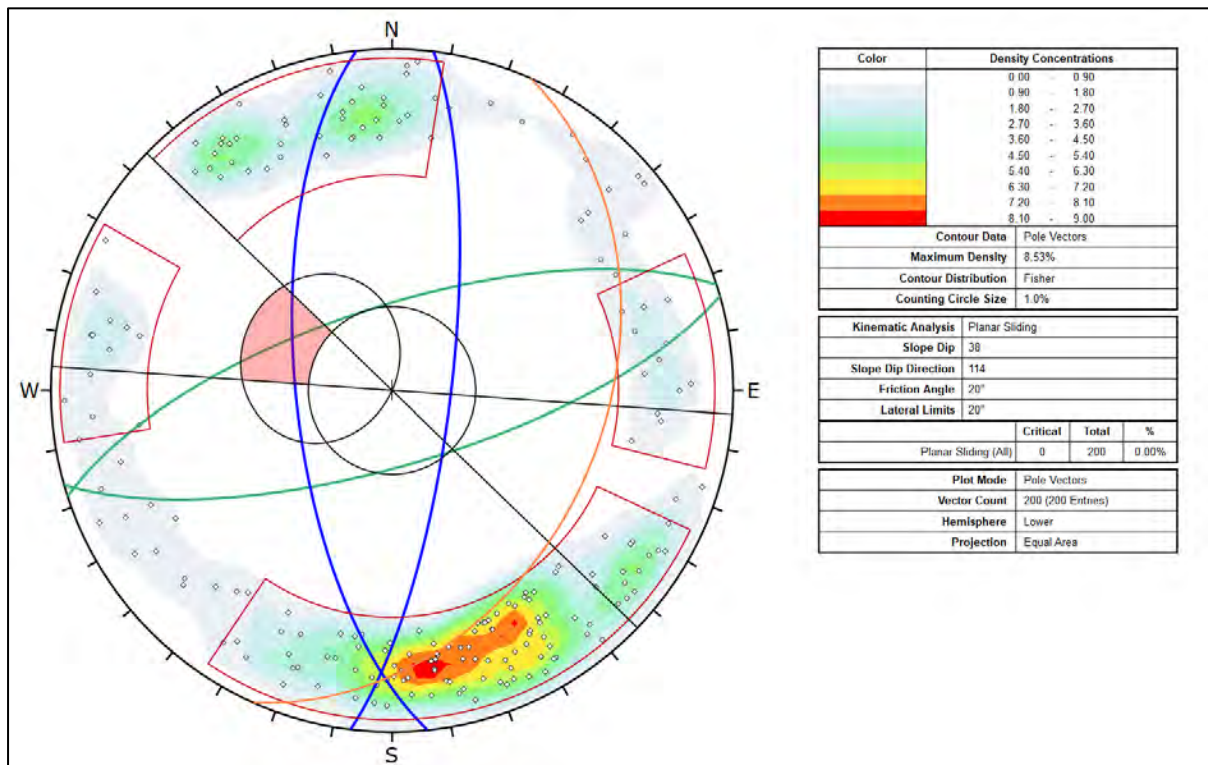


Figure: C126 - Kinematic Analysis (Joints >60°) - Highwall 2 (Overall Slope) – Planar Sliding.

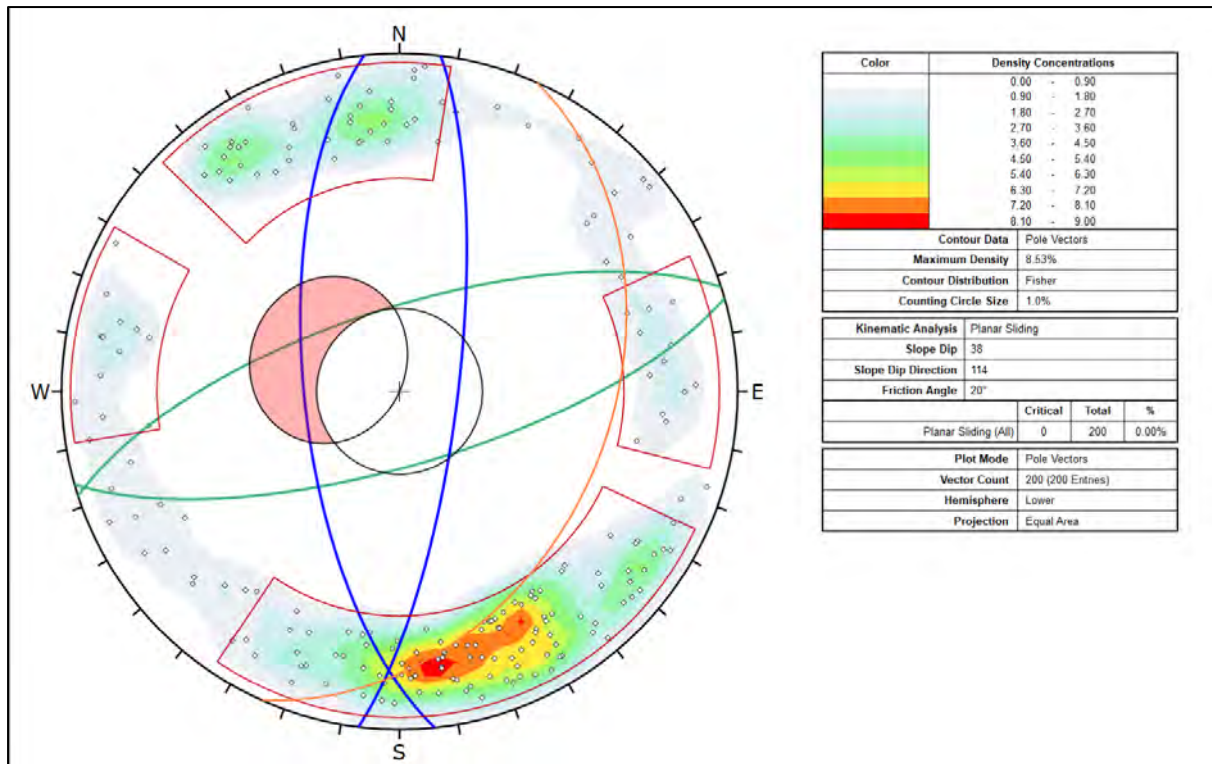


Figure: C127 - Kinematic Analysis (Joints >60°) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

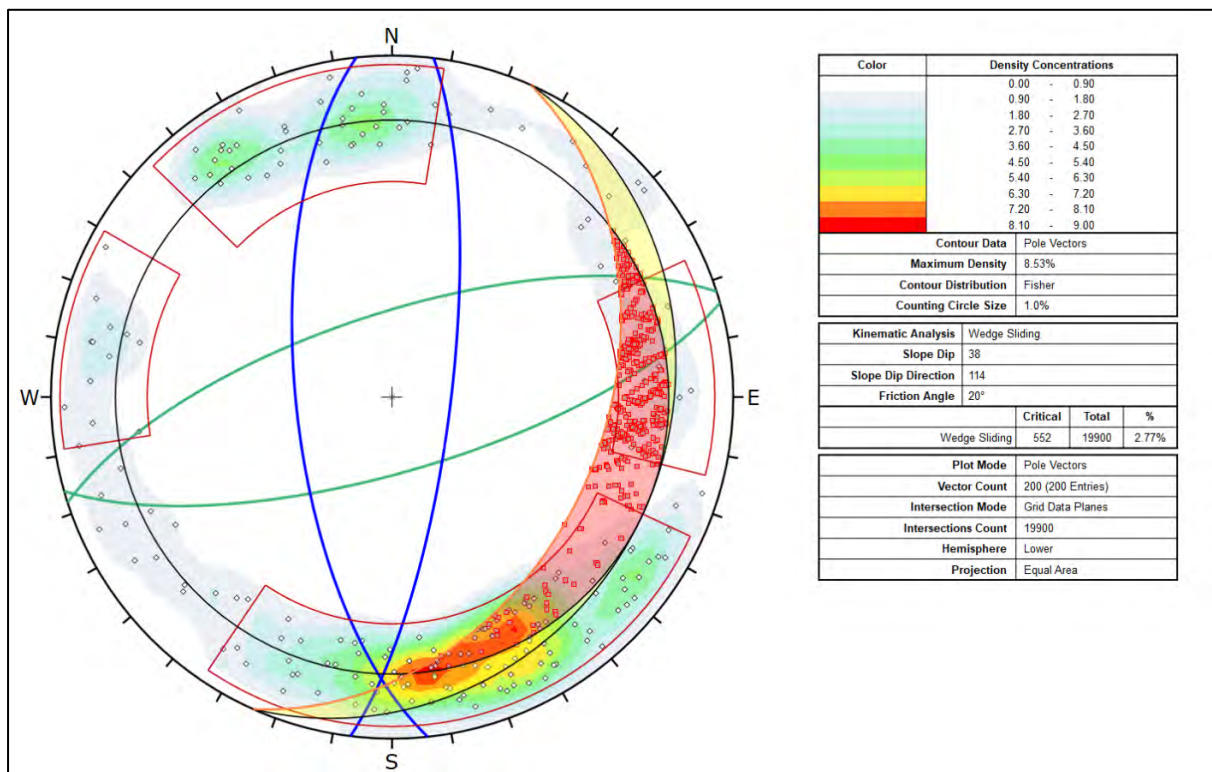


Figure: C128 - Kinematic Analysis (Joints >60°) - Highwall 2 (Overall Slope) – Wedge Sliding

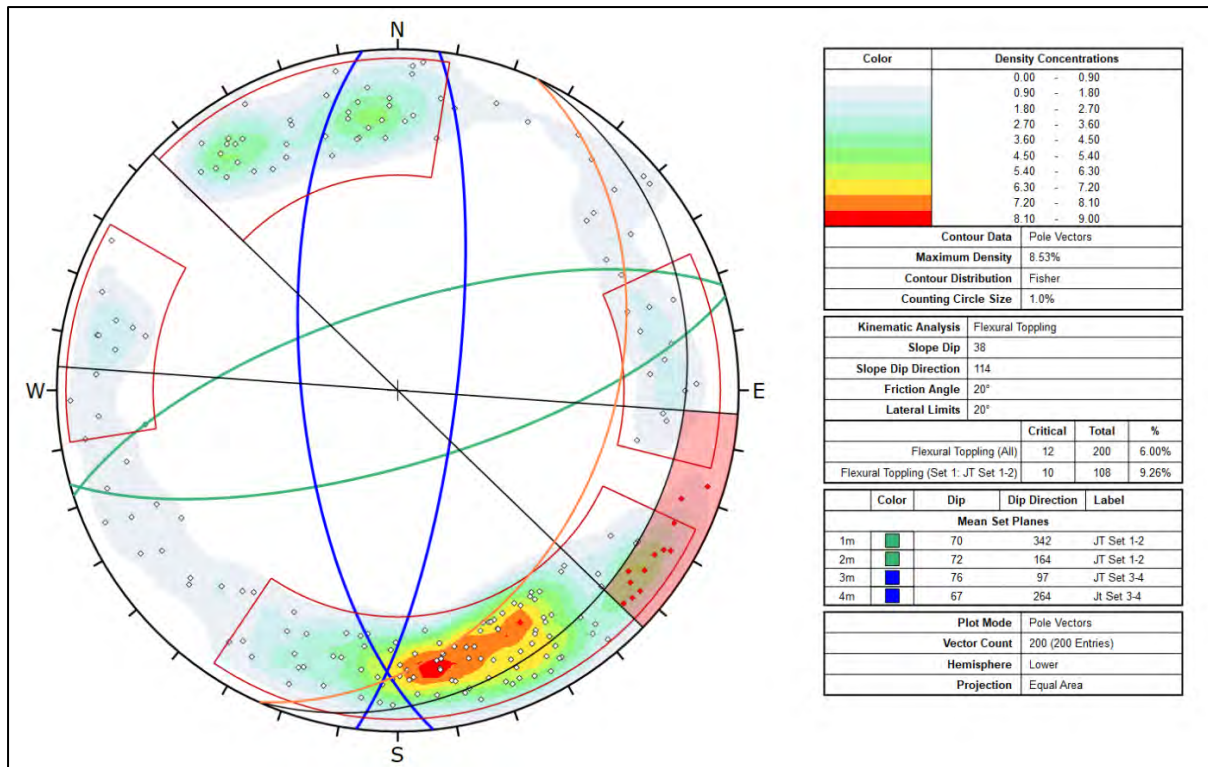


Figure: C129 - Kinematic Analysis (Joints >60°) - Highwall 2 (Overall Slope) – Flexural Toppling.

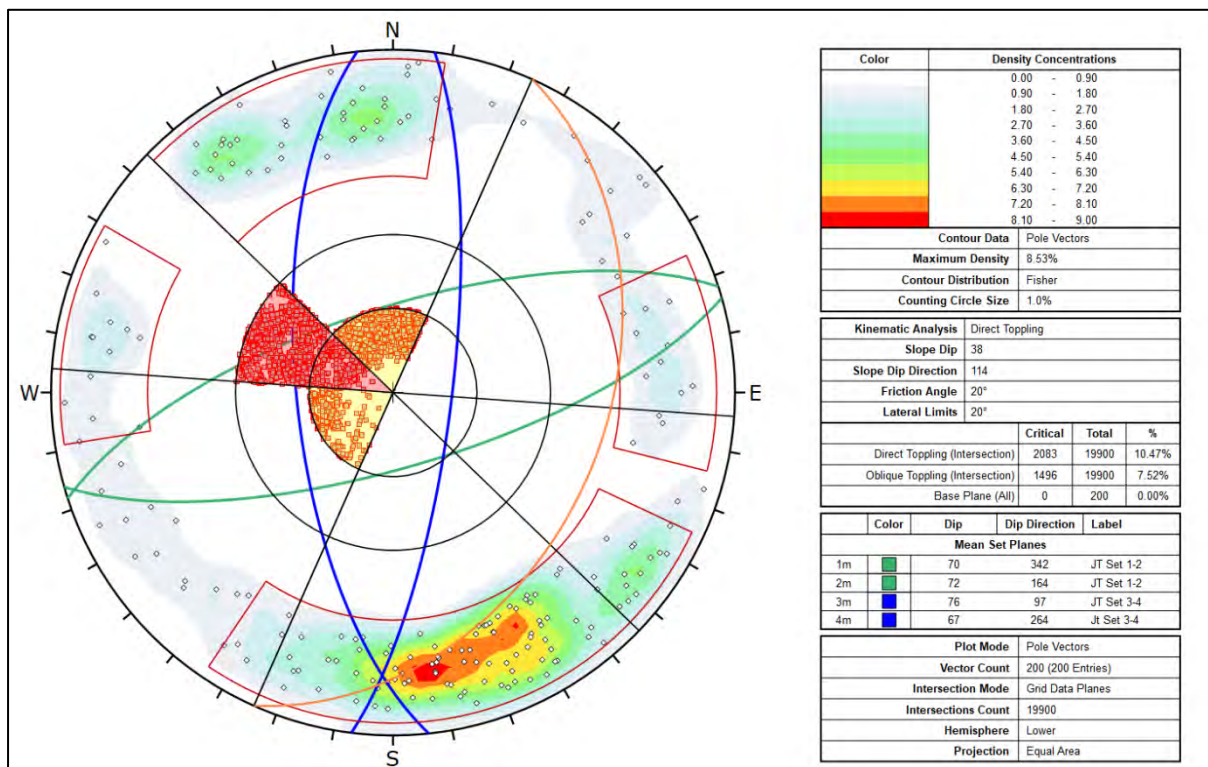


Figure: C130 - Kinematic Analysis (Joints >60°) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3 – Joints >60° - Overall Slope

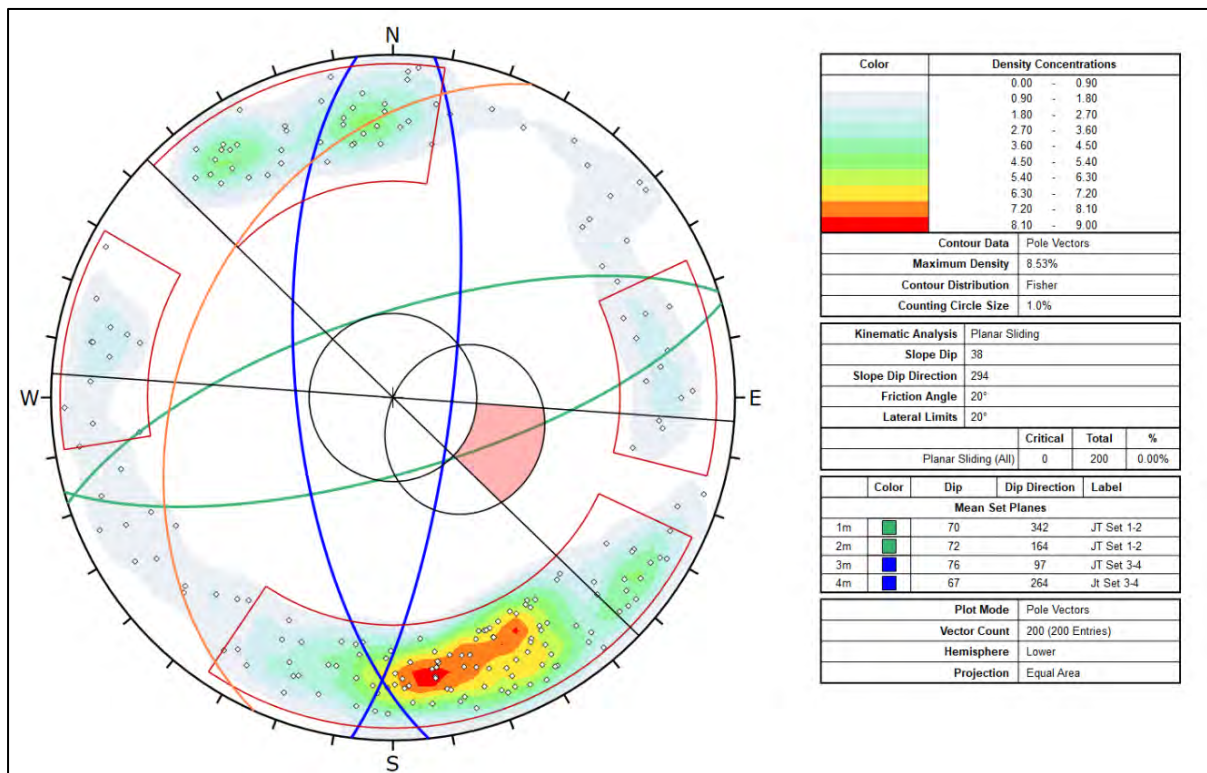


Figure: C131 - Kinematic Analysis (Joints >60°) - Highwall 3 (Overall Slope) – Planar Sliding.

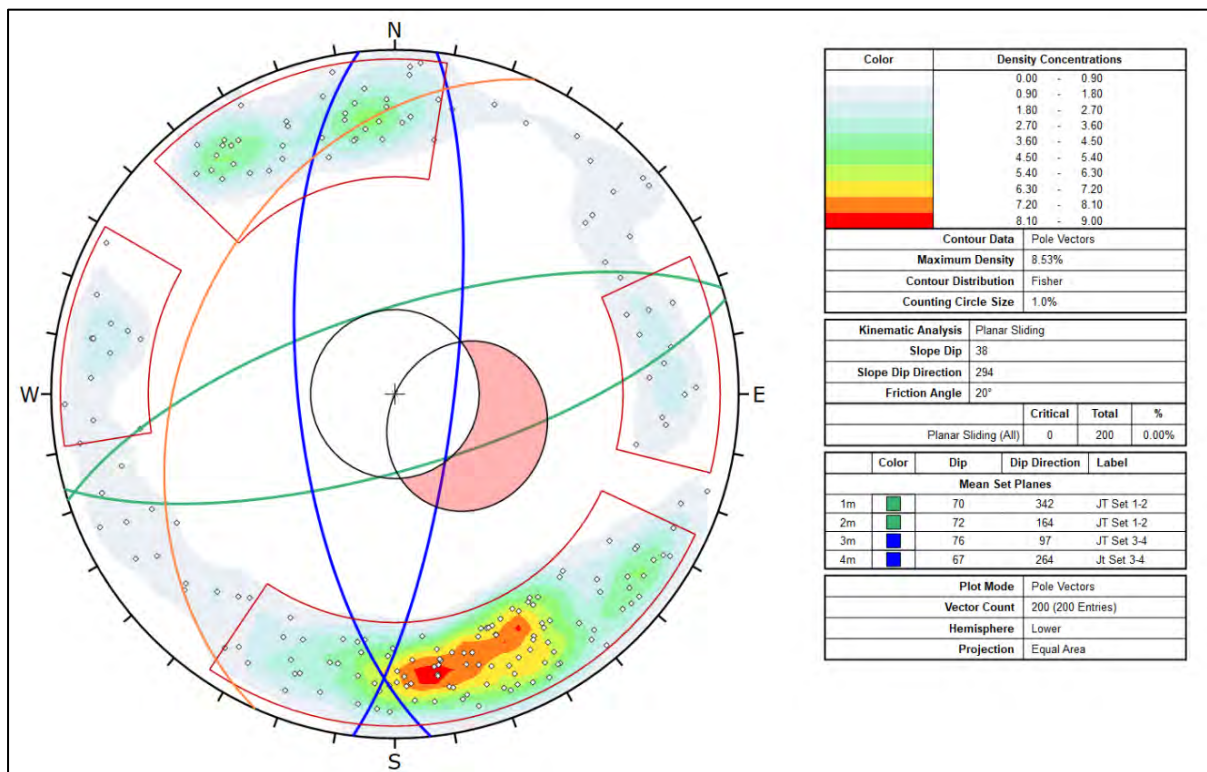


Figure: C132 - Kinematic Analysis (Joints >60°) - Highwall 3 (Overall Slope) – Planar Sliding (No Limits).

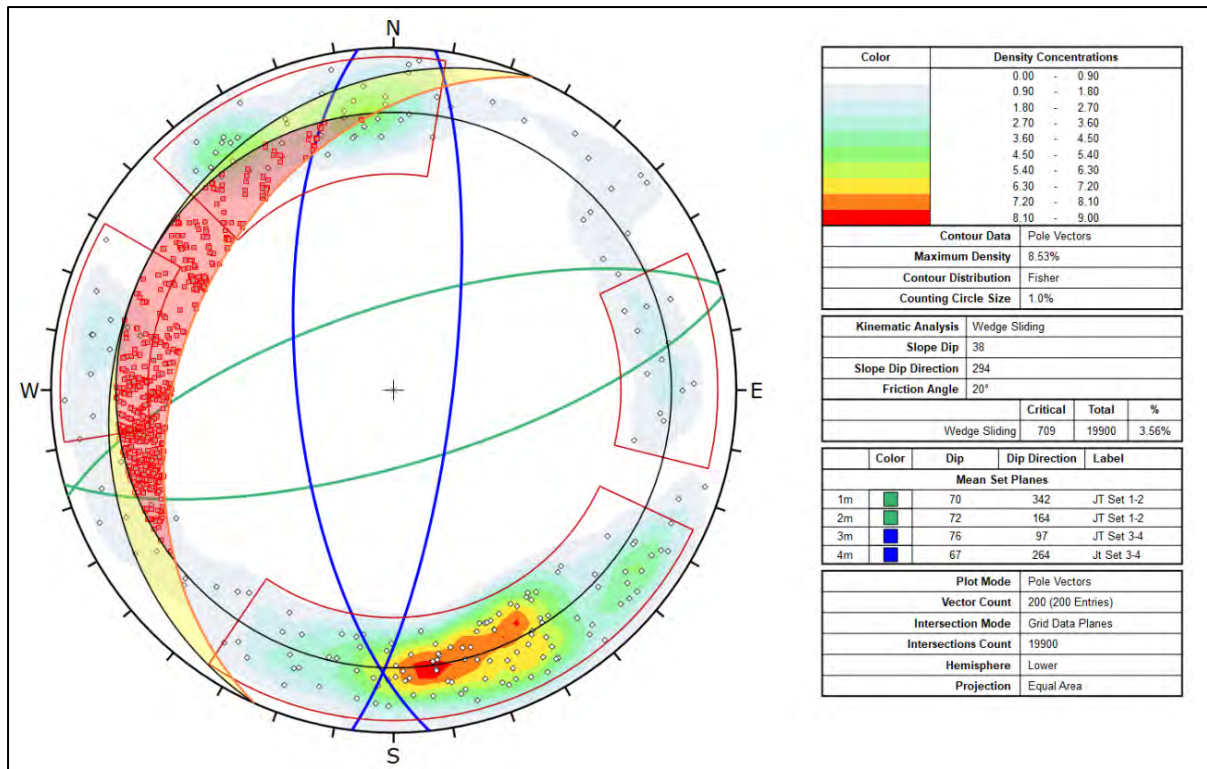


Figure: C133 - Kinematic Analysis (Joints >60°) - Highwall 3 (Overall Slope) – Wedge Sliding.

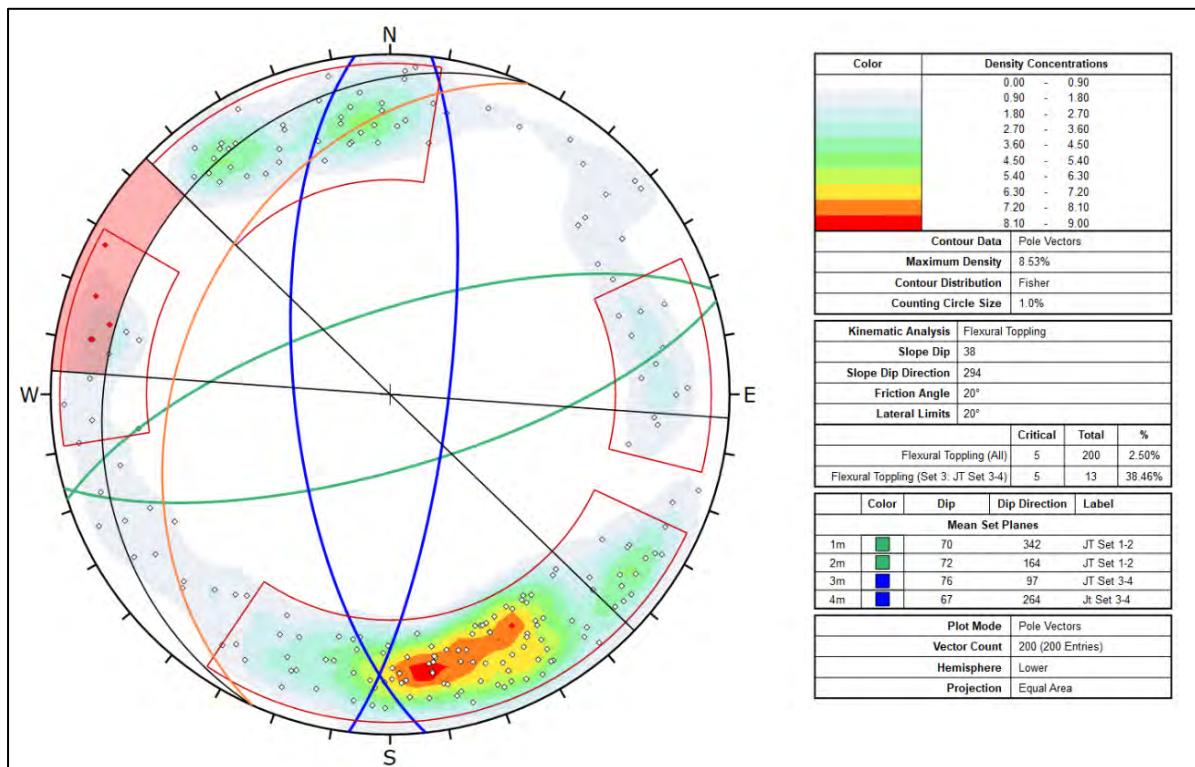


Figure: C134 - Kinematic Analysis (Joints >60°) - Highwall 3 (Overall Slope) – Flexural Topple.

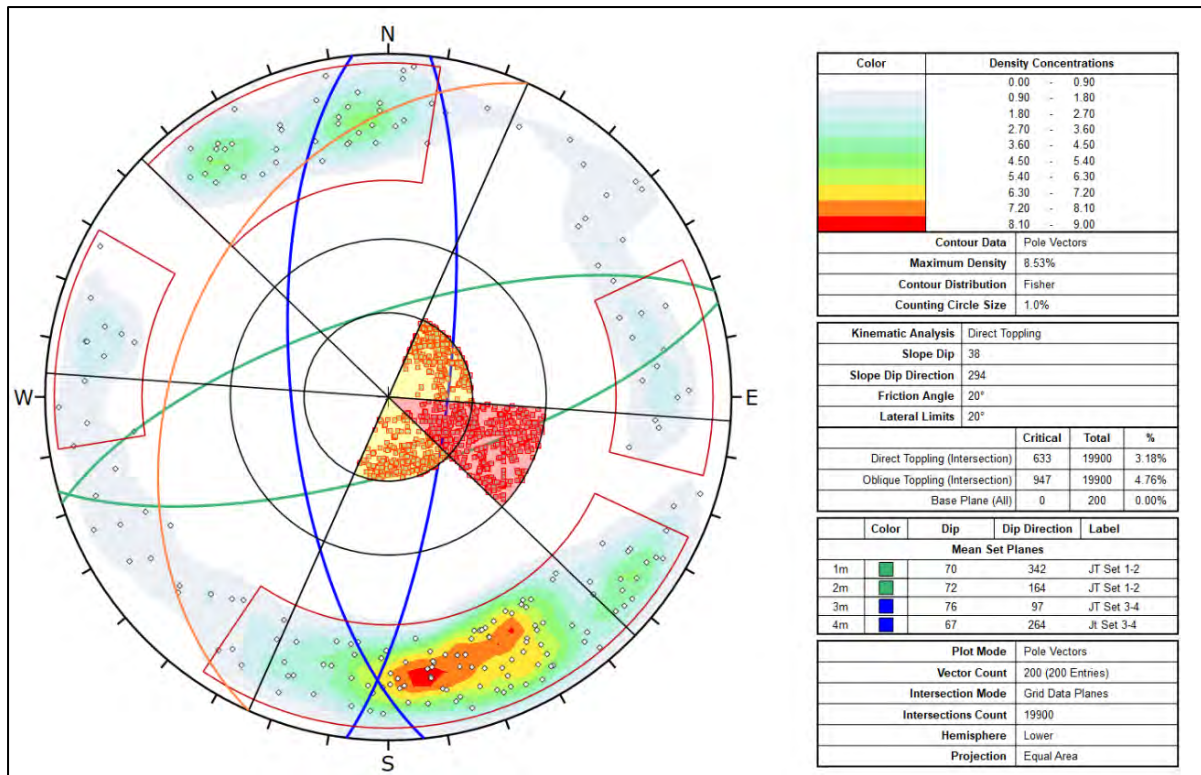


Figure: C135 - Kinematic Analysis (Joints >60°) - Highwall 3 (Overall Slope) – Direct Topple.

Highwall 4 – Joints >60° - Overall Slope

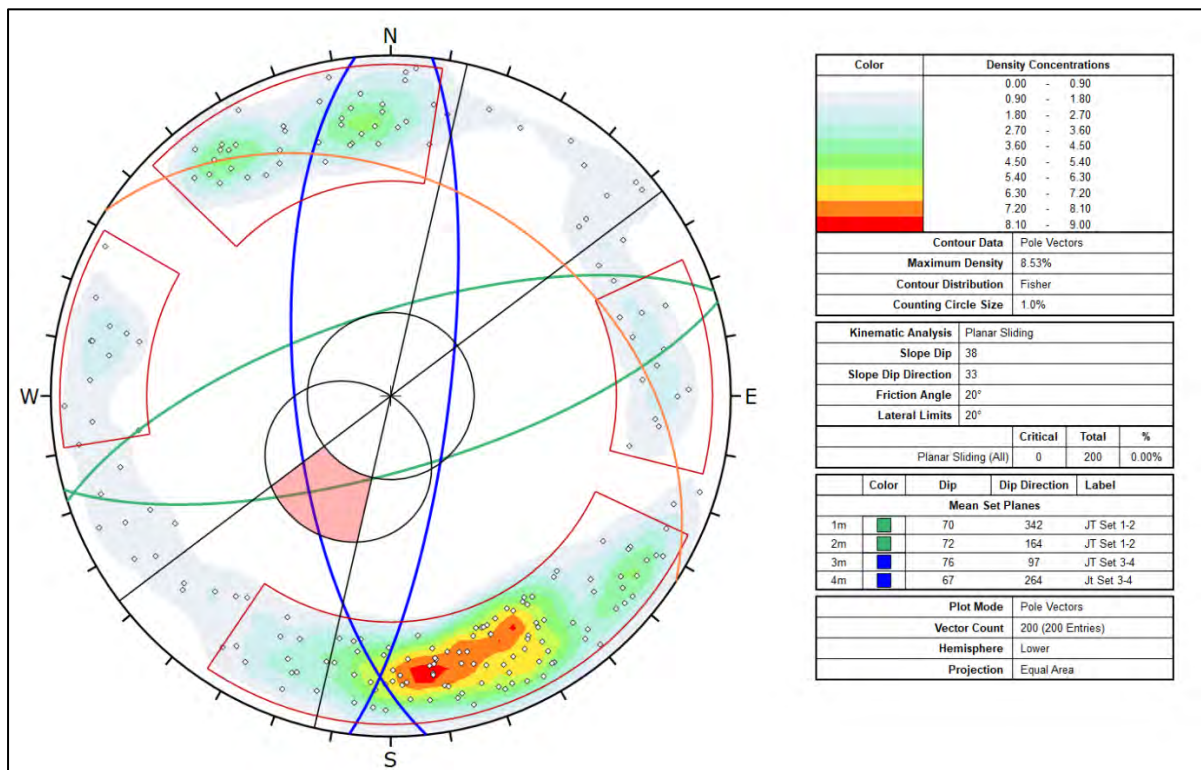


Figure: C136 - Kinematic Analysis (Joints >60°) - Highwall 4 (Overall Slope) – Planar Sliding.

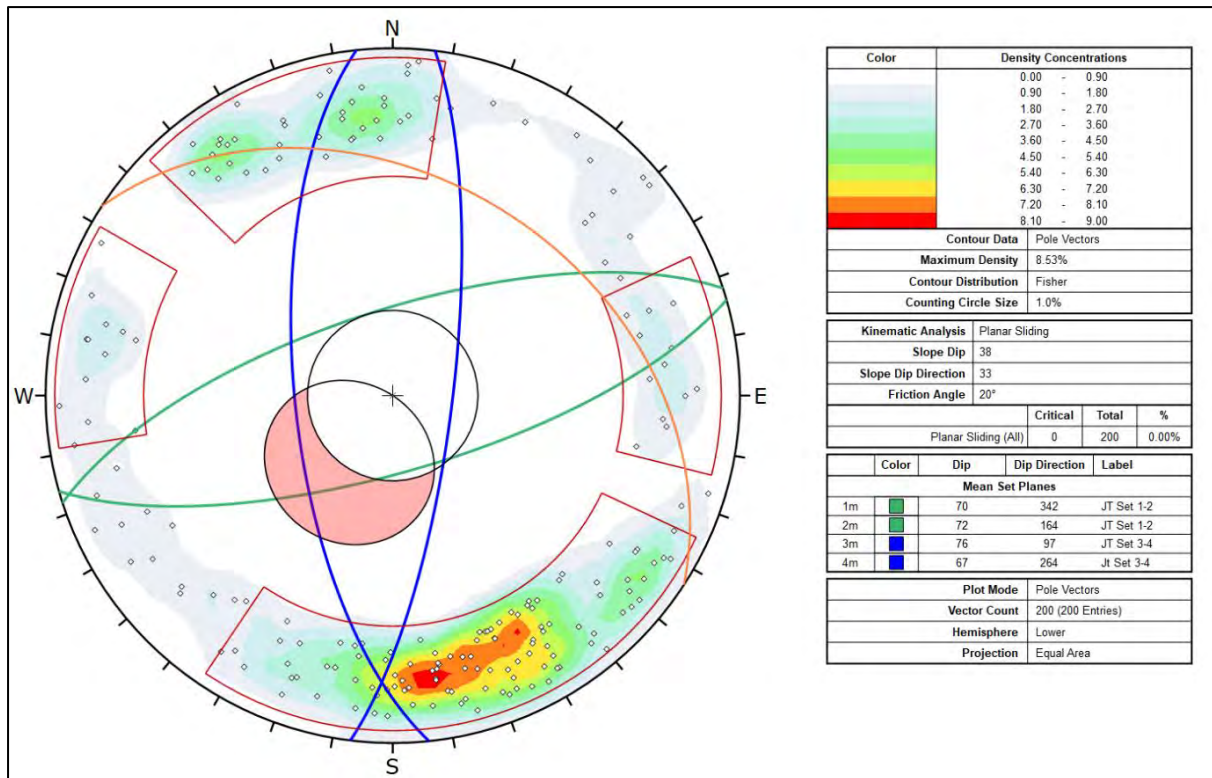


Figure: C137 - Kinematic Analysis (Joints >60°) - Highwall 4 (Overall Slope) – Planar Sliding (No Limits).

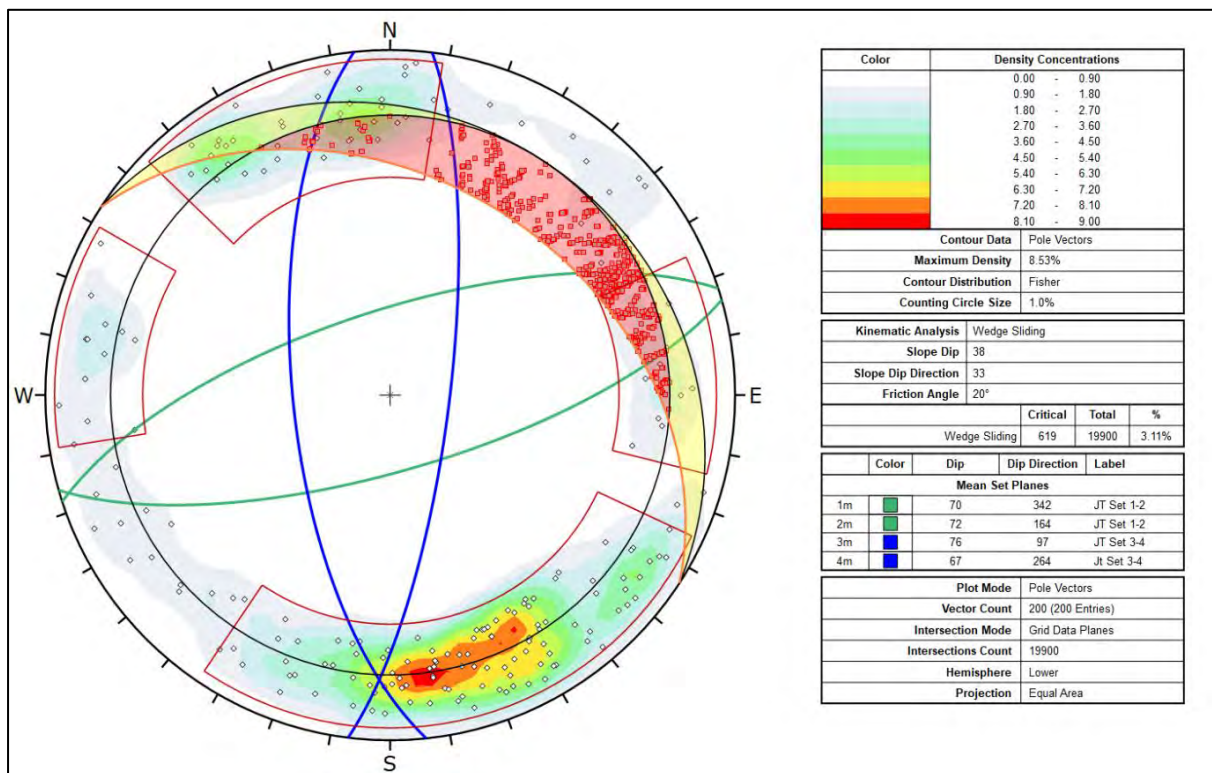


Figure: C138 - Kinematic Analysis (Joints >60°) - Highwall 4 (Overall Slope) – Wedge Sliding.

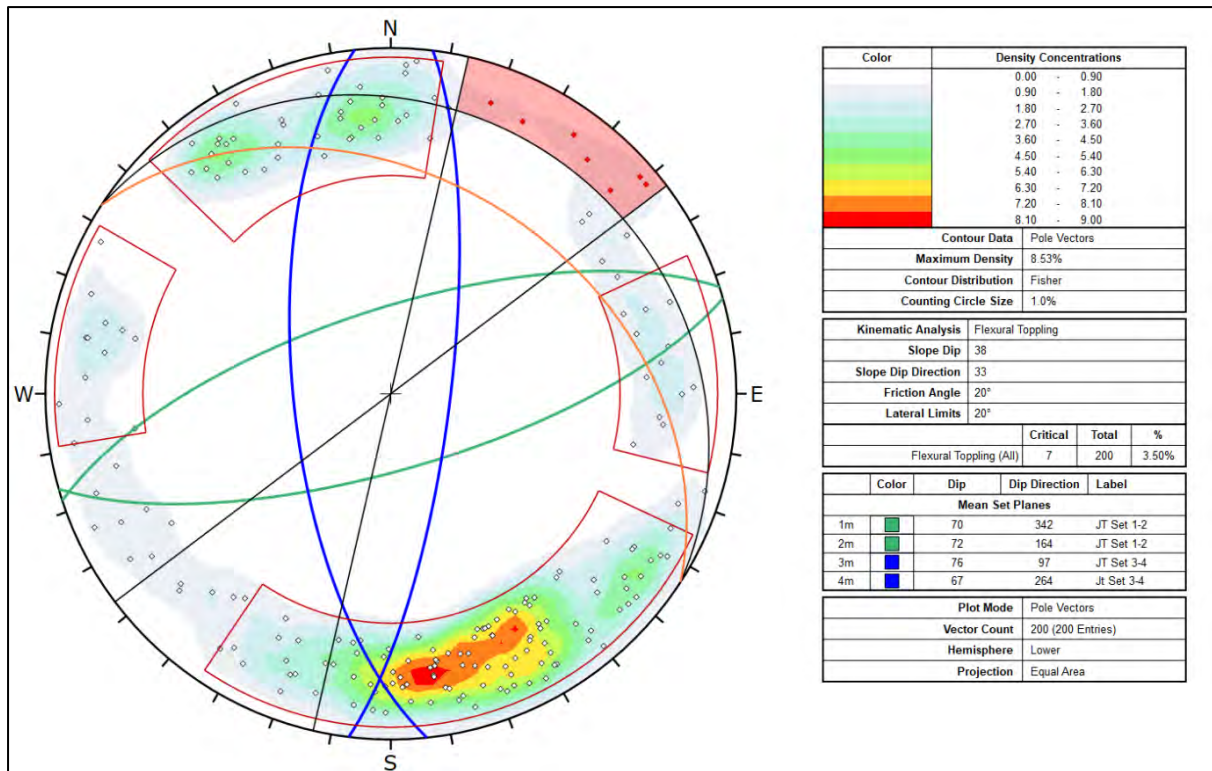


Figure: C139 - Kinematic Analysis (Joints >60°) - Highwall 4 (Overall Slope) – Flexural Toppling.

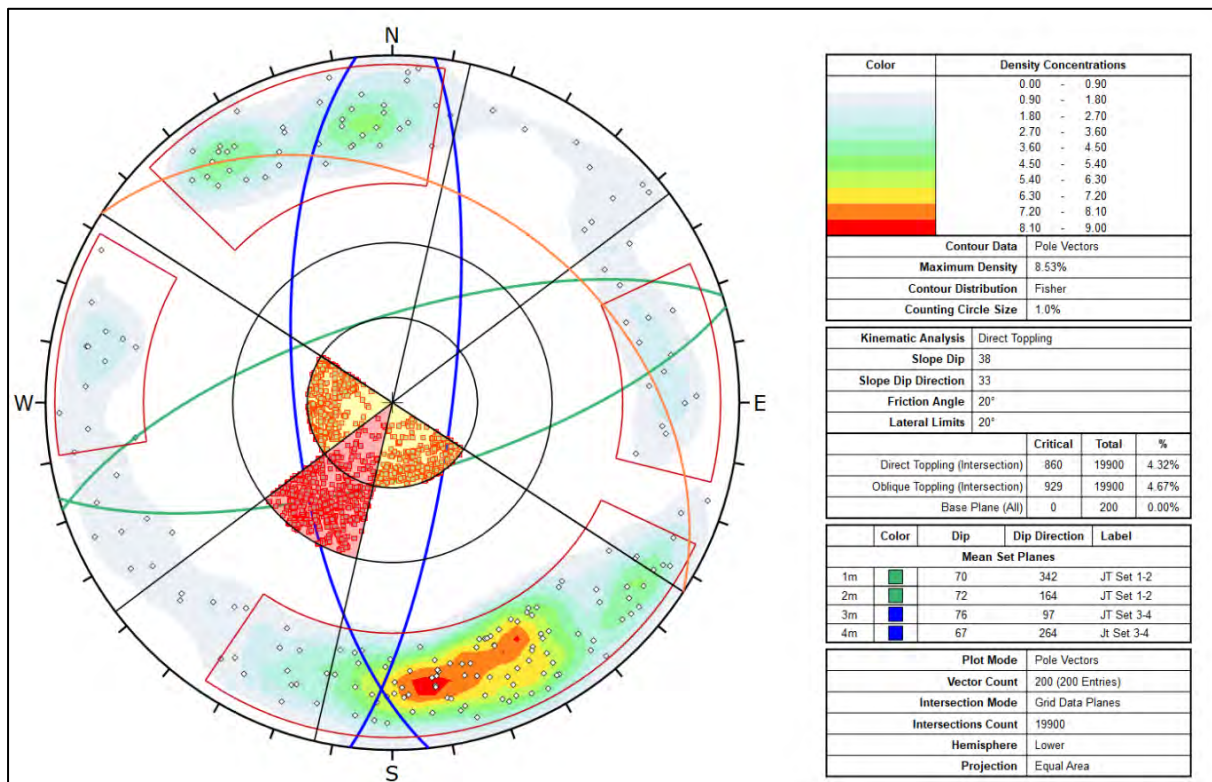


Figure: C140 - Kinematic Analysis (Joints >60°) - Highwall 4 (Overall Slope) – Direct Toppling.

Highwall 1 – Joints >60° - Bench Slope

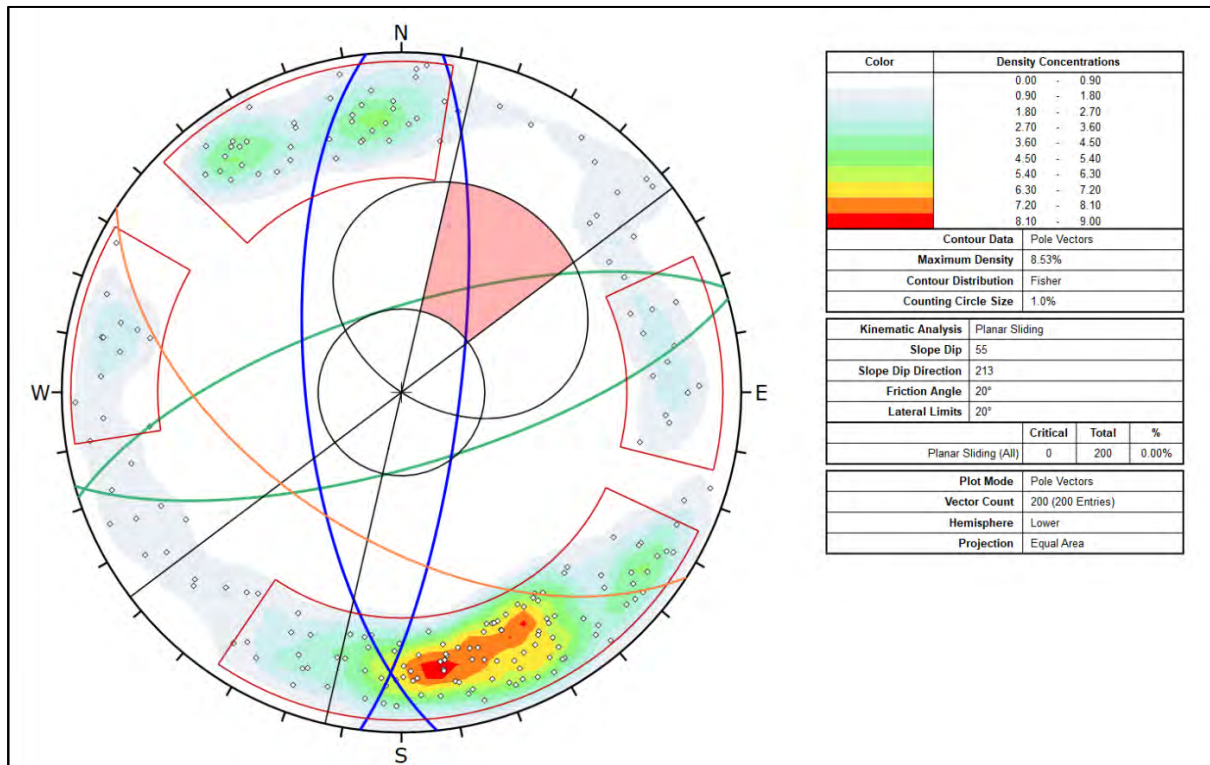


Figure: C141 - Kinematic Analysis (Joints >60°) - Highwall 1 (Bench Slope) – Planar Sliding.

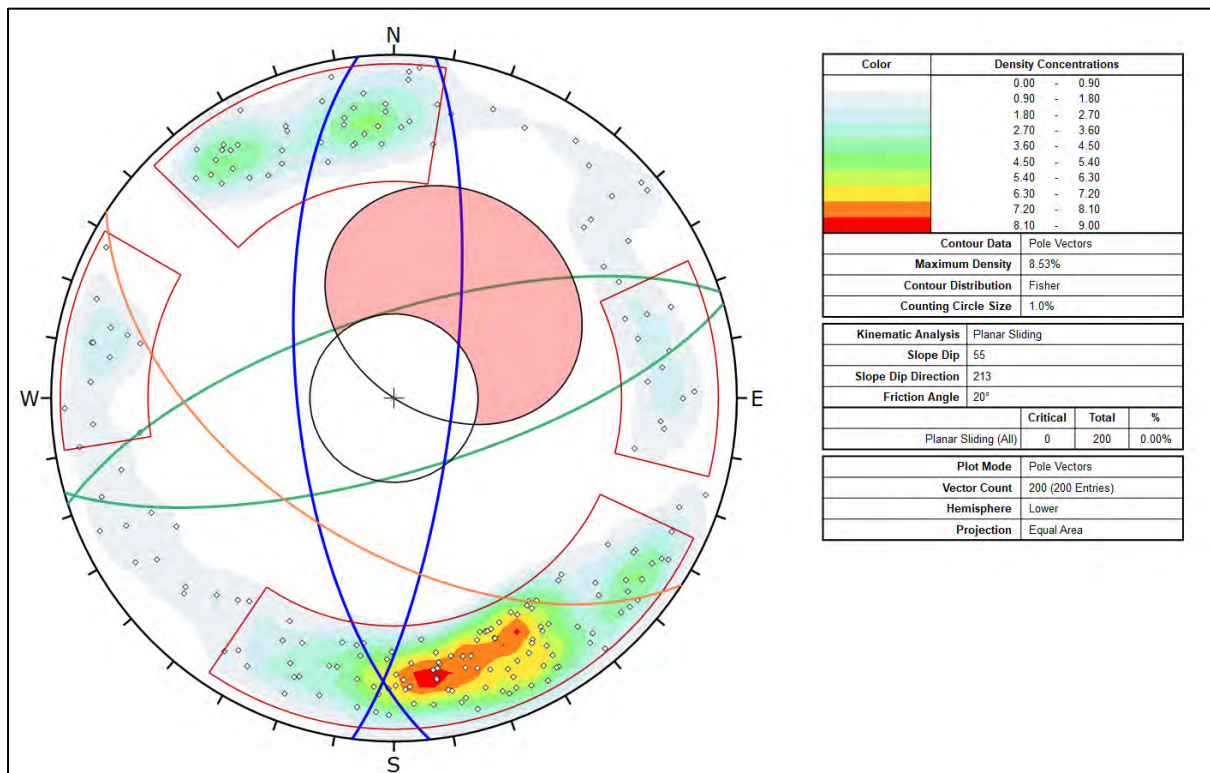
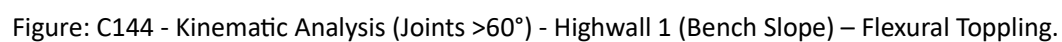
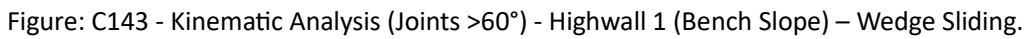


Figure: C142 - Kinematic Analysis (Joints >60°) - Highwall 1 (Bench Slope) – Planar Sliding (No Limits).



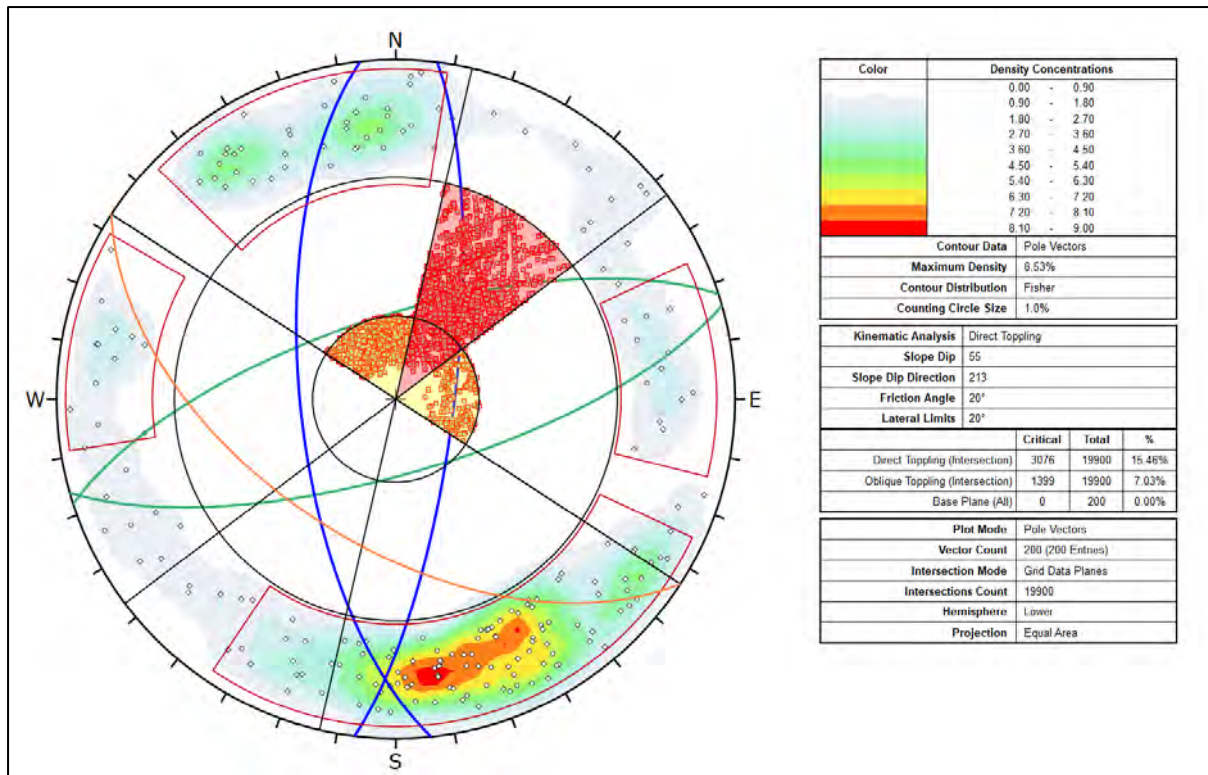


Figure: C145 - Kinematic Analysis (Joints >60°) - Highwall 1 (Bench Slope) – Direct Toppling.

Highwall 2 – Joints >60° - Bench Slope

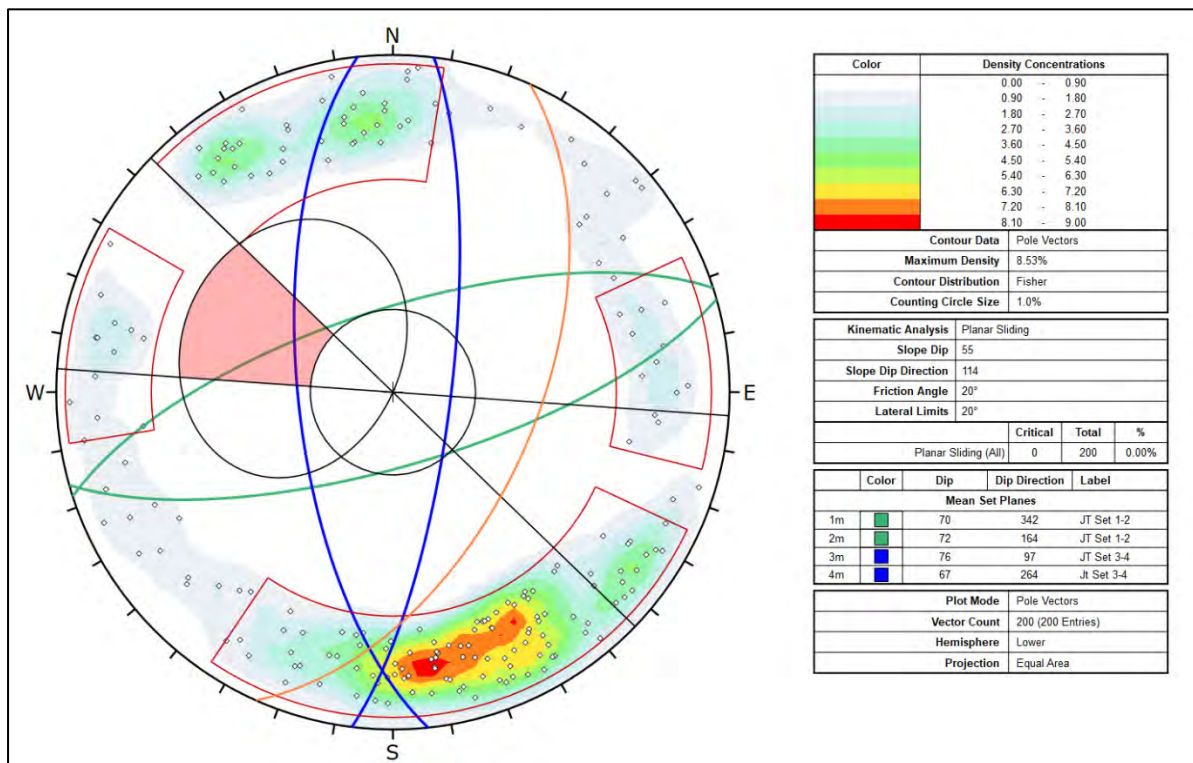


Figure: C146 - Kinematic Analysis (Joints >60°) - Highwall 2 (Bench Slope) – Planar Sliding.

Color

Density Concentrations	
0.00	- 0.90
0.90	- 1.80
1.80	- 2.70
2.70	- 3.60
3.60	- 4.50
4.50	- 5.40
5.40	- 6.30
6.30	- 7.20
7.20	- 8.10
8.10	- 9.00

Contour Data	Pole Vectors
Maximum Density	8.53%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	55
Slope Dip Direction	114
Friction Angle	20°

	Critical	Total	%
Wedge Sliding	1593	19900	8.01%

	Color	Dip	Dip Direction	Label
Mean Set Planes				
1m	Green	70	342	JT Set 1-2
2m	Green	72	164	JT Set 1-2
3m	Blue	76	97	JT Set 3-4
4m	Blue	67	264	Jt Set 3-4

Plot Mode	Pole Vectors
Vector Count	200 (200 Entries)
Intersection Mode	Grd Data Planes
Intersections Count	19900
Hemisphere	Lower
Projection	Equal Area

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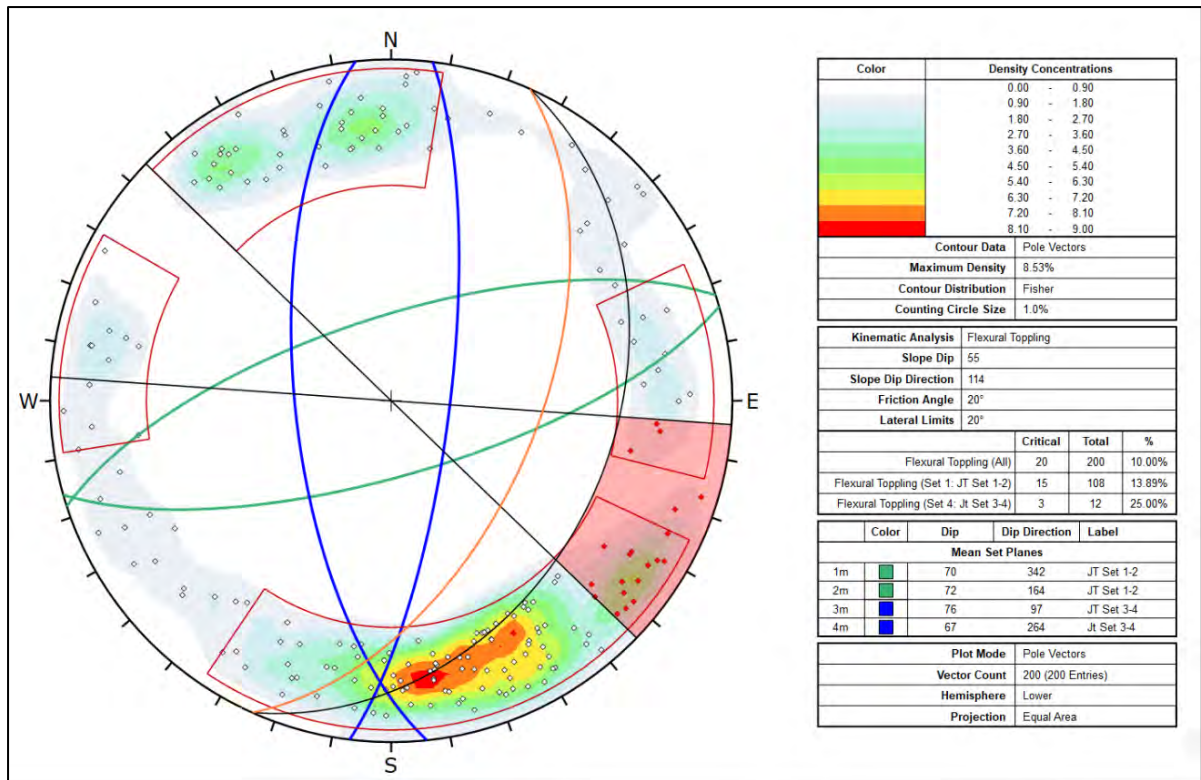


Figure: C149 - Kinematic Analysis (Joints >60°) - Highwall 2 (Bench Slope) – Flexural Toppling.

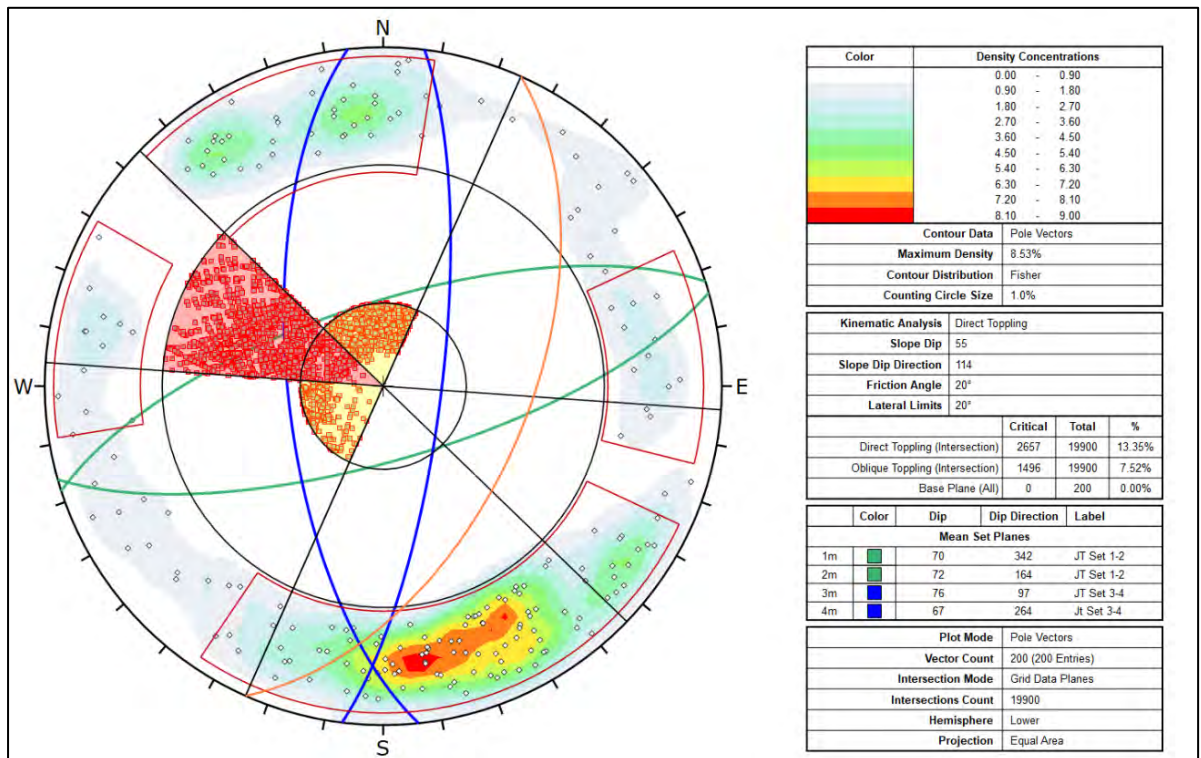


Figure: C150 - Kinematic Analysis (Joints >60°) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – Joints >60° - Bench Slope

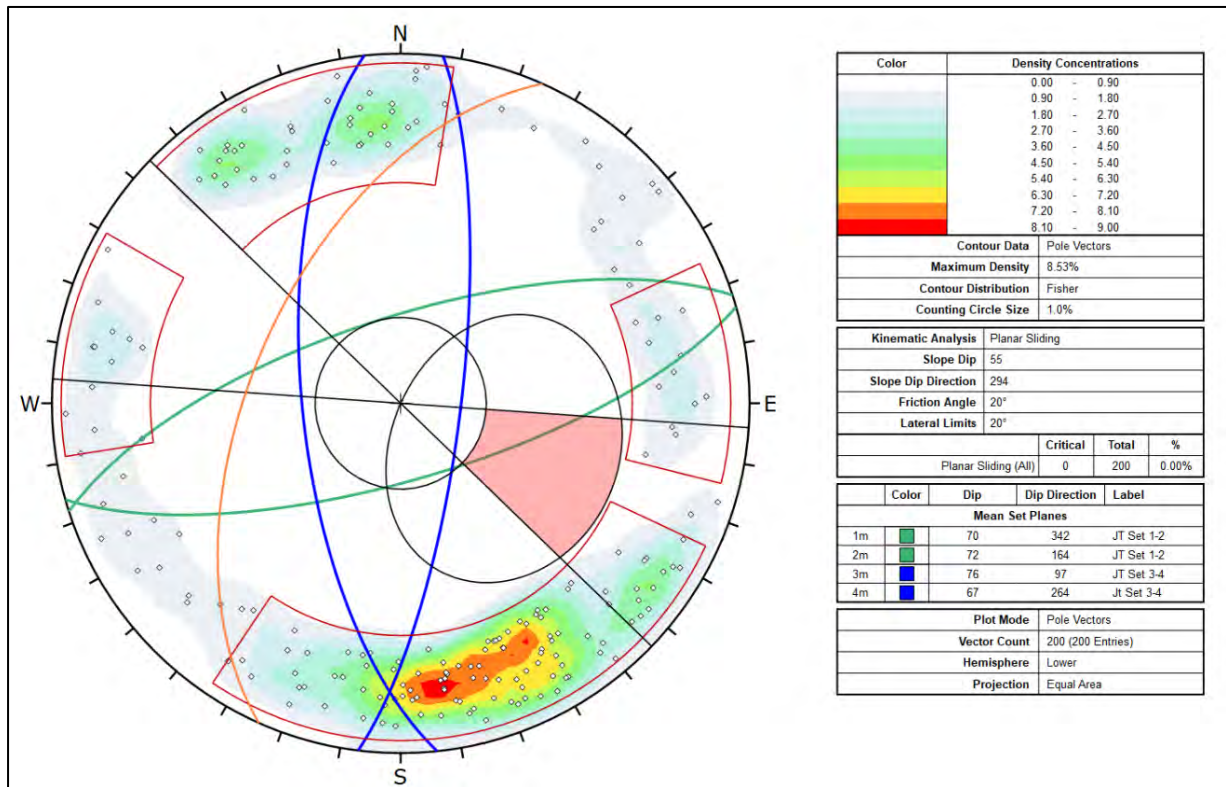


Figure: C151 - Kinematic Analysis (Joints >60°) - Highwall 3 (Bench Slope) – Planar Sliding.

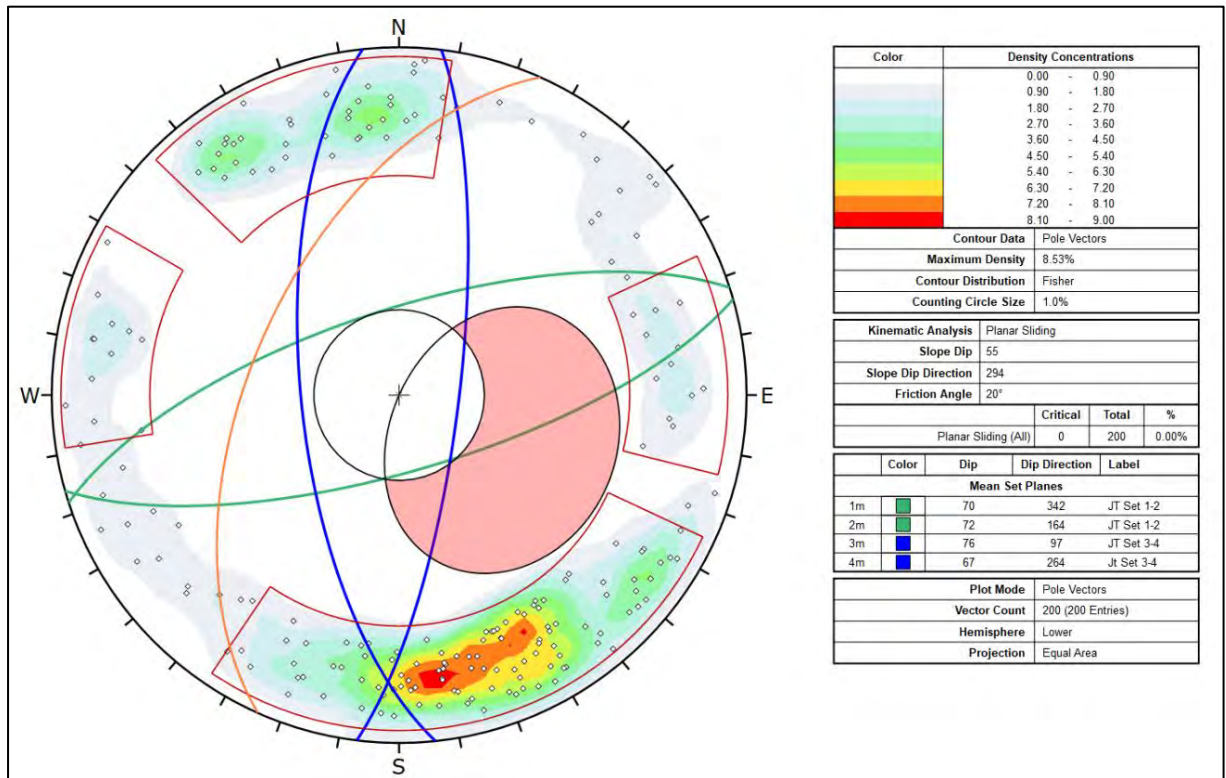


Figure: C152 - Kinematic Analysis (Joints >60°) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

Figure 10: Stereonet plot showing the distribution of slip vectors and density concentrations.

The plot is a circular equal-area projection with N, S, E, and W markers. It features a color-coded density map with a legend on the right. The legend includes a color scale from 0.00 to 9.00, a table of density concentrations, and a table of kinematic analysis parameters. The plot also shows contour lines and a counting circle size of 1.0%.

Color	Density Concentrations
0.00	0.90
0.90	1.80
1.80	2.70
2.70	3.60
3.60	4.50
4.50	5.40
5.40	6.30
6.30	7.20
7.20	8.10
8.10	9.00

Contour Data	Pole Vectors
Maximum Density	8.53%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Topping
Slope Dip	55
Slope Dip Direction	294
Friction Angle	20°
Lateral Limits	20°

	Critical	Total	%
Flexural Topping (All)	8	200	4.00%
Flexural Topping (Set 3, JT Set 3-4)	8	13	61.54%

Color	Dip	Dip Direction	Label
Mean Set Planes			
1m	70	342	JT Set 1-2
2m	72	164	JT Set 1-2
3m	76	97	JT Set 3-4
4m	67	264	JT Set 3-4

Plot Mode	Pole Vectors
Vector Count	200 (200 Entries)
Hemisphere	Lower
Projection	Equal Area

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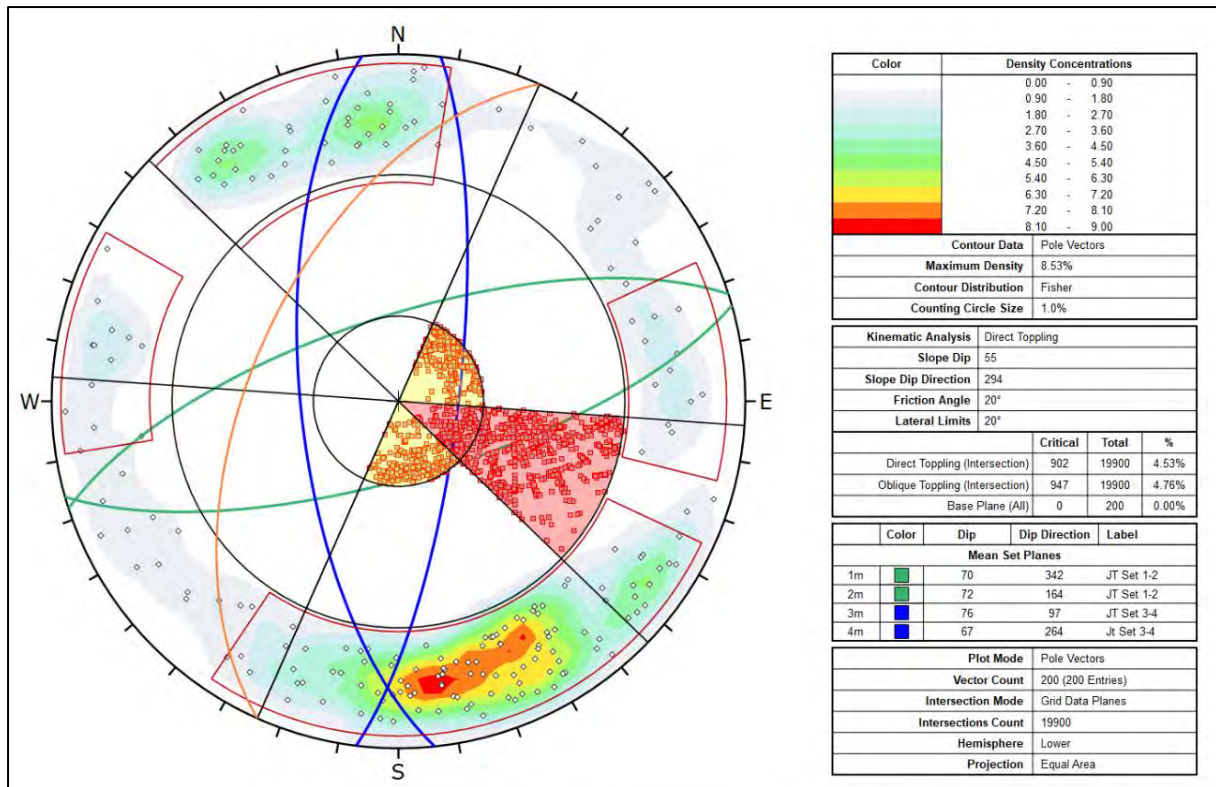


Figure: C155 - Kinematic Analysis (Joints >60°) - Highwall 3 (Bench Slope) – Direct Toppling.

Highwall 4 – Joints >60° - Bench Slope

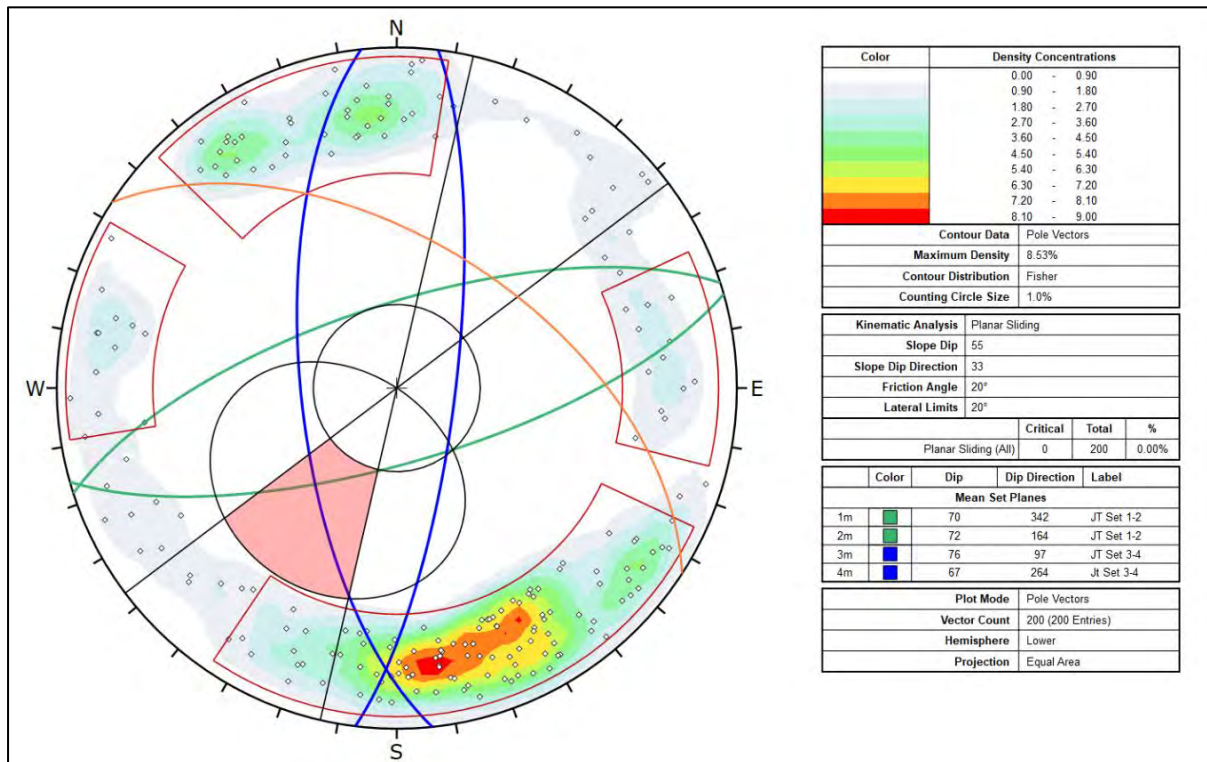


Figure: C156 - Kinematic Analysis (Joints >60°) - Highwall 4 (Bench Slope) – Planar Sliding.

Color

Density Concentrations	
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data Pole Vectors

Maximum Density 8.53%

Contour Distribution Fisher

Counting Circle Size 1.0%

Kinematic Analysis Wedge Sliding

Slope Dip 55

Slope Dip Direction 33

Friction Angle 20°

	Critical	Total	%
Wedge Sliding	2076	19900	10.43%

Color **Dip** **Dip Direction** **Label**

Mean Set Planes

1m	70	342	JT Set 1-2
2m	72	164	JT Set 1-2
3m	76	97	JT Set 3-4
4m	67	264	JT Set 3-4

Plot Mode Pole Vectors

Vector Count 200 (200 Entries)

Intersection Mode Grid Data Planes

Intersections Count 19900

Hemisphere Lower

Projection Equal Area

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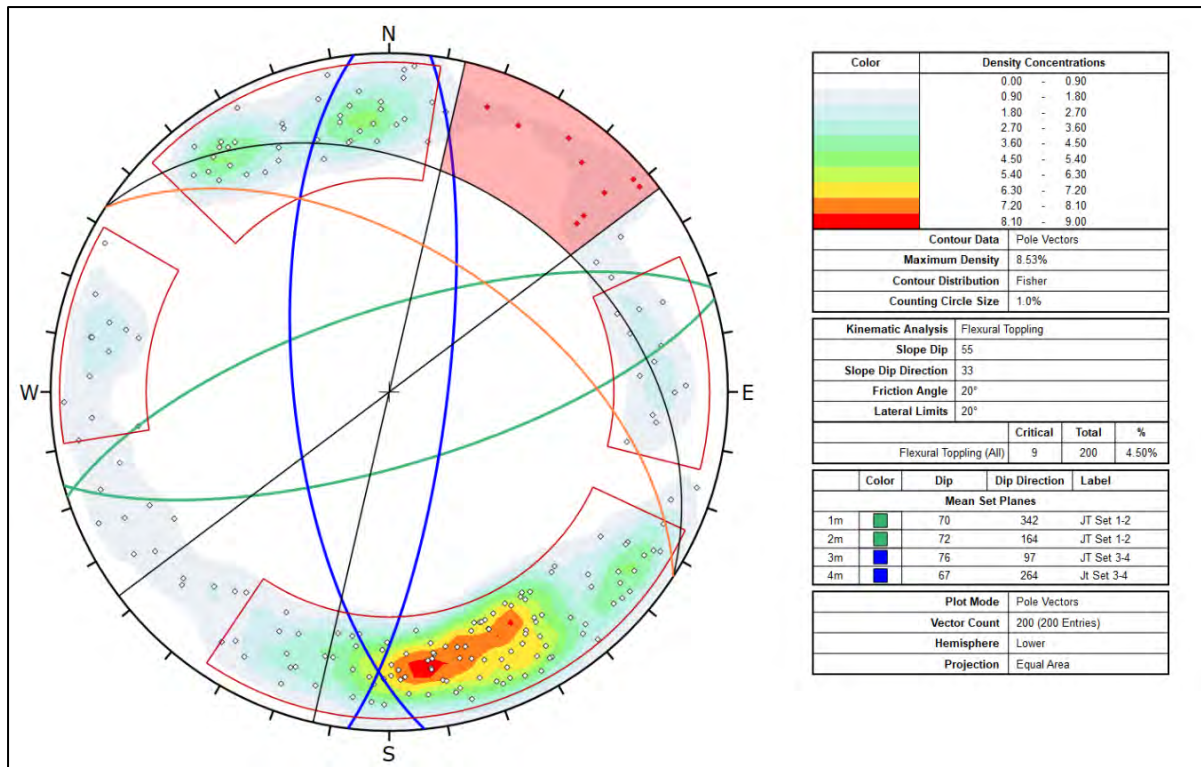


Figure: C159 - Kinematic Analysis (Joints >60°) - Highwall 4 (Bench Slope) – Flexural Toppling.

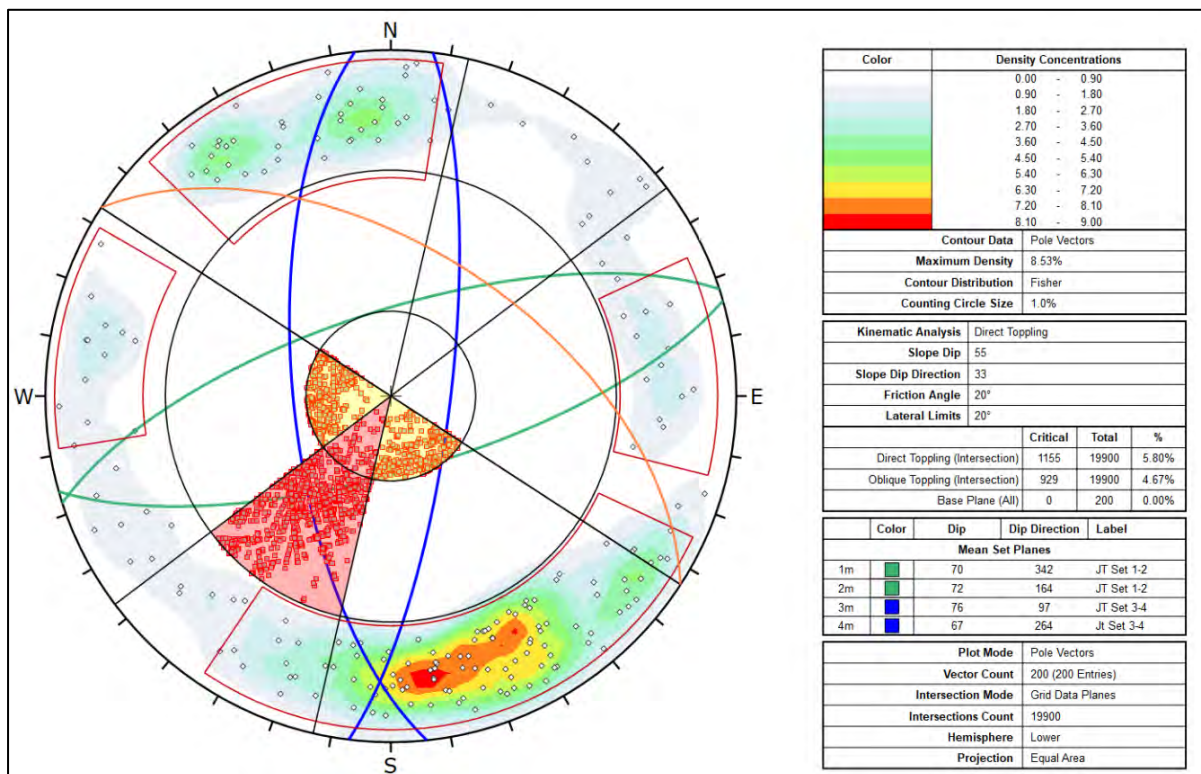


Figure: C160 - Kinematic Analysis (Joints >60°) - Highwall 4 (Bench Slope) – Direct Toppling.

Highwall 1- Fracture <30° - Overall Slope

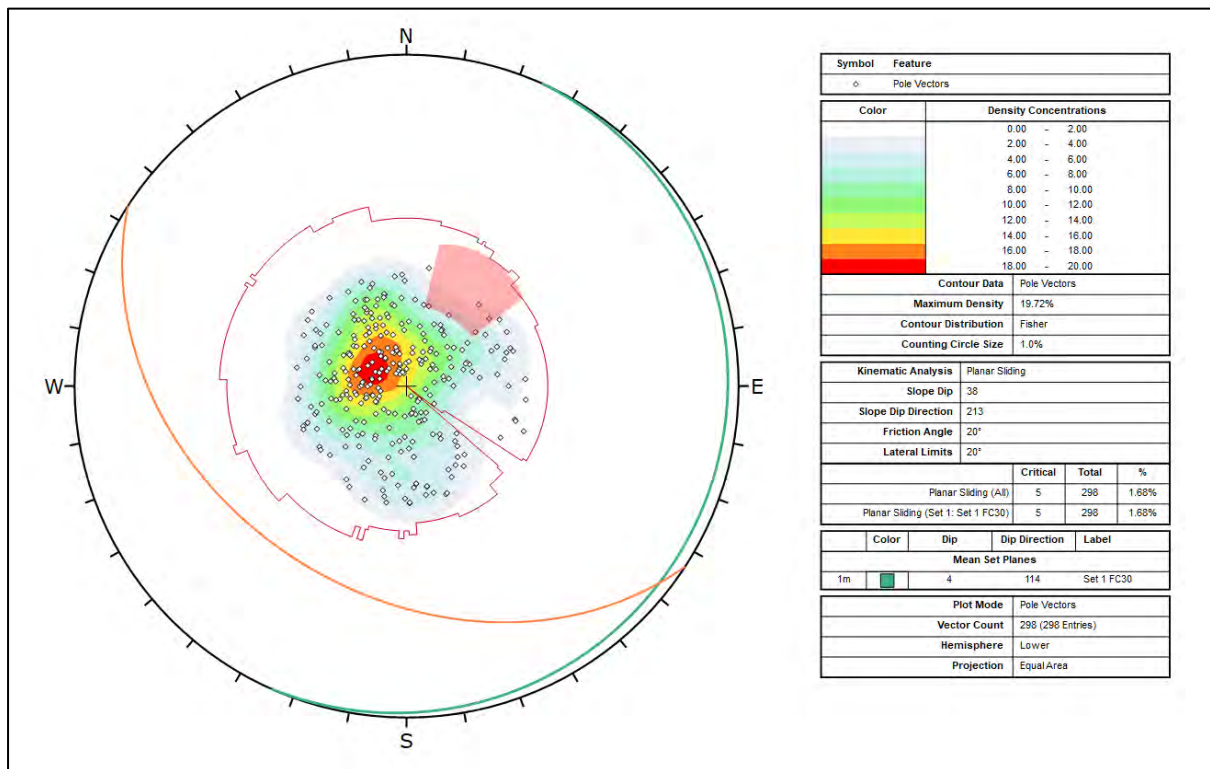


Figure: C161 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Overall Slope) – Planar Sliding.

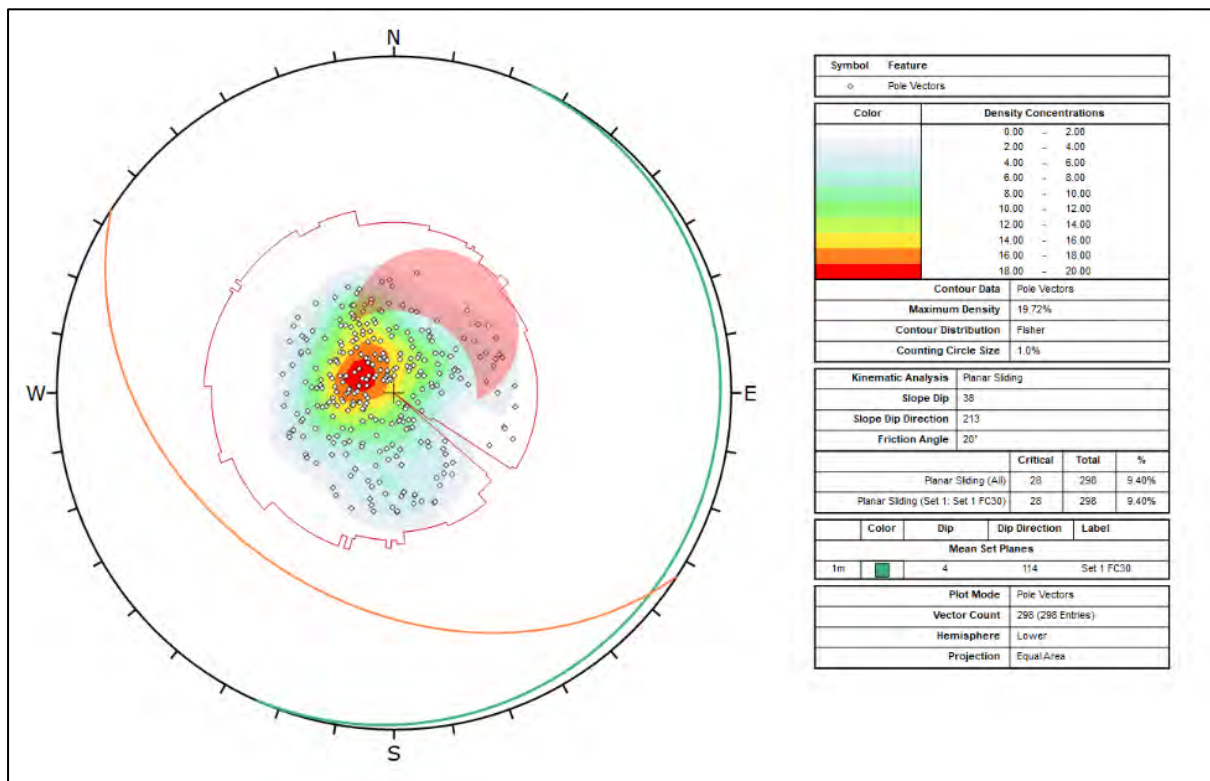


Figure: C162 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).

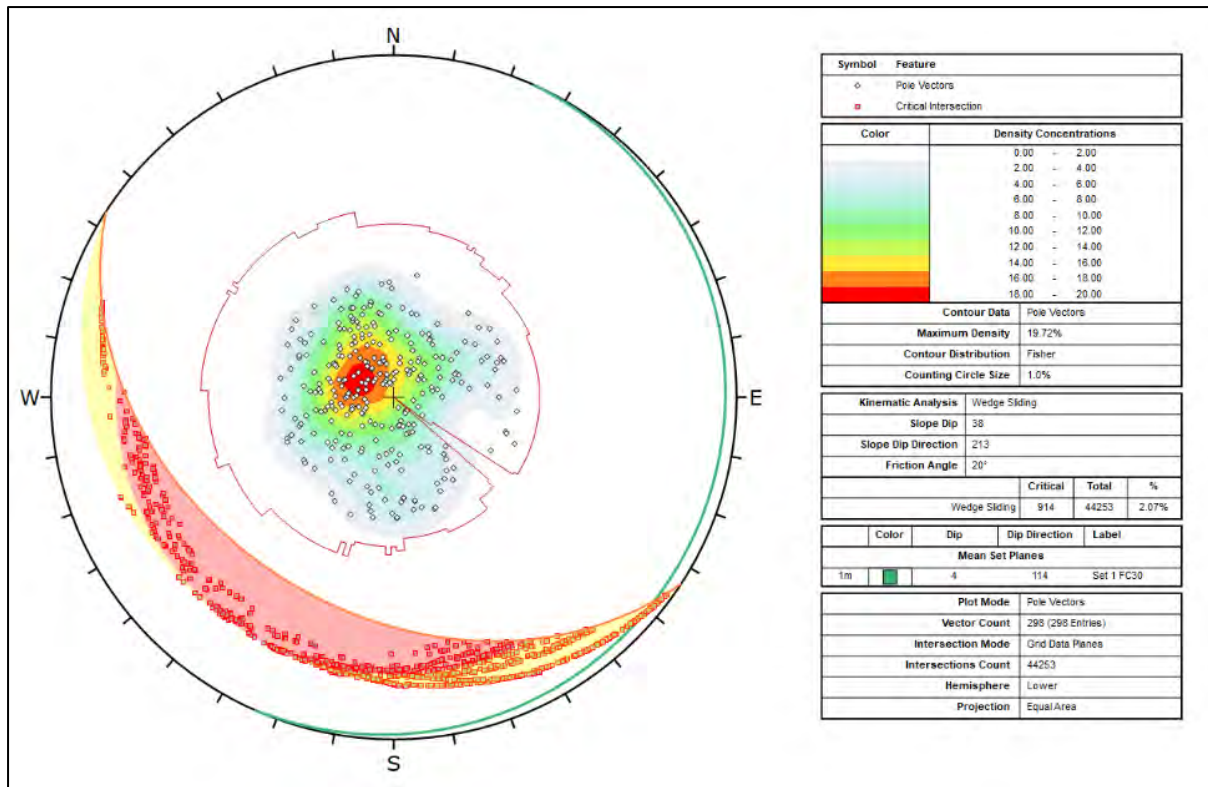


Figure: C163 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Overall Slope) – Wedge Sliding.

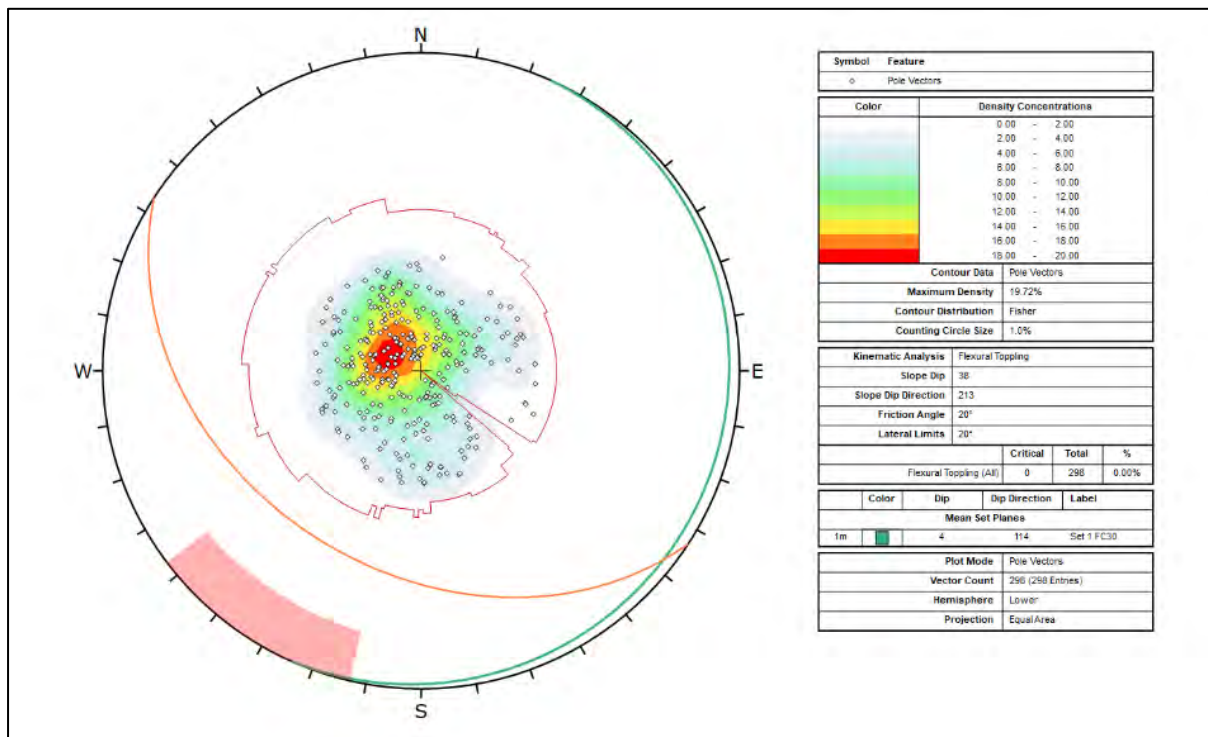


Figure: C164 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Overall Slope) – Flexural Toppling.

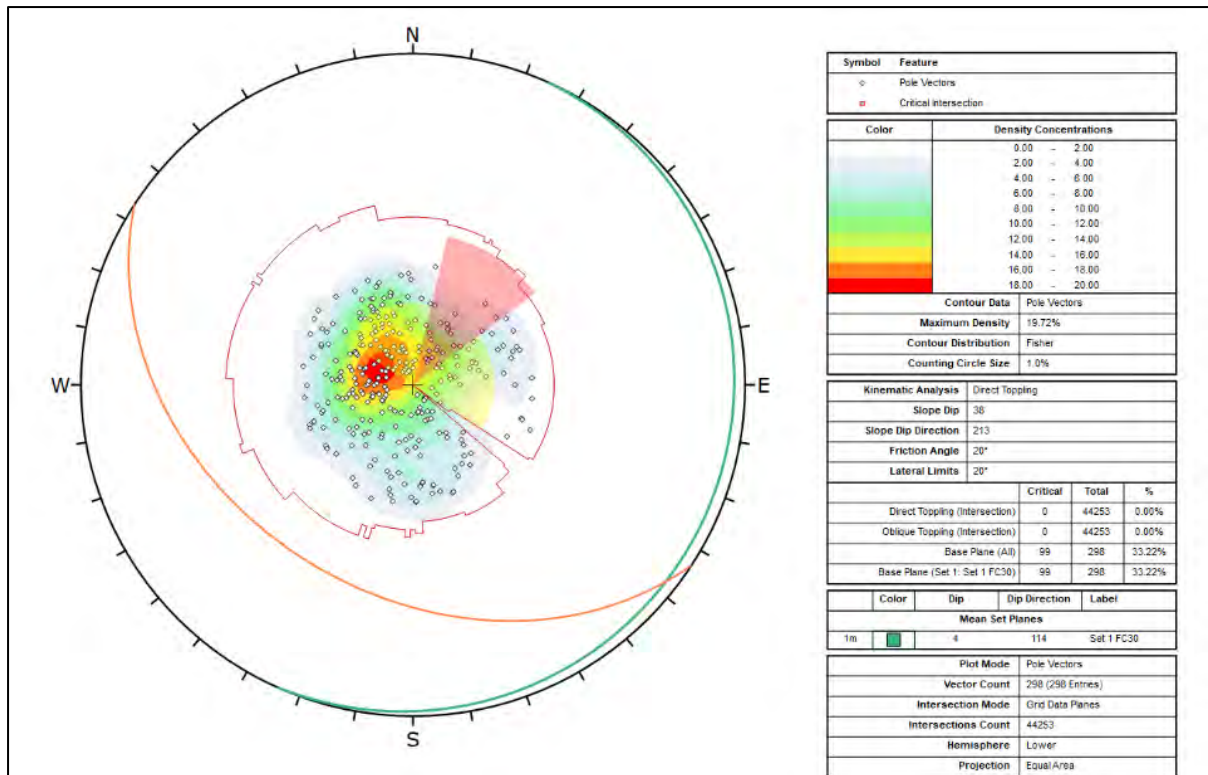


Figure: C165 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Overall Slope) – Direct Topple.

Highwall 2– Fracture <30° - Overall Slope

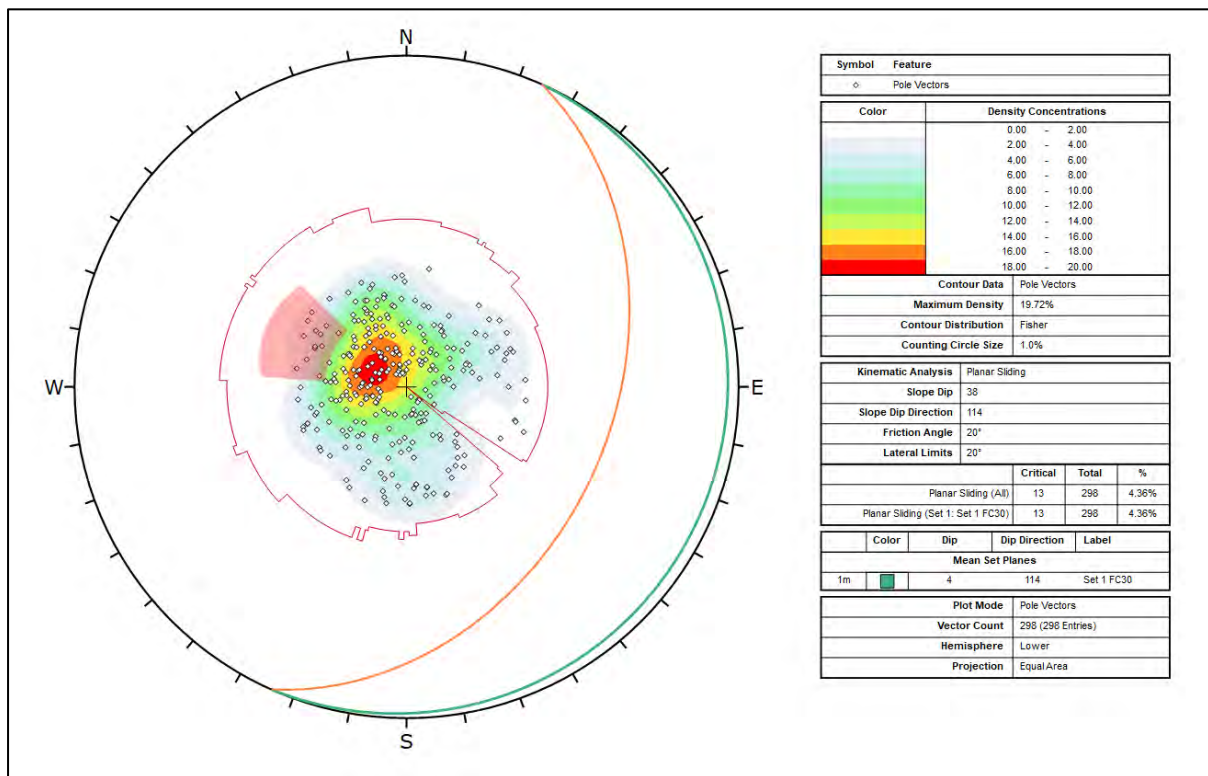


Figure: C166 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Overall Slope) – Planar Sliding.

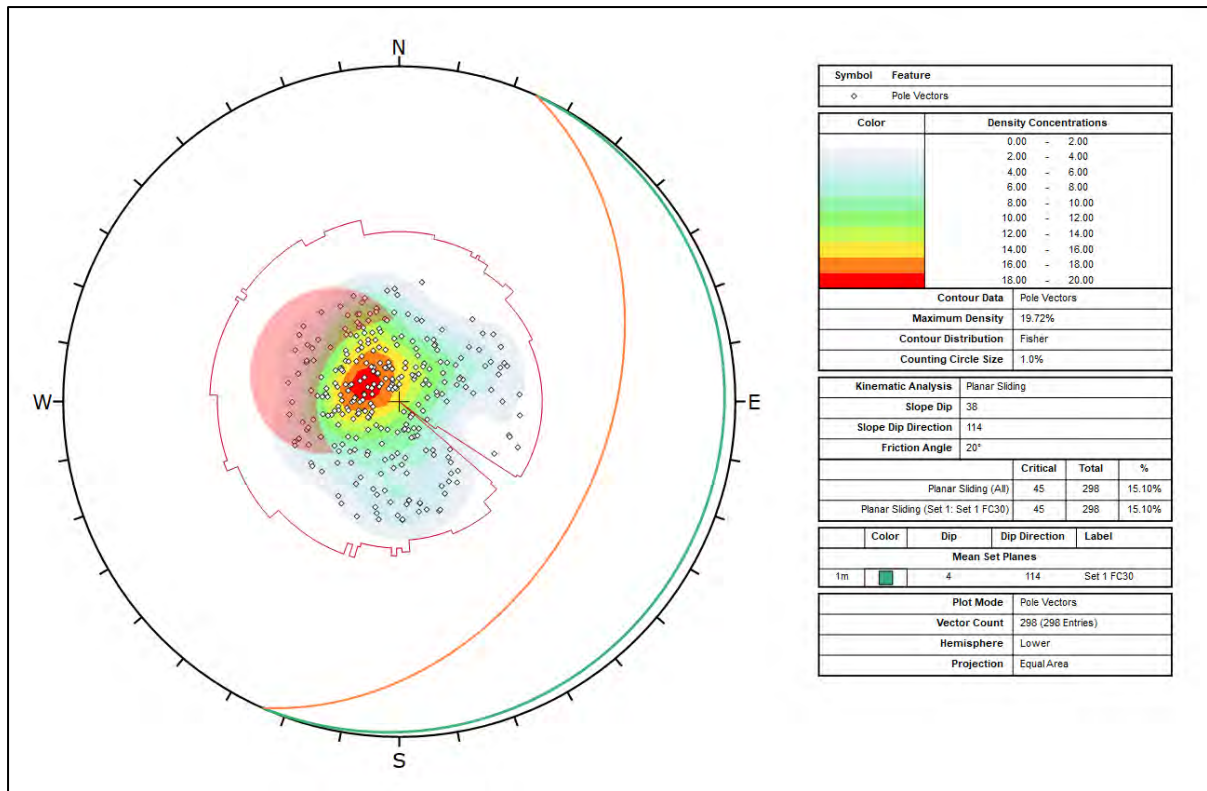


Figure: C167 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

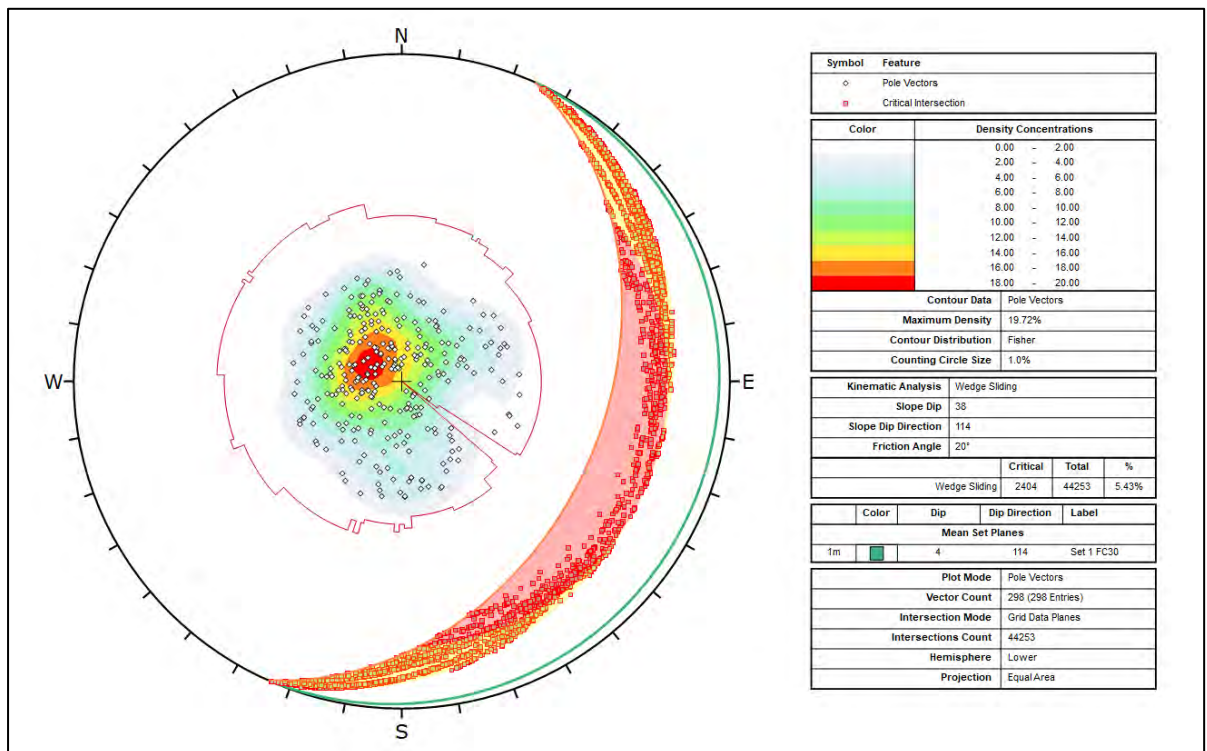


Figure: C168 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Overall Slope) – Wedge Sliding.

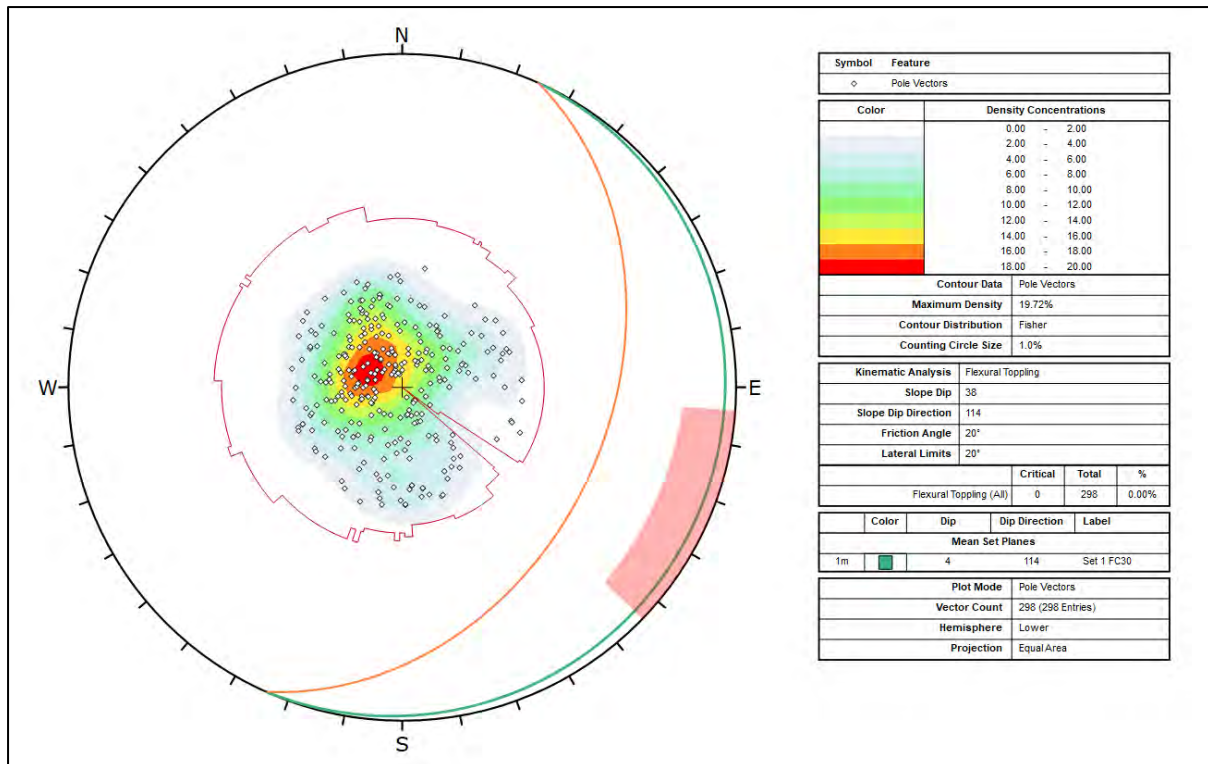


Figure: C169 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Overall Slope) – Flexural Toppling.

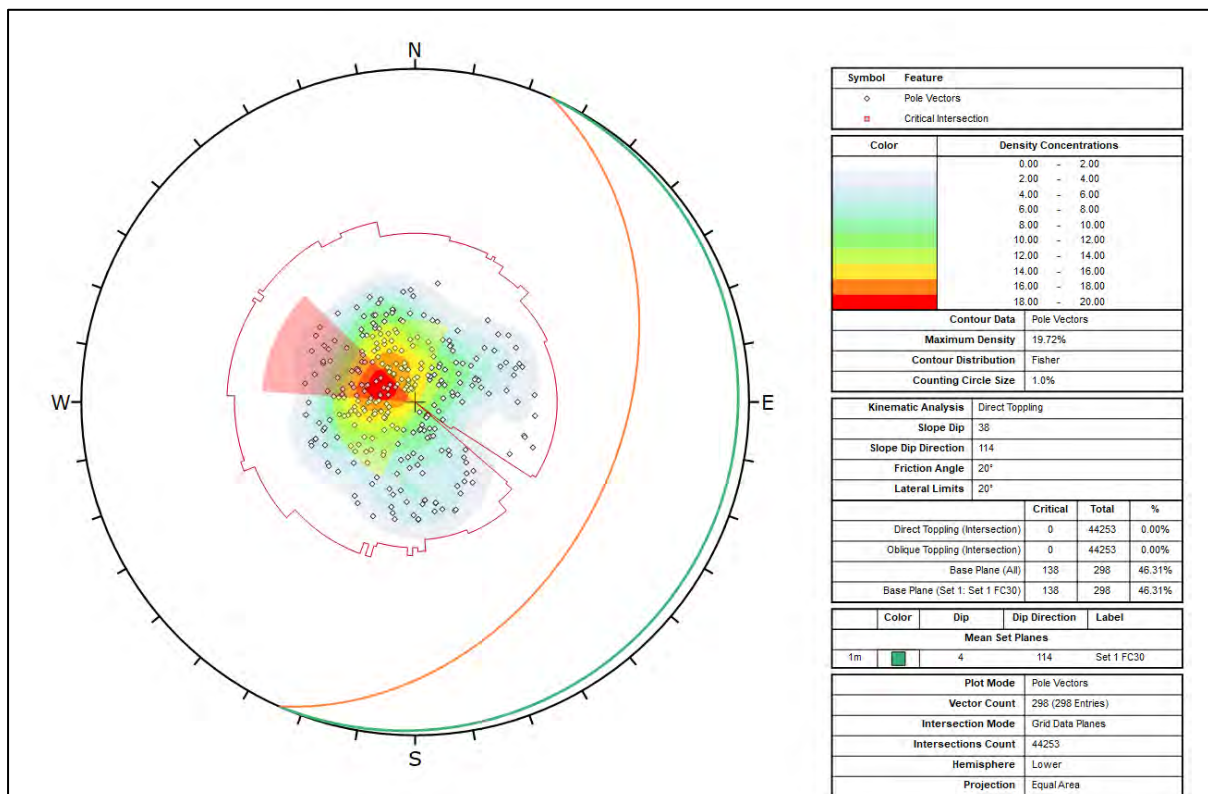


Figure: C170 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3- Fracture <30° - Overall Slope

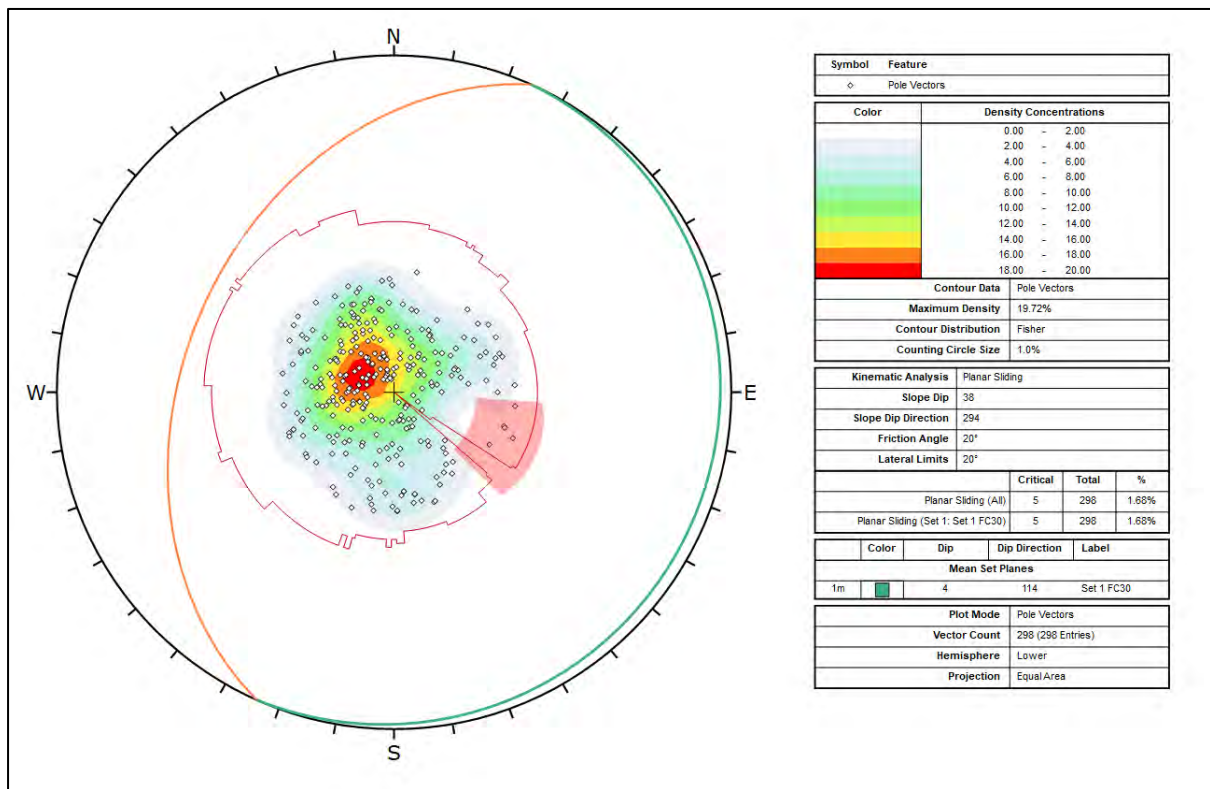


Figure: C171 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Overall Slope) – Planar Sliding.

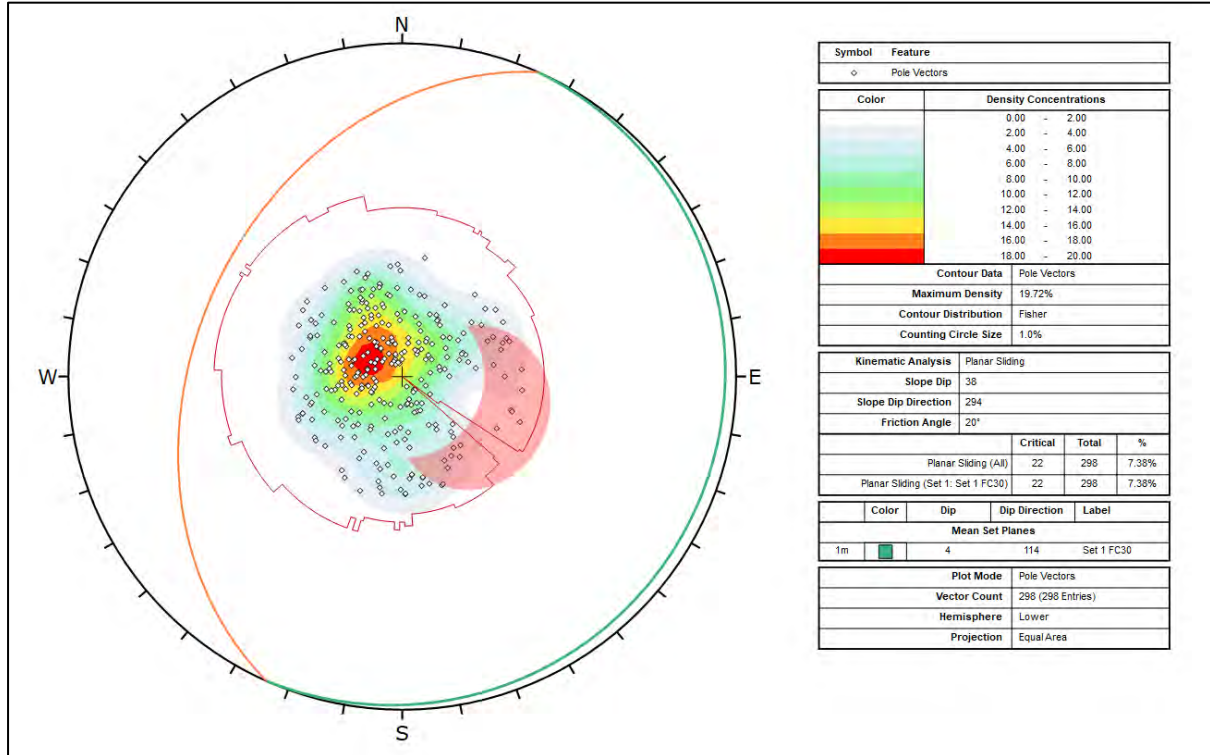


Figure: C172 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Overall Slope) – Planar Sliding (No Limits).

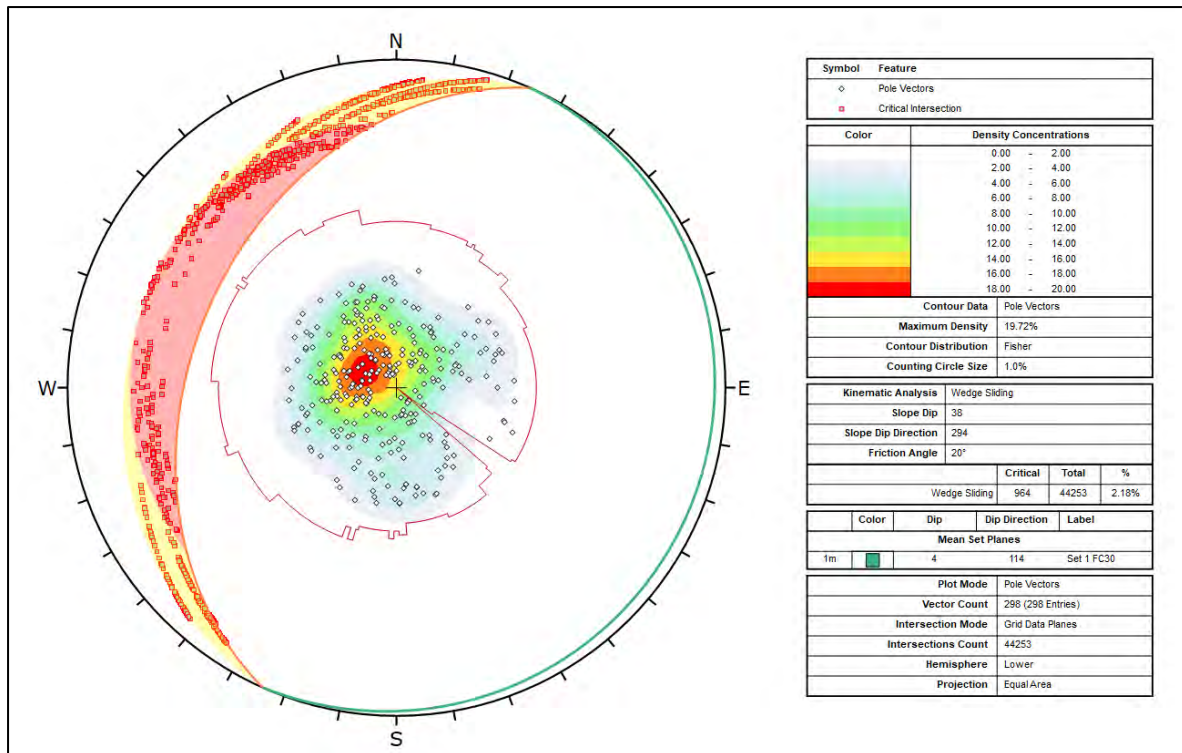


Figure: C173 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Overall Slope) – Wedge Sliding.

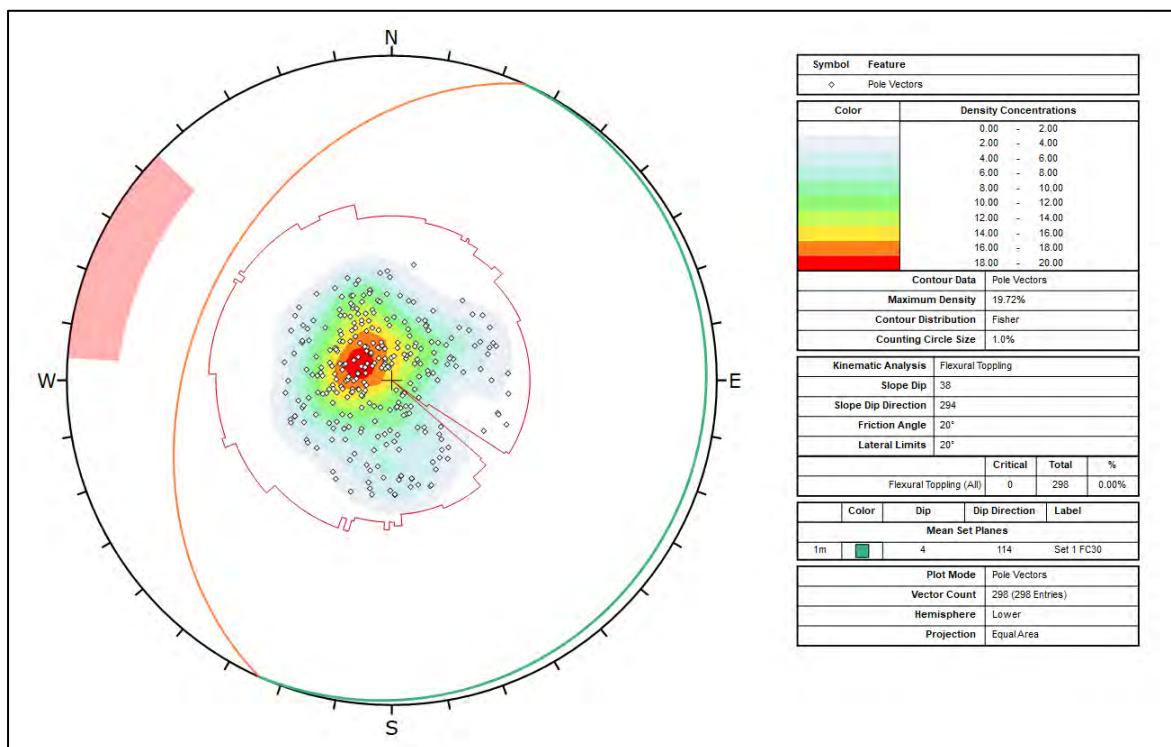


Figure: C174 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Overall Slope) – Flexural Toppling.

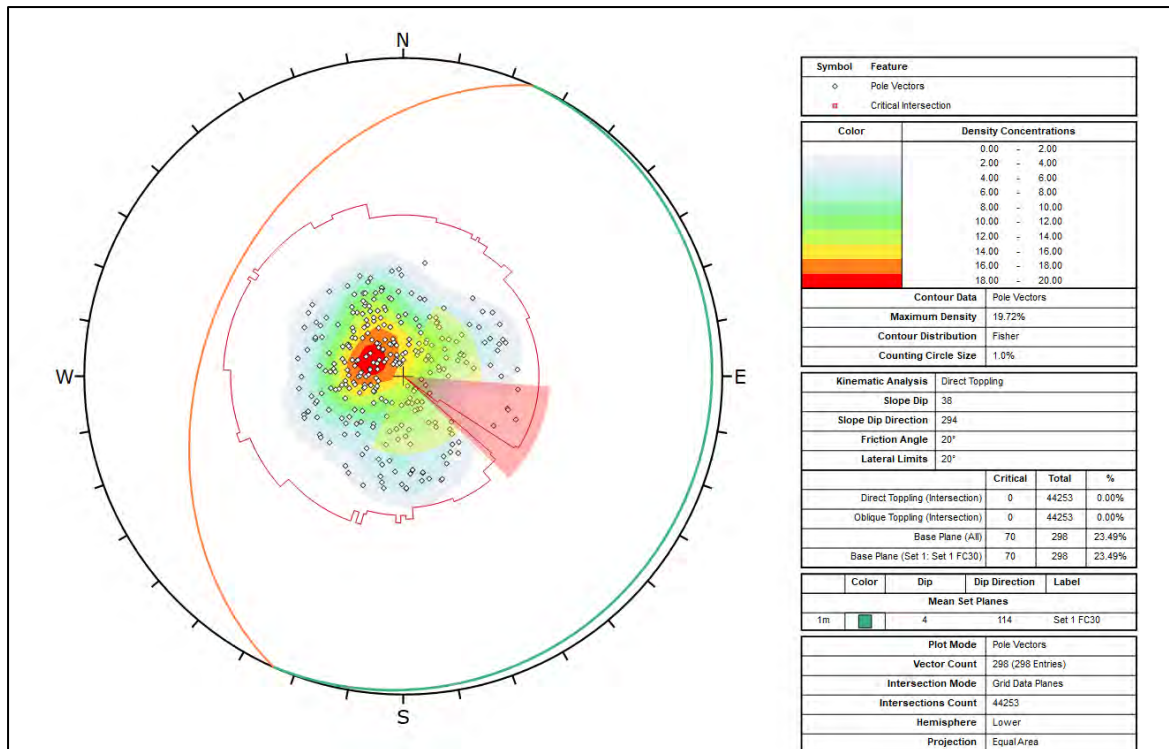


Figure: C175 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Overall Slope) – Direct Toppling.

Highwall 4 – Fracture <30° - Overall Slope

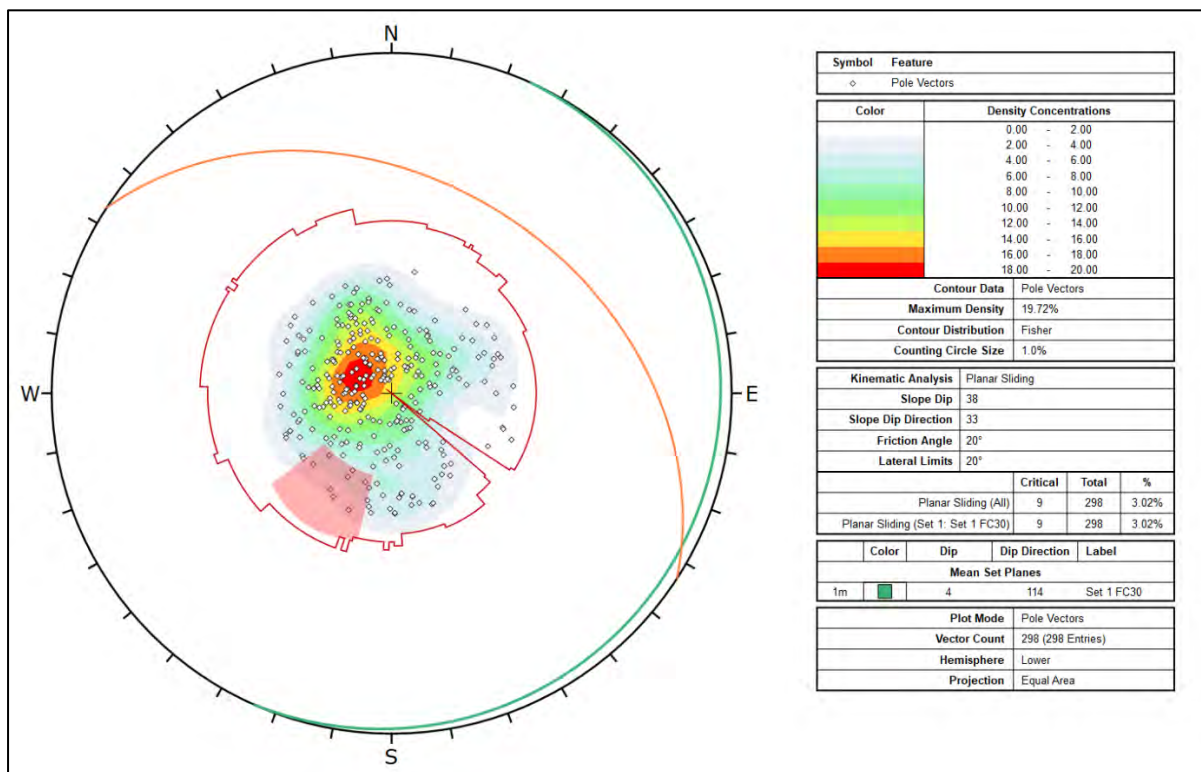


Figure: C176 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Overall Slope) – Planar Sliding.

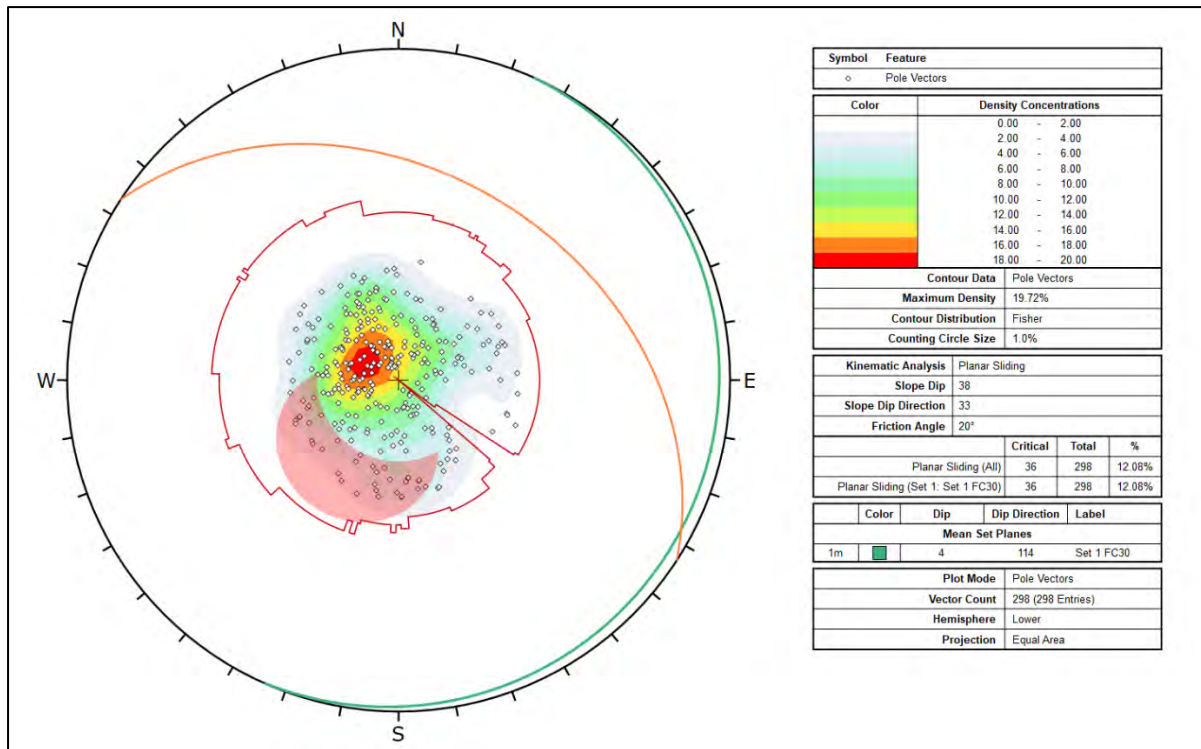


Figure: C177 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Overall Slope) – Planar Sliding (No Limits).

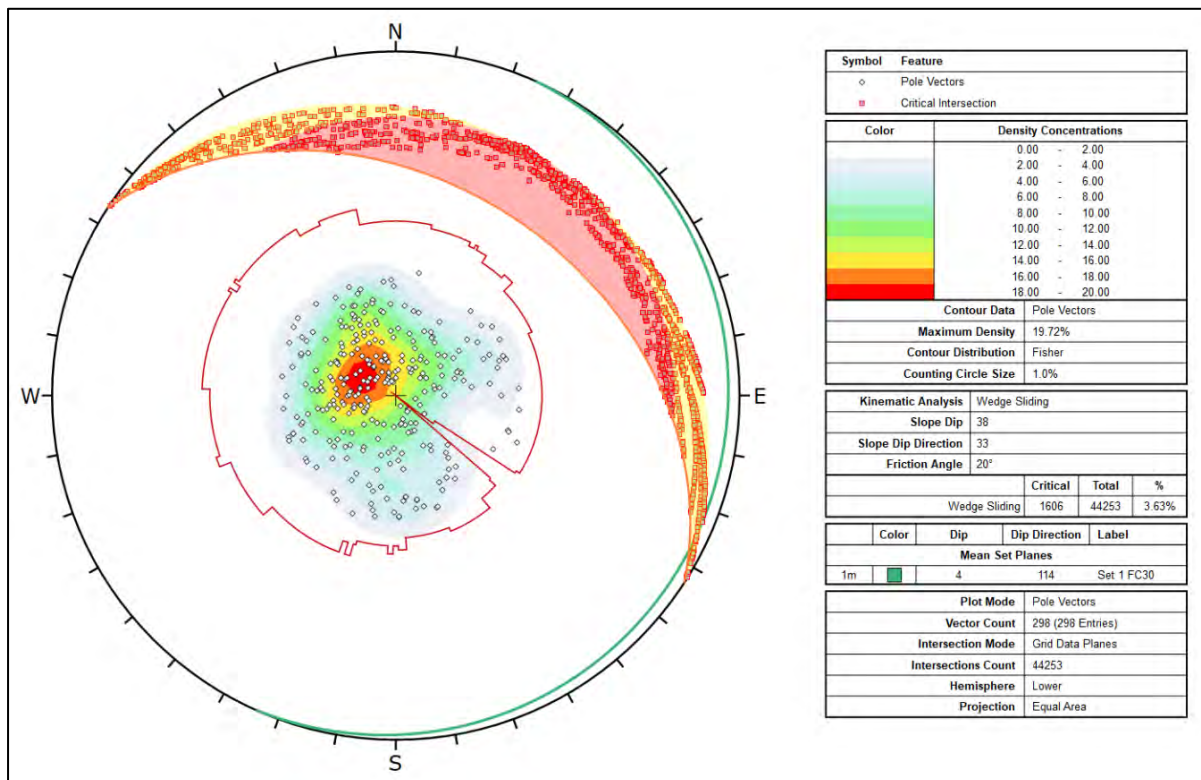


Figure: C178 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Overall Slope) – Wedge Sliding.

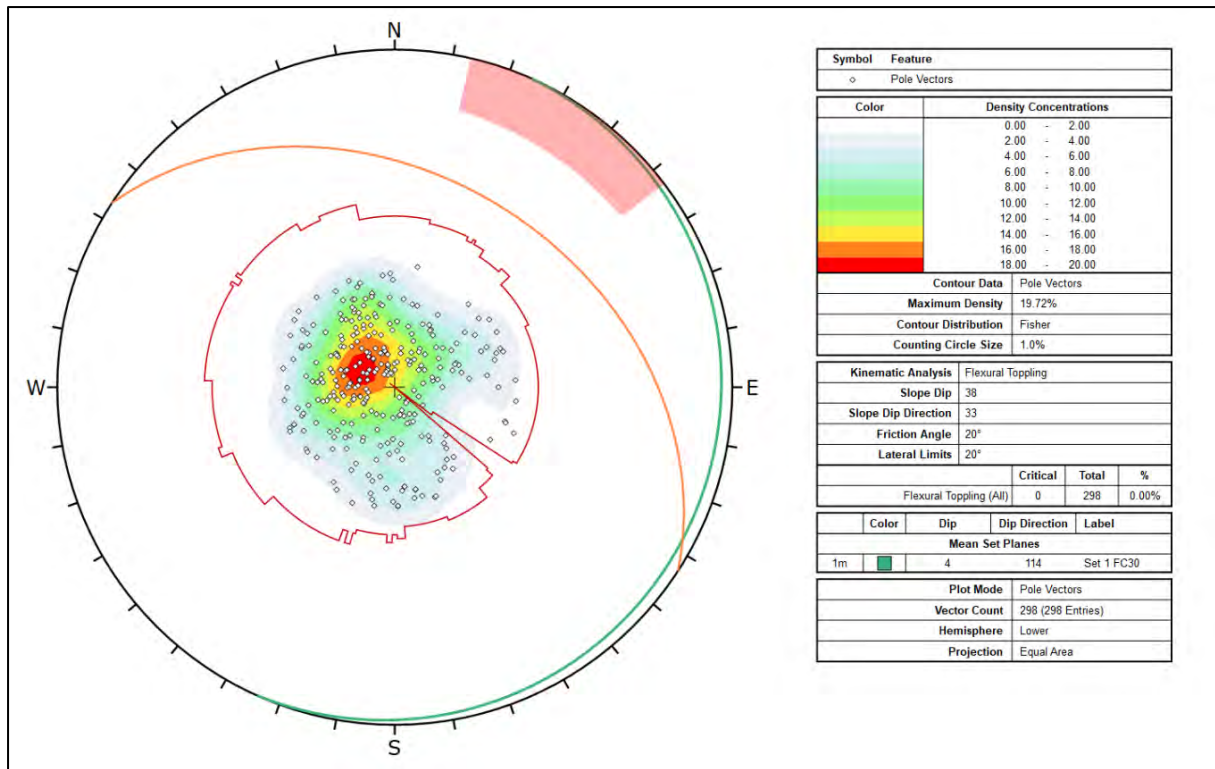


Figure: C179 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Overall Slope) – Flexural Toppling.

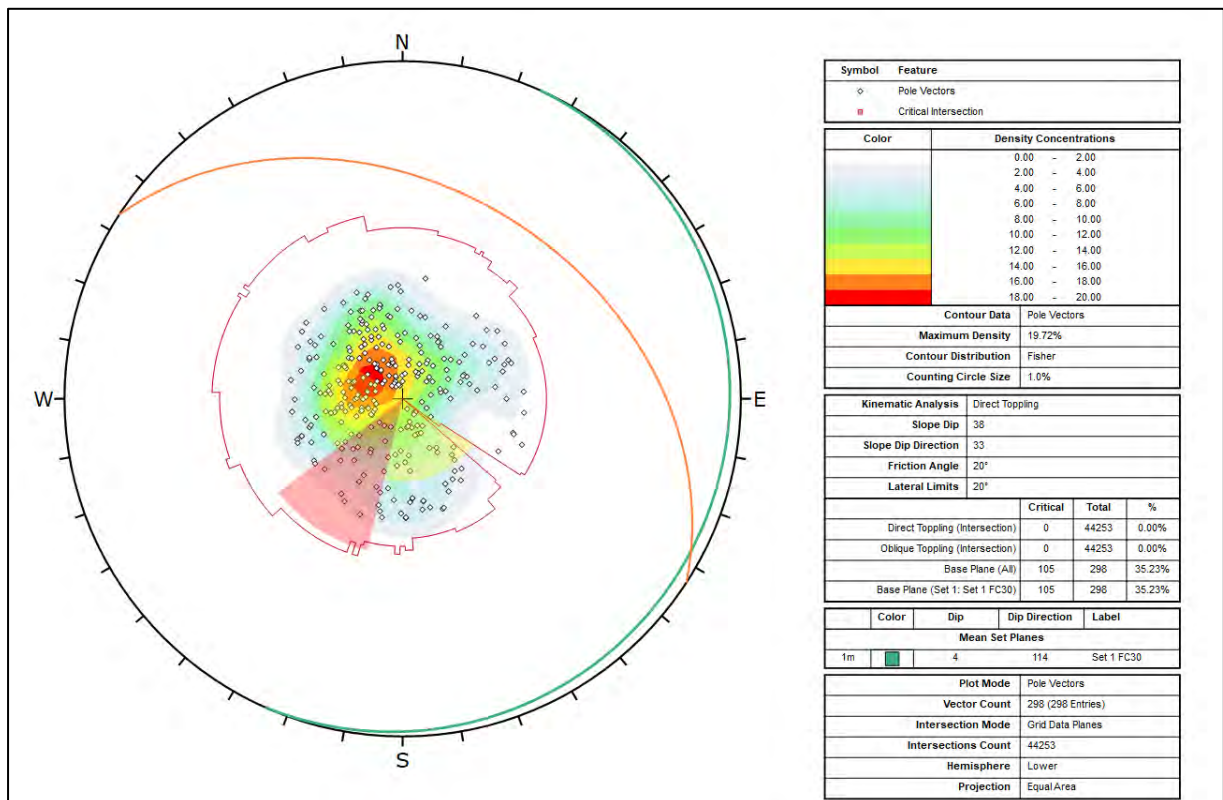


Figure: C180 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Overall Slope) – Direct Toppling.

Highwall 1 – Fracture <30° - Bench Slope

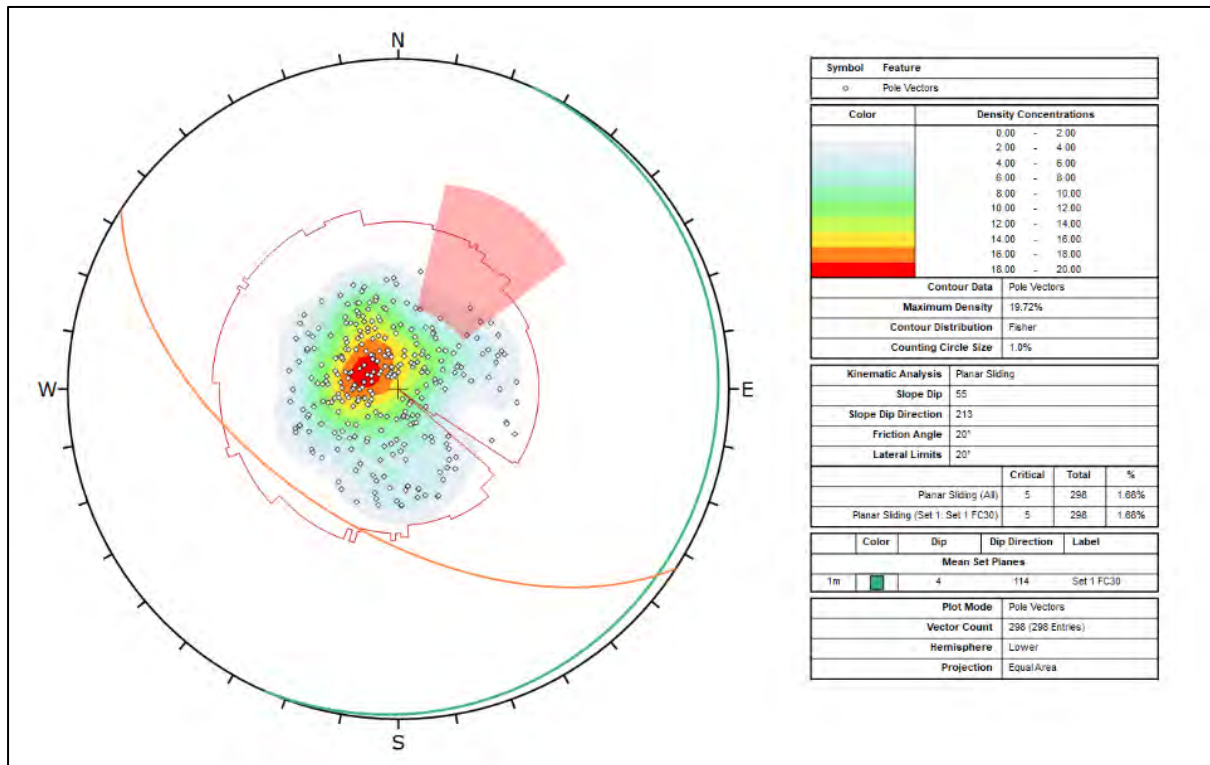


Figure: C181 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Bench Slope) – Planar Sliding.

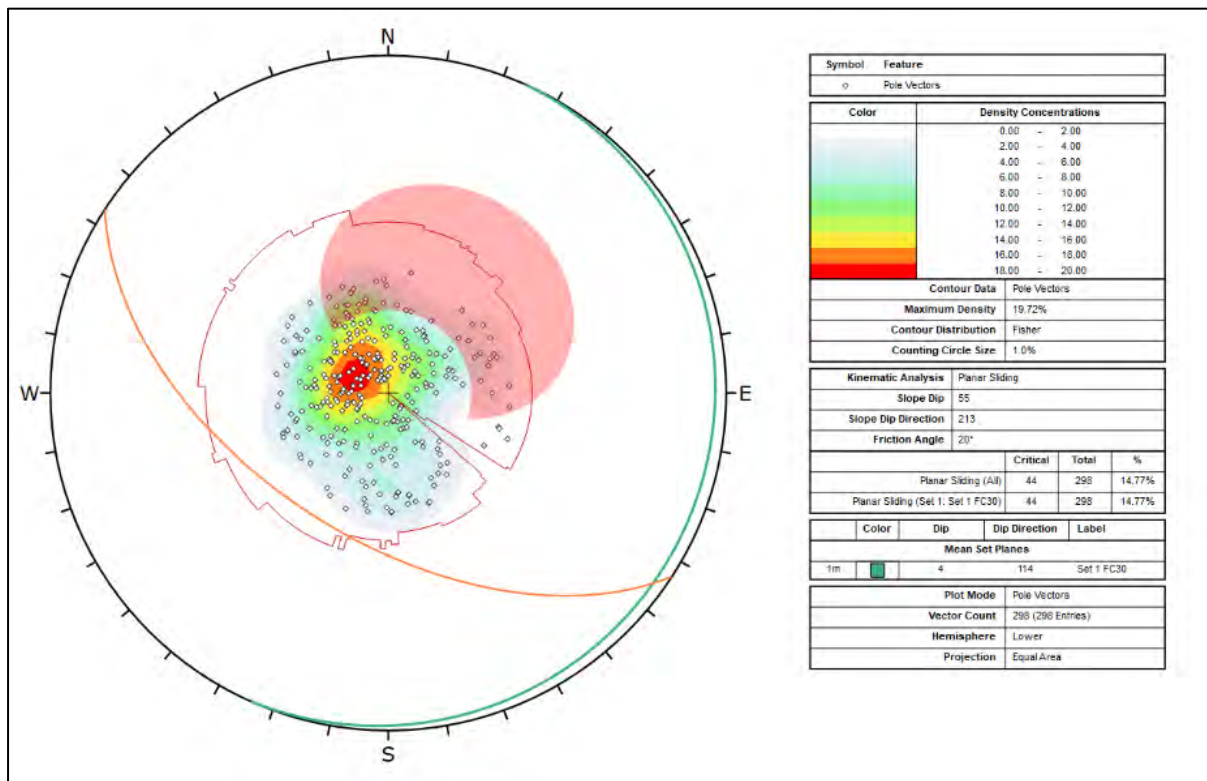


Figure: C182 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Bench Slope) – Planar Sliding (No Limits).

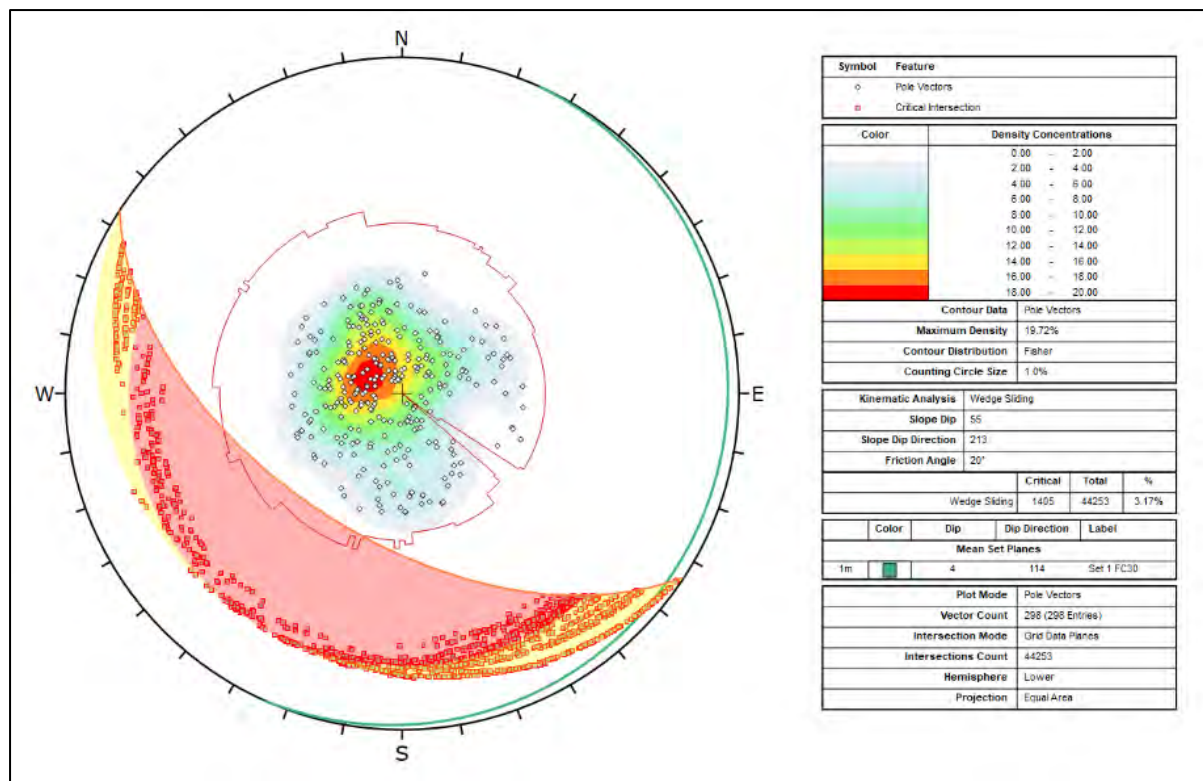


Figure: C183 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Bench Slope) – Wedge Sliding.

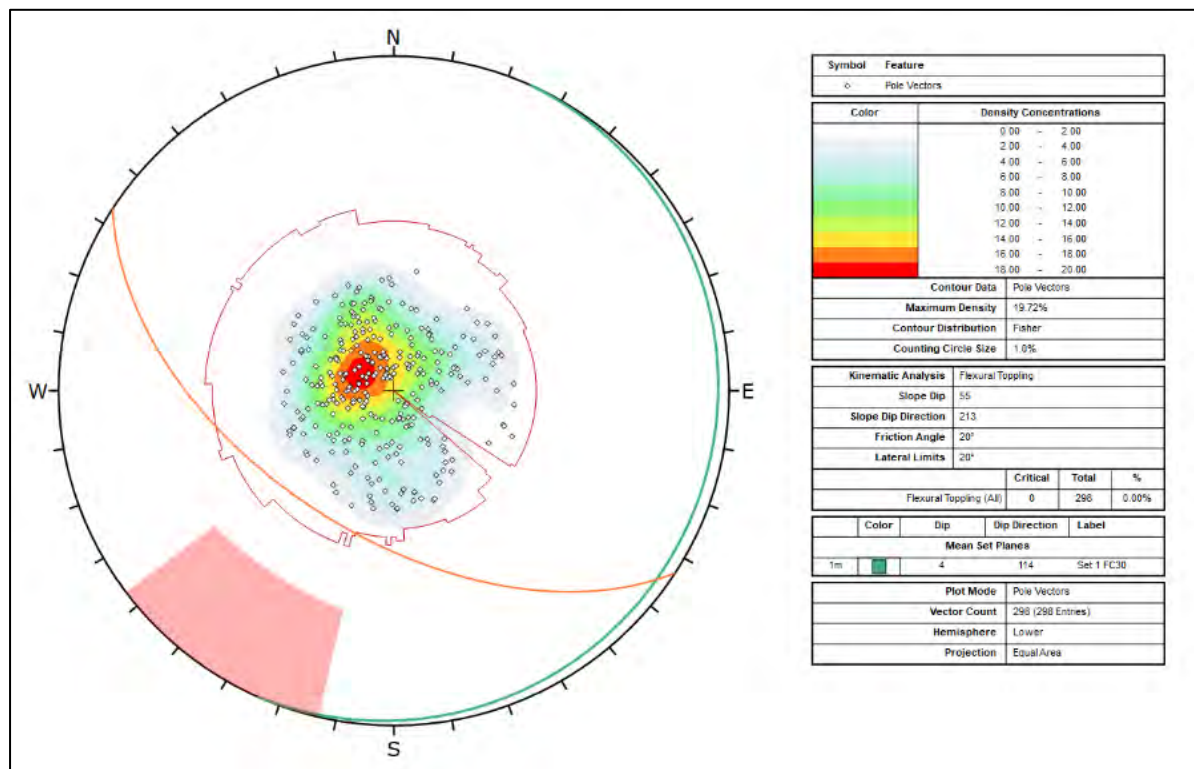


Figure: C184 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Bench Slope) – Flexural Topple.

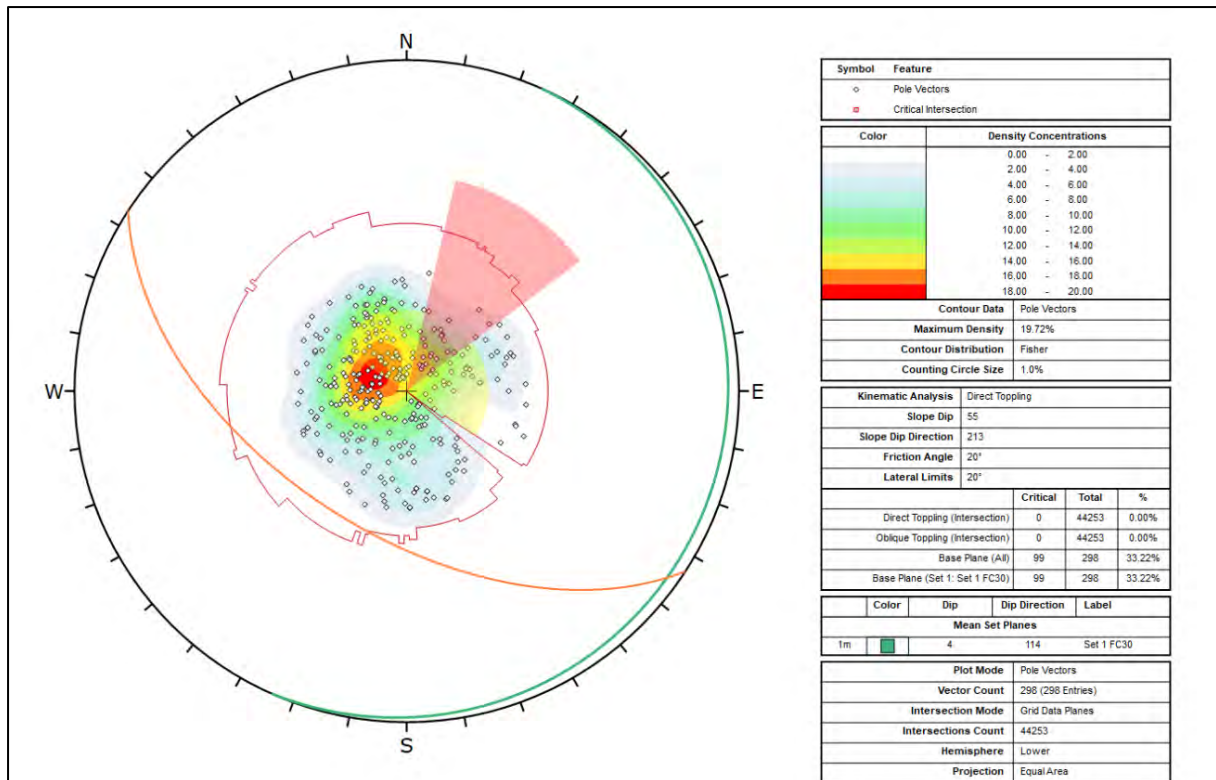


Figure: C185 - Kinematic Analysis (Fracture <30°) - Highwall 1 (Bench Slope) – Direct Topple.

Highwall 2 – Fracture <30° - Bench Slope

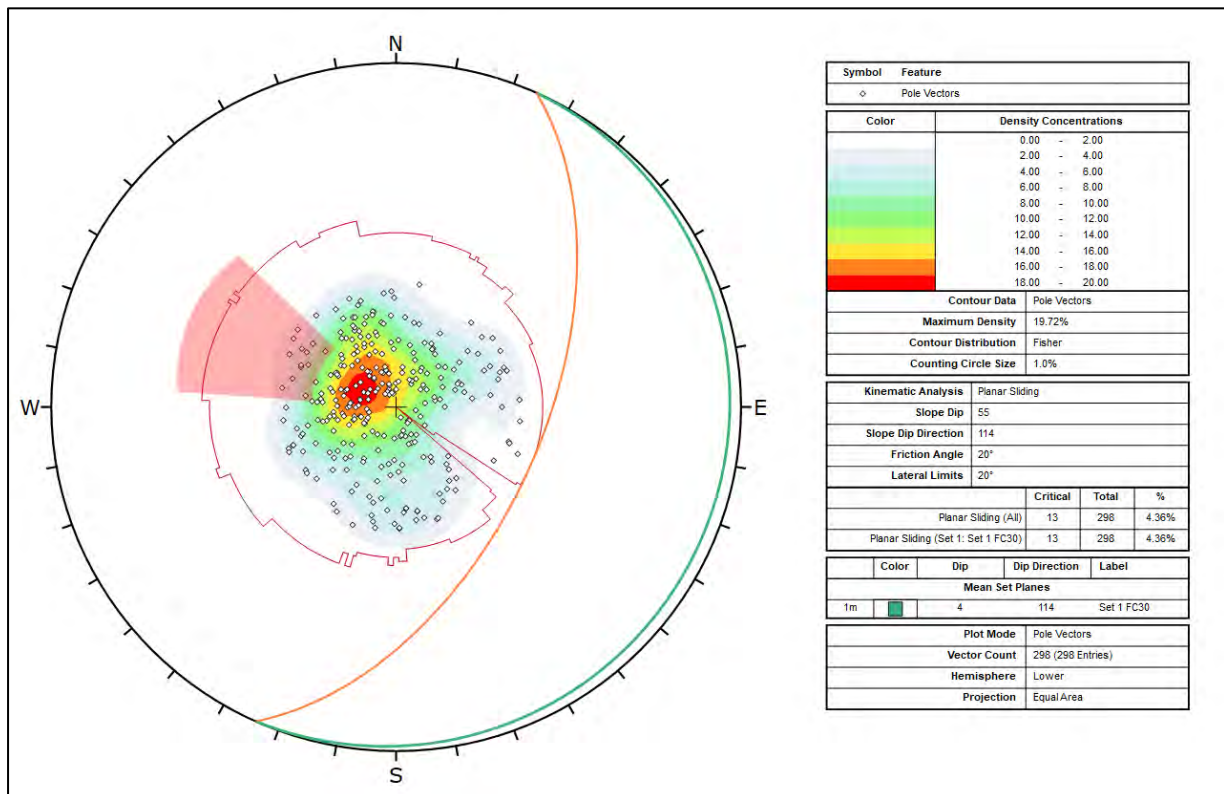


Figure: C186 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Bench Slope) – Planar Sliding.

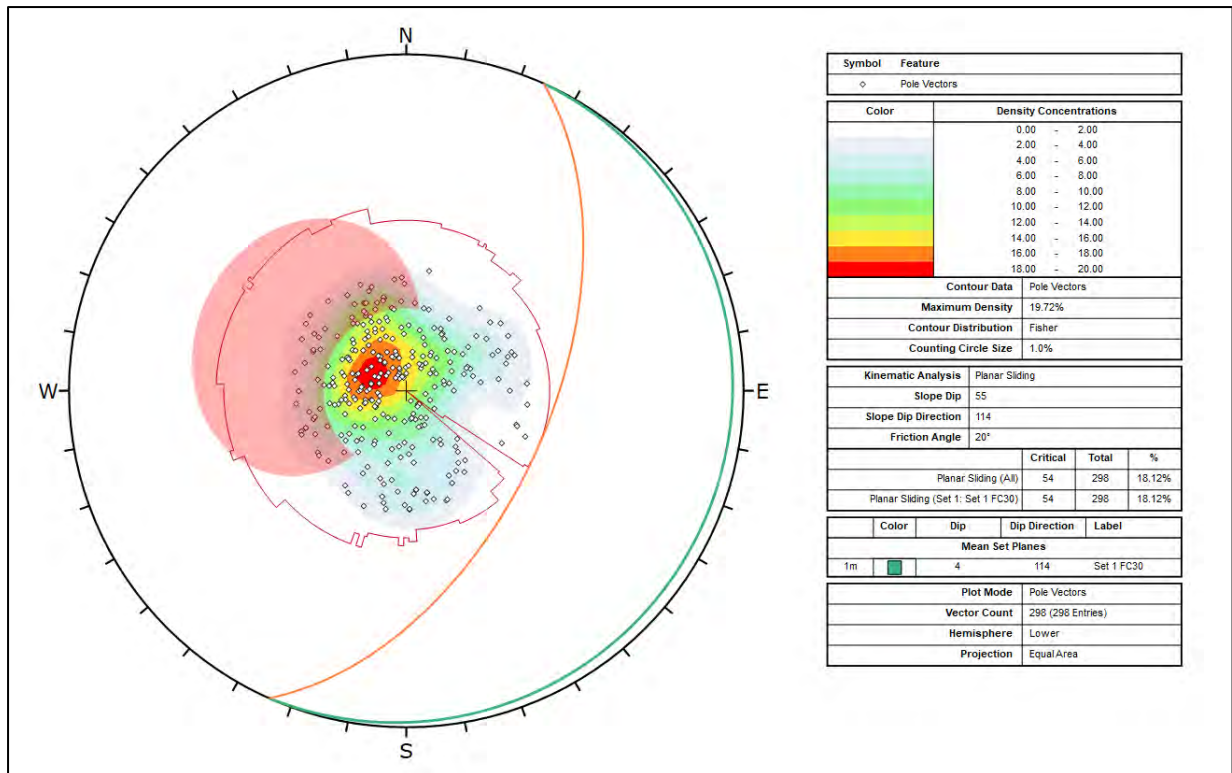


Figure: C187 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Bench Slope) – Planar Sliding (No Limits).

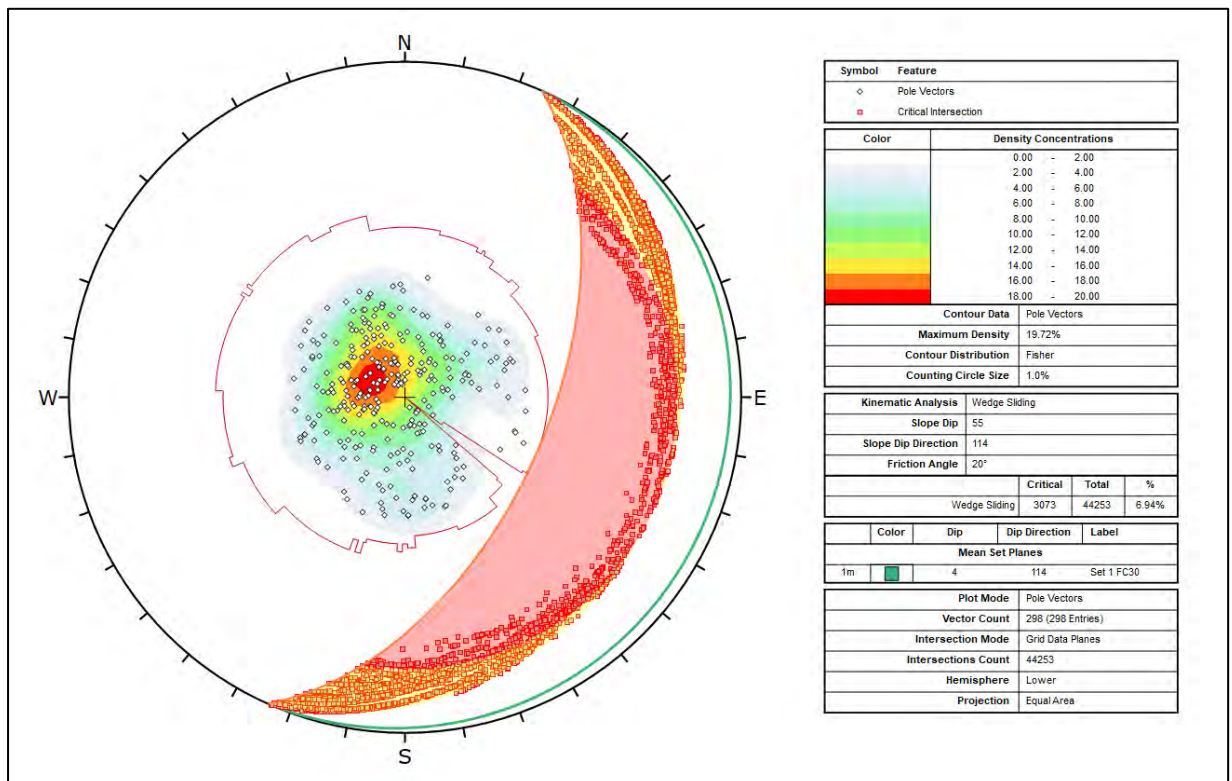


Figure: C188 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Bench Slope) – Wedge Sliding.

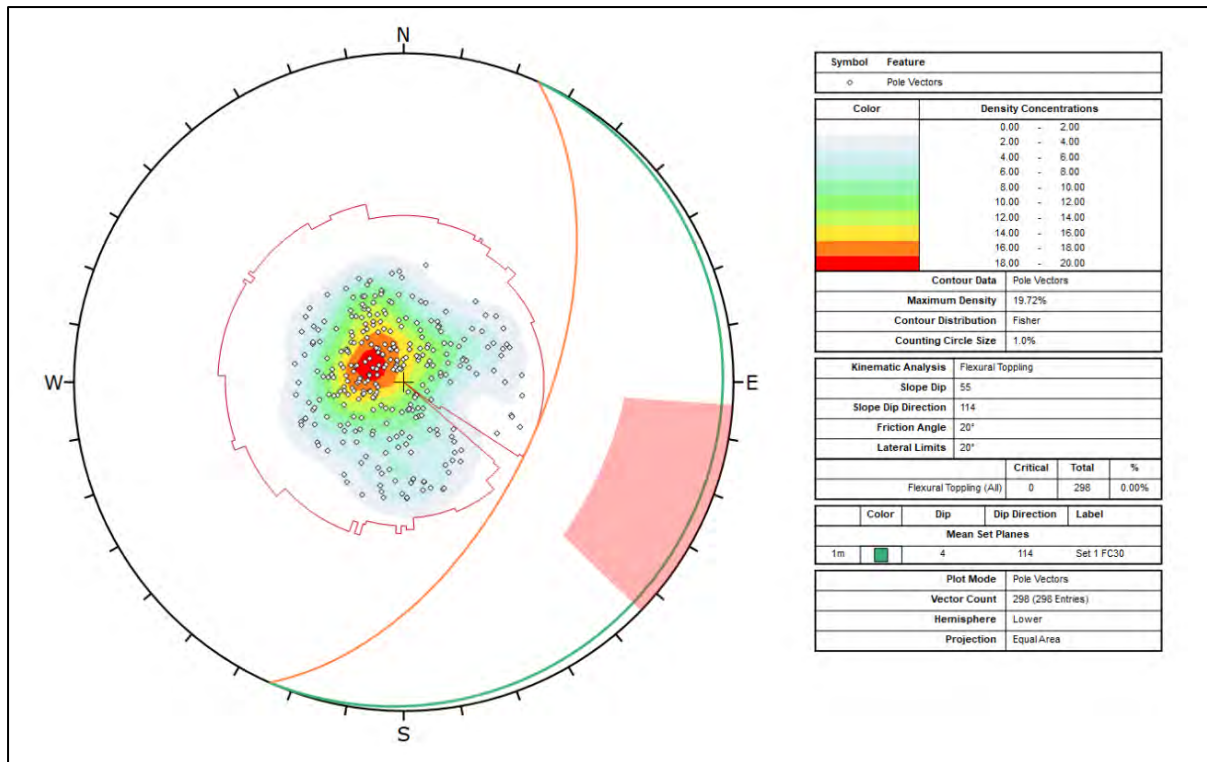


Figure: C189 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Bench Slope) – Flexural Toppling.

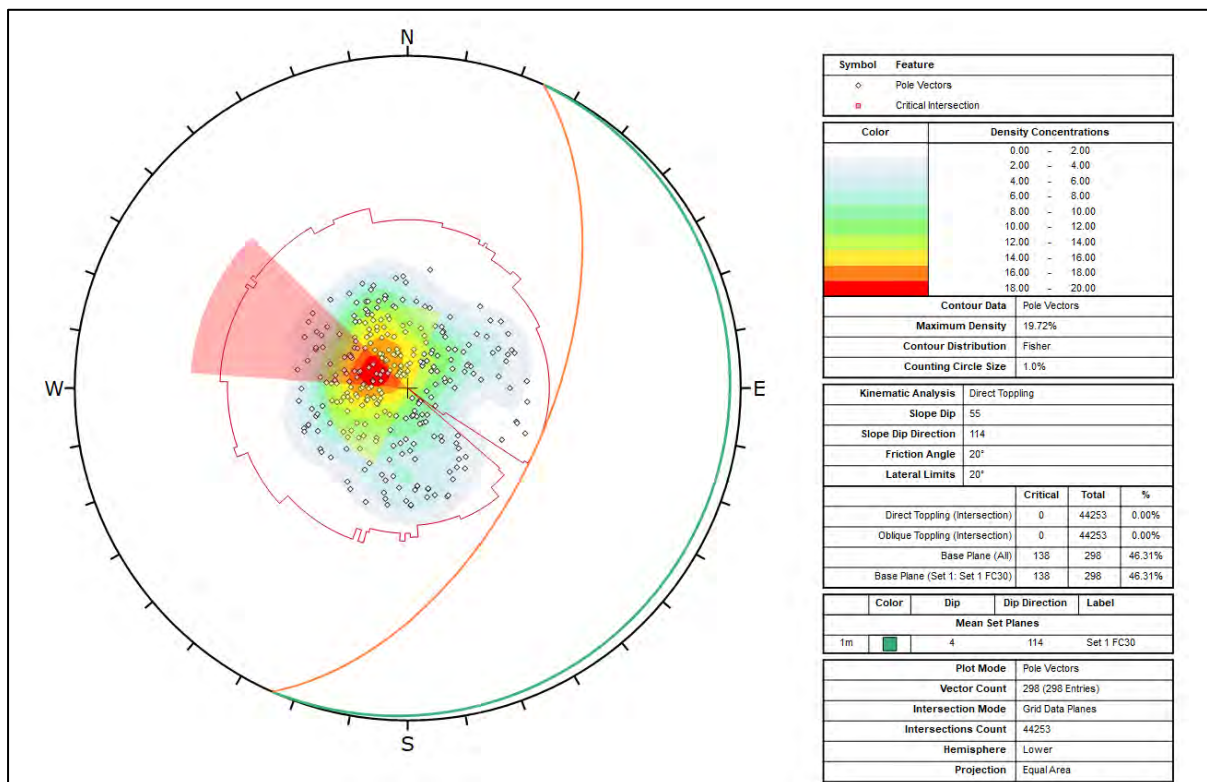


Figure: C190 - Kinematic Analysis (Fracture <30°) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – Fracture <30° - Bench Slope

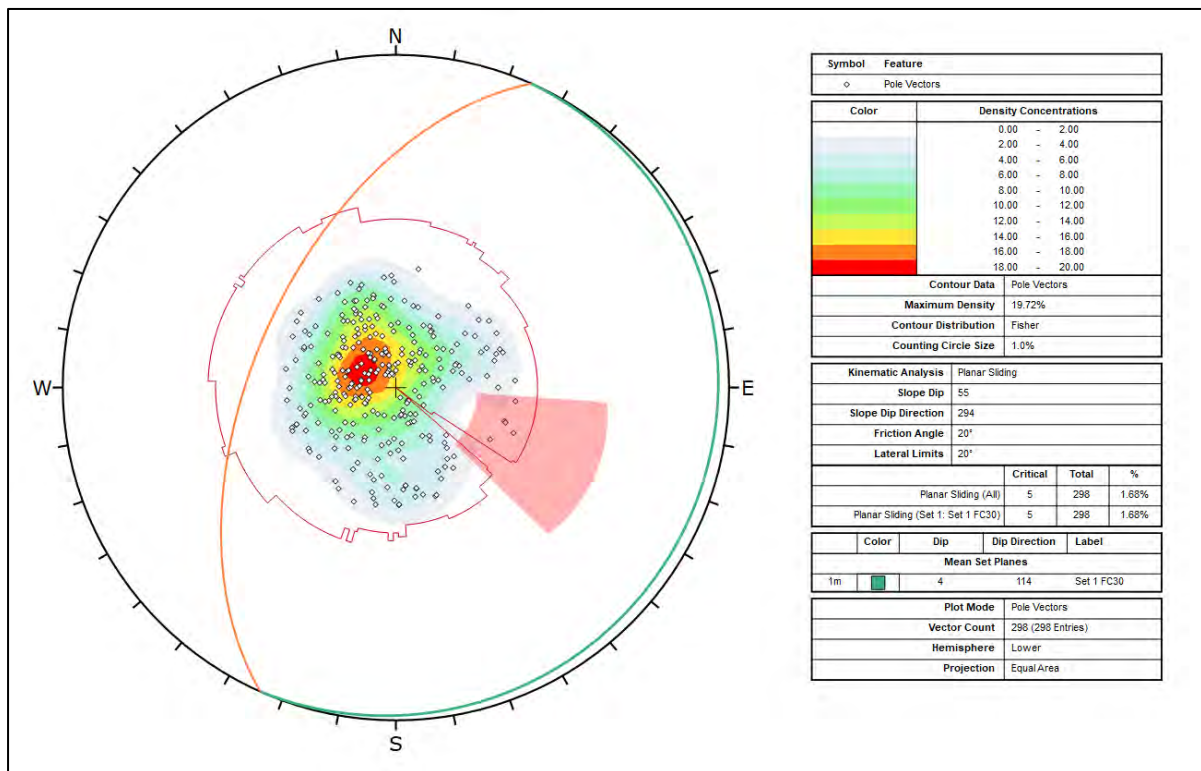


Figure: C191 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Bench Slope) – Planar Sliding.

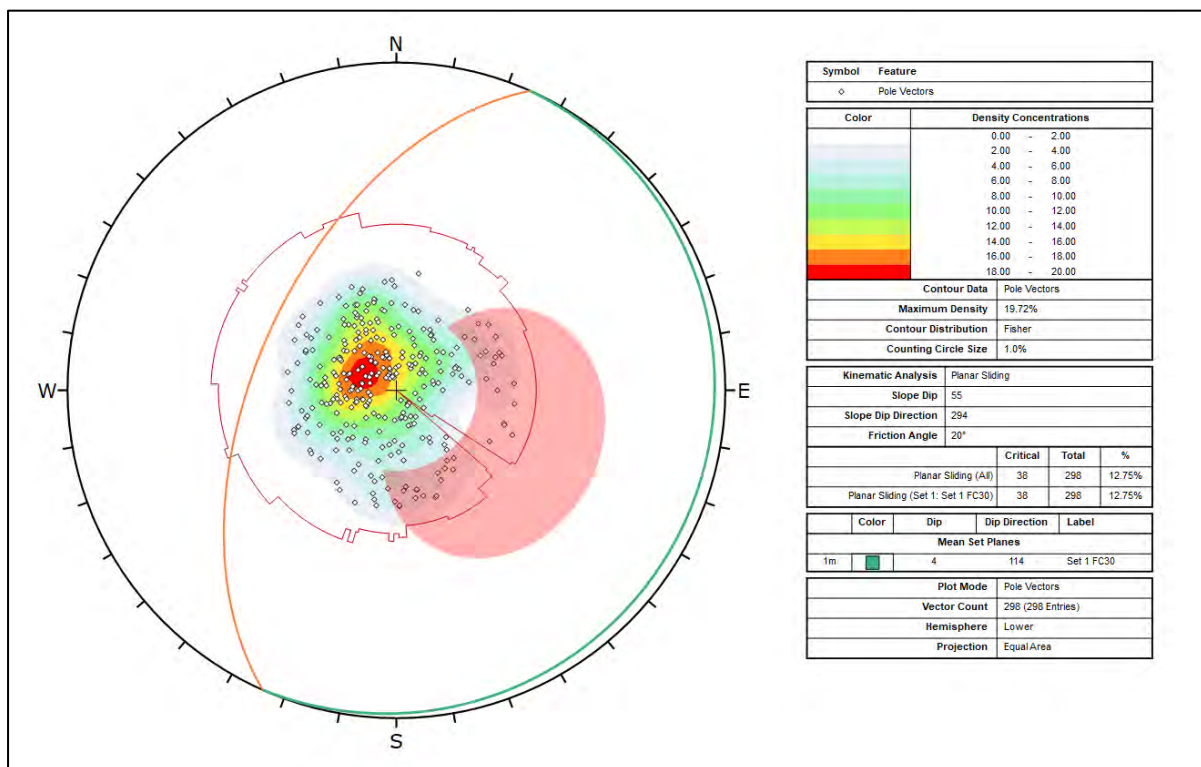


Figure: C192 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

Symbol	Feature
o	Pole Vectors

Color	Density Concentrations
	0.00 ~ 2.00
	2.00 ~ 4.00
	4.00 ~ 6.00
	6.00 ~ 8.00
	8.00 ~ 10.00
	10.00 ~ 12.00
	12.00 ~ 14.00
	14.00 ~ 16.00
	16.00 ~ 18.00
	18.00 ~ 20.00

Contour Data	Pole Vectors
Maximum Density	19.72%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexure/Topping
Slope Dip	55
Slope Dip Direction	294
Friction Angle	20°
Lateral Limits	20°

	Critical	Total	%
Flexural Topping (All)	0	298	0.00%

	Color	Dip	Dip Direction	Label
Mean Set Planes				
1m	[Green Box]	4	114	Set 1 FC30

Plot Mode	Pole Vectors
Vector Count	298 (298 Entries)
Hemisphere	Lower
Projection	Equal Area

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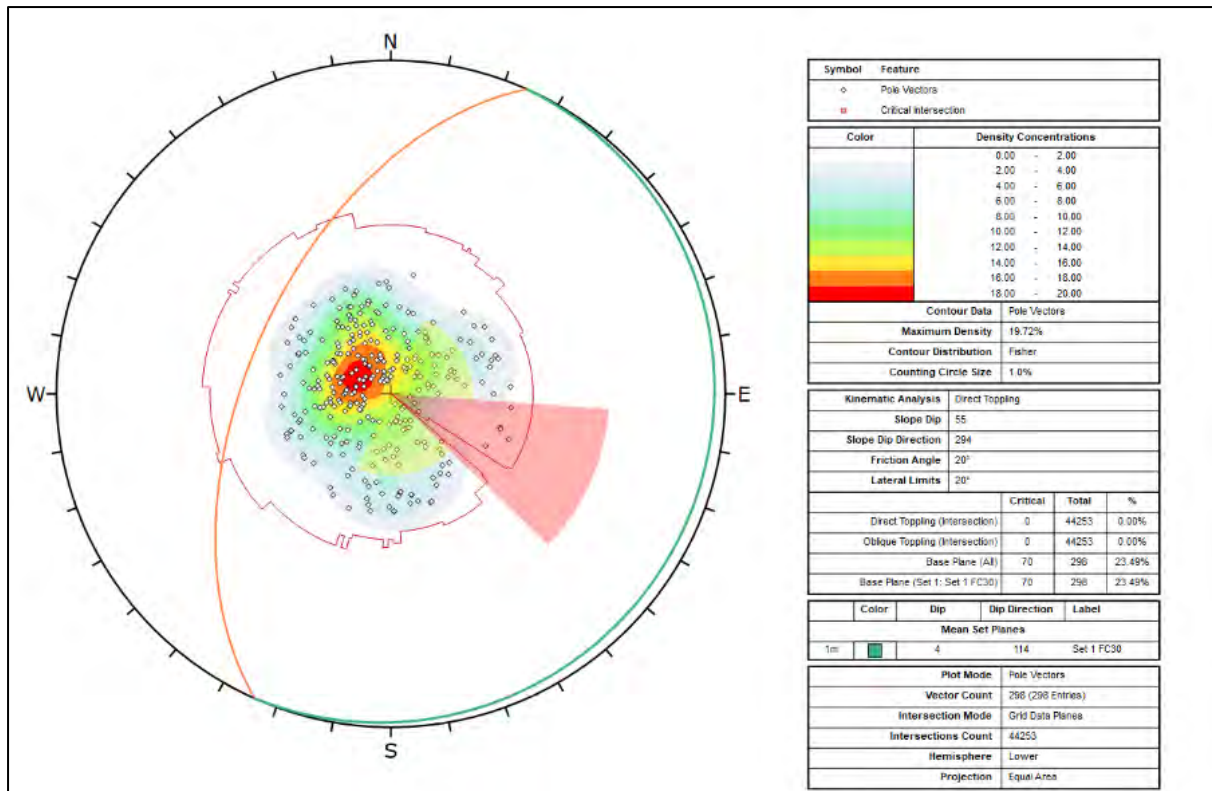


Figure: C195 - Kinematic Analysis (Fracture <30°) - Highwall 3 (Bench Slope) – Direct Toppling.

Highwall 4 – Fracture <30° - Bench Slope

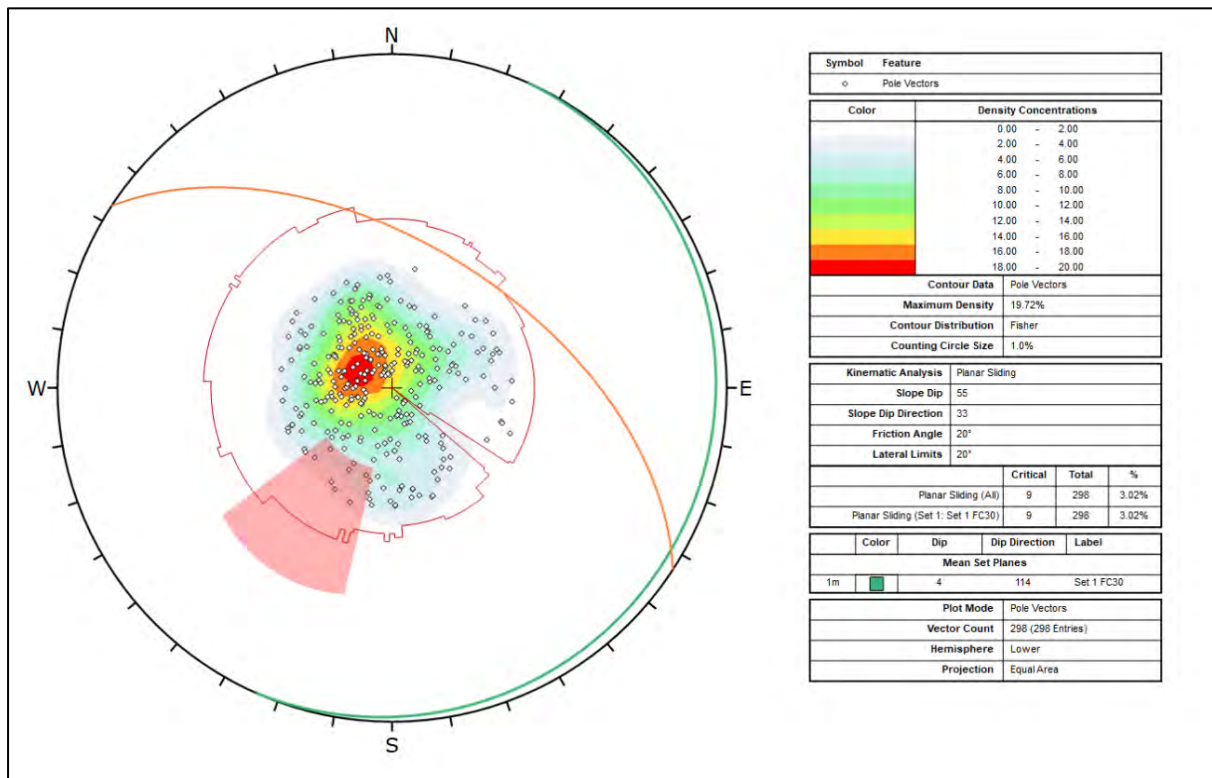


Figure: C196 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Bench Slope) – Planar Sliding.

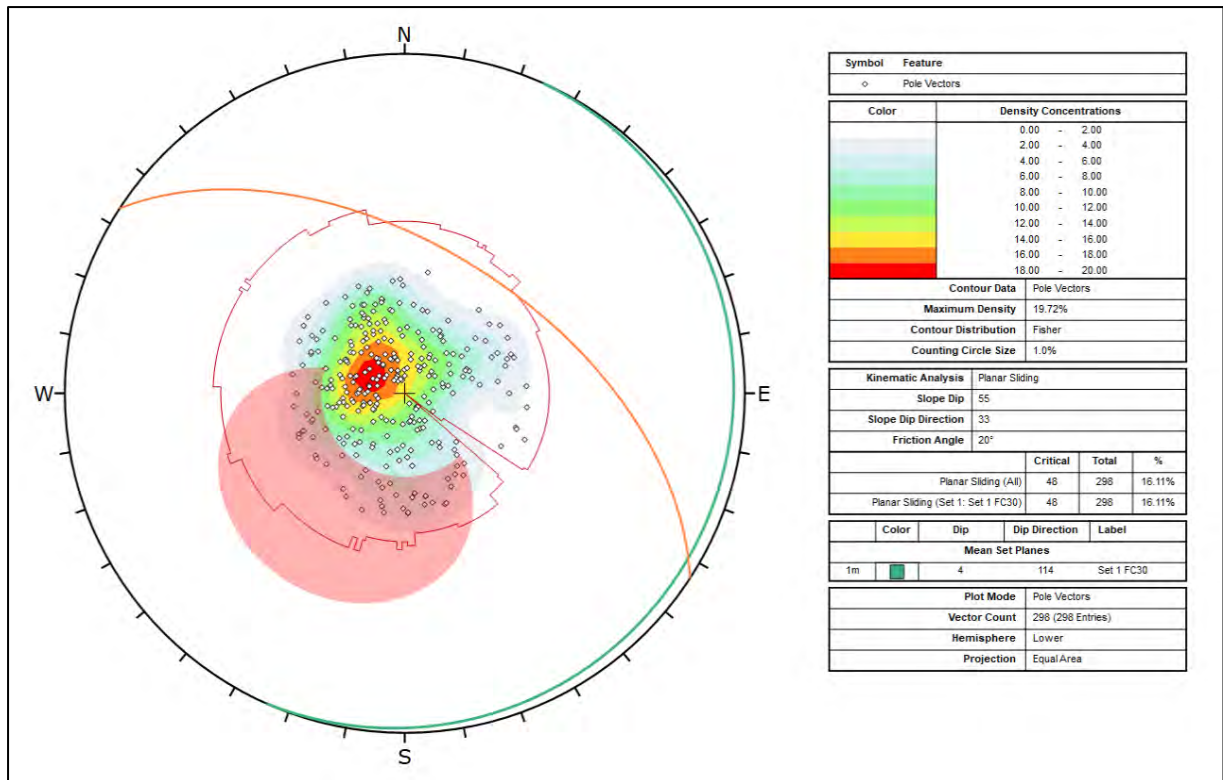


Figure: C197 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Bench Slope) – Planar Sliding (No Limits).

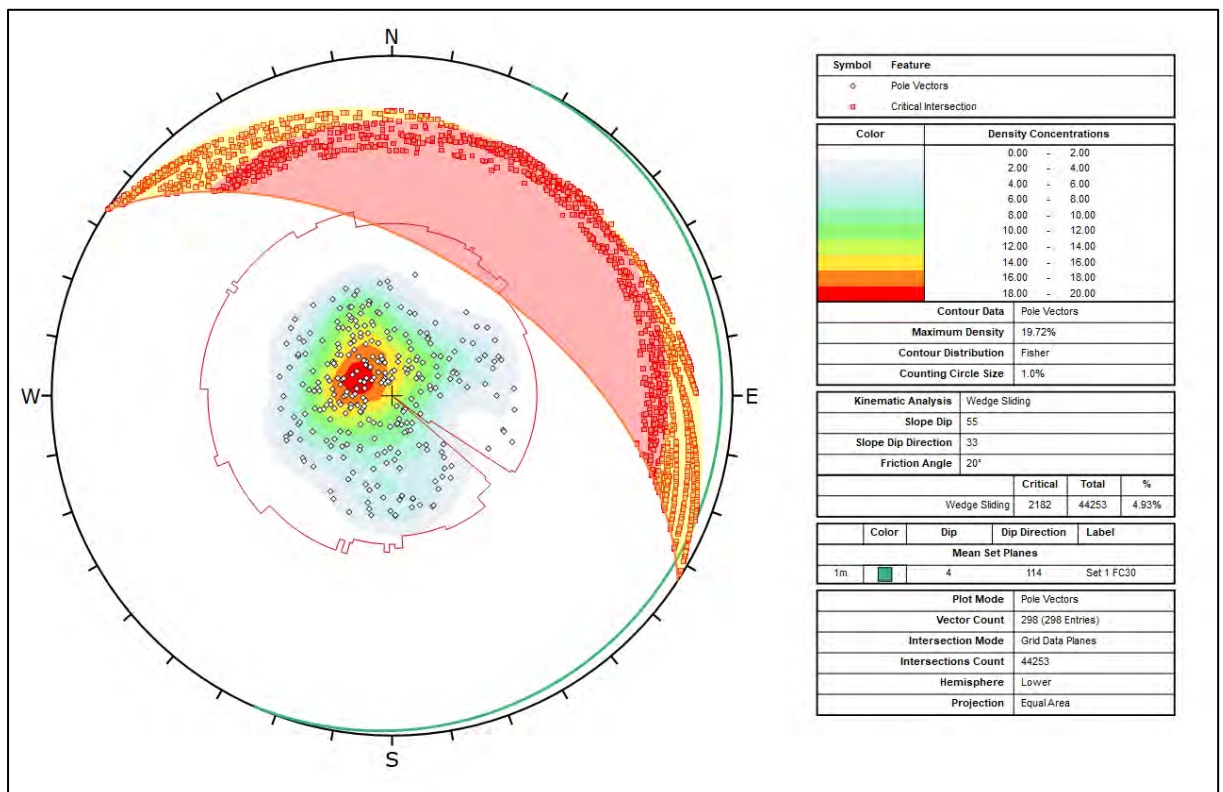


Figure: C198 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Bench Slope) – Wedge Sliding.

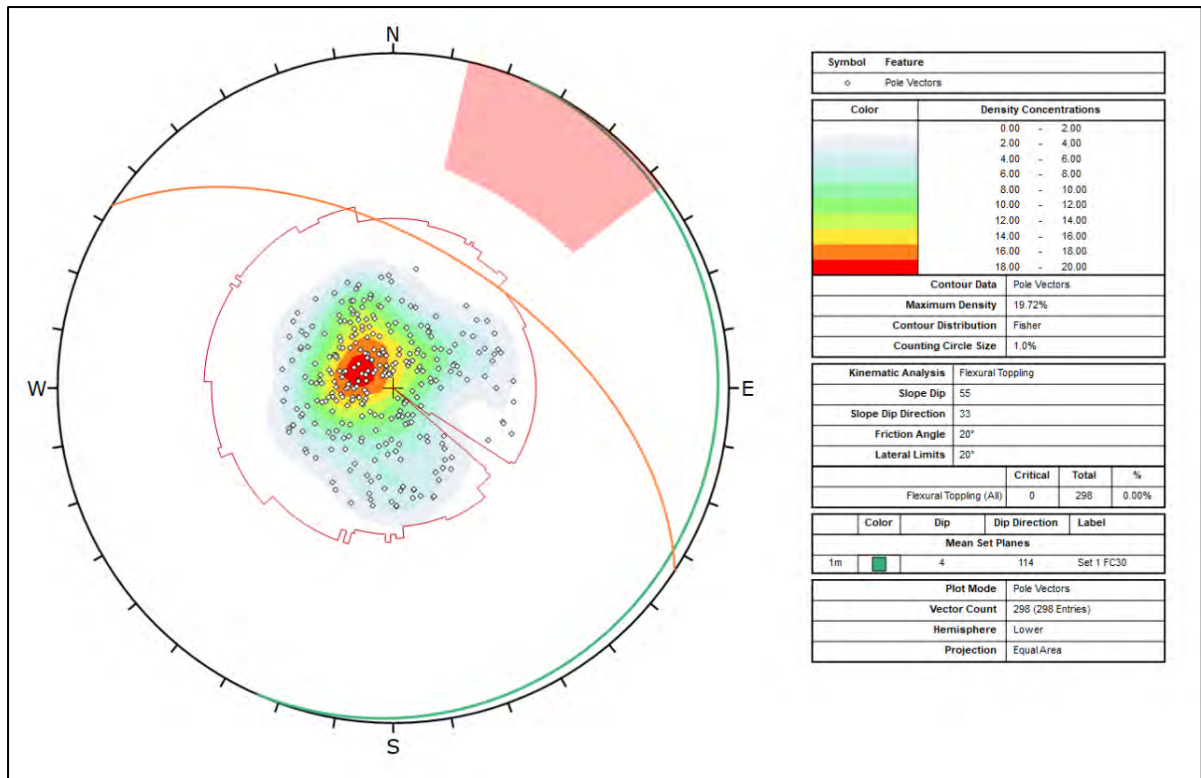


Figure: C199 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Bench Slope) – Flexural Toppling.

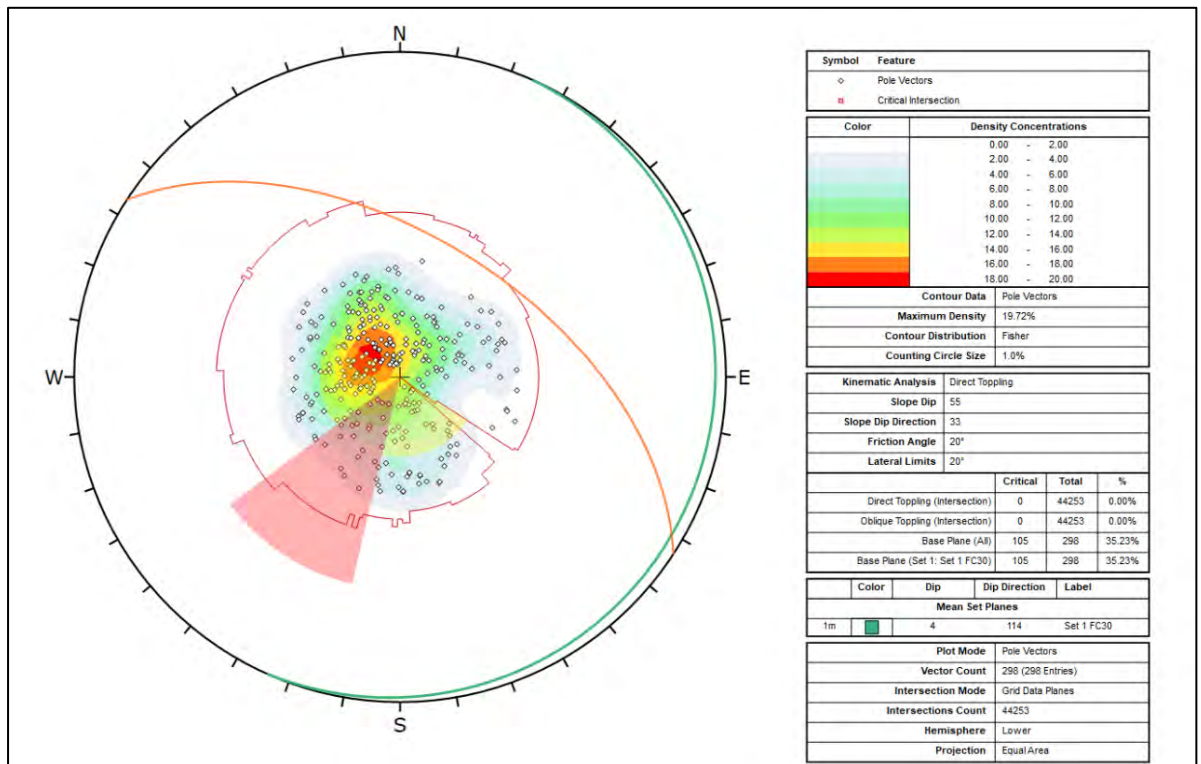


Figure: C200 - Kinematic Analysis (Fracture <30°) - Highwall 4 (Bench Slope) – Direct Toppling.

Highwall 1 – Fracture $>30^{\circ}$ $<60^{\circ}$ - Overall Slope

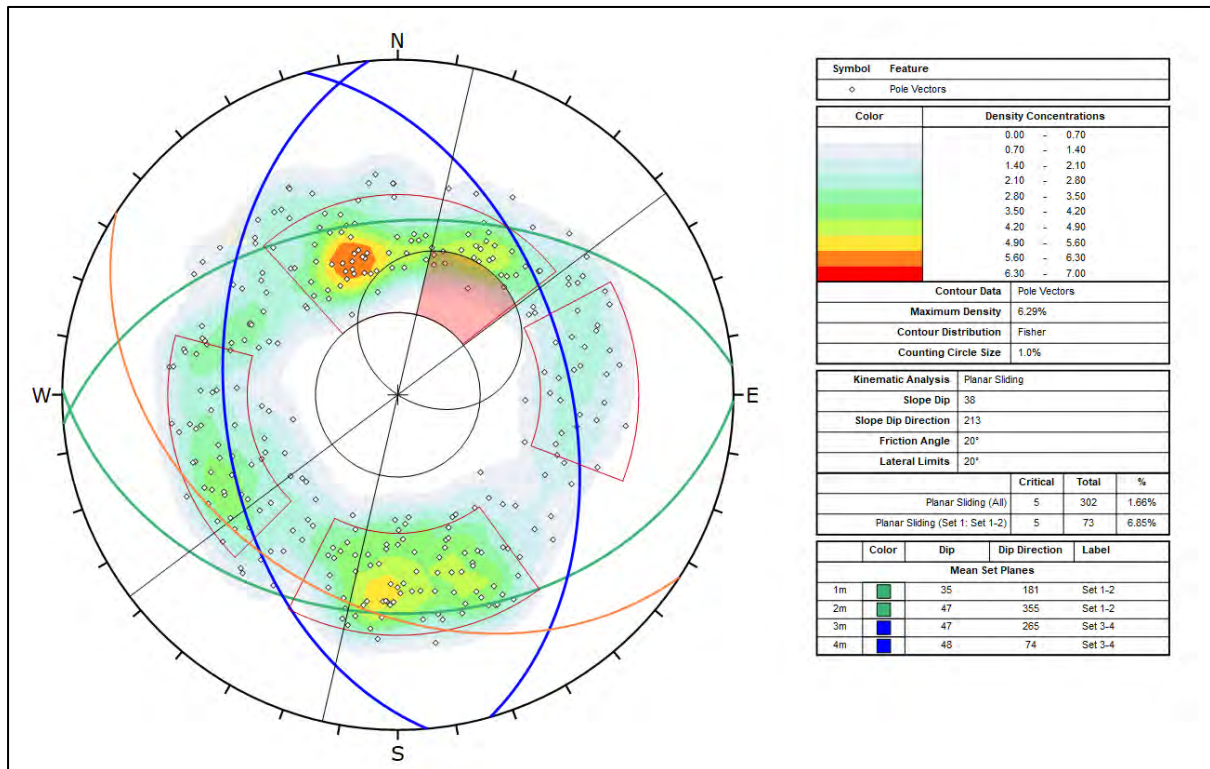


Figure: C201 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 1 (Overall Slope) – Planar Sliding.

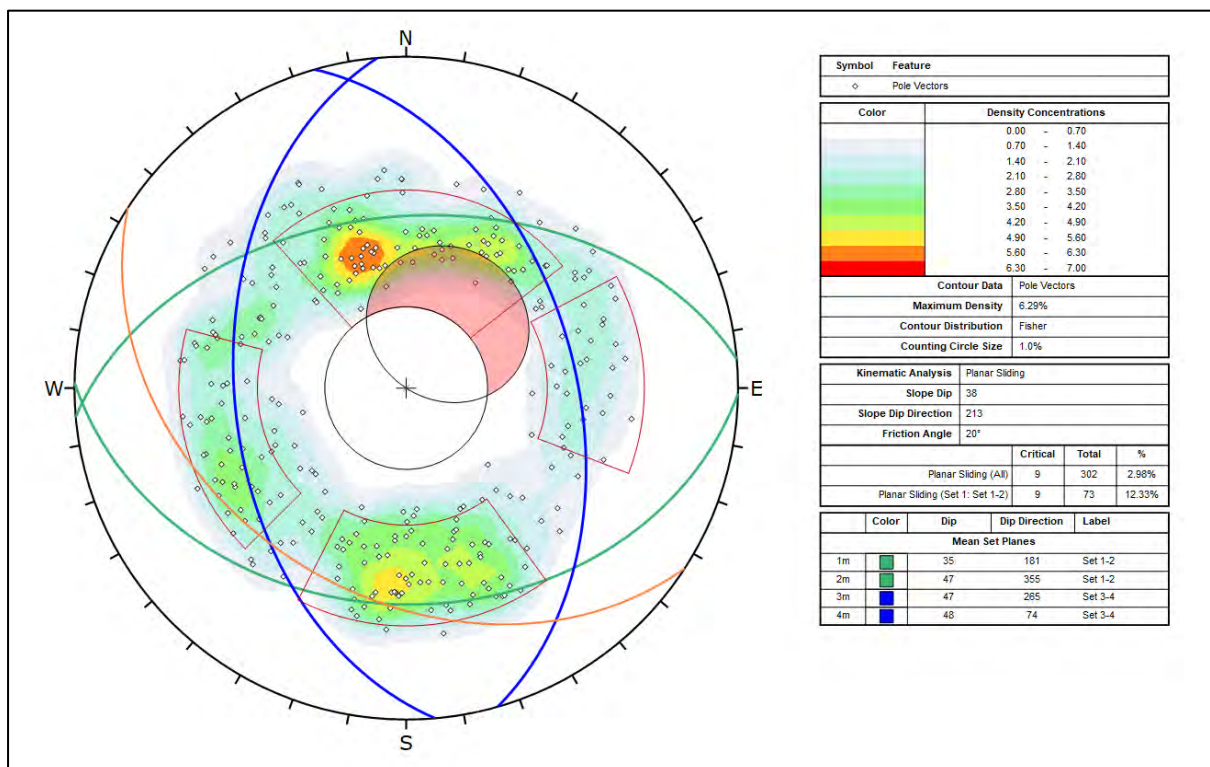


Figure: C202 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 1 (Overall Slope) – Planar Sliding (No Limits).

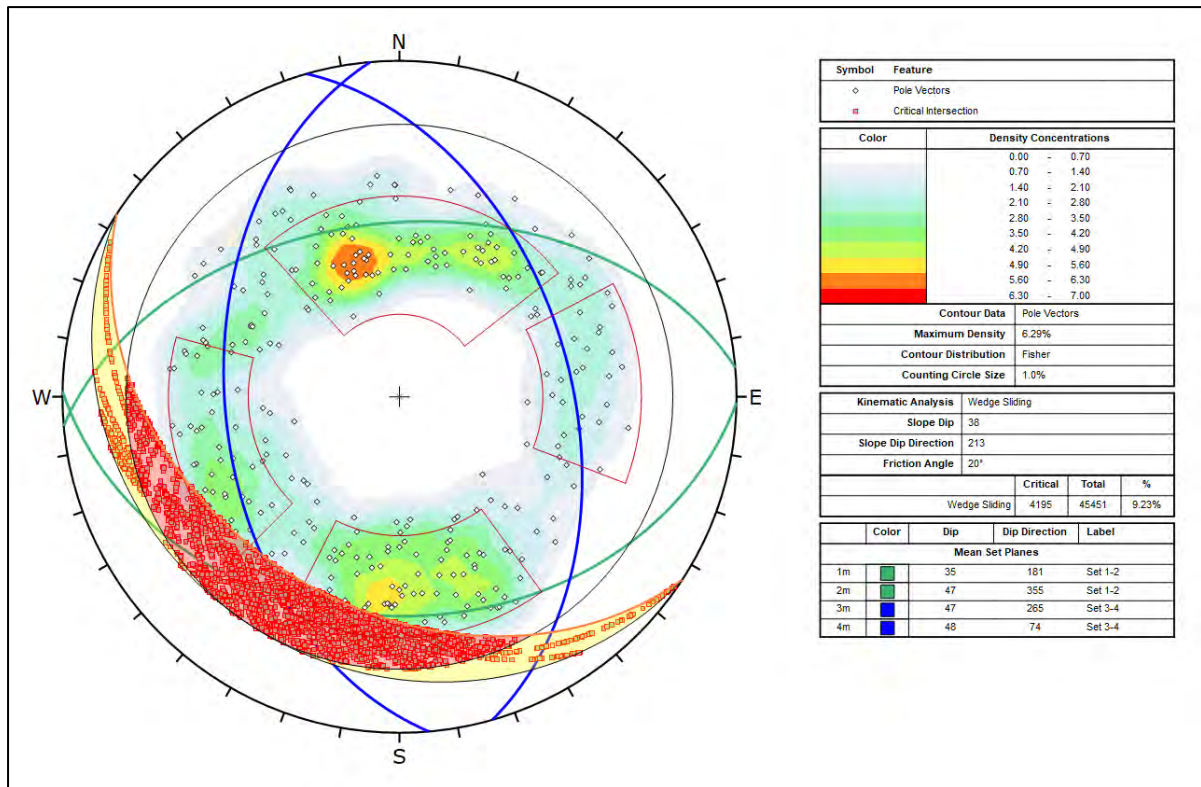


Figure: C203 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Overall Slope) – Wedge Sliding.

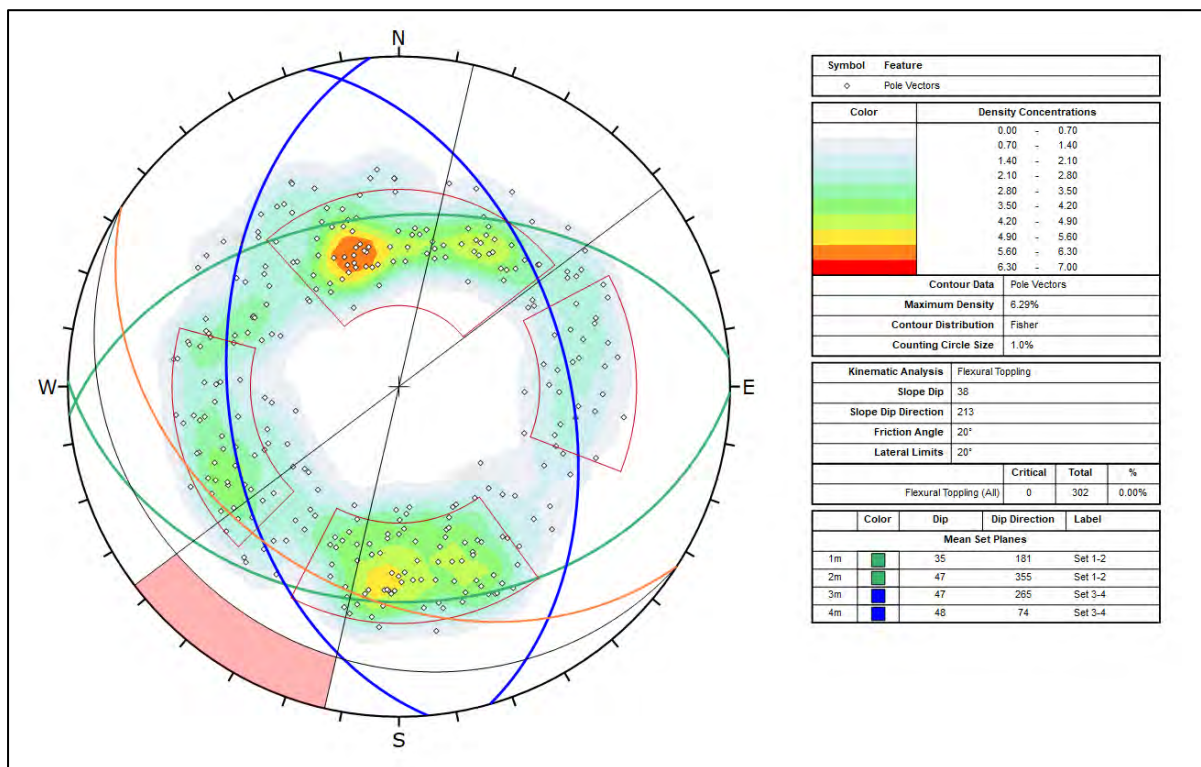


Figure: C204 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Overall Slope) – Flexural Toppling.

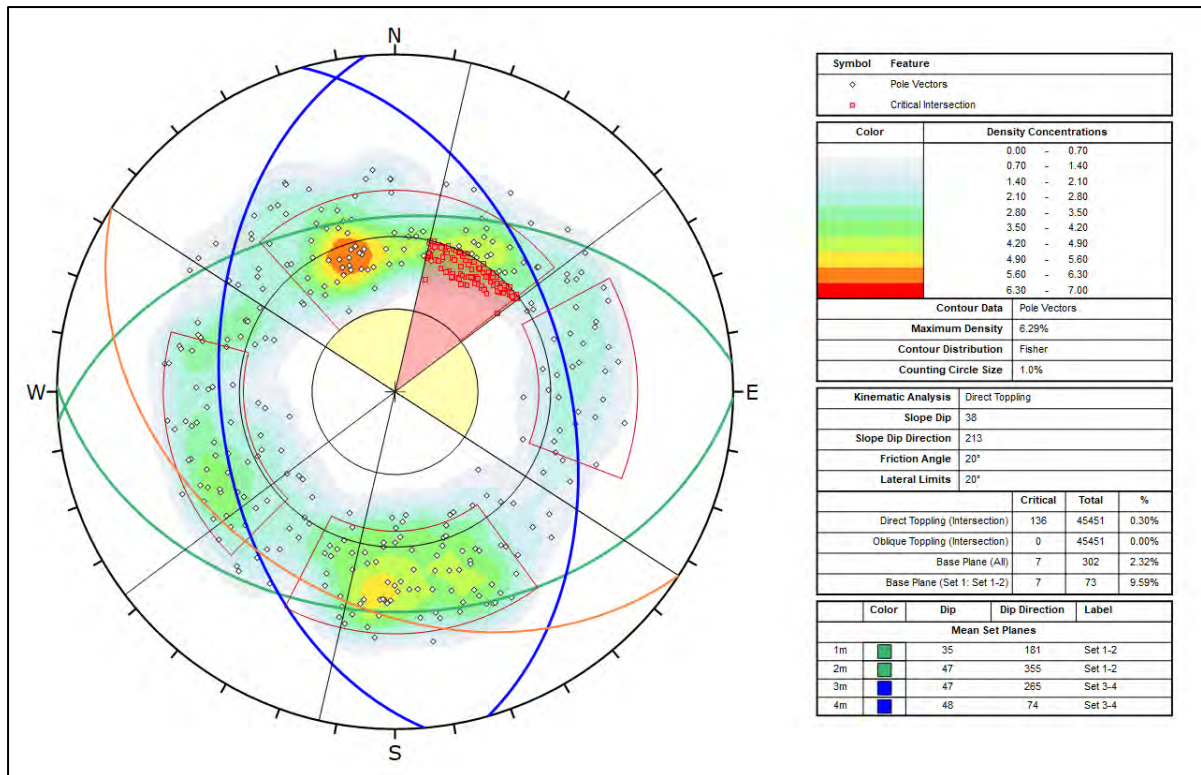


Figure: C205 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Overall Slope) – Direct Toppling.

Highwall 2 – Fracture >30° <60° - Overall Slope

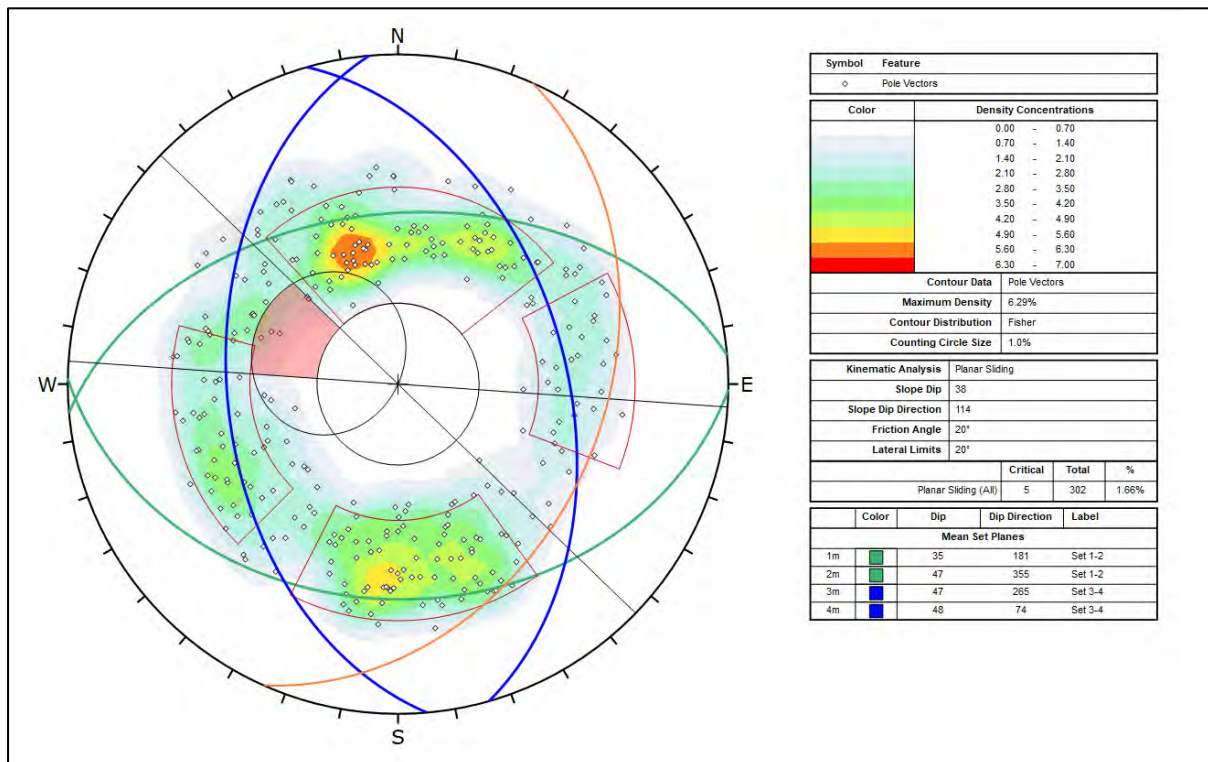


Figure: C206 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Overall Slope) – Planar Sliding.

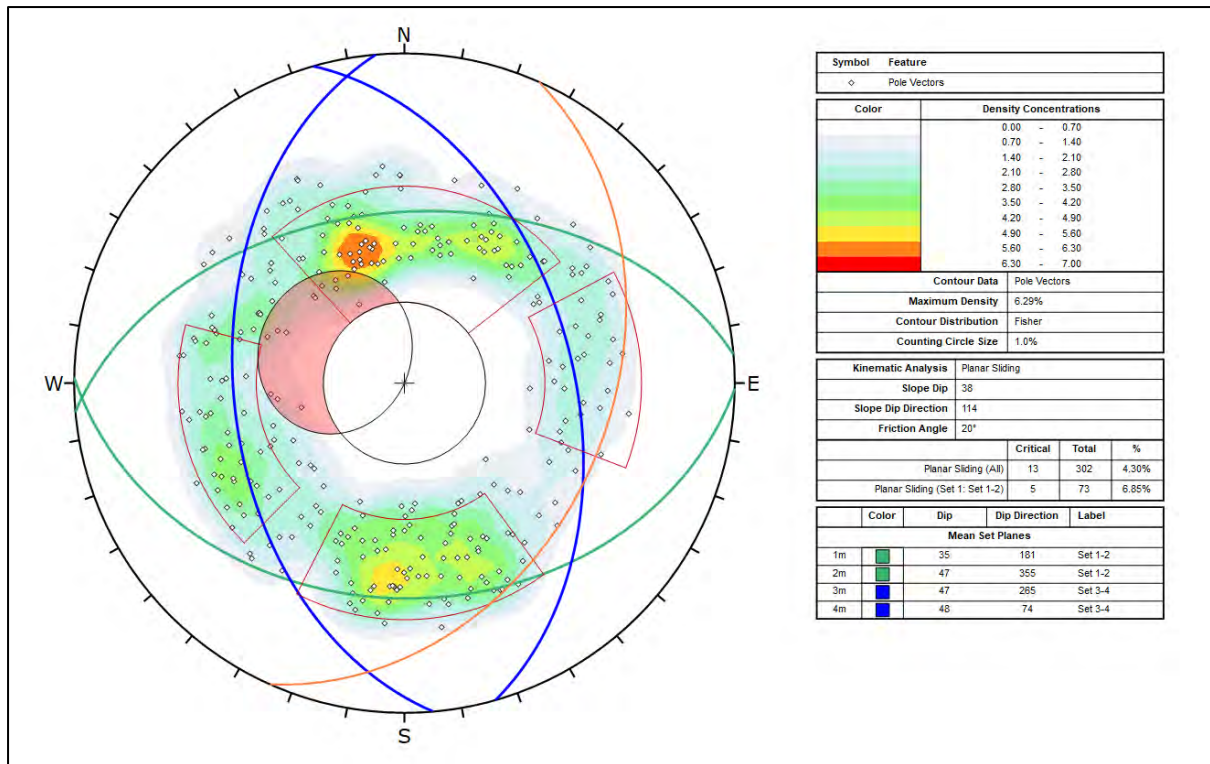


Figure: C207 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Overall Slope) – Planar Sliding (No Limits).

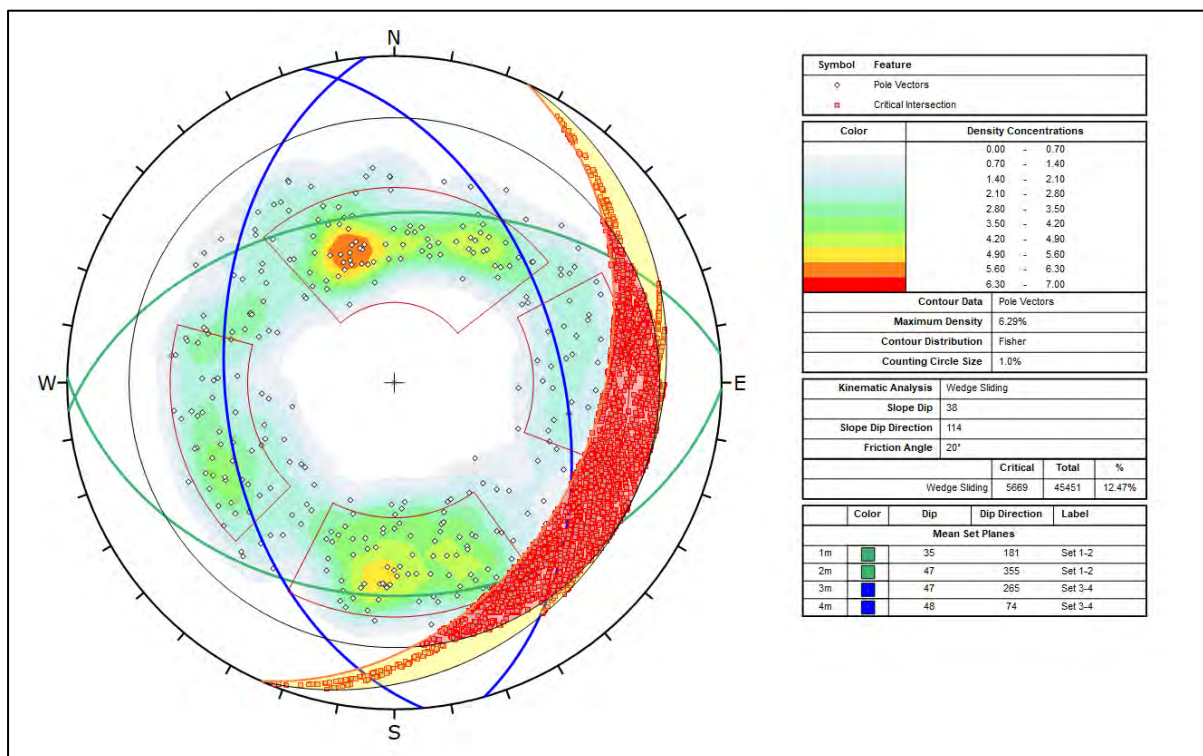


Figure: C208 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Overall Slope) – Wedge Sliding.

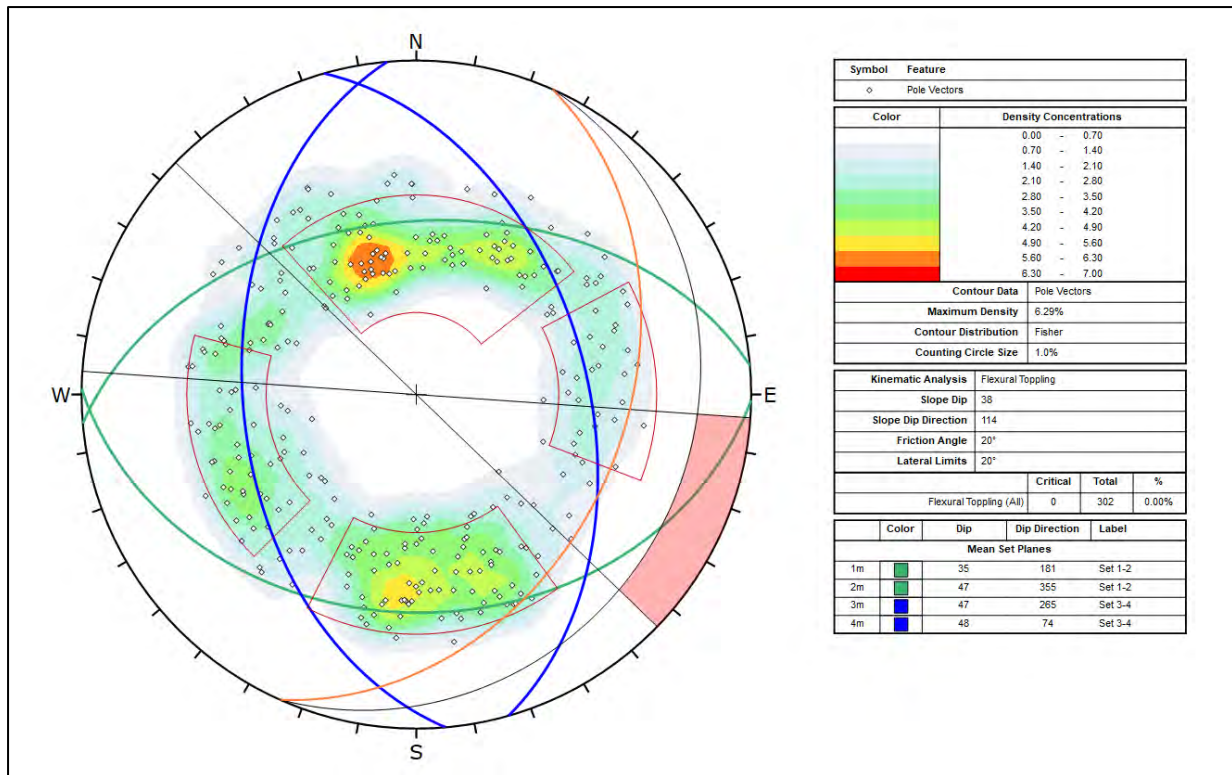


Figure: C209 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Overall Slope) – Flexural Toppling.

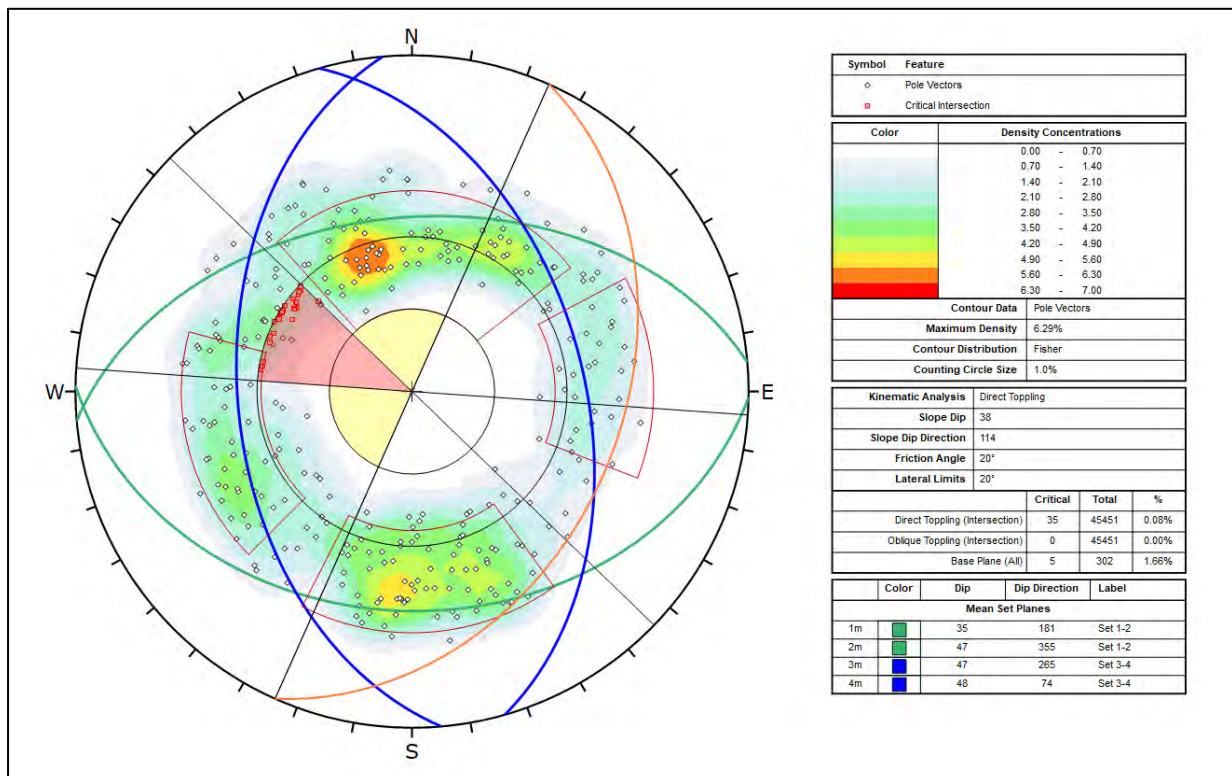


Figure: C210 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Overall Slope) – Direct Toppling.

Highwall 3 – Fracture $>30^{\circ} <60^{\circ}$ - Overall Slope

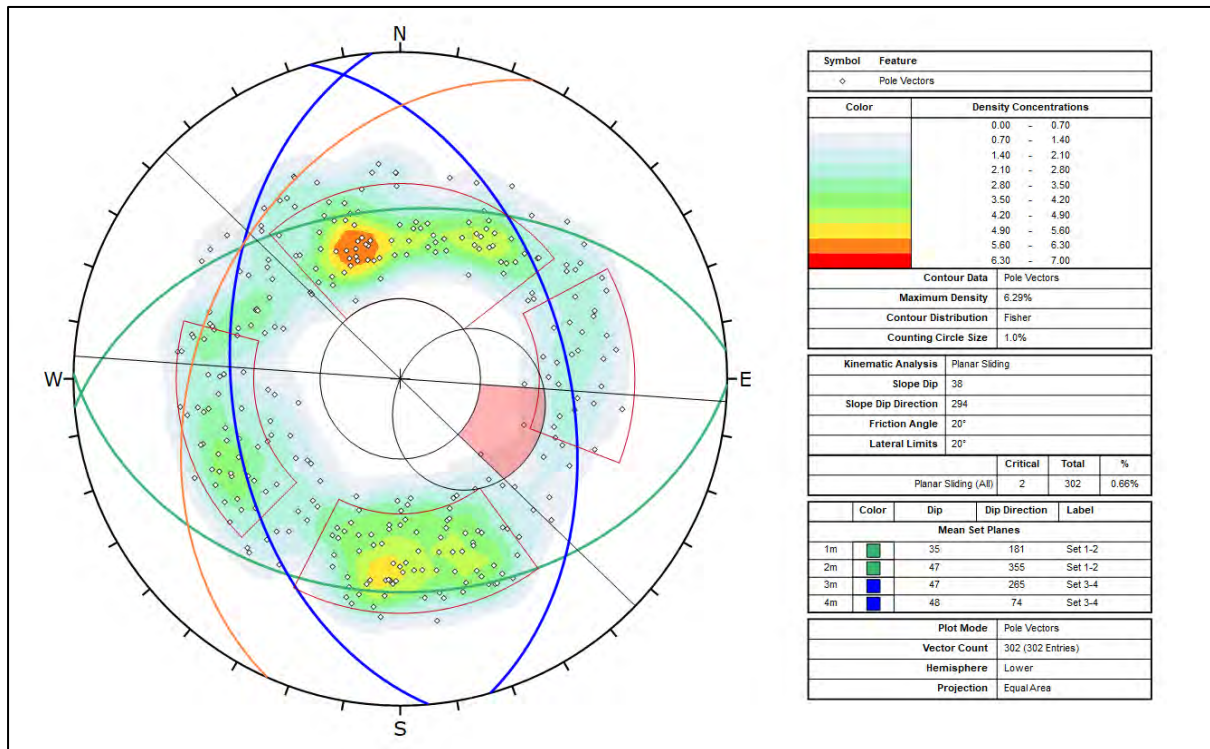


Figure: C211 - Kinematic Analysis (Fracture $>30^{\circ} <60^{\circ}$) - Highwall 3 (Overall Slope) – Planar Sliding.

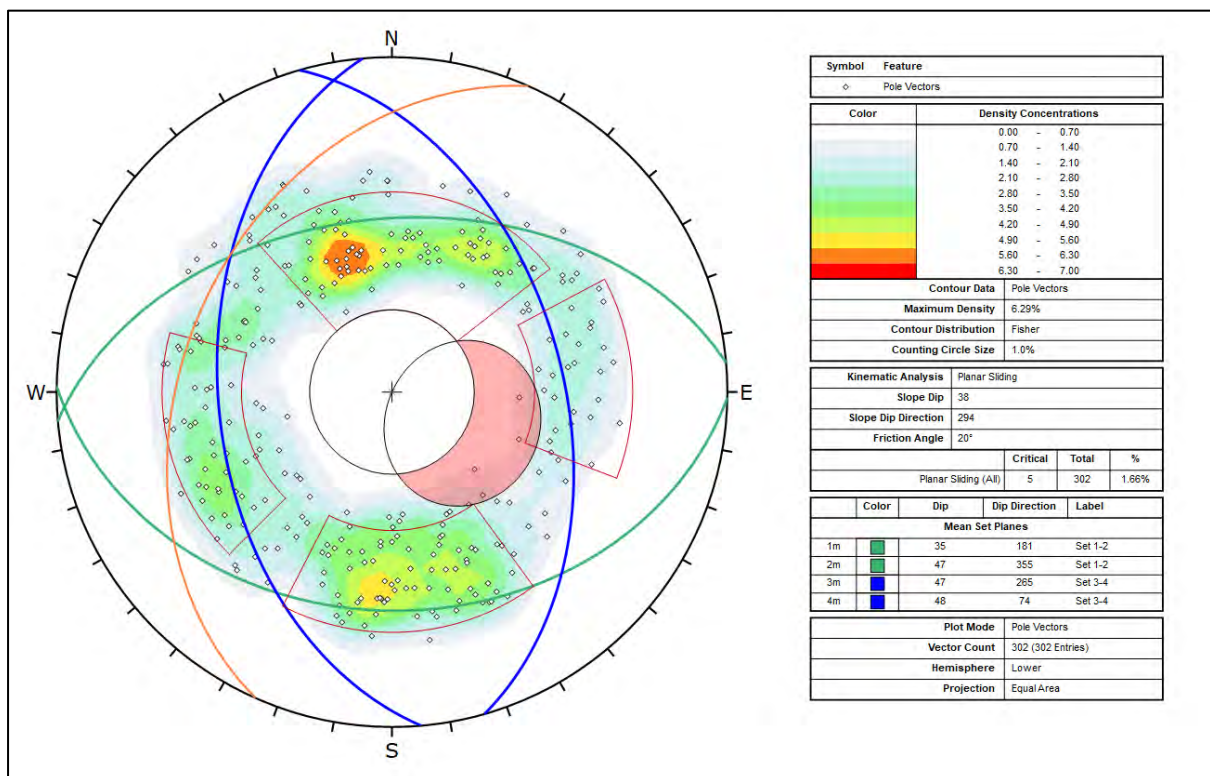


Figure: C212 - Kinematic Analysis (Fracture $>30^{\circ} <60^{\circ}$) - Highwall 3 (Overall Slope) – Planar Sliding (No Limits).

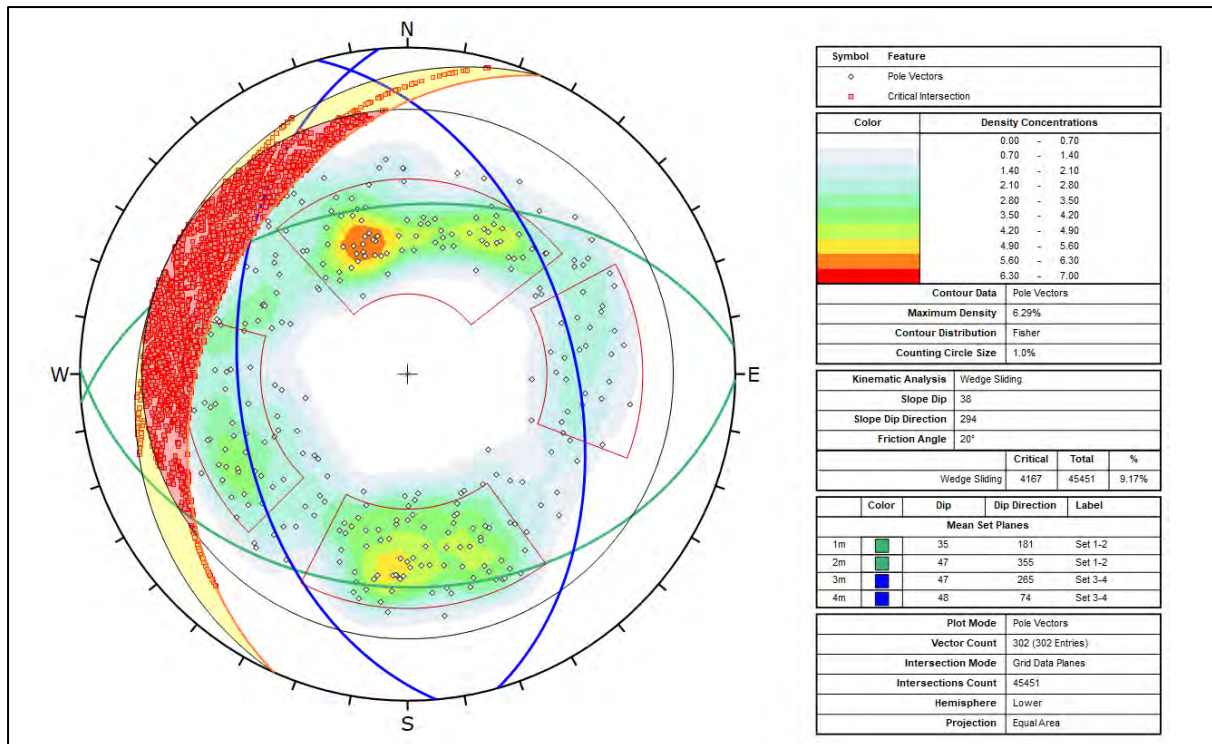


Figure: C213 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Overall Slope) – Wedge Sliding.

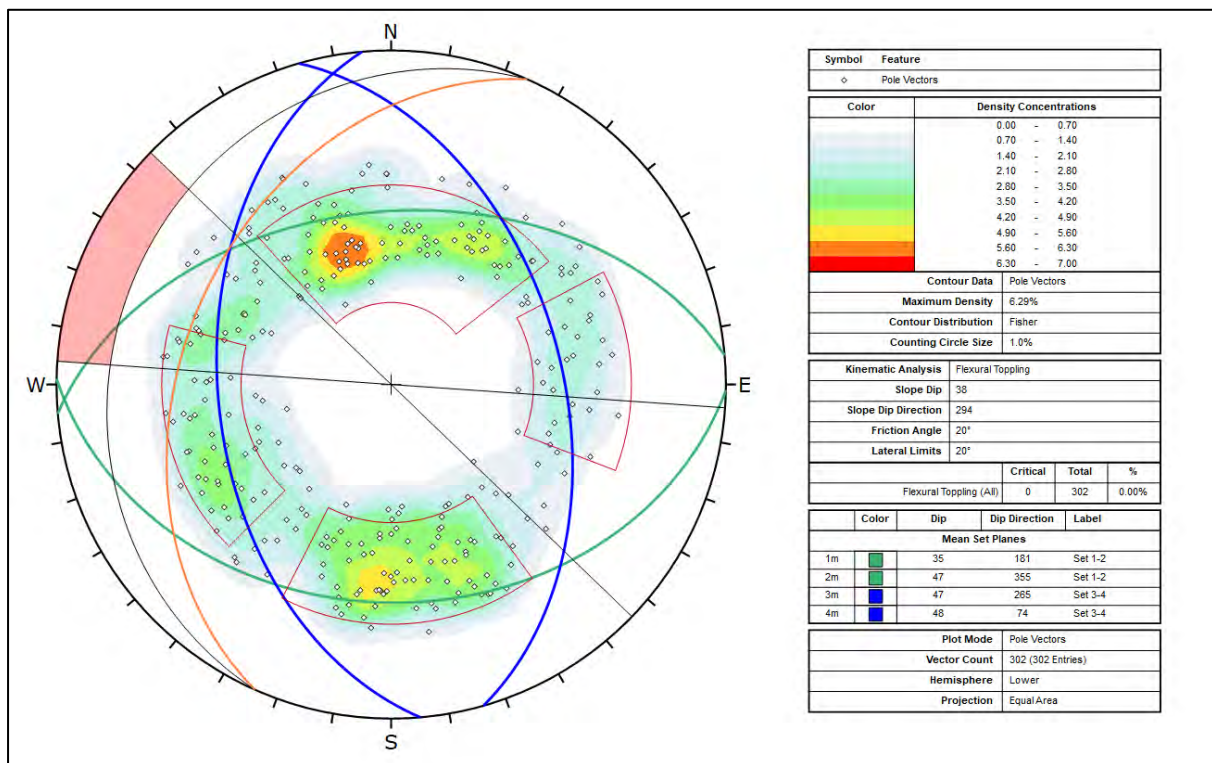


Figure: C214 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Overall Slope) – Flexural Toppling.

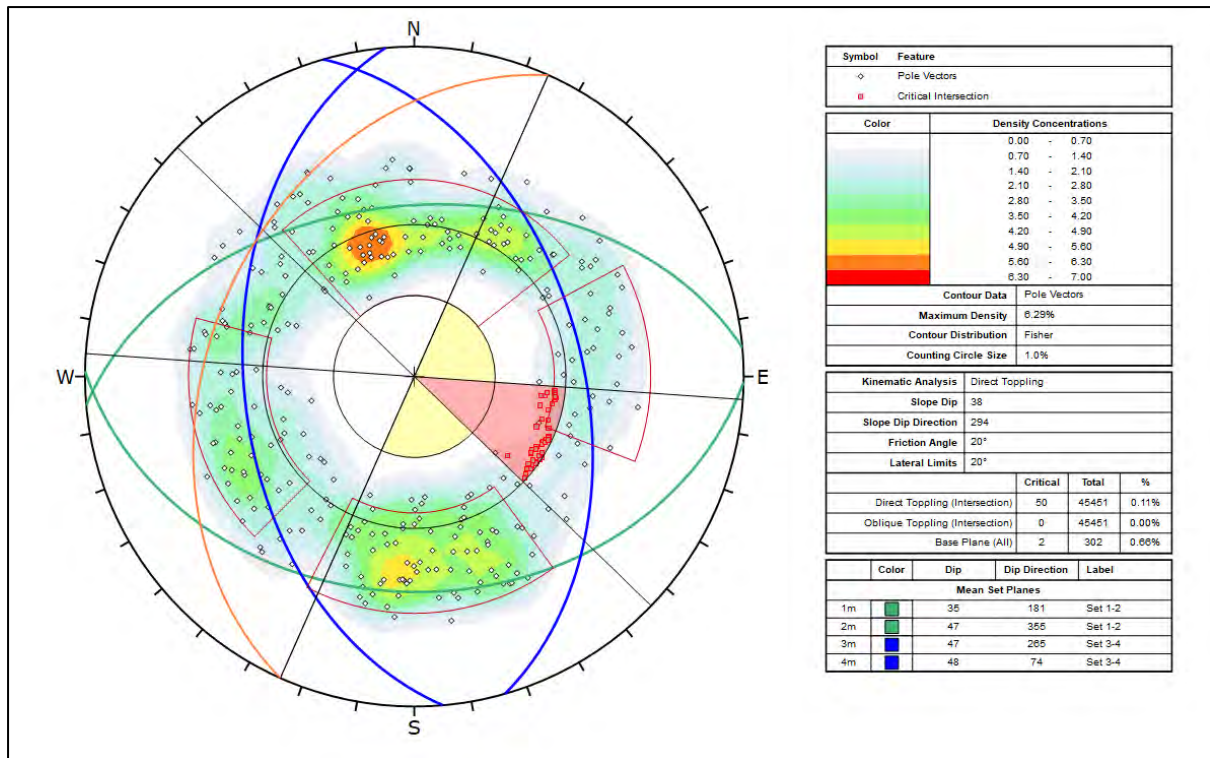


Figure: C215 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Overall Slope) – Direct Toppling.

Highwall 4 – Fracture >30° <60° - Overall Slope

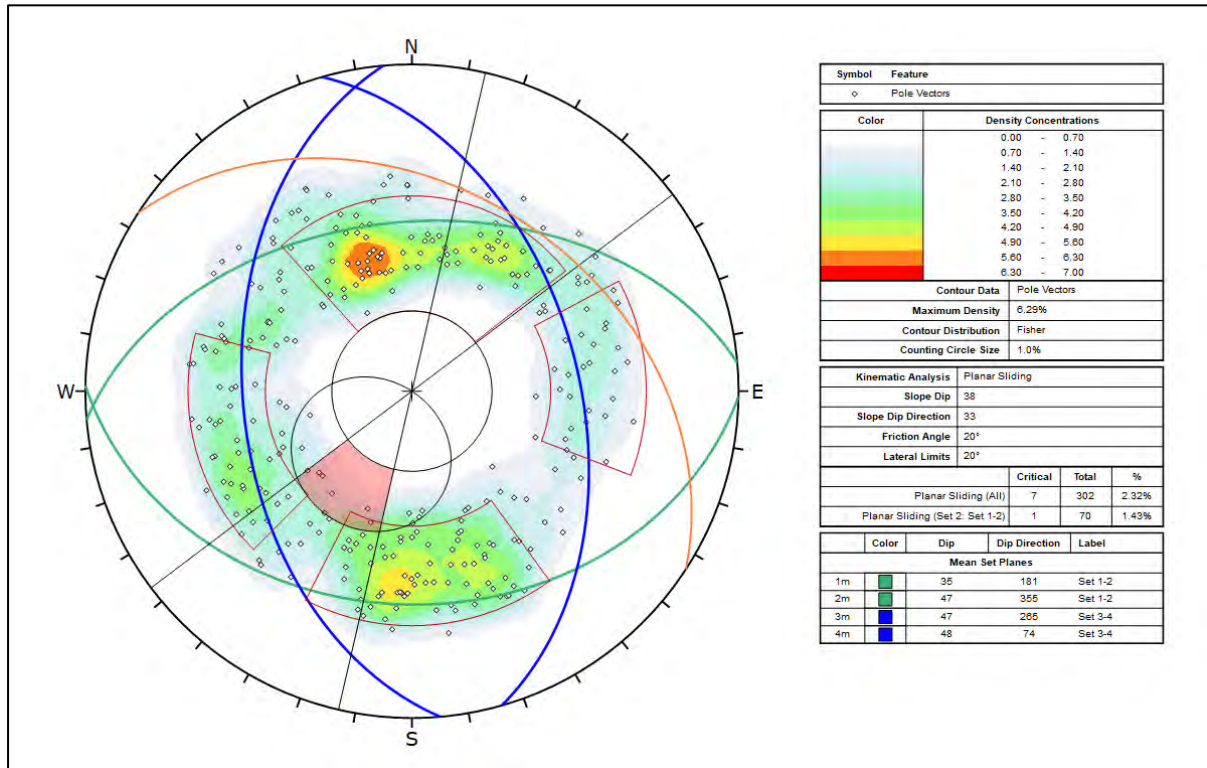


Figure: C216 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Overall Slope) – Planar Sliding.

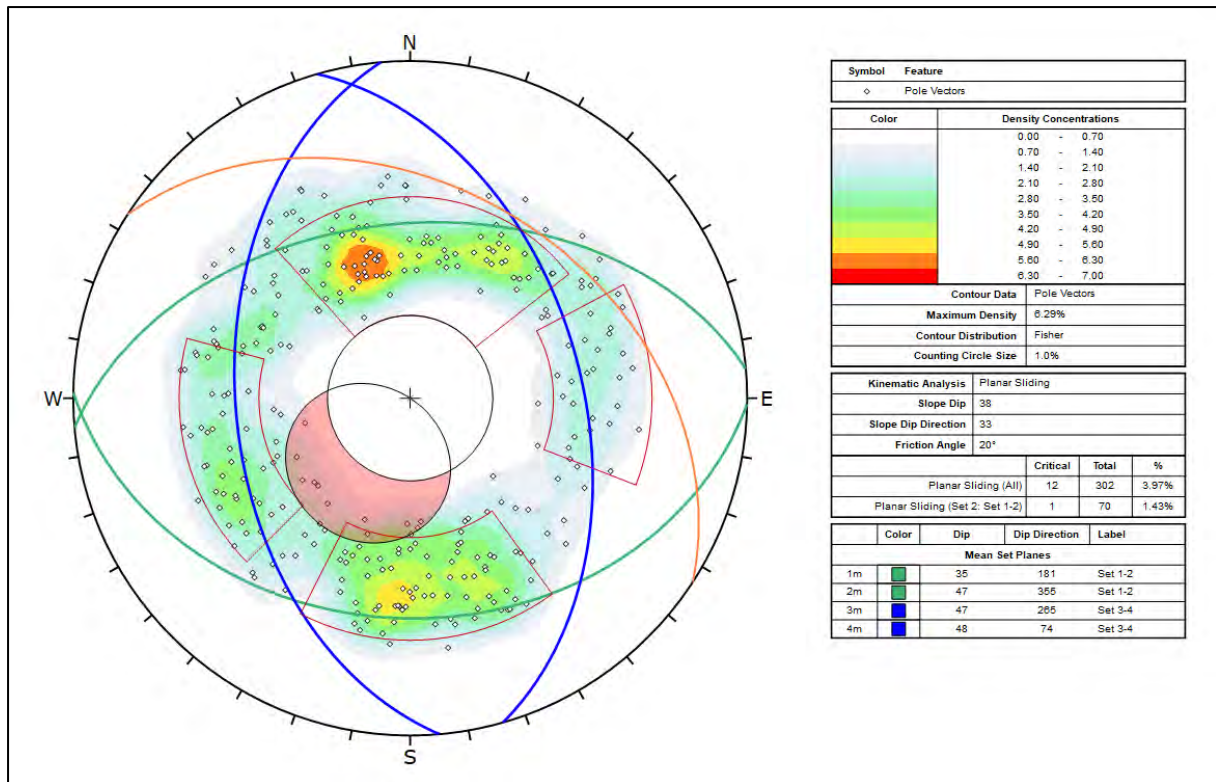


Figure: C217 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Overall Slope) – Planar Sliding (No Limits).

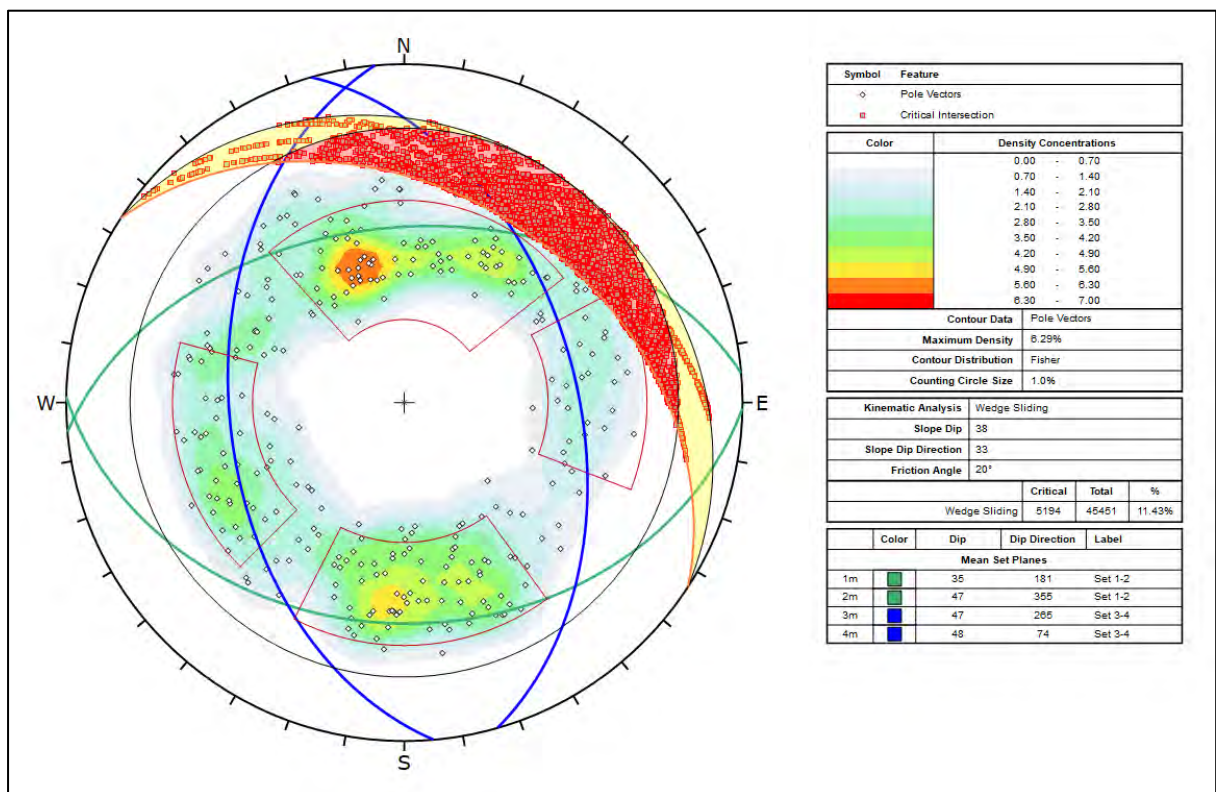


Figure: C218 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Overall Slope) – Wedge Sliding.

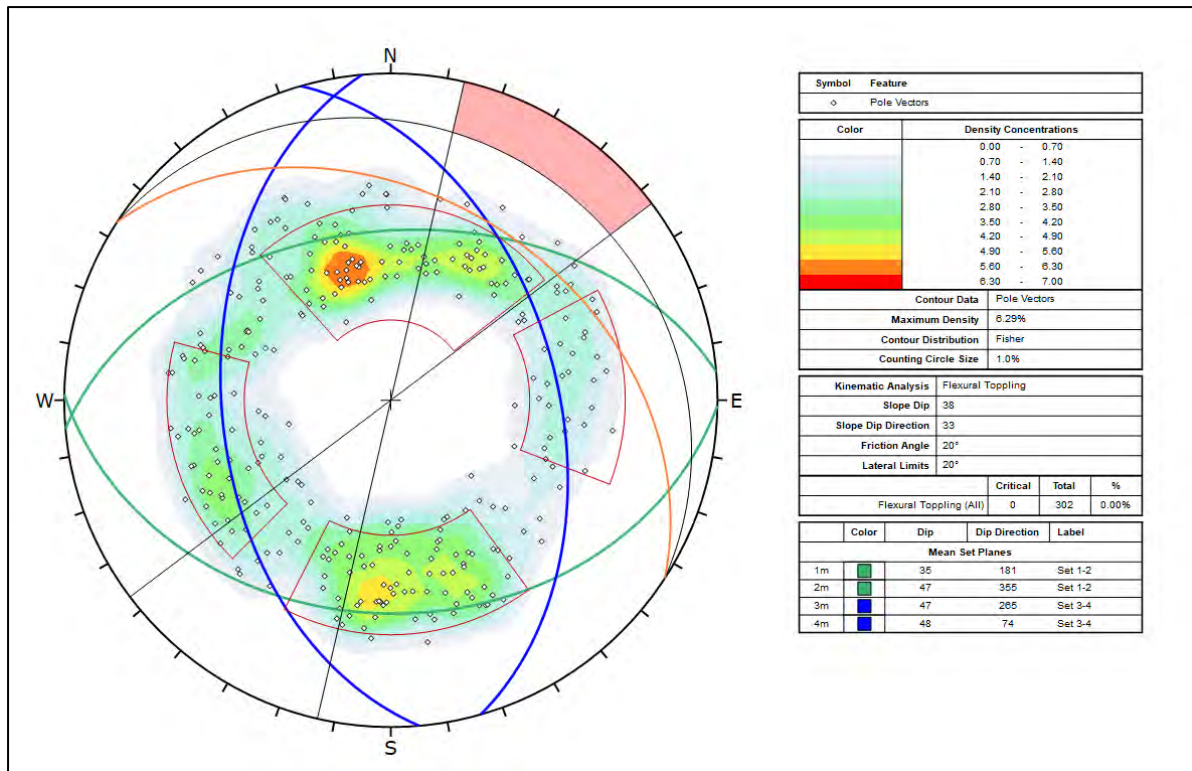


Figure: C219 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Overall Slope) – Flexural Toppling.

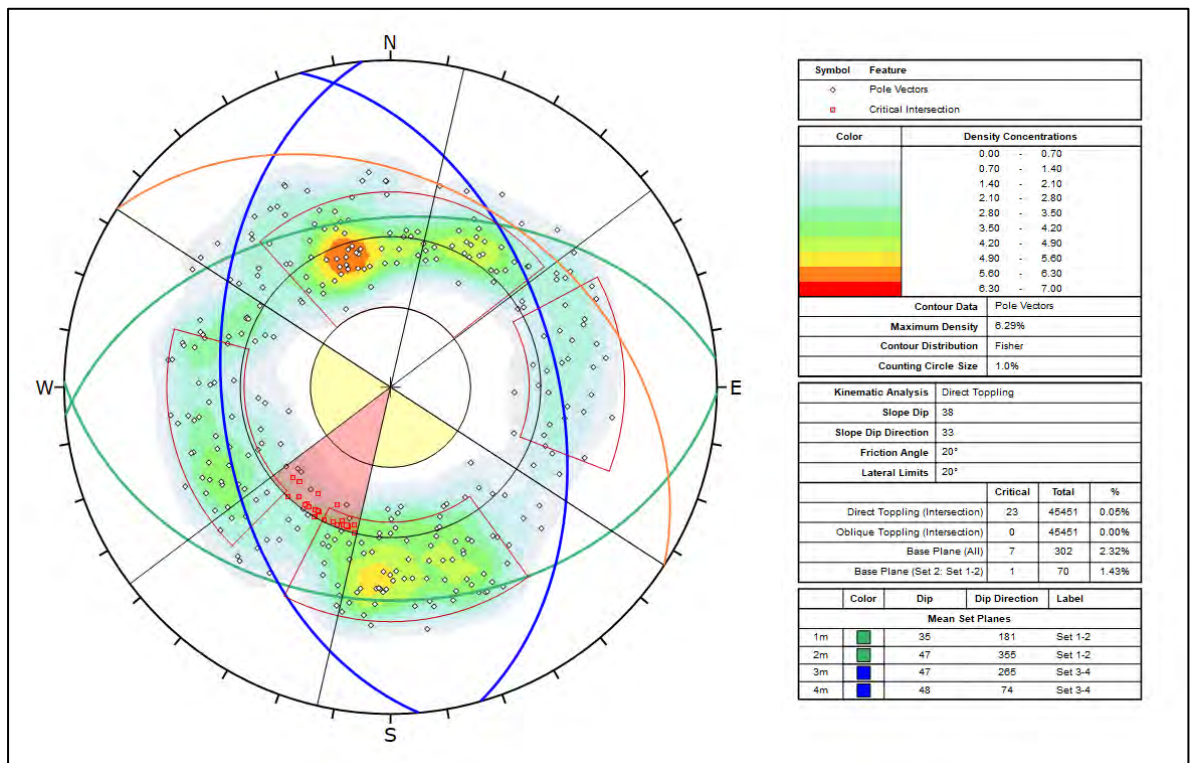


Figure: C220 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Overall Slope) – Direct Toppling.

Highwall 1 – Fracture $>30^{\circ}$ $<60^{\circ}$ - Bench Slope

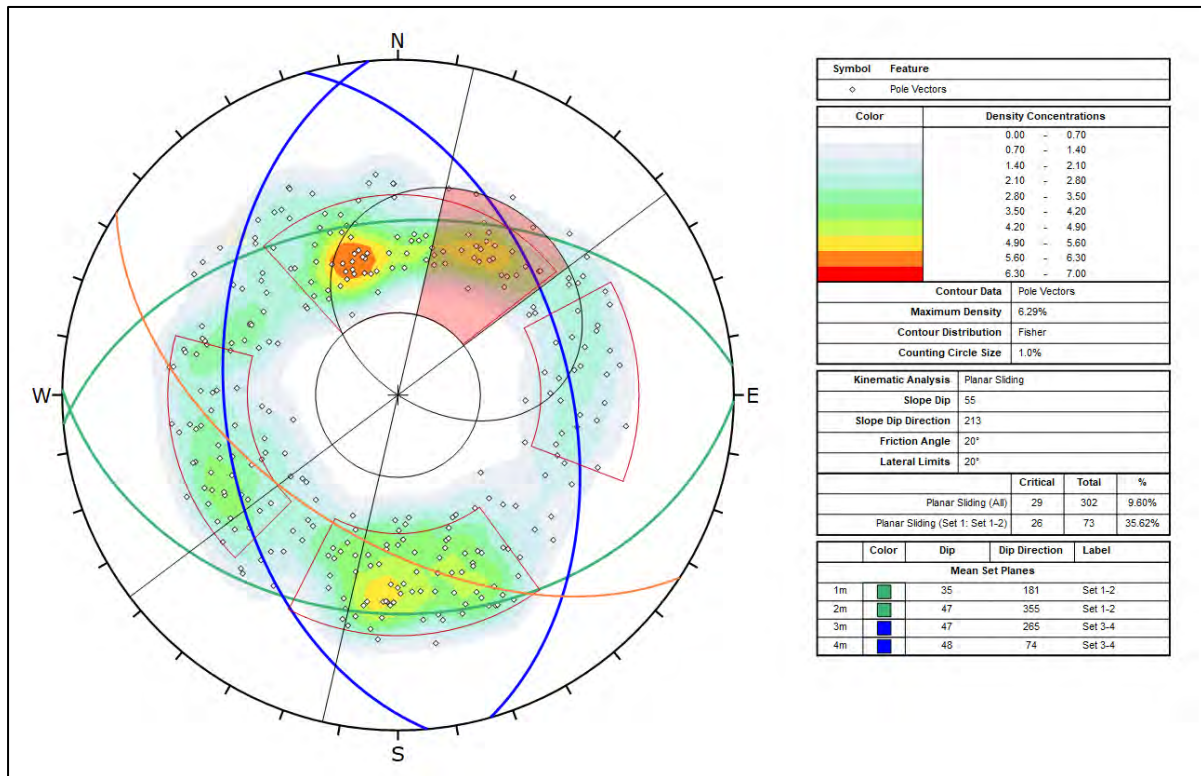


Figure: C221 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 1 (Bench Slope) – Planar Sliding.

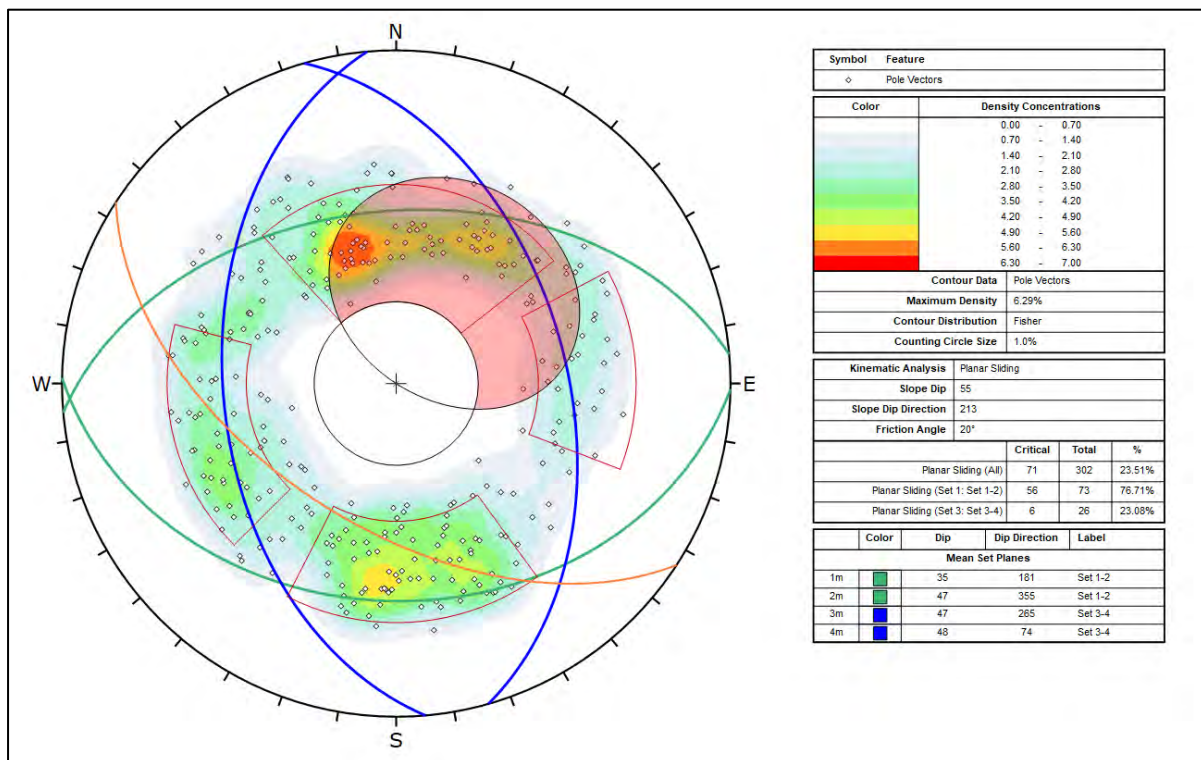


Figure: C222 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 1 (Bench Slope) – Planar Sliding (No Limits).

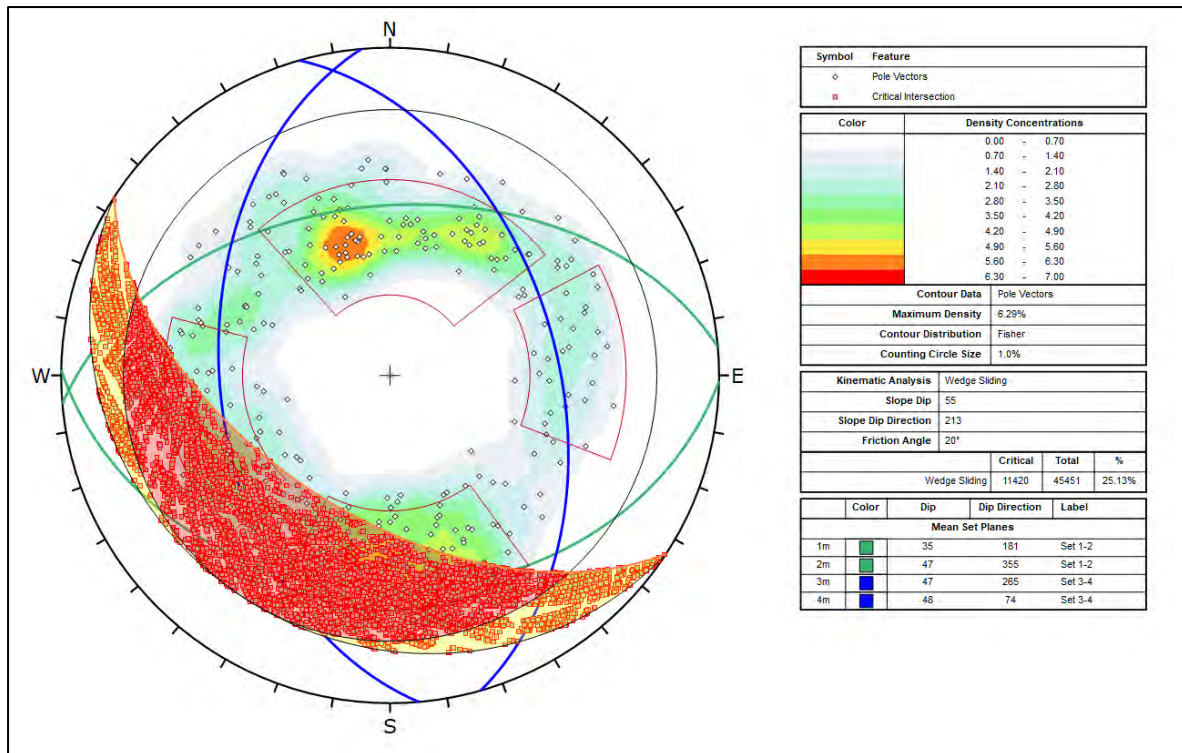


Figure: C223 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Bench Slope) – Wedge Sliding.

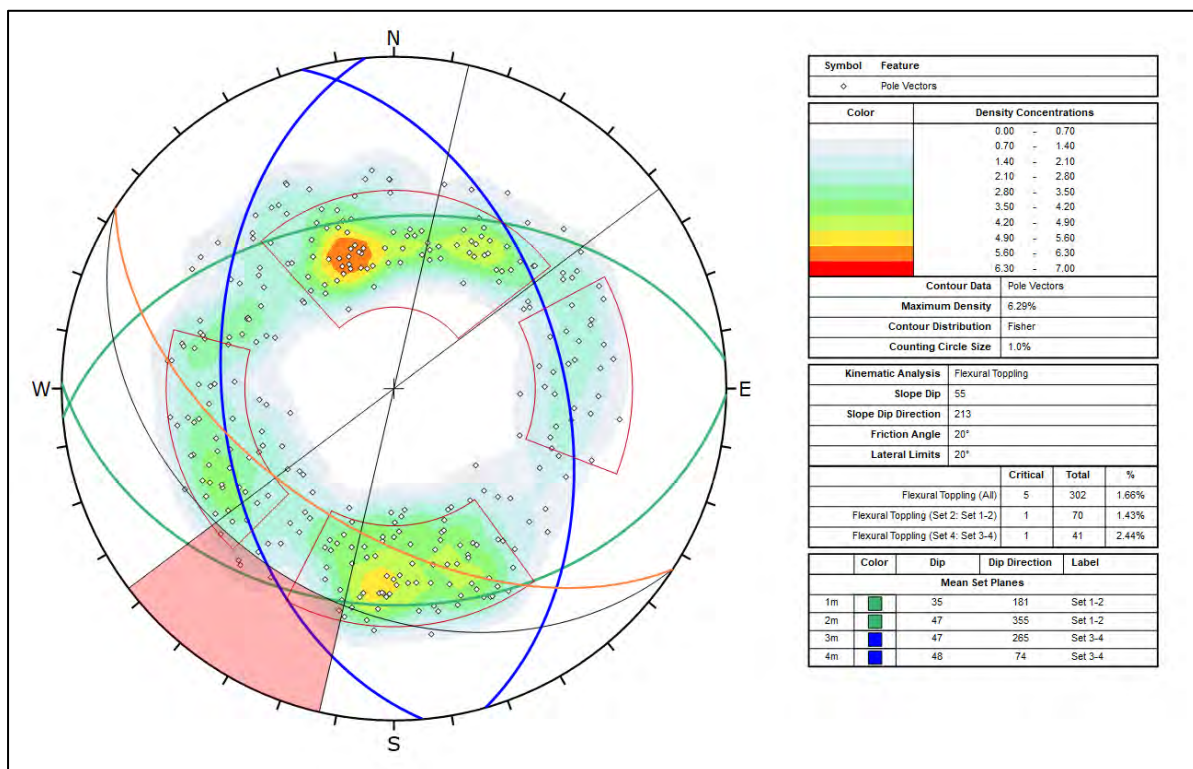


Figure: C224 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Bench Slope) – Flexural Toppling.

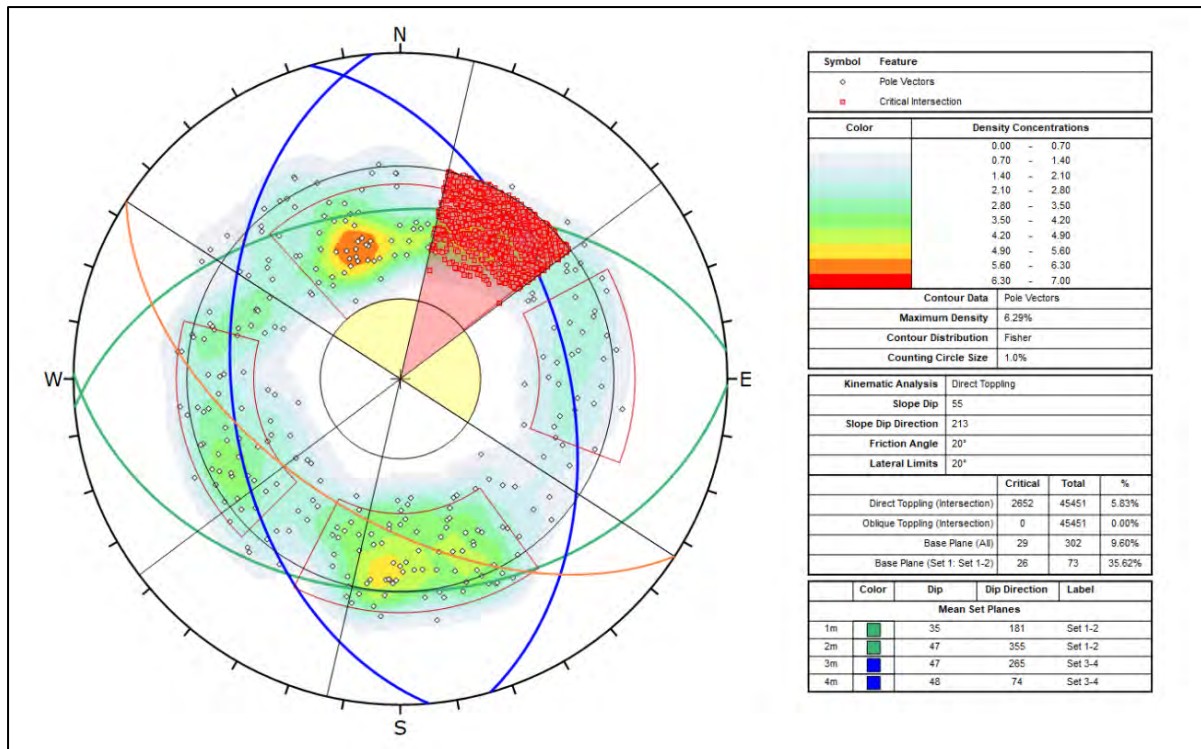


Figure: C225 - Kinematic Analysis (Fracture >30° <60°) - Highwall 1 (Bench Slope) – Direct Topping.

Highwall 2 – Fracture >30° <60° - Bench Slope

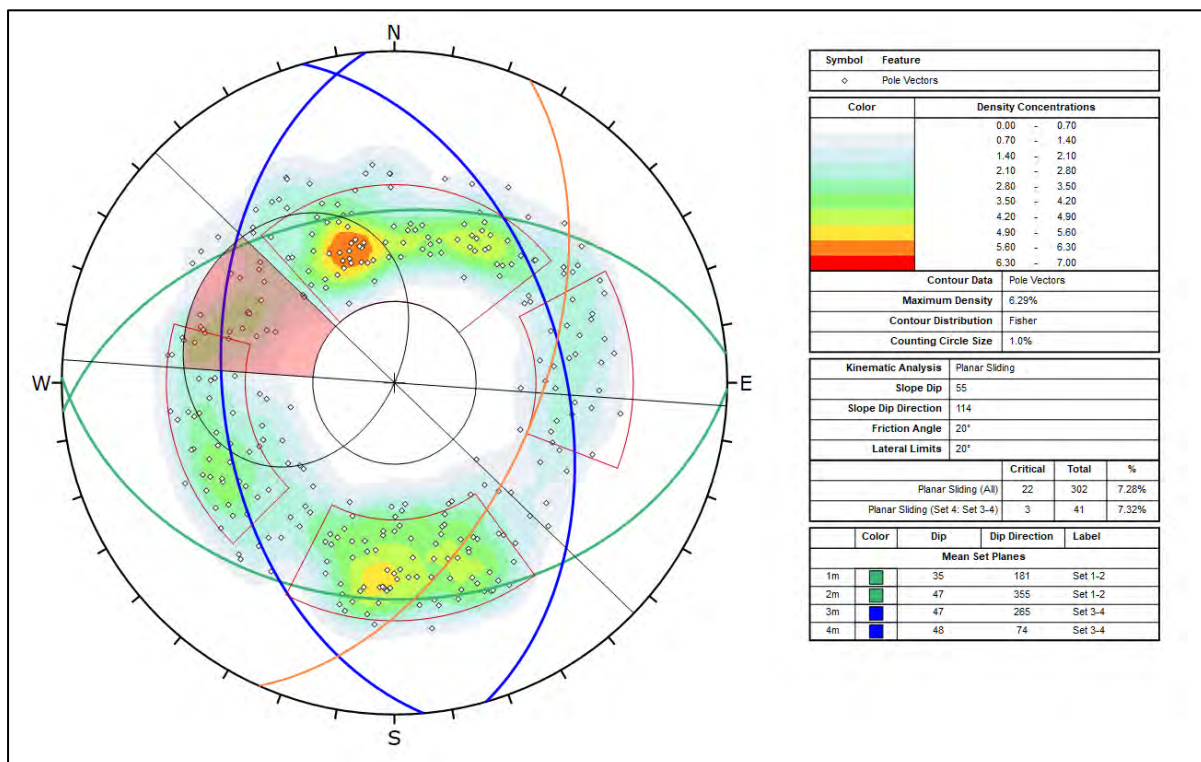


Figure: C226 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Bench Slope) – Planar Sliding.

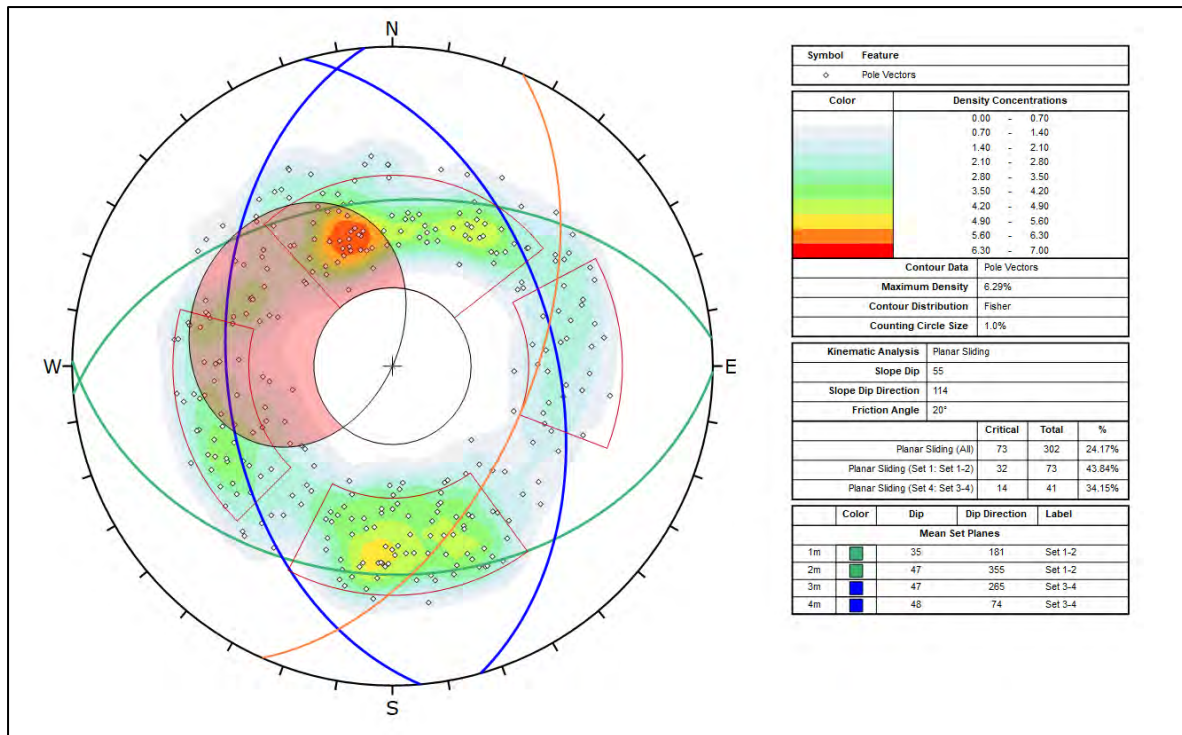


Figure: C227 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Bench Slope) – Planar Sliding (No Limits).

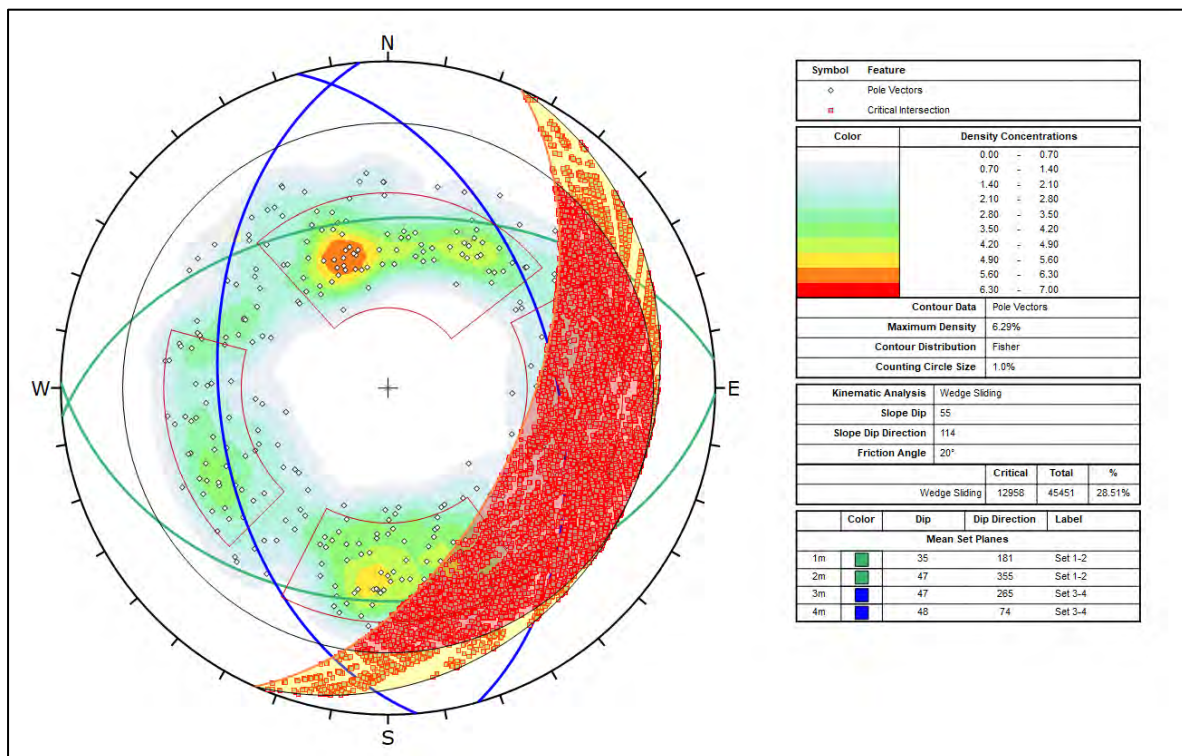


Figure: C228 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Bench Slope) – Wedge Sliding.

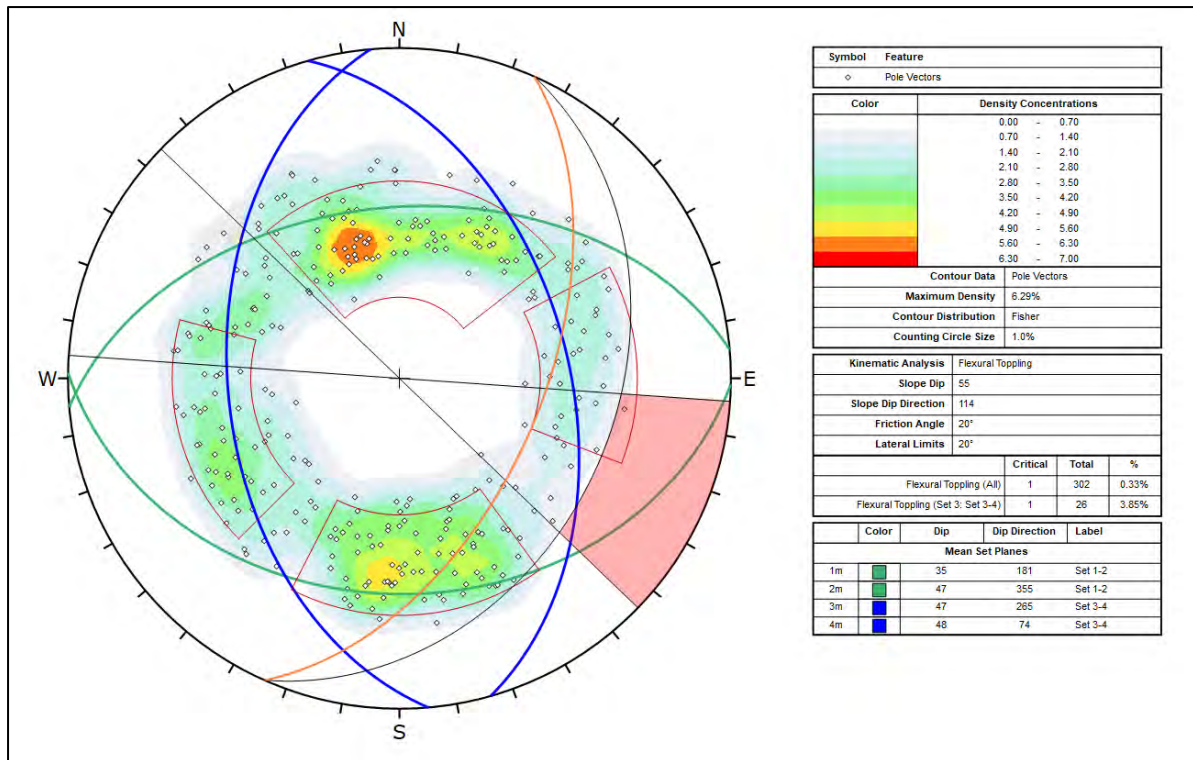


Figure: C229 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Bench Slope) – Flexural Toppling.

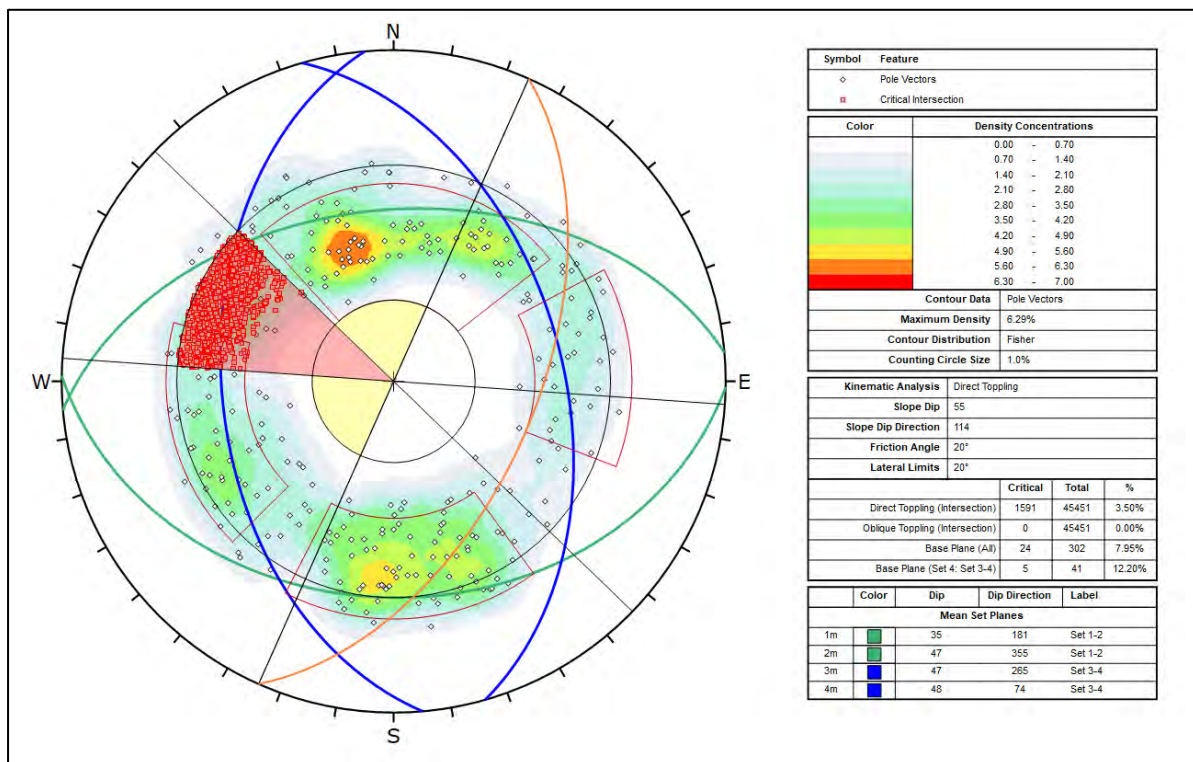


Figure: C230 - Kinematic Analysis (Fracture >30° <60°) - Highwall 2 (Bench Slope) – Direct Toppling.

Highwall 3 – Fracture $>30^{\circ}$ $<60^{\circ}$ - Bench Slope

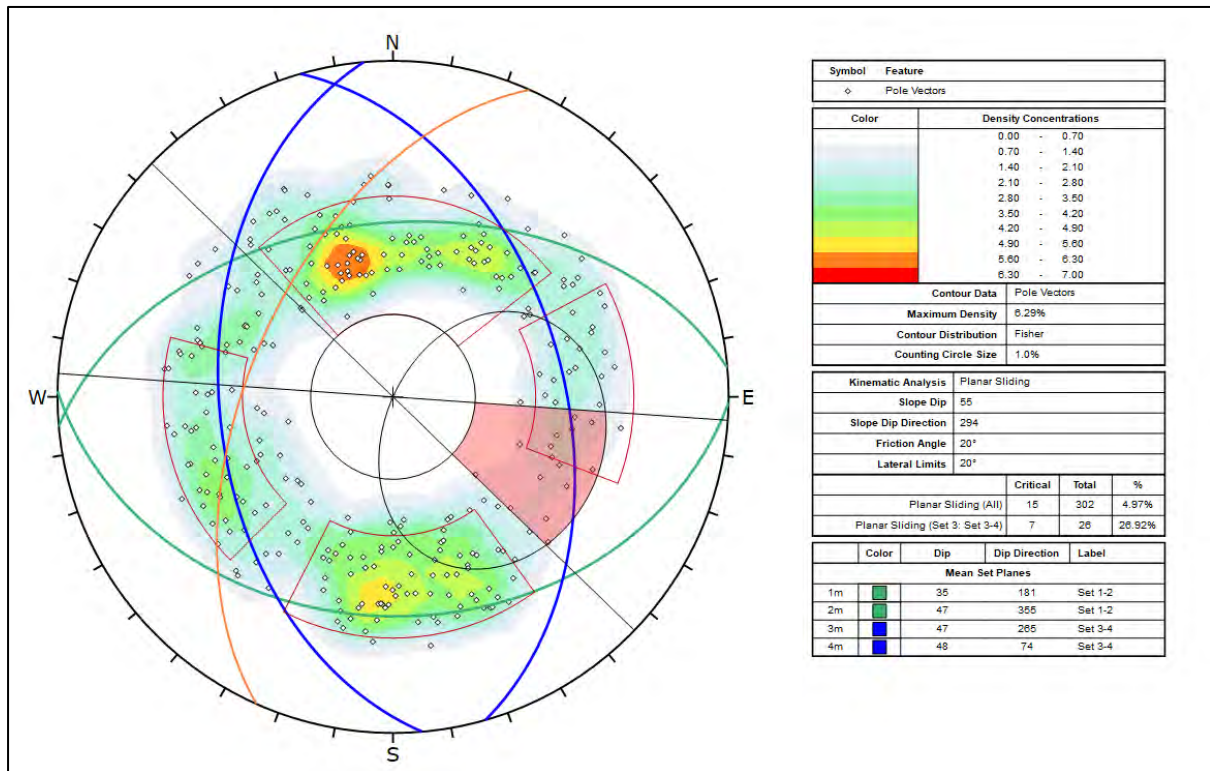


Figure: C231 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 3 (Bench Slope) – Planar Sliding.

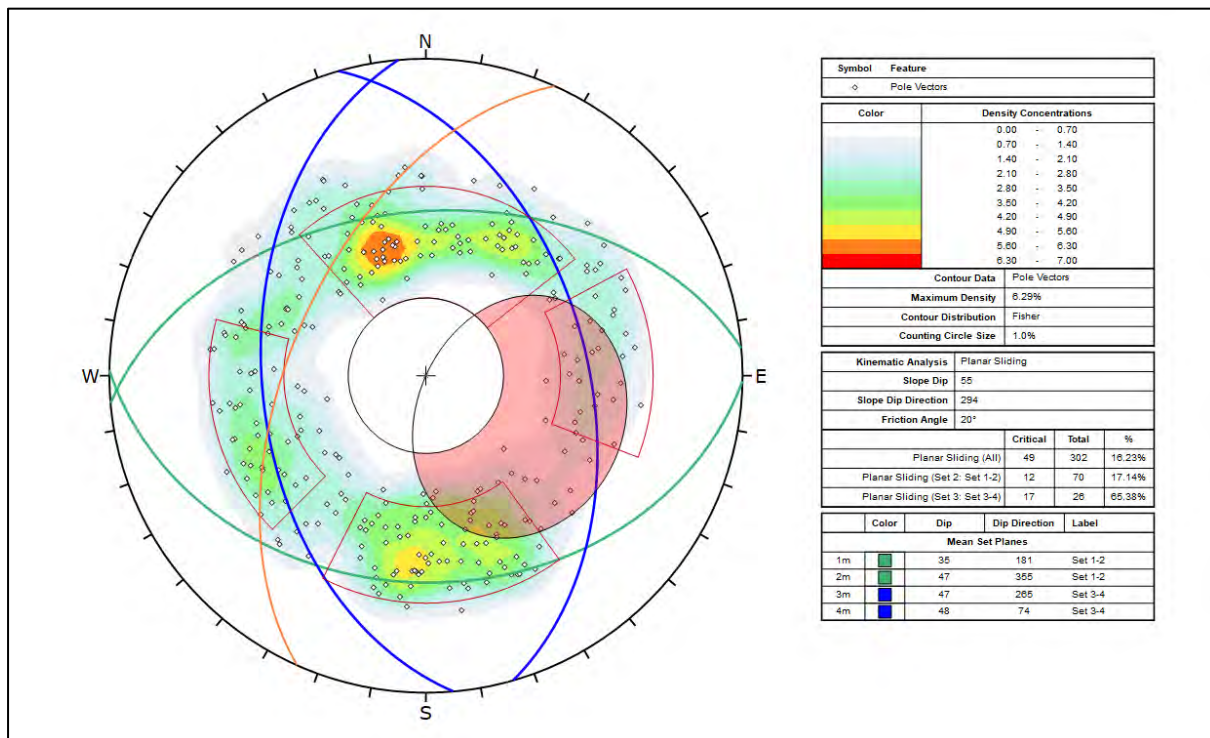


Figure: C232 - Kinematic Analysis (Fracture $>30^{\circ}$ $<60^{\circ}$) - Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

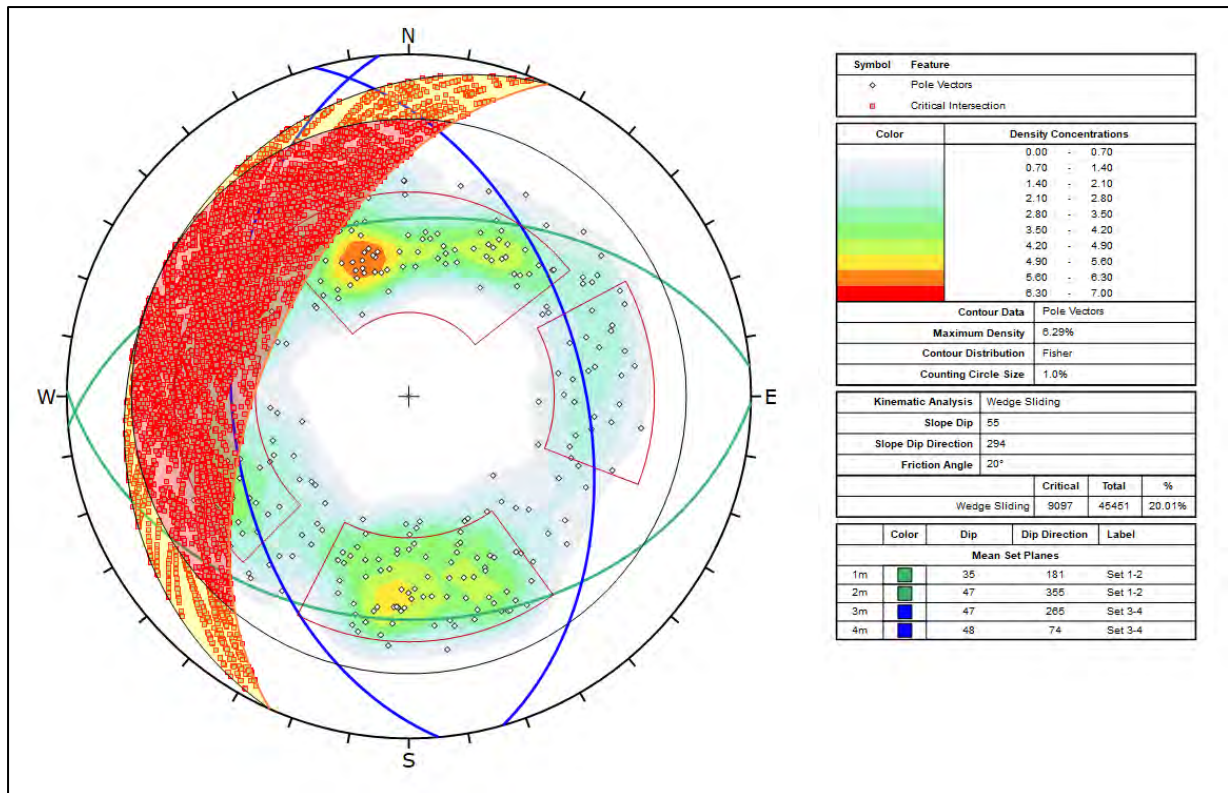


Figure: C233 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Bench Slope) – Wedge Sliding.

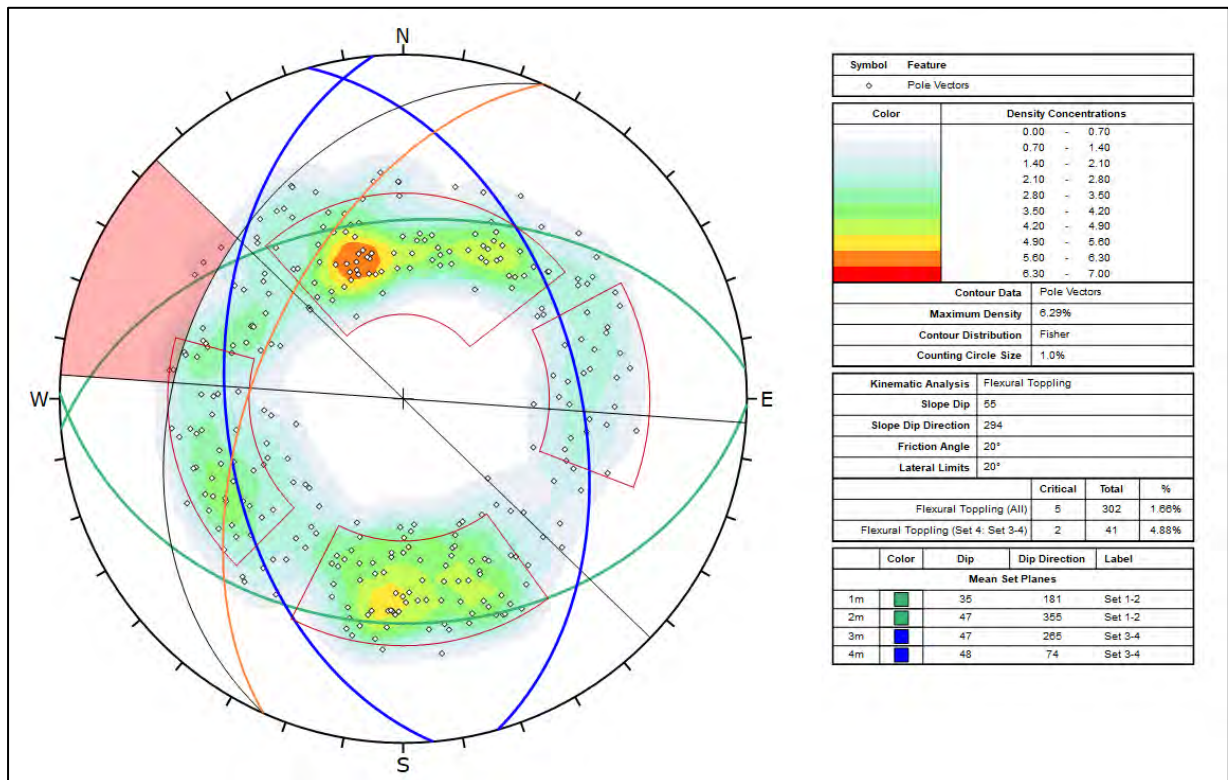


Figure: C234 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Bench Slope) – Flexural Toppling.

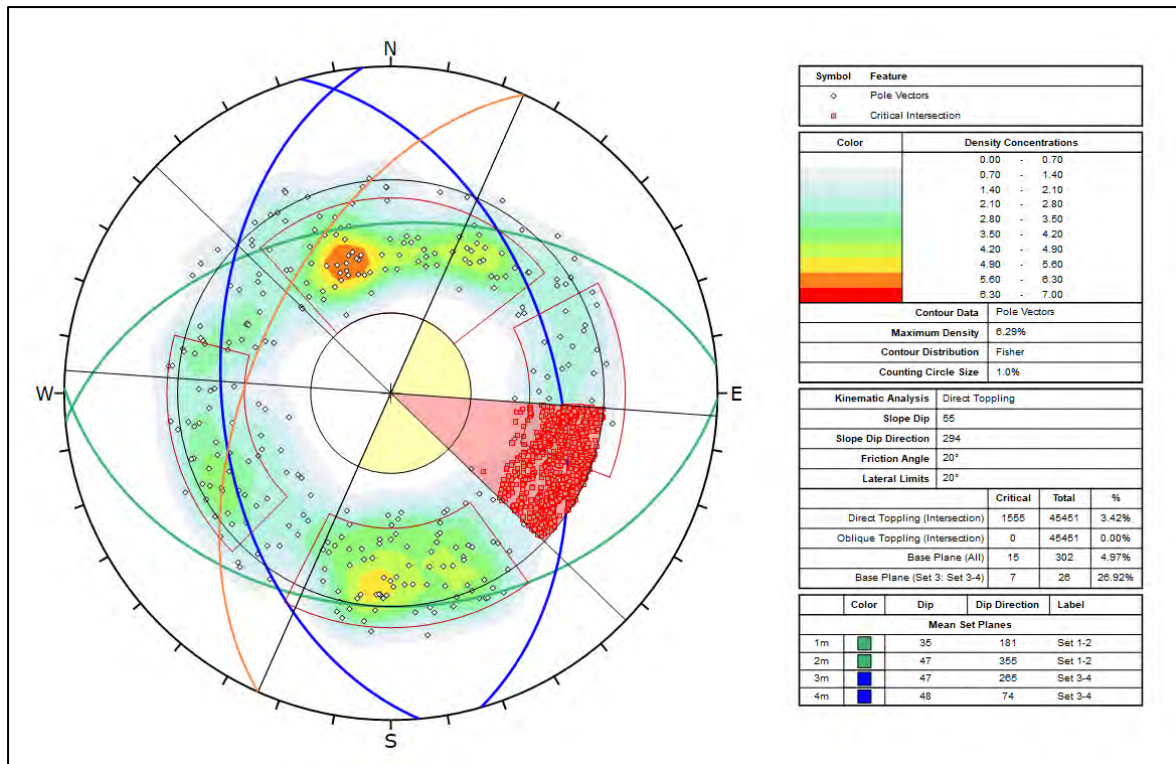


Figure: C235 - Kinematic Analysis (Fracture >30° <60°) - Highwall 3 (Bench Slope) –Direct Toppling.

Highwall 4 – Fracture >30° <60° - Bench Slope

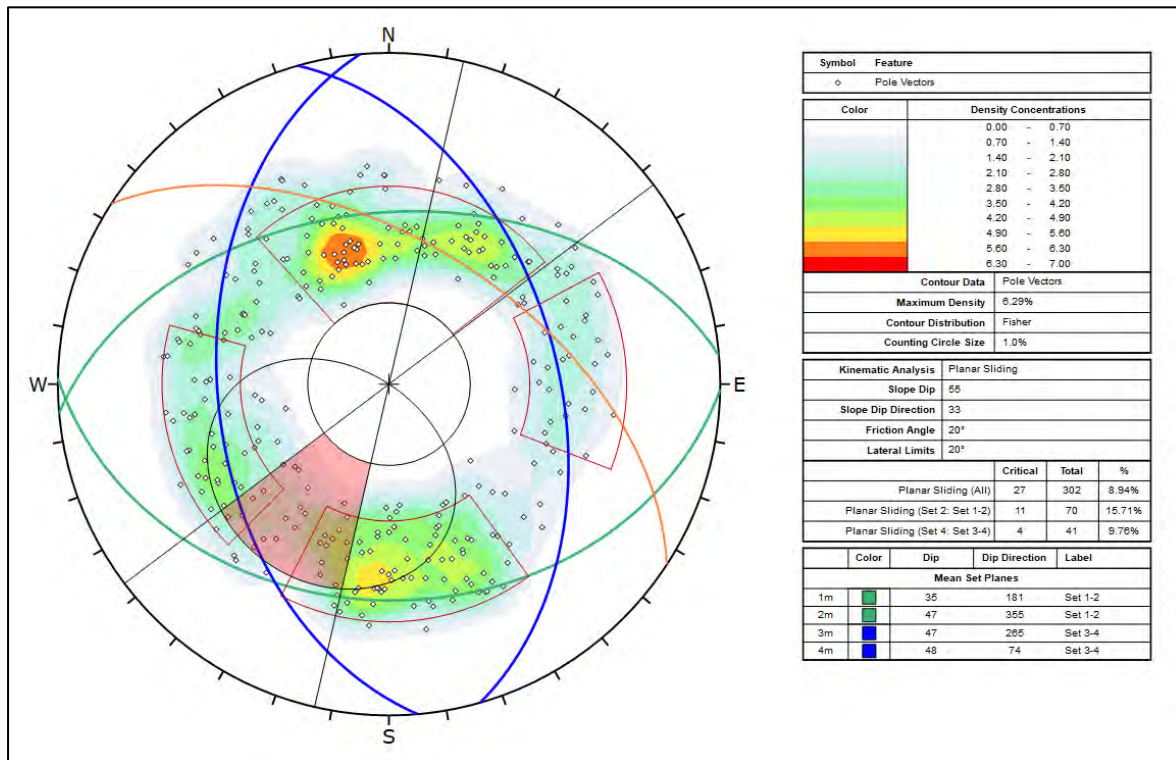


Figure: C236 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Bench Slope) –Planar Sliding.

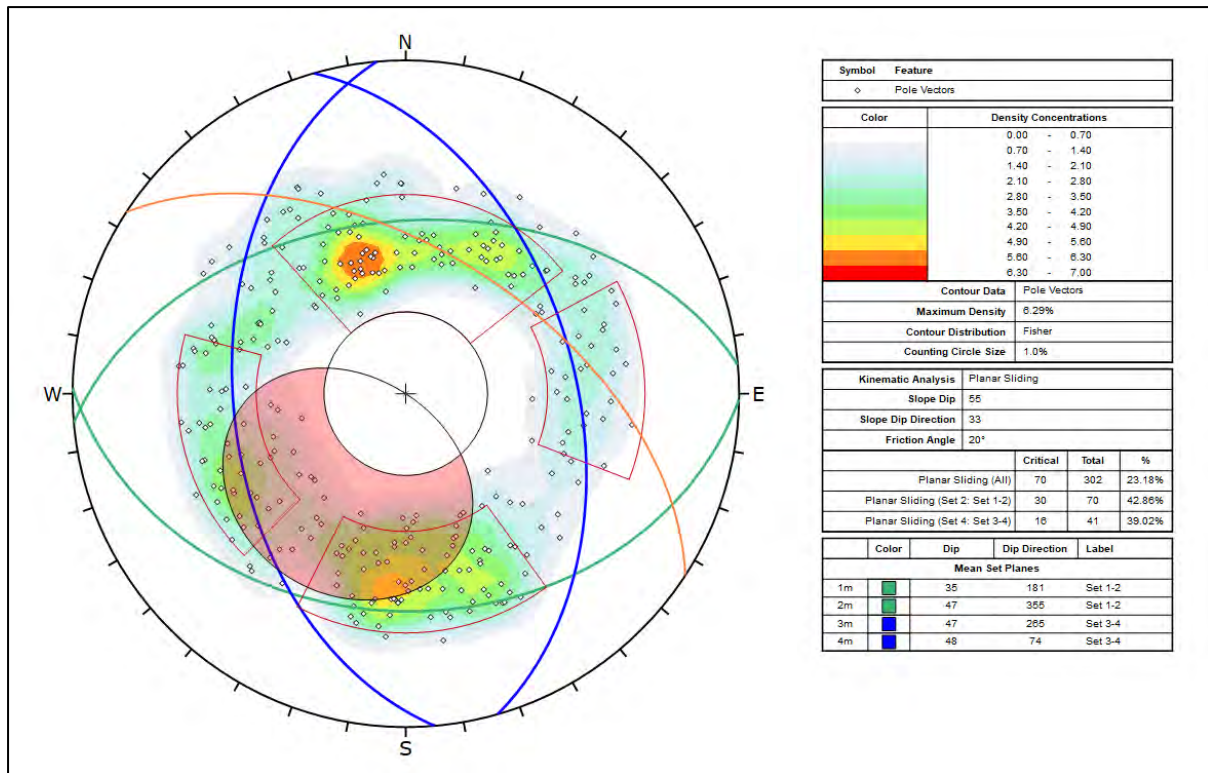


Figure: C237 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Bench Slope) –Planar Sliding (No Limits).

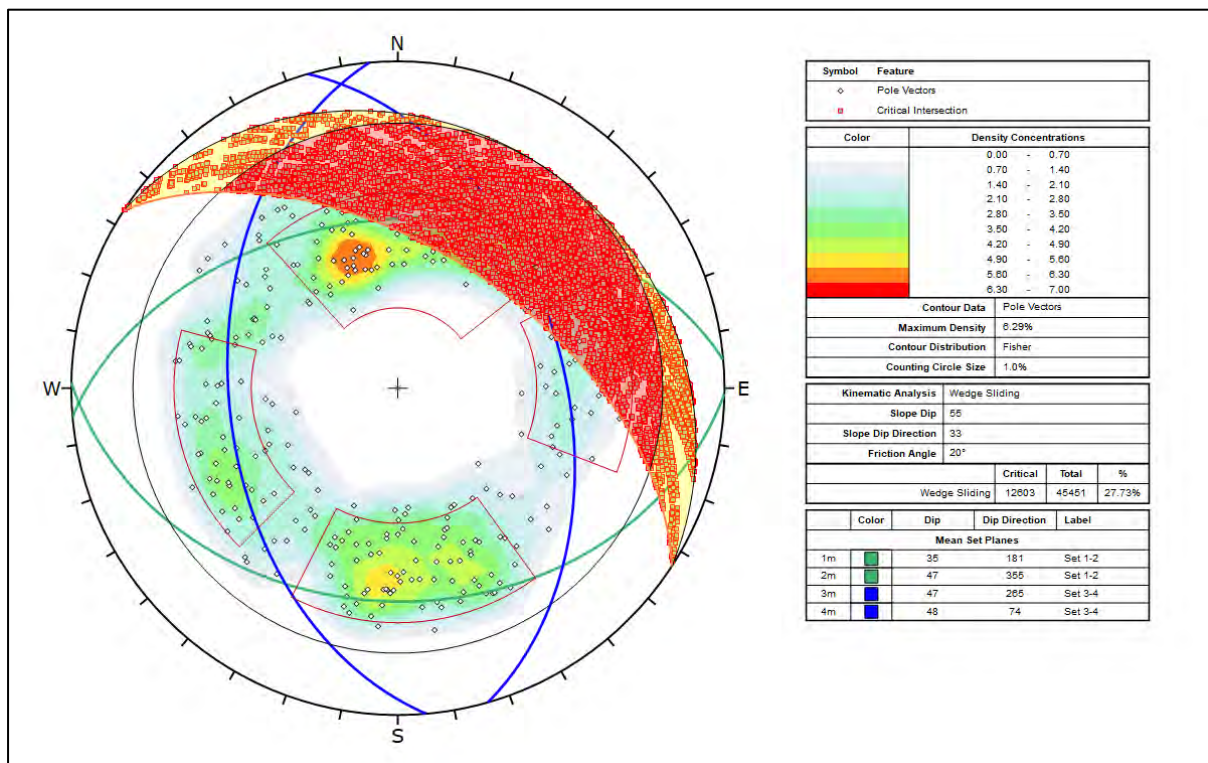


Figure: C238 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Bench Slope) –Wedge Sliding.

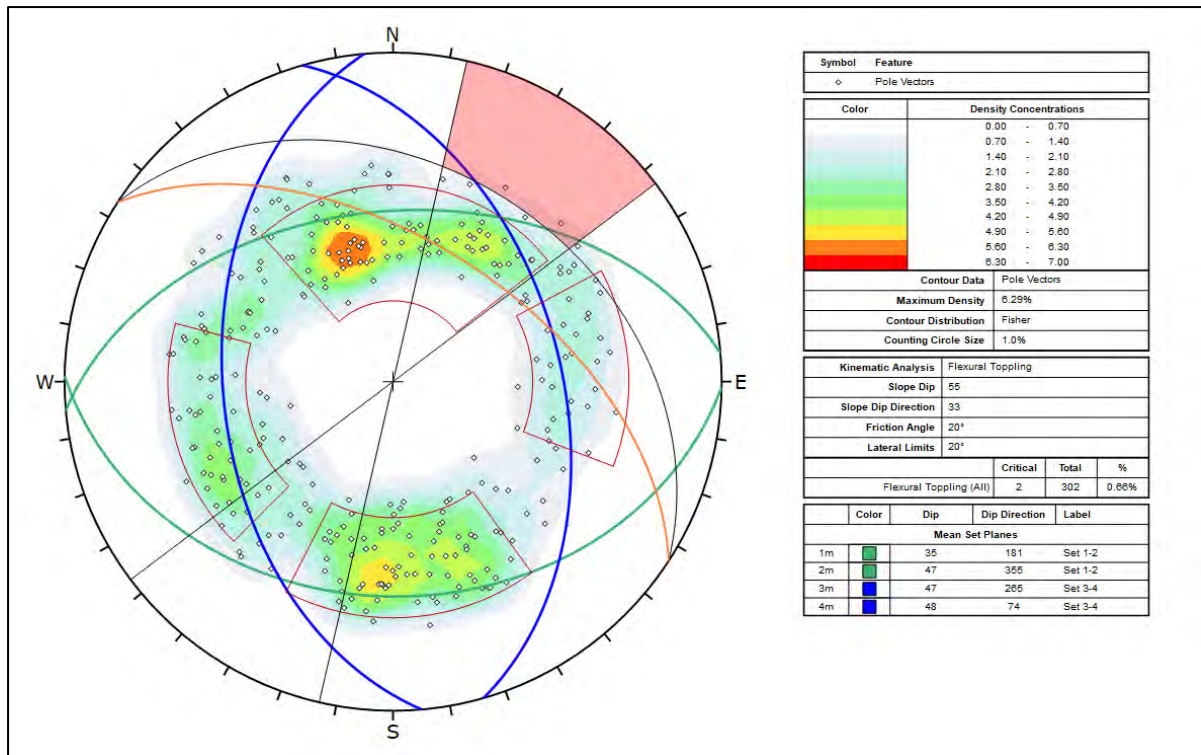


Figure: C239 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Bench Slope) –Flexural Toppling.

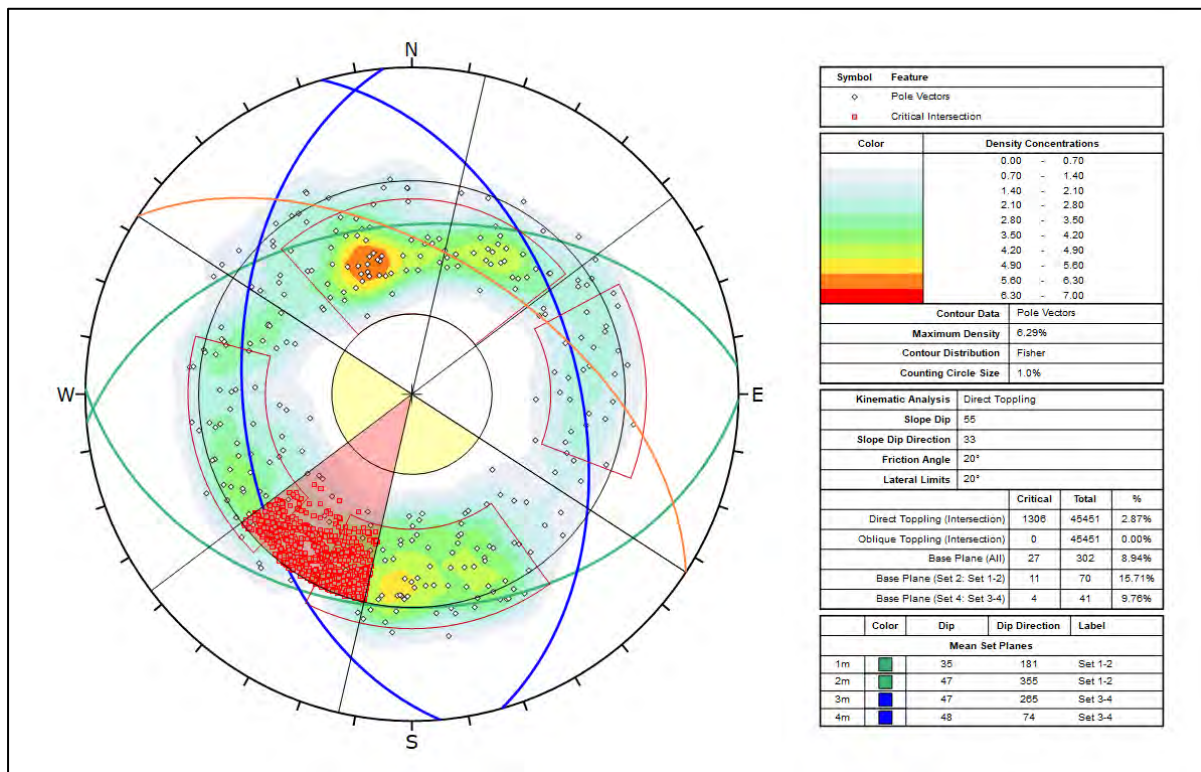


Figure: C240 - Kinematic Analysis (Fracture >30° <60°) - Highwall 4 (Bench Slope) –Direct Toppling.

Highwall 1 – Fracture >60° - Overall Slope

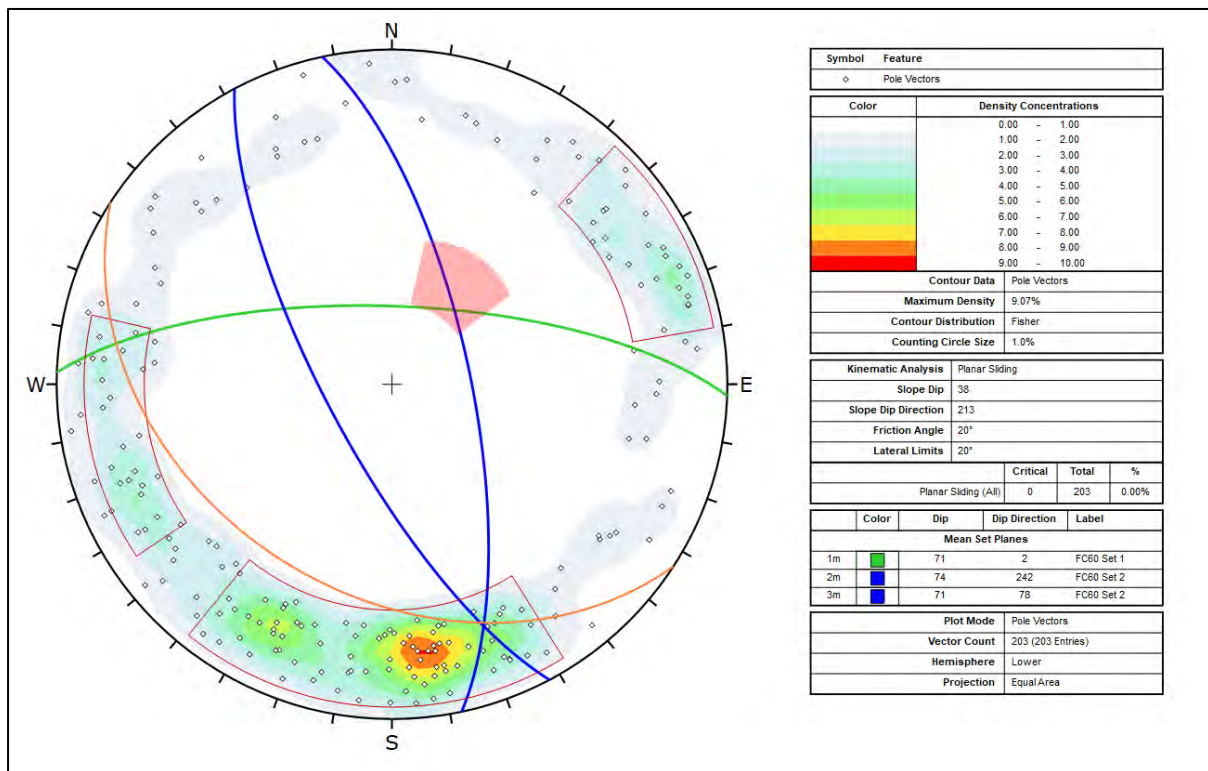


Figure: C241 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Overall Slope) –Planar Sliding.

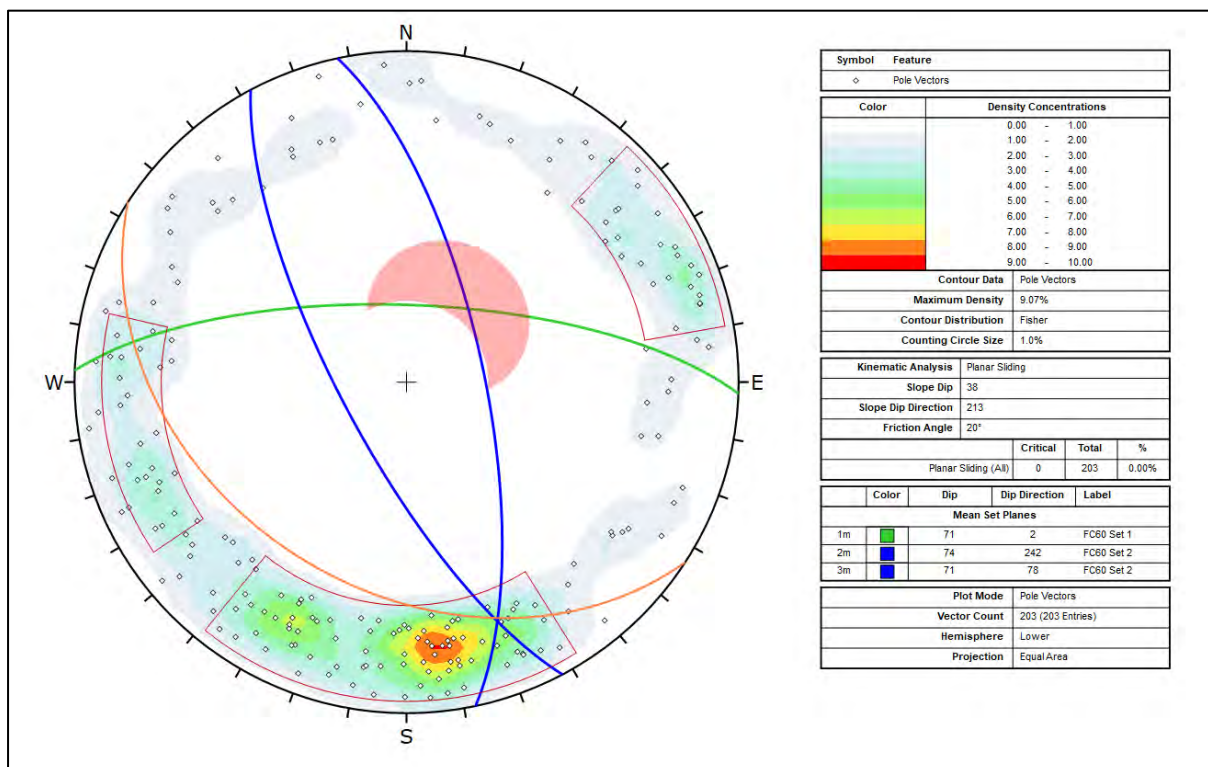


Figure: C242 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Overall Slope) –Planar Sliding (No Limits).

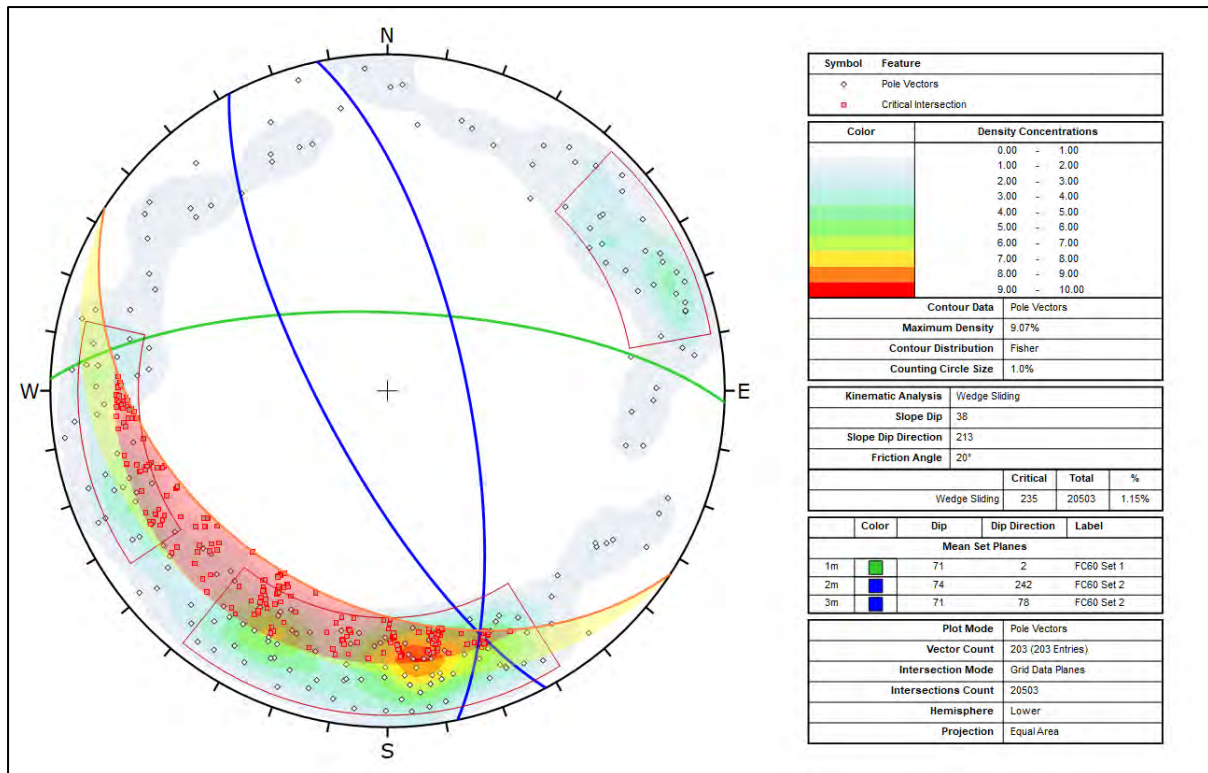


Figure: C243 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Overall Slope) –Wedge Sliding.

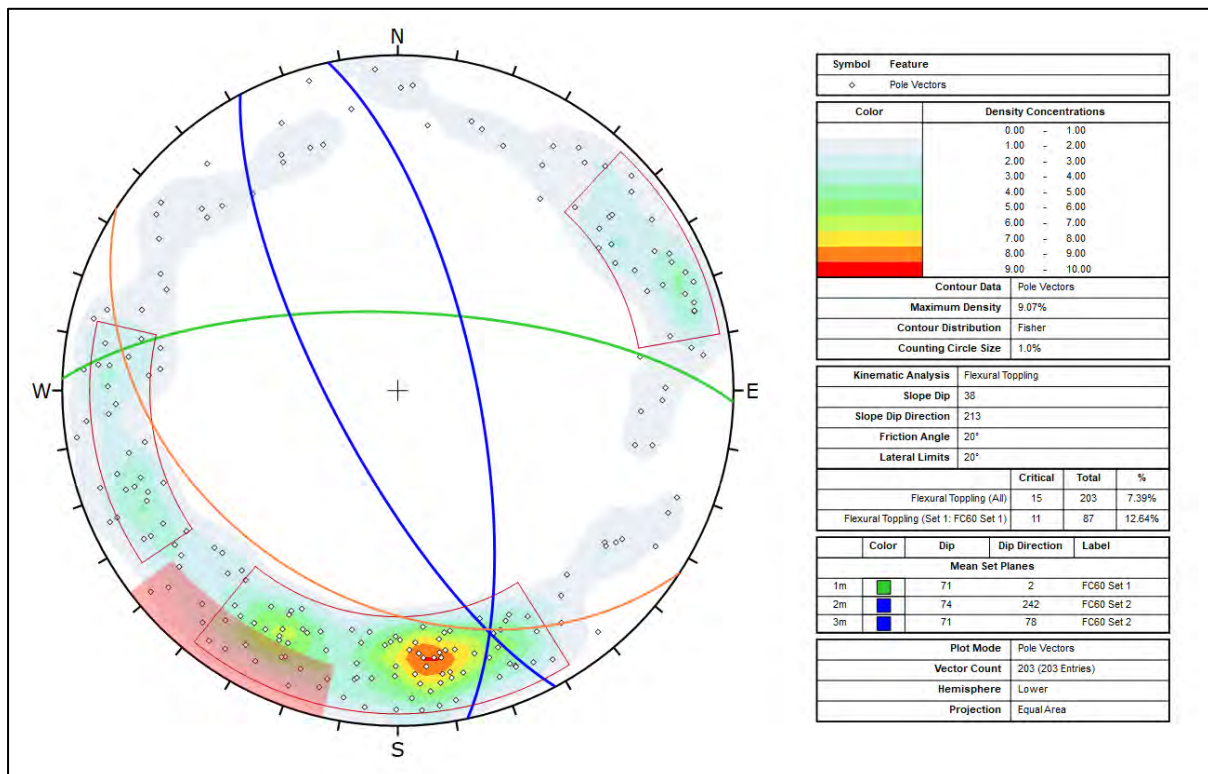


Figure: C244 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Overall Slope) –Flexural Topping.

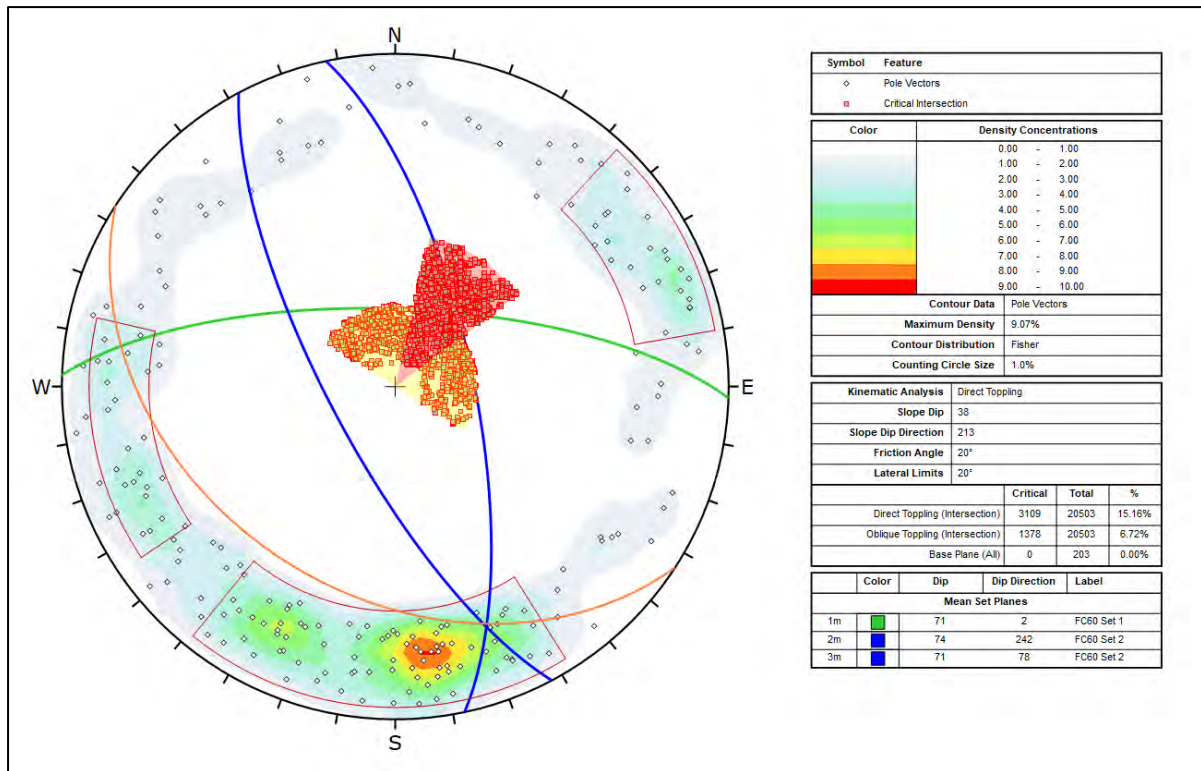


Figure: C245 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Overall Slope) -Direct Toppling.

Highwall 2 – Fracture >60° - Overall Slope

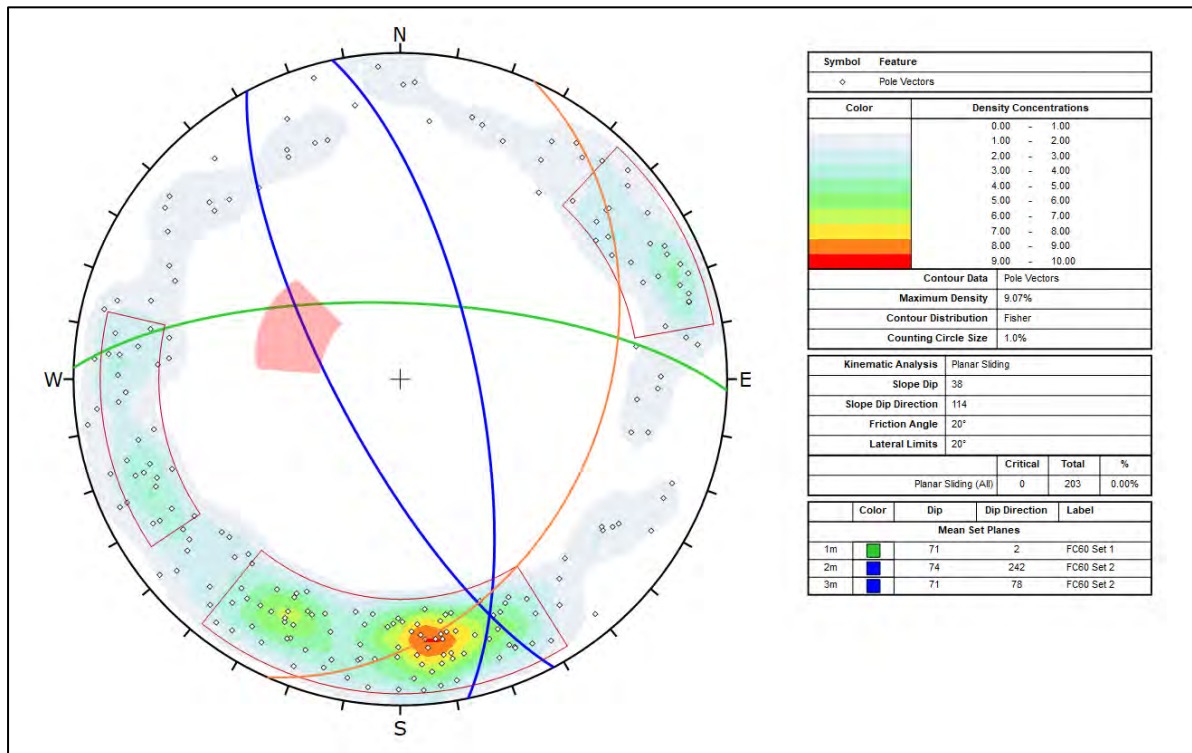


Figure: C246 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Overall Slope) -Planar Sliding.

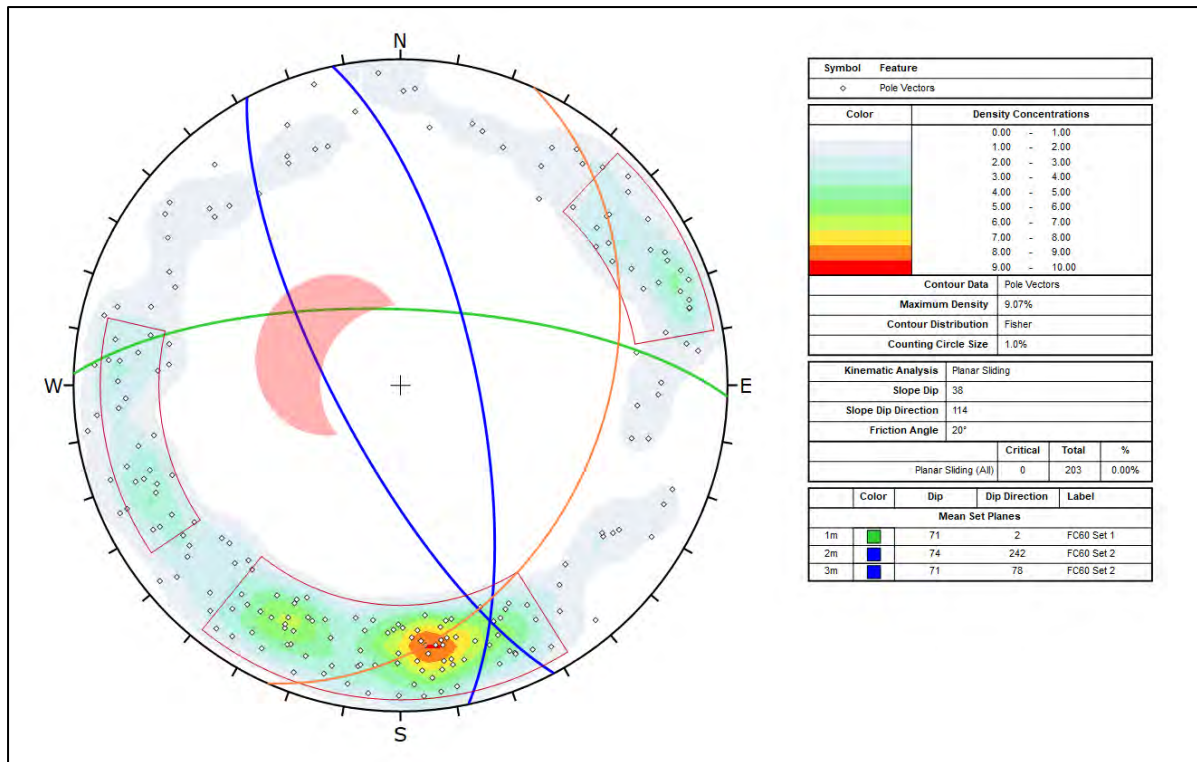


Figure: C247 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Overall Slope) –Planar Sliding (No Limits).

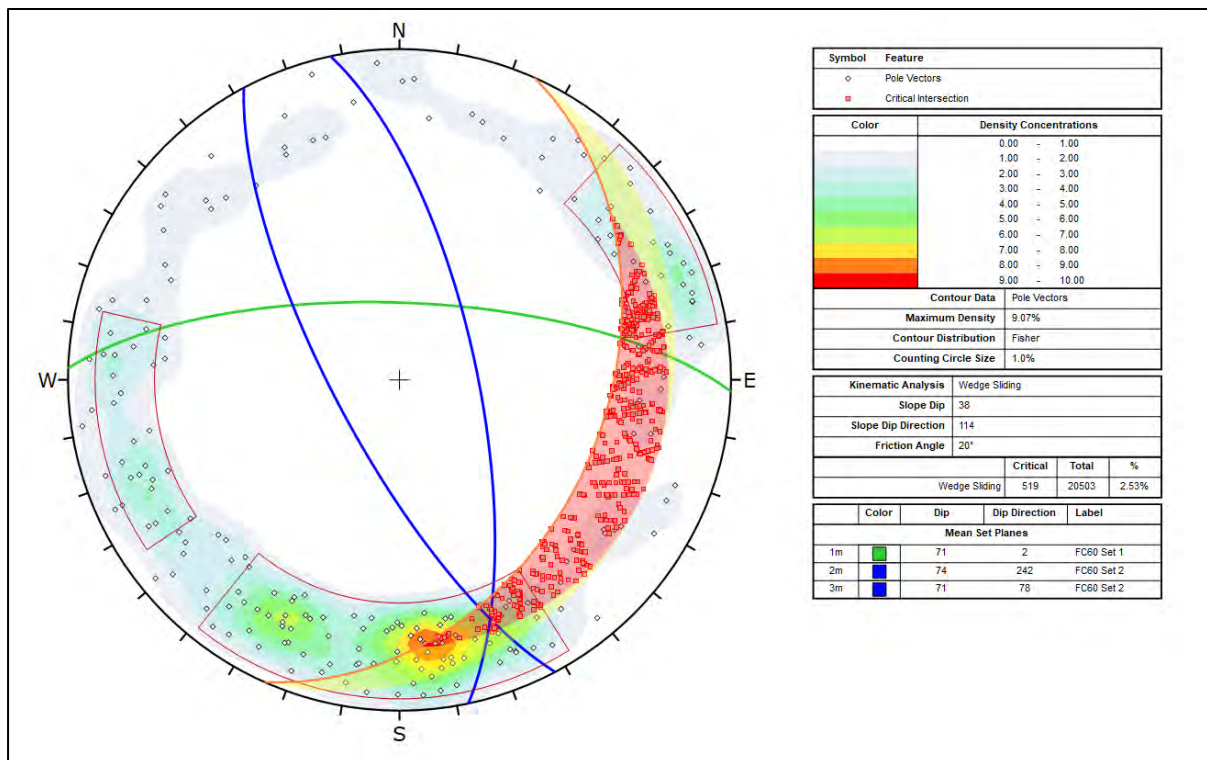


Figure: C248 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Overall Slope) –Wedge Sliding.

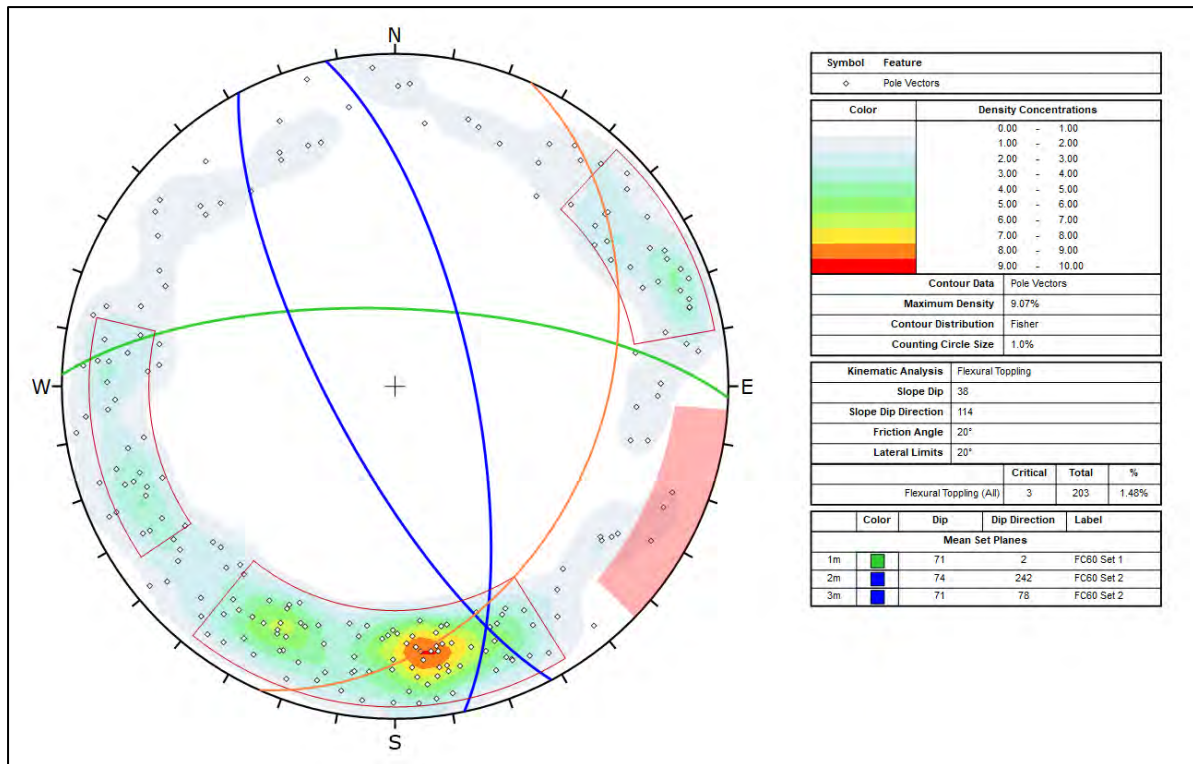


Figure: C249 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Overall Slope) –Flexural Toppling.

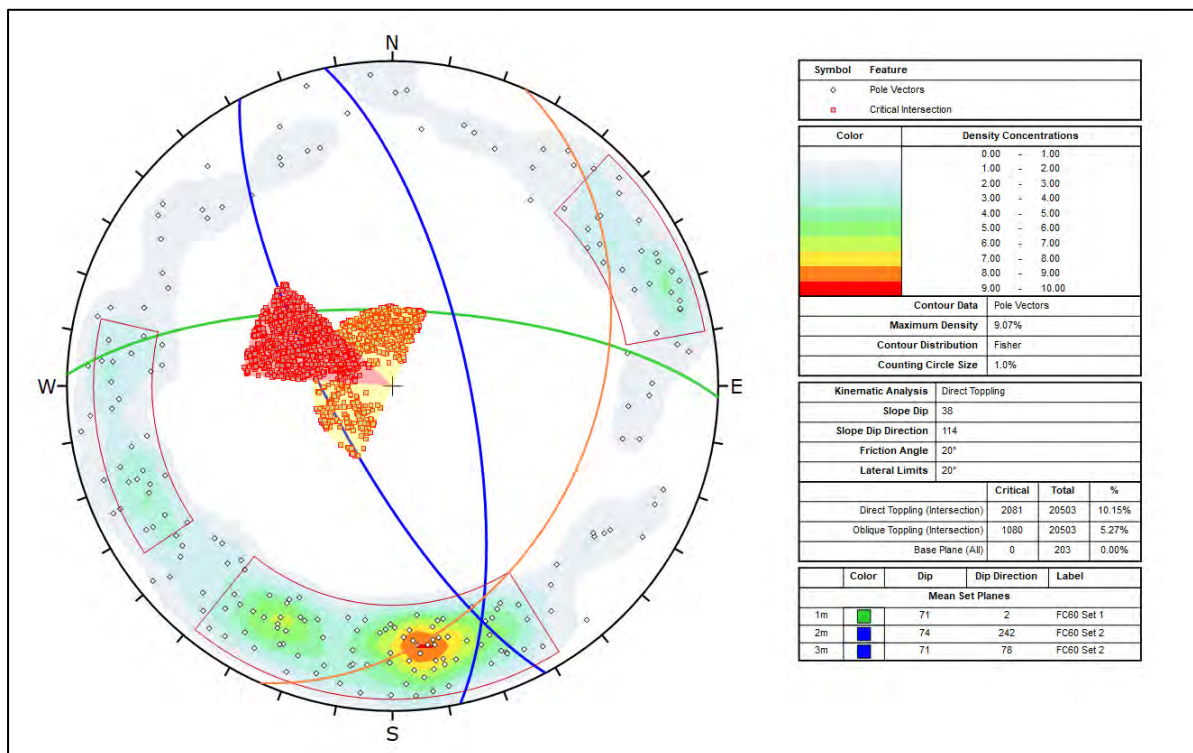


Figure: C250 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Overall Slope) –Direct Toppling.

Highwall 3 – Fracture >60° - Overall Slope

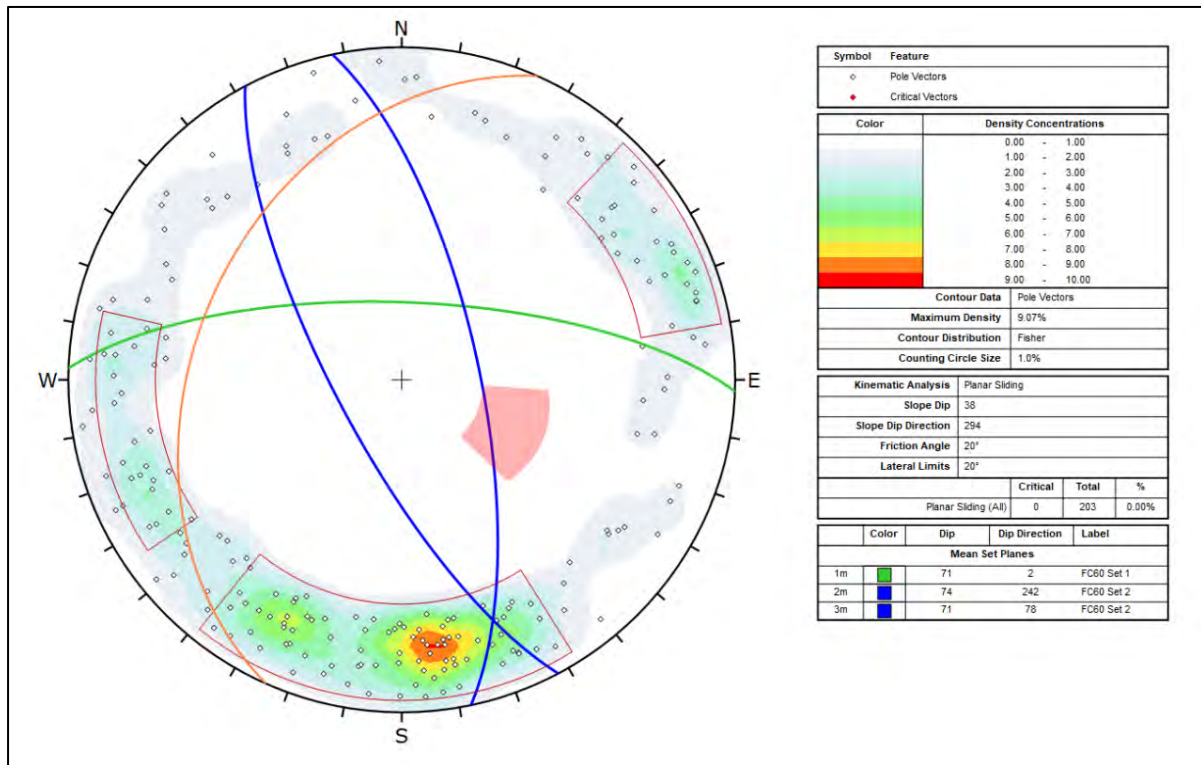


Figure: C251 - Kinematic Analysis (Fracture >60°) - Highwall 3 (Overall Slope) –Planar Sliding.

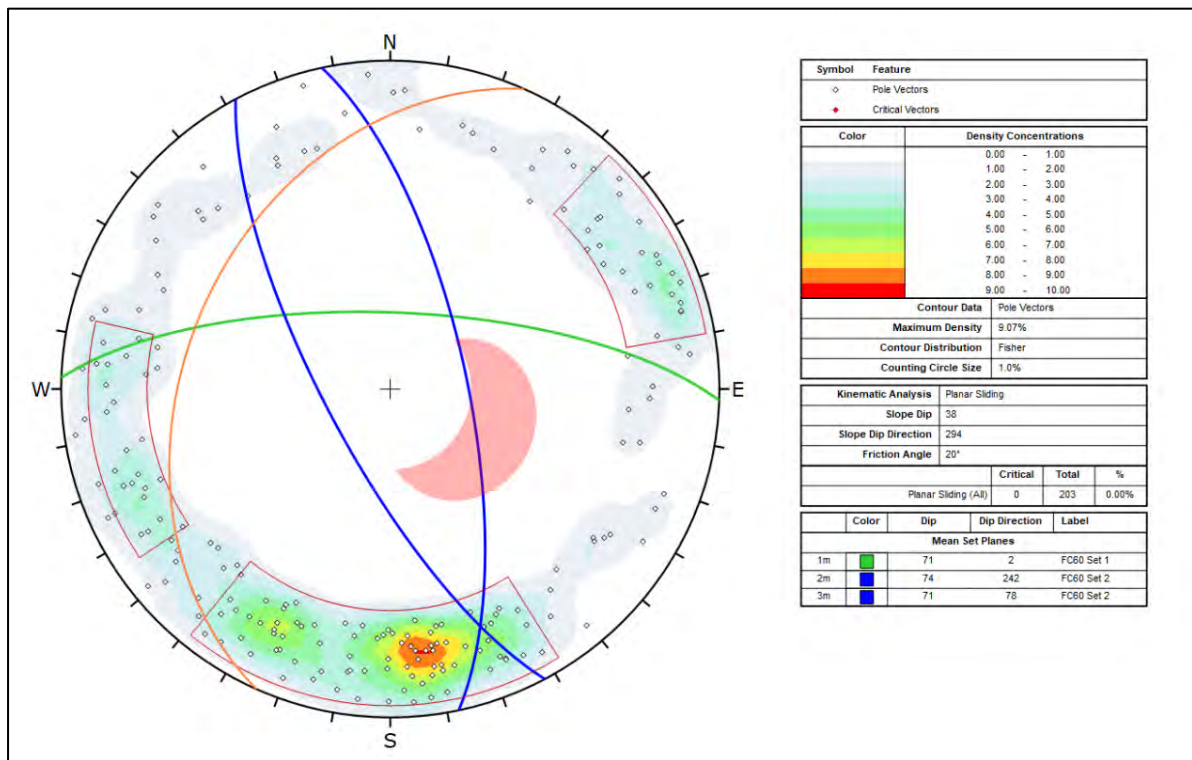


Figure: C252 - Kinematic Analysis (Fracture >60°) - Highwall 3 (Overall Slope) –Planar Sliding (No Limits).

Symbol **Feature**

- ◊ Pole Vectors
- Critical Vectors

Color **Density Concentrations**

0.00	- 1.00
1.00	- 2.00
2.00	- 3.00
3.00	- 4.00
4.00	- 5.00
5.00	- 6.00
6.00	- 7.00
7.00	- 8.00
8.00	- 9.00
9.00	- 10.00

Contour Data **Pole Vectors**

Maximum Density	9.07%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis **Flexural Topping**

Slope Dip	38
Slope Dip Direction	294
Friction Angle	20°
Lateral Limits	20°

	Critical	Total	%
Flexural Topping (All)	8	203	3.94%
Flexural Topping (Set 3: FC60 Set 2)	3	23	13.04%

Mean Set Planes

	Color	Dip	Dip Direction	Label
1m	Green	71	2	FC60 Set 1
2m	Blue	74	242	FC60 Set 2
3m	Blue	71	78	FC60 Set 2

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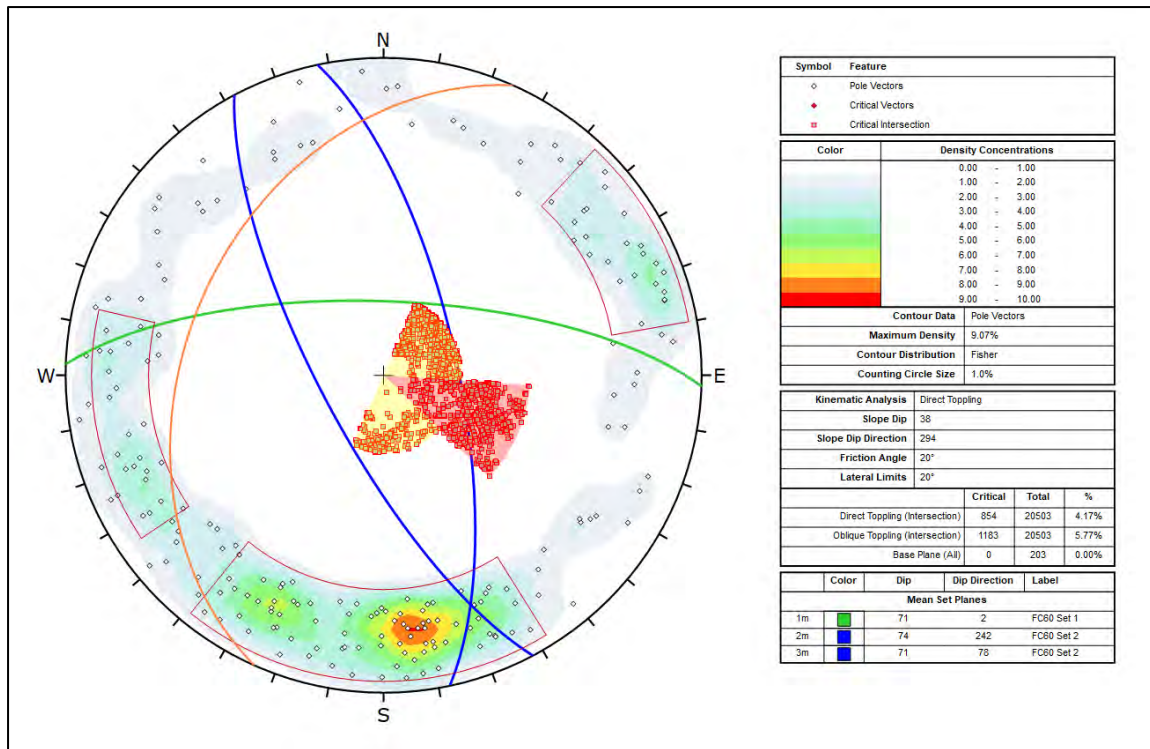


Figure: C255 - Kinematic Analysis (Fracture >60°) - Highwall 3 (Overall Slope) –Direct Toppling.

Highwall 4 – Fracture >60° - Overall Slope

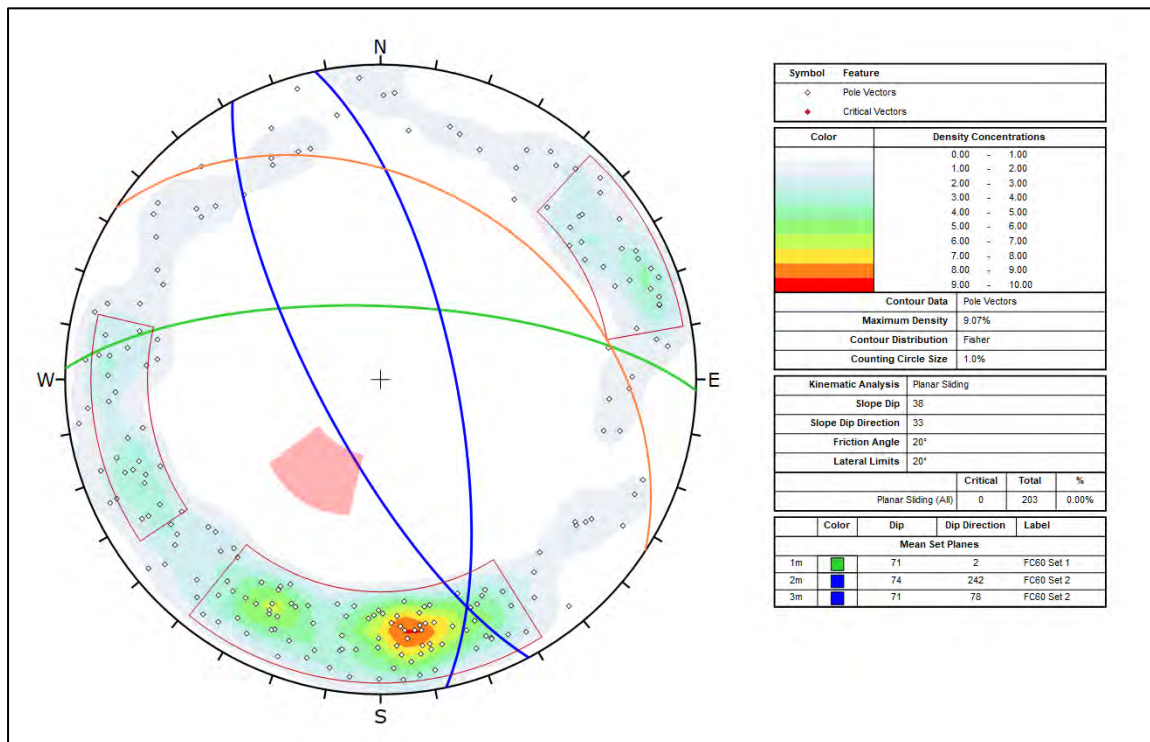


Figure: C256 - Kinematic Analysis (Fracture >60°) - Highwall 4 (Overall Slope) –Planar Sliding.

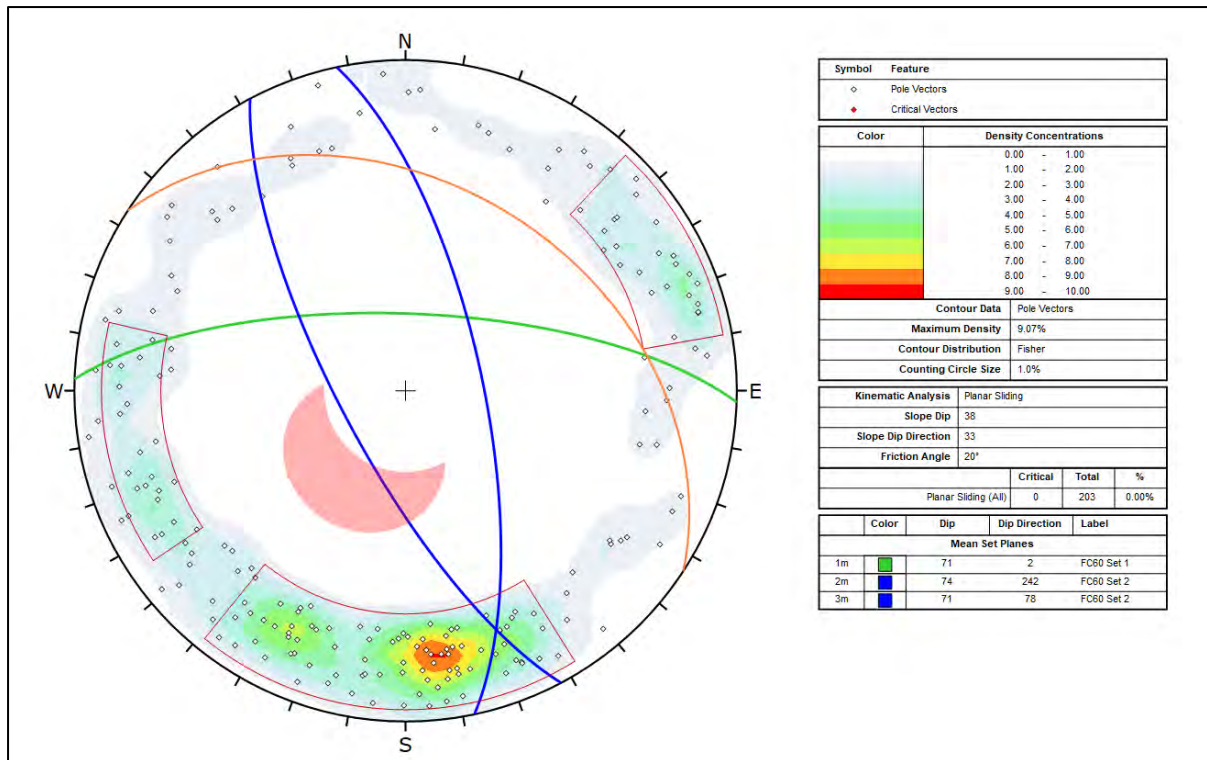
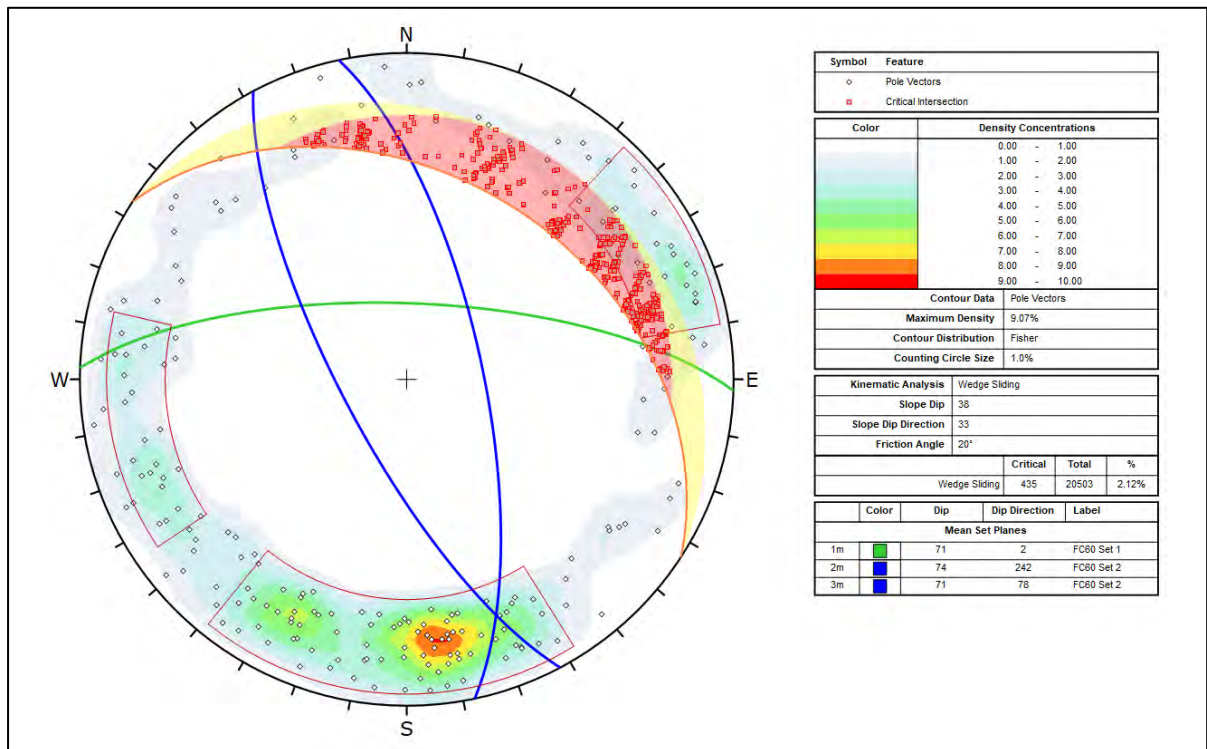


Figure: C257 - Kinematic Analysis (Fracture >60°) - Highwall 4 (Overall Slope) - Planar Sliding (No Limits).



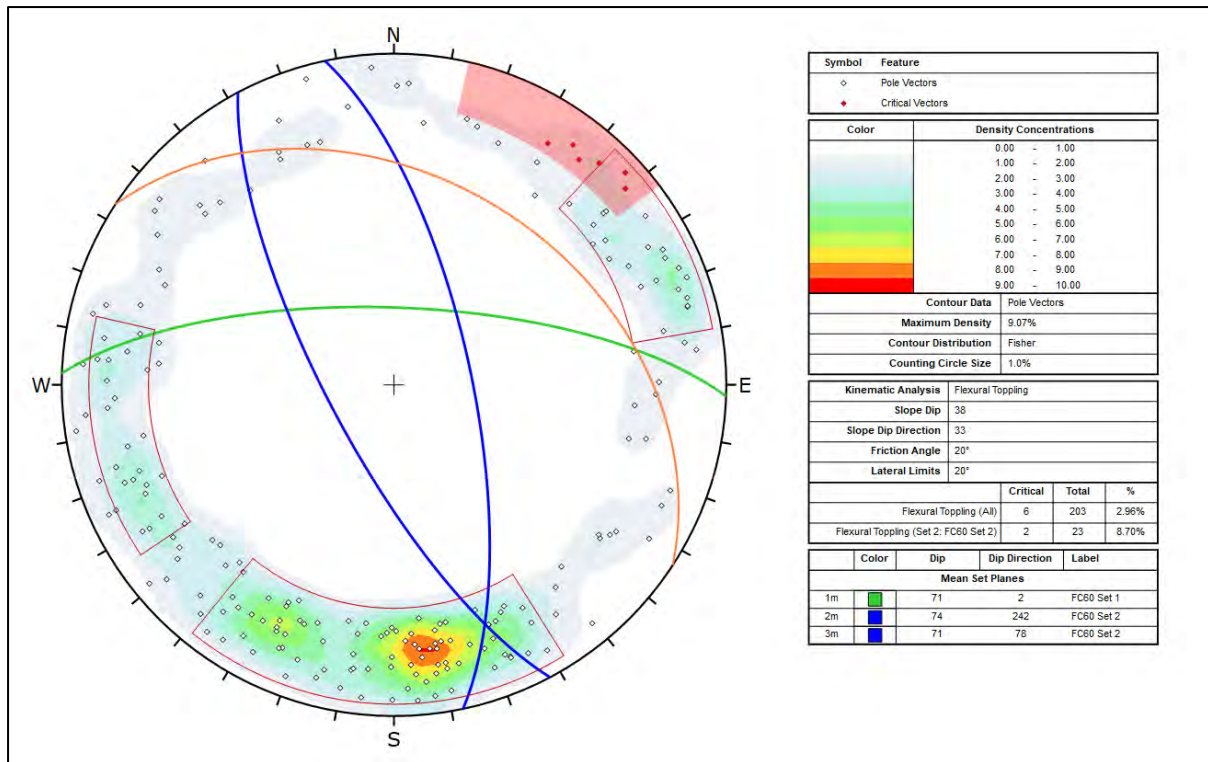


Figure: C259 - Kinematic Analysis (Fracture >60°) - Highwall 4 (Overall Slope) –Flexural Toppling.

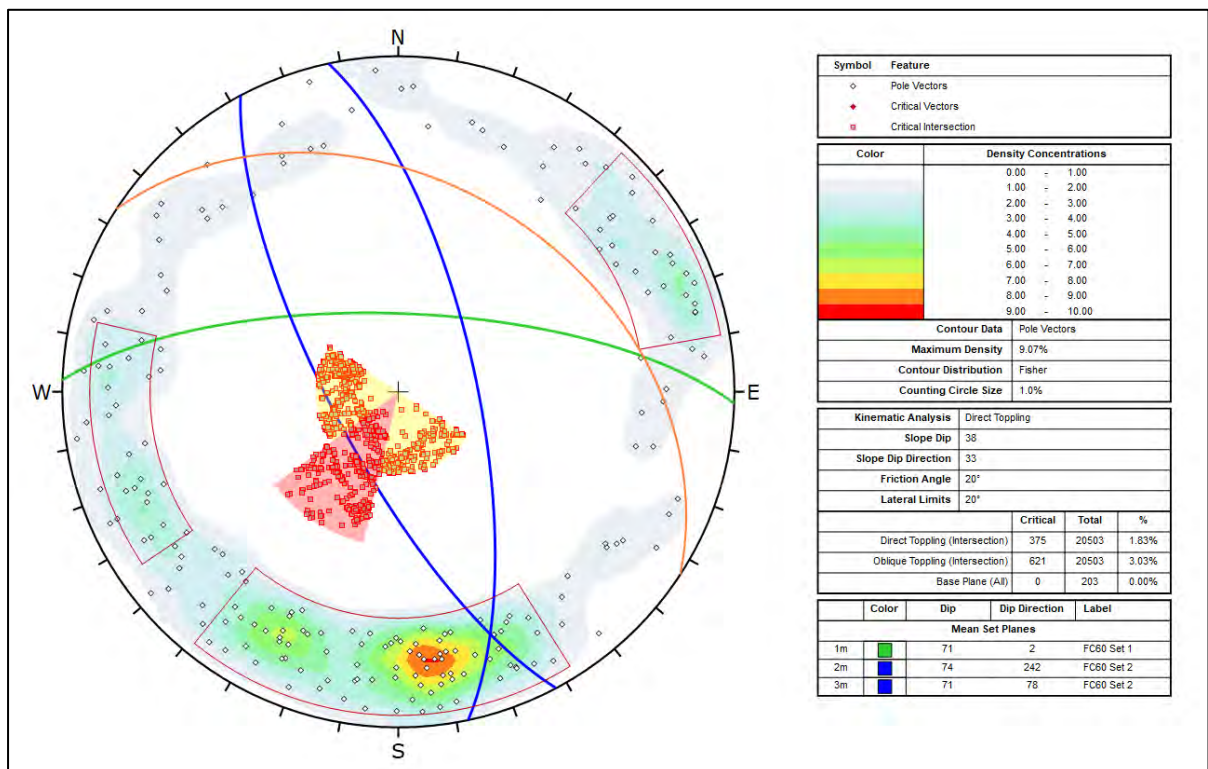


Figure: C260 - Kinematic Analysis (Fracture >60°) - Highwall 4 (Overall Slope) –Direct Toppling.

Highwall 1 – Fracture >60° - Bench Slope

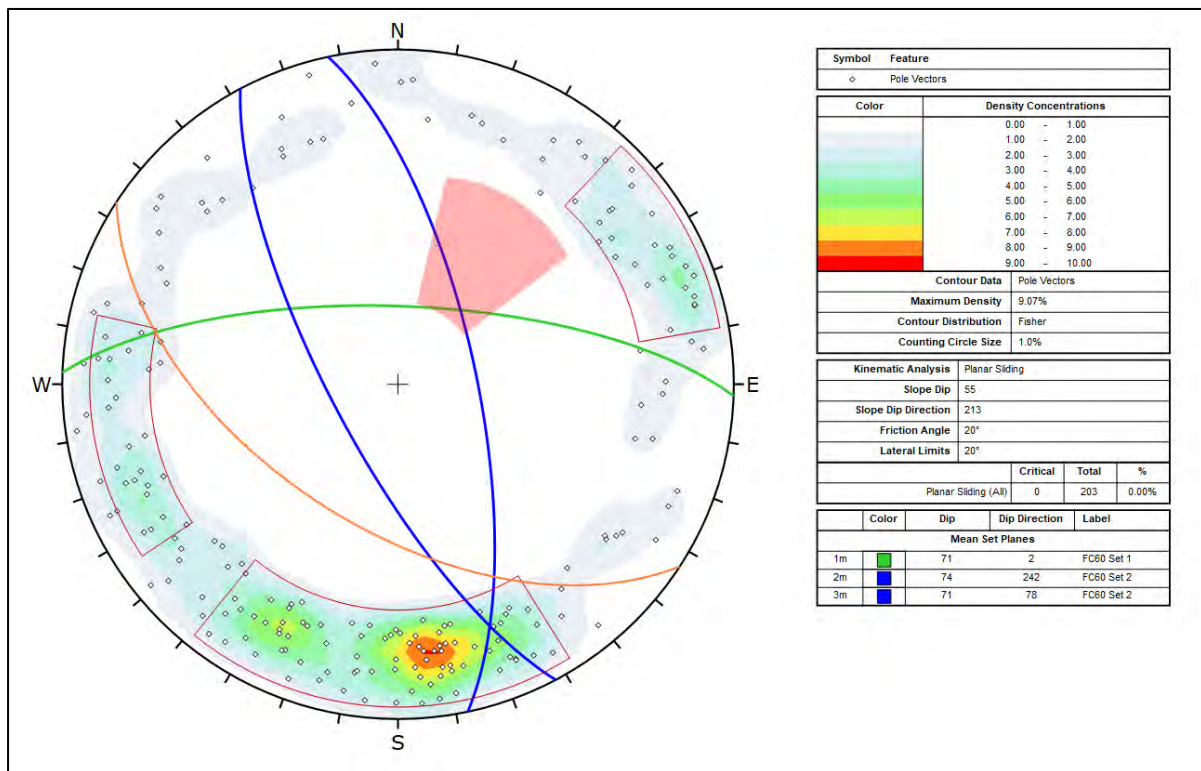


Figure: C261 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Bench Slope) –Planar Sliding.

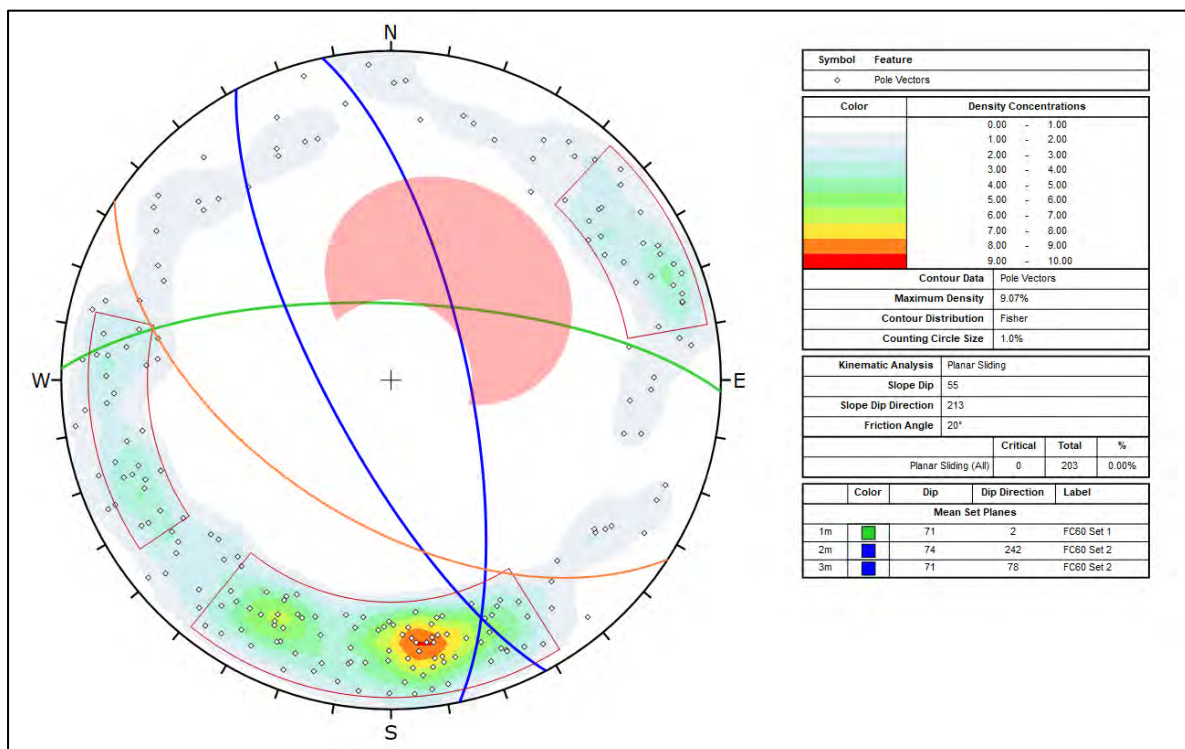


Figure: C262 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Bench Slope) –Planar Sliding (No Limits).

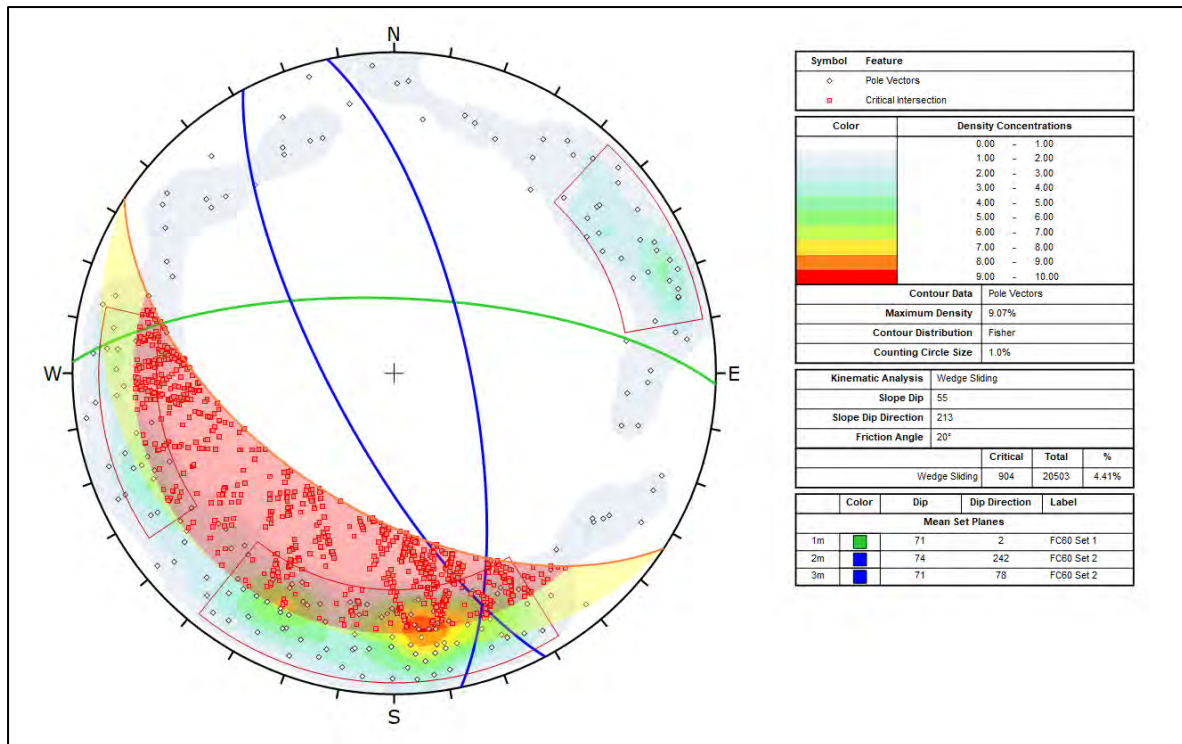


Figure: C263 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Bench Slope) –Wedge Sliding

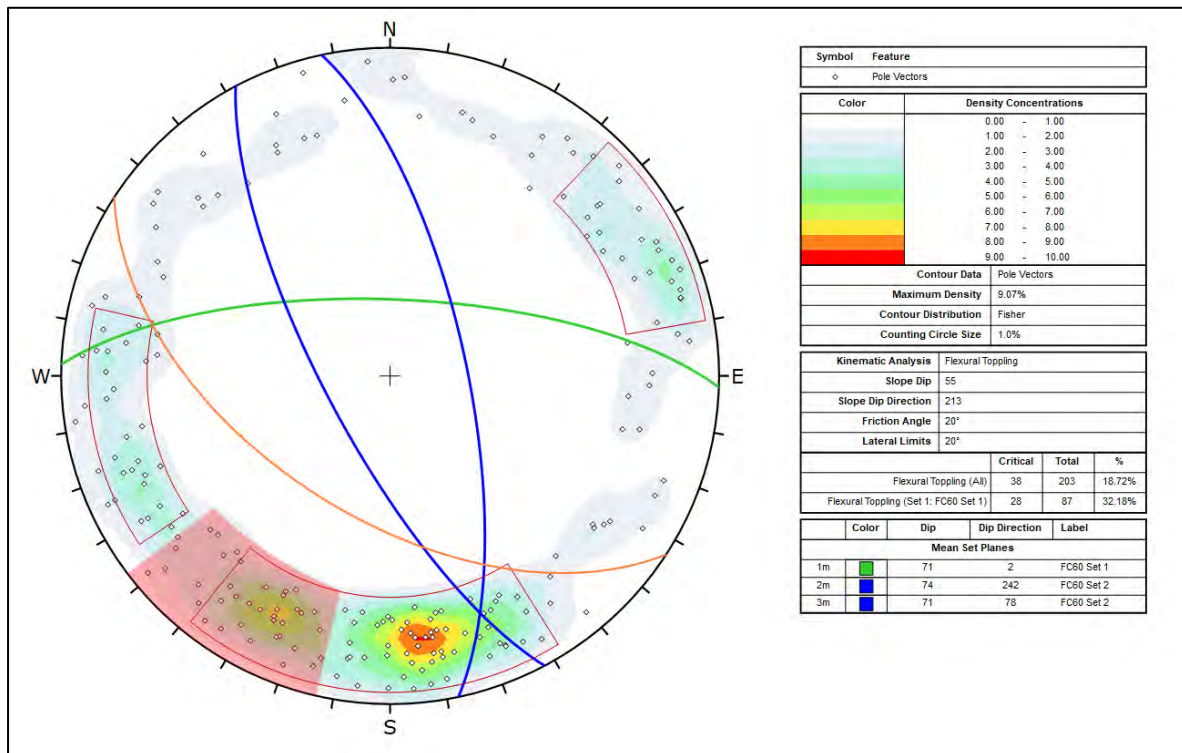


Figure: C264 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Bench Slope) –Flexural Toppling.

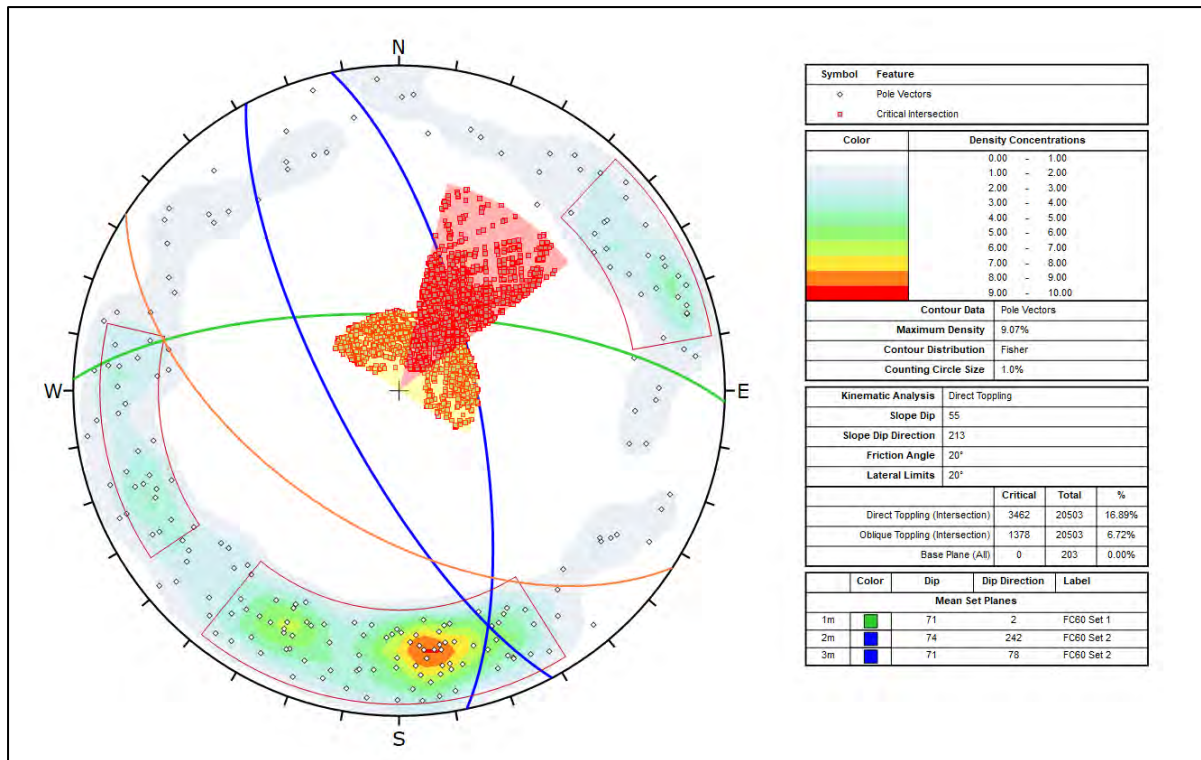


Figure: C265 - Kinematic Analysis (Fracture >60°) - Highwall 1 (Bench Slope) -Direct Toppling.

Highwall 2 – Fracture >60° - Bench Slope

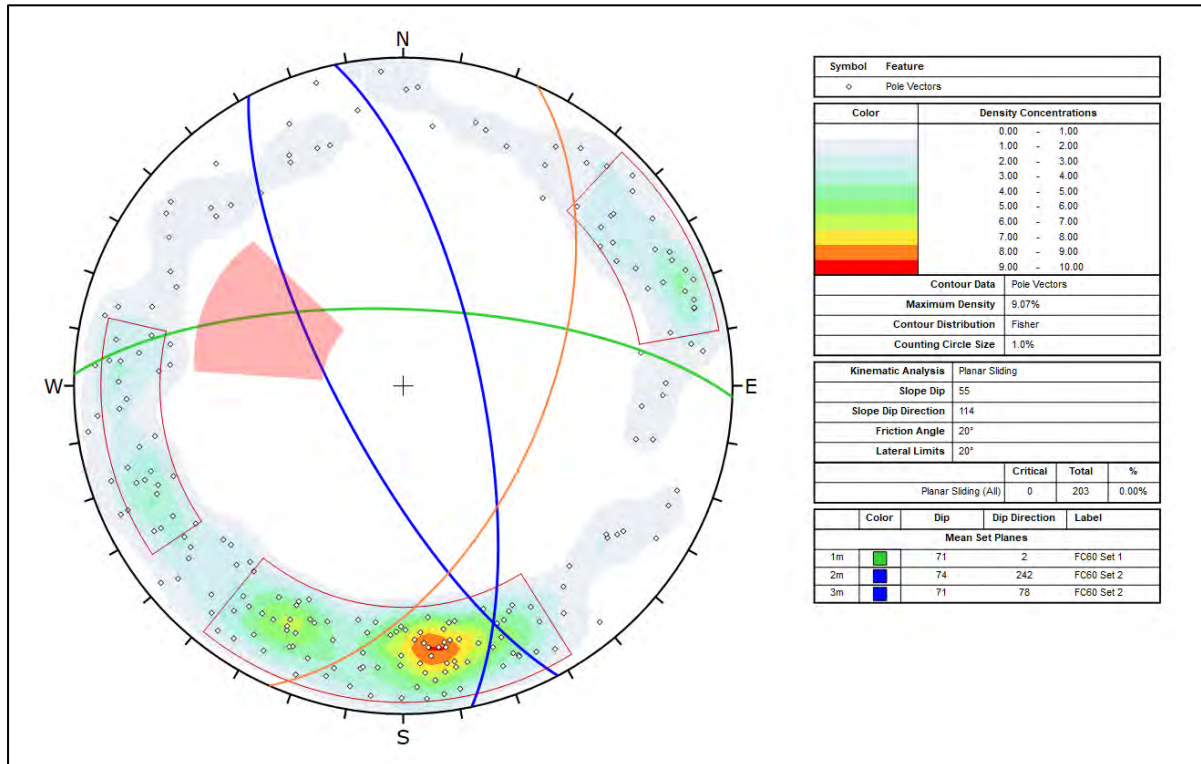


Figure: C266 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Bench Slope) -Planar Sliding.

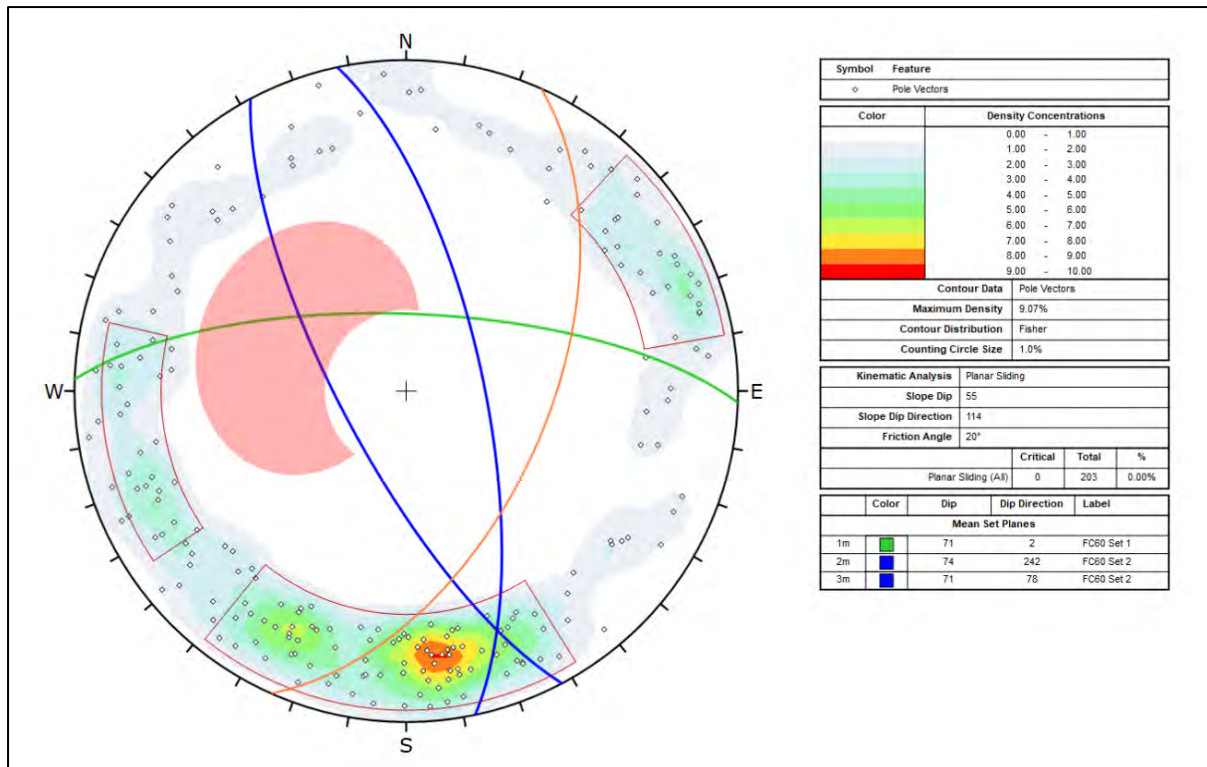


Figure: C267 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Bench Slope) -Planar Sliding (No Limits).

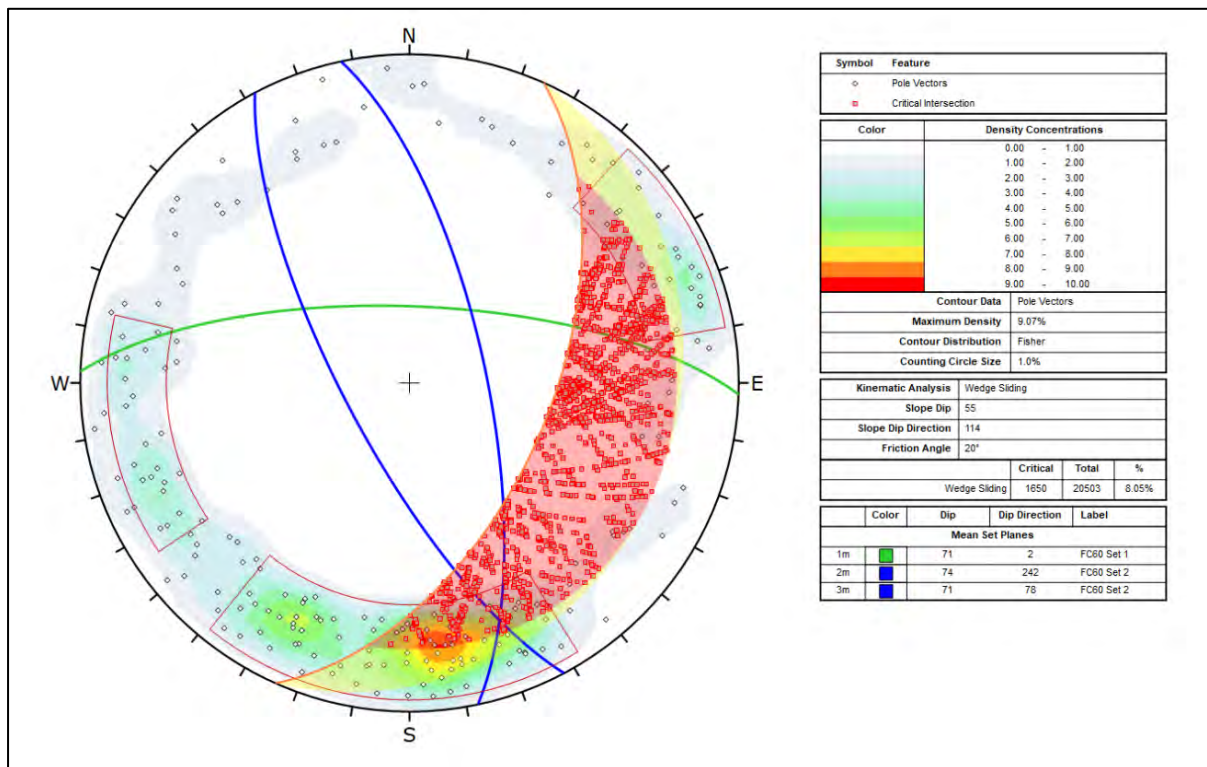


Figure: C268 - Kinematic Analysis (Fracture >60°) - Highwall 2 (Bench Slope) -Wedge Sliding.

Symbol Feature

- ◊ Pole Vectors
- ✦ Critical Vectors
- Critical Intersection

Color	Density Concentrations
	0.00 ~ 1.00
	1.00 ~ 2.00
	2.00 ~ 3.00
	3.00 ~ 4.00
	4.00 ~ 5.00
	5.00 ~ 6.00
	6.00 ~ 7.00
	7.00 ~ 8.00
	8.00 ~ 9.00
	9.00 ~ 10.00

Contour Data Pole Vectors

- Maximum Density 9.07%
- Contour Distribution Fisher
- Counting Circle Size 1.0%

Kinematic Analysis Direct Topping

- Slope Dip 55
- Slope Dip Direction 114
- Friction Angle 20°
- Lateral Limits 20°

	Critical	Total	%
Direct Topping (Intersection)	2821	20503	13.76%
Oblique Topping (Intersection)	1080	20503	5.27%
Base Plane (All)	0	203	0.00%

	Color	Dip	Dip Direction	Label
Mean Set Planes				
1m		71	2	FC60 Set 1
2m		74	242	FC60 Set 2
3m		71	78	FC60 Set 2

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Highwall 3 – Fracture >60° - Bench Slope

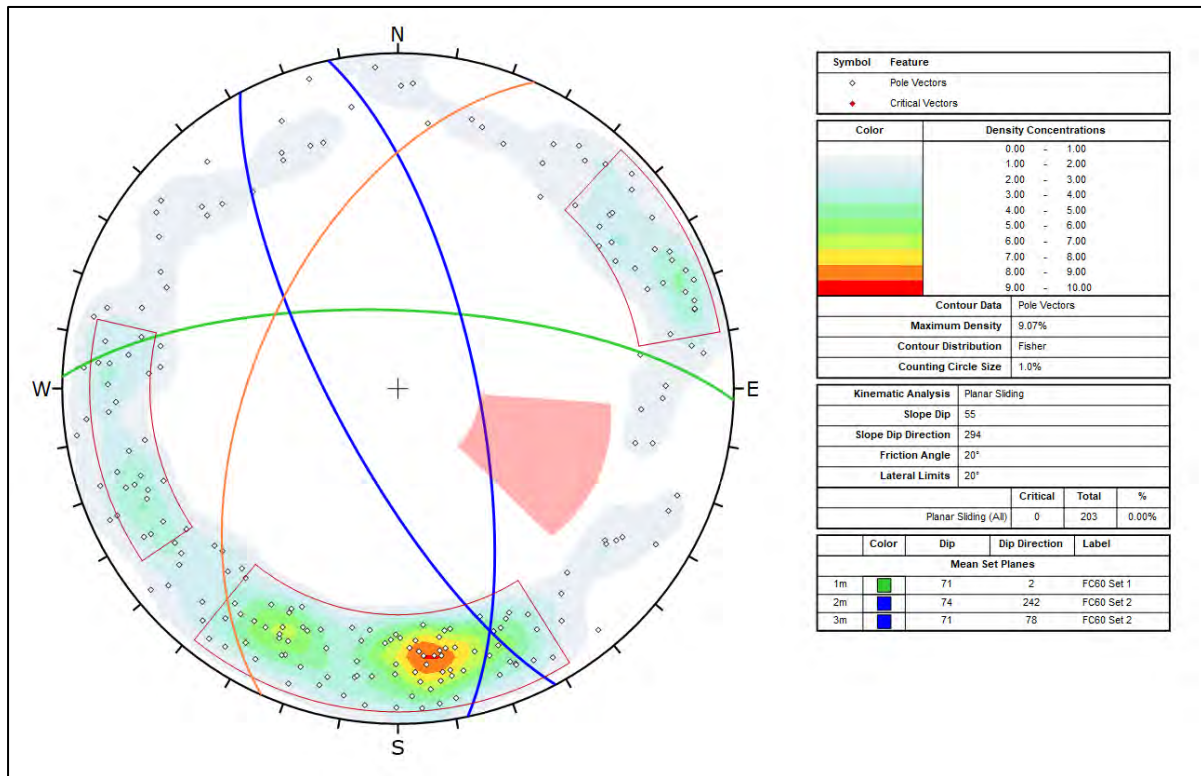


Figure: C271 - Kinematic Analysis (Fracture >60°) - Highwall 3 (Bench Slope) – Planar Sliding.

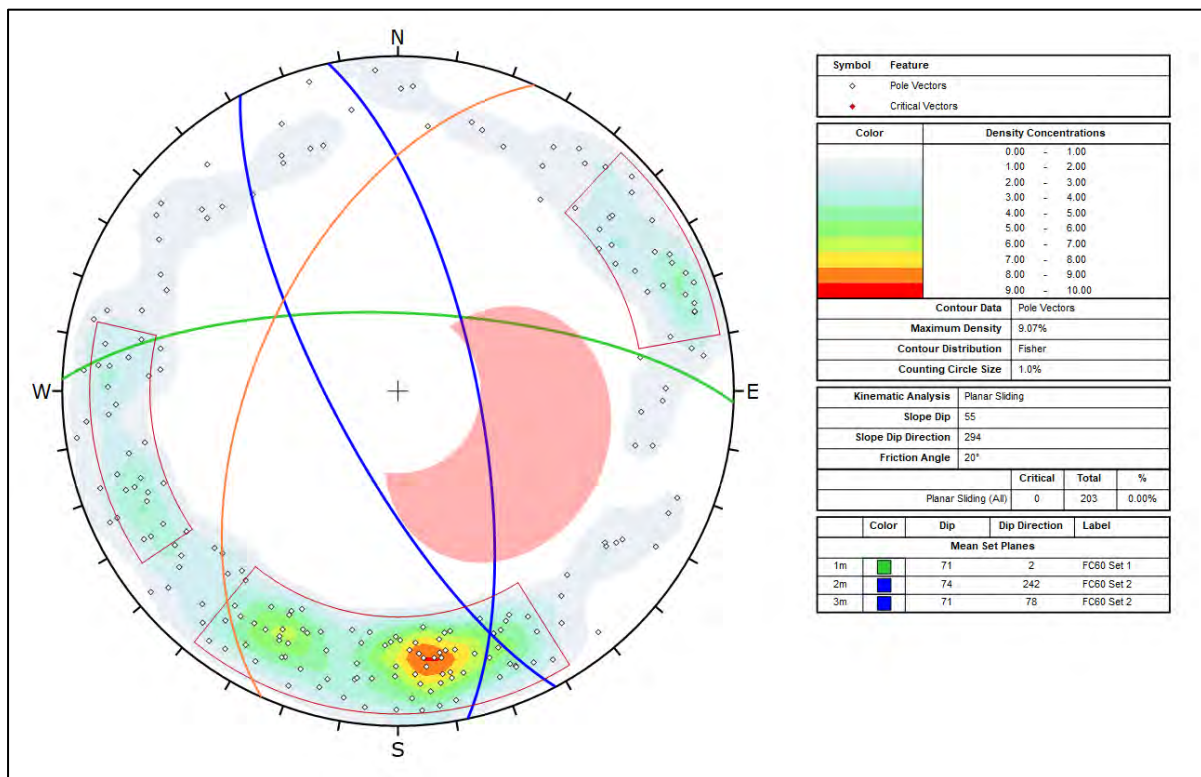


Figure: C272 - Kinematic Analysis (Fracture >60°) – Highwall 3 (Bench Slope) – Planar Sliding (No Limits).

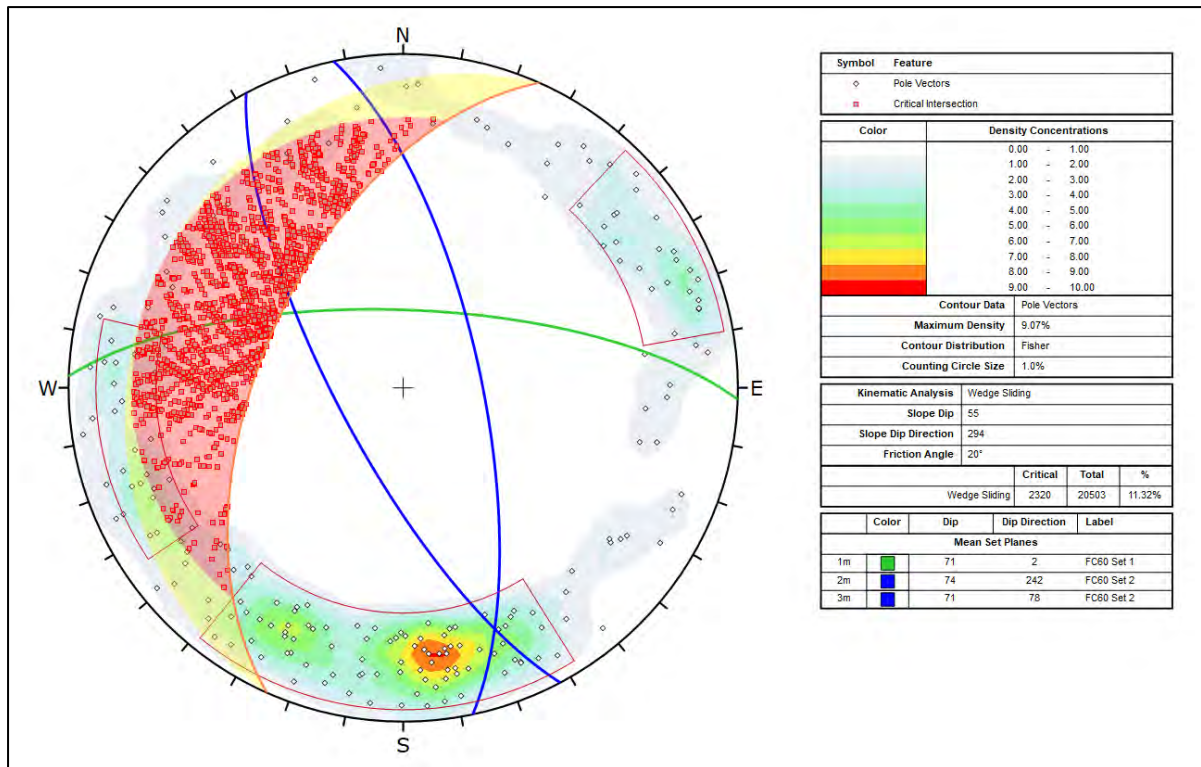


Figure: C273 - Kinematic Analysis (Fracture >60°) – Highwall 3 (Bench Slope) – Wedge Sliding.

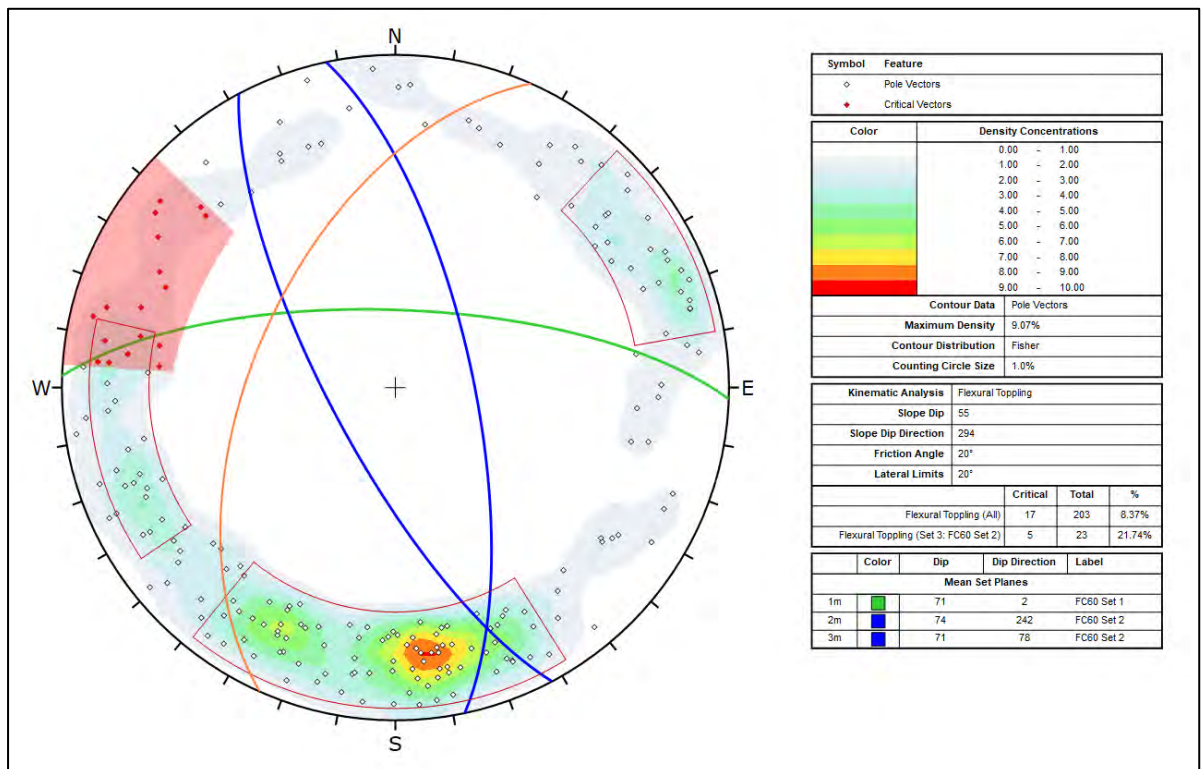


Figure: C274 - Kinematic Analysis (Fracture >60°) – Highwall 3 (Bench Slope) – Flexural Toppling.

Highwall 4 – Fracture $>60^\circ$ - Bench Slope

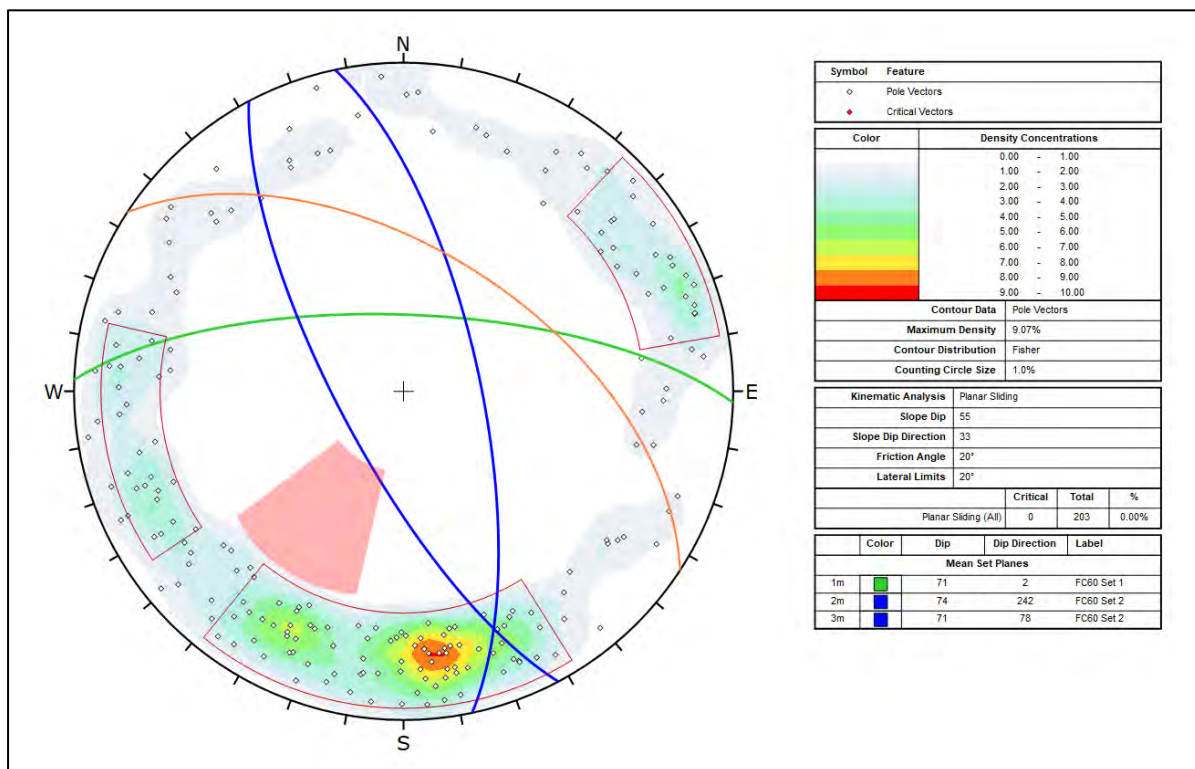


Figure: C276 - Kinematic Analysis (Fracture >60°) – Highwall 4 (Bench Slope) – Planar Sliding.

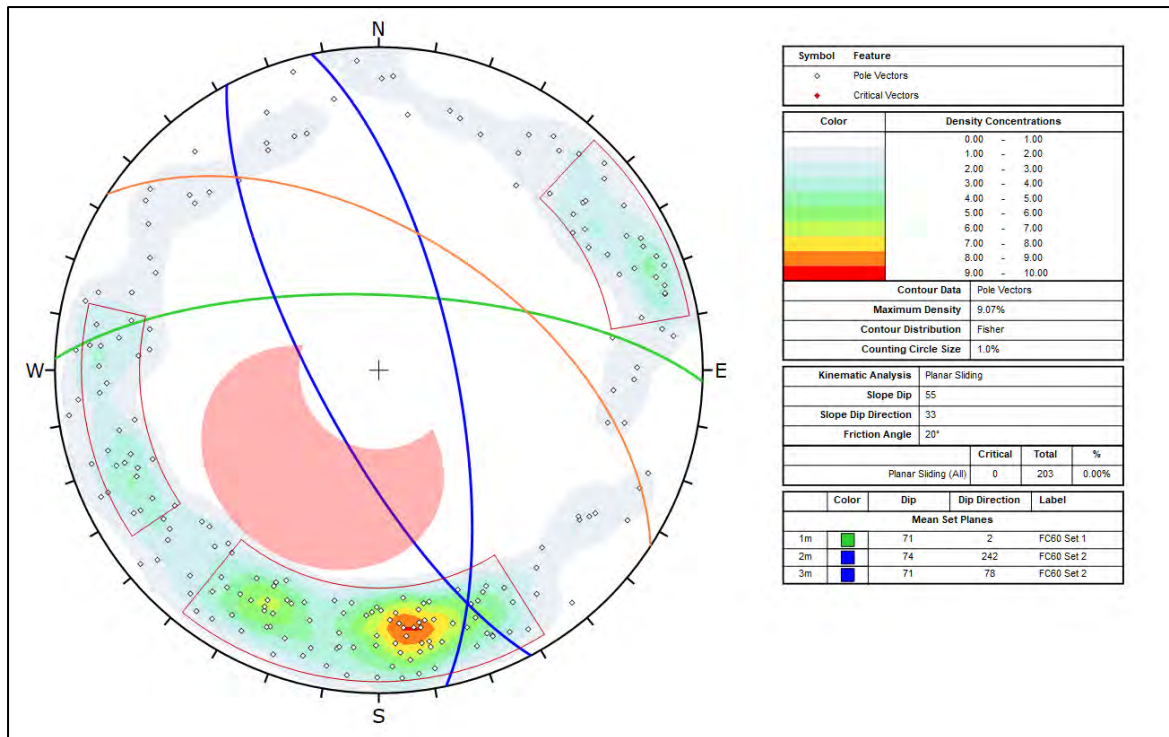


Figure: C277 - Kinematic Analysis (Fracture >60°) – Highwall 4 (Bench Slope) – Planar Sliding (No Limits).

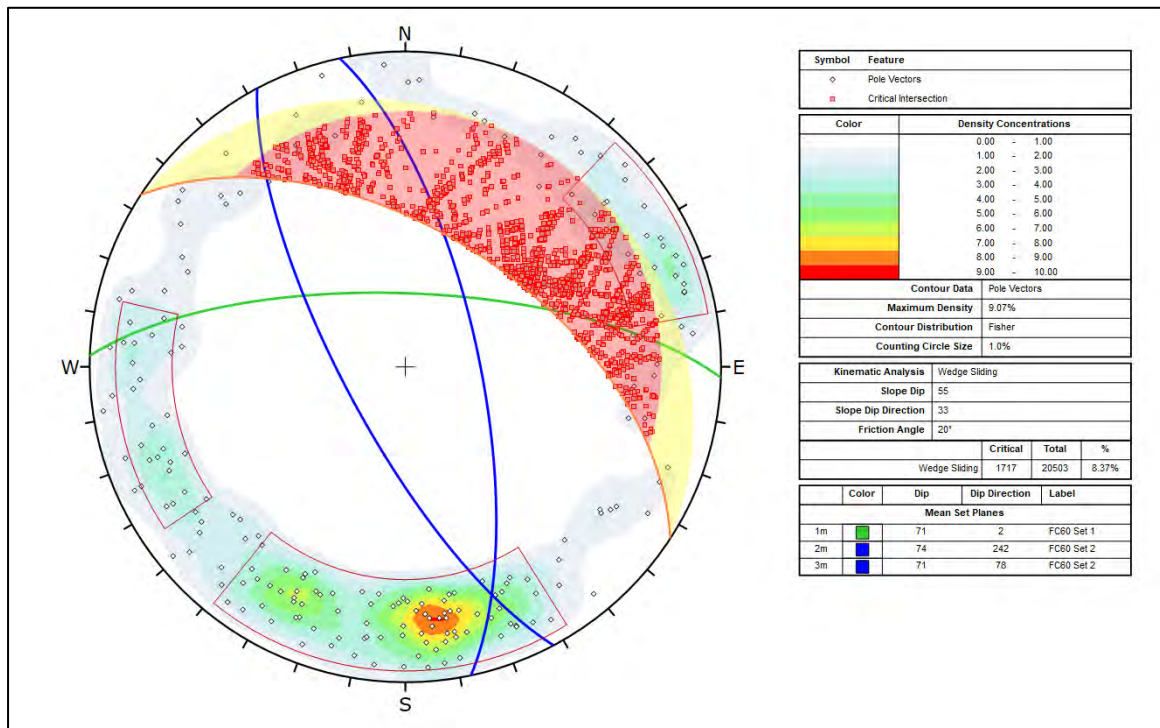


Figure: C278 - Kinematic Analysis (Fracture >60°) – Highwall 4 (Bench Slope) – Wedge Sliding.

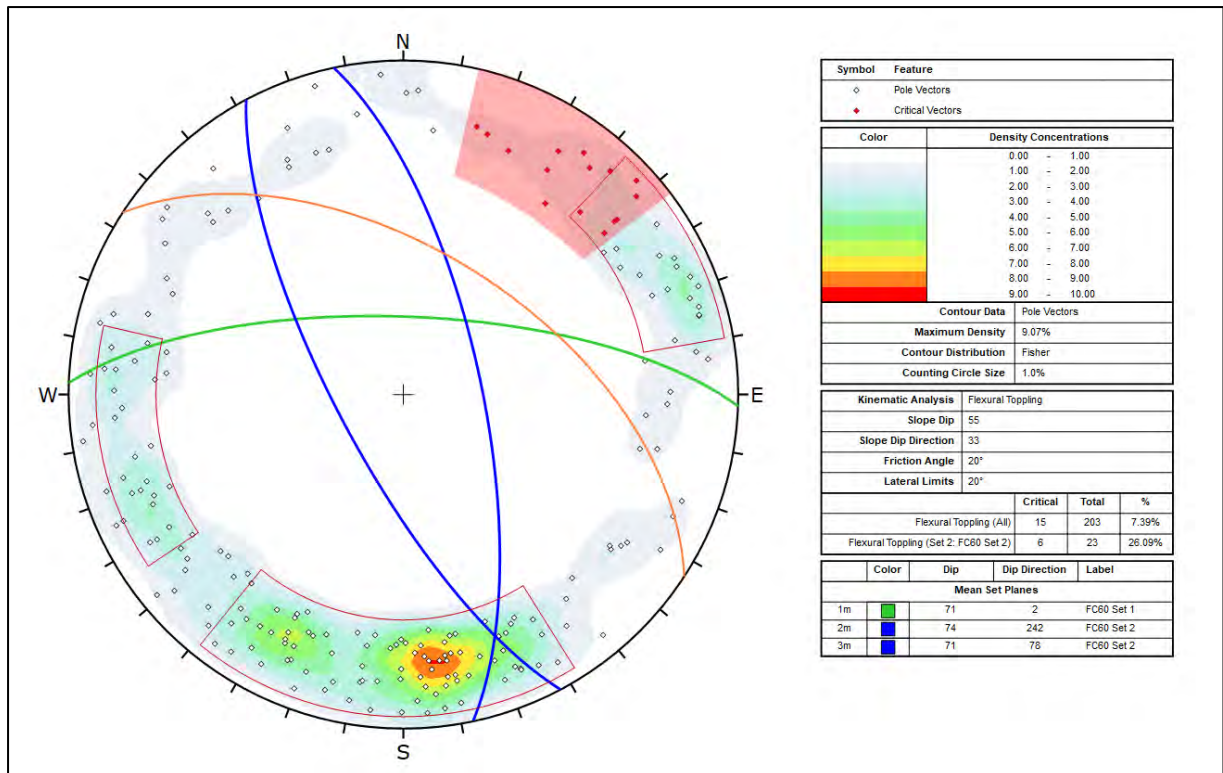


Figure: C279 - Kinematic Analysis (Fracture >60°) – Highwall 4 (Bench Slope) – Flexural Toppling.

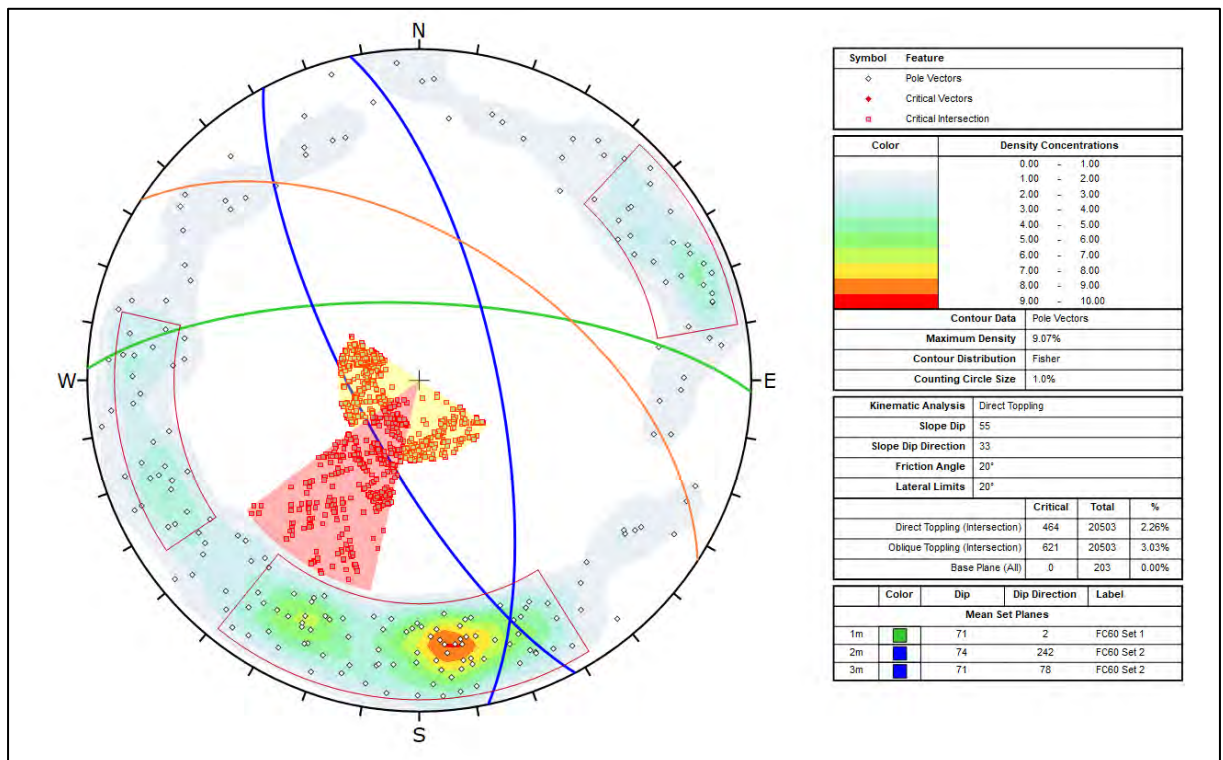


Figure: C280 - Kinematic Analysis (Fracture >60°) – Highwall 4 (Bench Slope) – Direct Toppling.

Highwalls – Brunner Coal Measures (BCM) Crush Zones – Planar Sliding

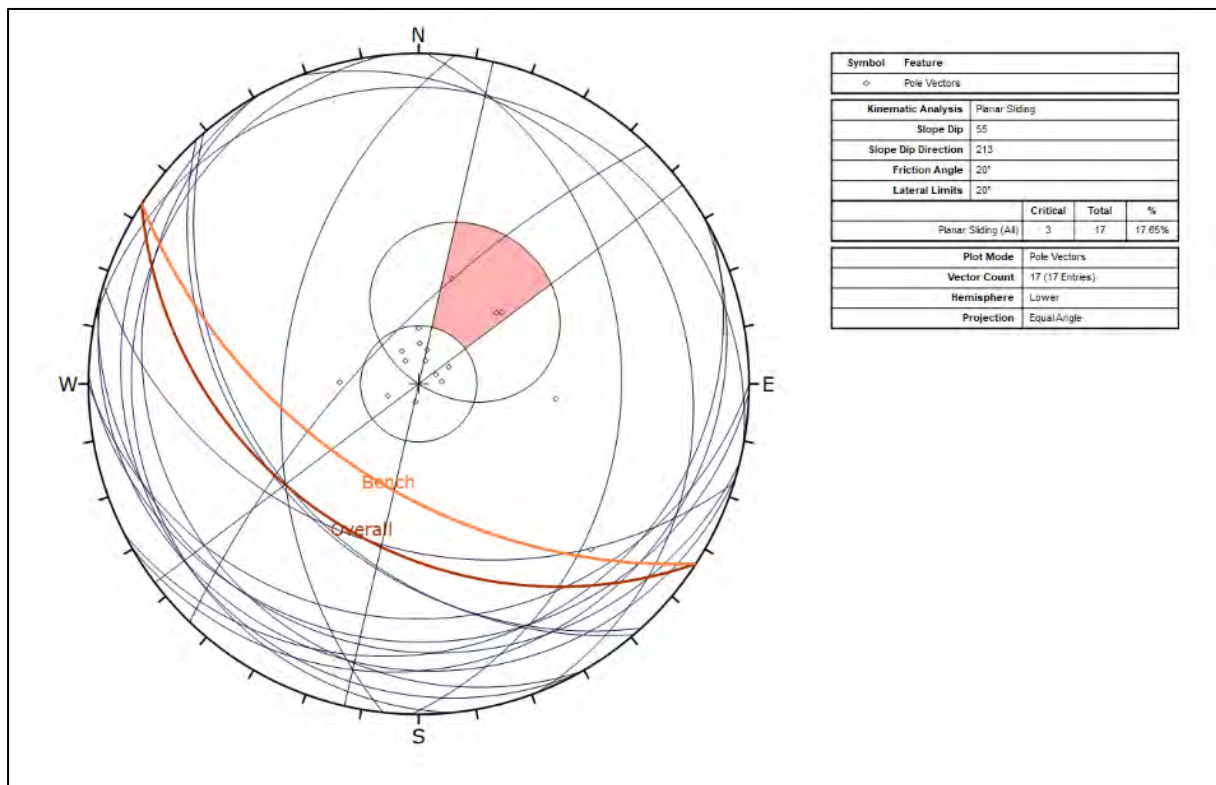


Figure: C281-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Bench Slope)–Planar Sliding.

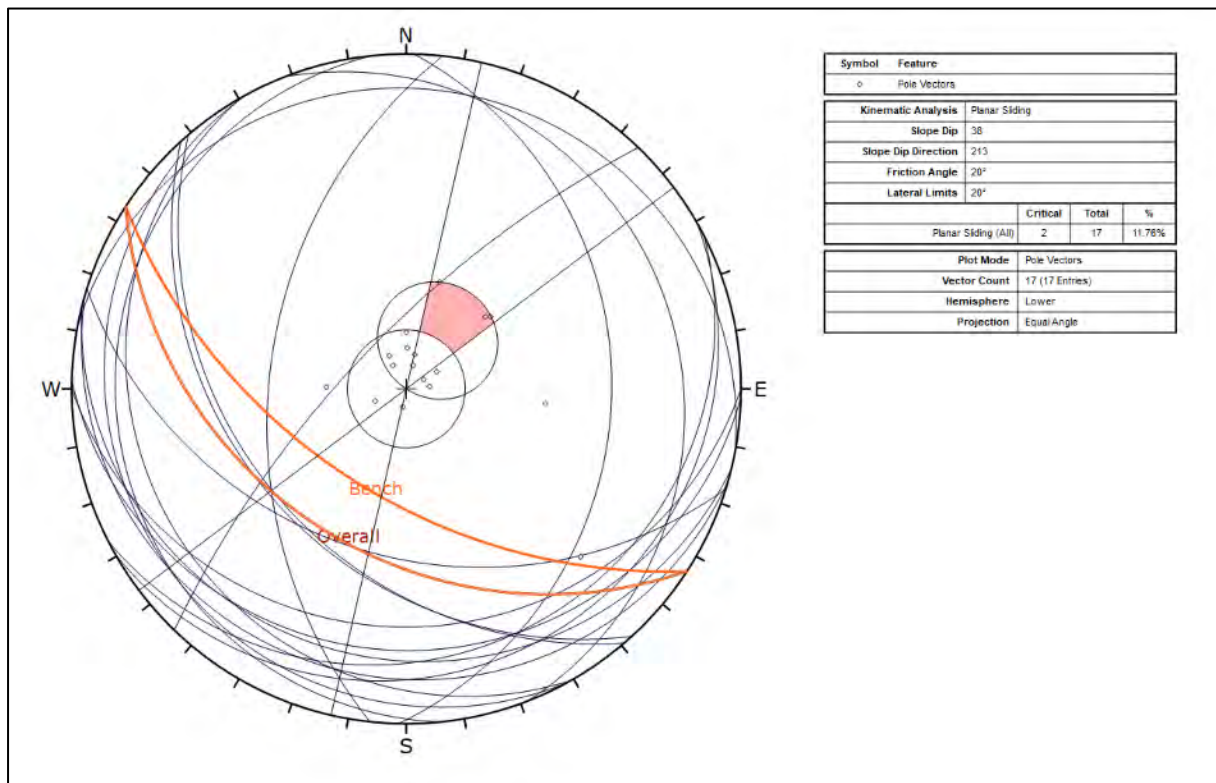


Figure: C282-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Overall Slope)–Planar Sliding.

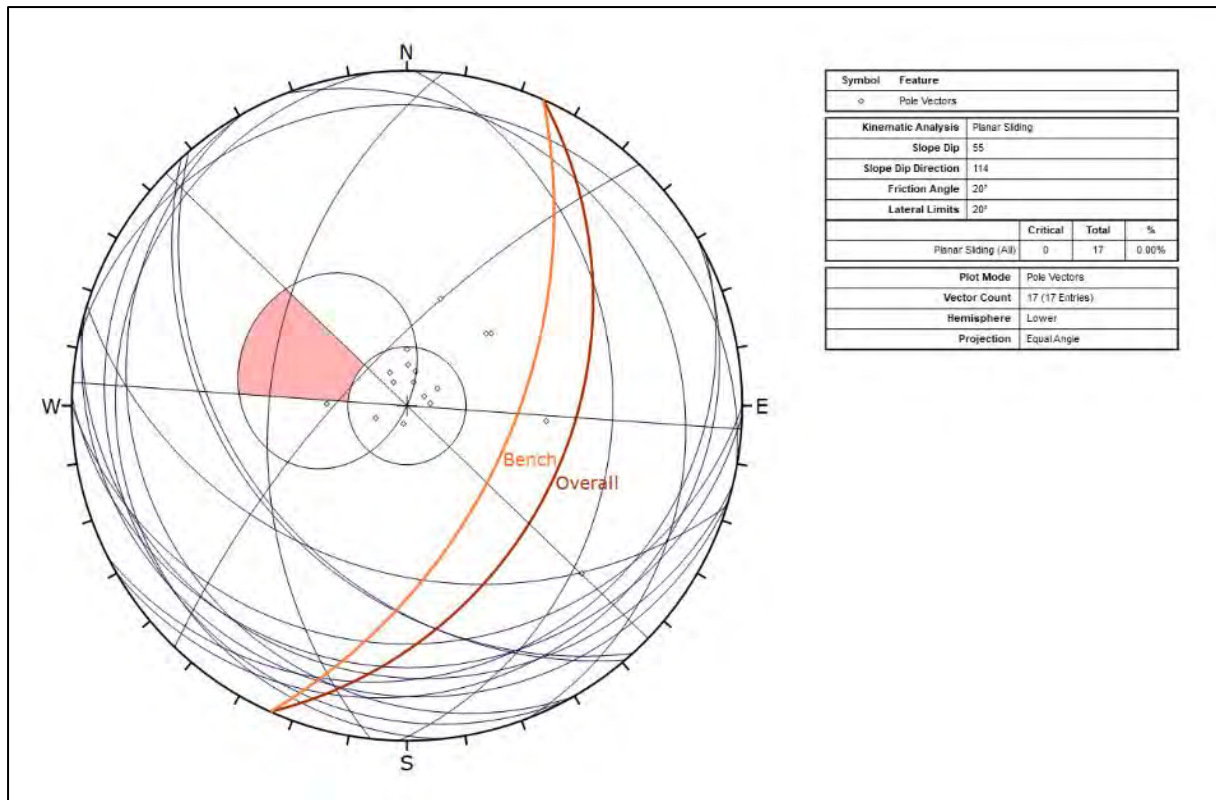


Figure: C283-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Bench Slope)–Planar Sliding.

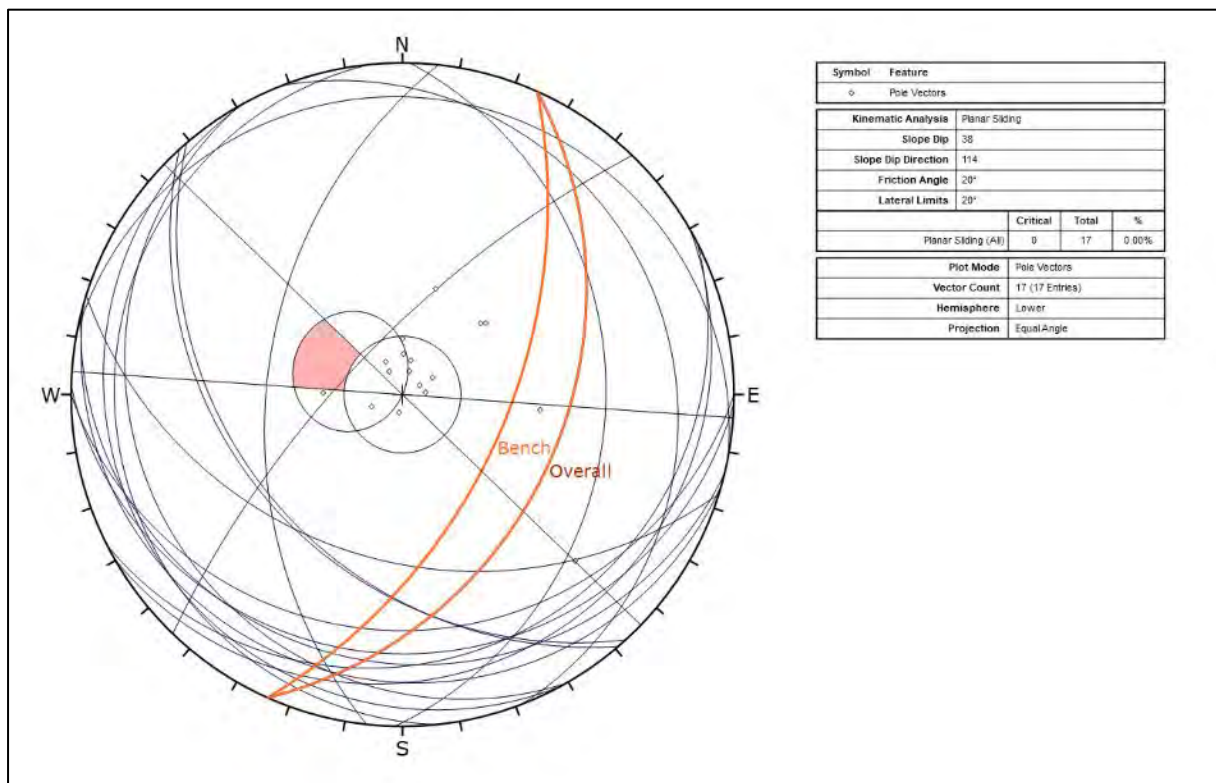


Figure: C284-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Overall Slope)–Planar Sliding.

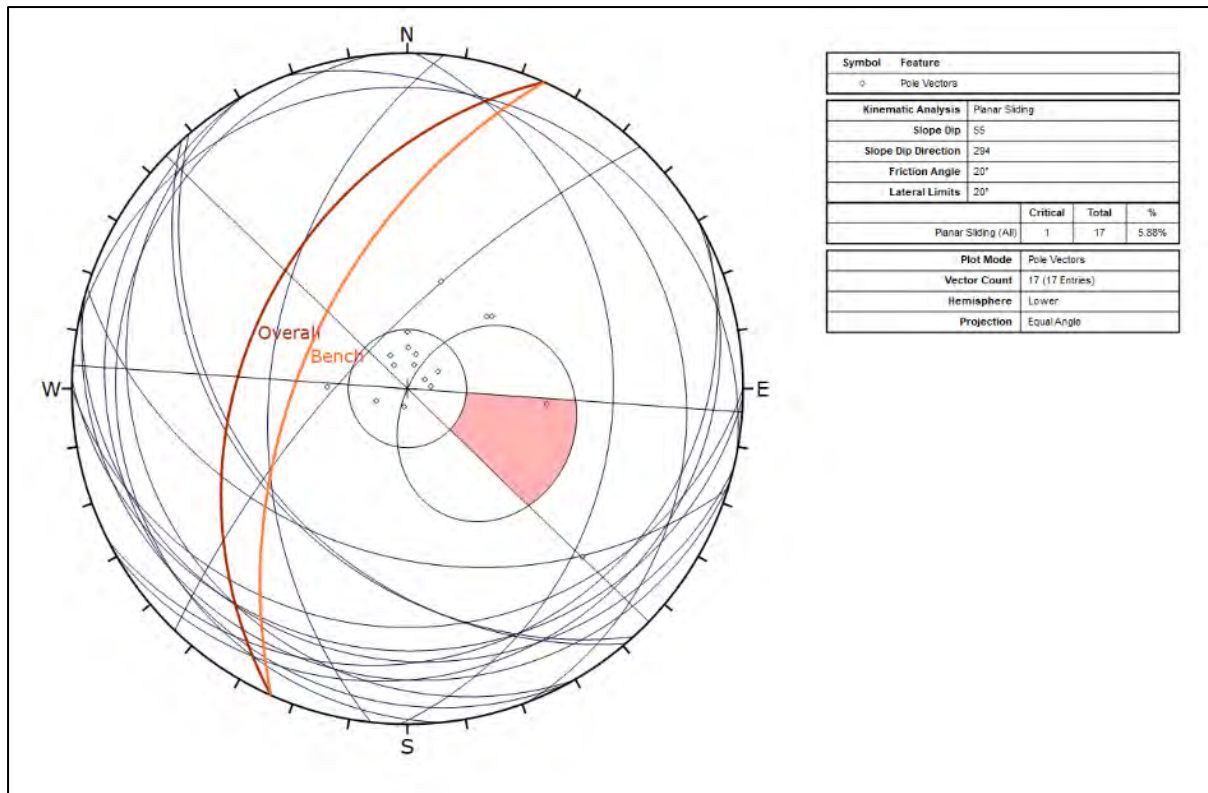


Figure: C285-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Bench Slope)–Planar Sliding.

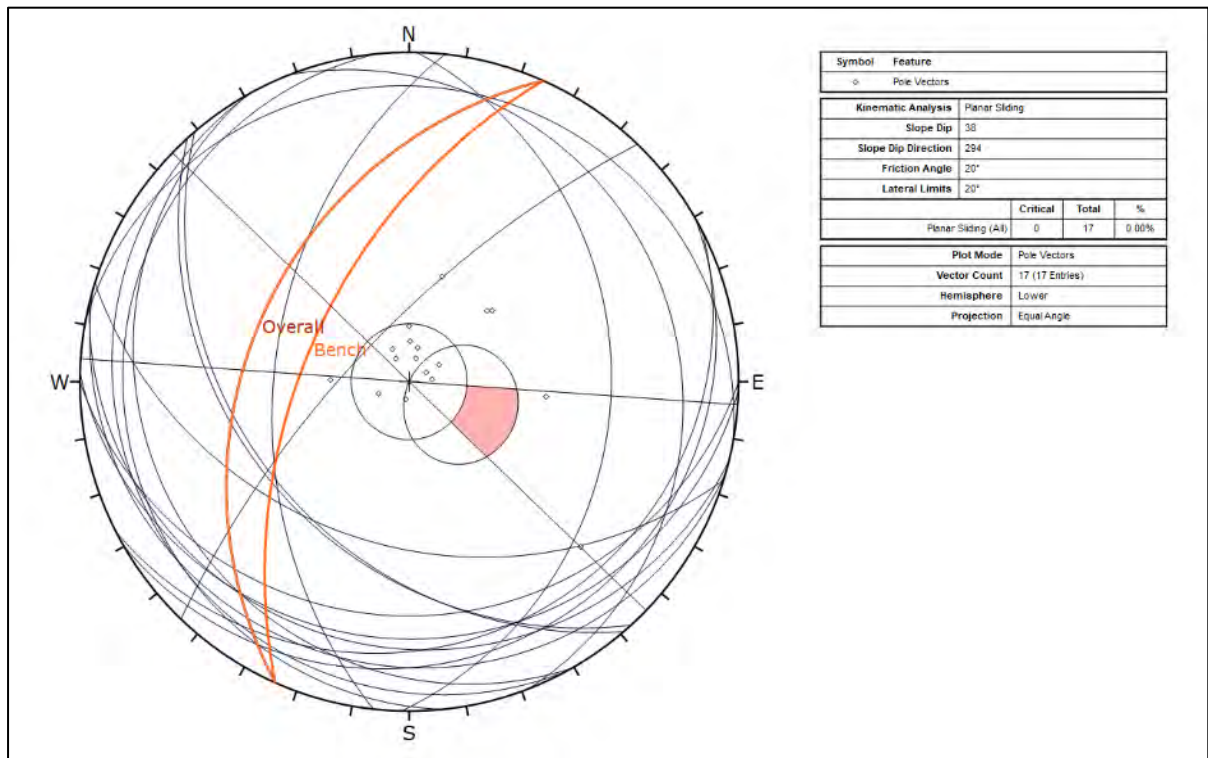


Figure: C286-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Overall Slope)–Planar Sliding.

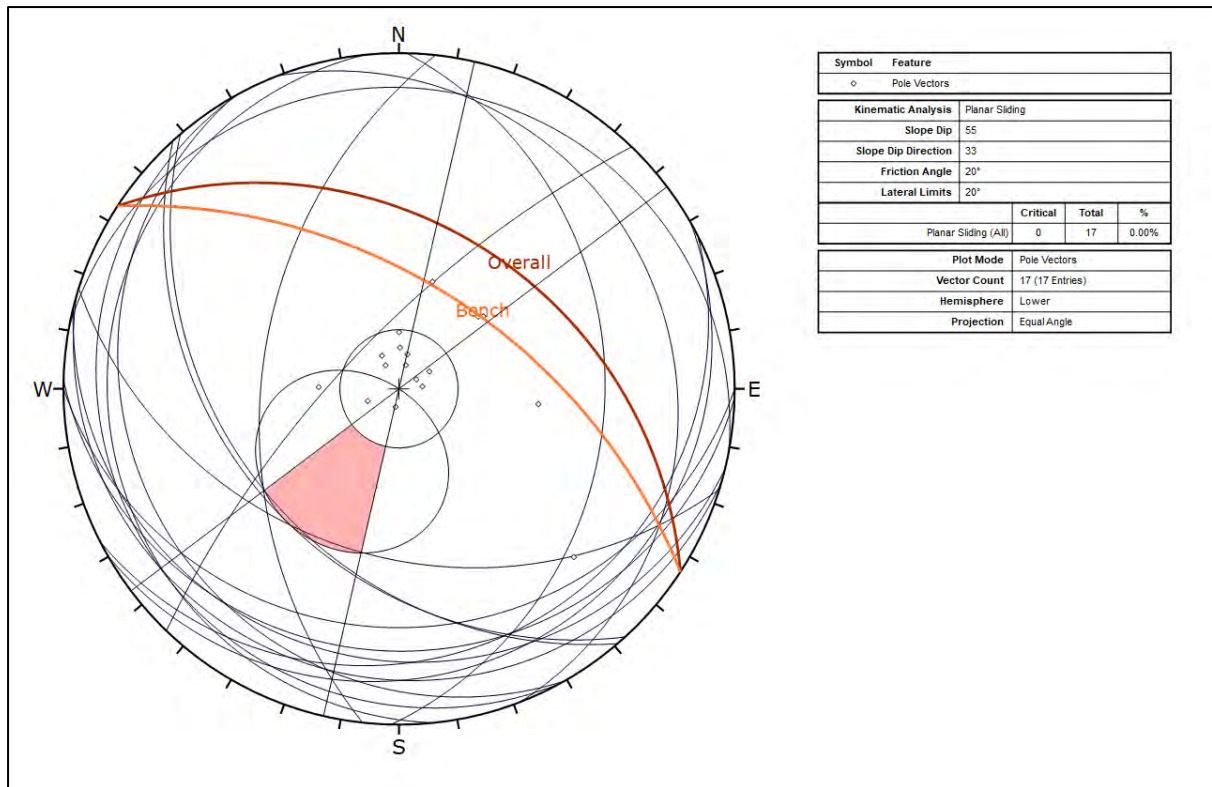


Figure: C287-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Bench Slope)–Planar Sliding.

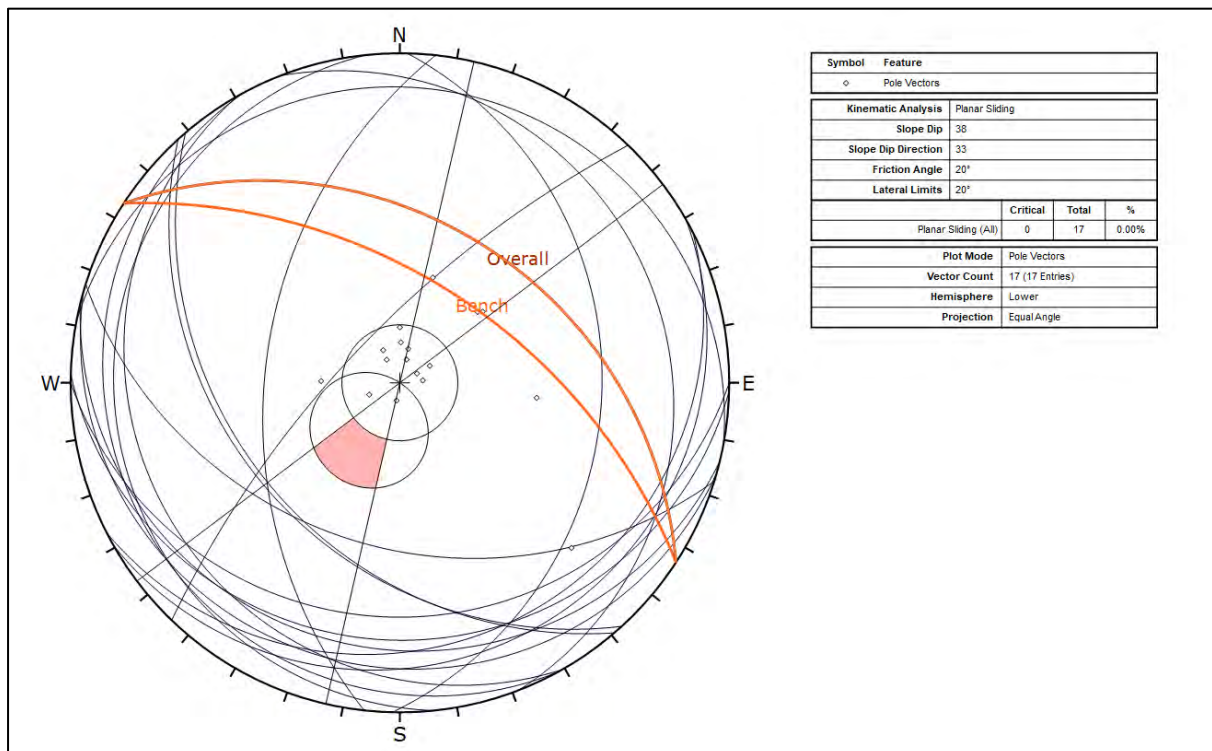


Figure: C288-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Overall Slope)–Planar Sliding.

Highwall – Brunner Coal Measures (BCM) Crush Zones – Wedge Failure

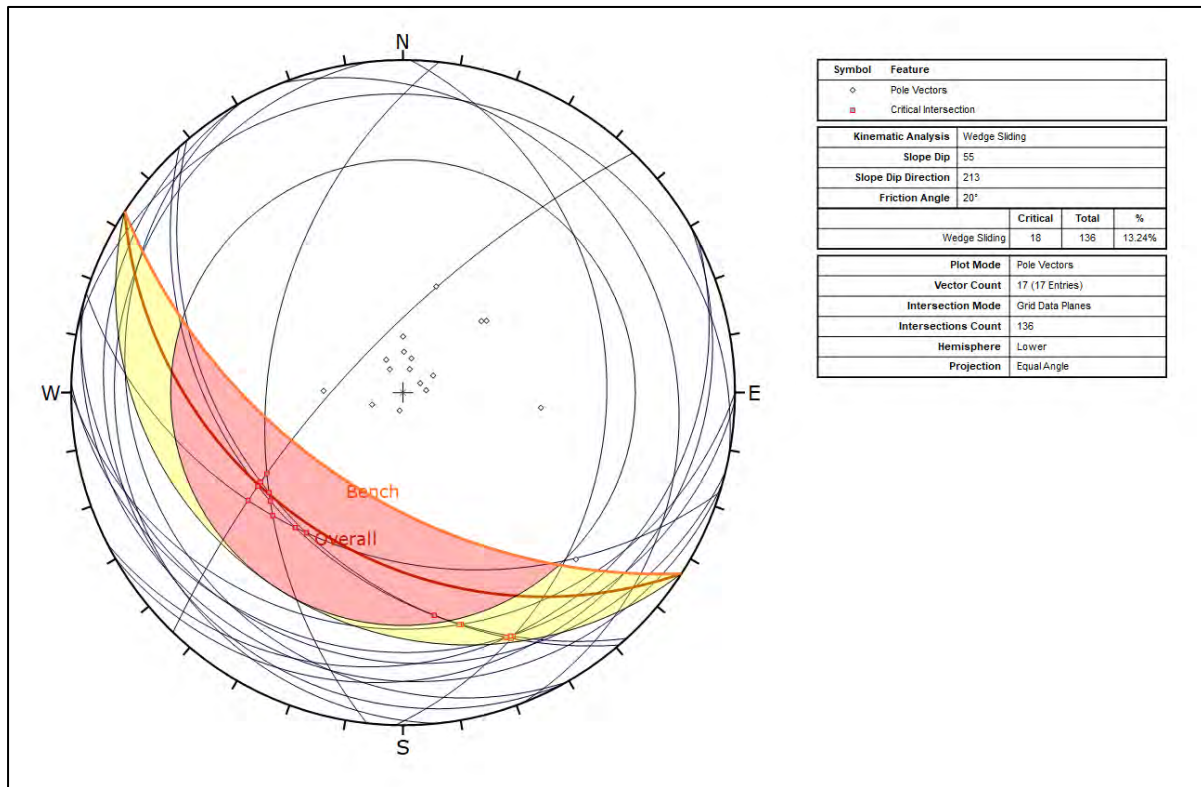


Figure: C289-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Bench Slope)–Wedge Failure.

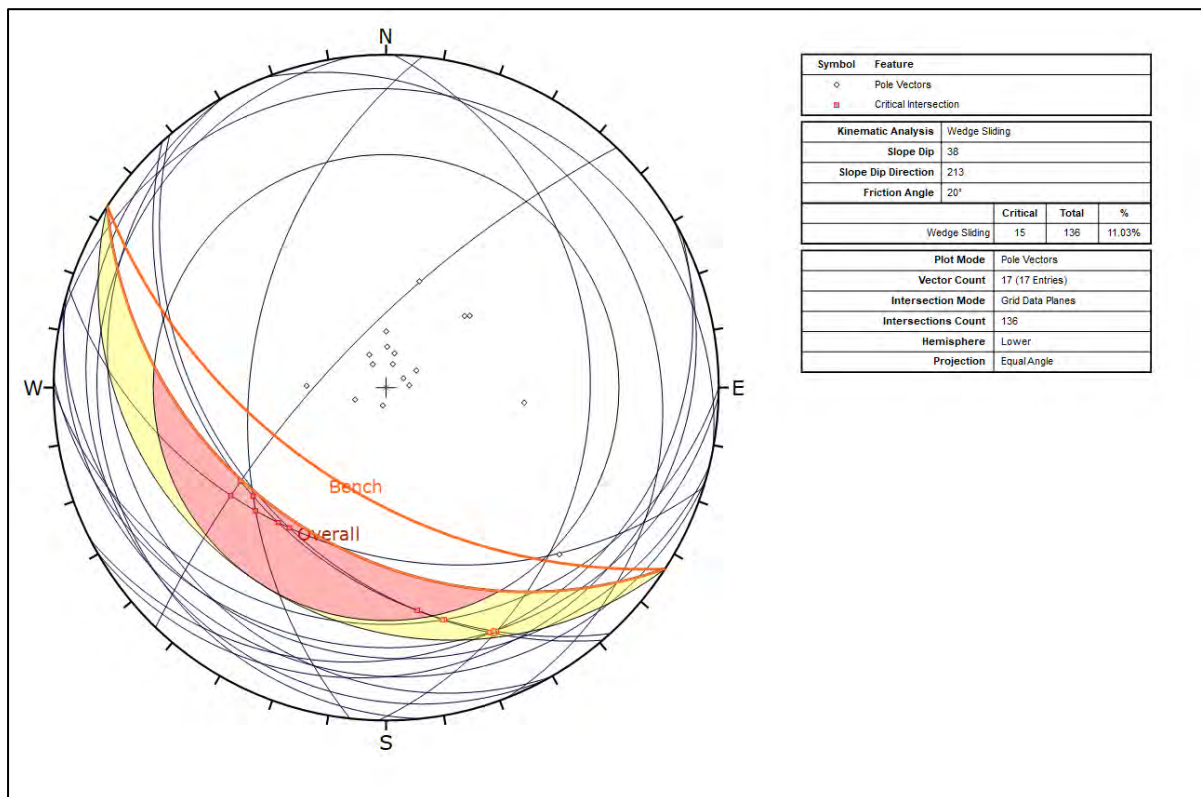


Figure: C290-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Overall Slope)–Wedge Failure.

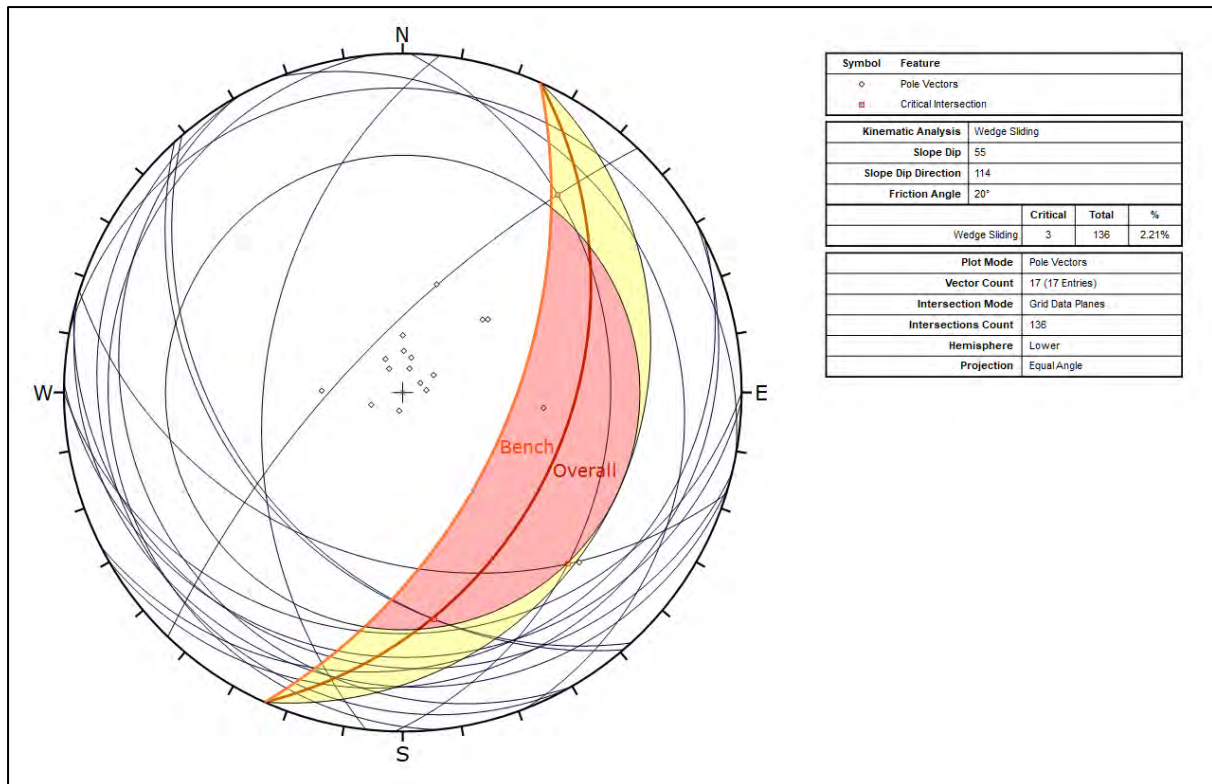


Figure: C291-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Bench Slope)–Wedge Failure.

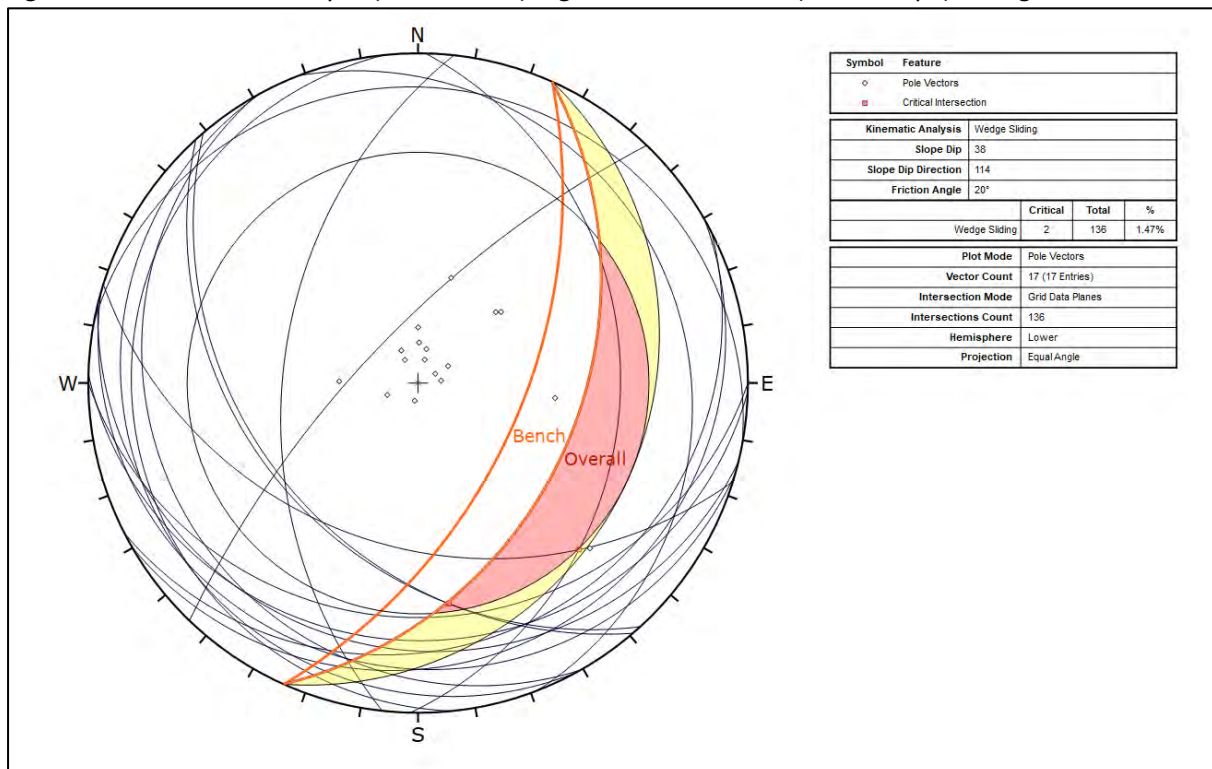


Figure: C292-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Overall Slope)–Wedge Failure.

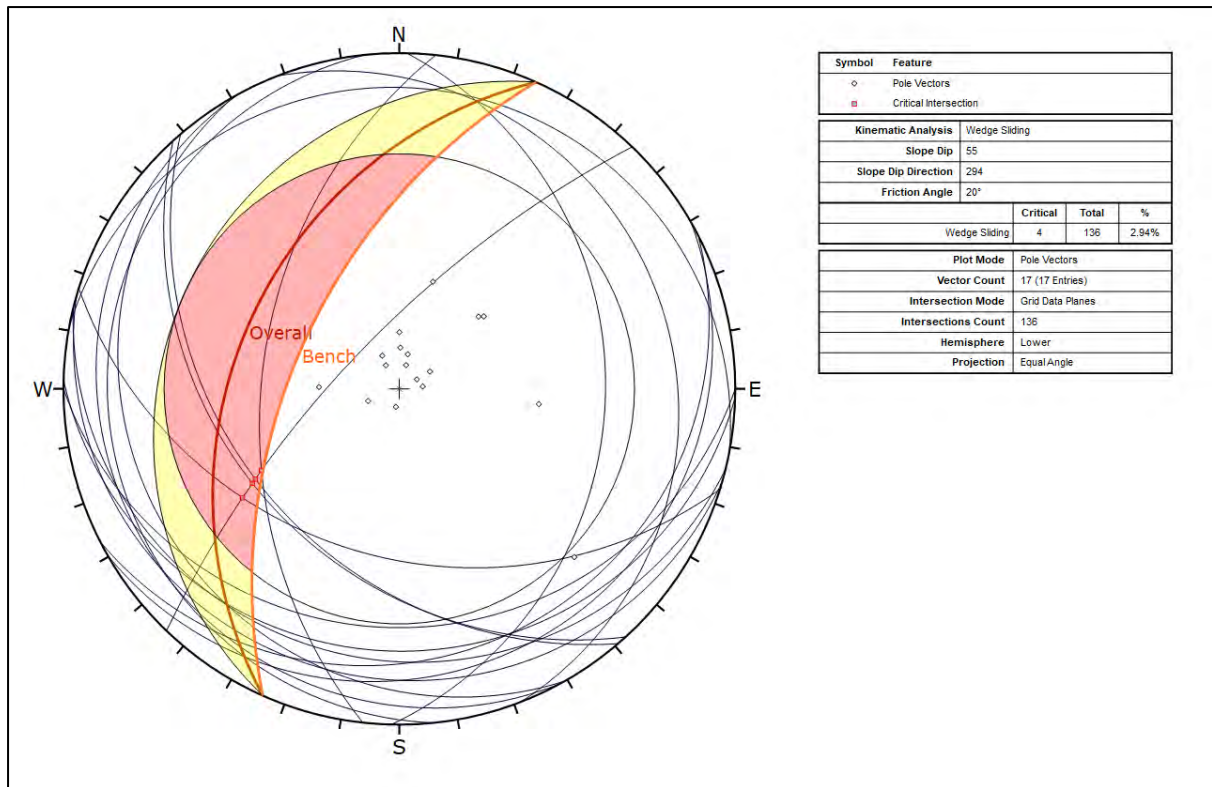


Figure: C293-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Bench Slope)–Wedge Failure.

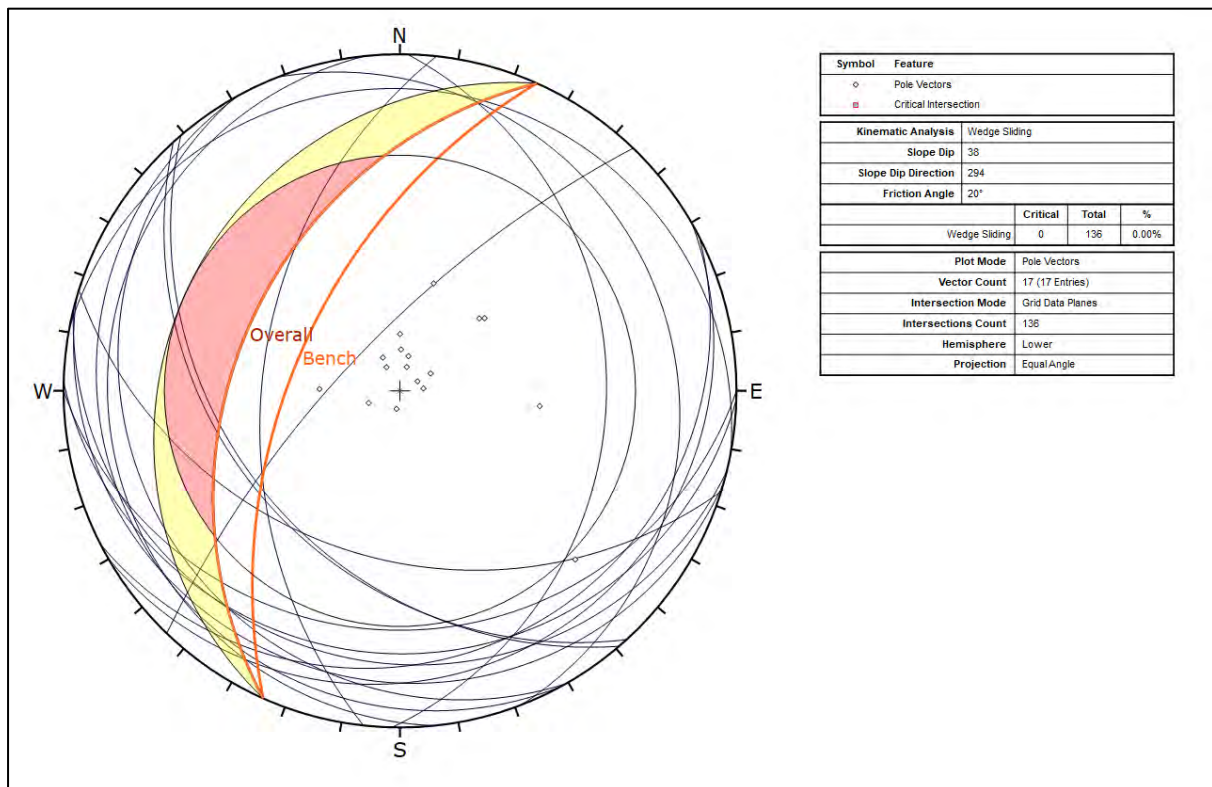


Figure: C294-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Overall Slope)–Wedge Failure.

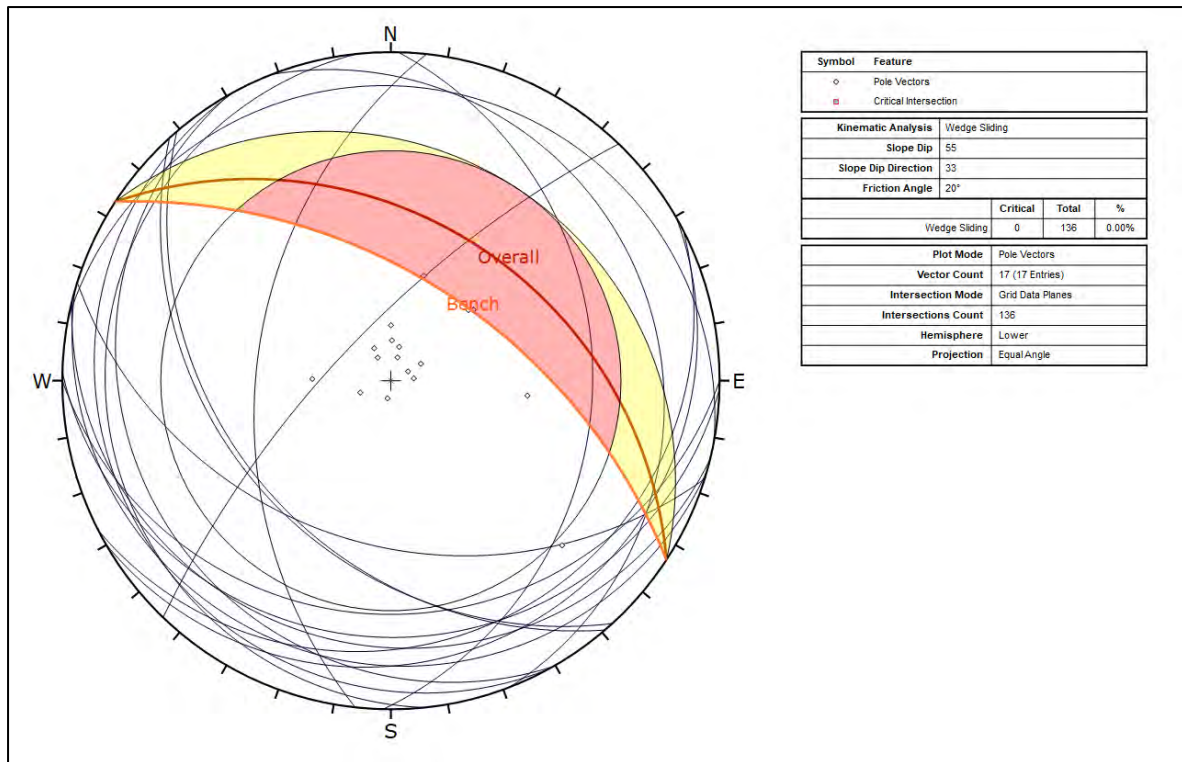


Figure: C295-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Bench Slope)–Wedge Failure.

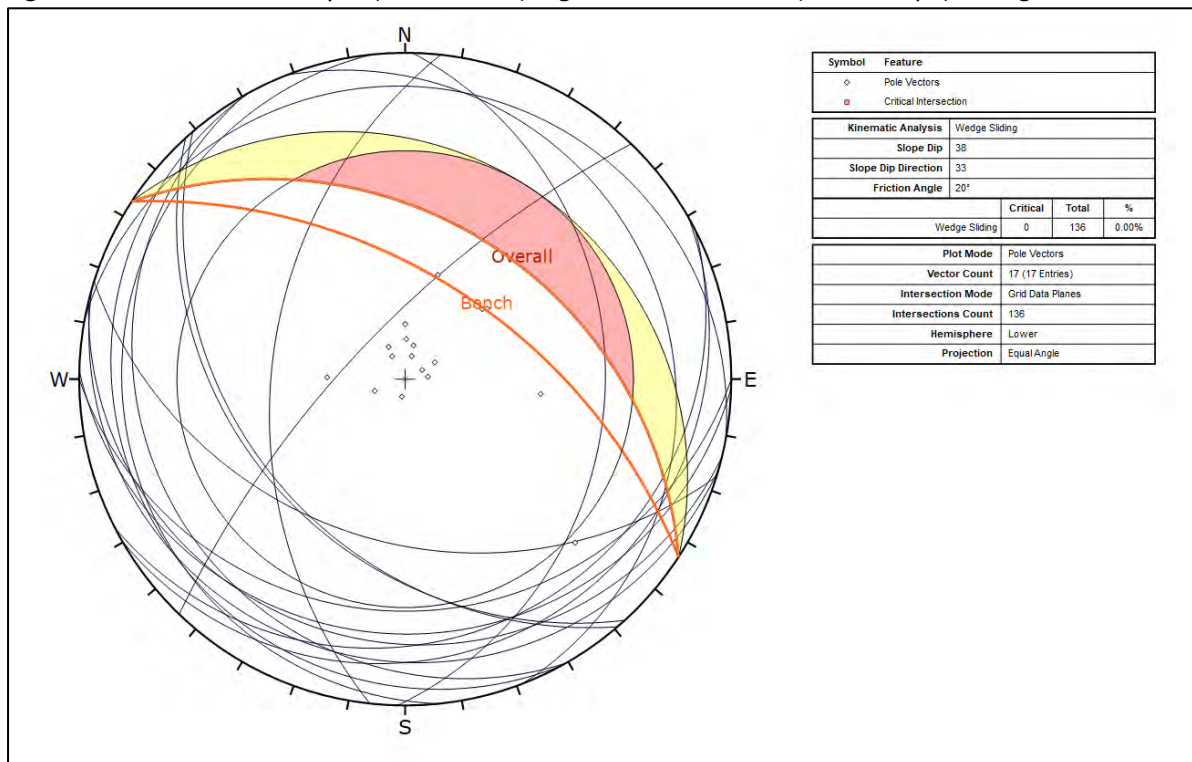


Figure: C296-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Overall Slope)–Wedge Failure.

Highwall – Brunner Coal Measures (BCM) Crush Zones – Topple Failure

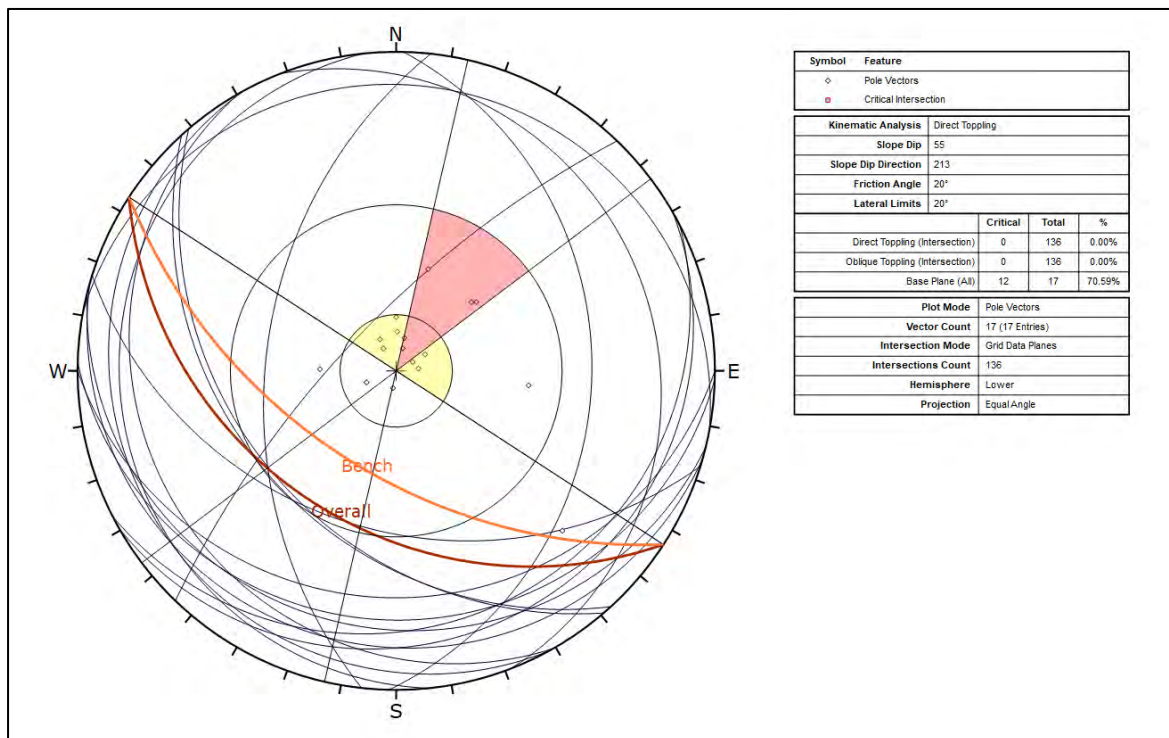


Figure: C297-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Bench Slope)–Topple Failure.

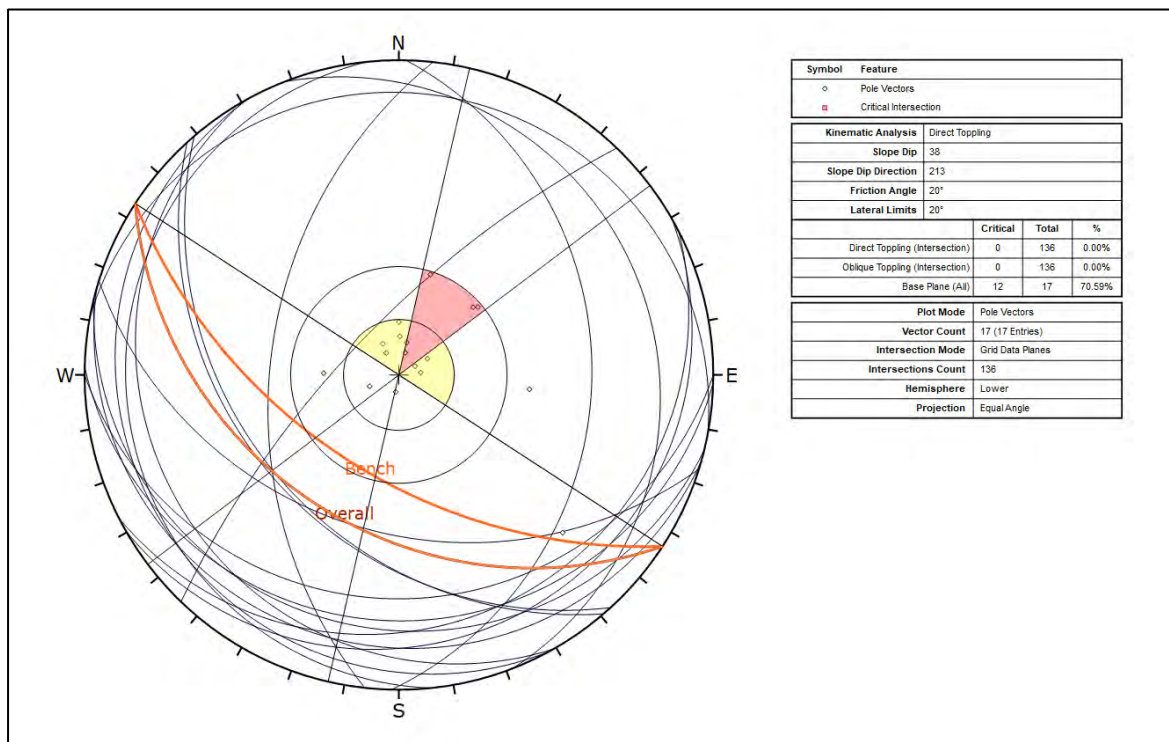


Figure: C298-Kinematic Analysis (Crush Zones) Highwall Orientation 1 (Overall Slope)–Topple Failure.

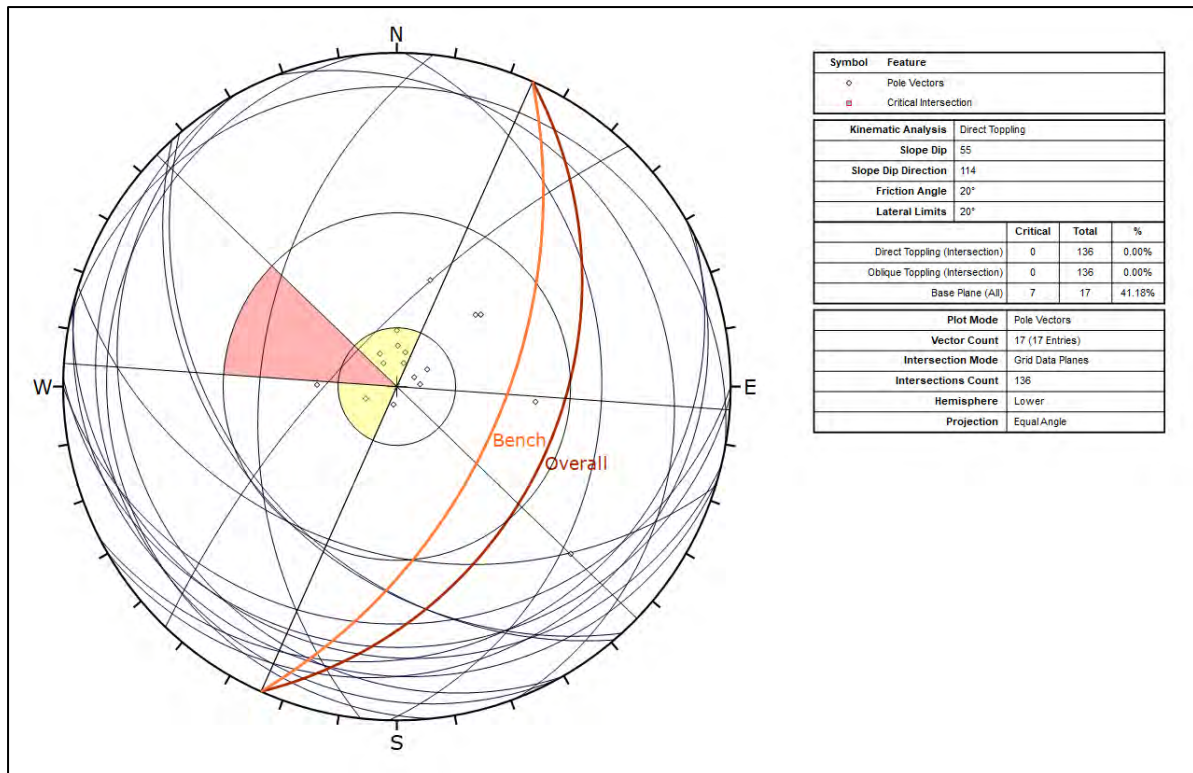


Figure: C299-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Bench Slope)–Topple Failure.

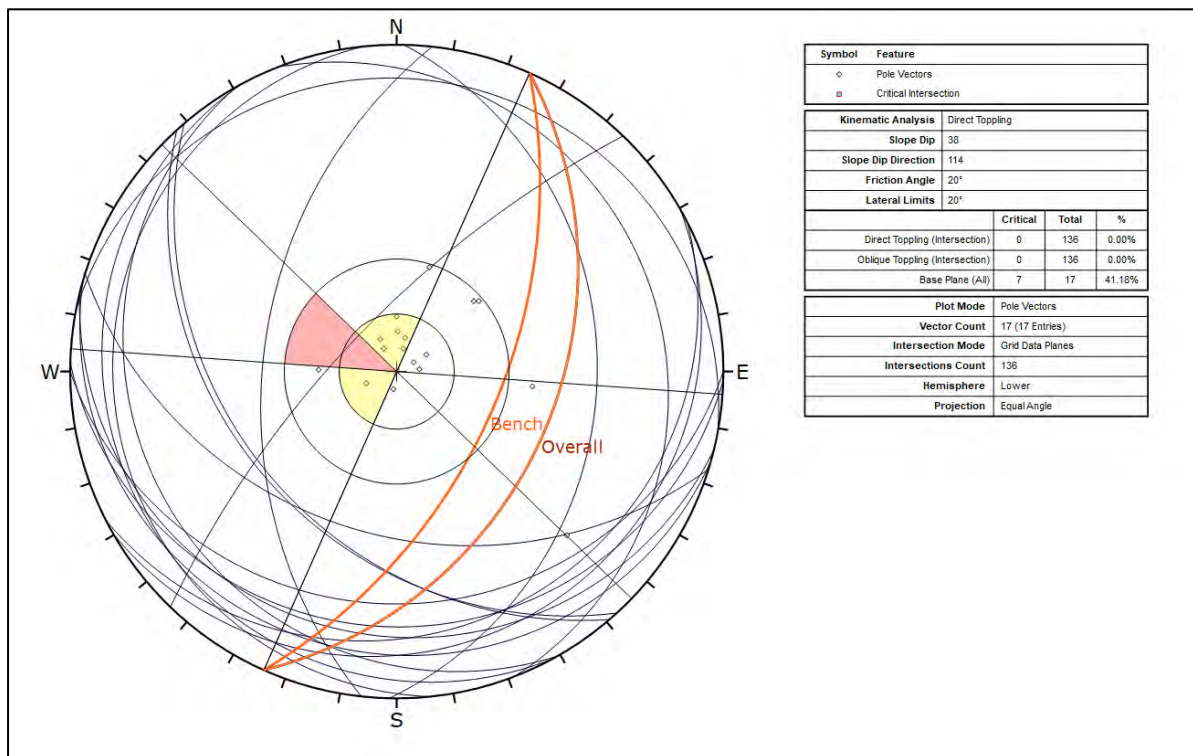


Figure: C300-Kinematic Analysis (Crush Zones) Highwall Orientation 2 (Overall Slope)–Topple Failure.

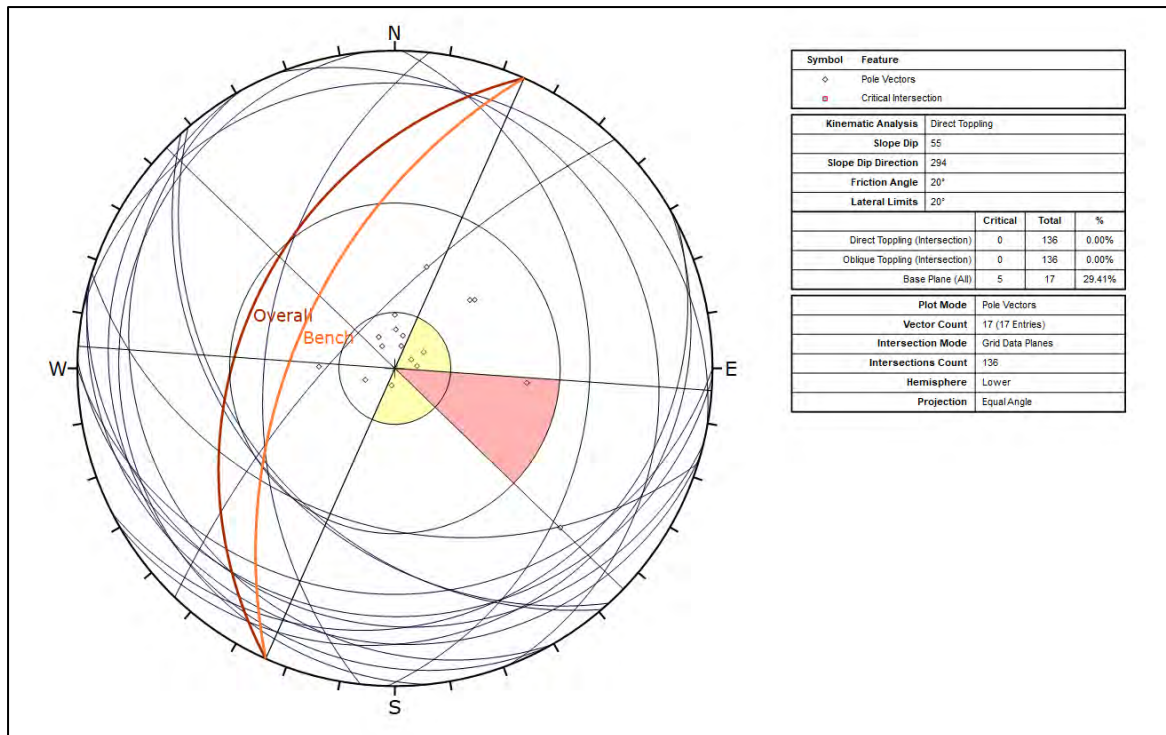


Figure: C301-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Bench Slope)–Topples Failure.

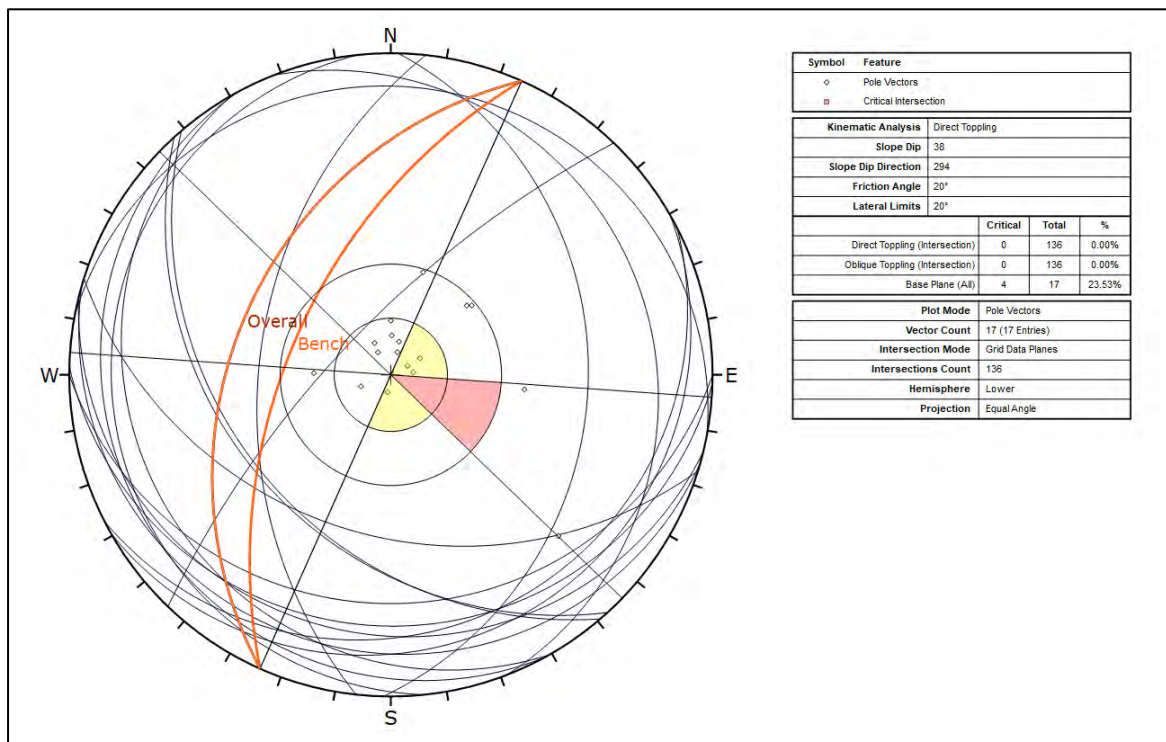


Figure: C302-Kinematic Analysis (Crush Zones) Highwall Orientation 3 (Overall Slope)–Topples Failure.

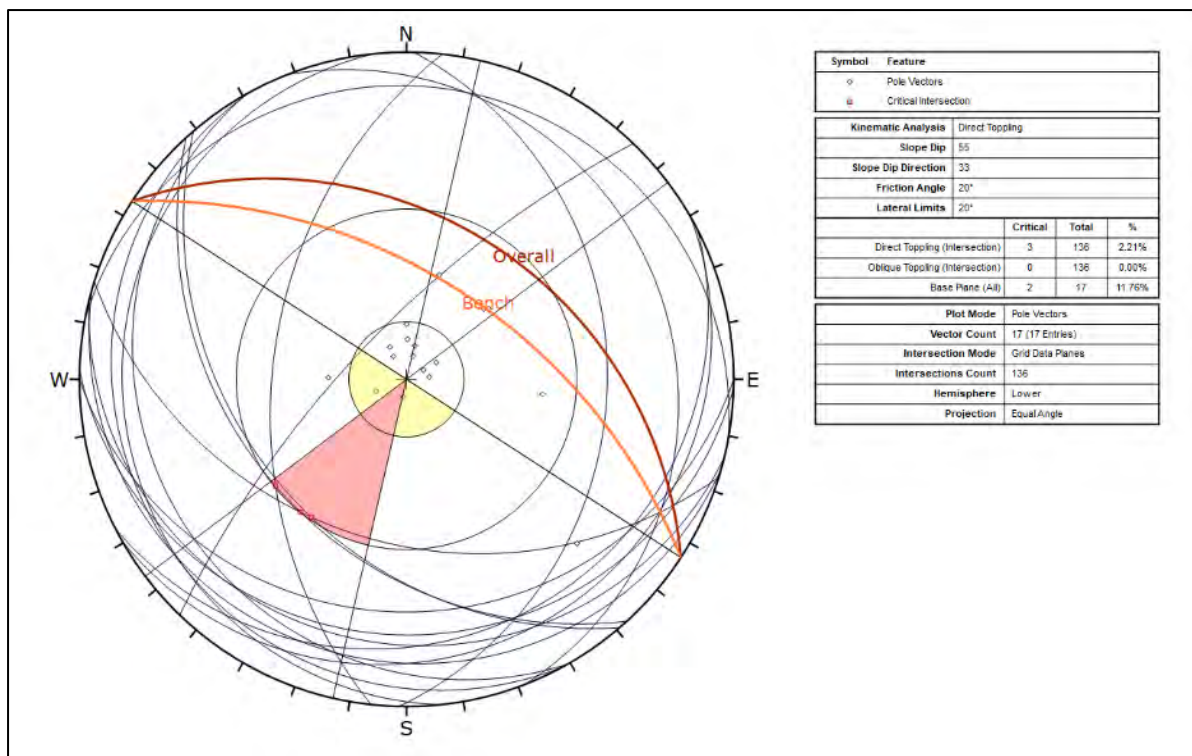


Figure: C303-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Bench Slope)–Topples Failure.

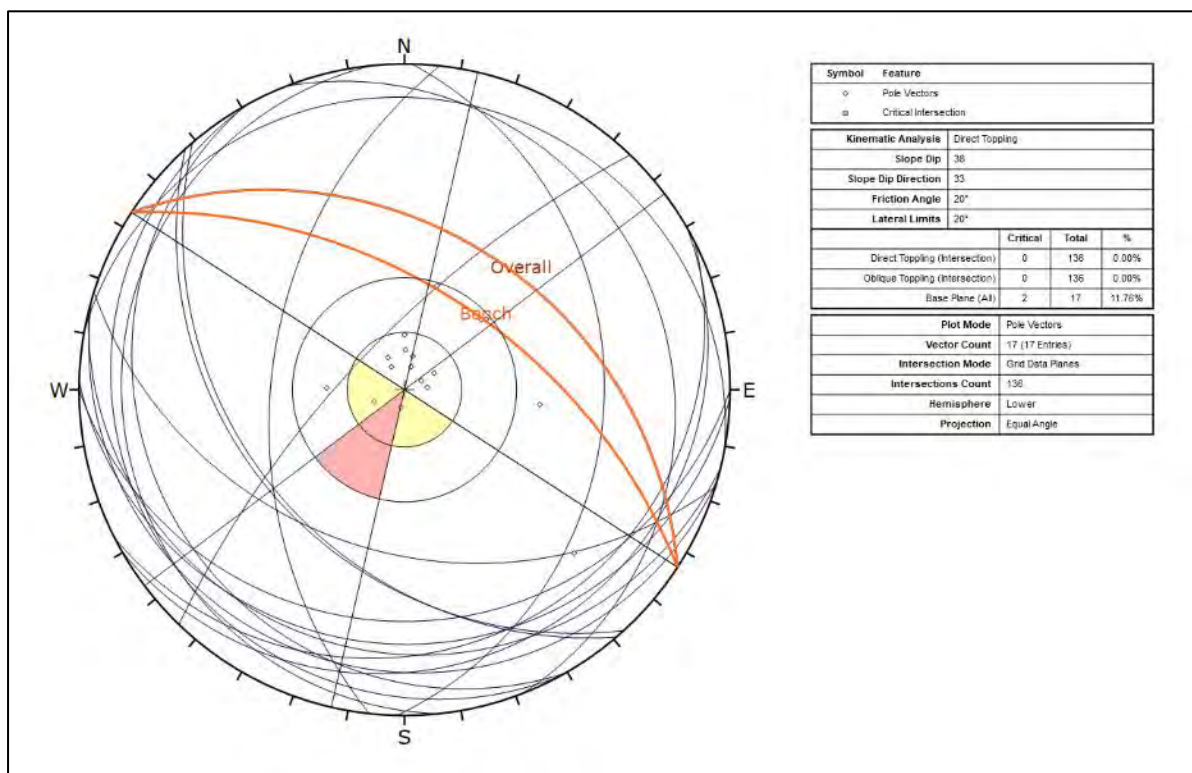


Figure: C304-Kinematic Analysis (Crush Zones) Highwall Orientation 4 (Overall Slope)–Topples Failure.

Highwall – Faults Zones – Wedge Failure

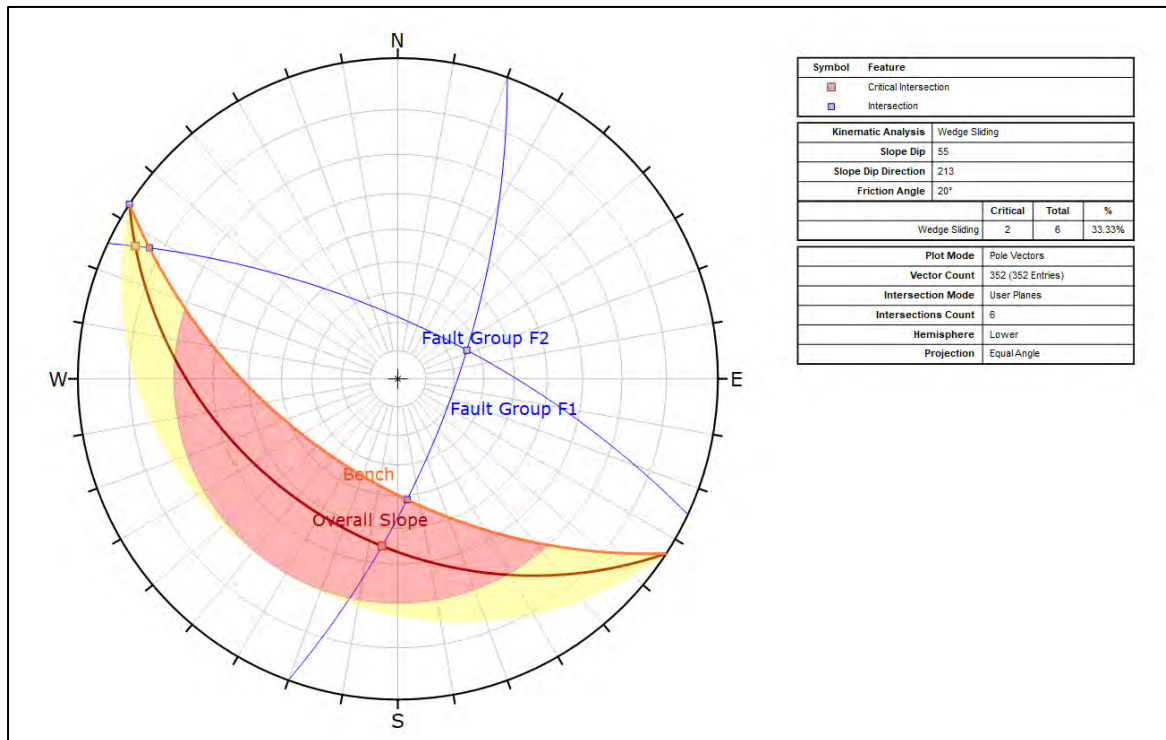


Figure: C305-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Bench Slope)–Wedge Failure.

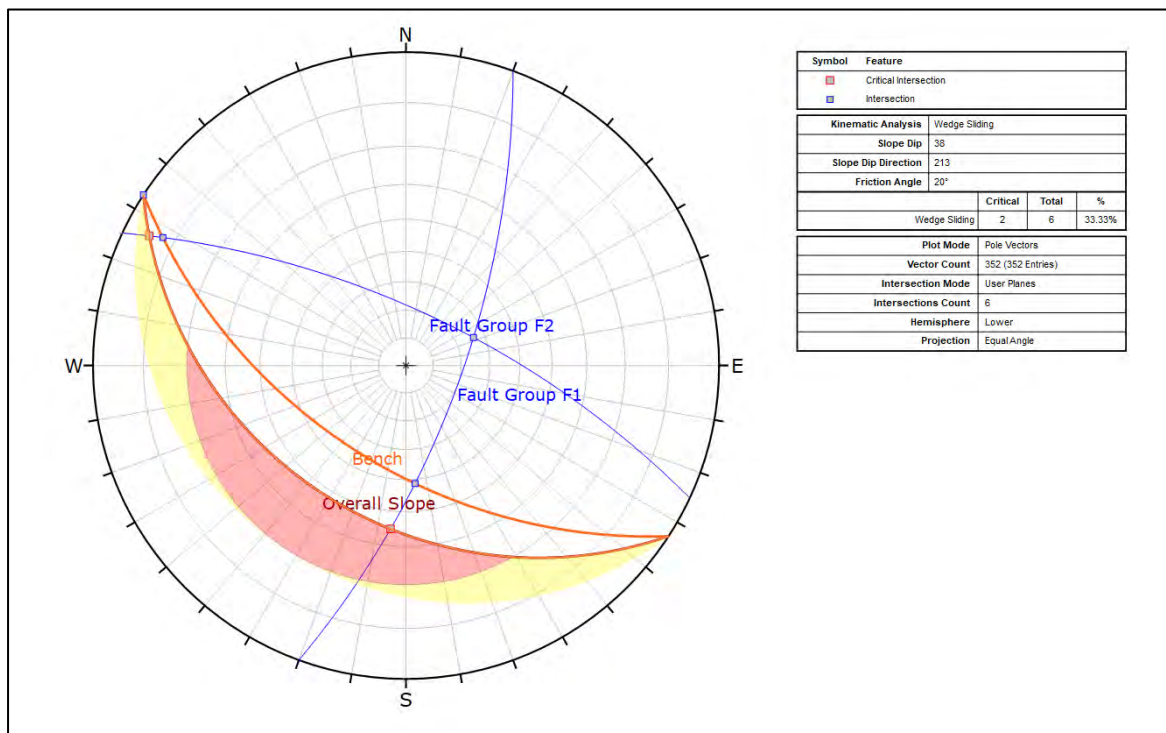


Figure: C306-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Overall Slope)–Wedge Failure.

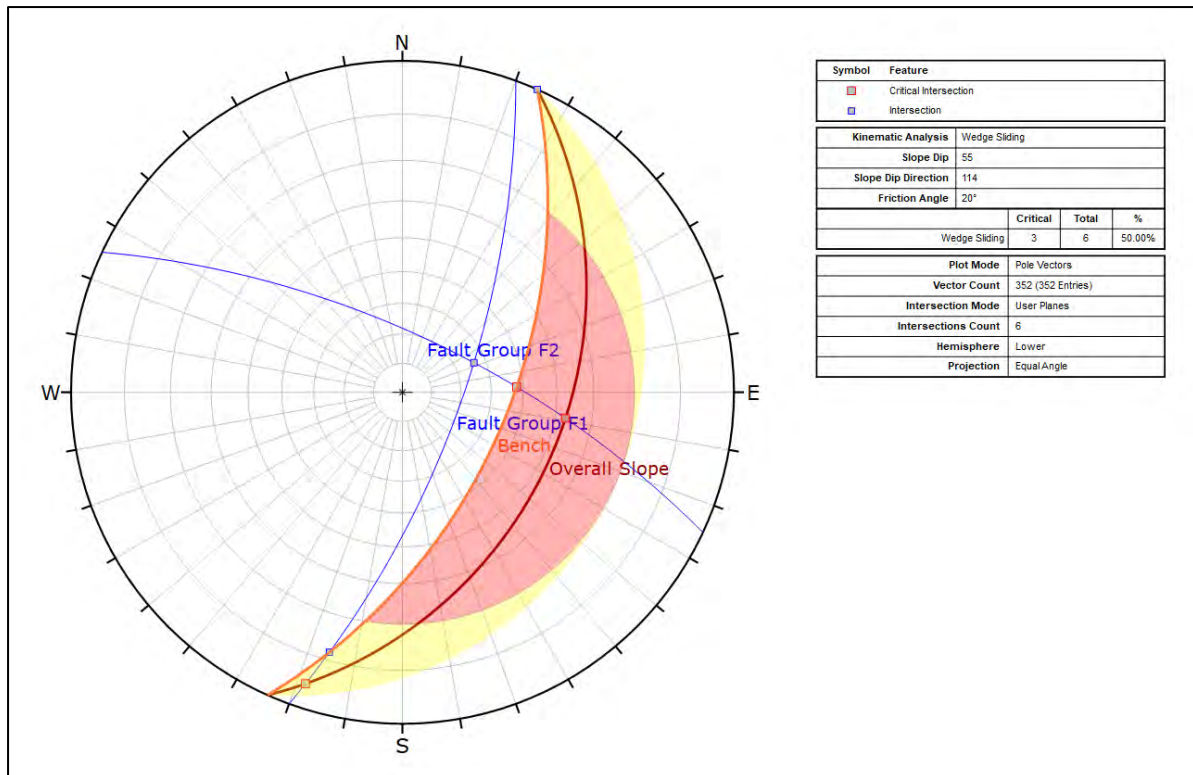


Figure: C307-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Bench Slope)–Wedge Failure.

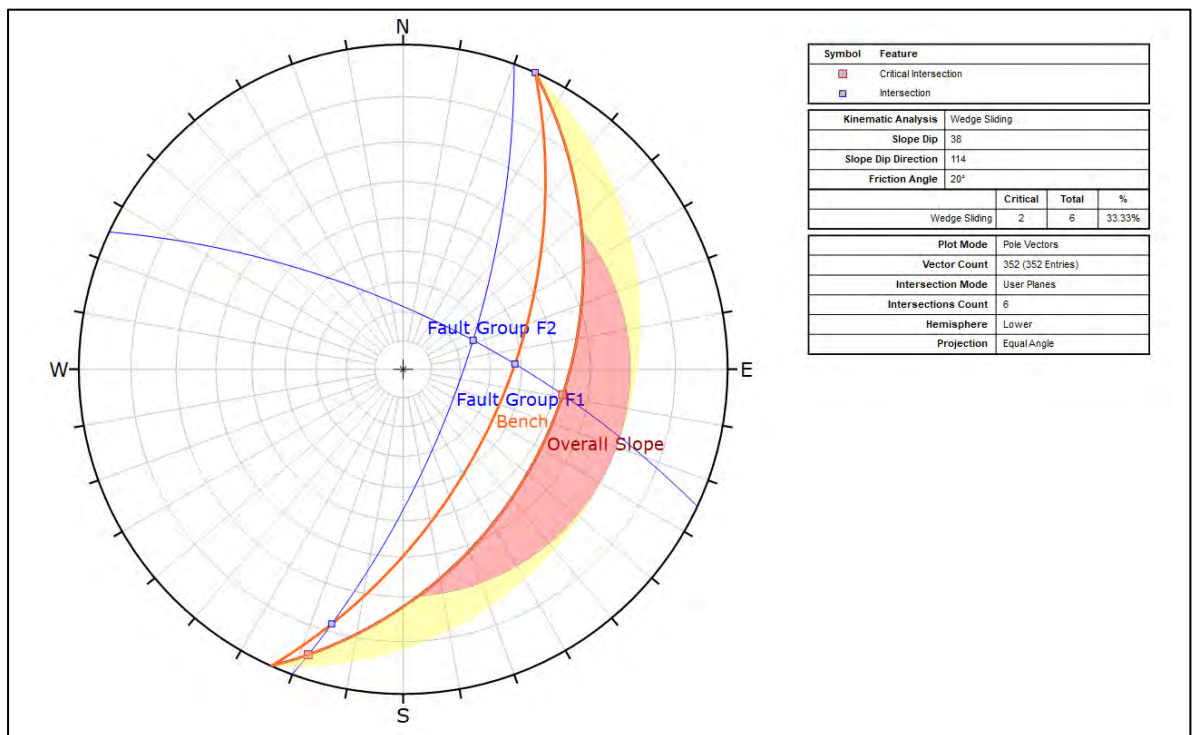


Figure: C308-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Overall Slope)–Wedge Failure.

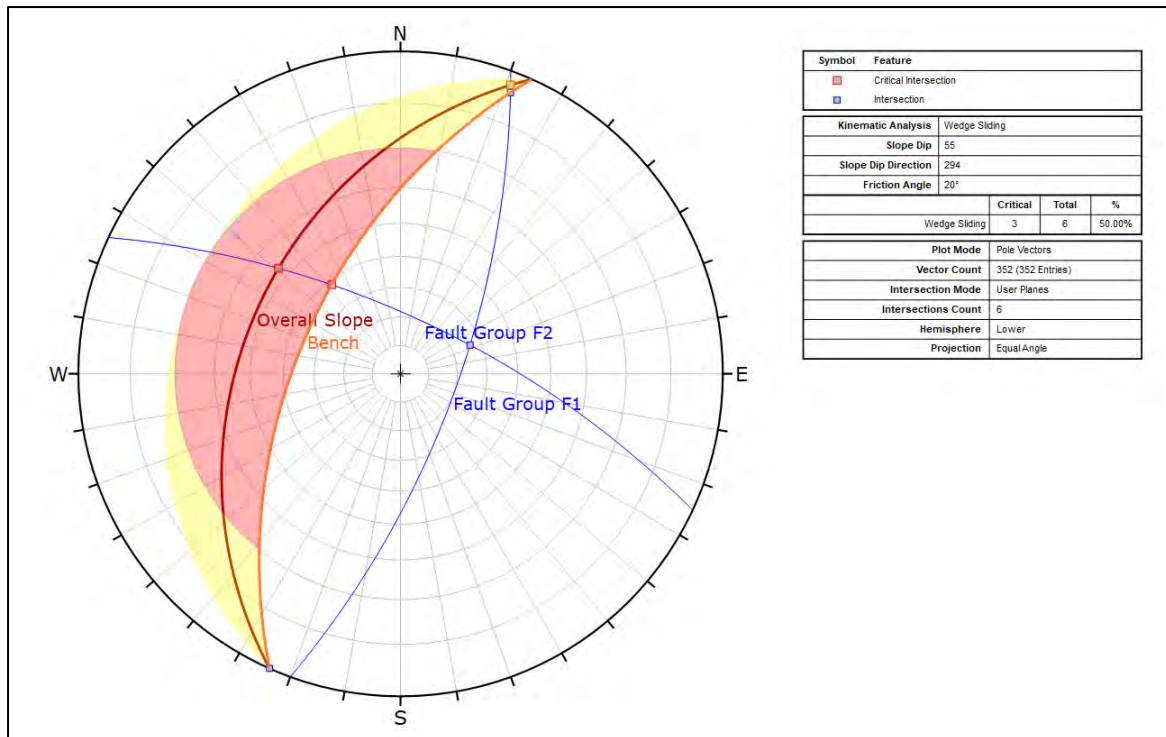


Figure: C309-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Bench Slope)–Wedge Failure.

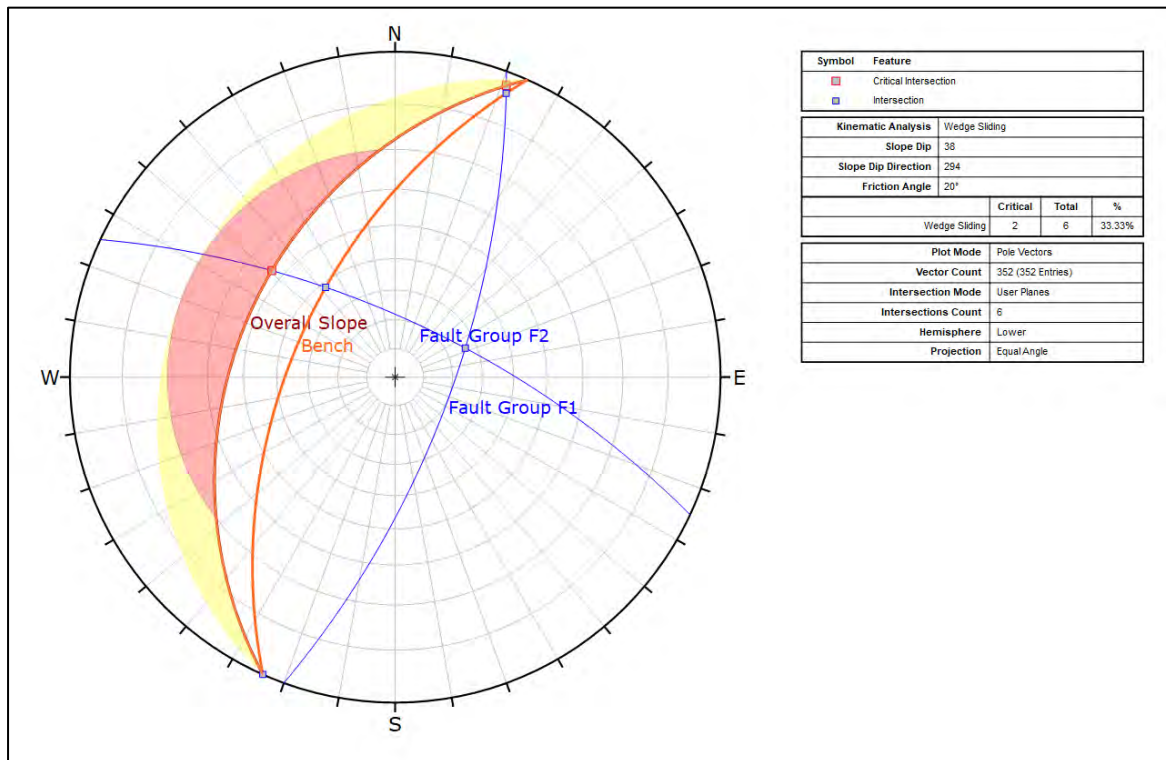


Figure: C310-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Overall Slope)–Wedge Failure.

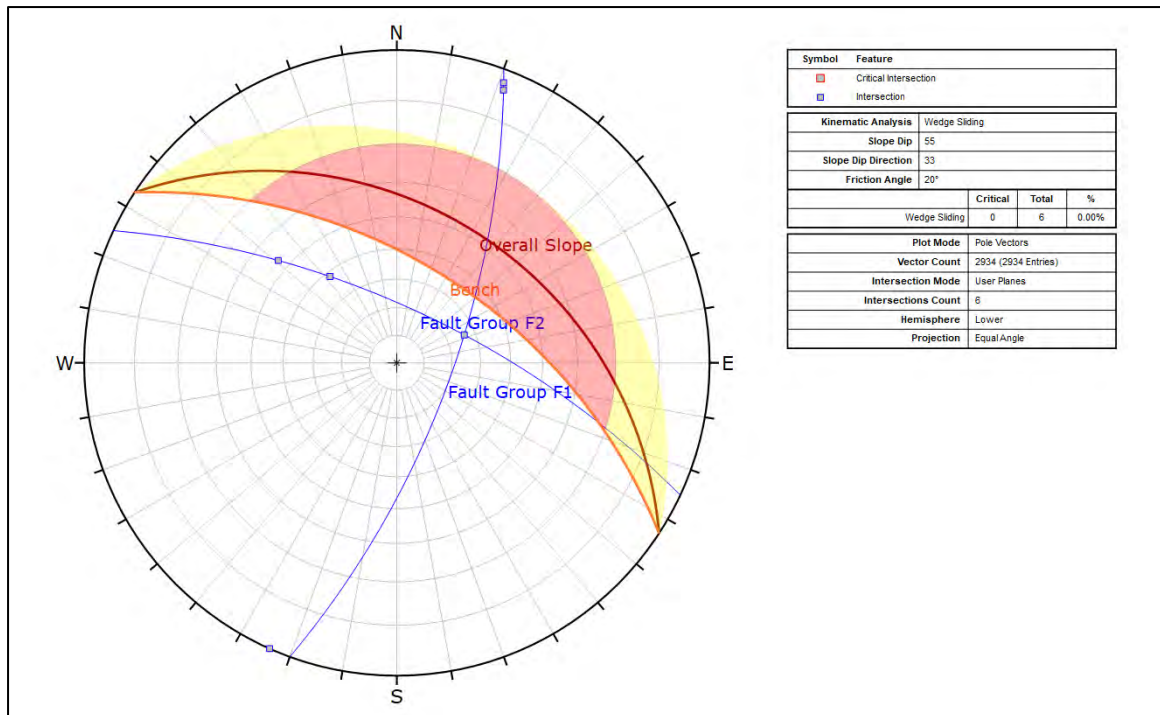


Figure: C311-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Bench Slope)–Wedge Failure.

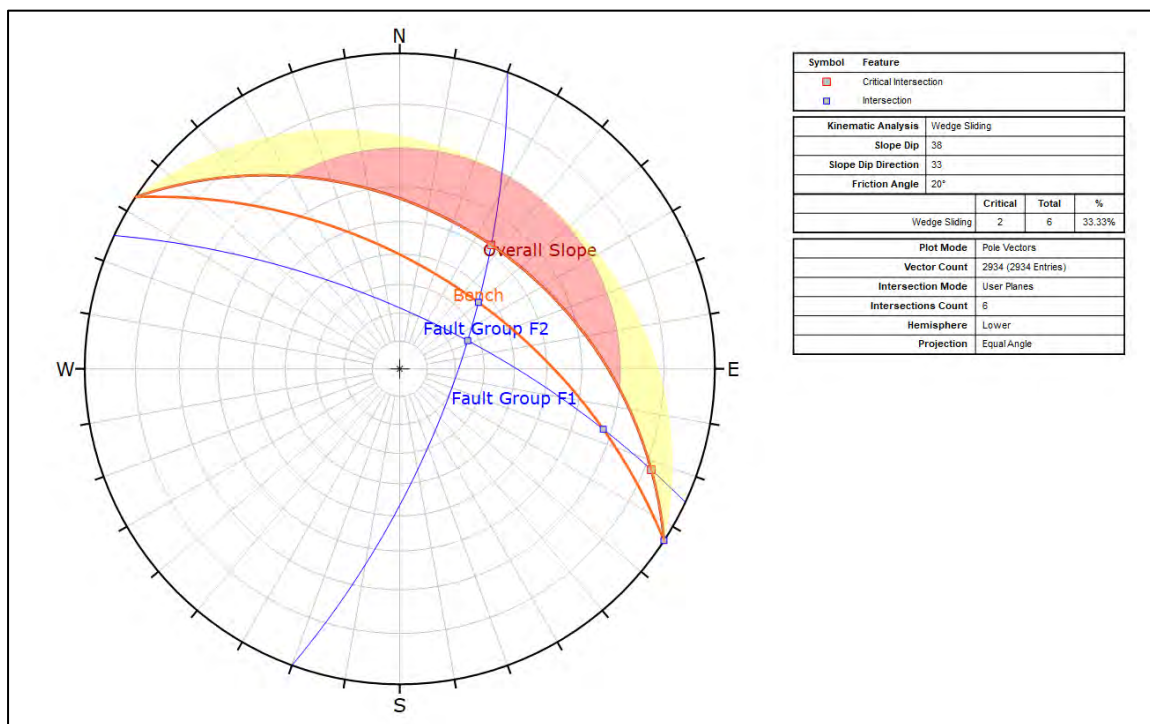


Figure: C312-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Overall Slope)–Wedge Failure.

Highwall – Faults Zones – Topple Failure

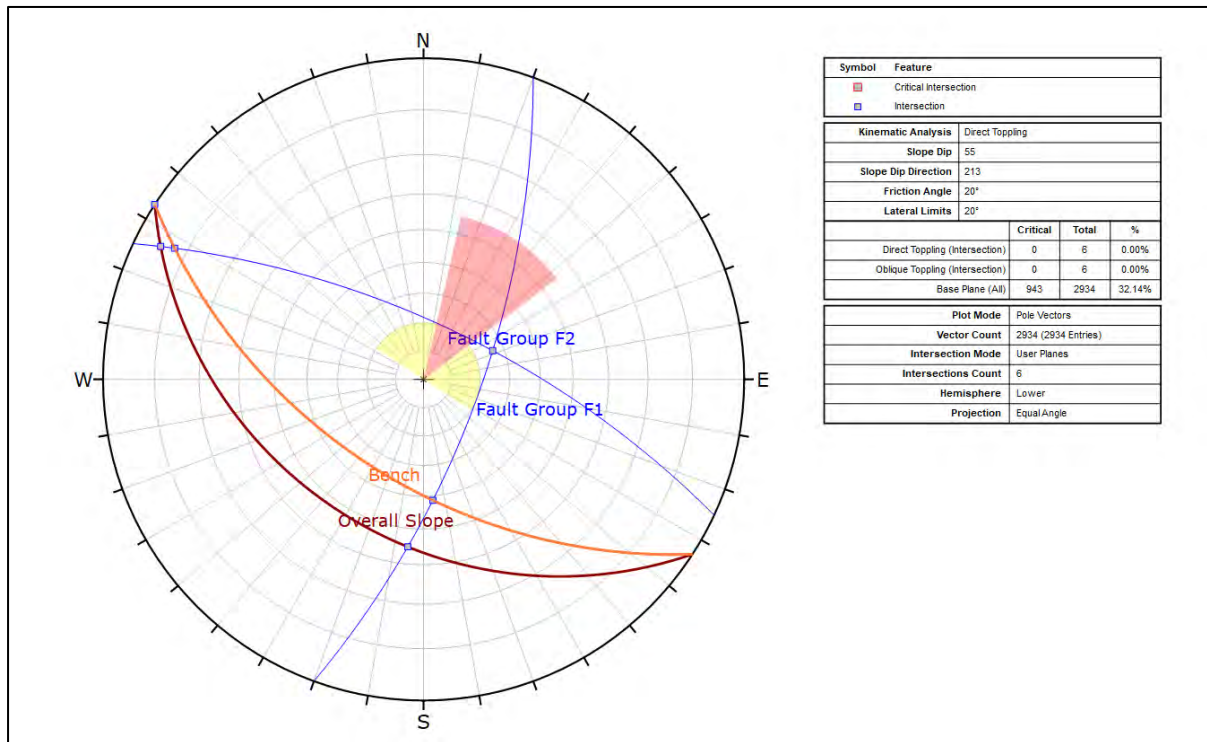


Figure: C313-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Bench Slope)–Topple Failure.

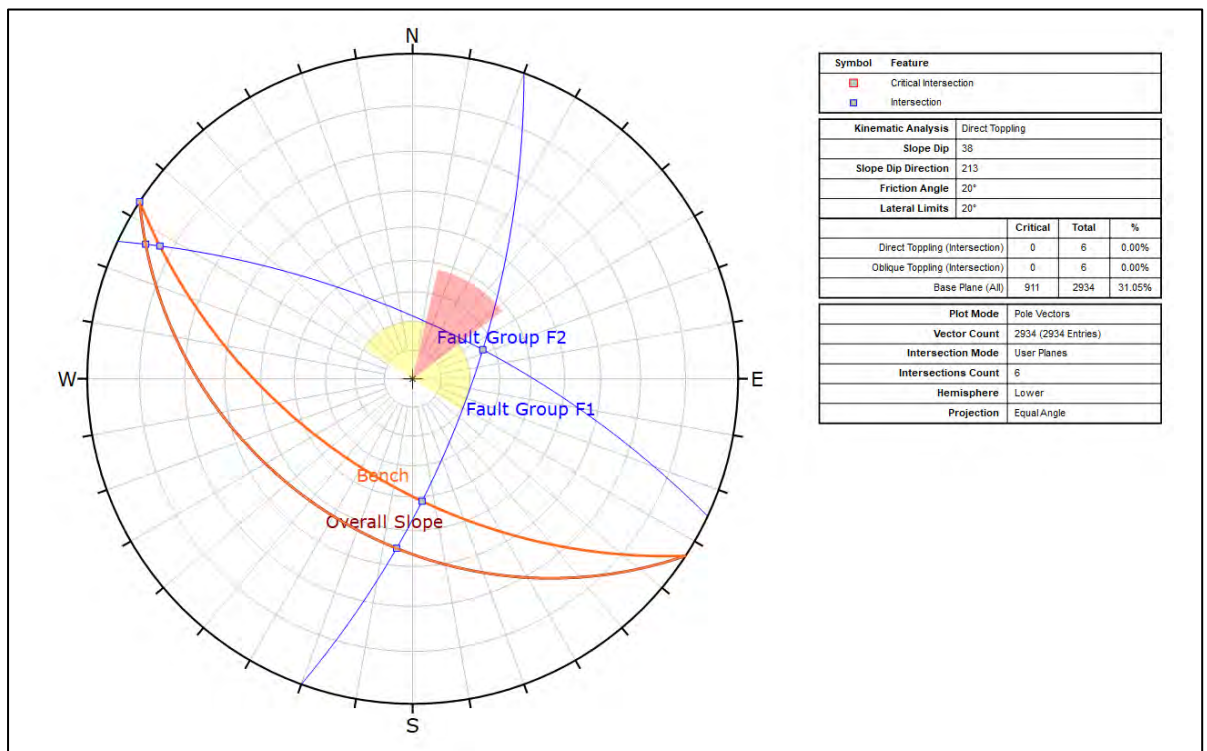


Figure: C314-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Overall Slope)–Topple Failure.

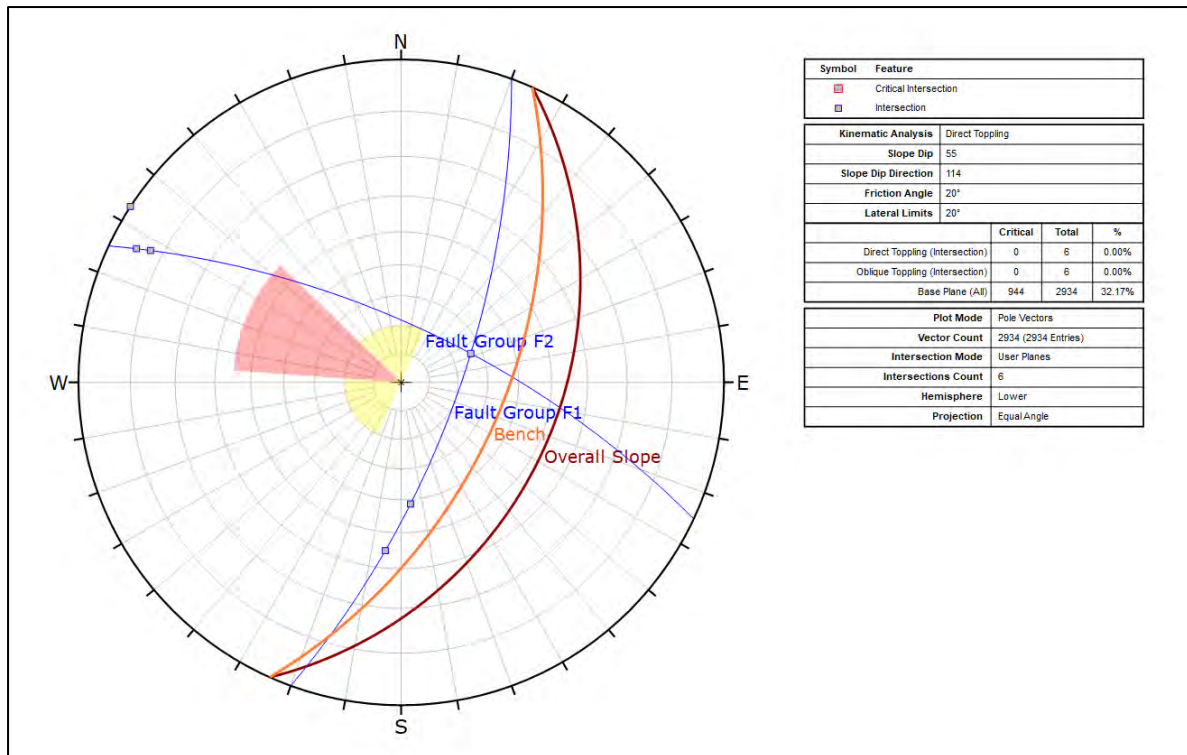


Figure: C315-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Bench Slope)–Topple Failure.

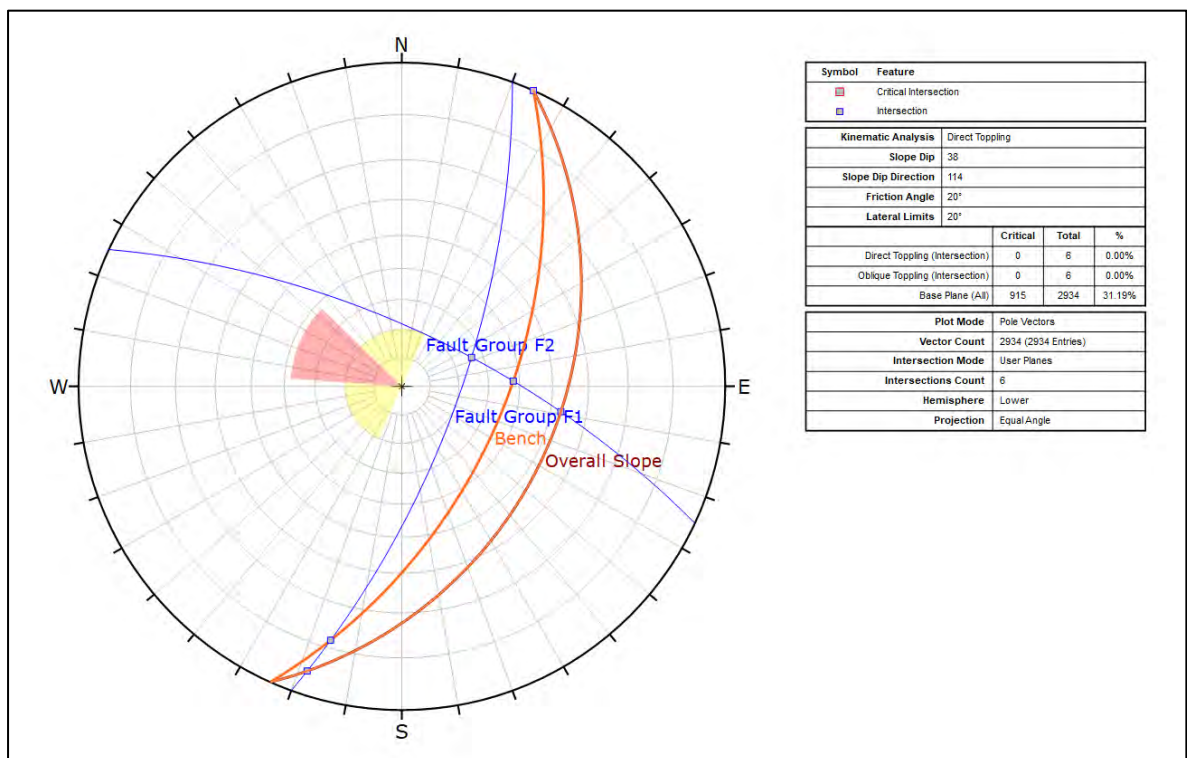


Figure: C316-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Overall Slope)–Topple Failure.

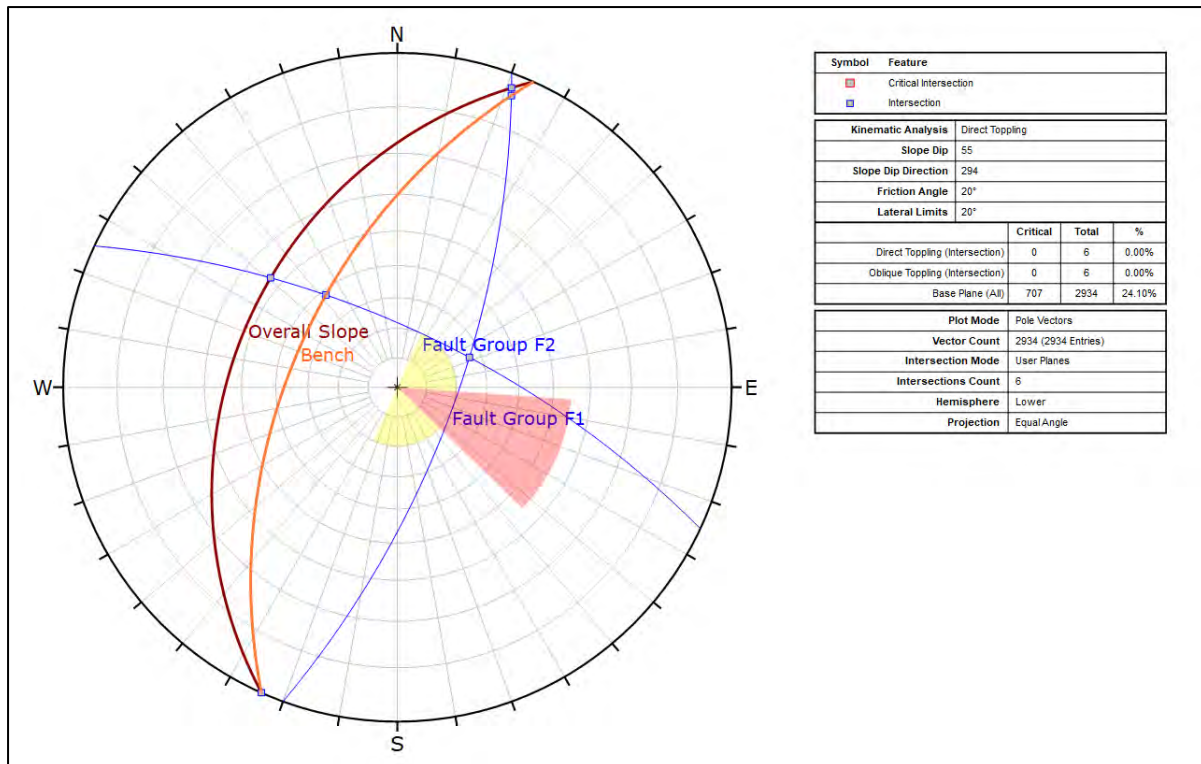


Figure: C317-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Bench Slope)–Topple Failure.

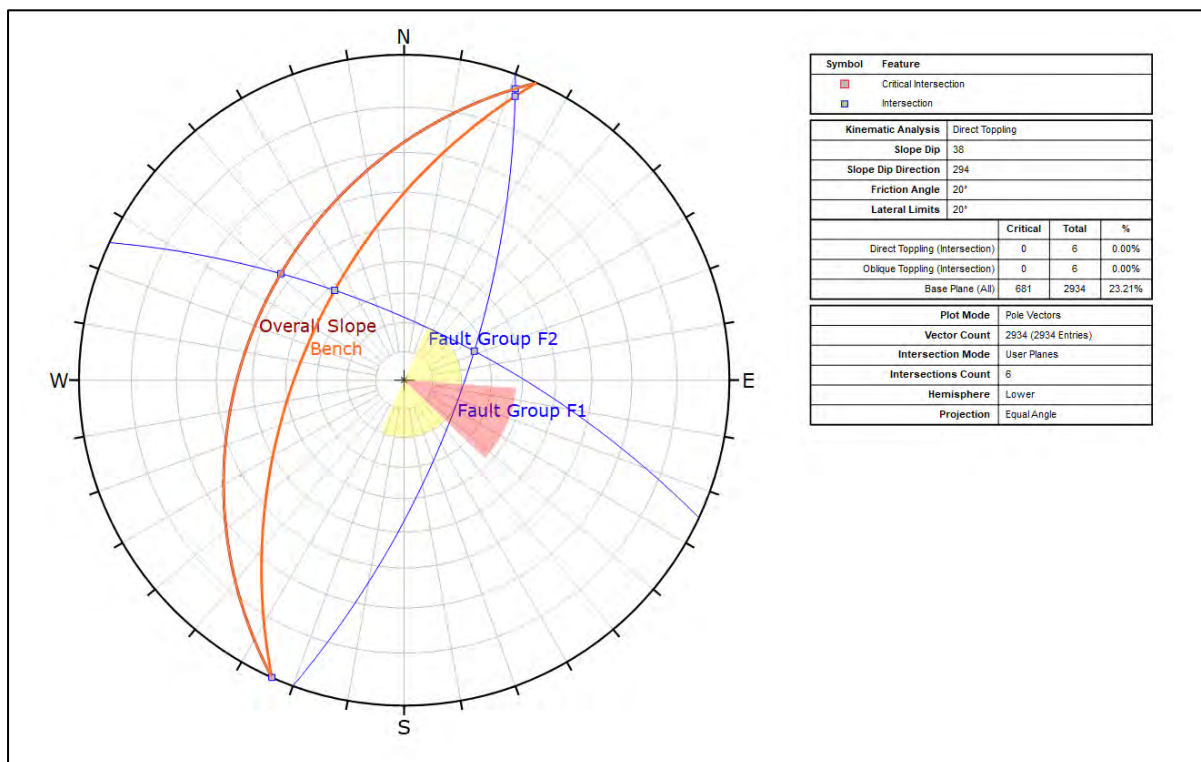


Figure: C318-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Overall Slope)–Topple Failure.

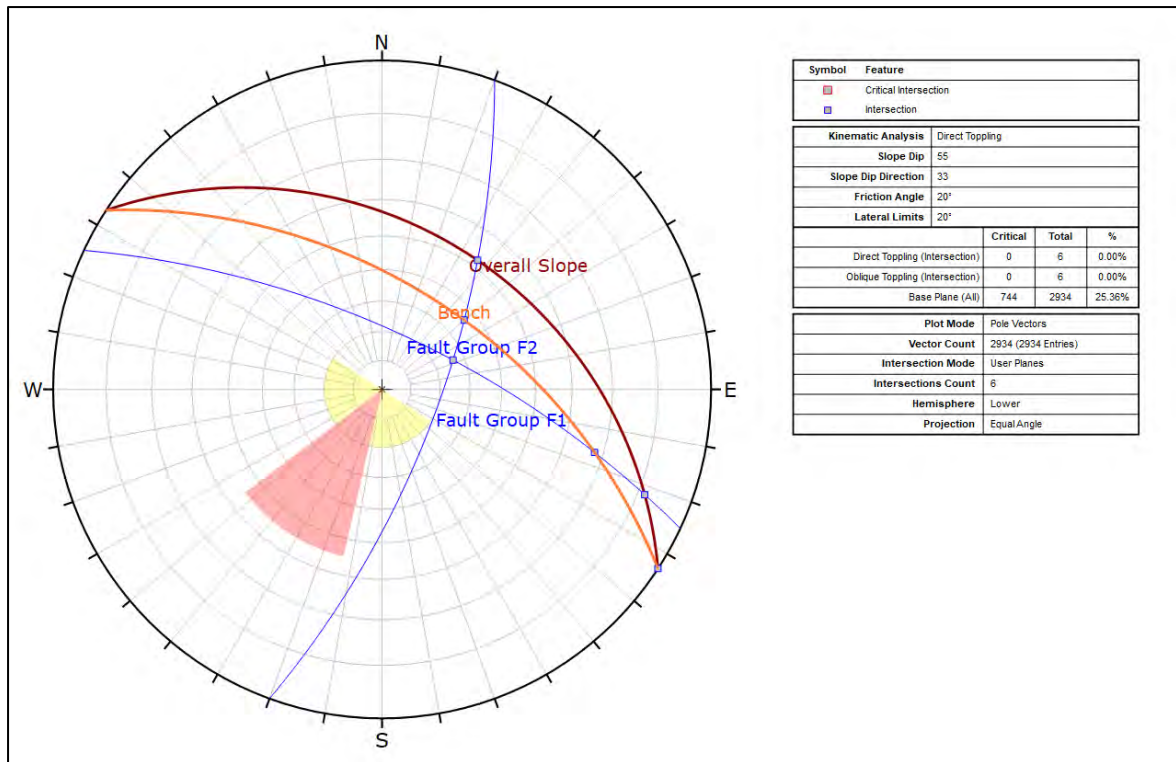


Figure: C319-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Bench Slope)–Topple Failure.

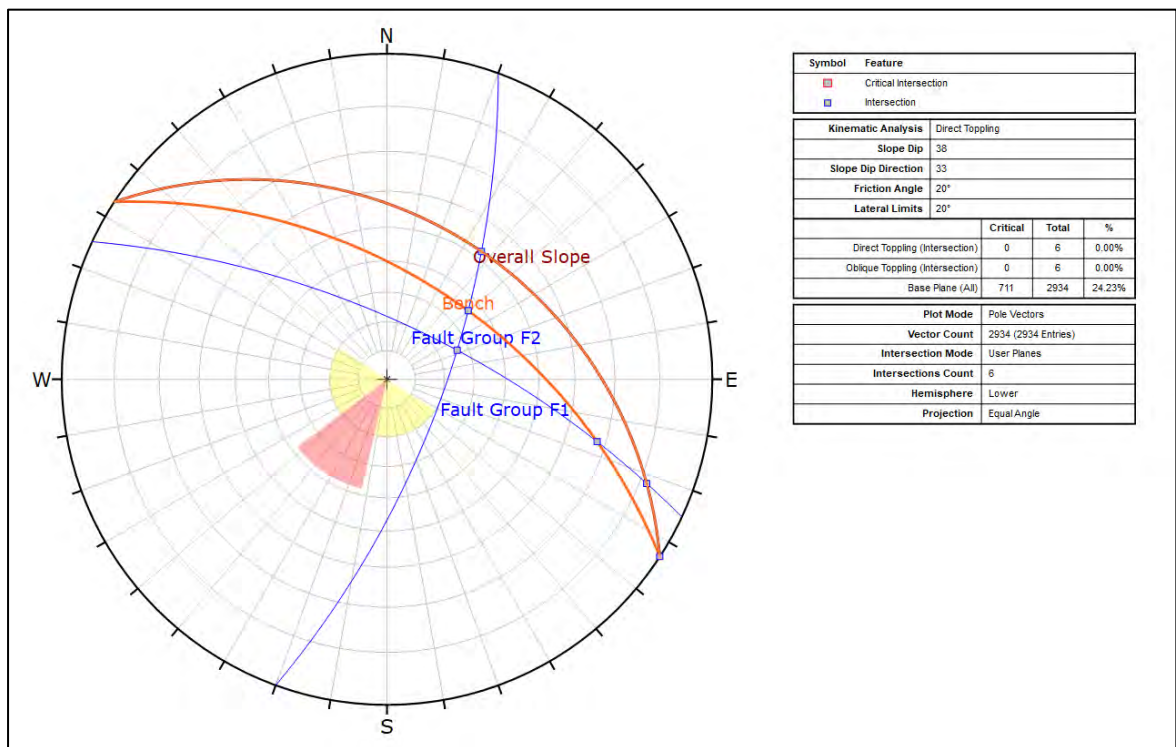


Figure: C320-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Overall Slope)–Topple Failure.

Highwall – Faults Zones – Planar Sliding

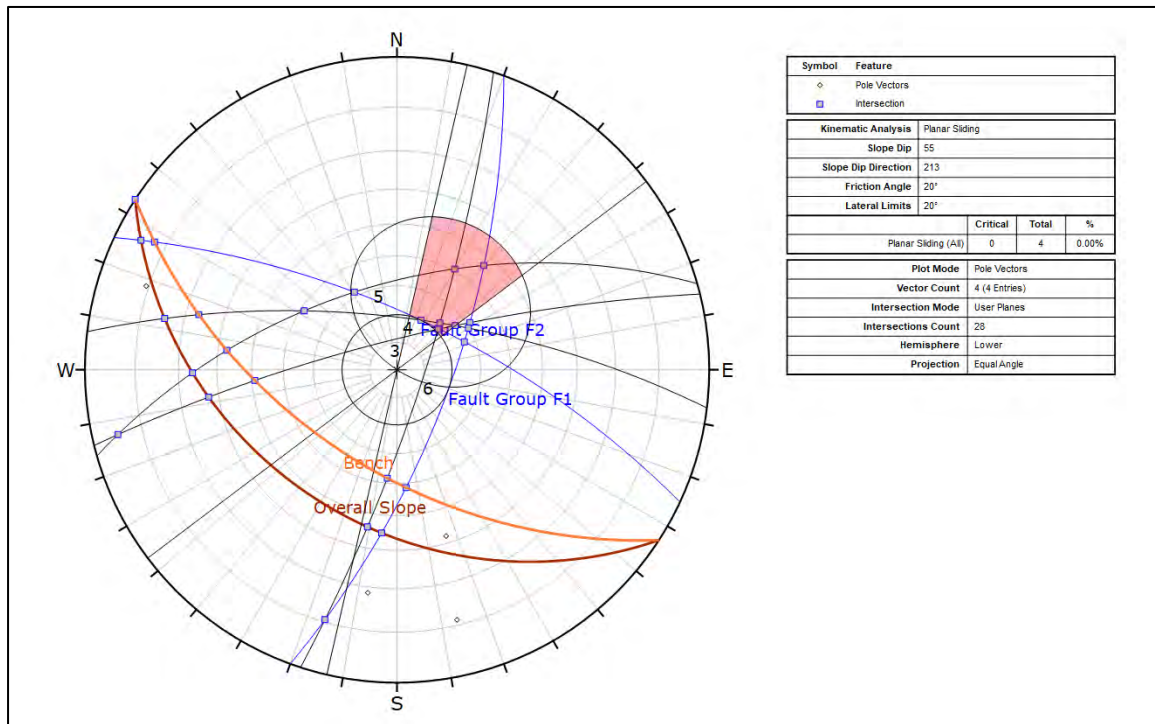


Figure: C321-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Bench Slope)–Planar Sliding.

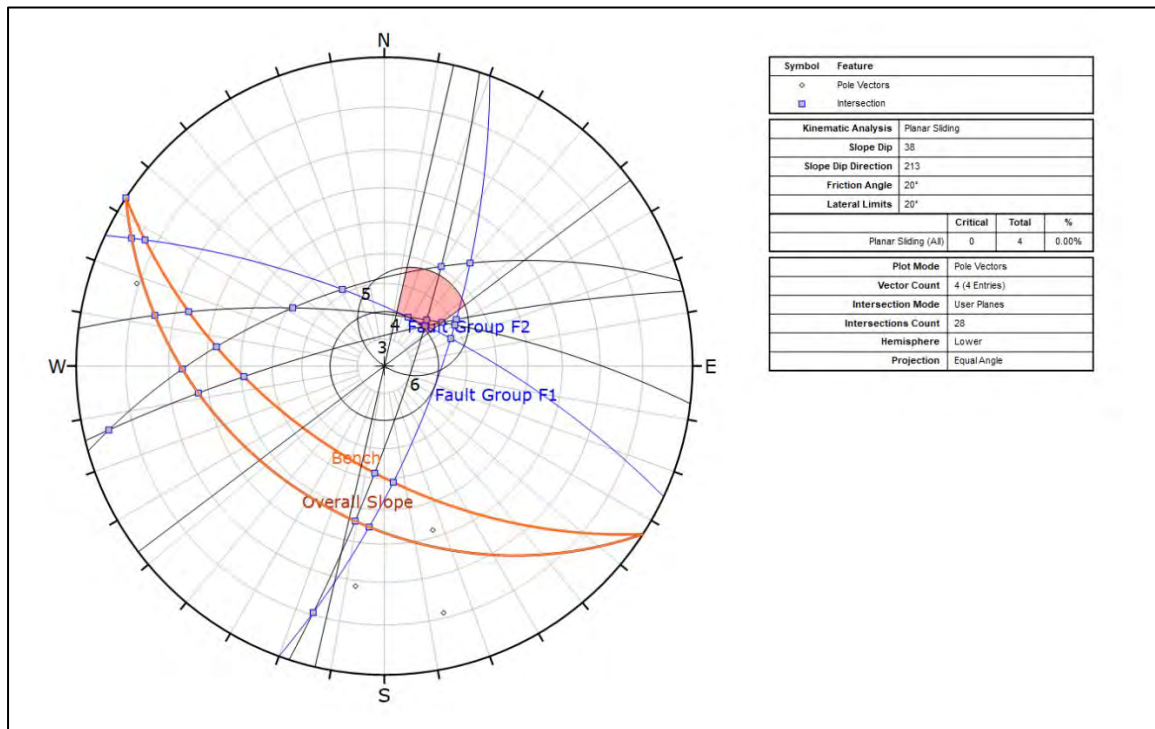


Figure: C322-Kinematic Analysis (Fault Zones) Highwall Orientation 1 (Overall Slope)–Planar Sliding.

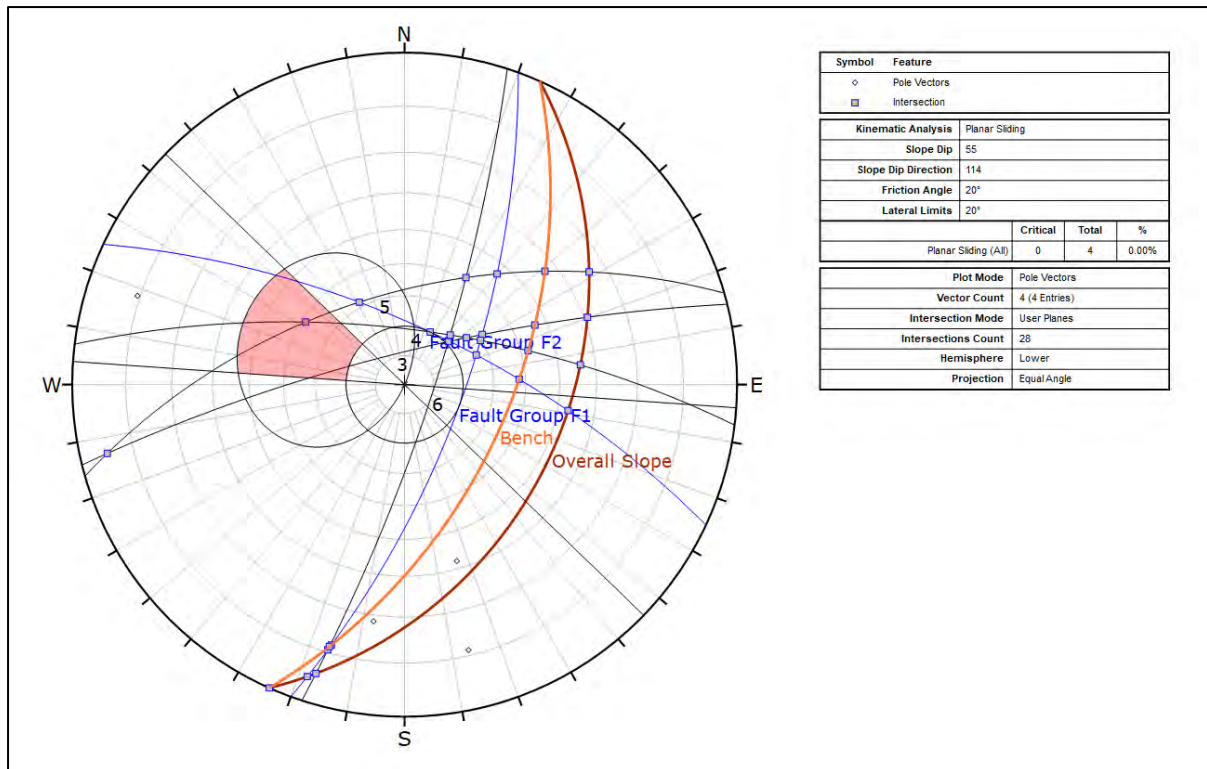


Figure: C323-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Bench Slope)–Planar Sliding.

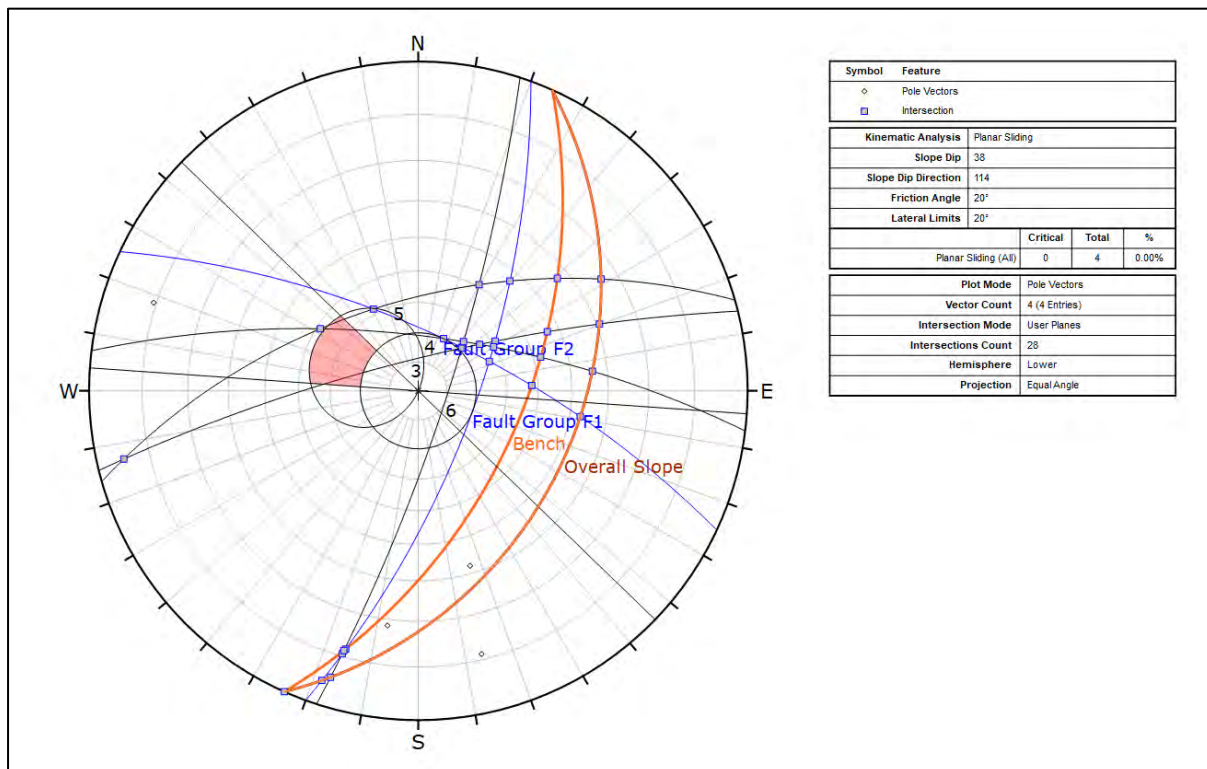


Figure: C324-Kinematic Analysis (Fault Zones) Highwall Orientation 2 (Overall Slope)–Planar Sliding.

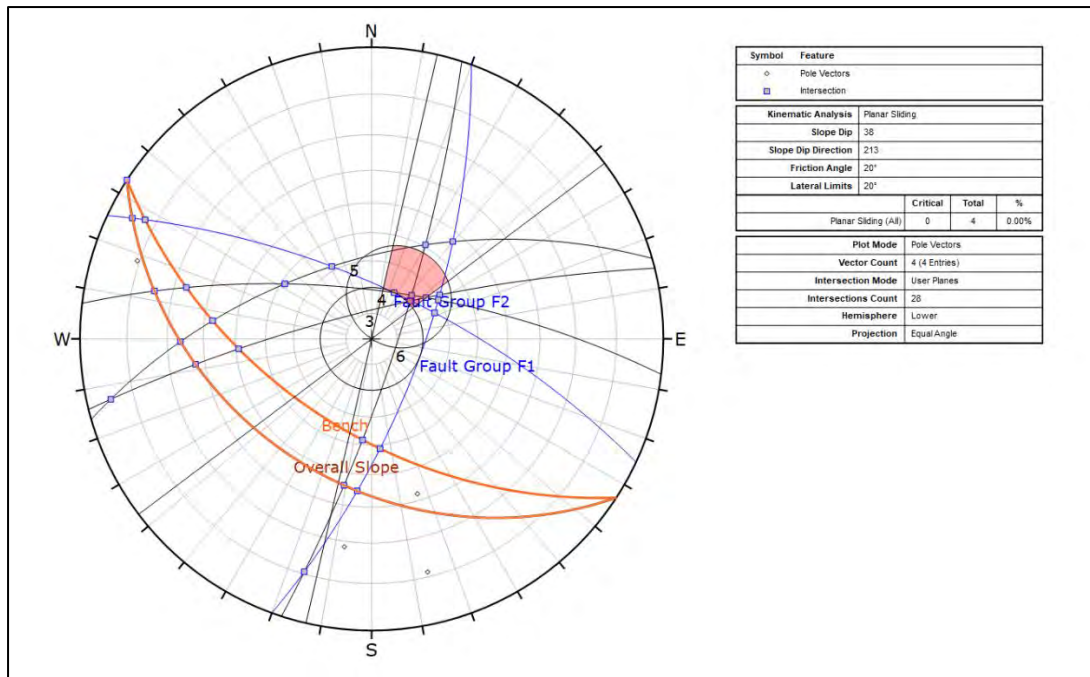


Figure: C325-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Bench Slope)–Planar Sliding.

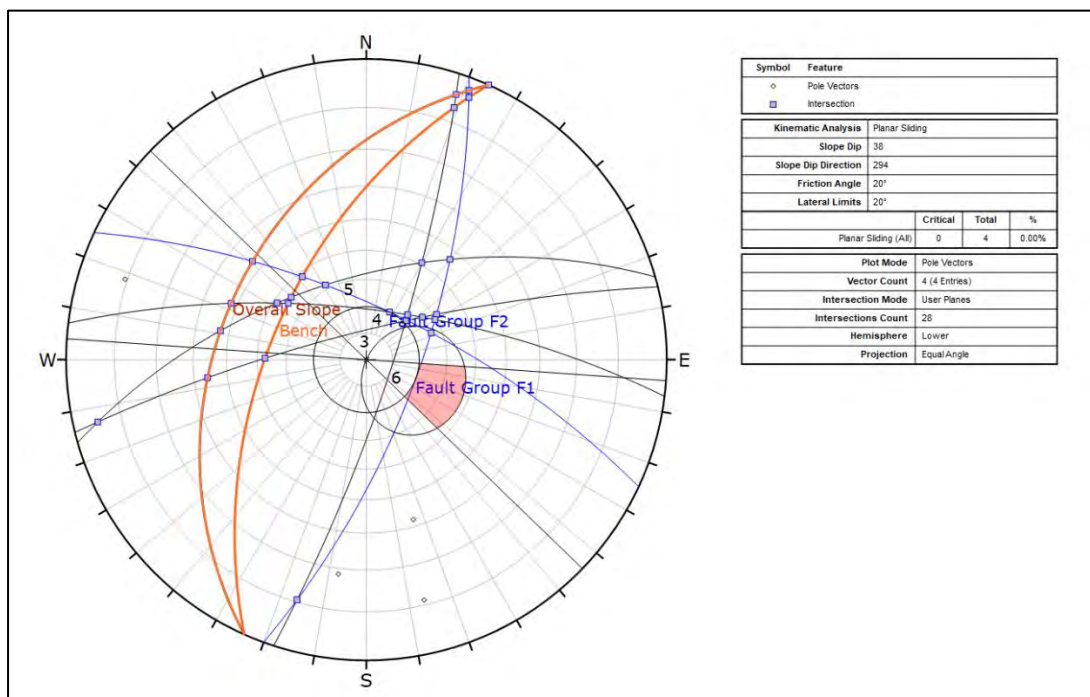


Figure: C326-Kinematic Analysis (Fault Zones) Highwall Orientation 3 (Overall Slope)–Planar Sliding.

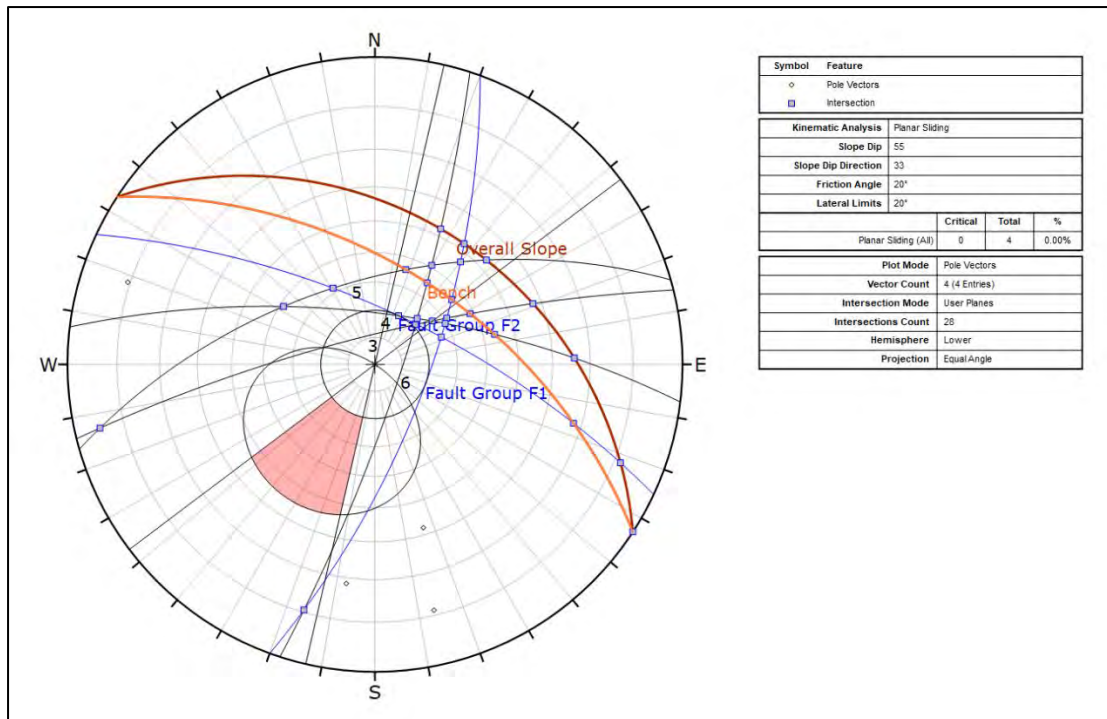


Figure: C327-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Bench Slope)–Planar Sliding.

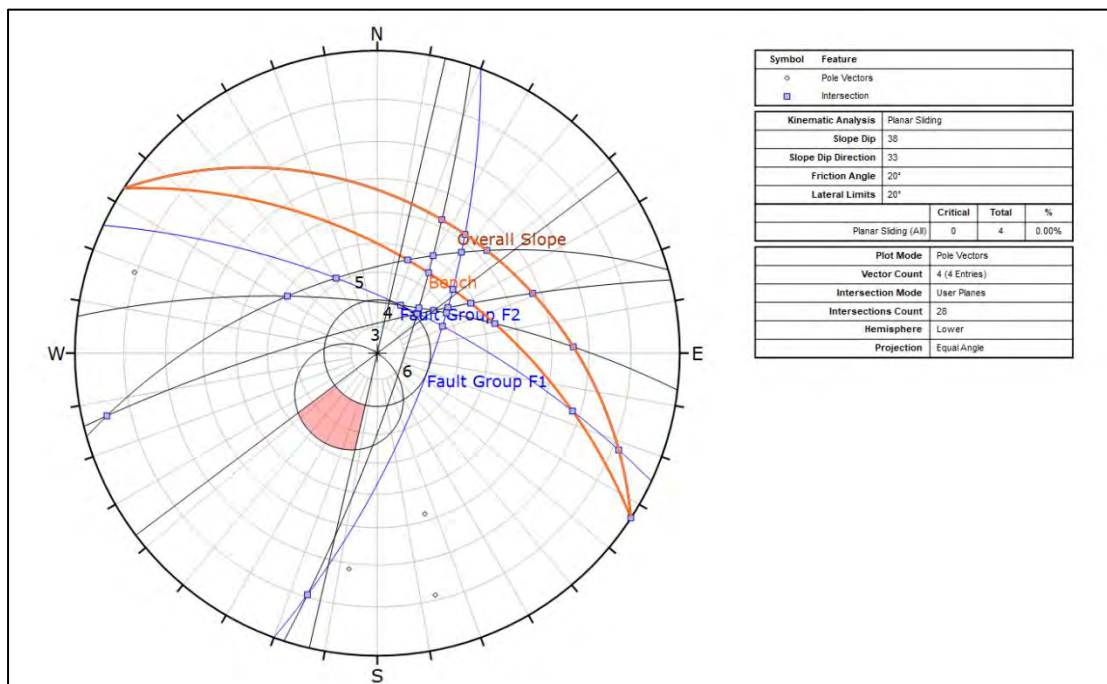


Figure: C328-Kinematic Analysis (Fault Zones) Highwall Orientation 4 (Overall Slope)–Planar Sliding.

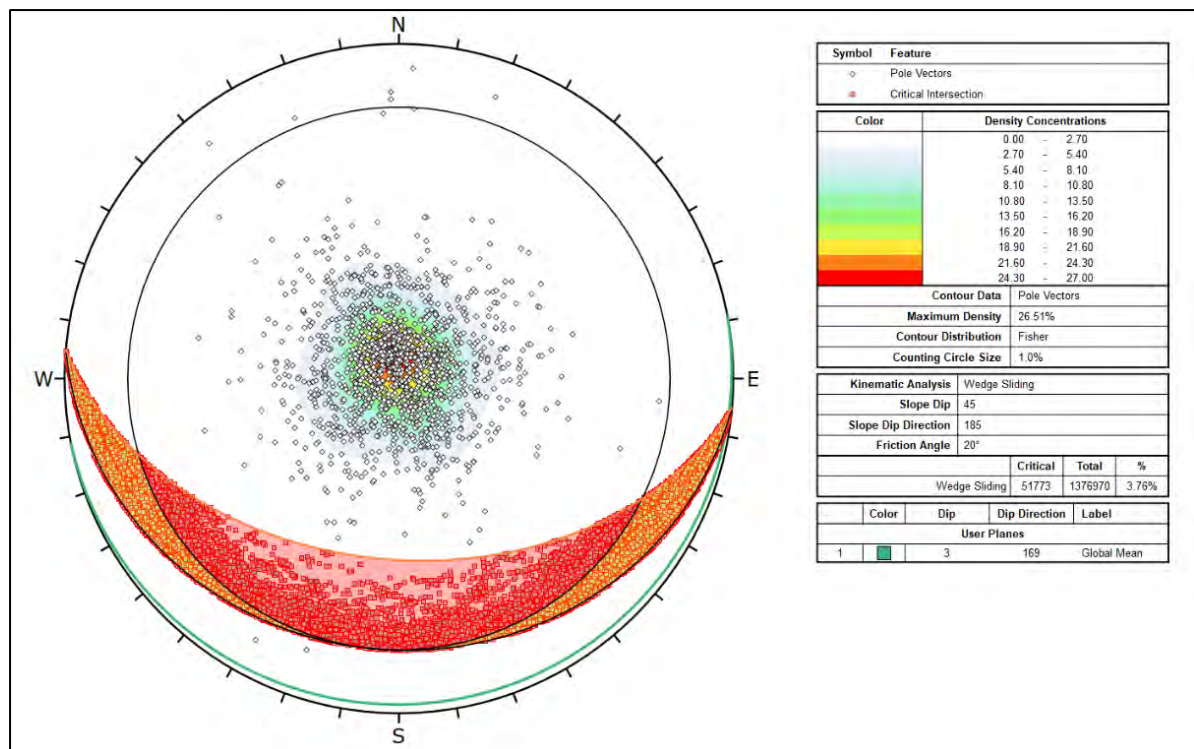


Figure C331 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (North Wall) – Wedge Sliding.

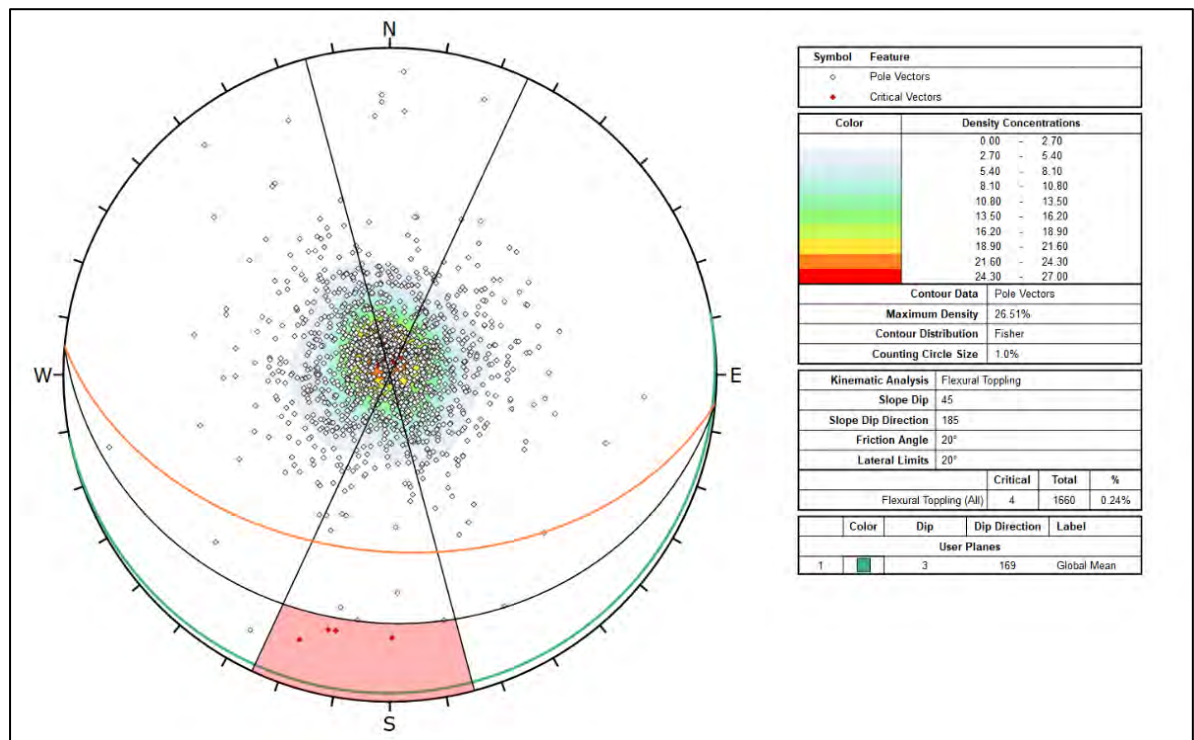


Figure C332 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (North Wall) – Flexural Toppling.

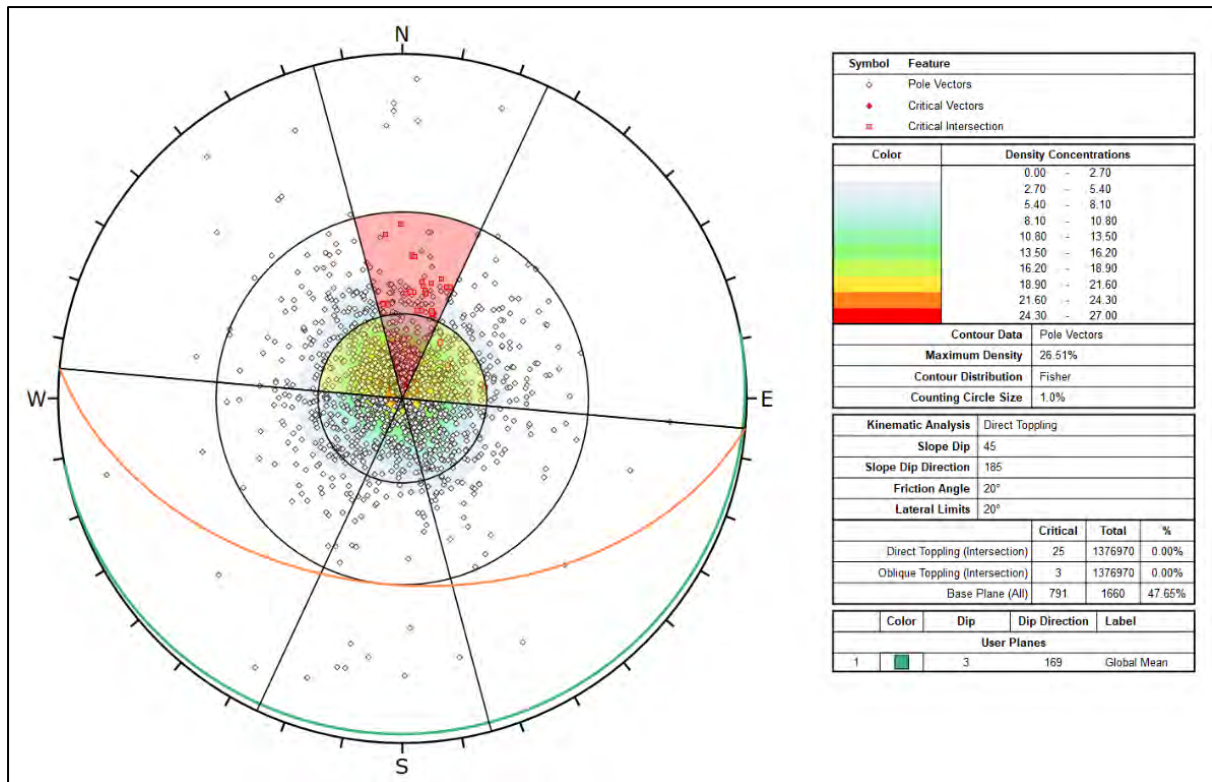


Figure C333 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – BCM - Bedding - Overall Slope

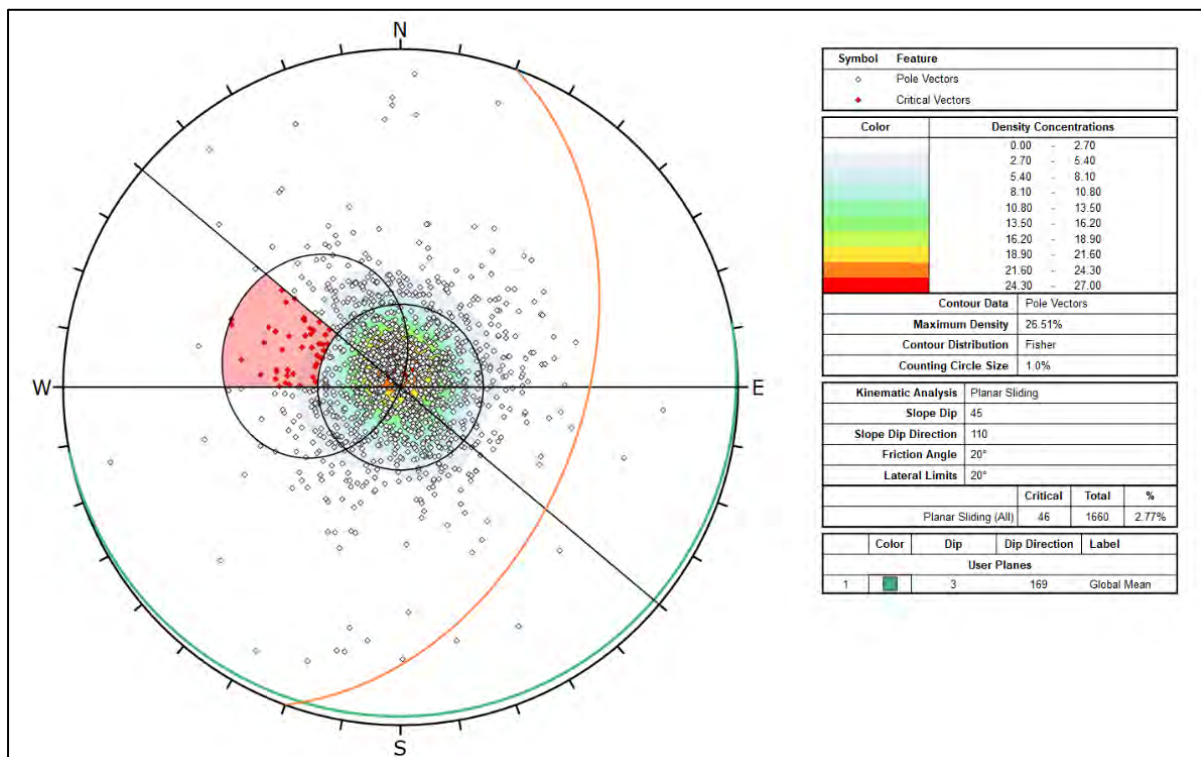


Figure C334 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (West Wall) – Planar Sliding.

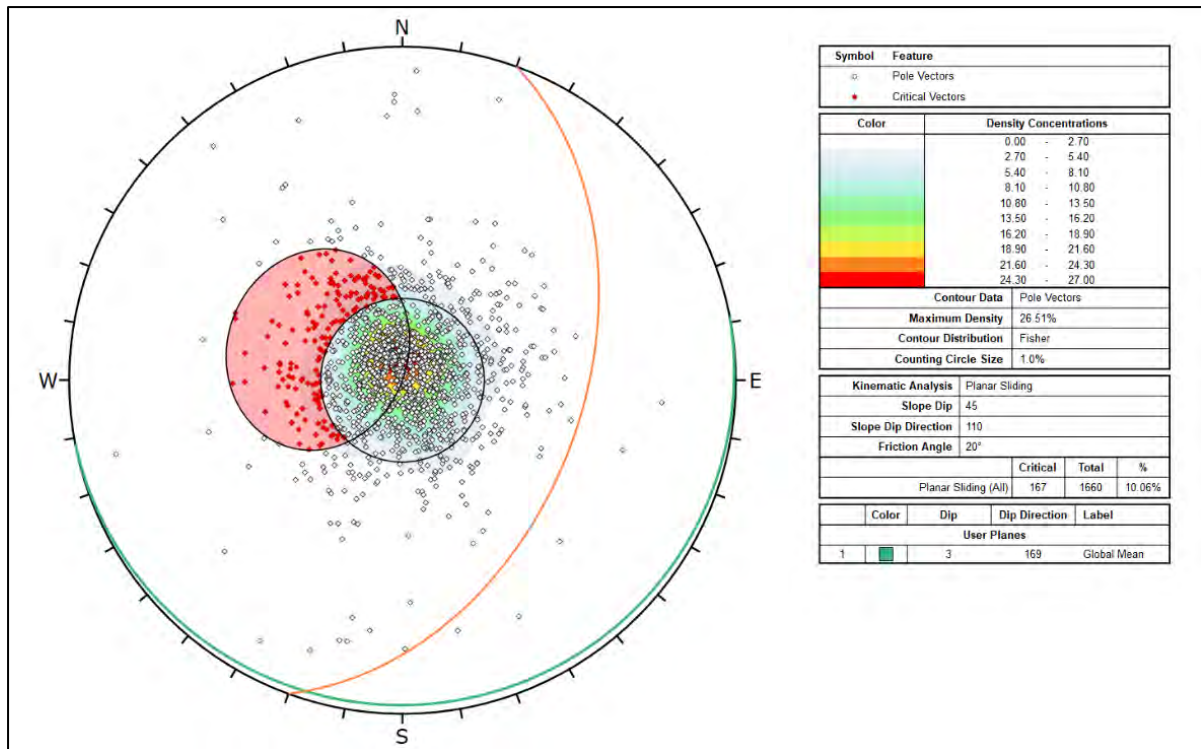


Figure C335 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (West Wall) – Planar Sliding (No Limits).

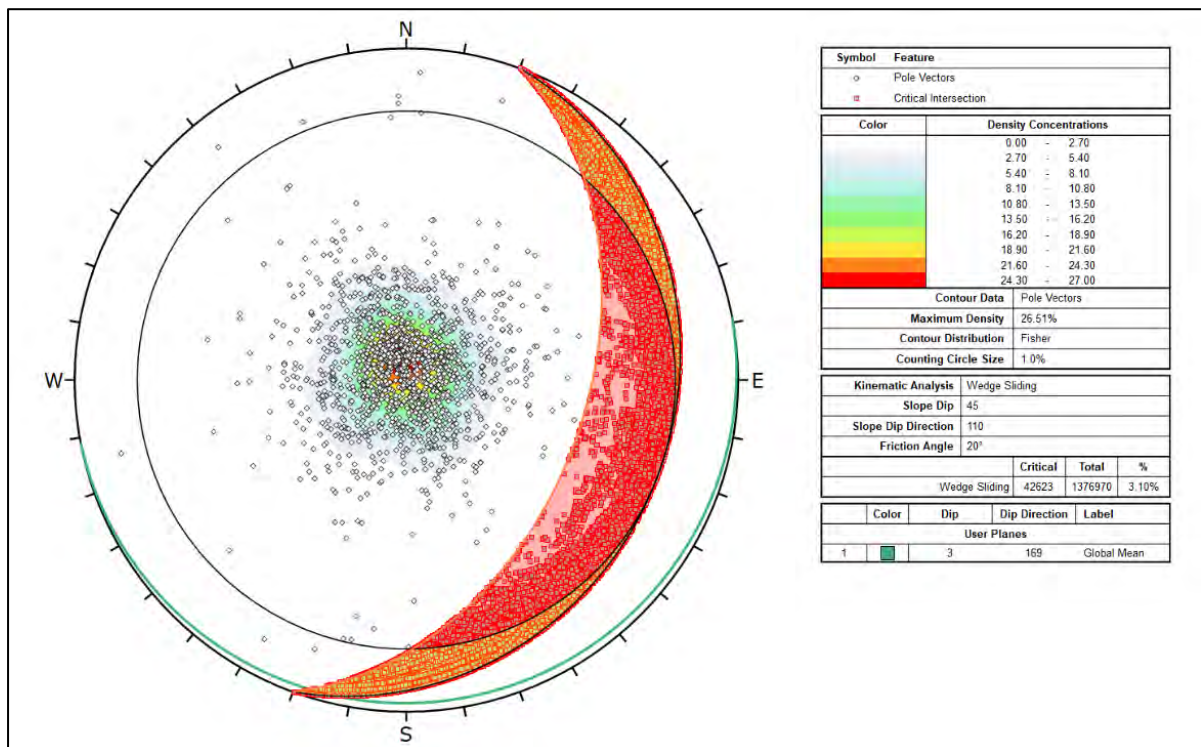


Figure C336 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (West Wall) – Wedge Sliding.

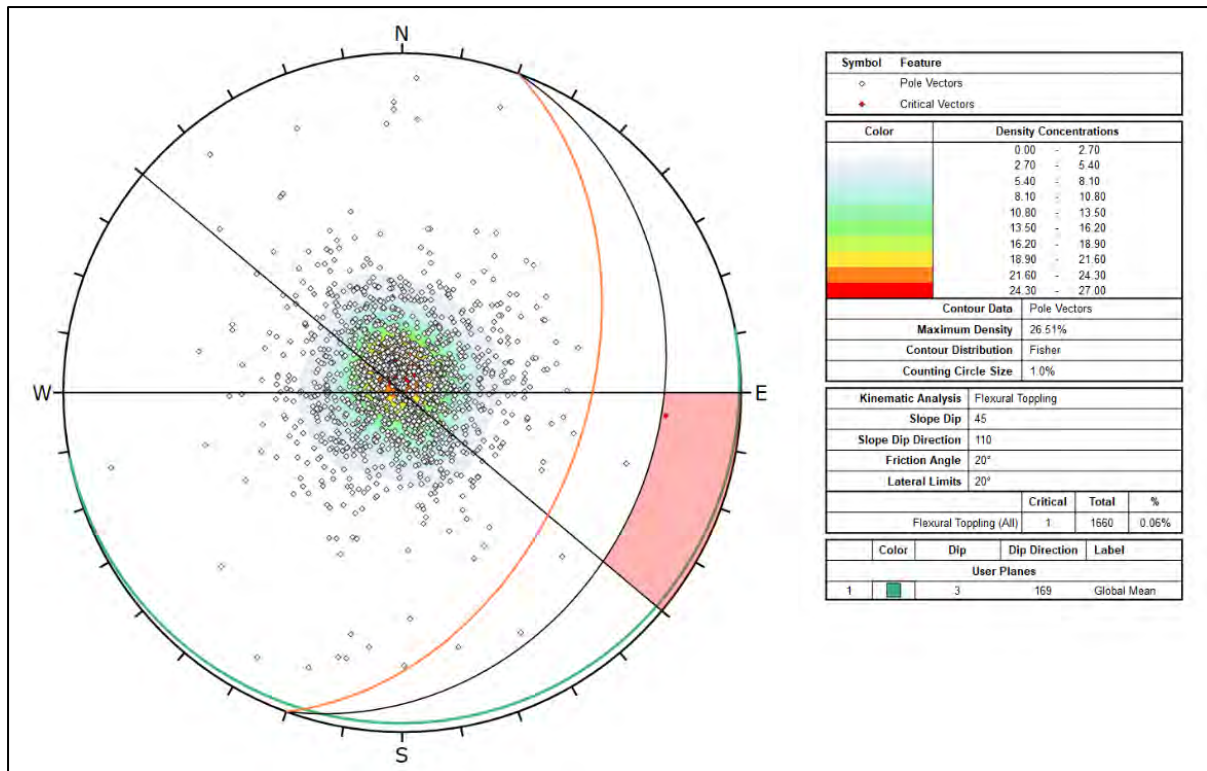


Figure C337 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (West Wall) – Flexural Toppling.

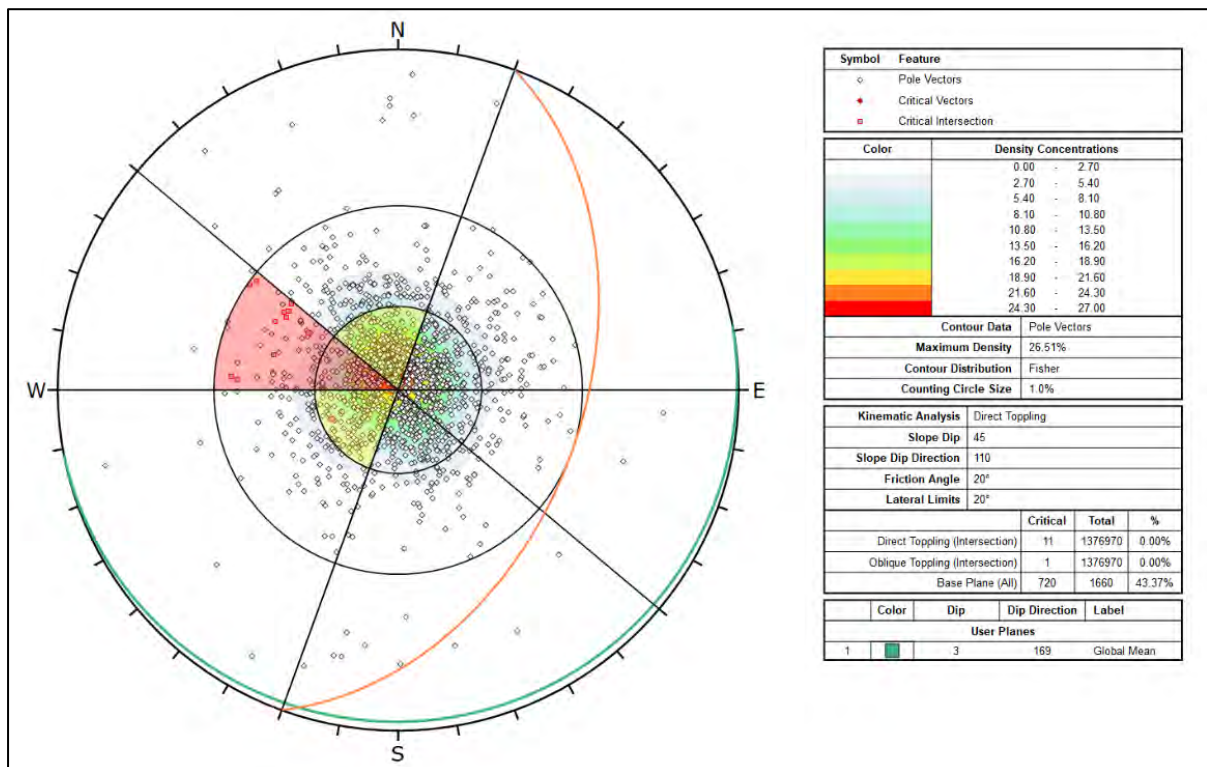


Figure C338 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – BCM - Bedding - Overall Slope

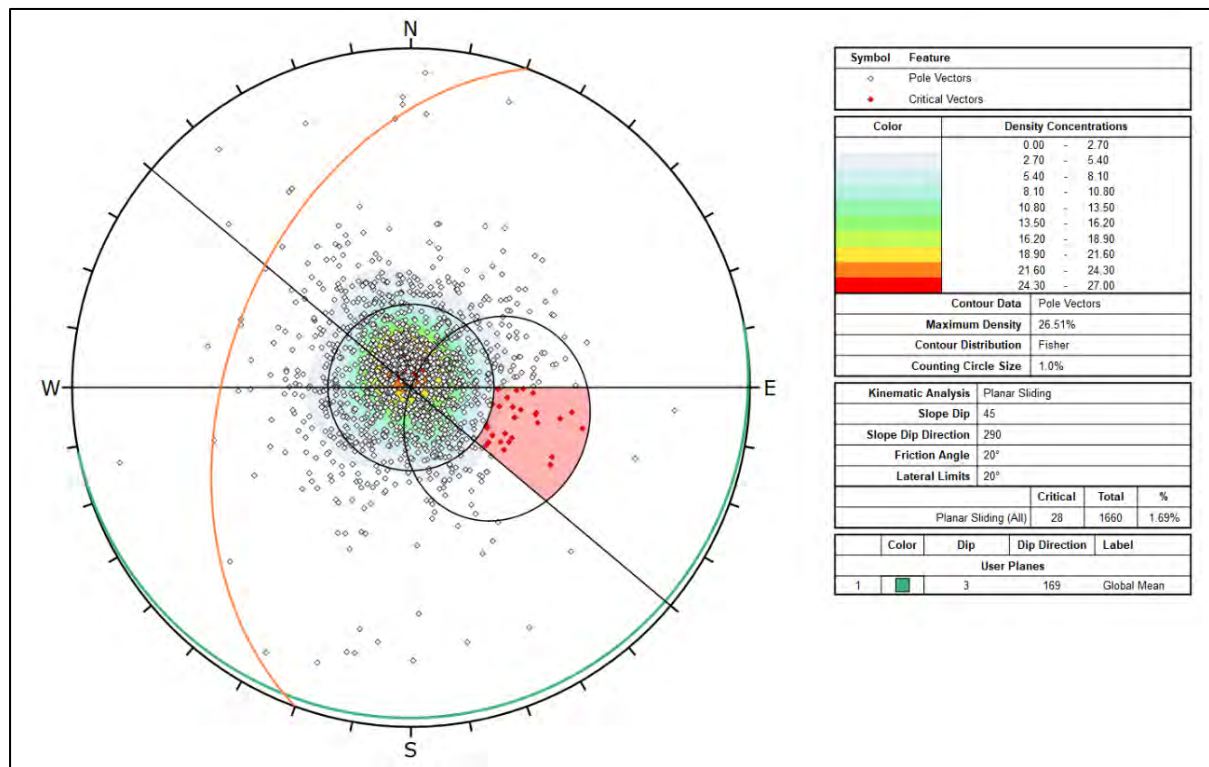


Figure C339 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (East Wall) – Planar Sliding.

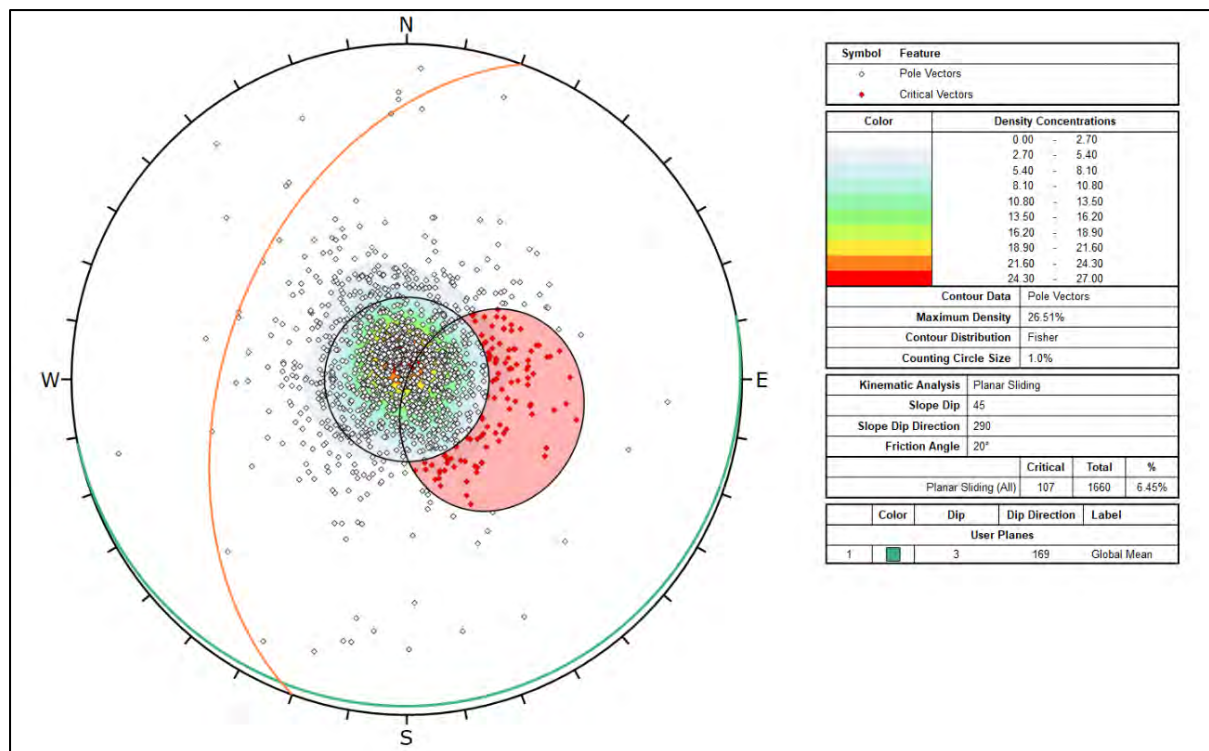


Figure C340 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (East Wall) – Planar Sliding (No Limits).

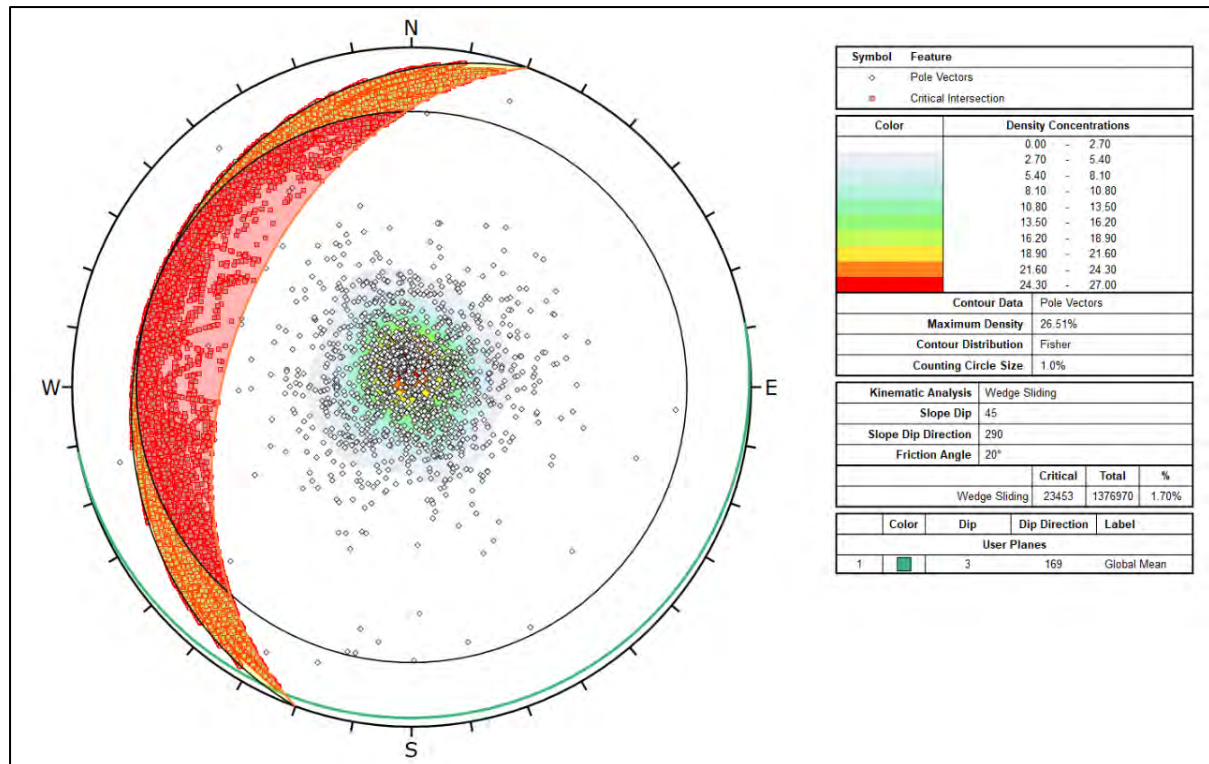


Figure C341 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (East Wall) – Wedge Sliding.

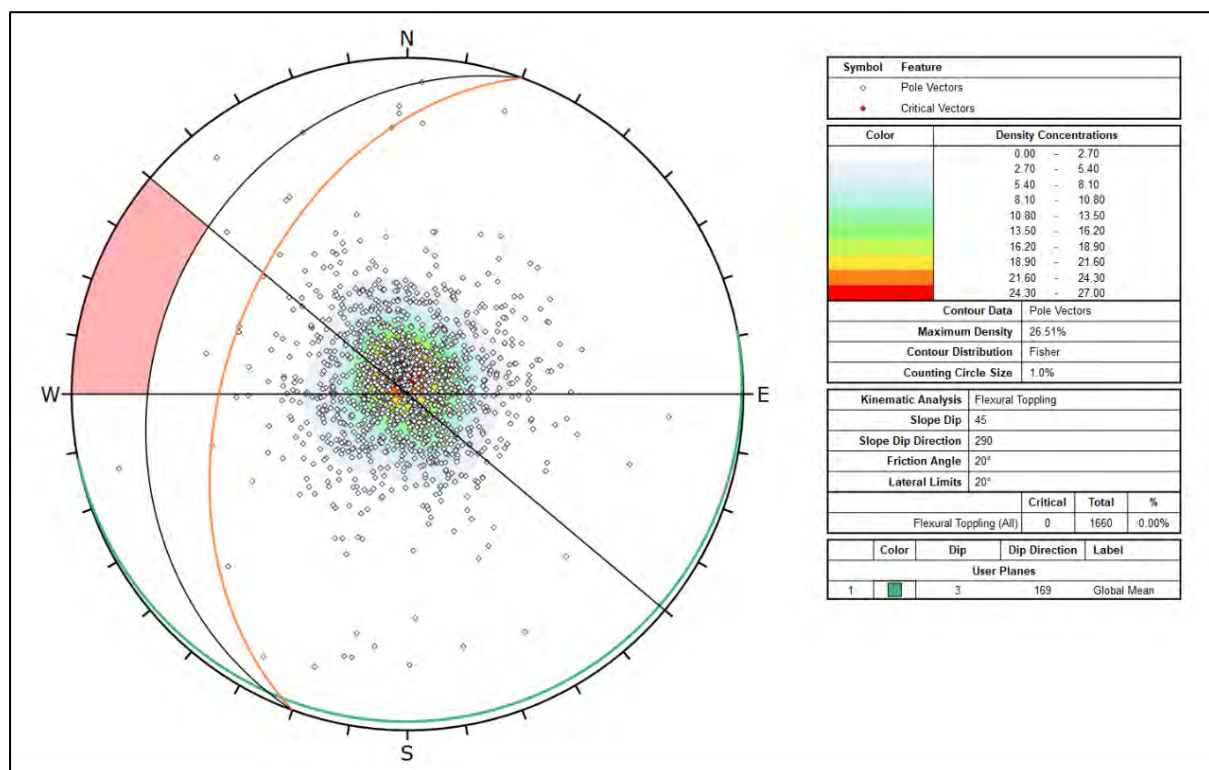


Figure C342 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (East Wall) – Flexural Toppling.

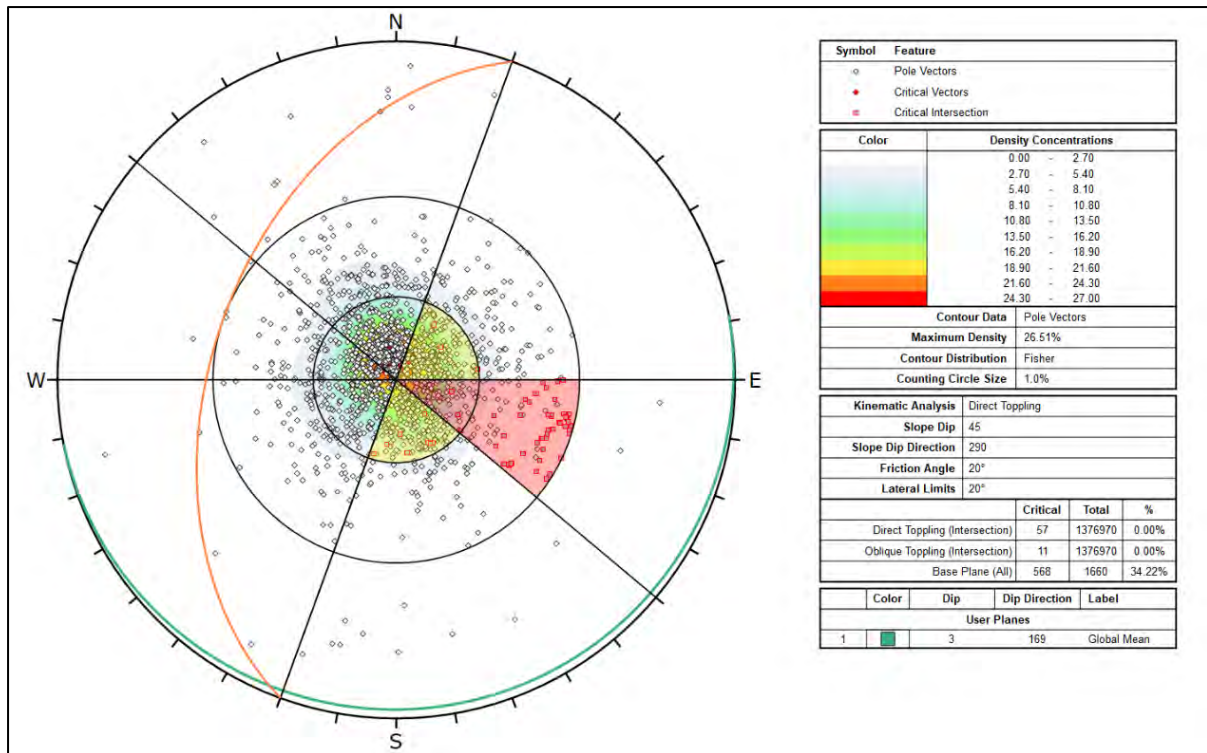


Figure C343 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – BCM - Bedding - Overall Slope

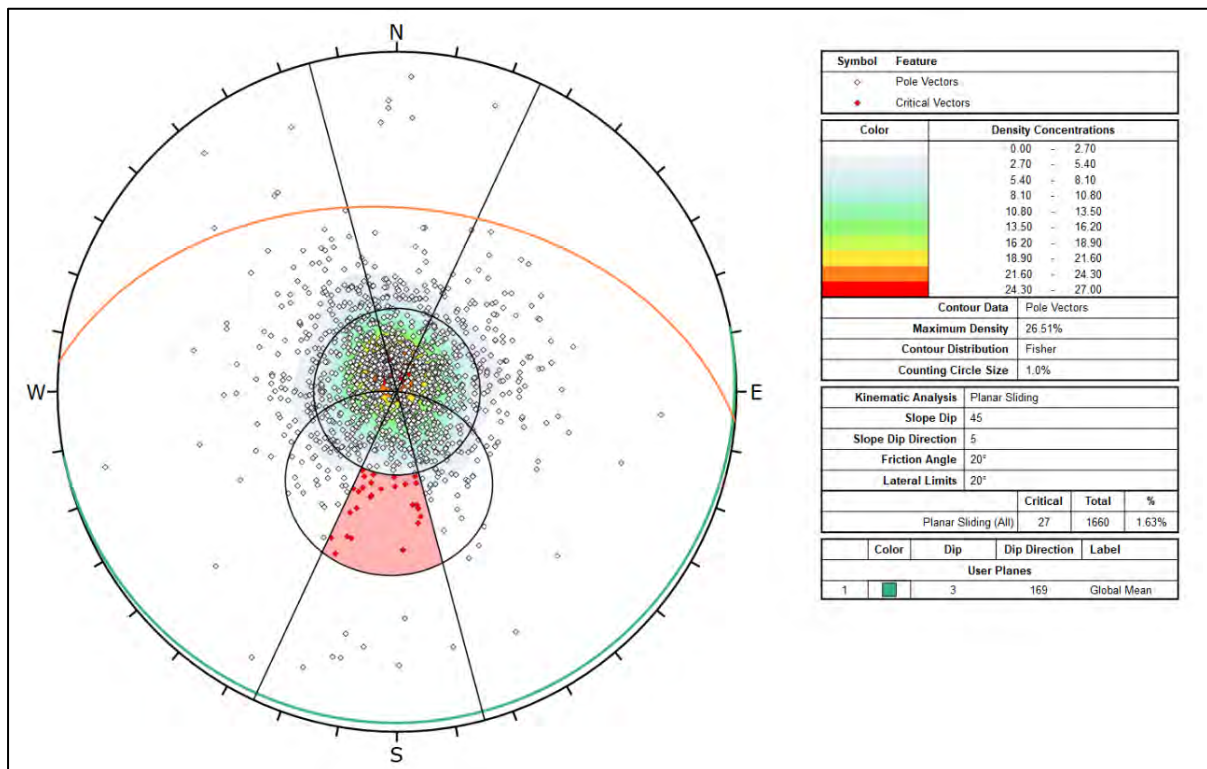


Figure C344 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (South Wall) – Planar Sliding.

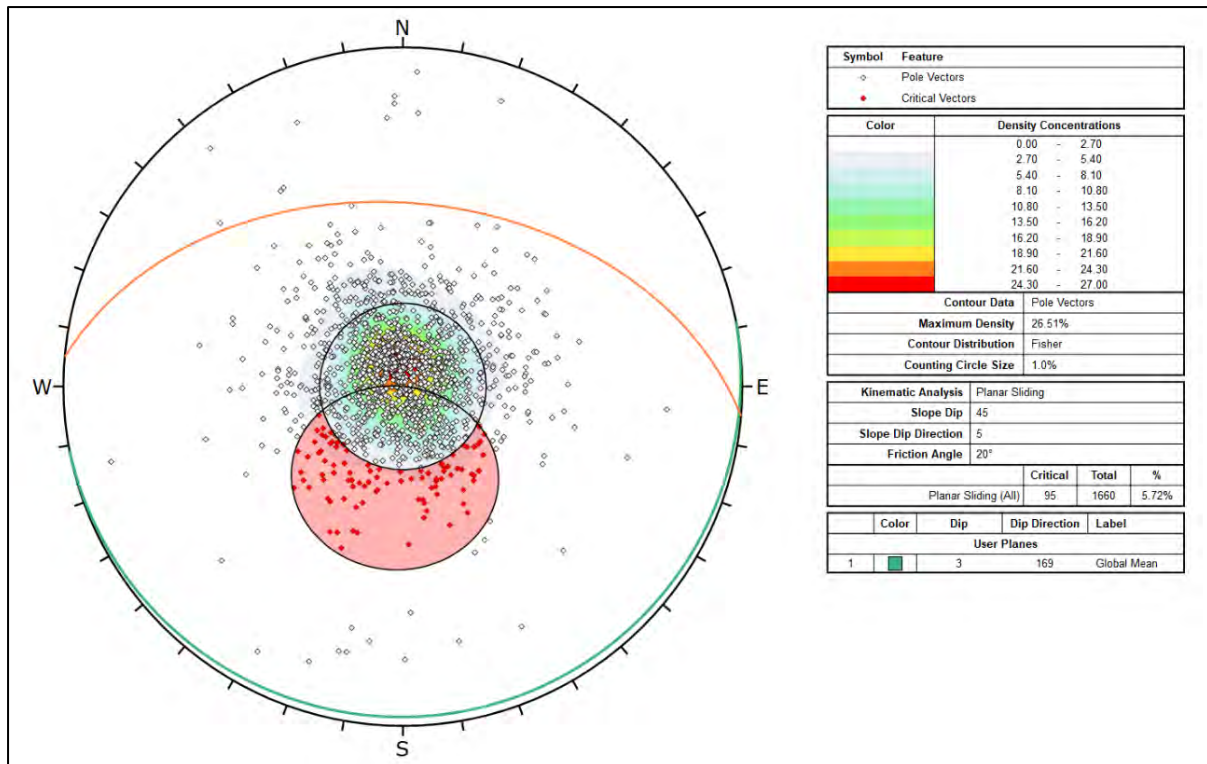


Figure C345 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (South Wall) – Planar Sliding (No Limits).

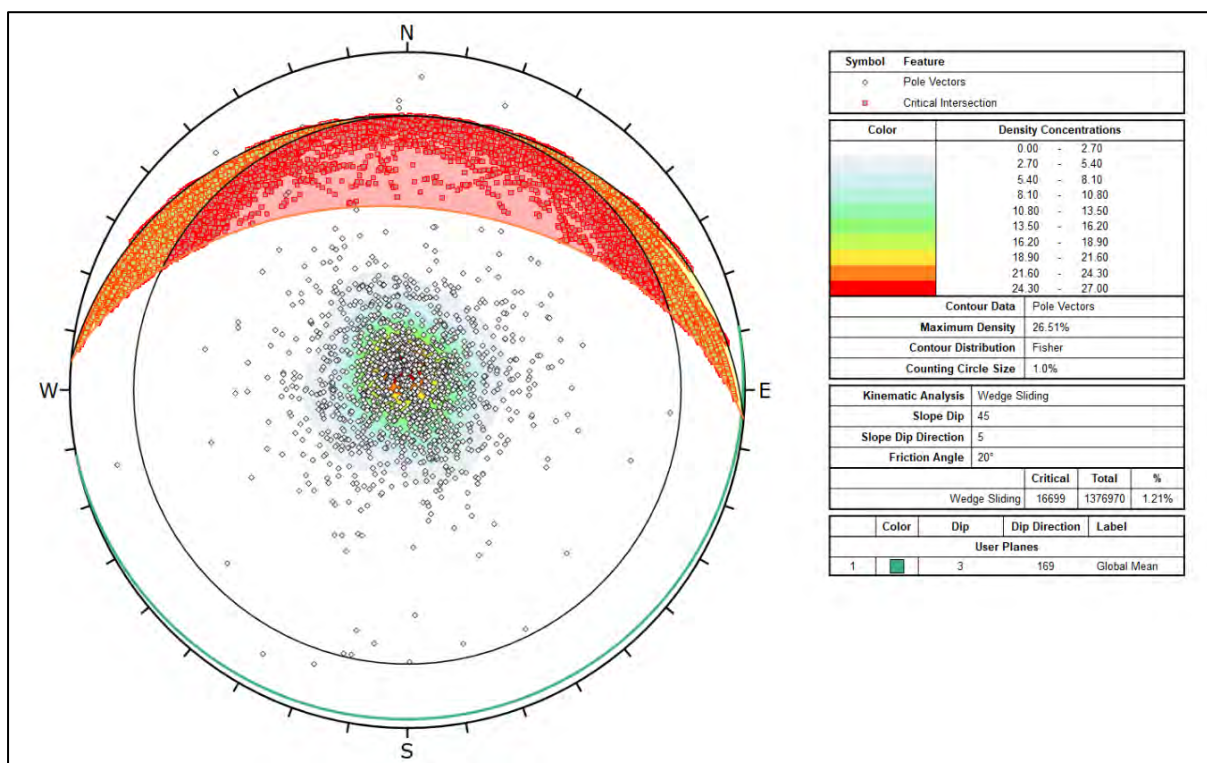


Figure C346 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (South Wall) – Wedge Sliding.

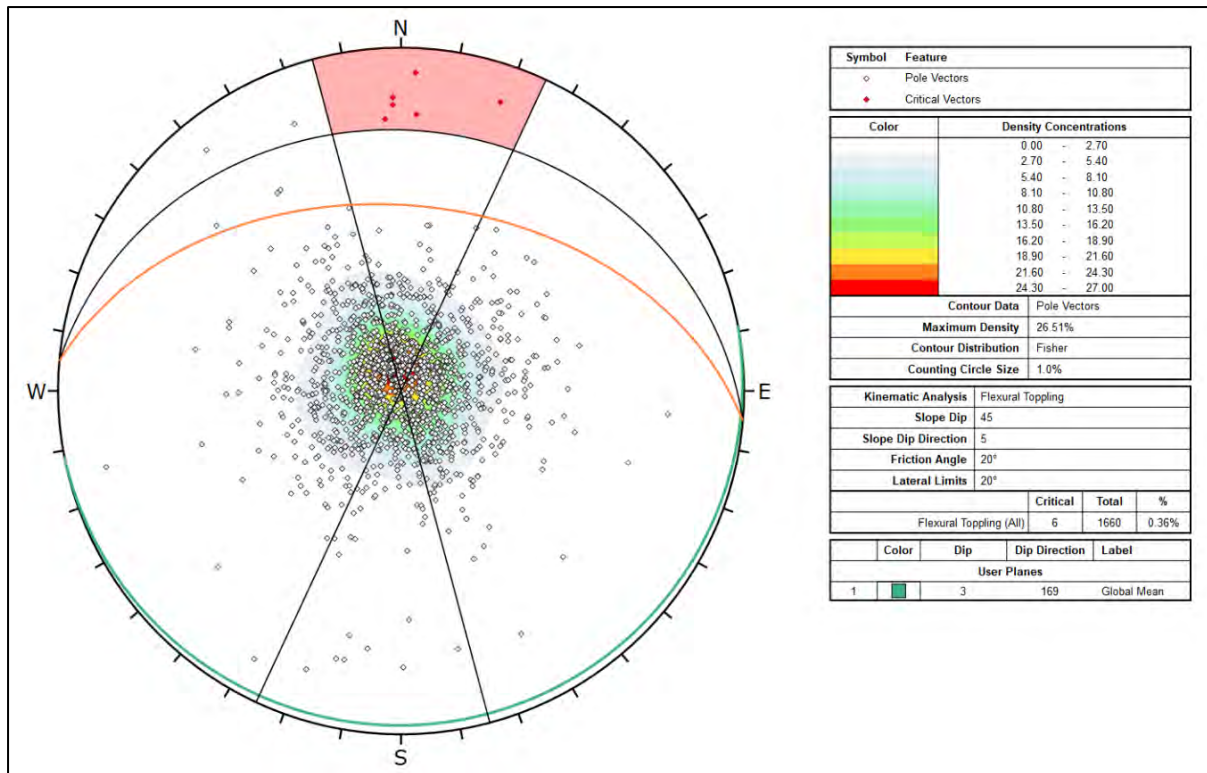


Figure C347 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (South Wall) – Flexural Toppling.

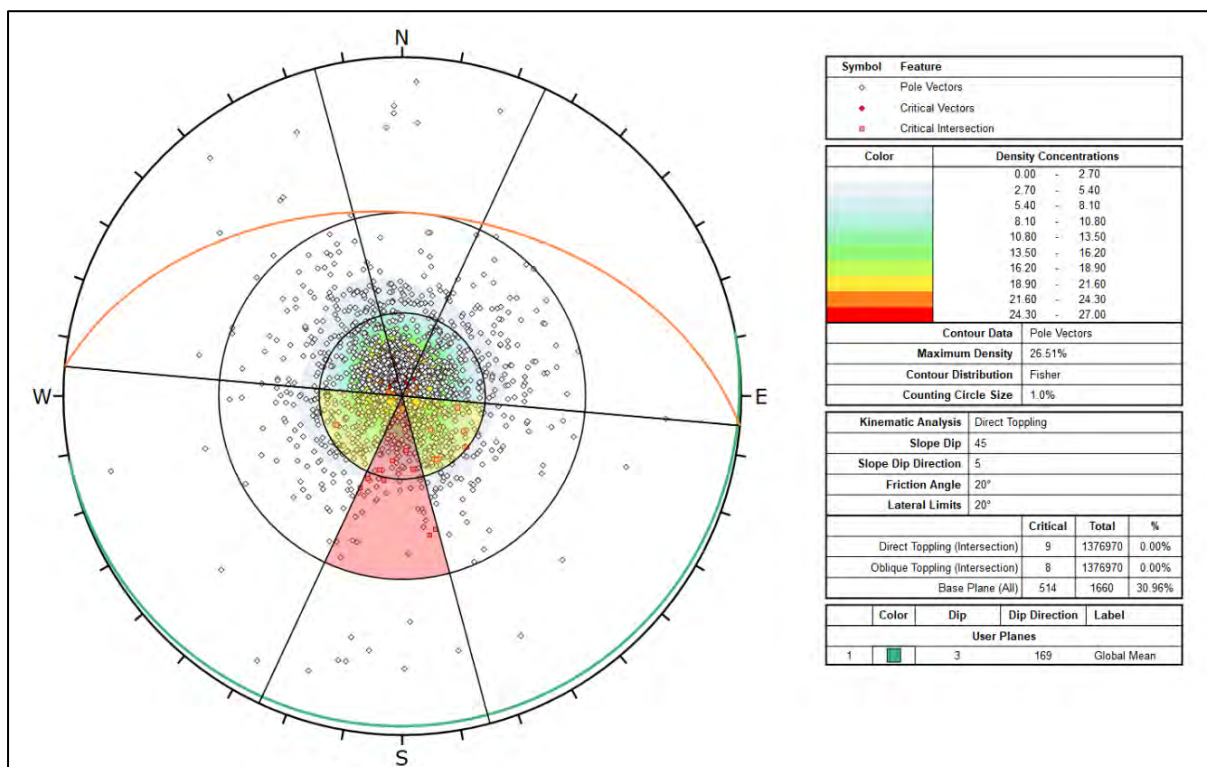


Figure C348 – Kinematic Analysis (BCM Bedding) – Overall Slope - West Sump (South Wall) – Flexural Toppling.

West Sump (North Wall) – BCM - Bedding – Bench Slope

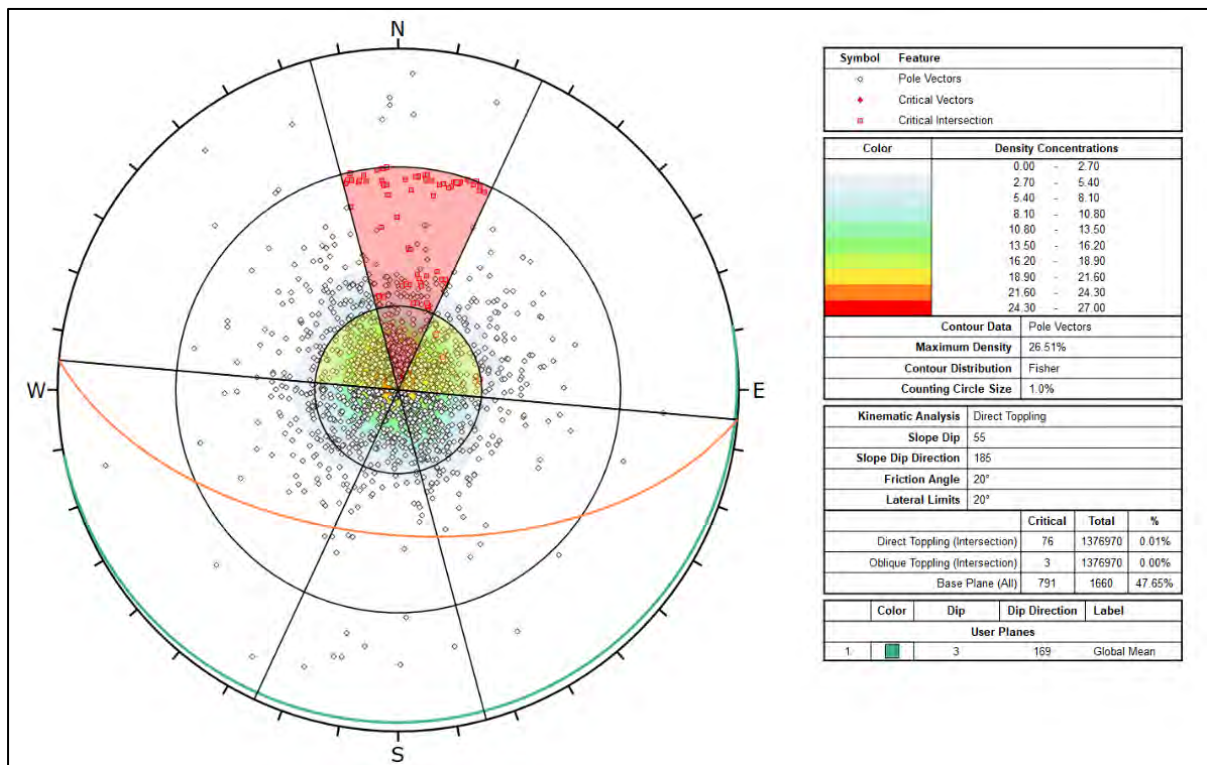


Figure C349 – Kinematic Analysis (BCM Bedding)- Bench Slope – West Sump (North Wall) – Planar Sliding.

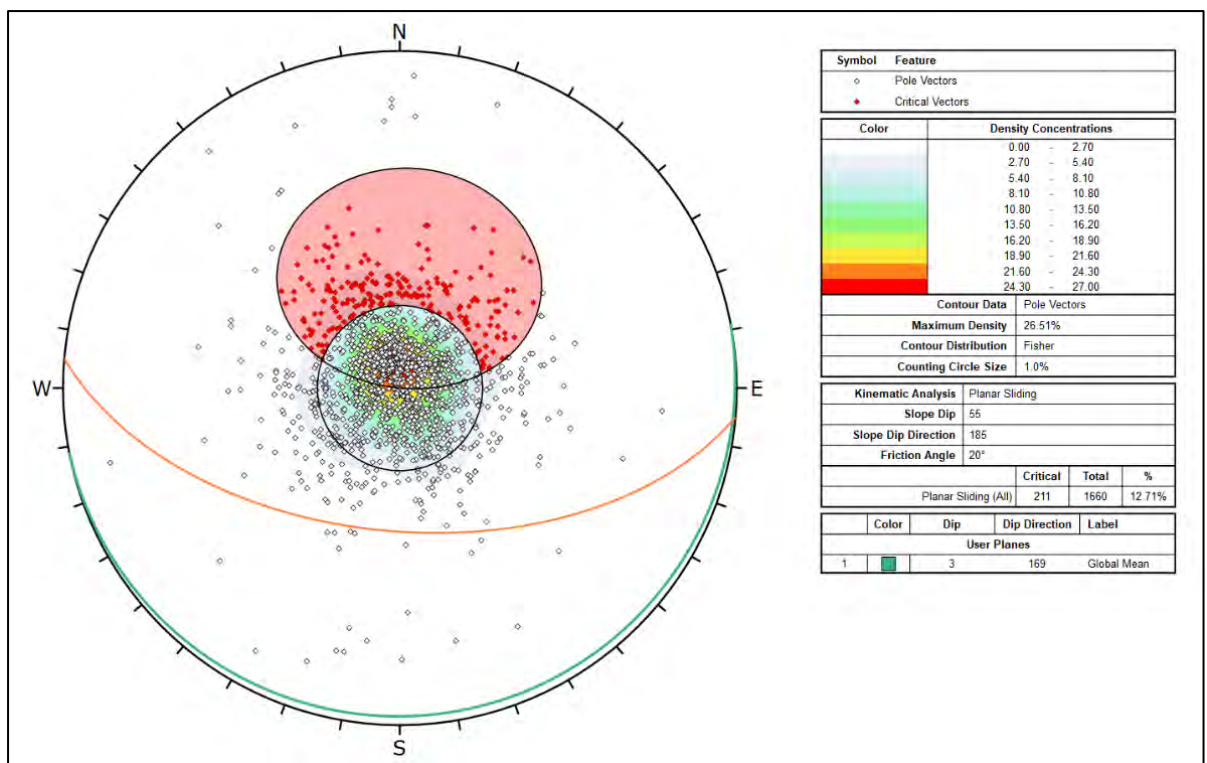


Figure C350 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (North Wall) – Planar Sliding (No Limits).

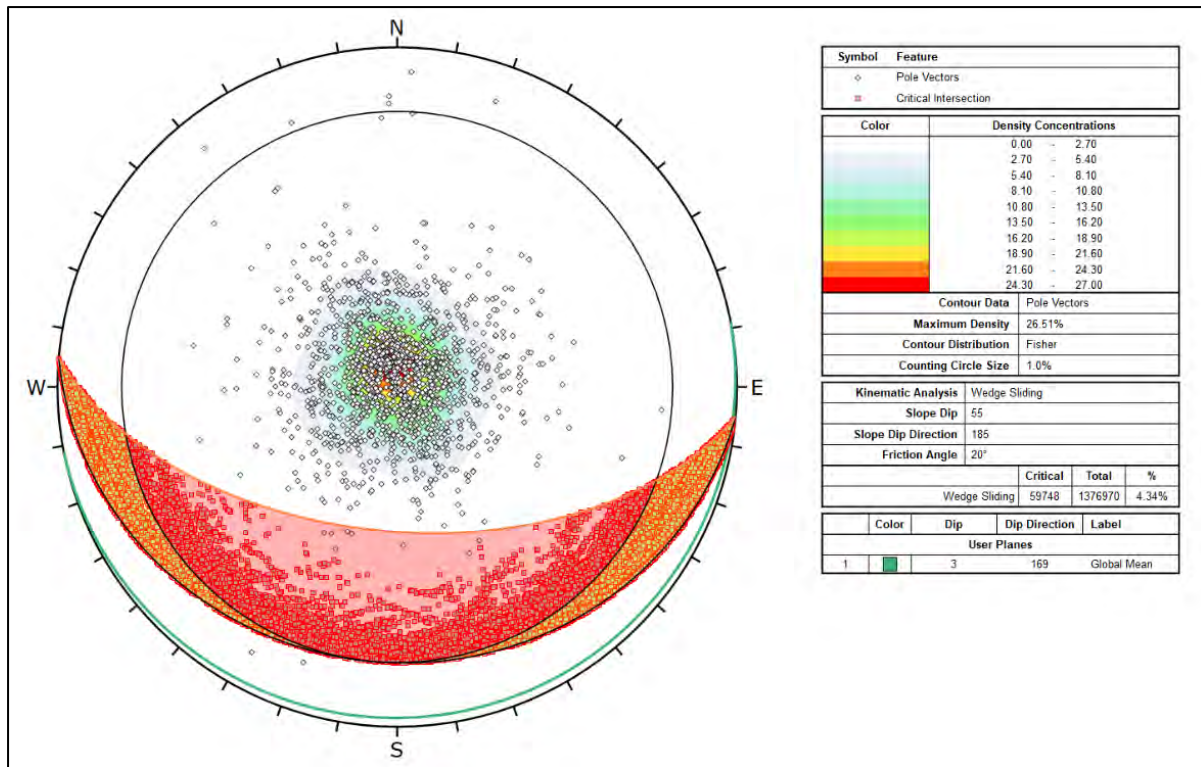


Figure C351 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (North Wall) – Wedge Sliding.

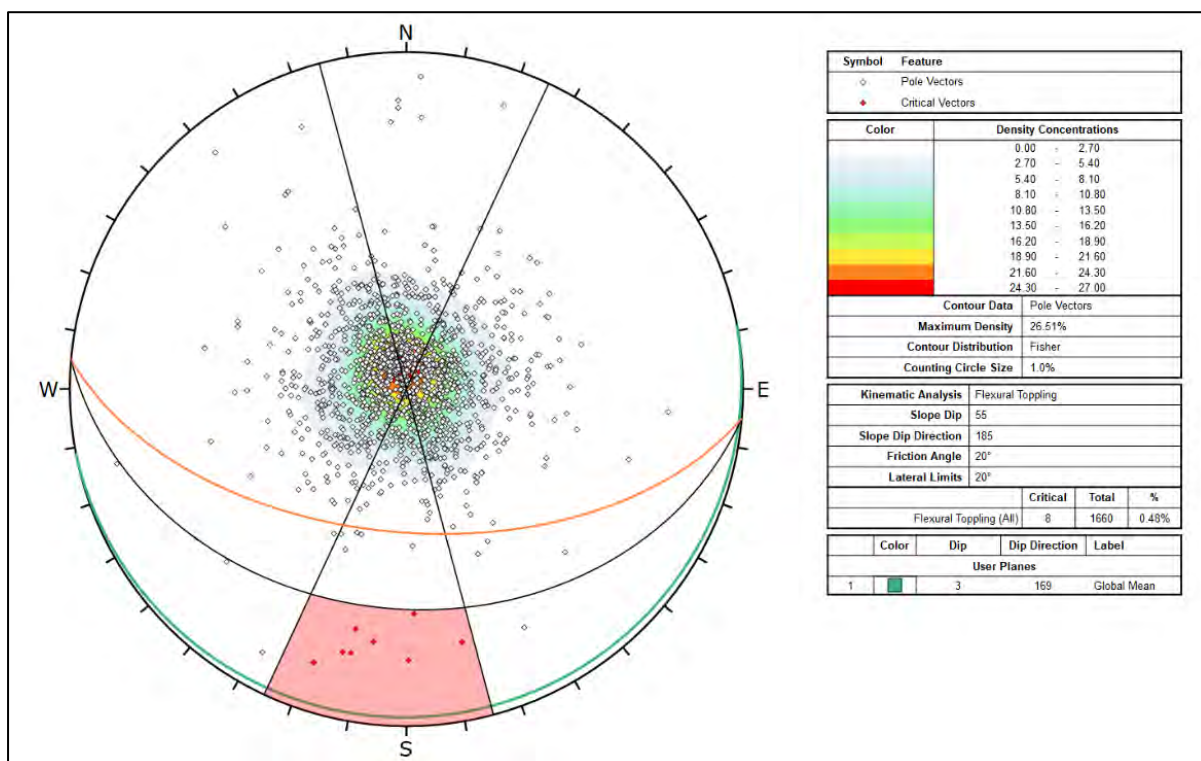


Figure C352 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (North Wall) – Flexural Toppling.

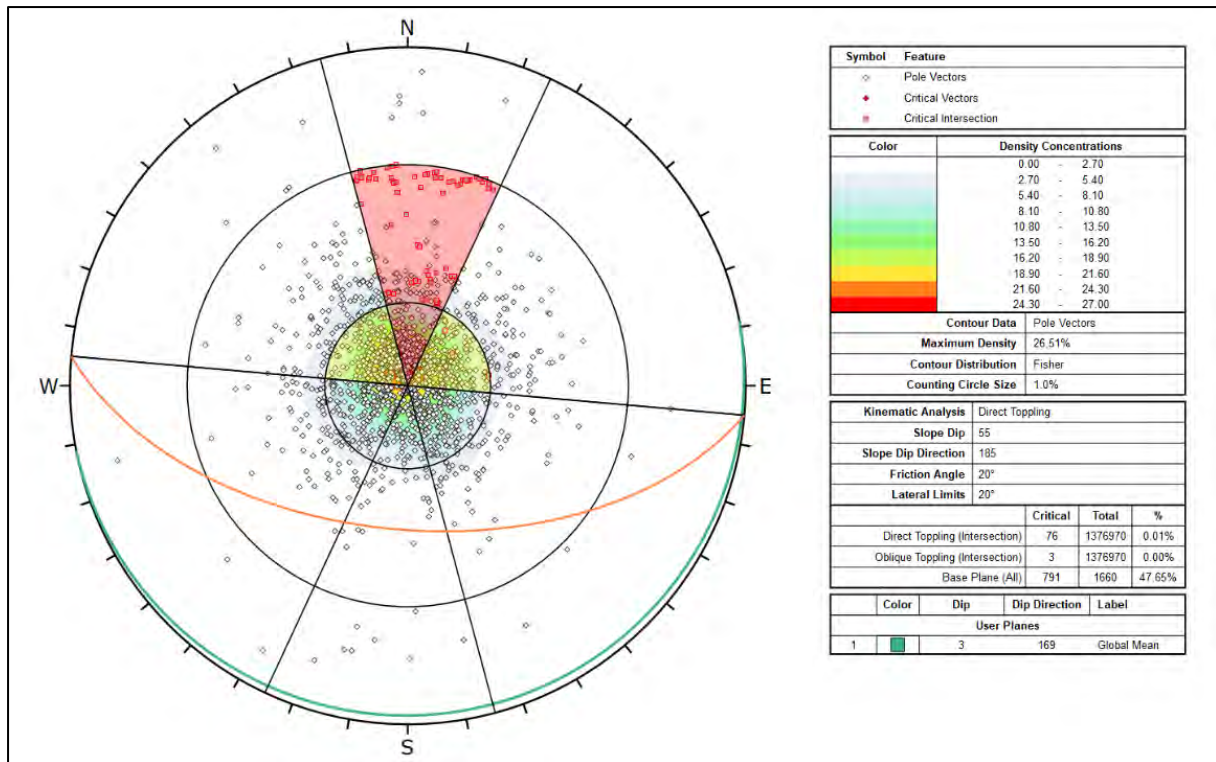


Figure C353 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – BCM - Bedding – Bench Slope

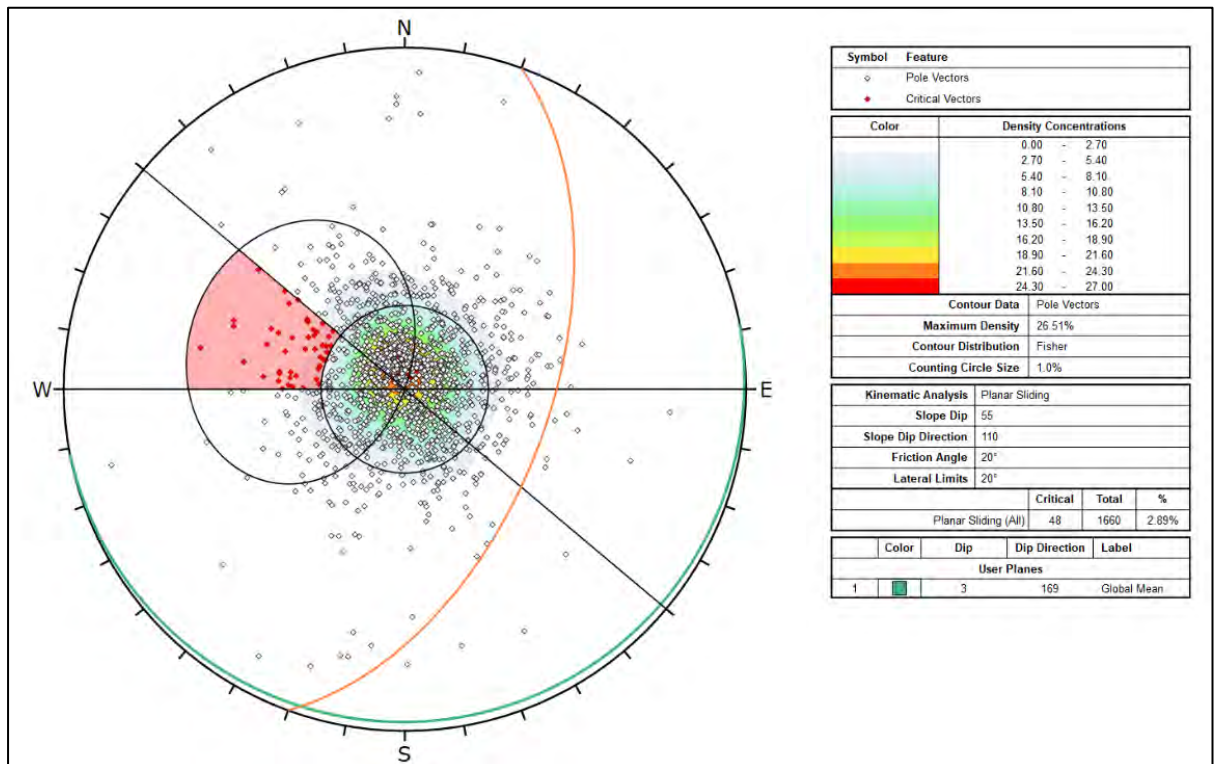


Figure C354 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (West Wall) – Planar Sliding.

Symbol **Feature**

- Pole Vectors
- Critical Intersection

Color **Density Concentrations**

0.00	-	2.70
2.70	-	5.40
5.40	-	8.10
8.10	-	10.80
10.80	-	13.50
13.50	-	16.20
16.20	-	18.90
18.90	-	21.60
21.60	-	24.30
24.30	-	27.00

Contour Data Pole Vectors

Maximum Density 26.51%

Contour Distribution Fisher

Counting Circle Size 1.0%

Kinematic Analysis Wedge Sliding

Slope Dip 55

Slope Dip Direction 110

Friction Angle 20°

	Critical	Total	%
Wedge Sliding	50862	1376970	3.69%

User Planes

Color	Dip	Dip Direction	Label
1	3	169	Global Mean

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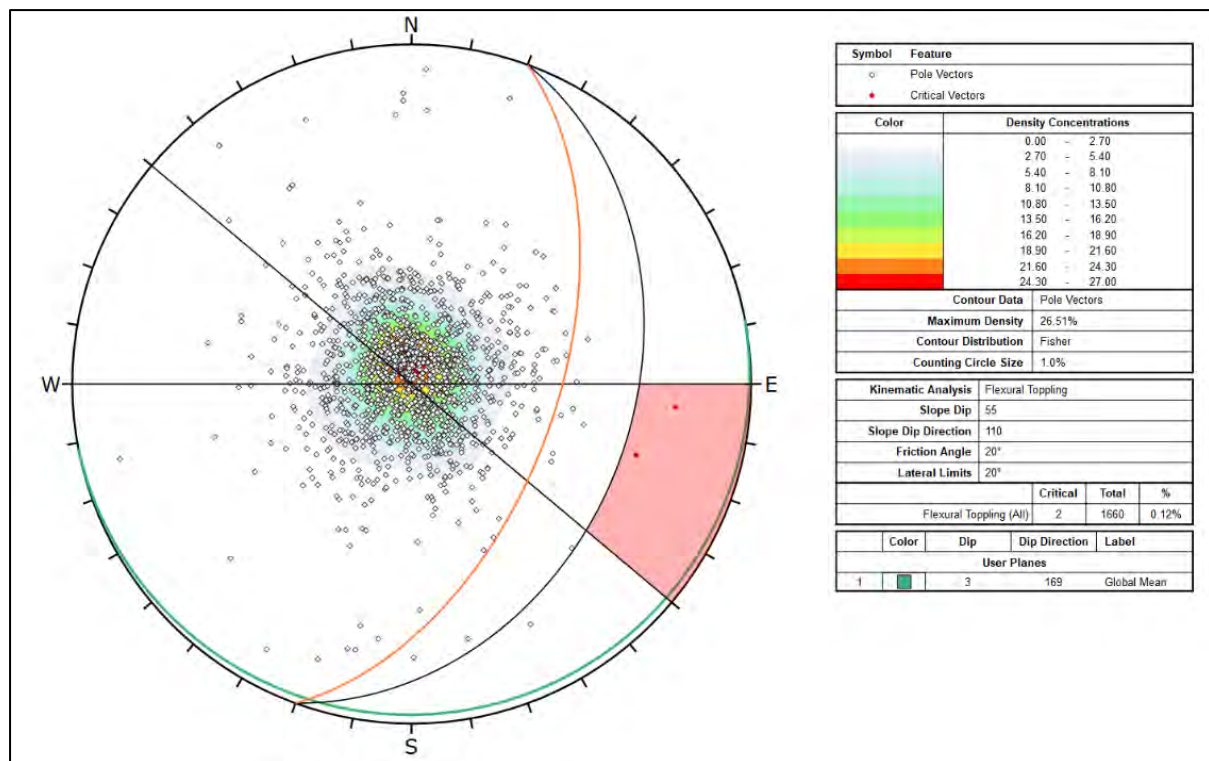


Figure C357 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (West Wall) – Flexural Toppling.

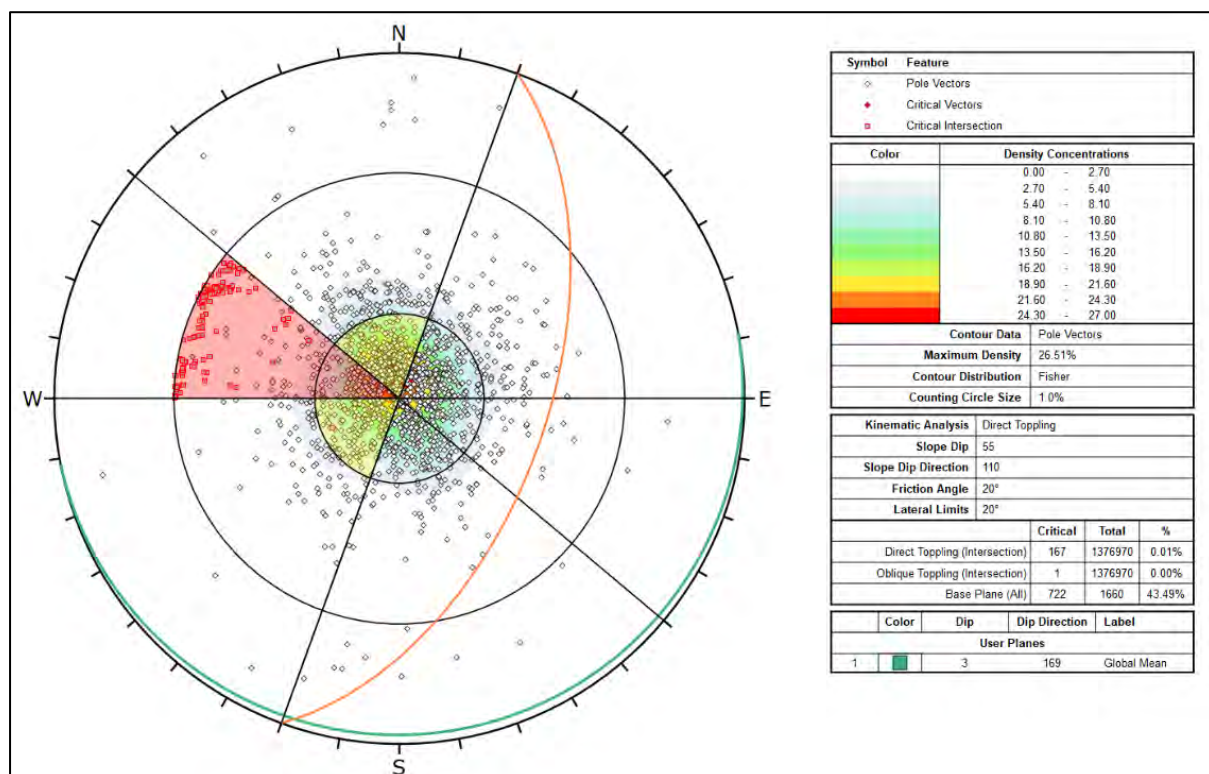


Figure C358 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – BCM - Bedding – Bench Slope

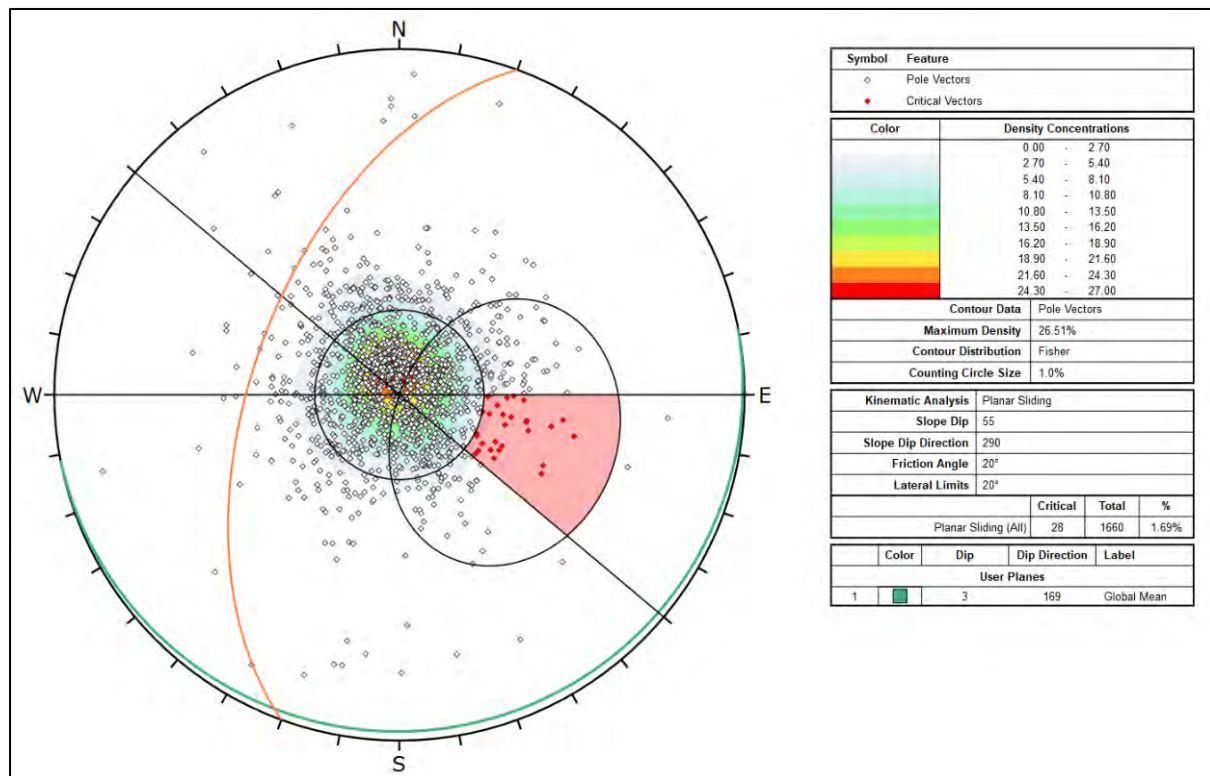


Figure C359 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (East Wall) – Planar Sliding.

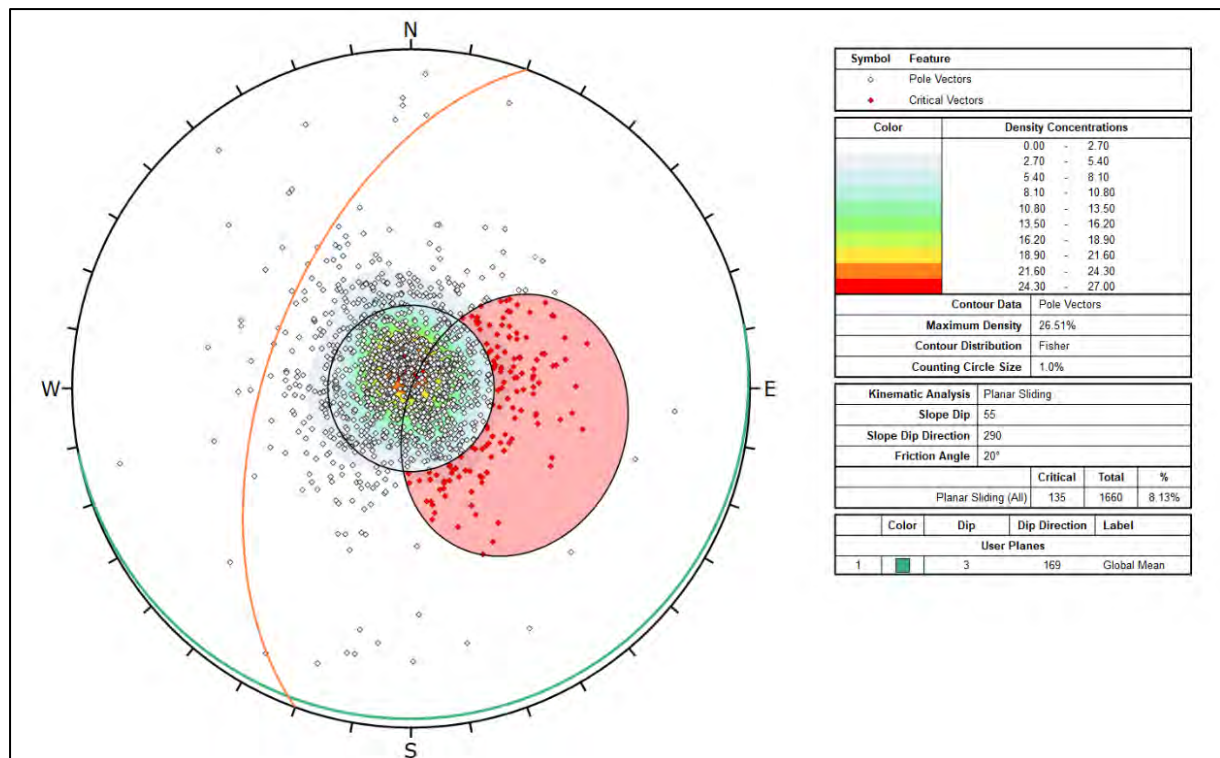


Figure C360 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

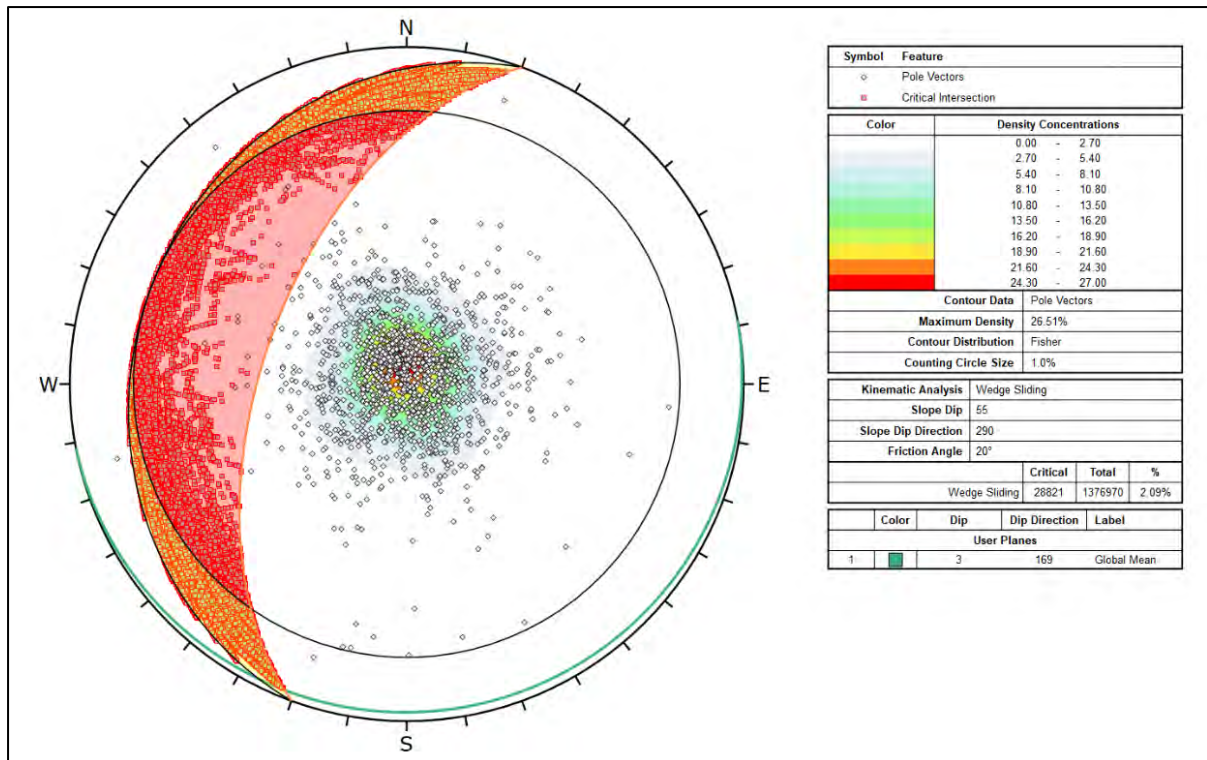


Figure C361 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (East Wall) – Wedge Sliding.

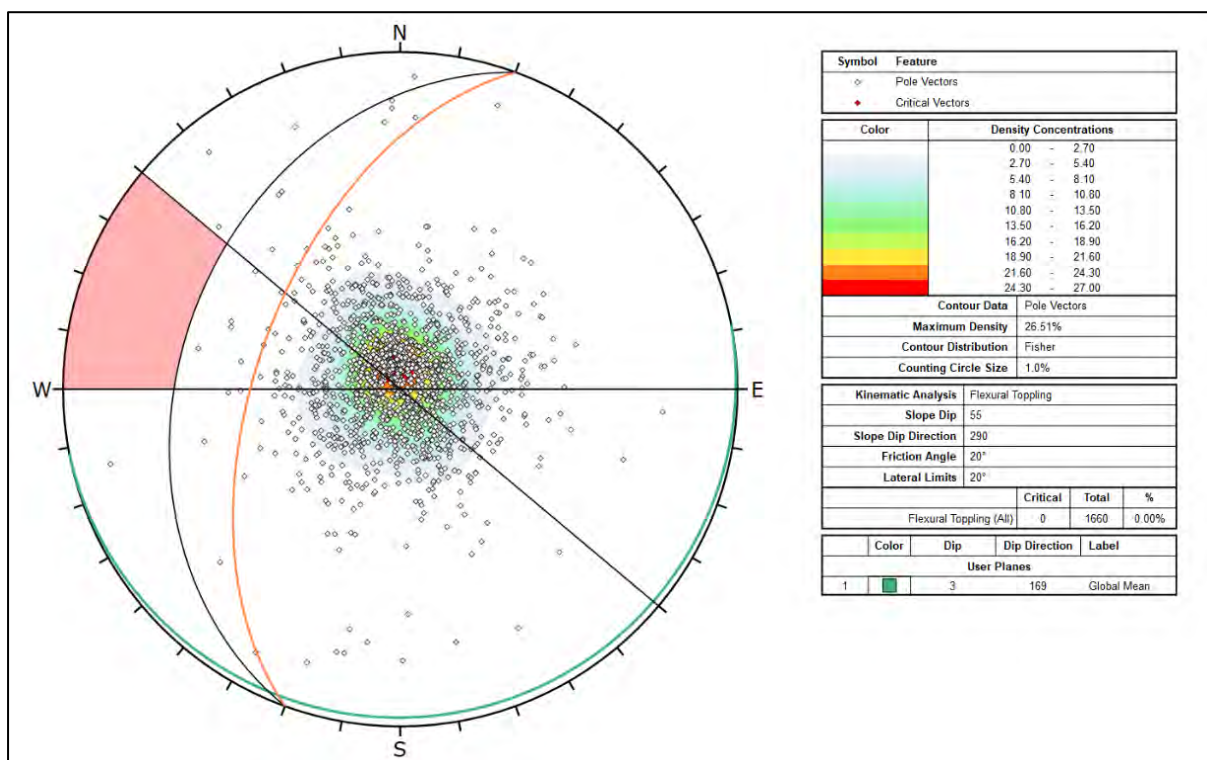


Figure C362 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (East Wall) – Flexural Toppling.

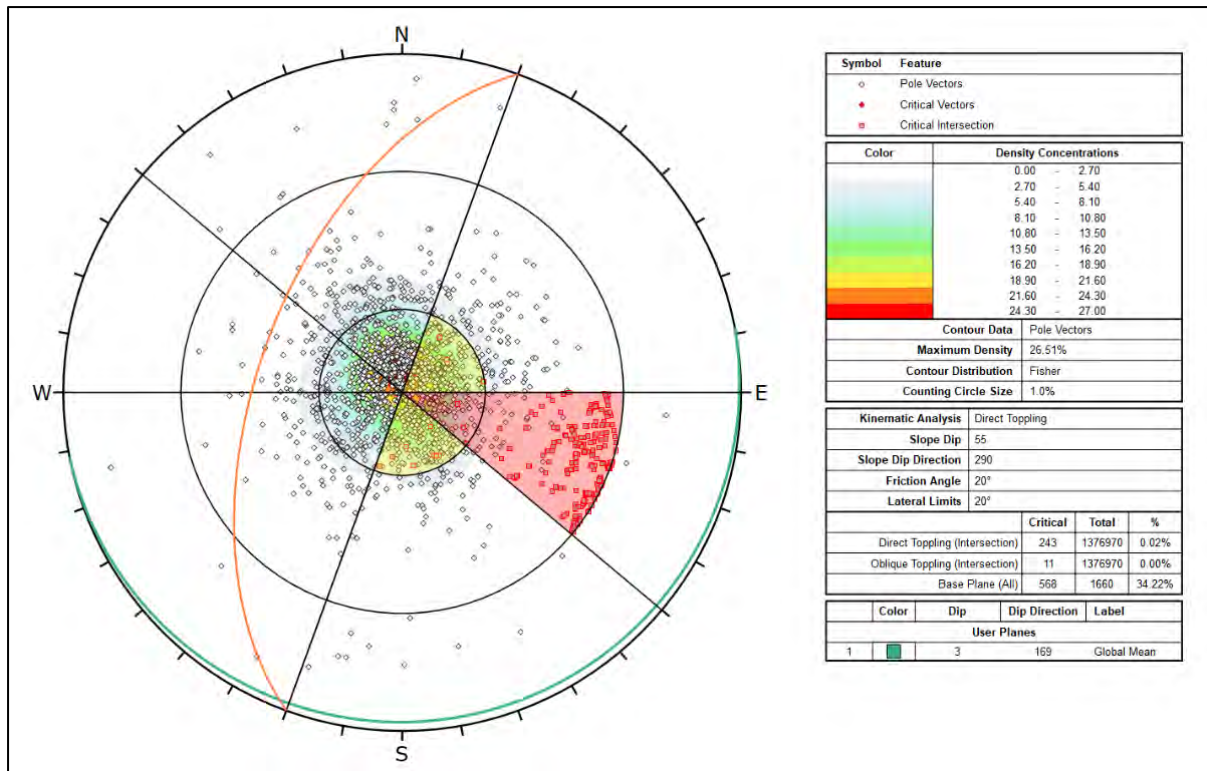


Figure C363 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – BCM - Bedding – Bench Slope

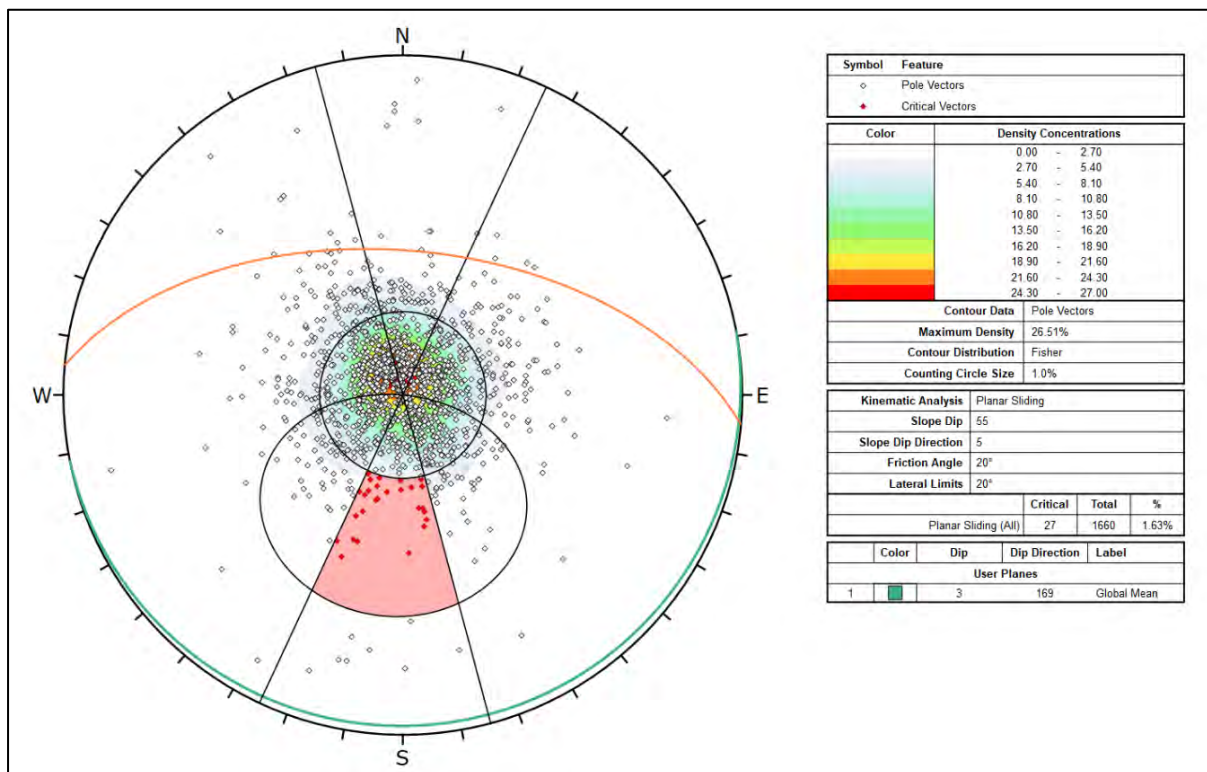


Figure C364 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (South Wall) – Planar Sliding.

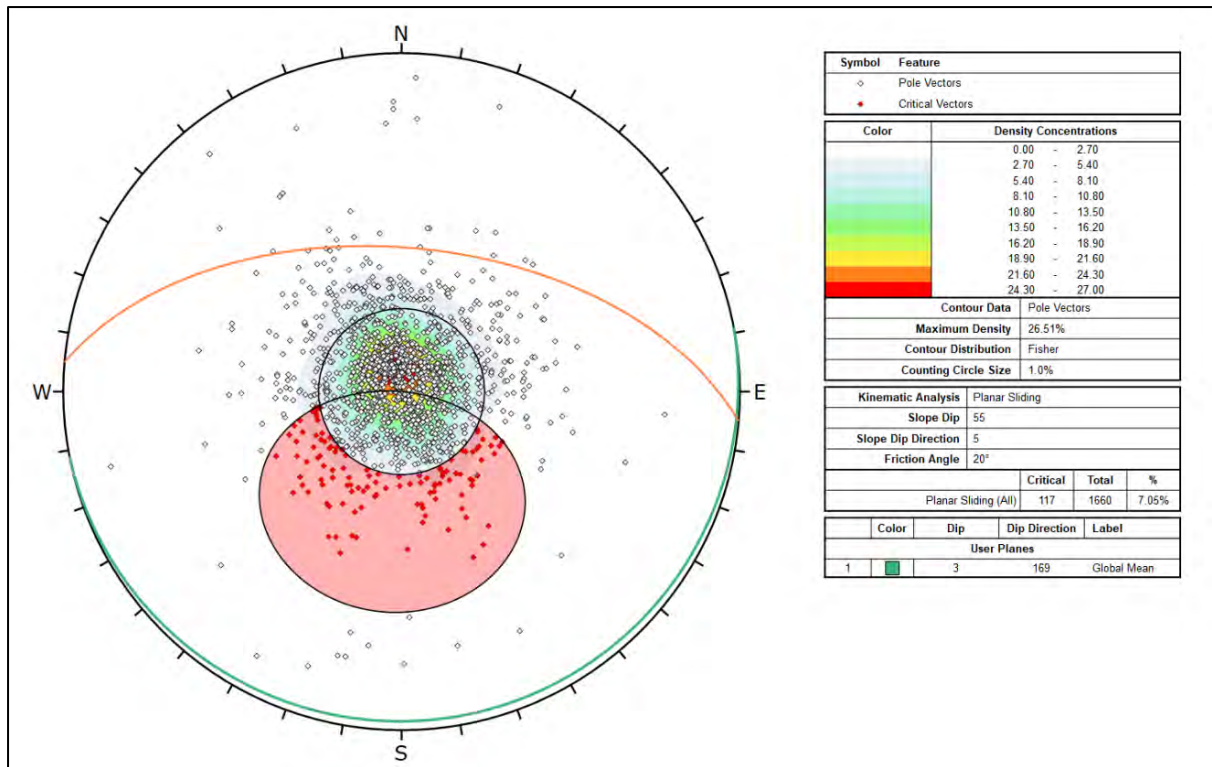


Figure C365 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (South Wall) – Planar Toppling (No Limits).

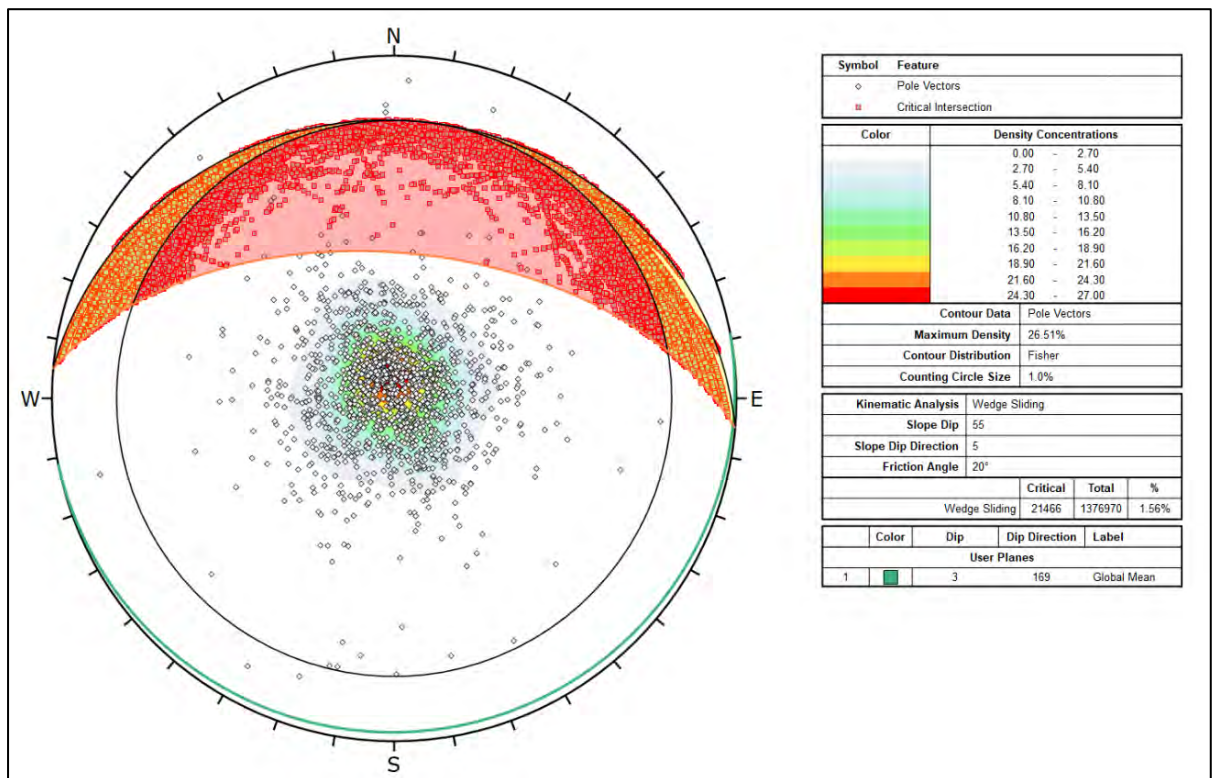


Figure C366 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (South Wall) – Wedge Sliding.

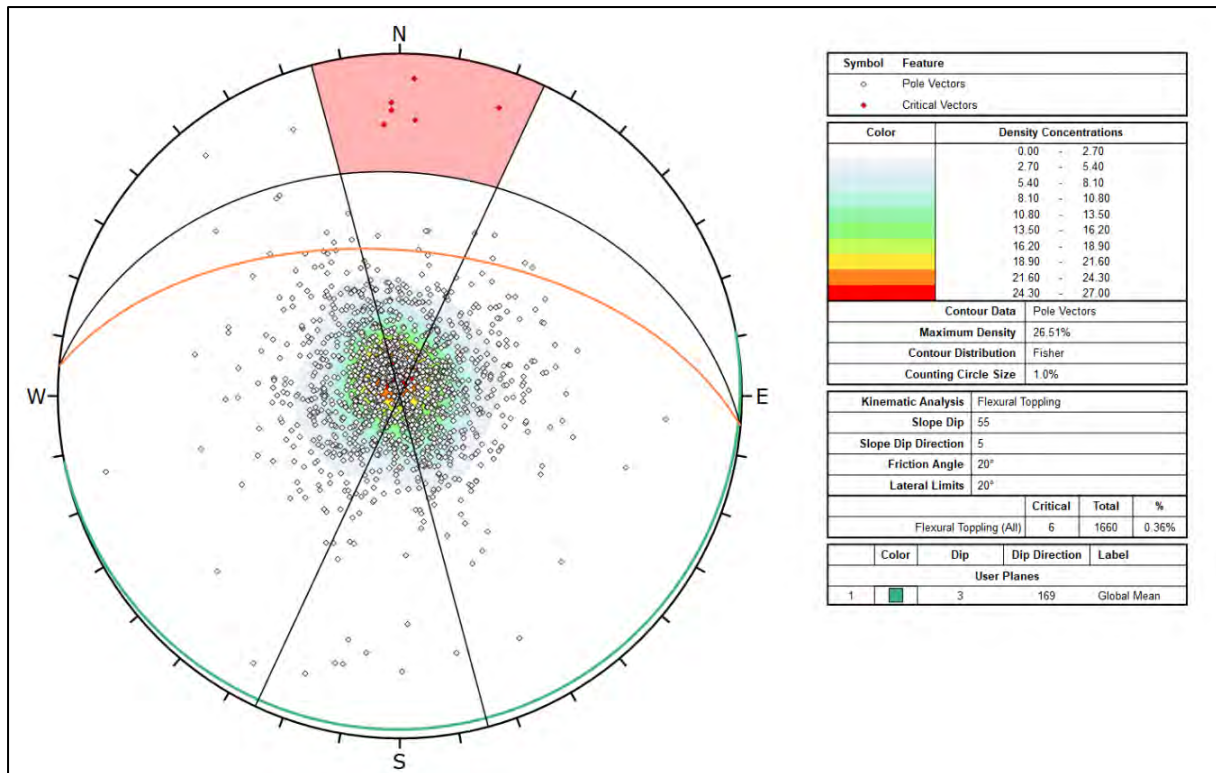


Figure C367 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (South Wall) – Flexural Toppling.

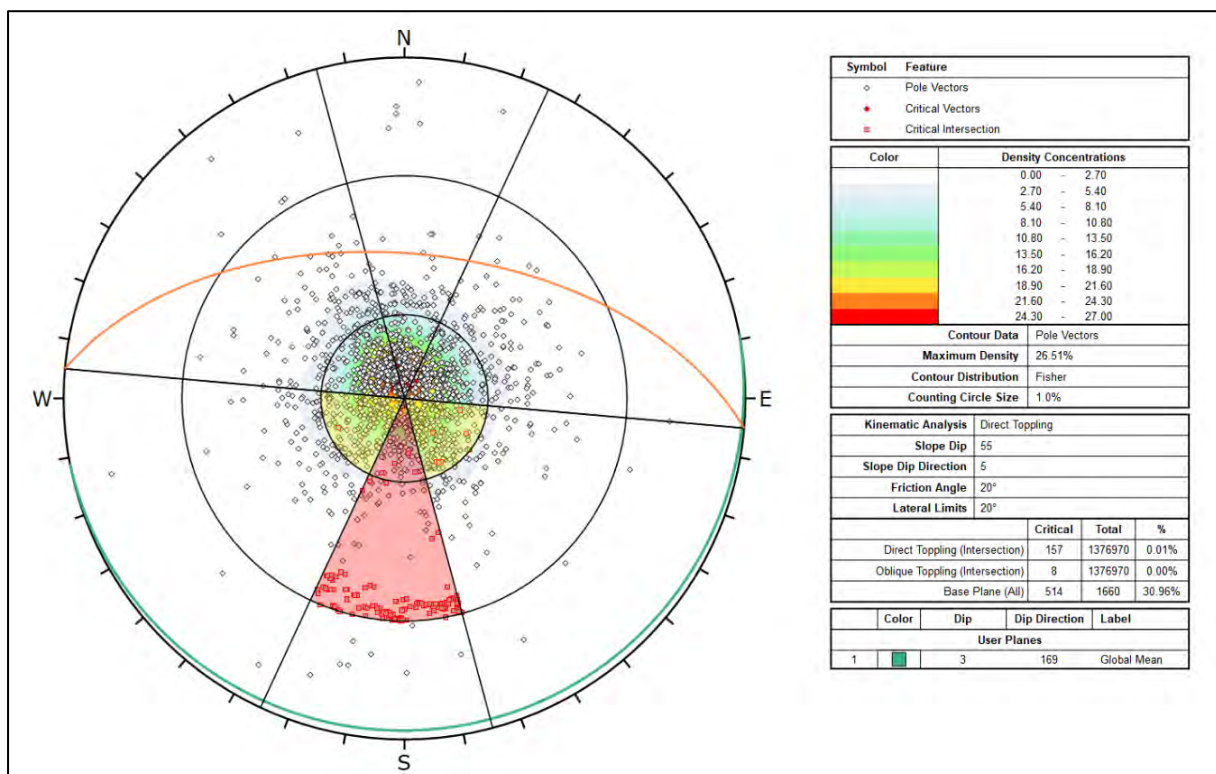


Figure C368 – Kinematic Analysis (BCM Bedding) - Bench Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – BSM - Bedding – Overall Slope

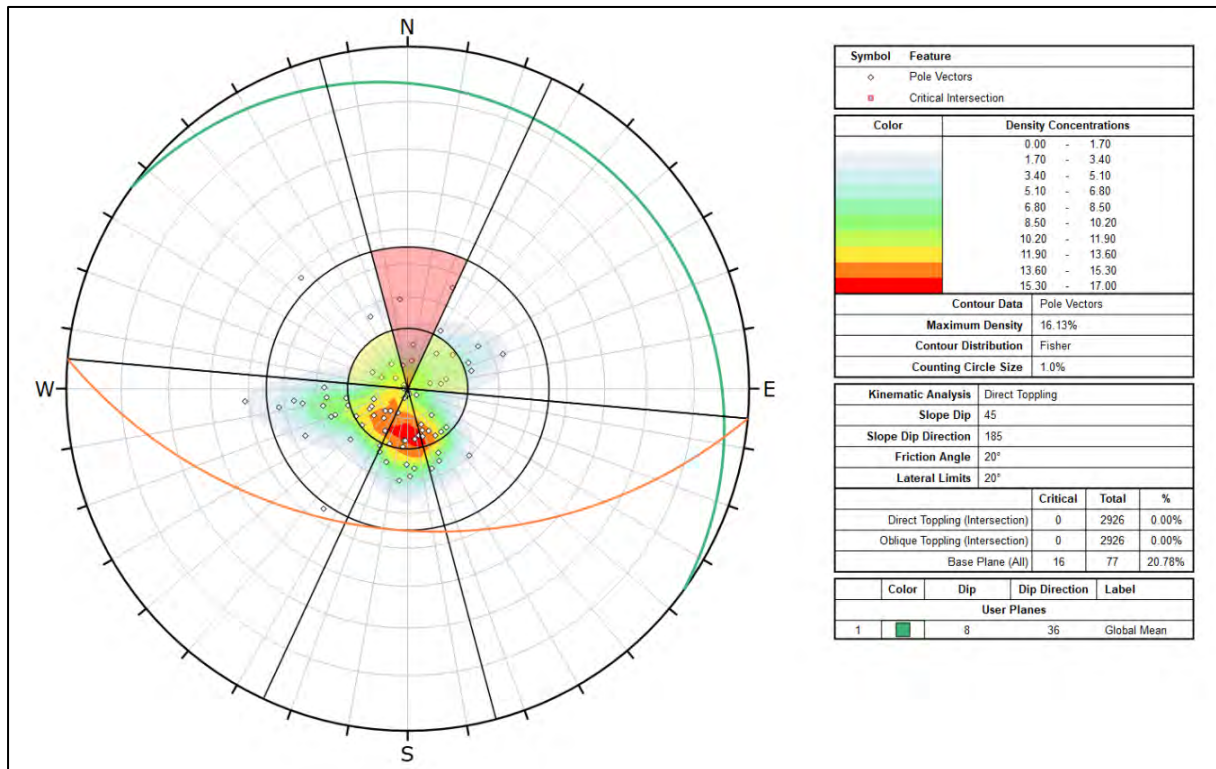


Figure C369 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (North Wall) – Planar Sliding.

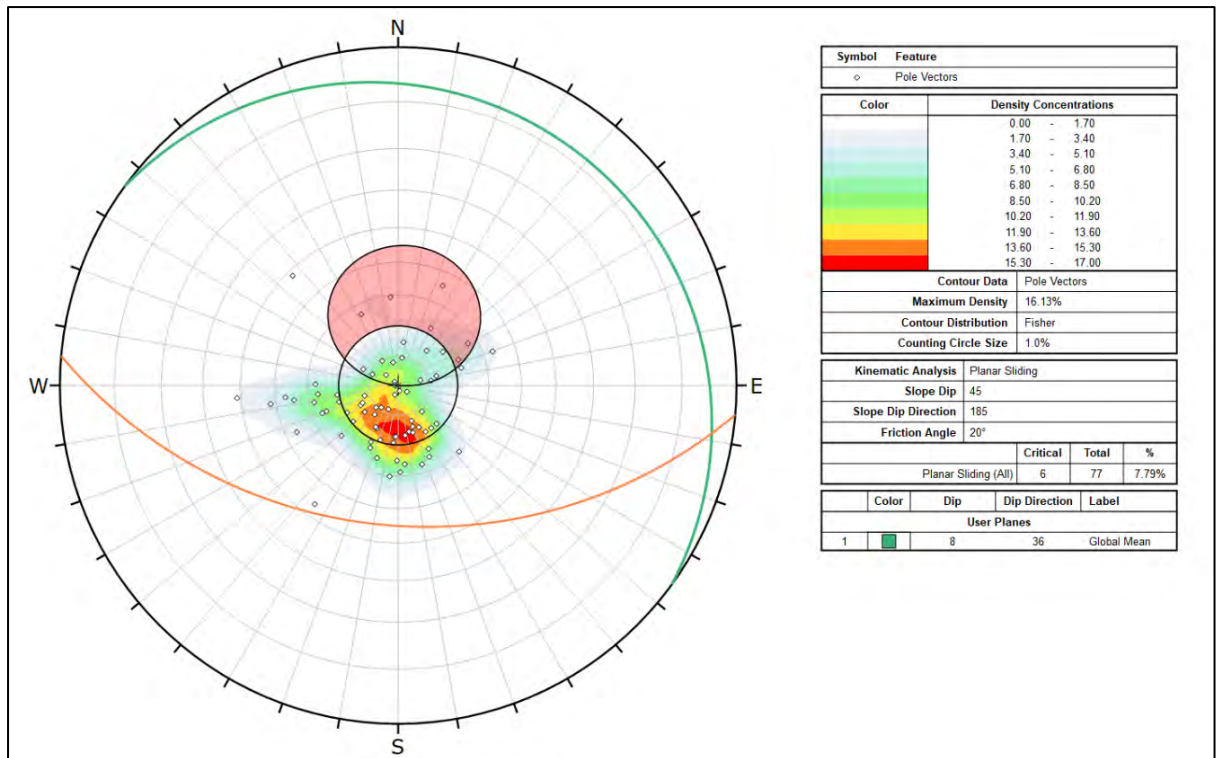


Figure C370 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (North Wall) – Planar Sliding (No Limits).

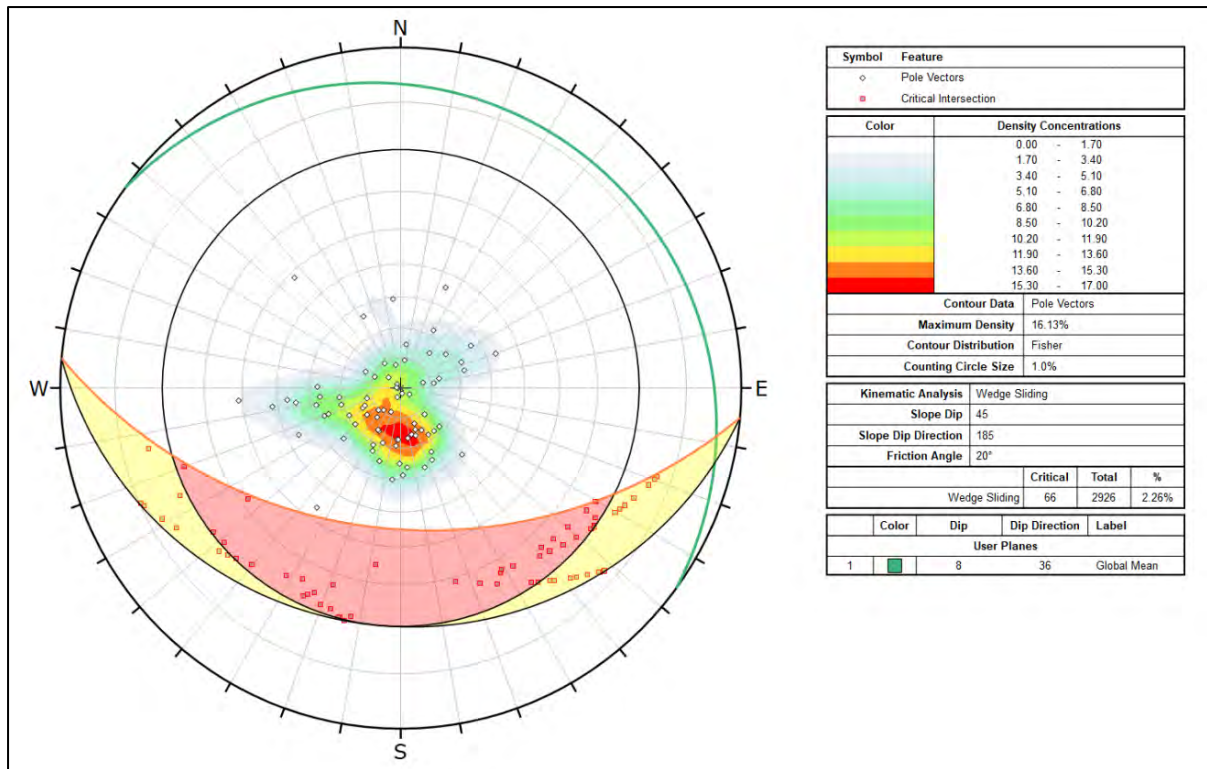


Figure C371 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (North Wall) – Wedge Sliding).

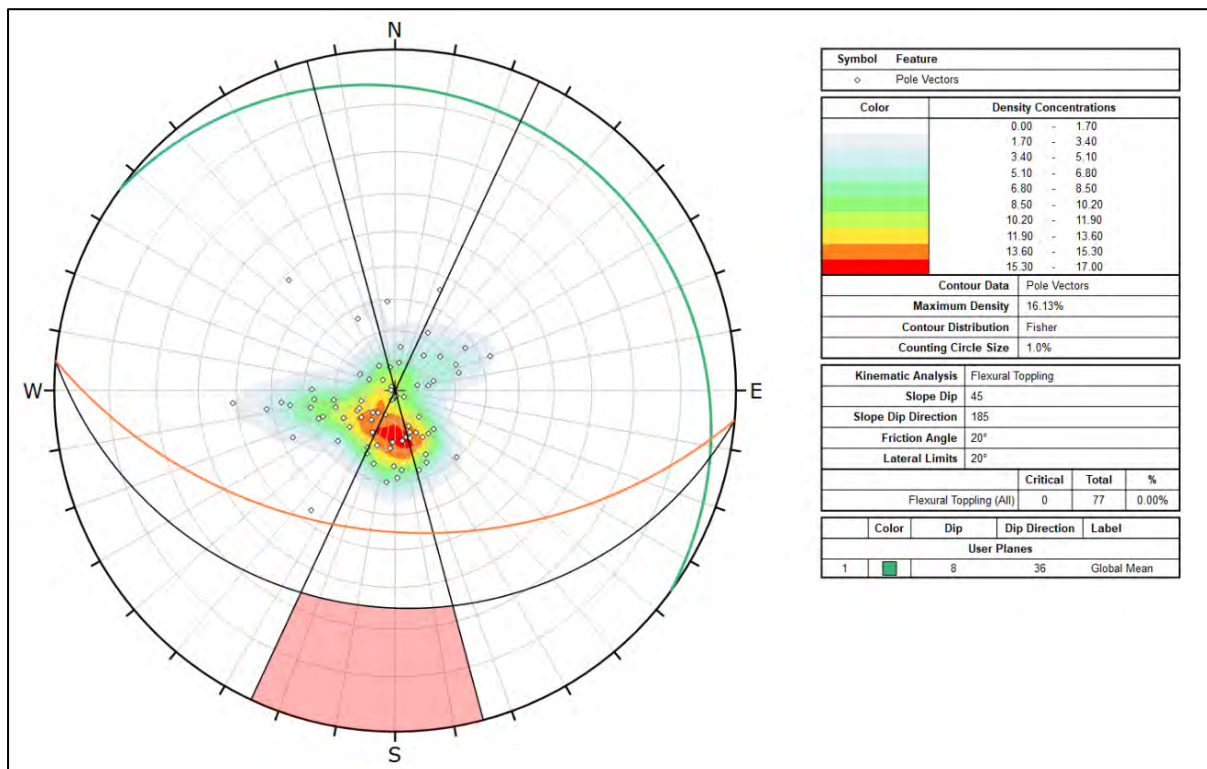


Figure C372 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (North Wall) – Flexural Toppling).

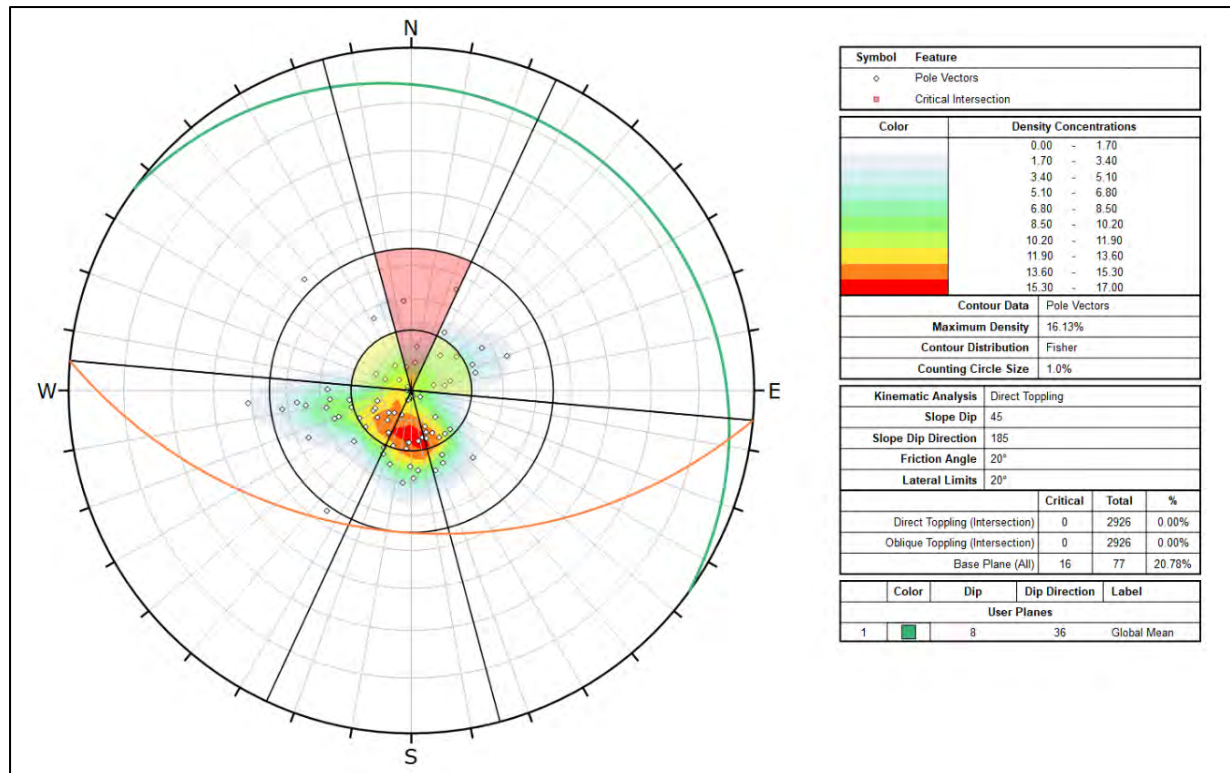


Figure C373 – Kinematic Analysis (BSM Bedding) – Overall Slope – West Sump (North Wall) – Flexural Toppling).

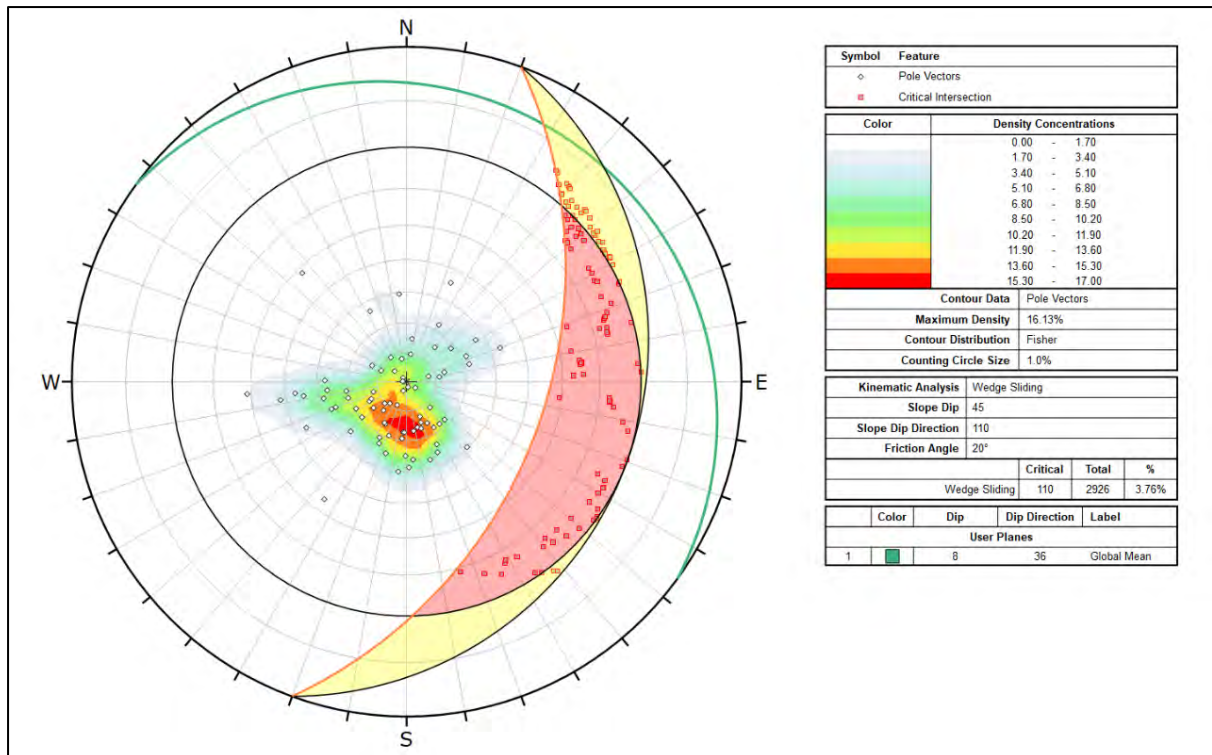


Figure C376 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (West Wall) – Wedge Sliding.

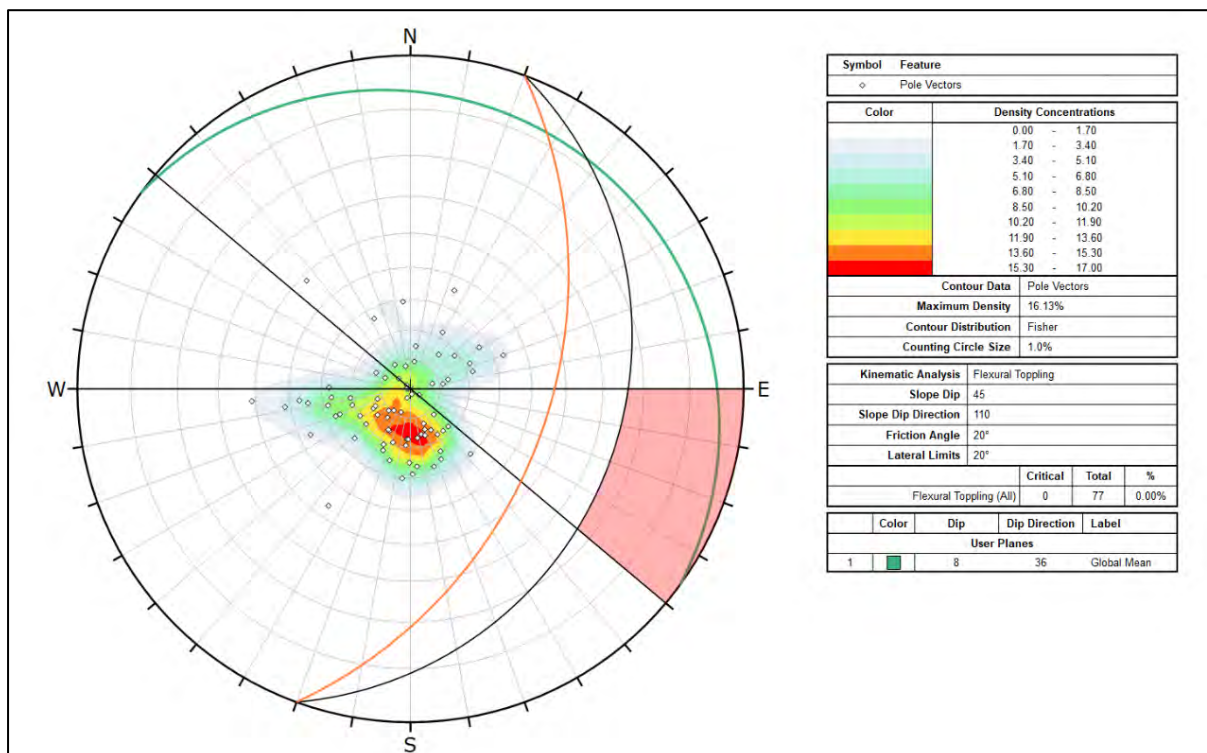


Figure C377 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (West Wall) – Flexural Toppling.

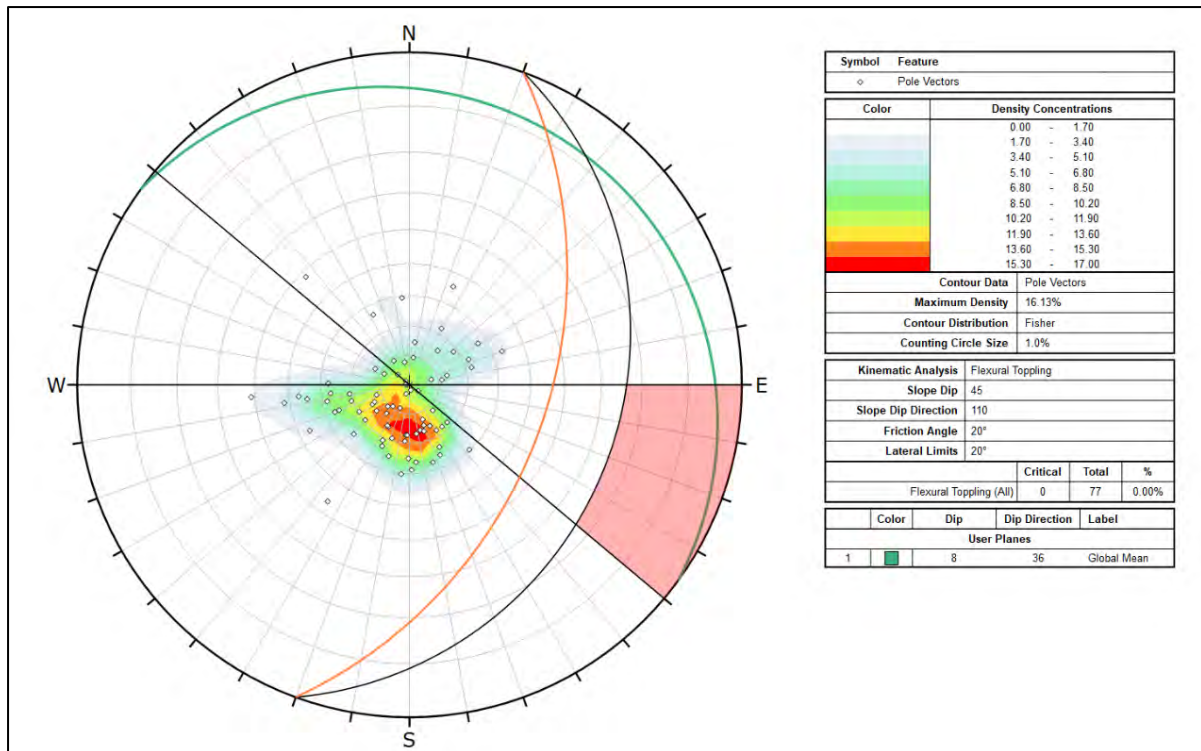


Figure C378 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – BSM - Bedding – Overall Slope

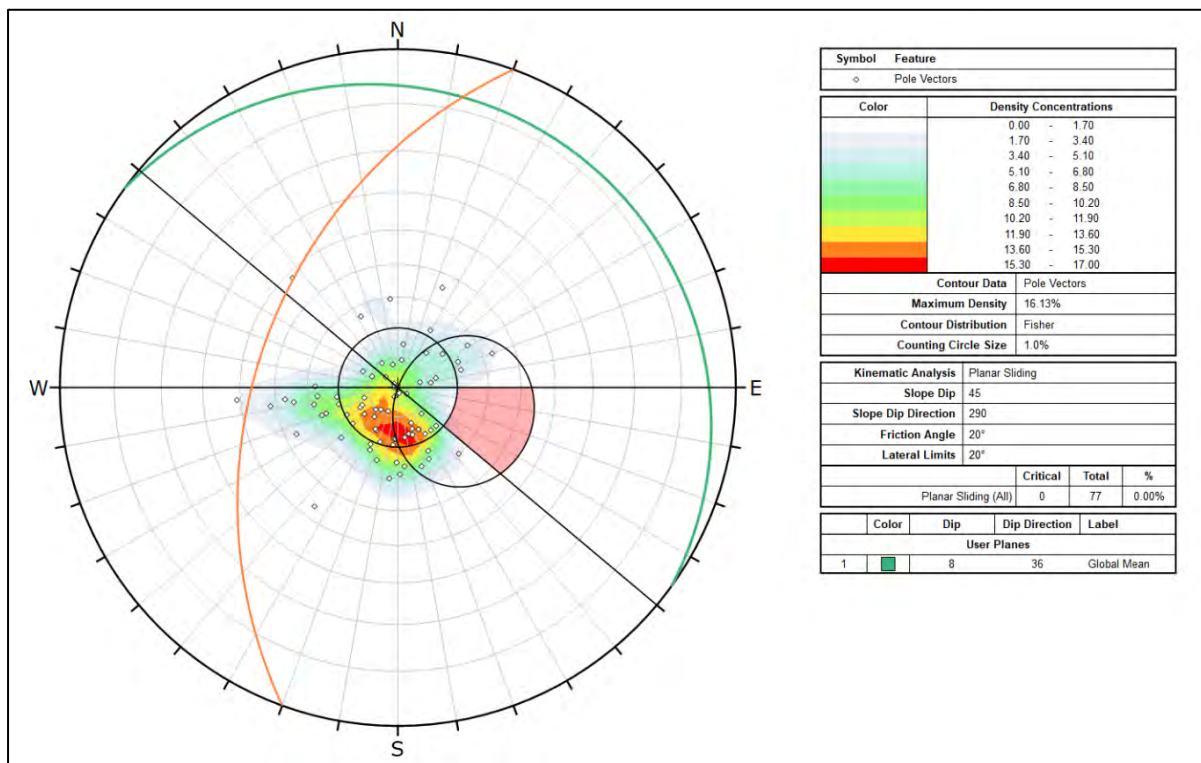


Figure C379 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (East Wall) – Planar Sliding.

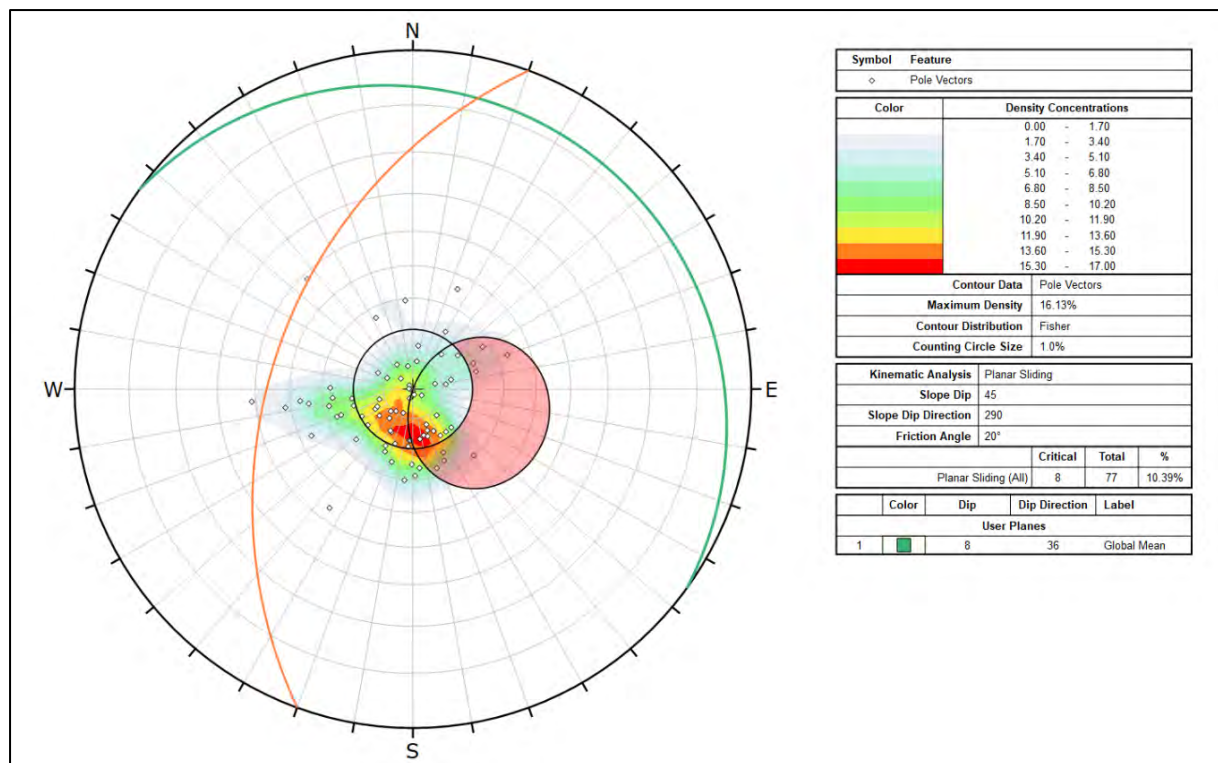


Figure C380 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (East Wall) – Planar Sliding (No Limits).

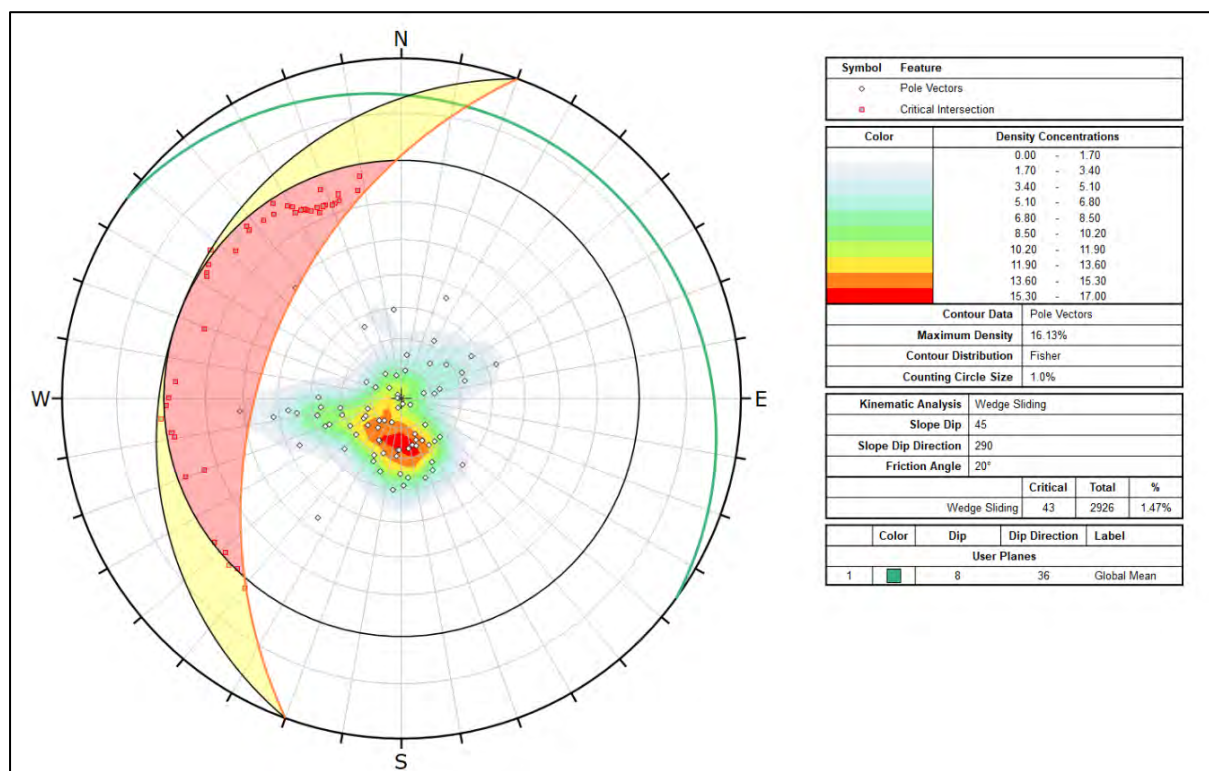


Figure C381 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (East Wall) – Wedge Sliding.

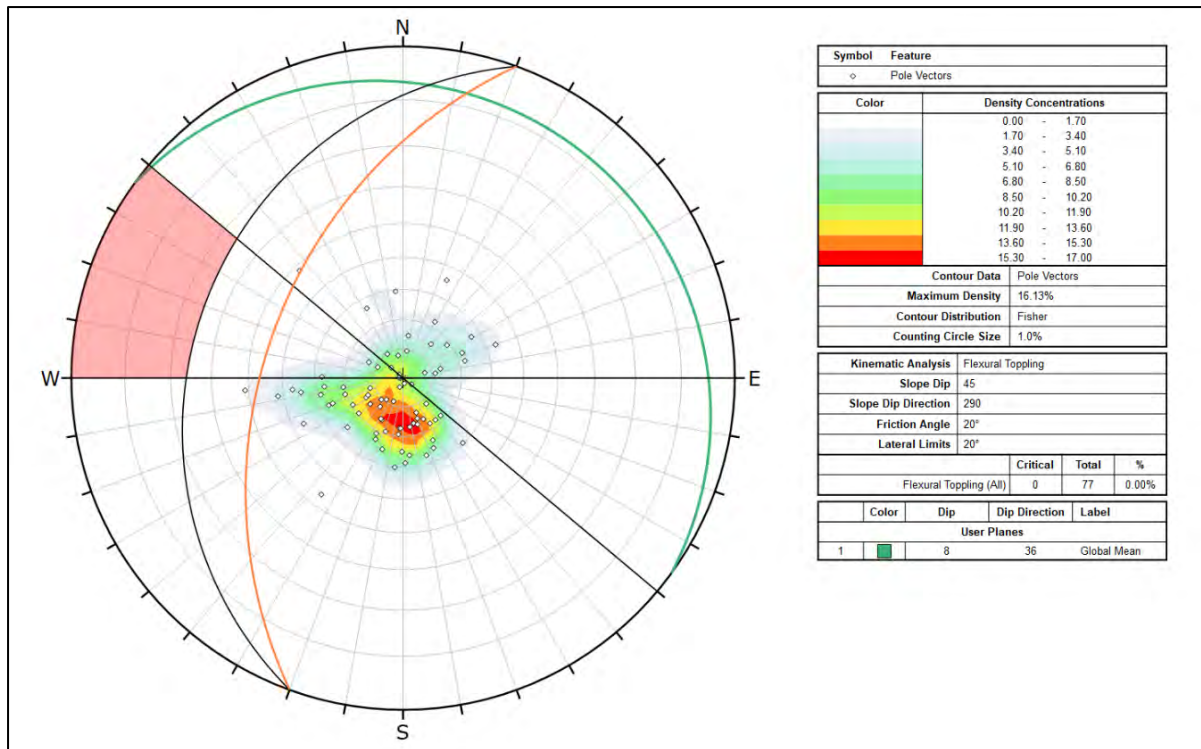


Figure C382 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

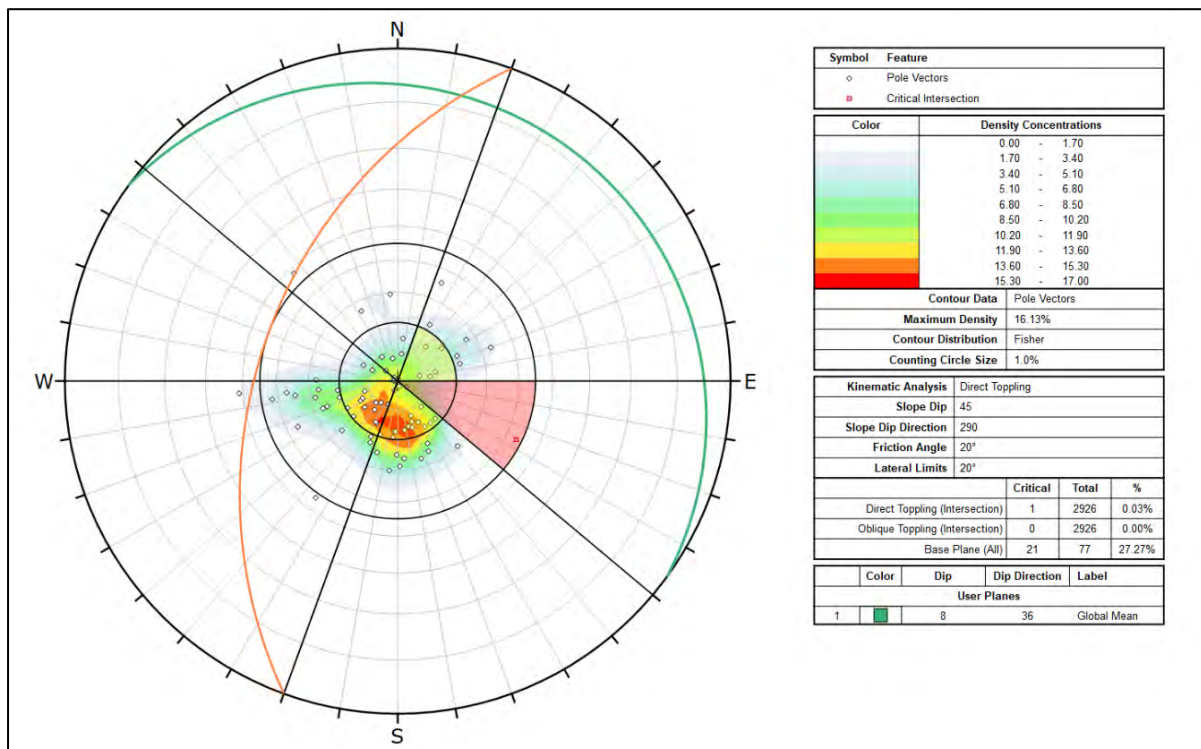


Figure C383 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – BSM - Bedding – Overall Slope

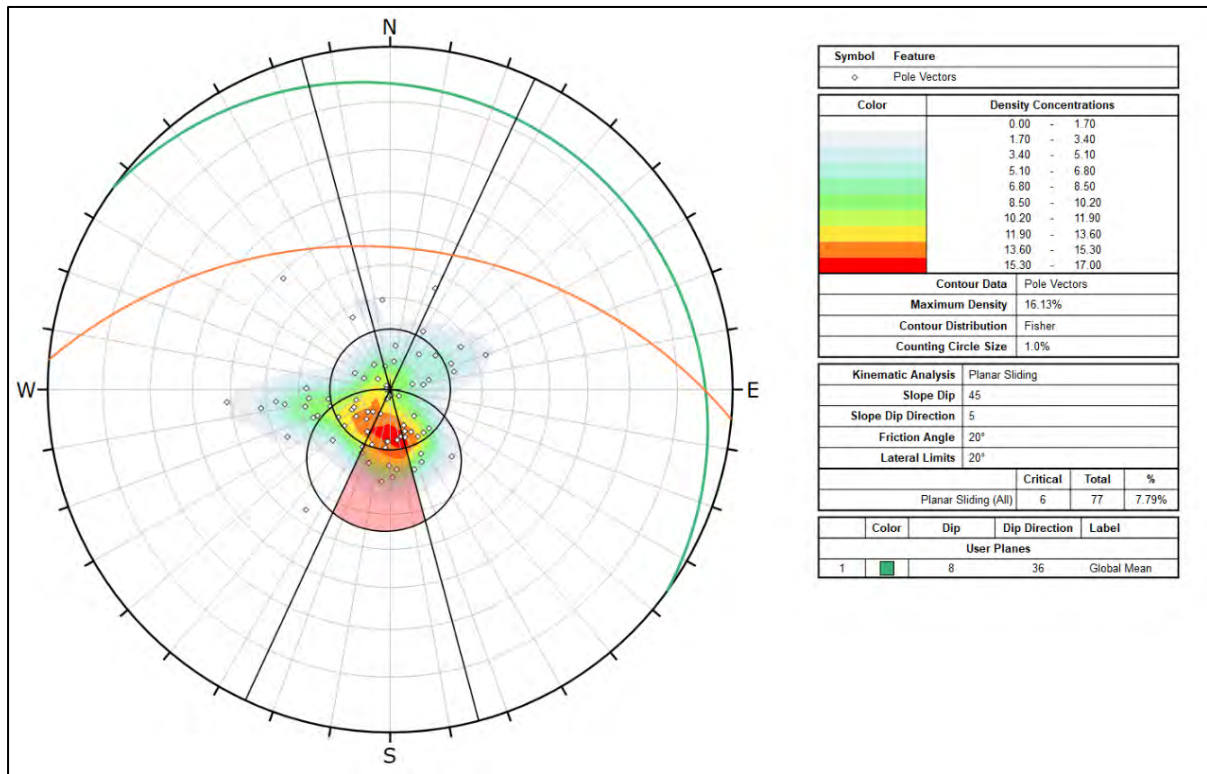


Figure C384 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (South Wall) – Planar Sliding.

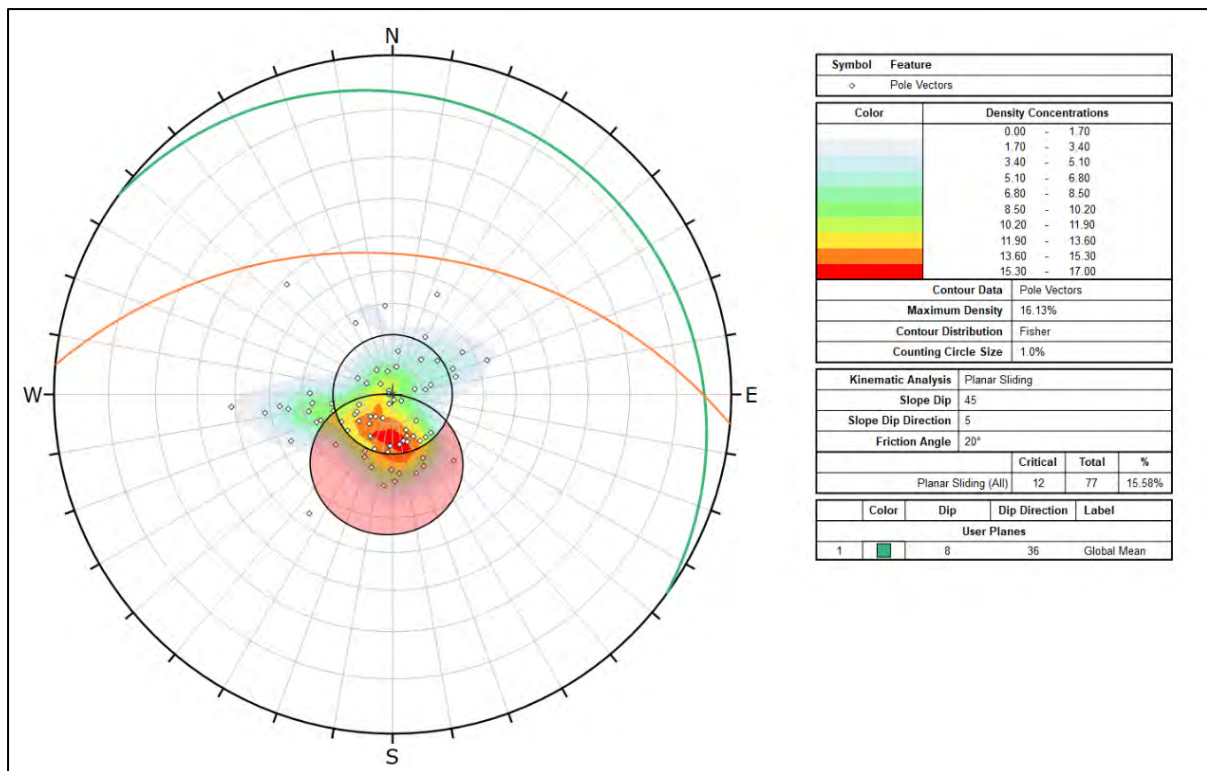
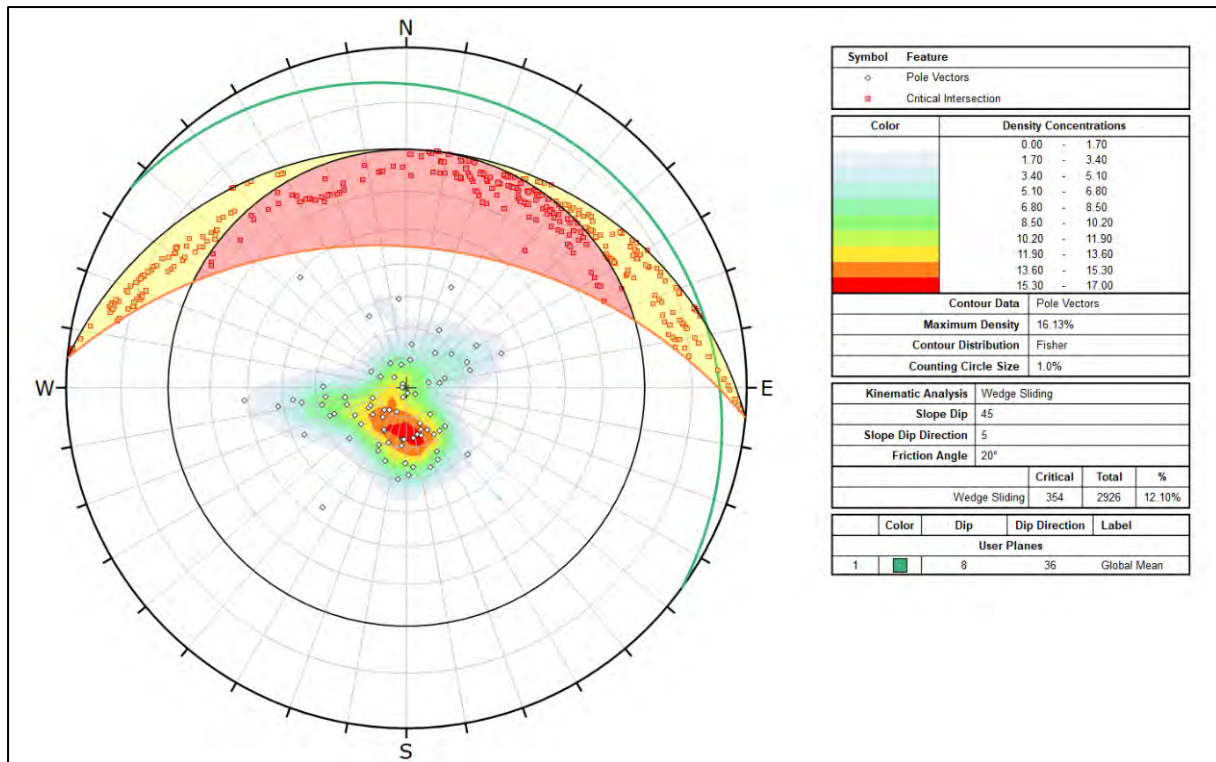


Figure C385 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (South Wall) – Planar Sliding (No Limits).



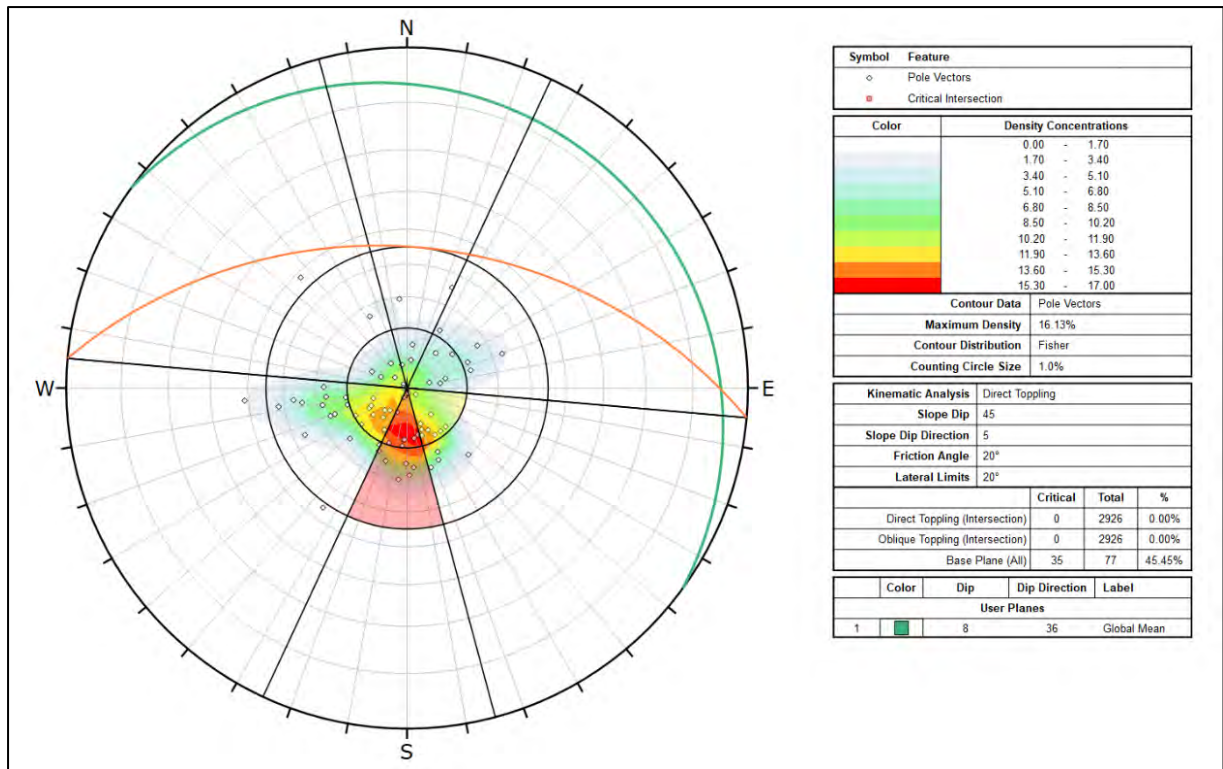


Figure C388 – Kinematic Analysis (BSM Bedding) - Overall Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – BSM - Bedding – Bench Slope

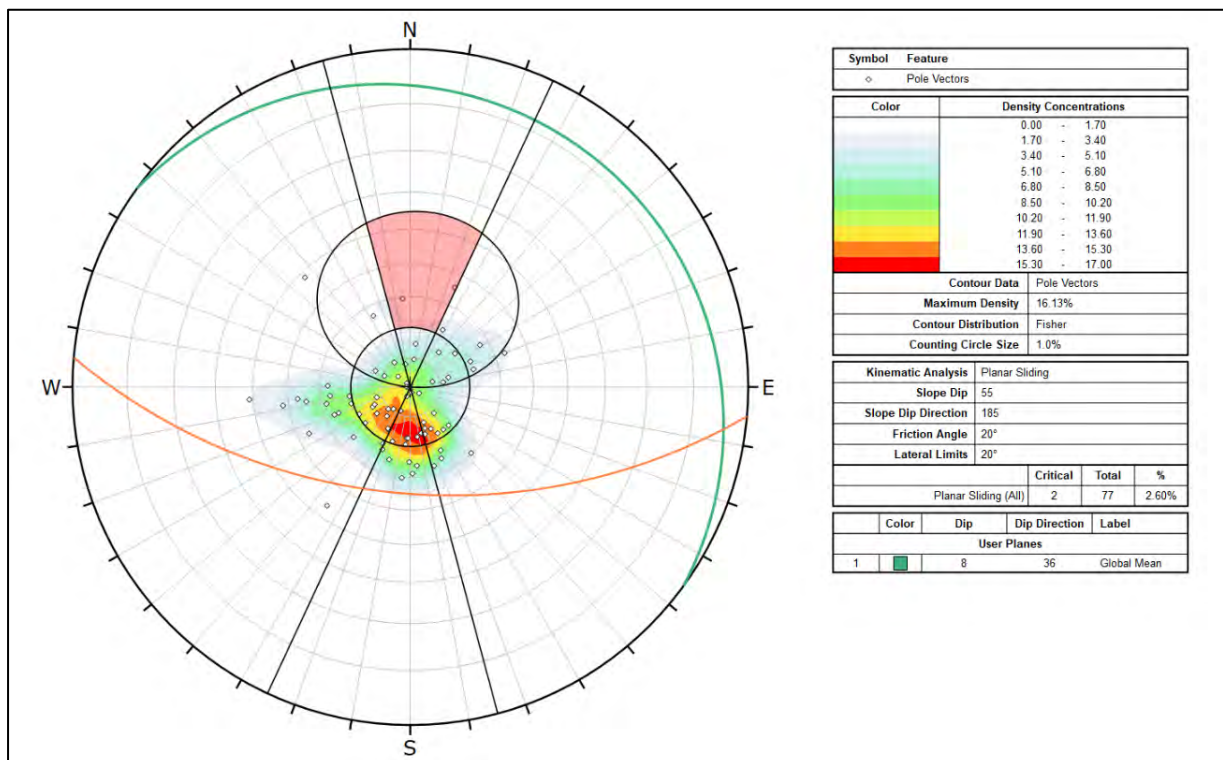


Figure C389 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (North Wall) – Planar Sliding.

Symbol	Feature
○	Pole Vectors
■	Critical Intersection

Color	Density Concentrations
0.00	~ 1.70
1.70	~ 3.40
3.40	~ 5.10
5.10	~ 6.80
6.80	~ 8.50
8.50	~ 10.20
10.20	~ 11.90
11.90	~ 13.60
13.60	~ 15.30
15.30	~ 17.00

Contour Data	Pole Vectors
Maximum Density	16.13%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	55		
Slope Dip Direction	185		
Friction Angle	20°		
	Critical	Total	%
Wedge Sliding	80	2926	2.73%

	Color	Dip	Dip Direction	Label
User Planes				
1	■	8	36	Global Mean

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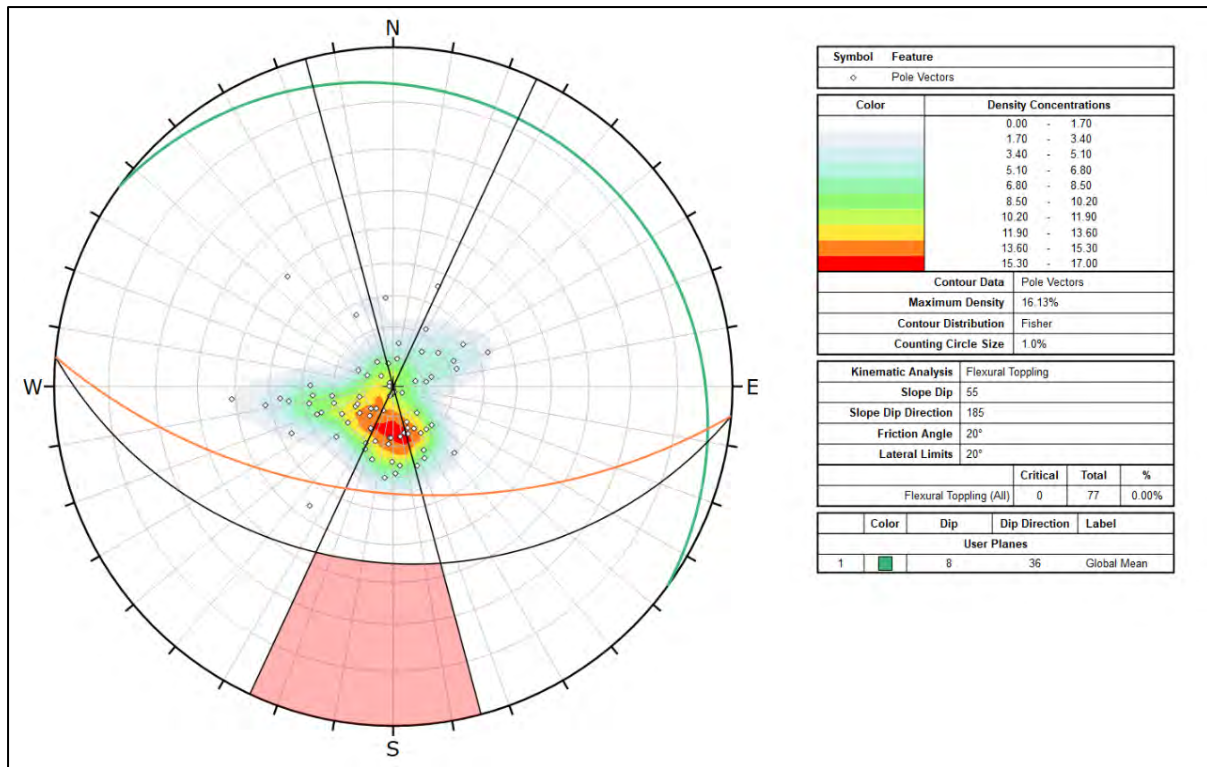


Figure C392 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (North Wall) – Flexural Toppling.

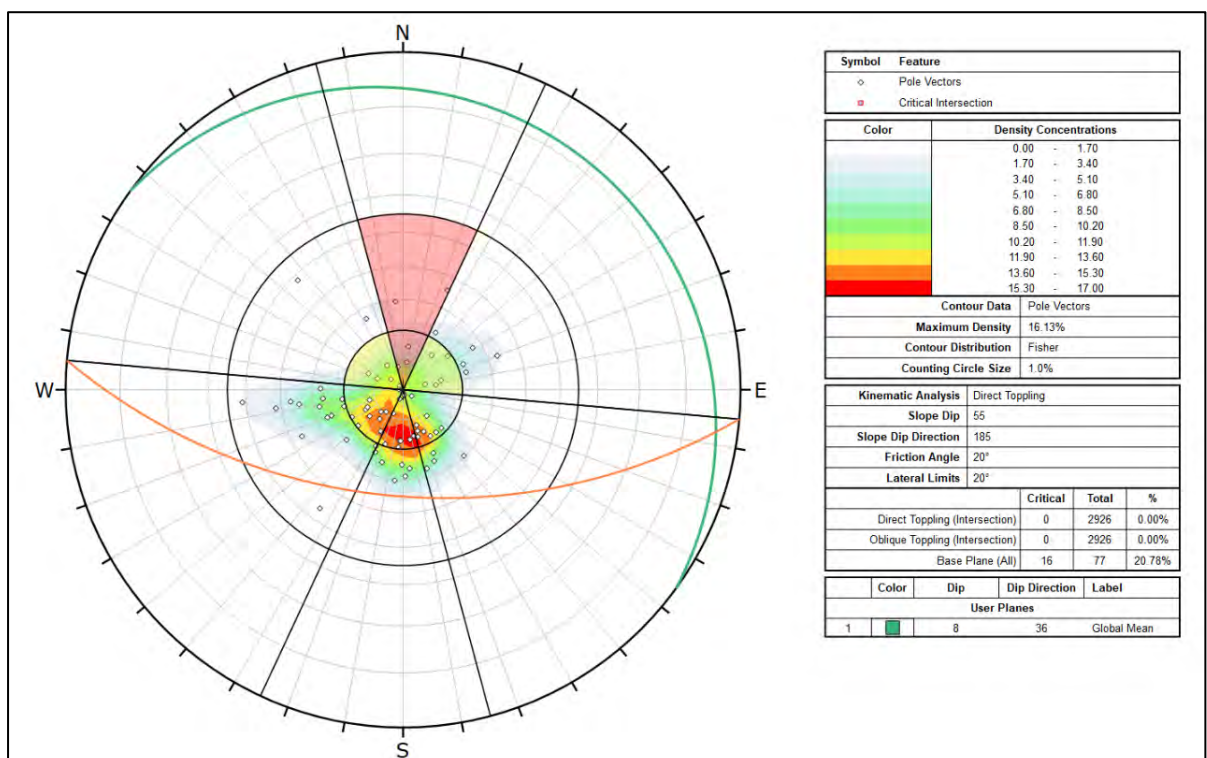


Figure C393 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – BSM - Bedding – Bench Slope

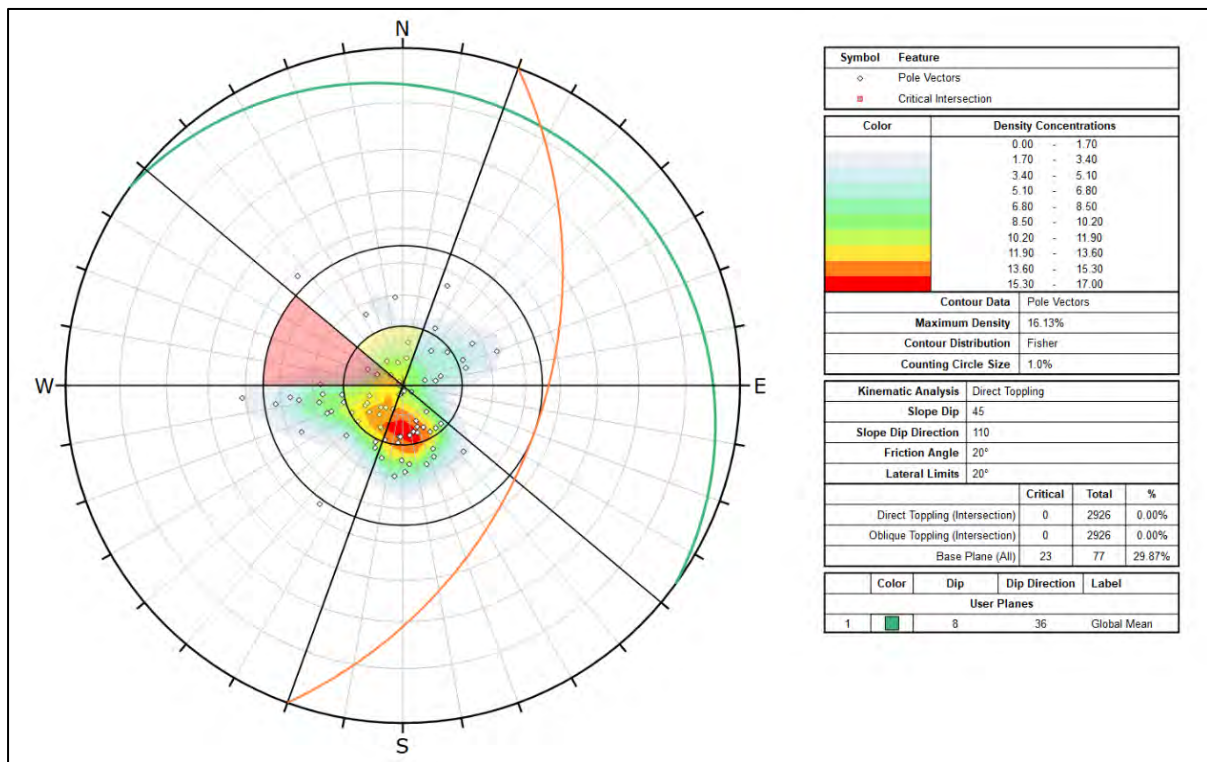


Figure C394 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (West Wall) – Planar Sliding.

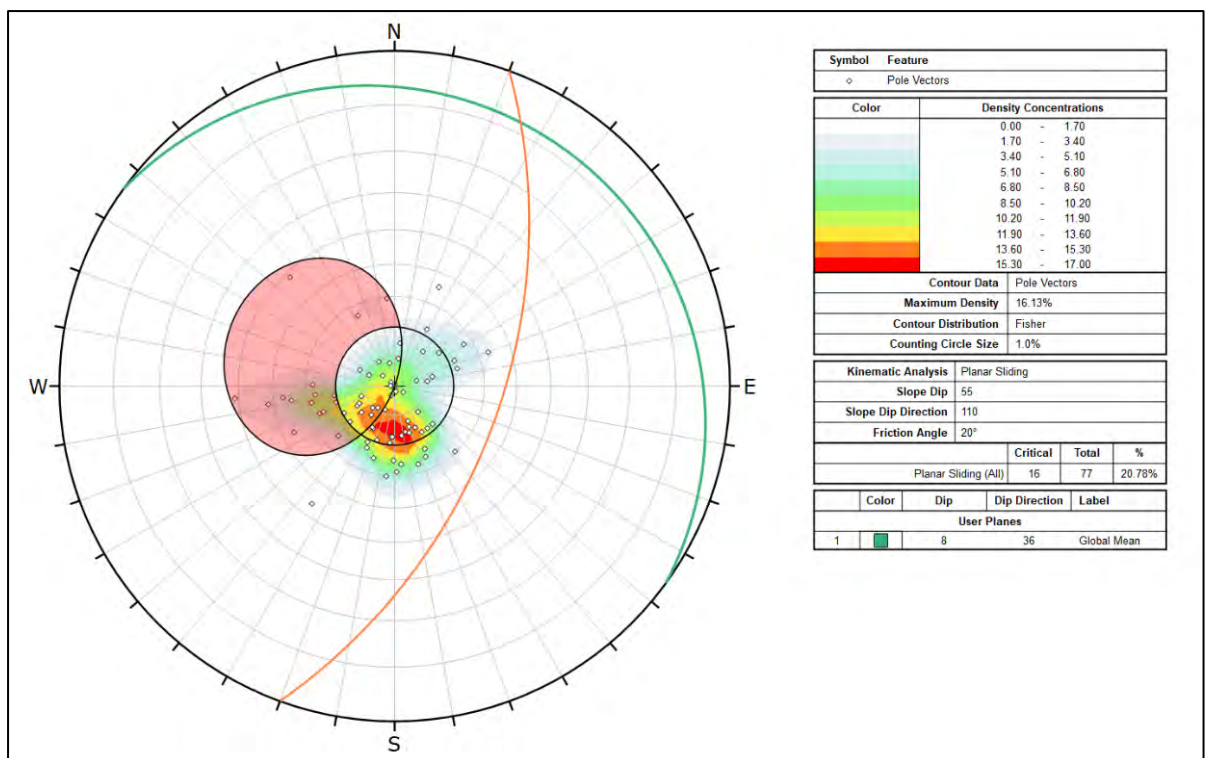


Figure C395 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

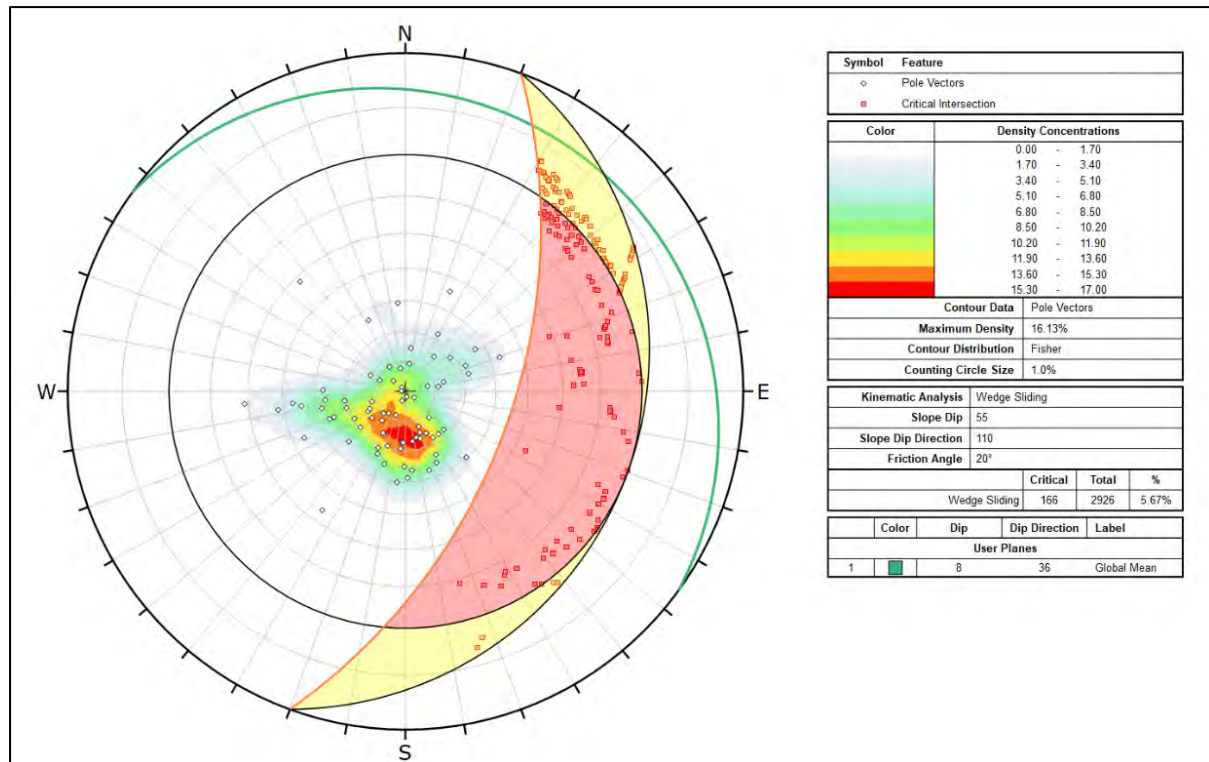


Figure C396 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (West Wall) – Wedge Sliding.

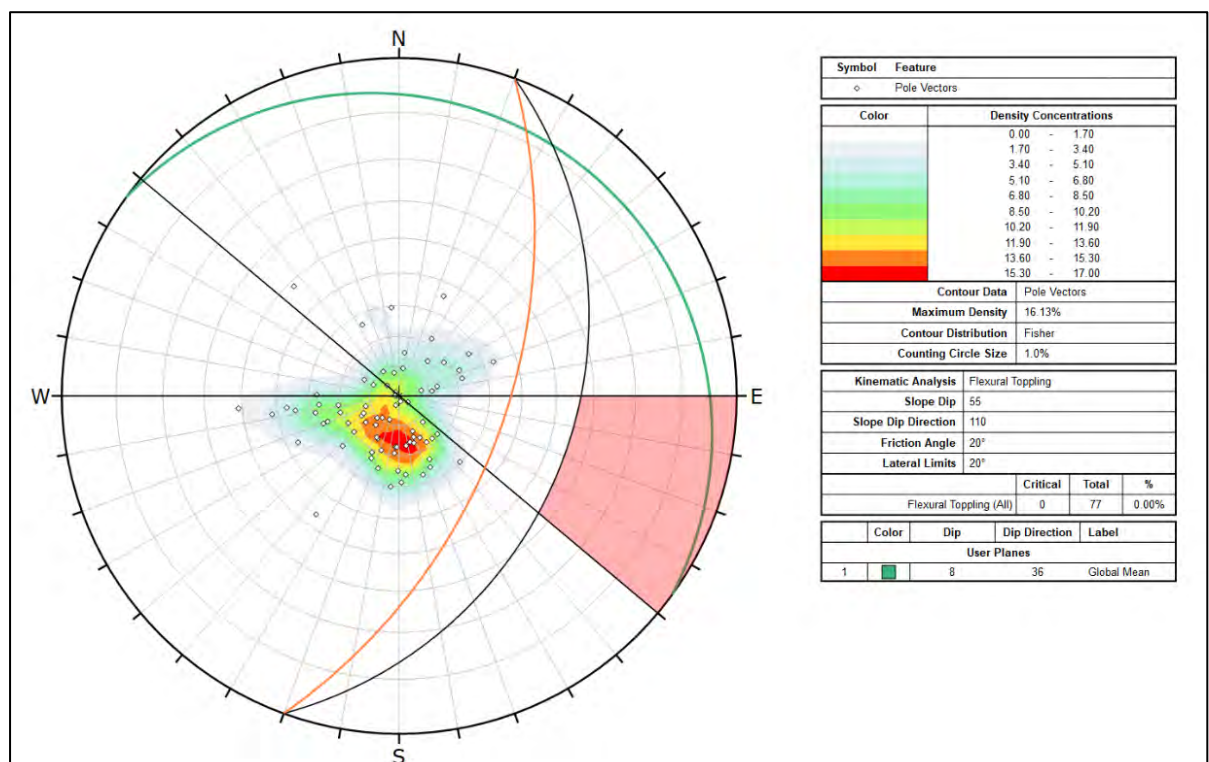


Figure C397 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (West Wall) – Flexural Toppling.

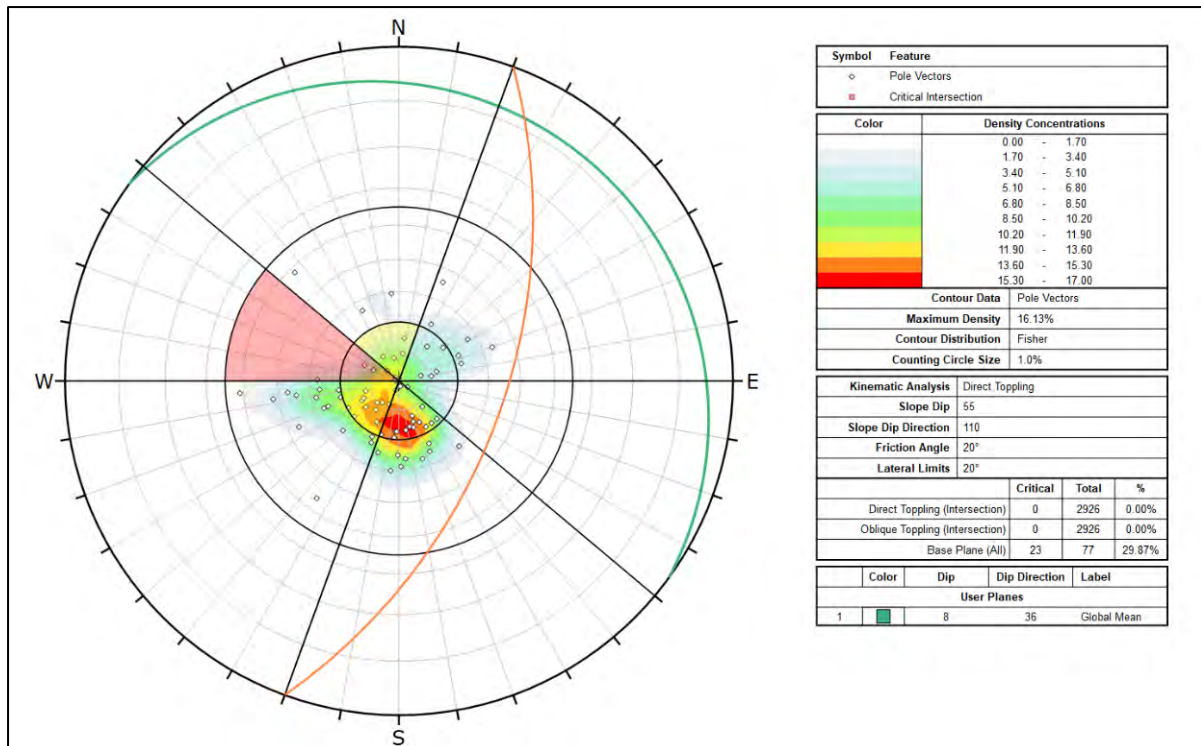


Figure C398 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – BSM - Bedding – Bench Slope

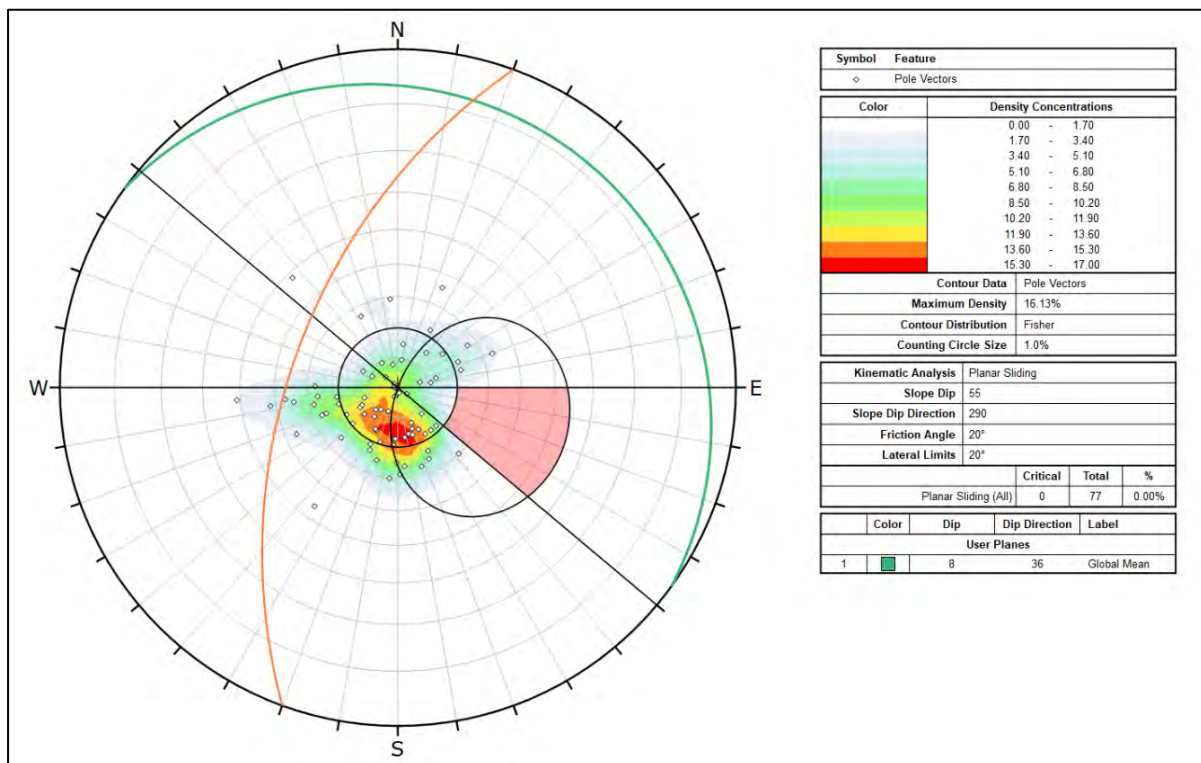


Figure C399 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (East Wall) – Planar Sliding.

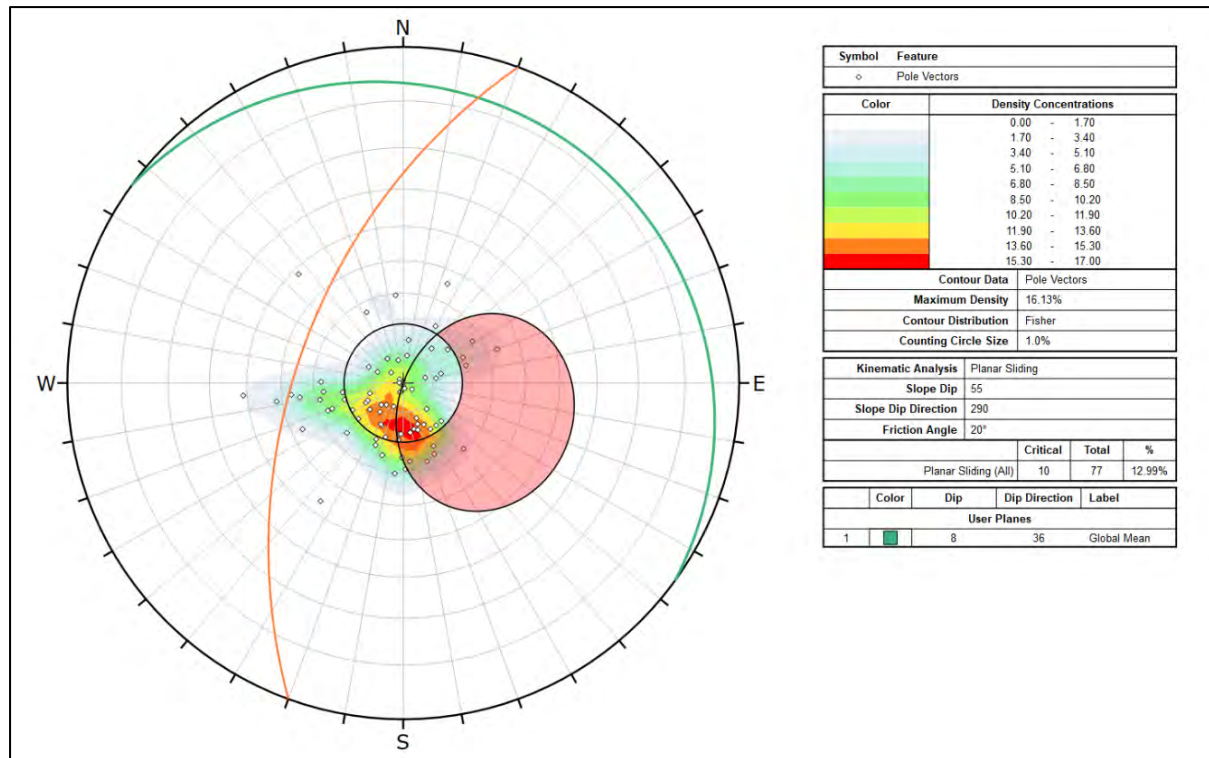


Figure C400 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

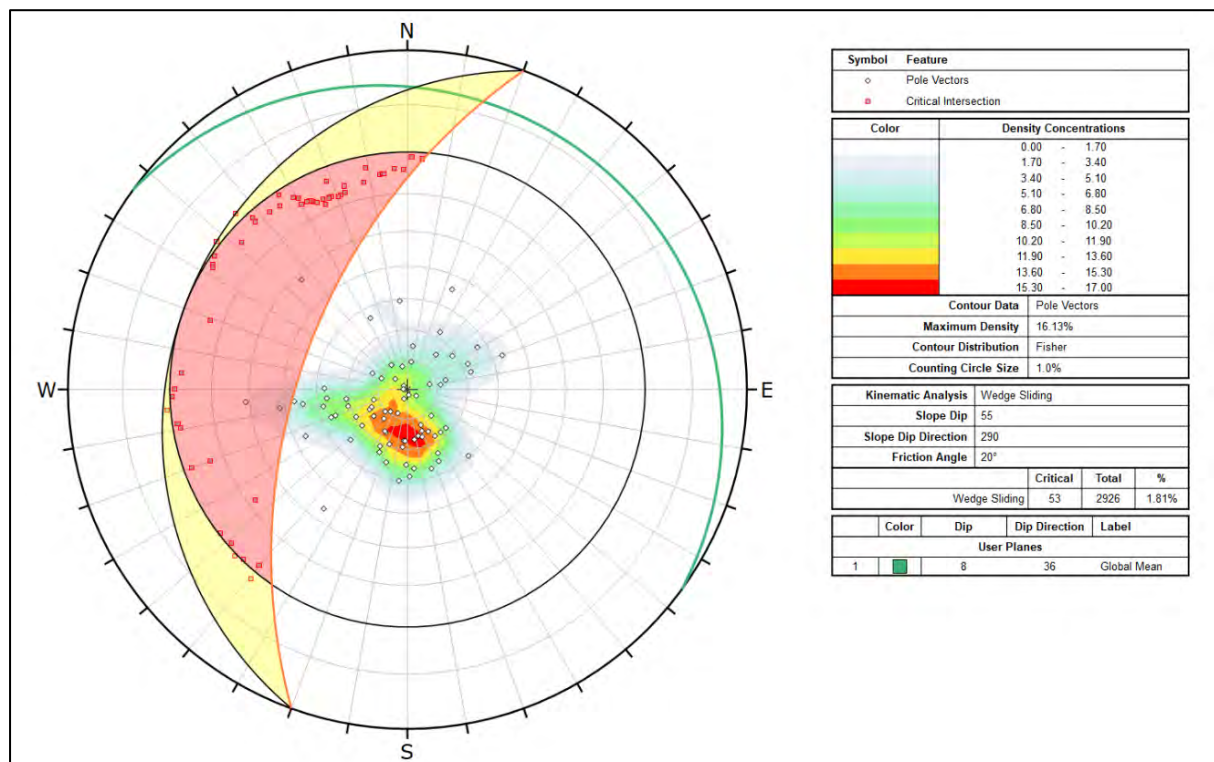


Figure C401 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (East Wall) – Wedge Sliding.

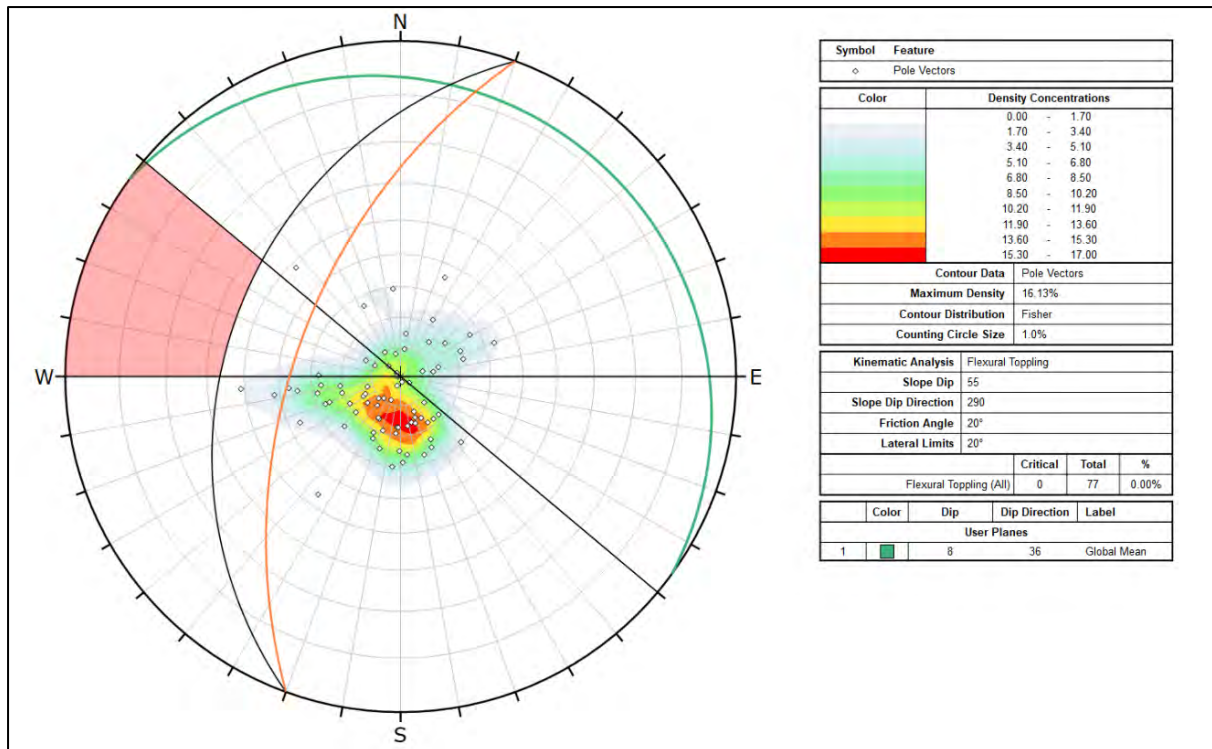


Figure C402 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (East Wall) – Flexural Toppling.

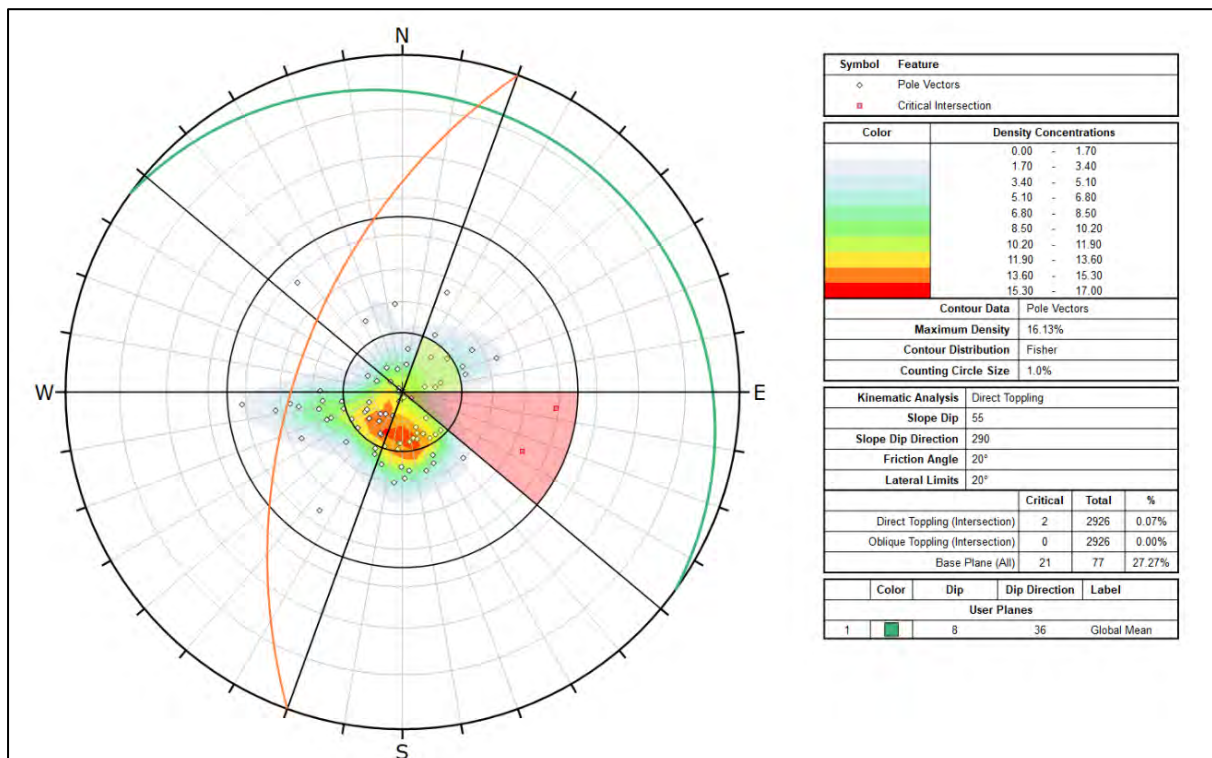


Figure C403 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – BSM - Bedding – Bench Slope

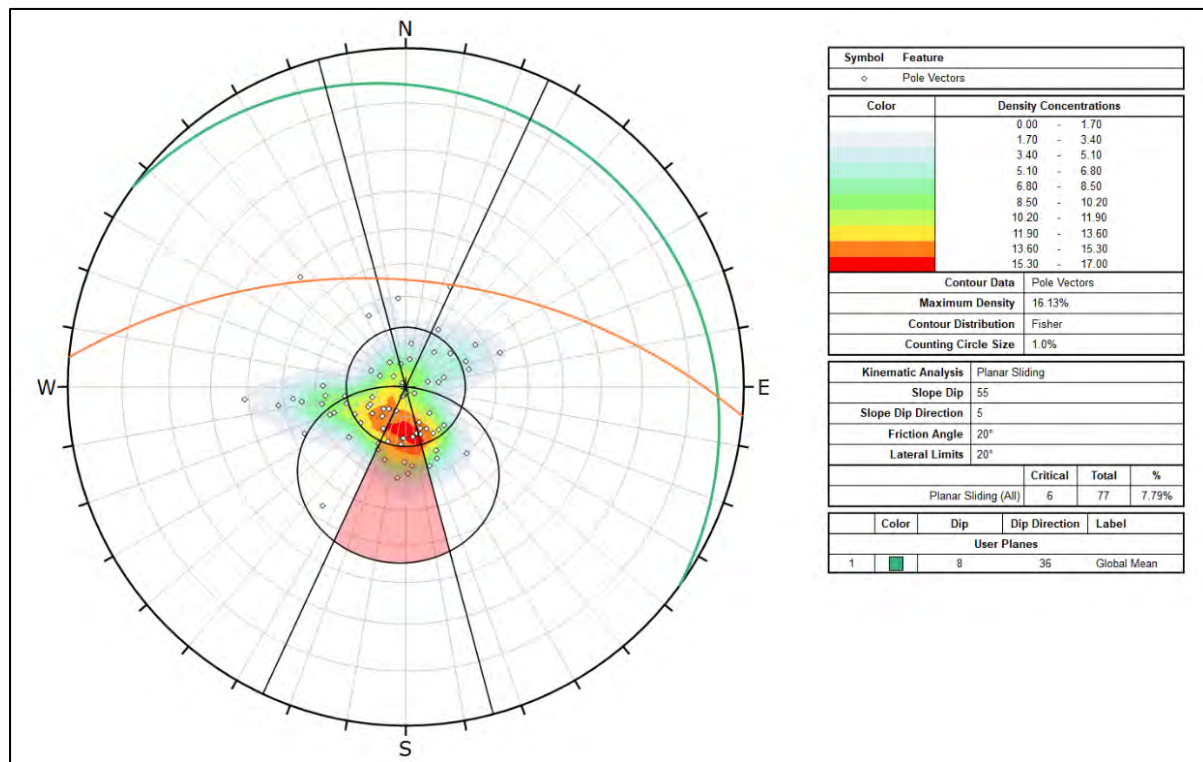


Figure C404 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (South Wall) – Planar Sliding.

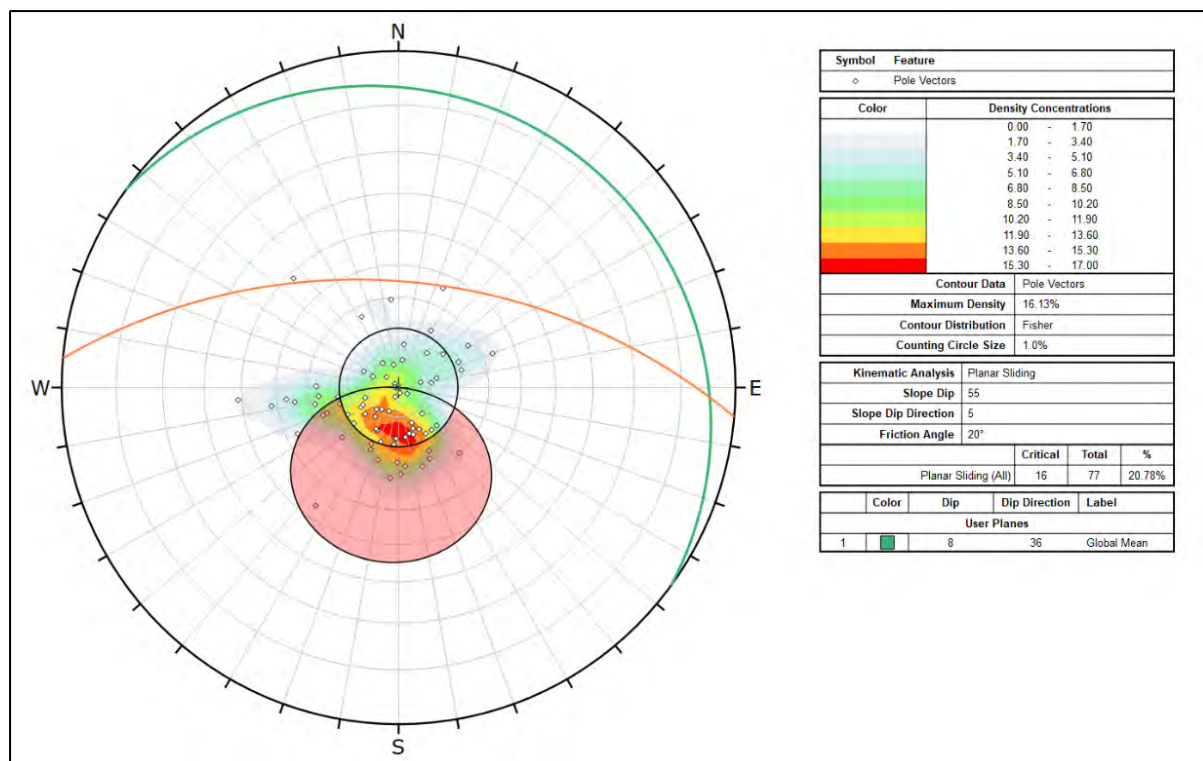


Figure C405 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).

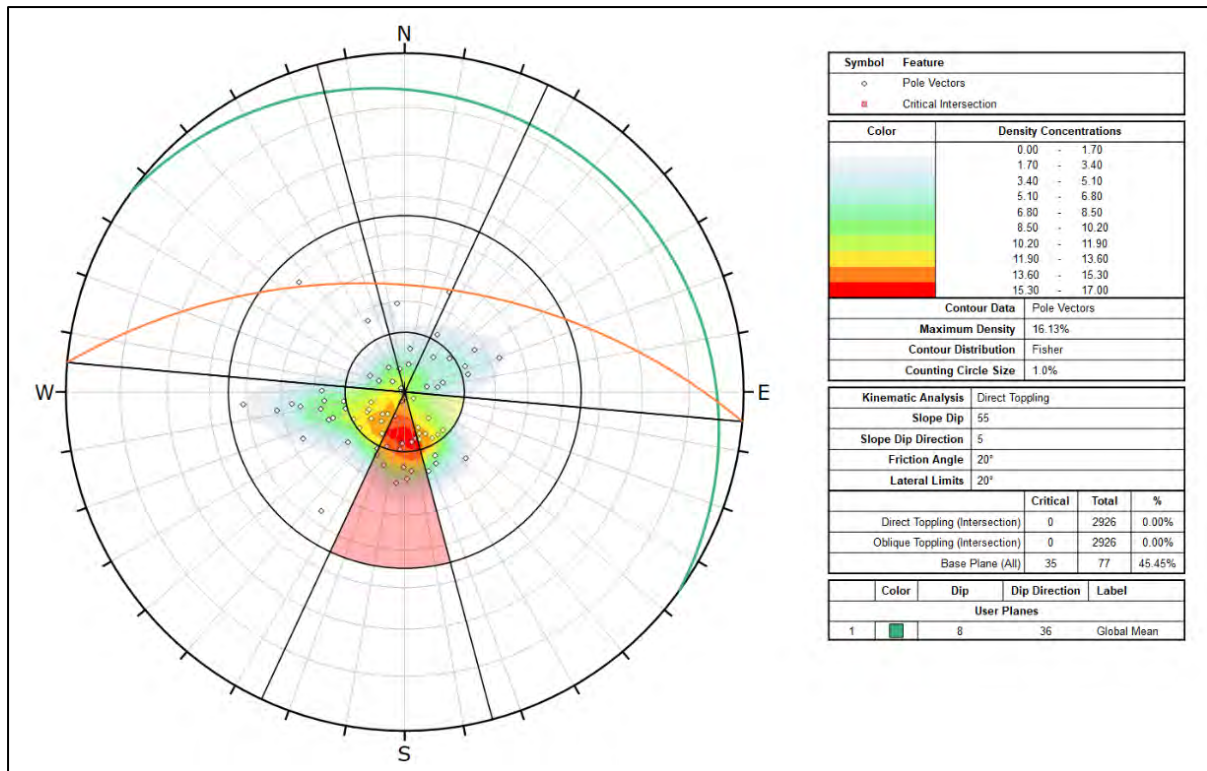


Figure C408 – Kinematic Analysis (BSM Bedding) - Bench Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Joints <30°– Overall Slope

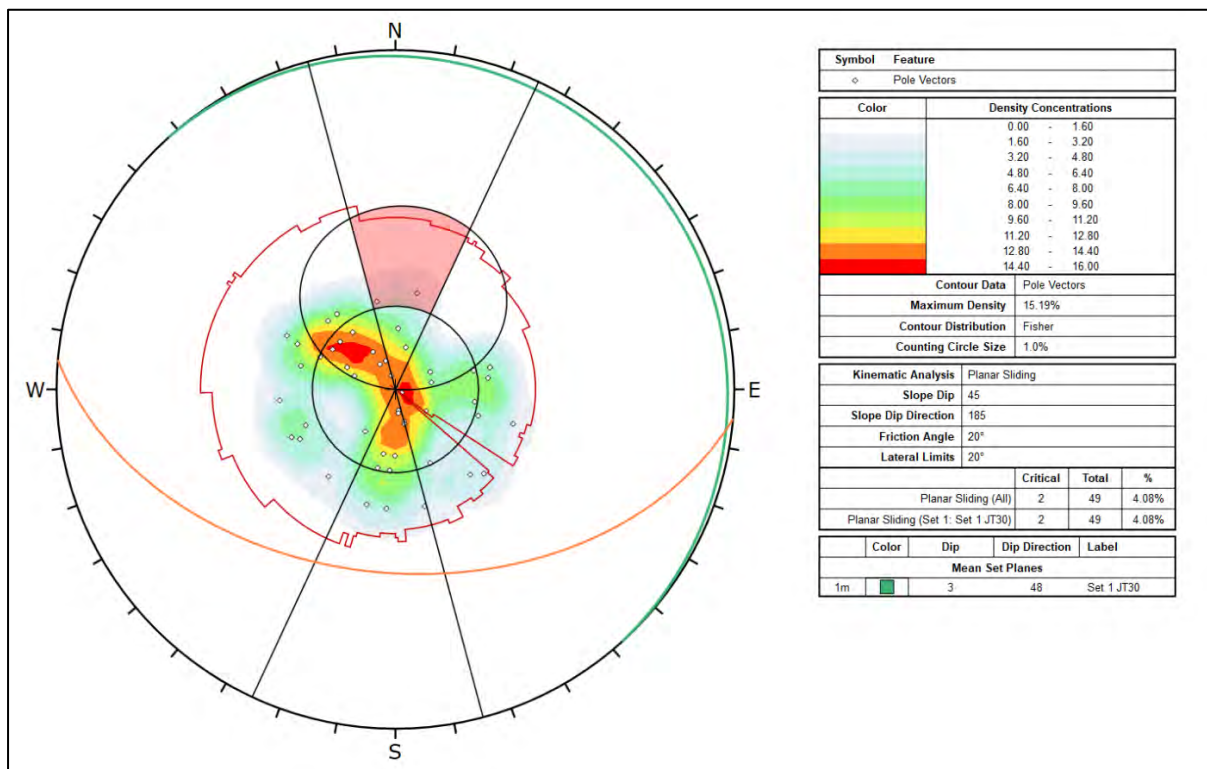


Figure C409 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (North Wall) – Planar Sliding.

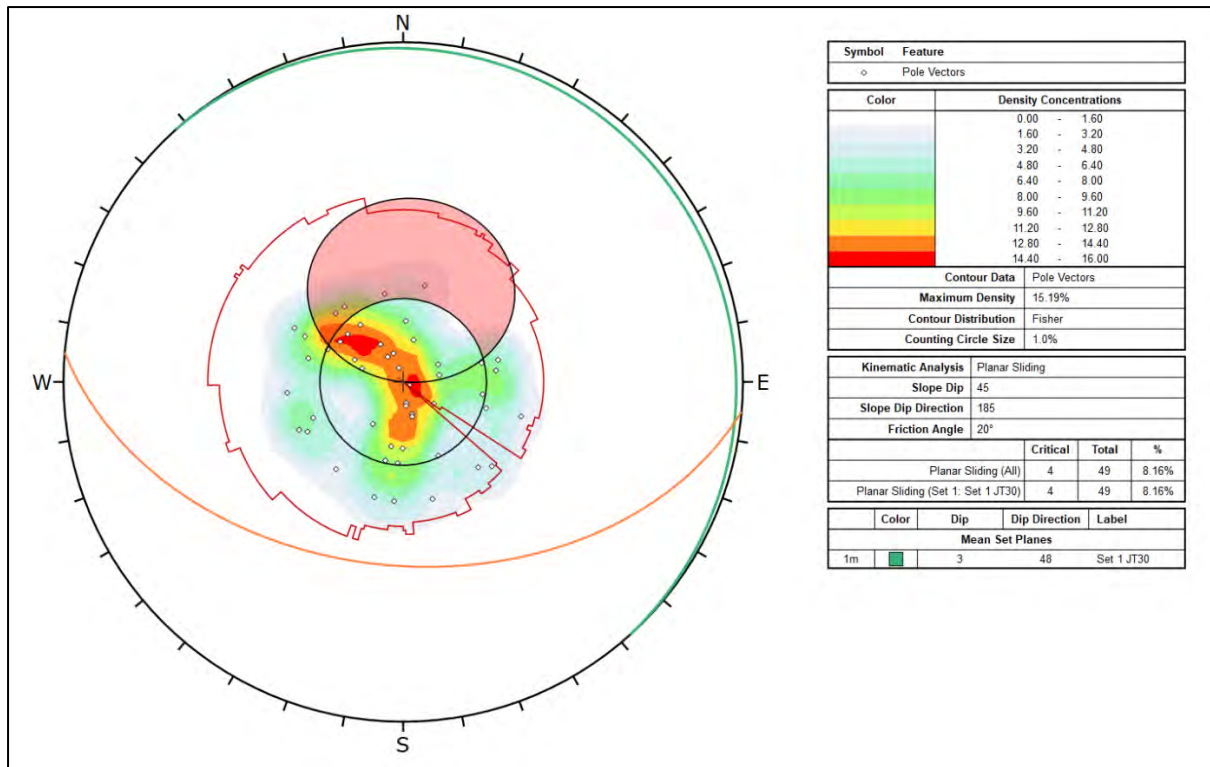


Figure C410 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (North Wall) – Planar Sliding (No Limits).

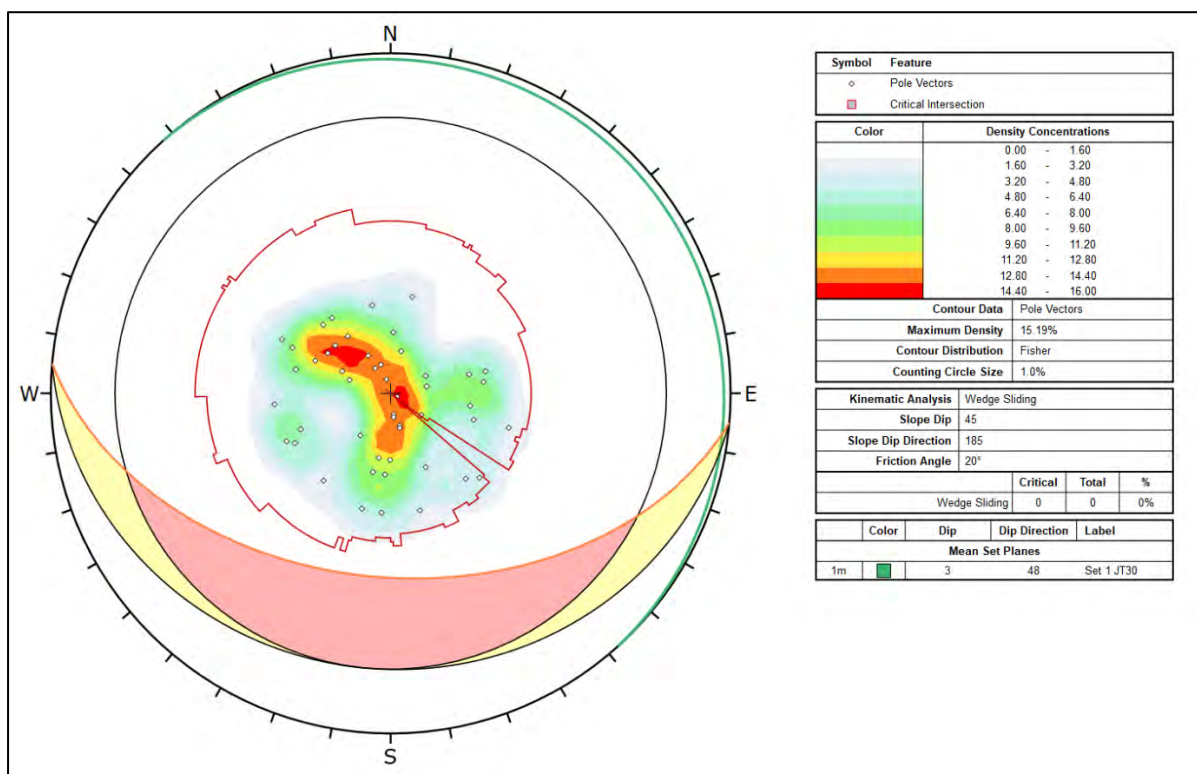


Figure C411 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (North Wall) – Wedge Sliding.

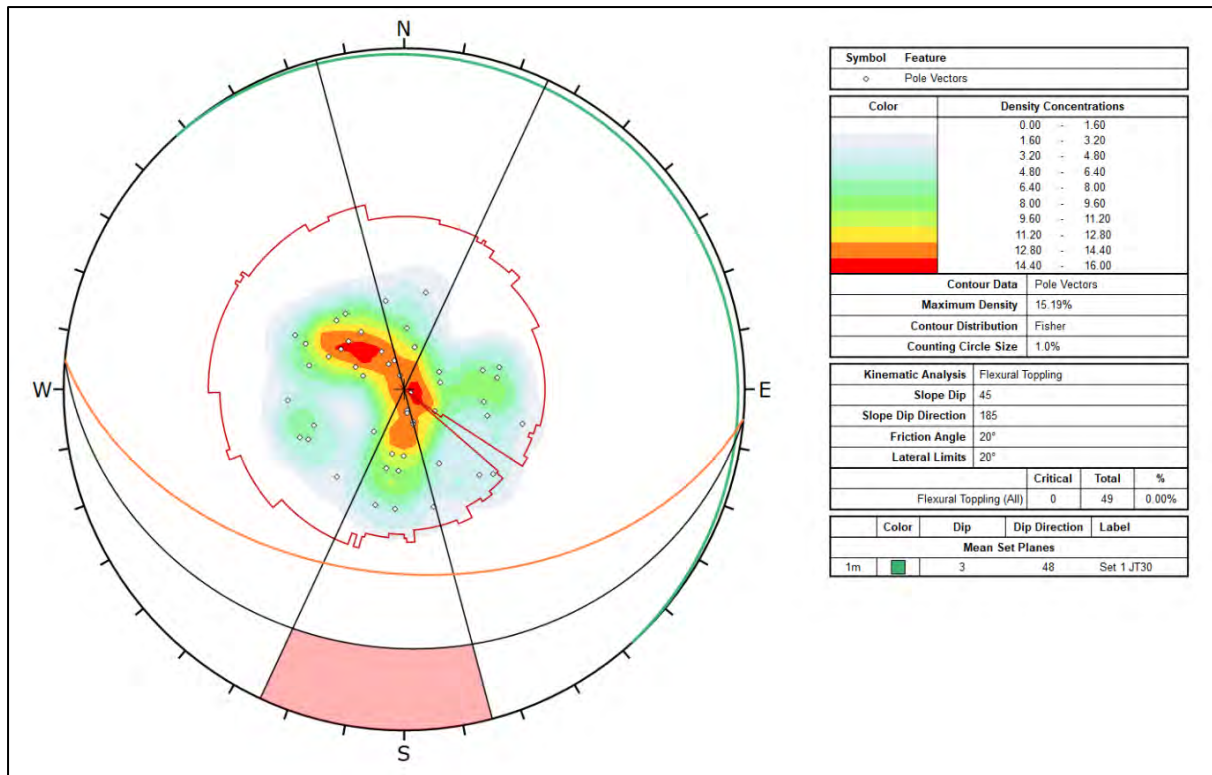


Figure C412 – Kinematic Analysis (Joints <30°) – Overall Slope – West Sump (North Wall) – Flexural Toppling.

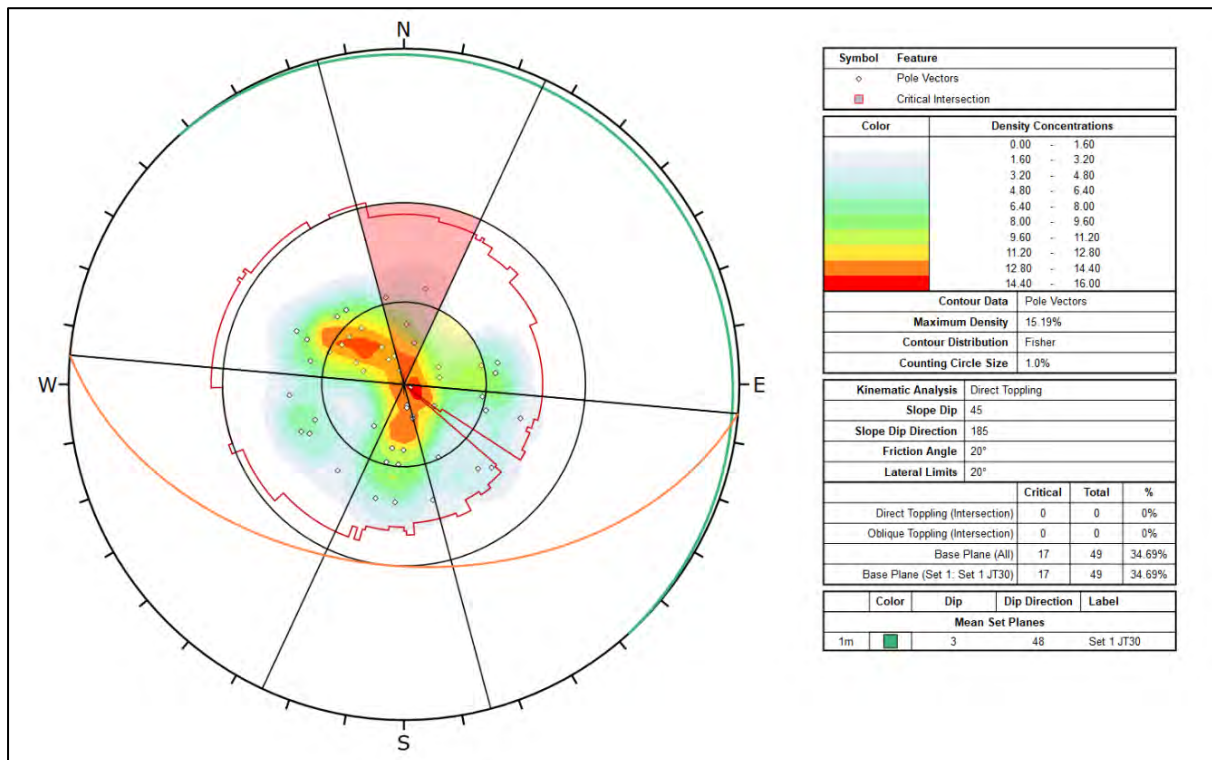


Figure C413 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints <30°– Overall Slope

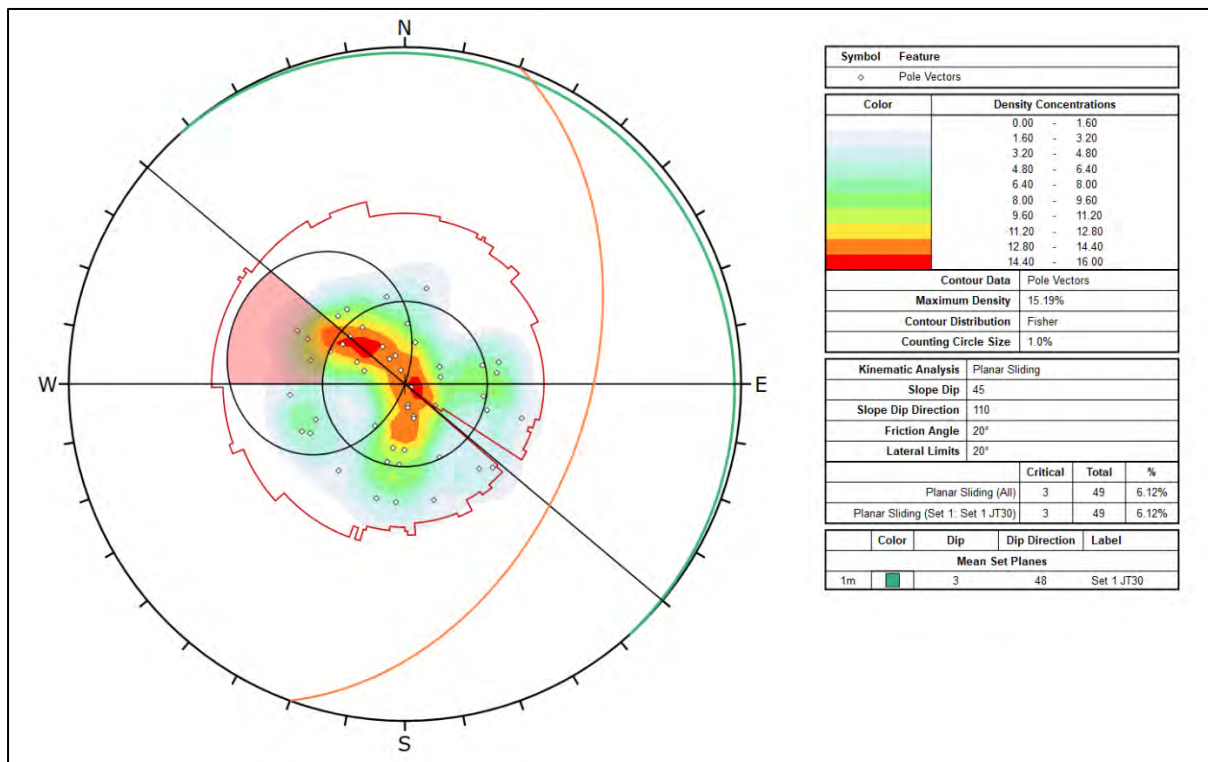


Figure C414 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (West Wall) – Planar Sliding.

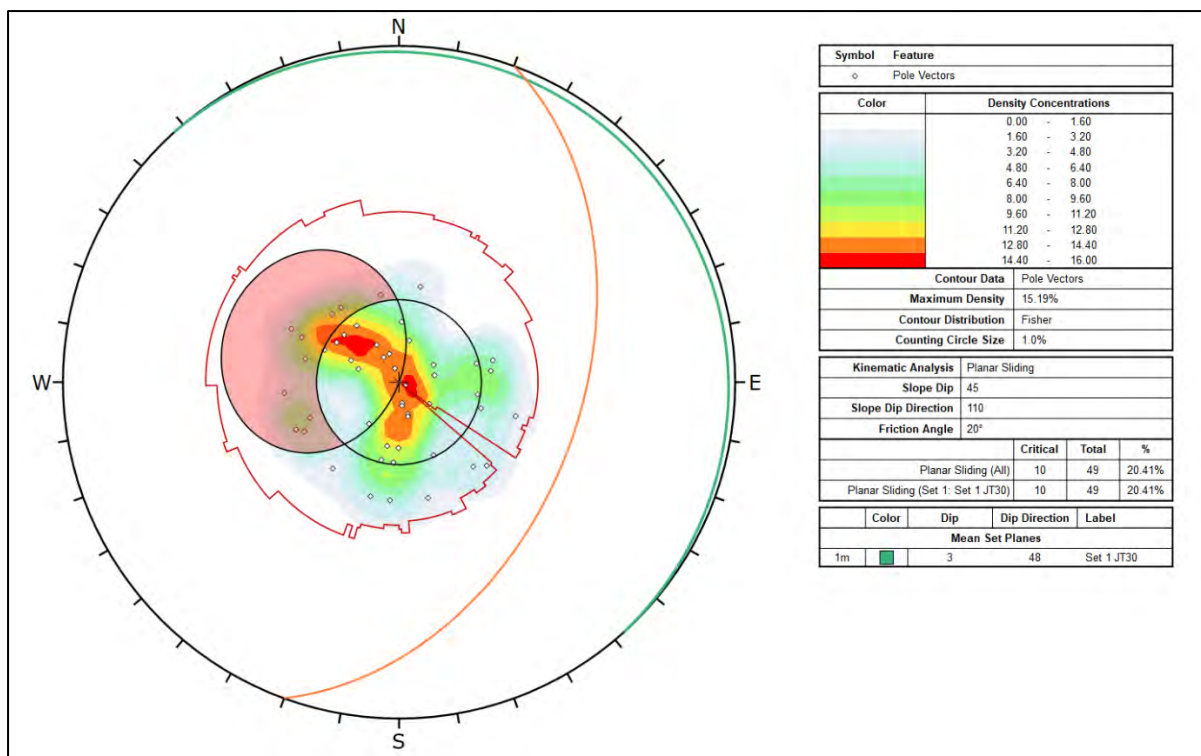


Figure C415 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (West Wall) – Planar Sliding (No Limits).

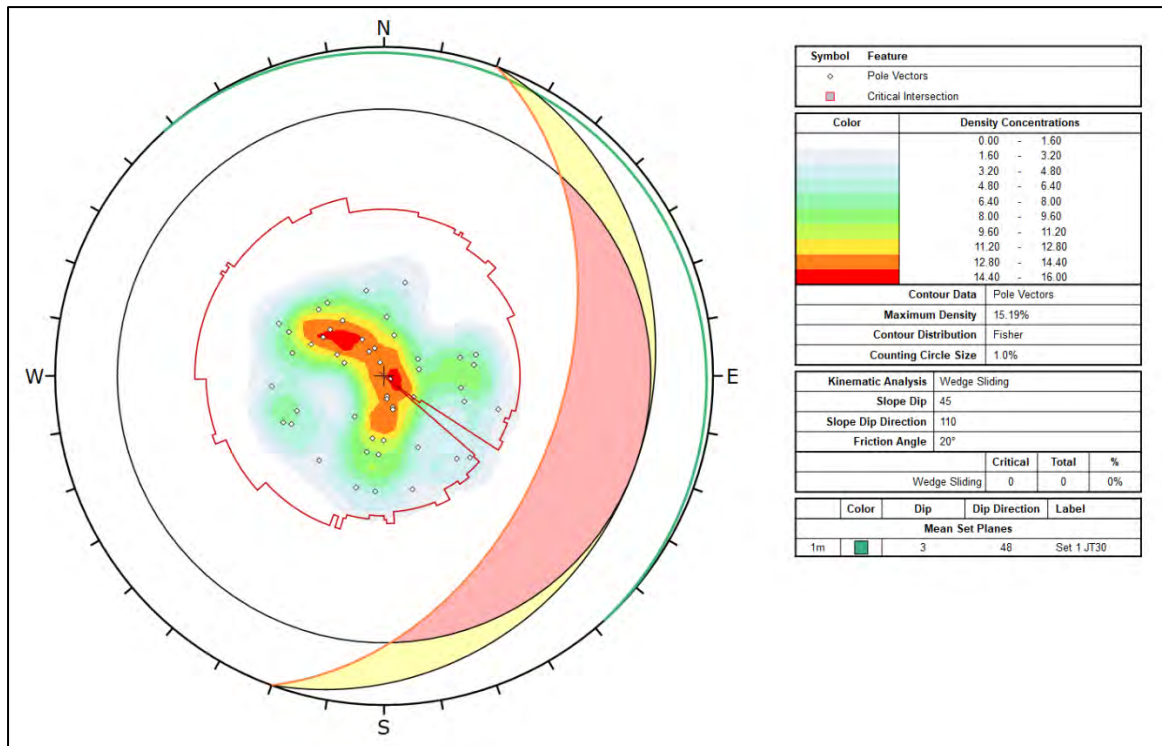


Figure C416 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (West Wall) – Wedge Sliding.

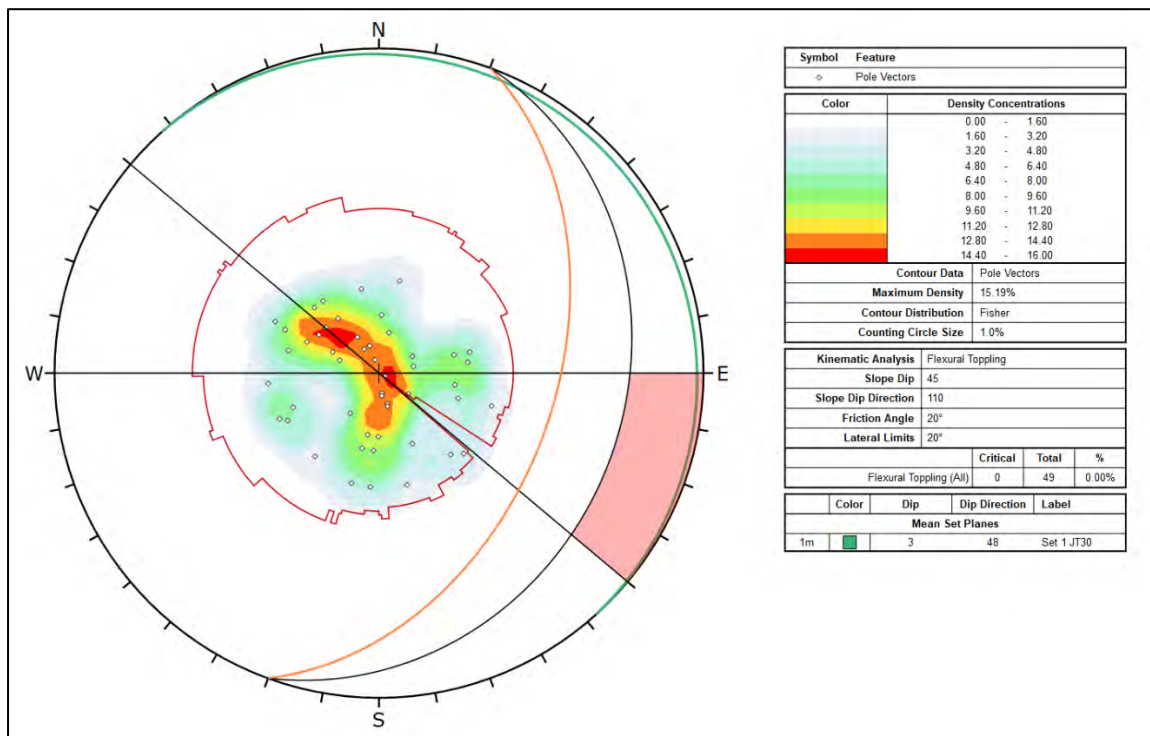


Figure C417 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (West Wall) – Flexural Toppling.

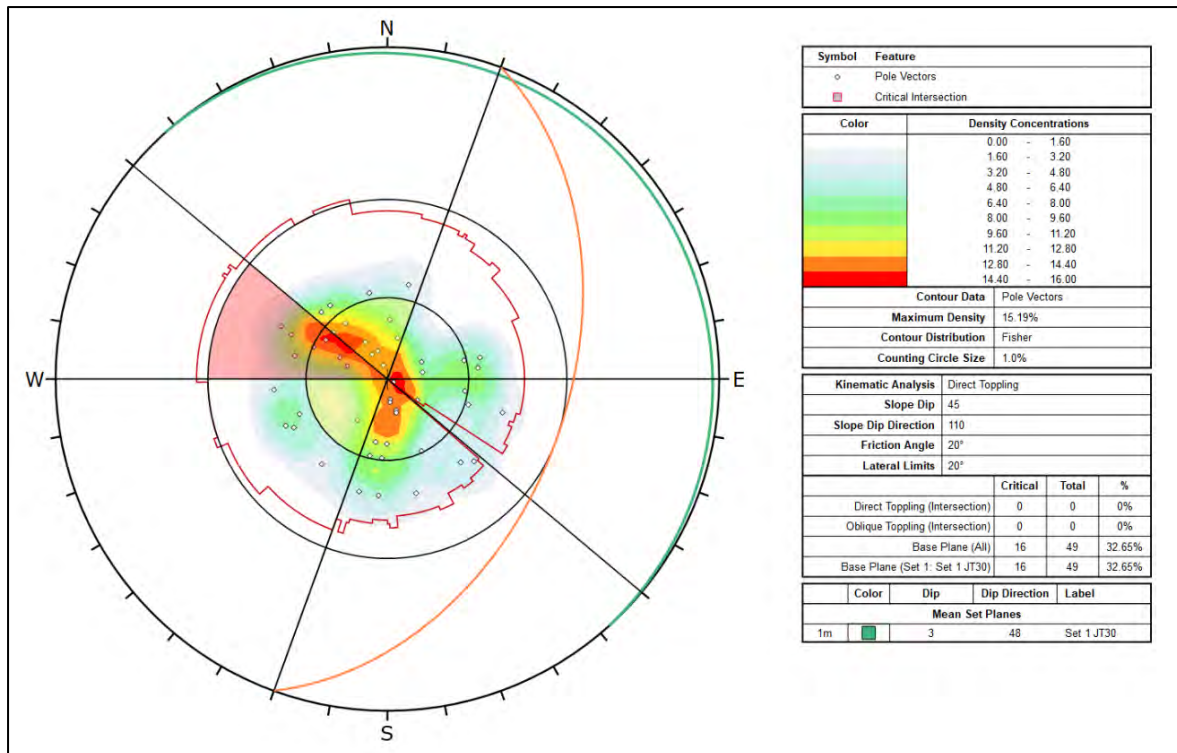


Figure C418 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints <30° – Overall Slope

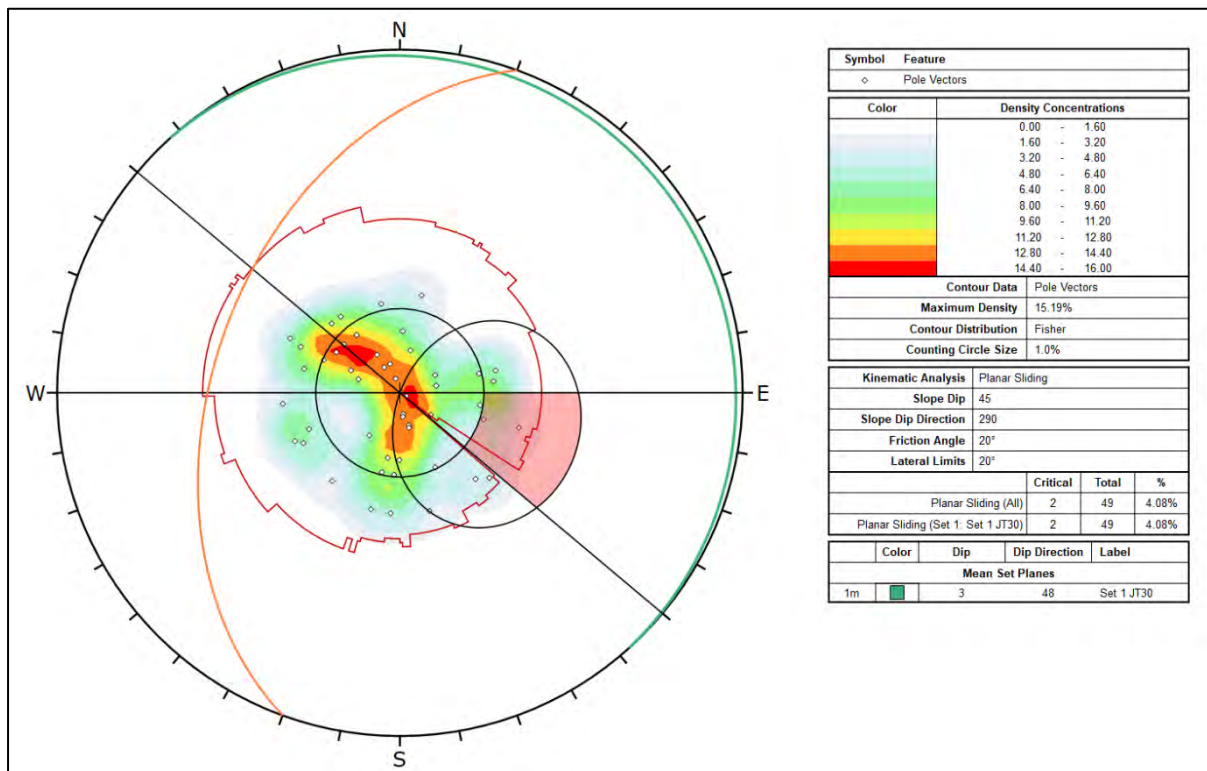
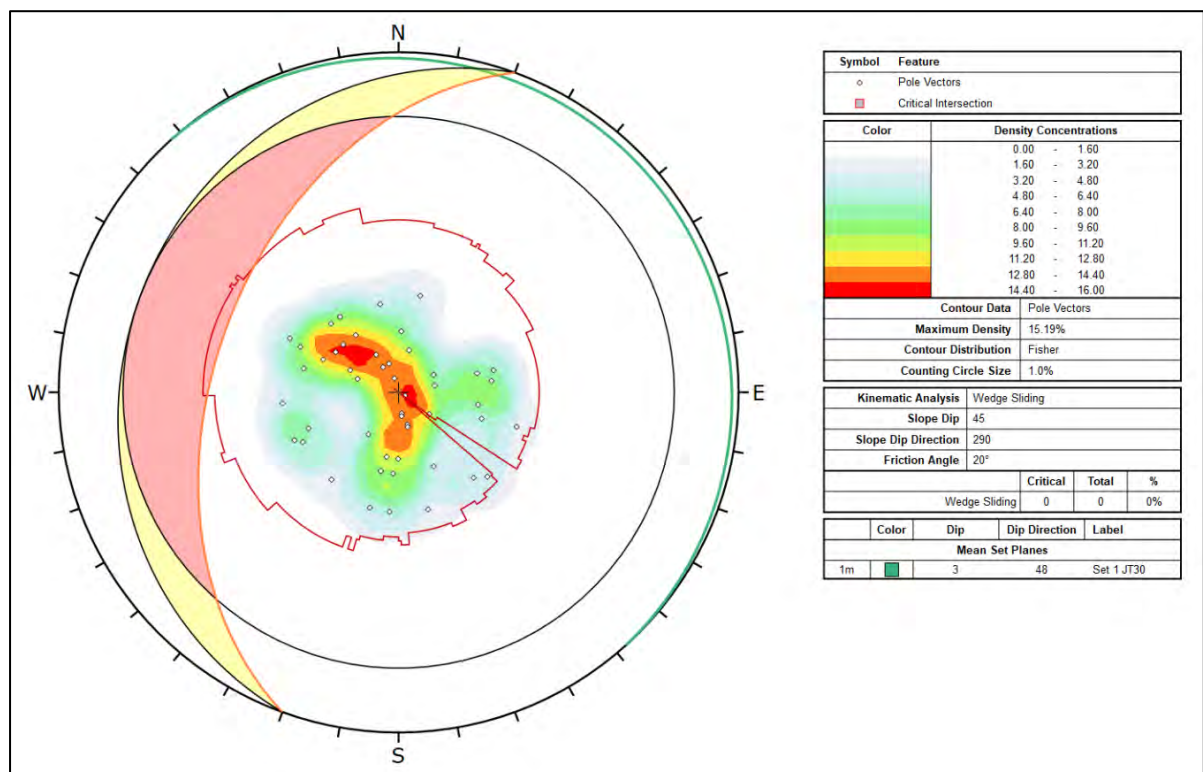


Figure C419 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Planar Sliding.



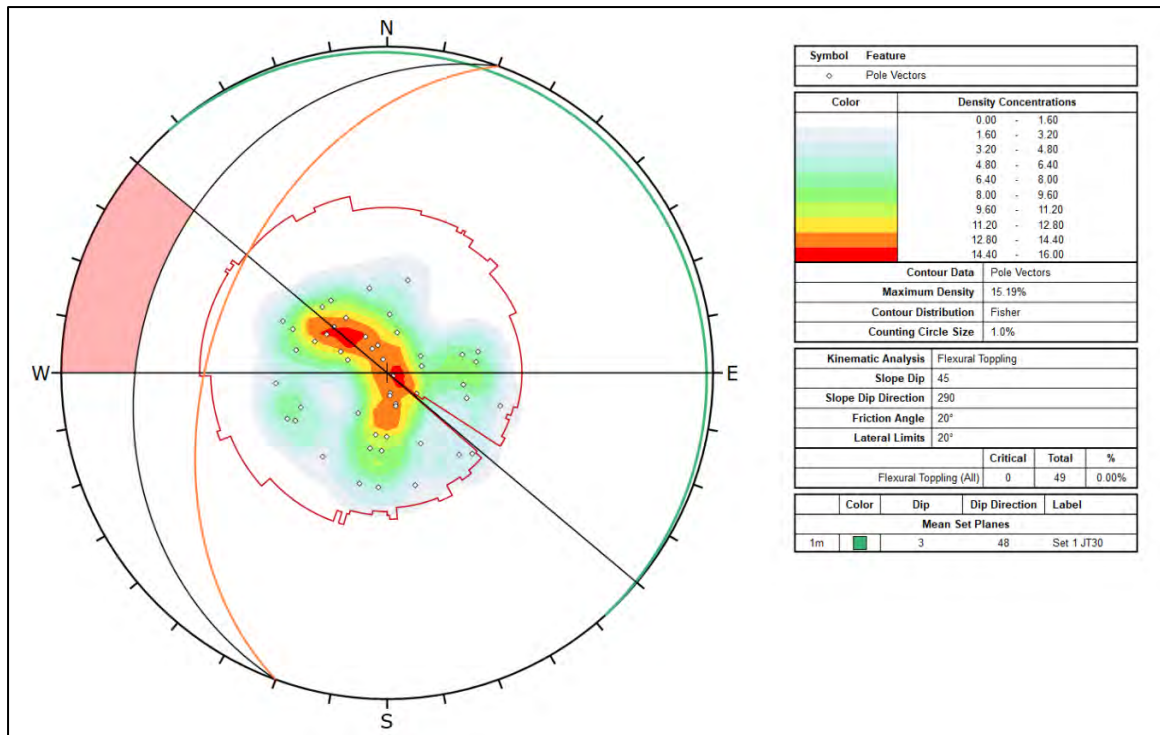


Figure C422 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

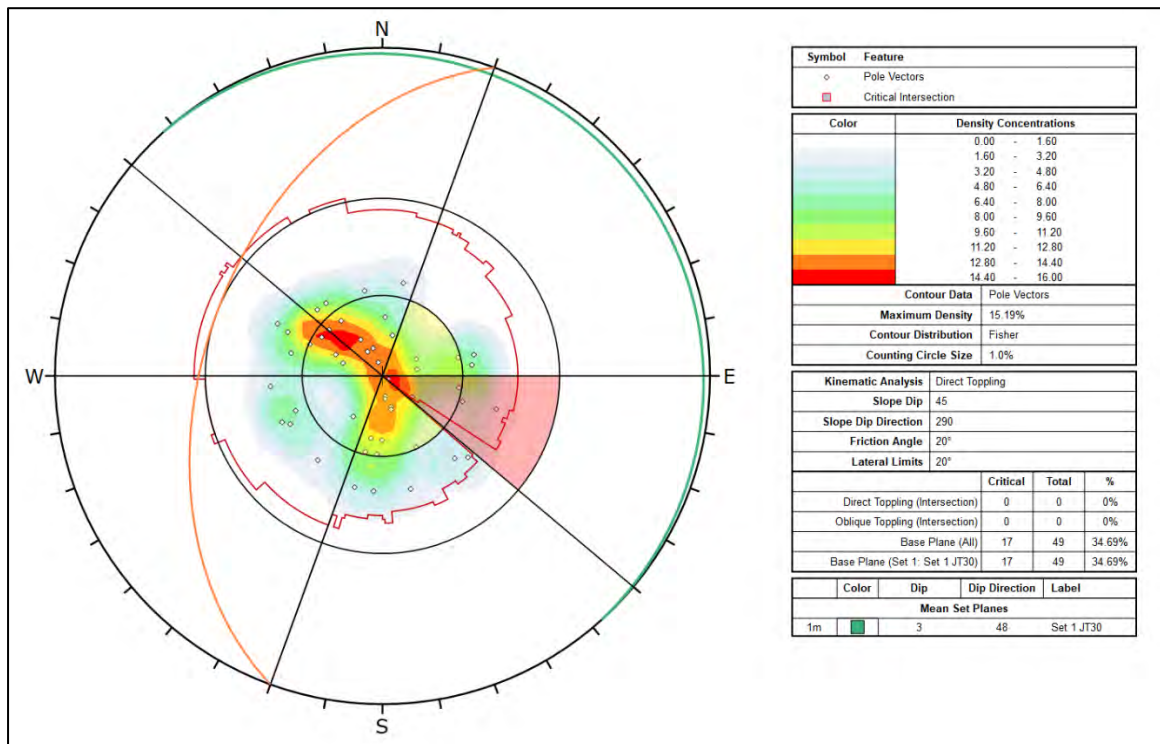


Figure C423 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Joints <30°– Overall Slope

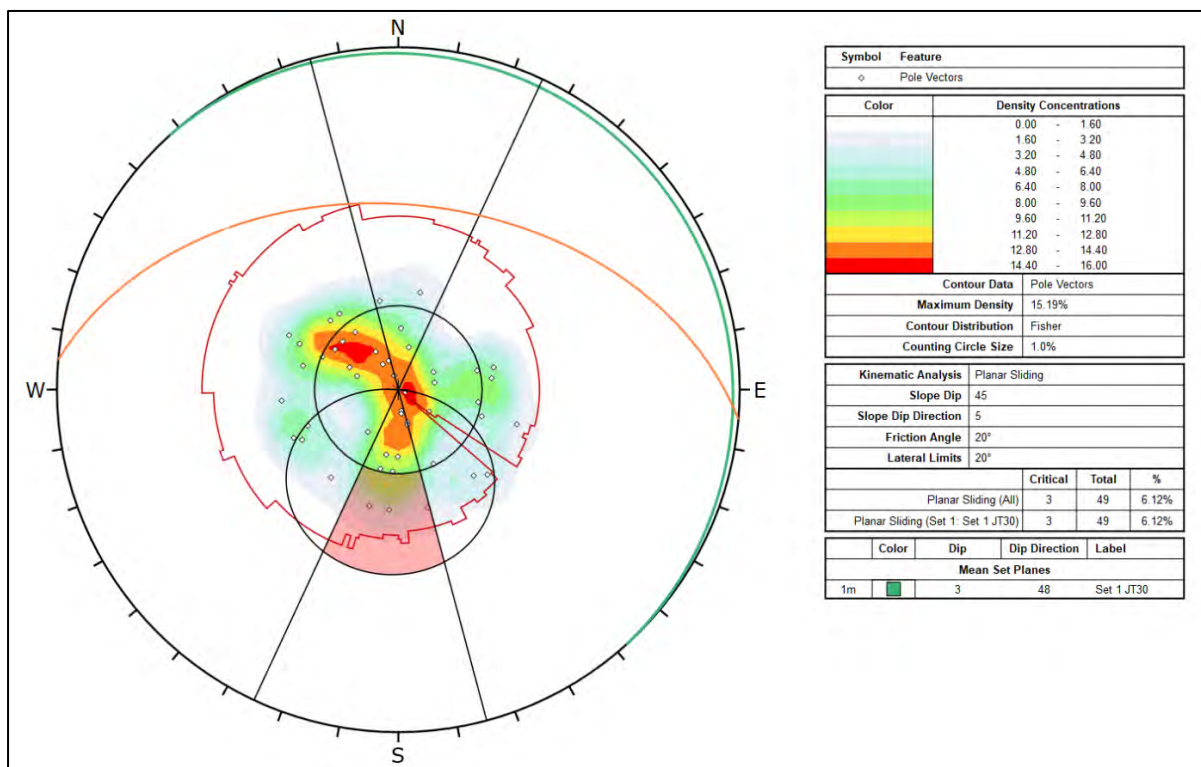


Figure C424 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

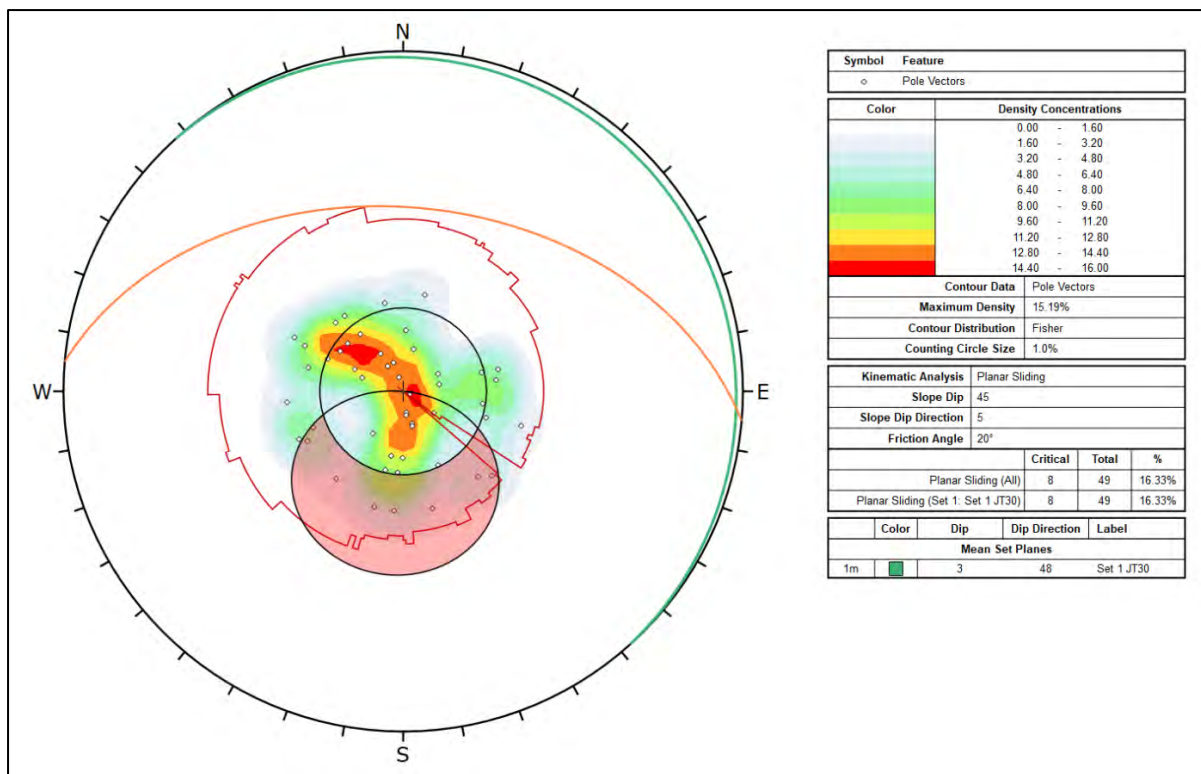


Figure C425 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

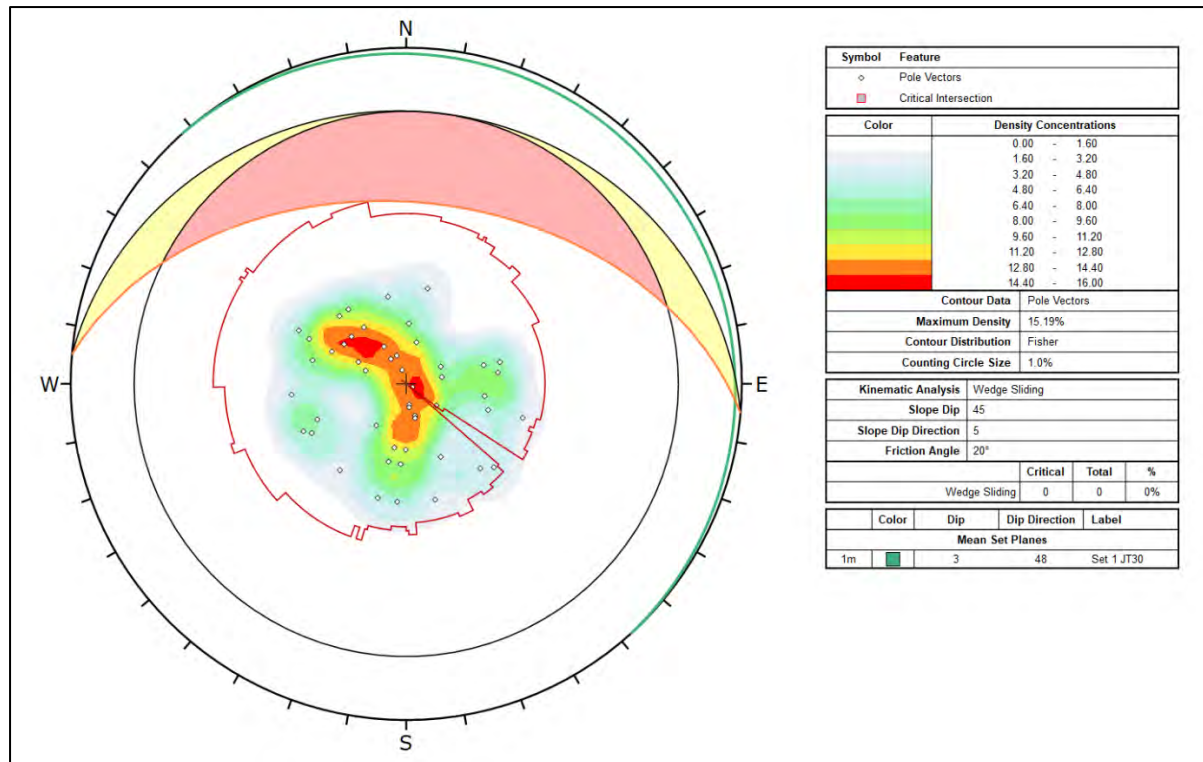


Figure C426 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) Wedge Sliding.

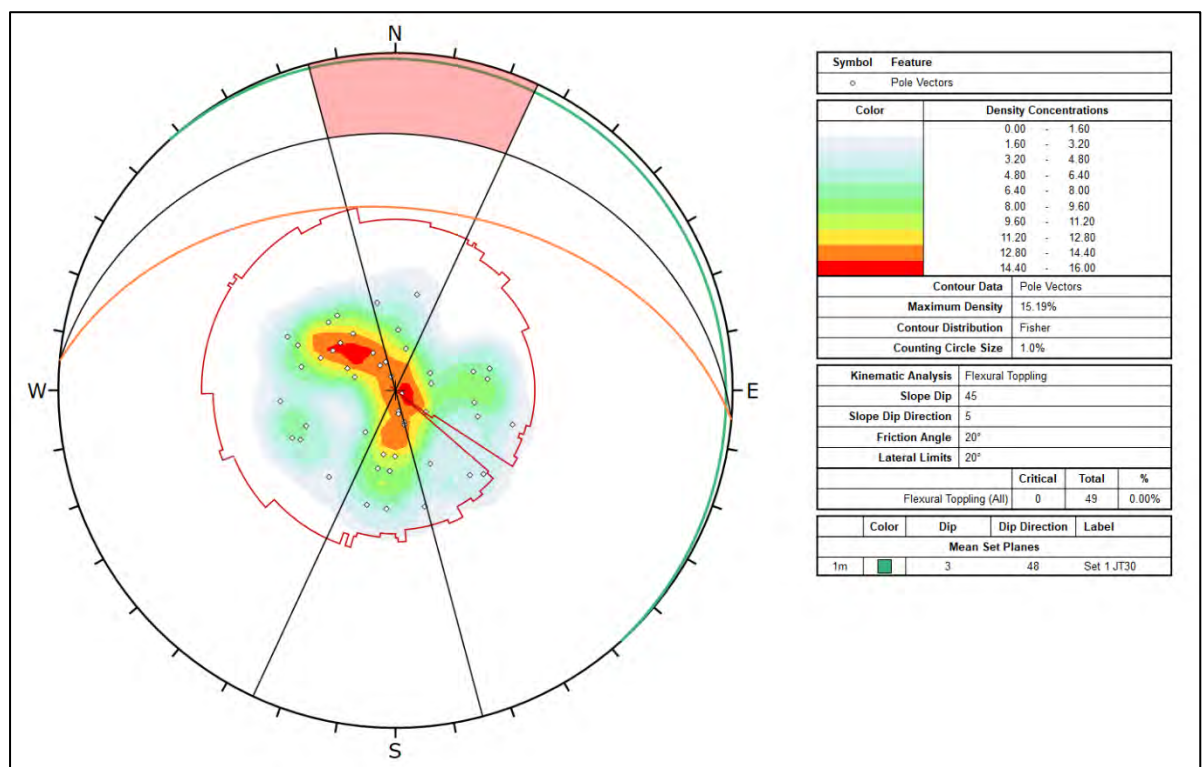


Figure C427 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

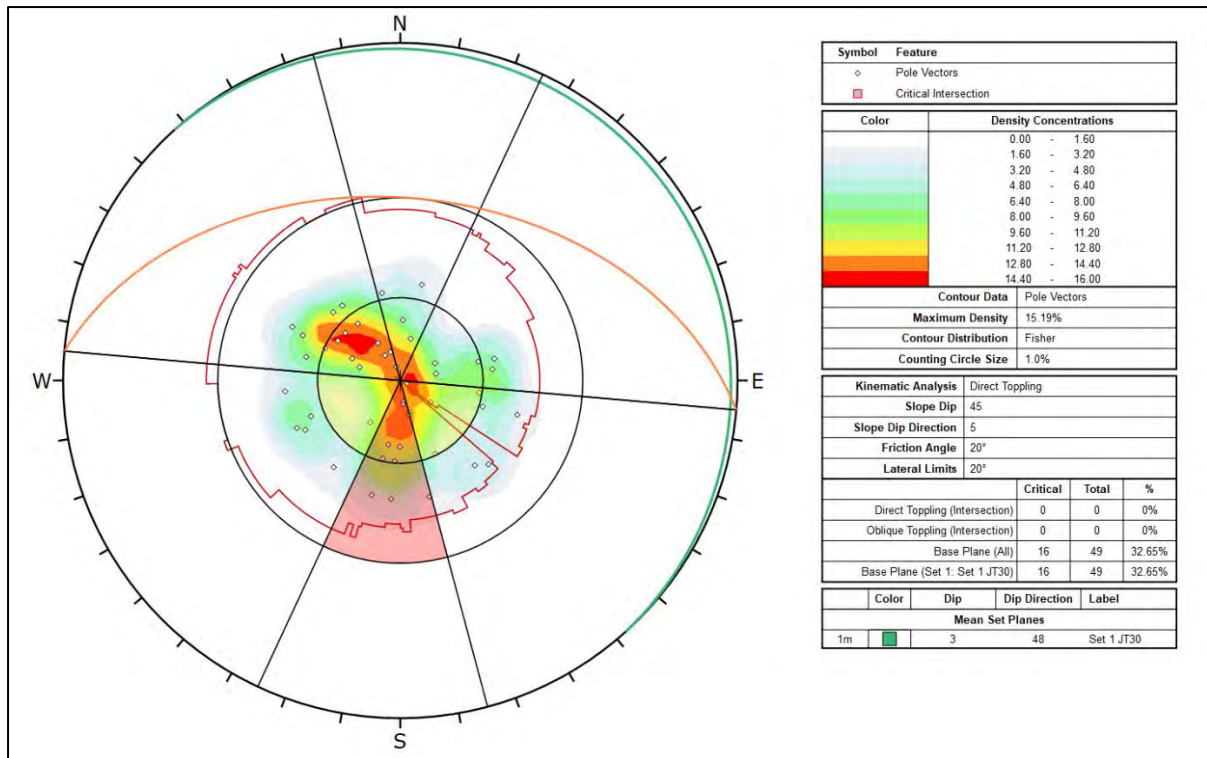


Figure C428 – Kinematic Analysis (Joints <30°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (North Wall) – Joints <30°– Bench Slope

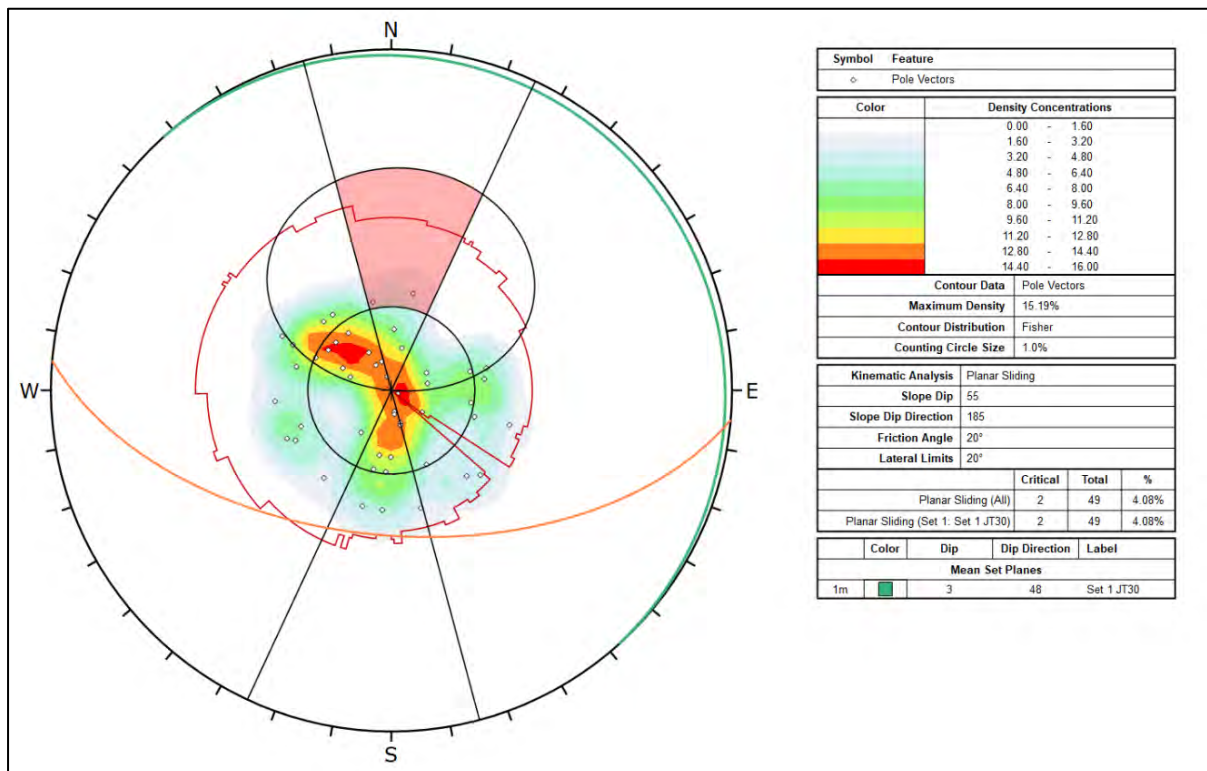


Figure C429 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (North Wall) – Planar Sliding.

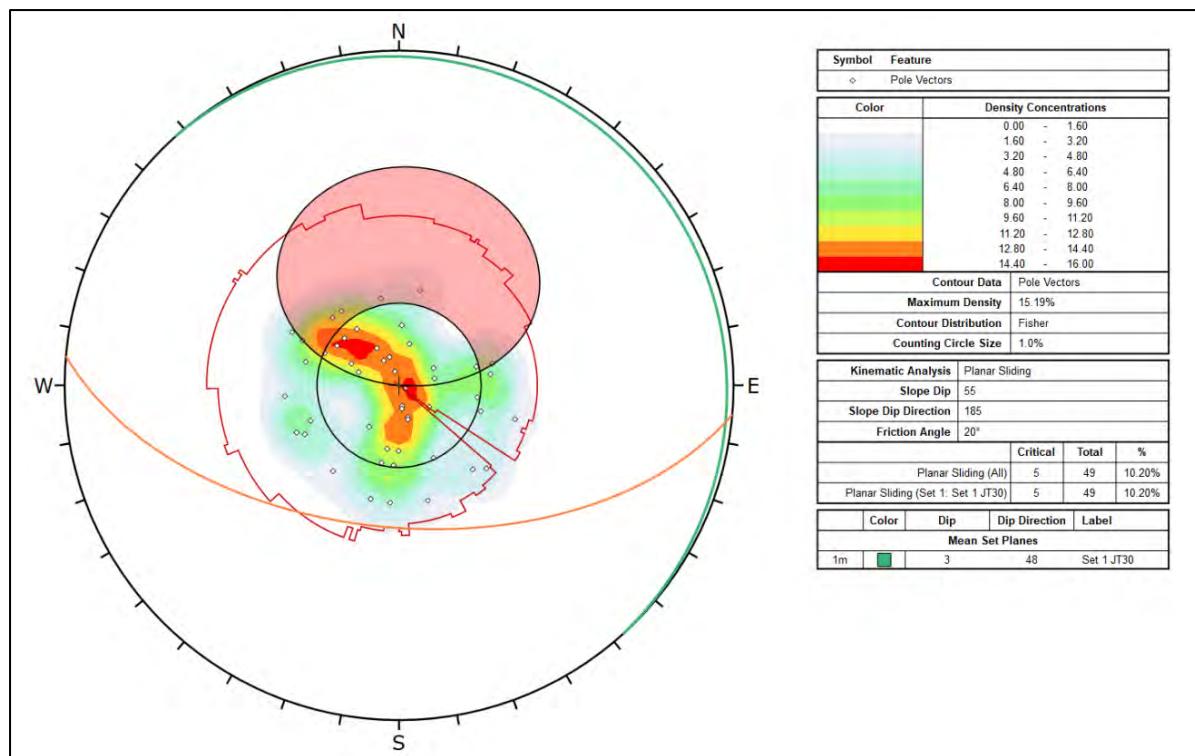


Figure C430 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (North Wall) – Planar Sliding (No Limits).

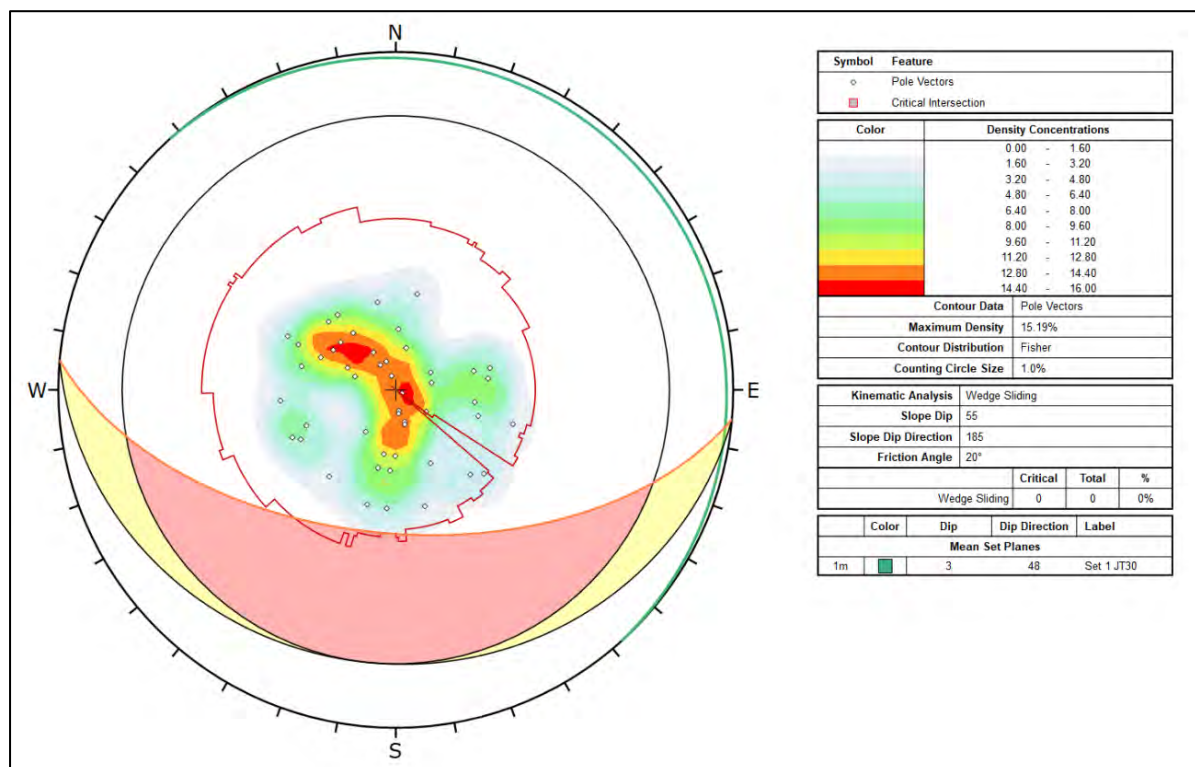


Figure C431 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (North Wall) – Wedge Sliding.

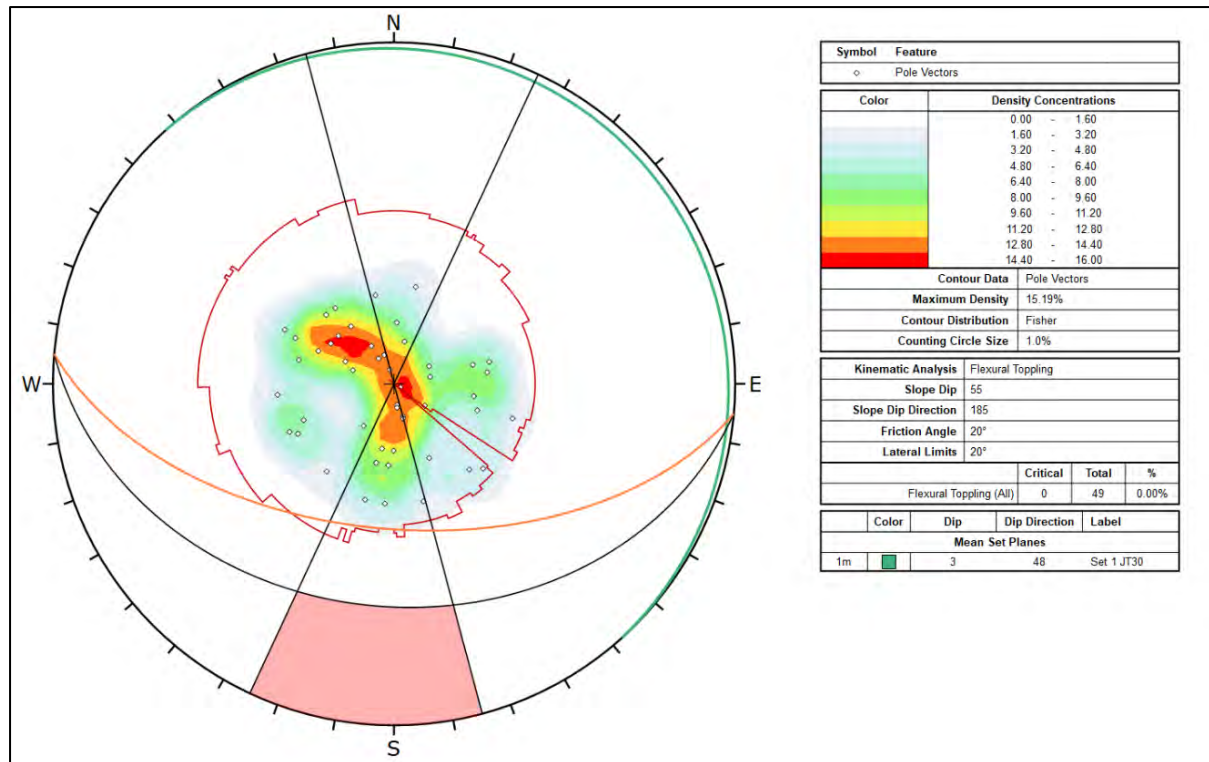


Figure C432 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (North Wall) – Flexural Toppling.

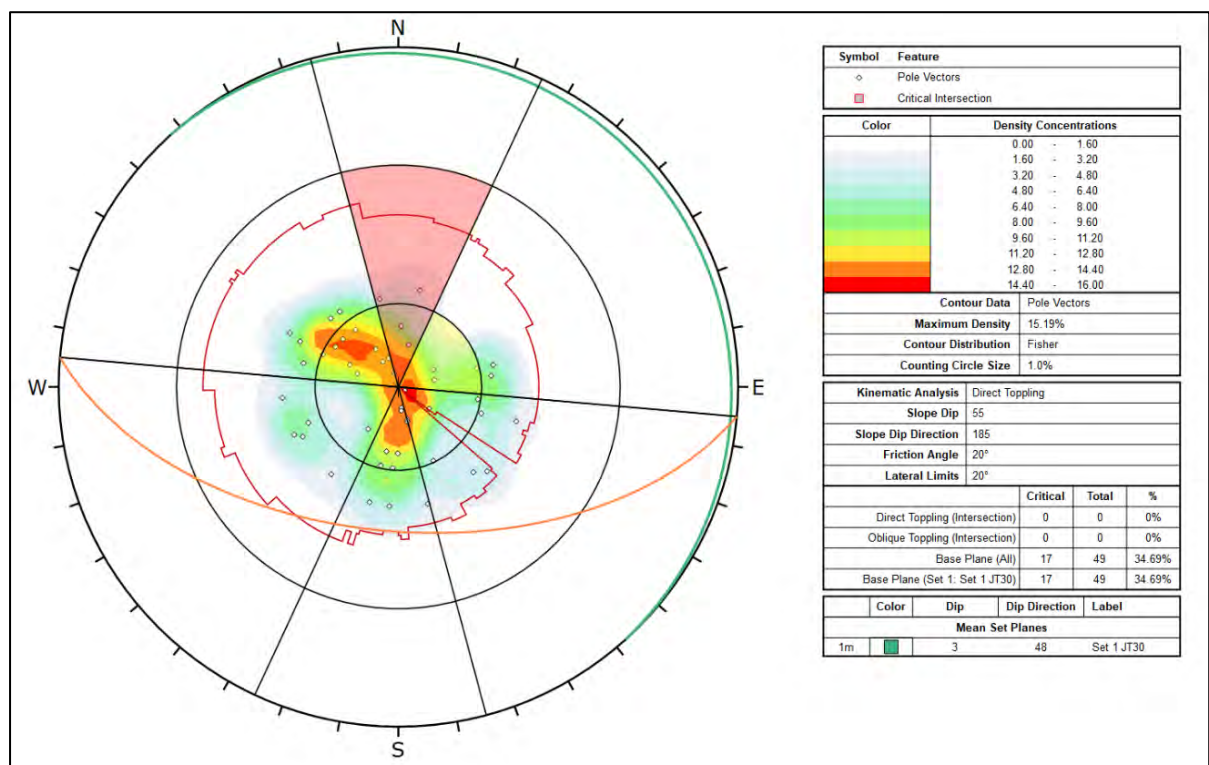


Figure C433 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints <30° – Bench Slope

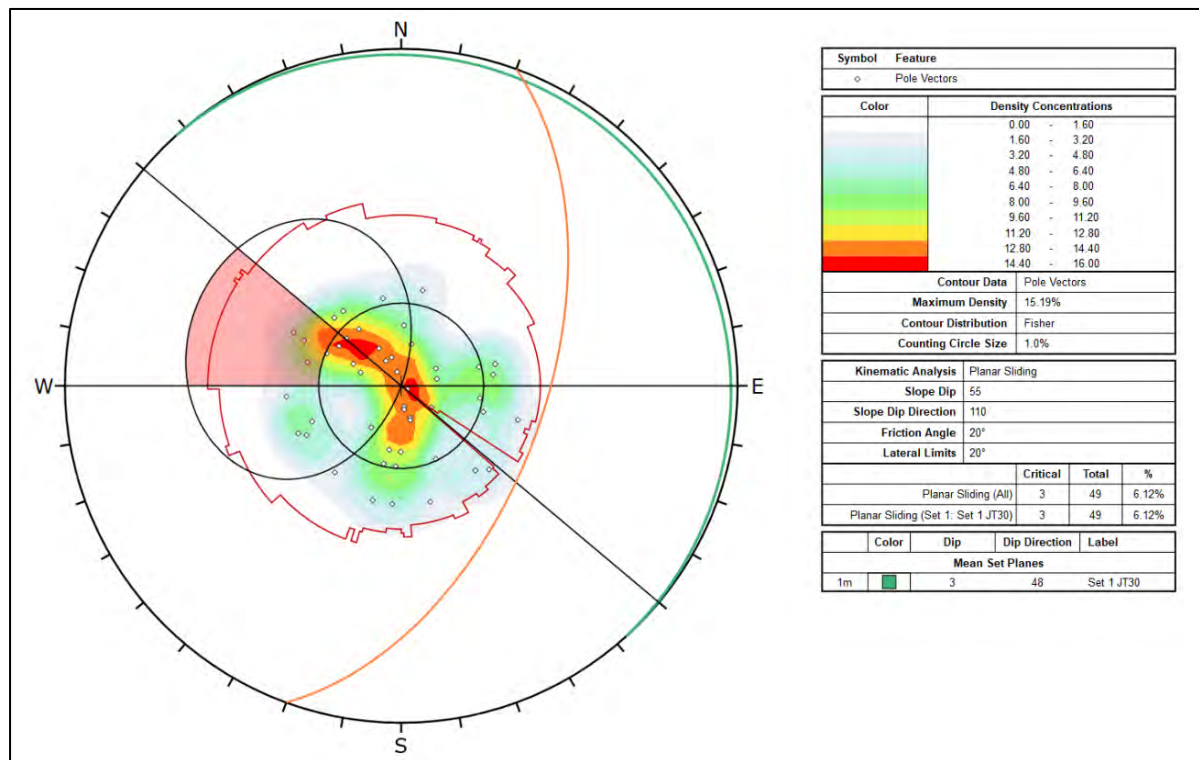


Figure C434 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (West Wall) – Planar Sliding.

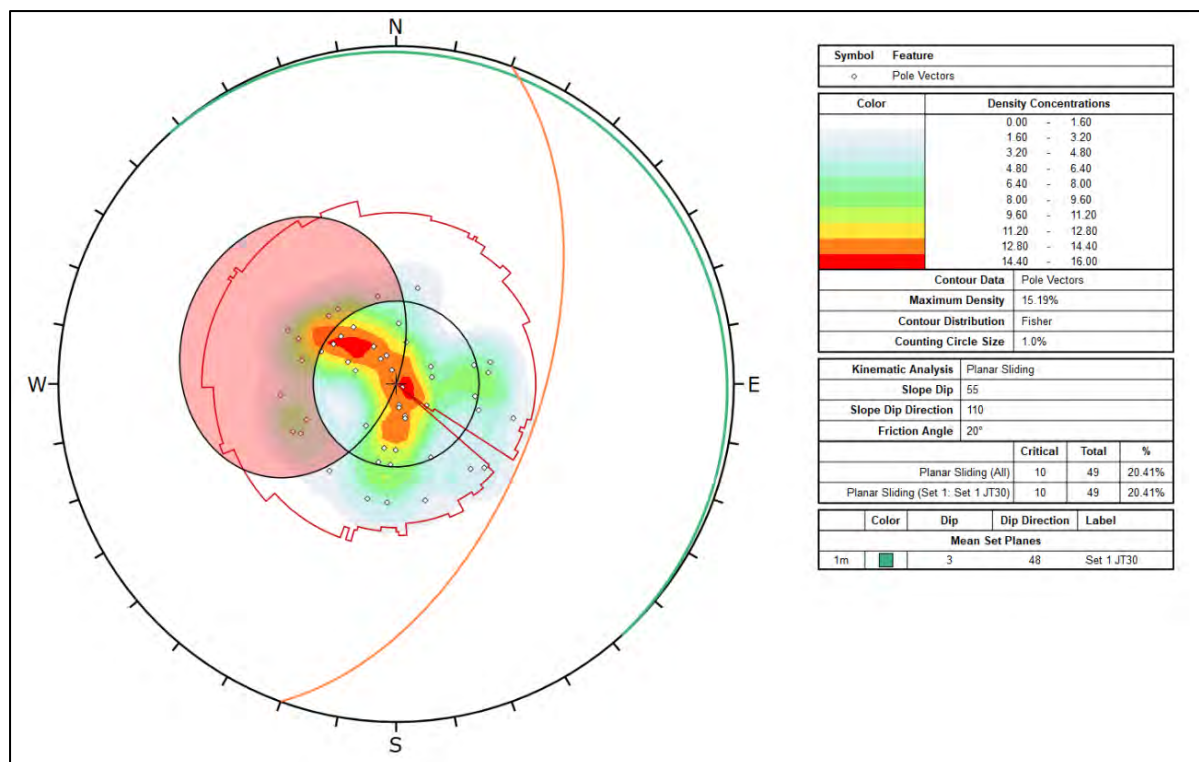


Figure C435 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

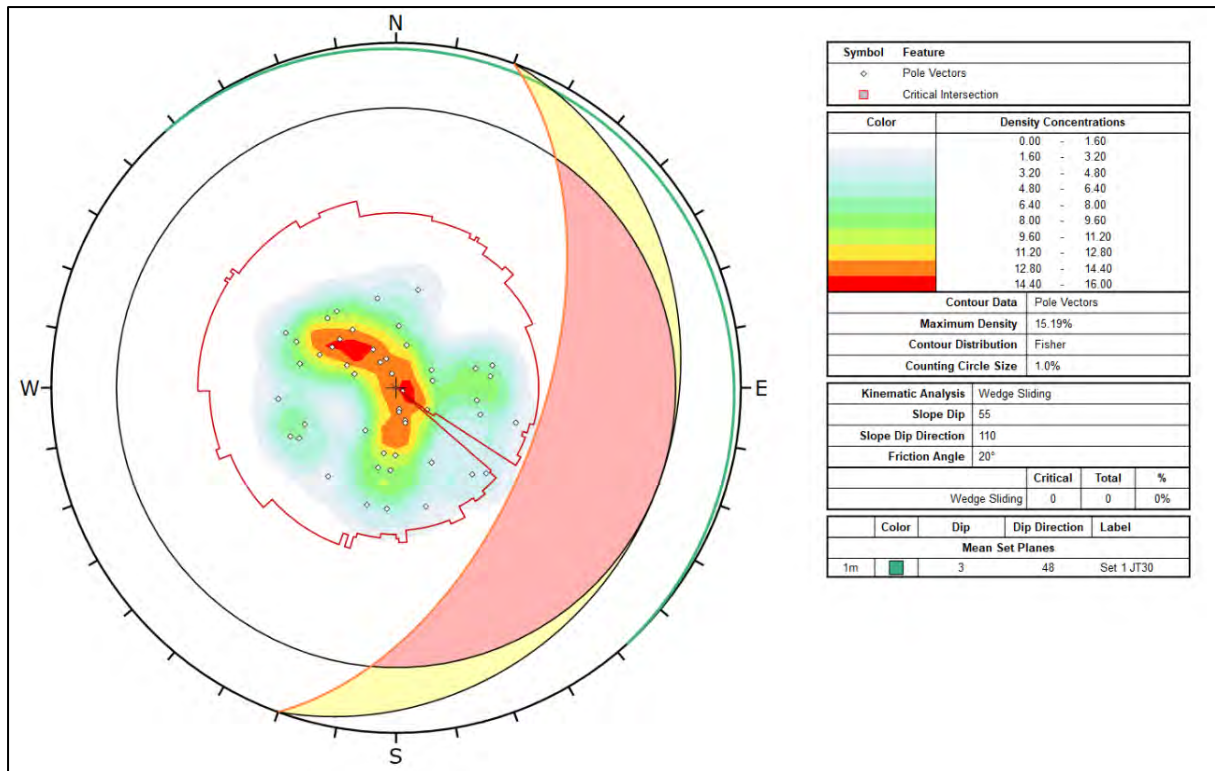


Figure C436 – Kinematic Analysis (Joints $<30^\circ$) - Bench Slope – West Sump (West Wall) – Wedge Sliding.

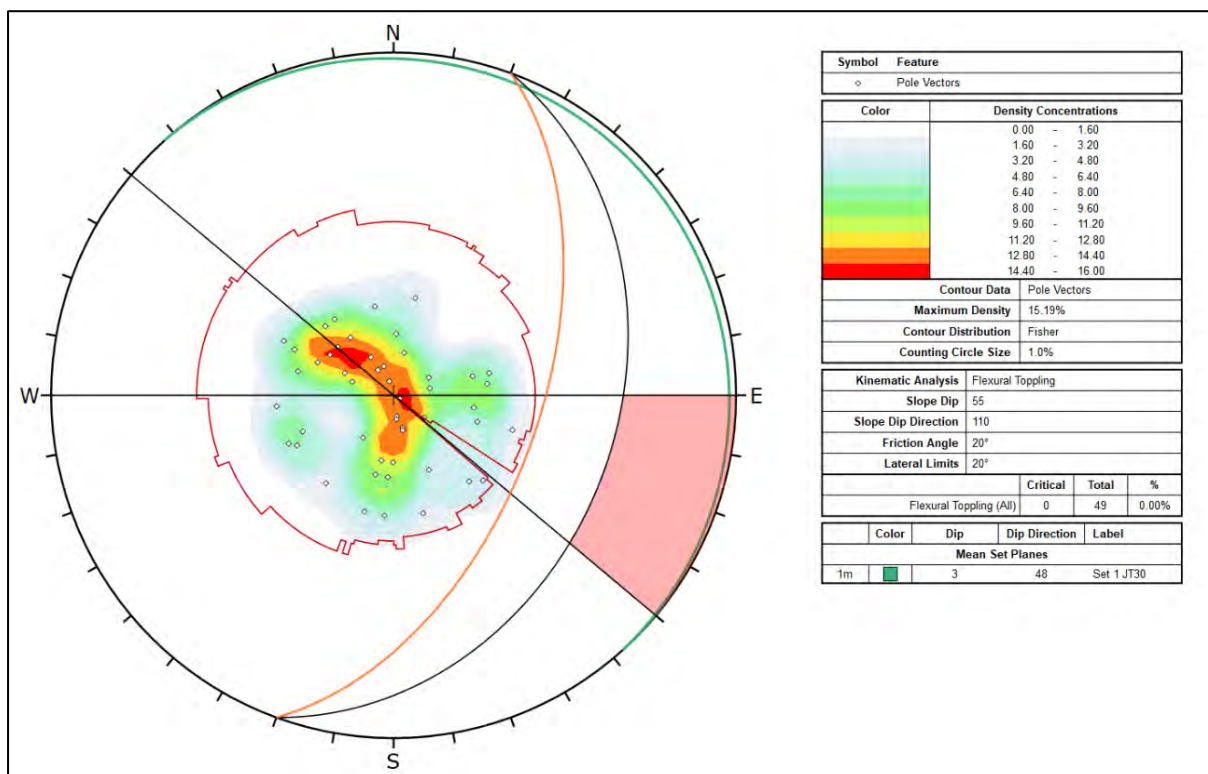


Figure C437– Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (West Wall) – Flexural Toppling.

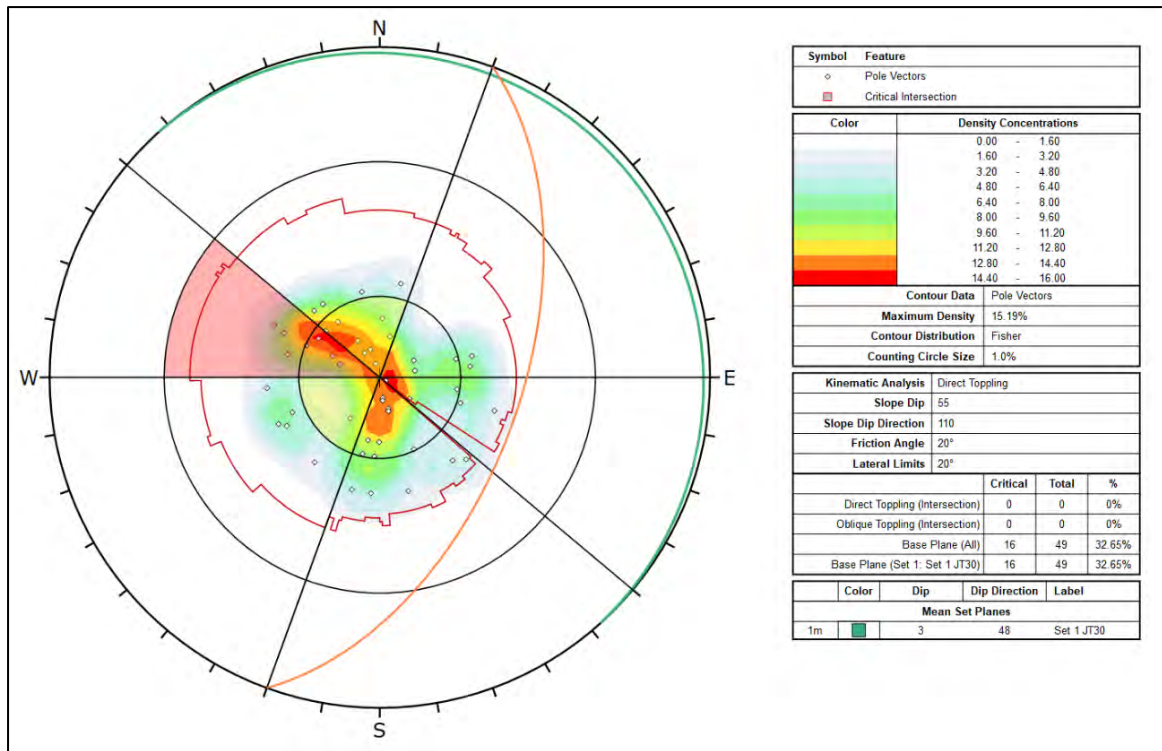


Figure C438– Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints <30°– Bench Slope

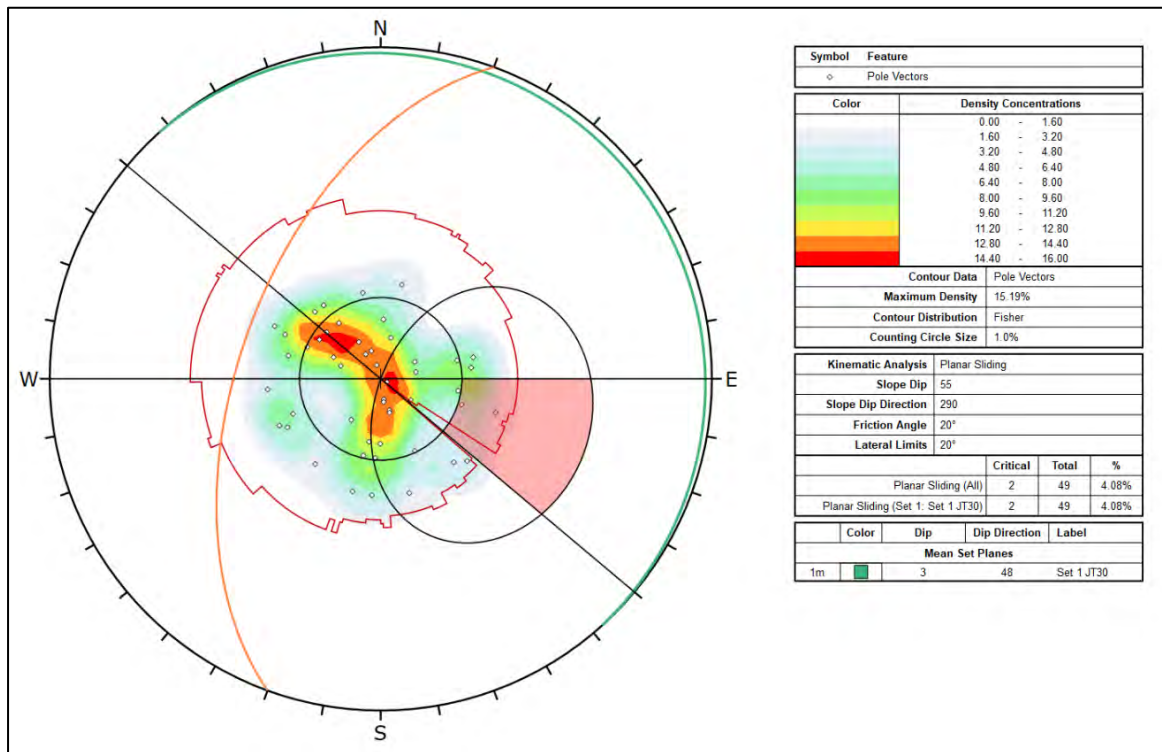


Figure C439– Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (East Wall) – Planar Sliding.

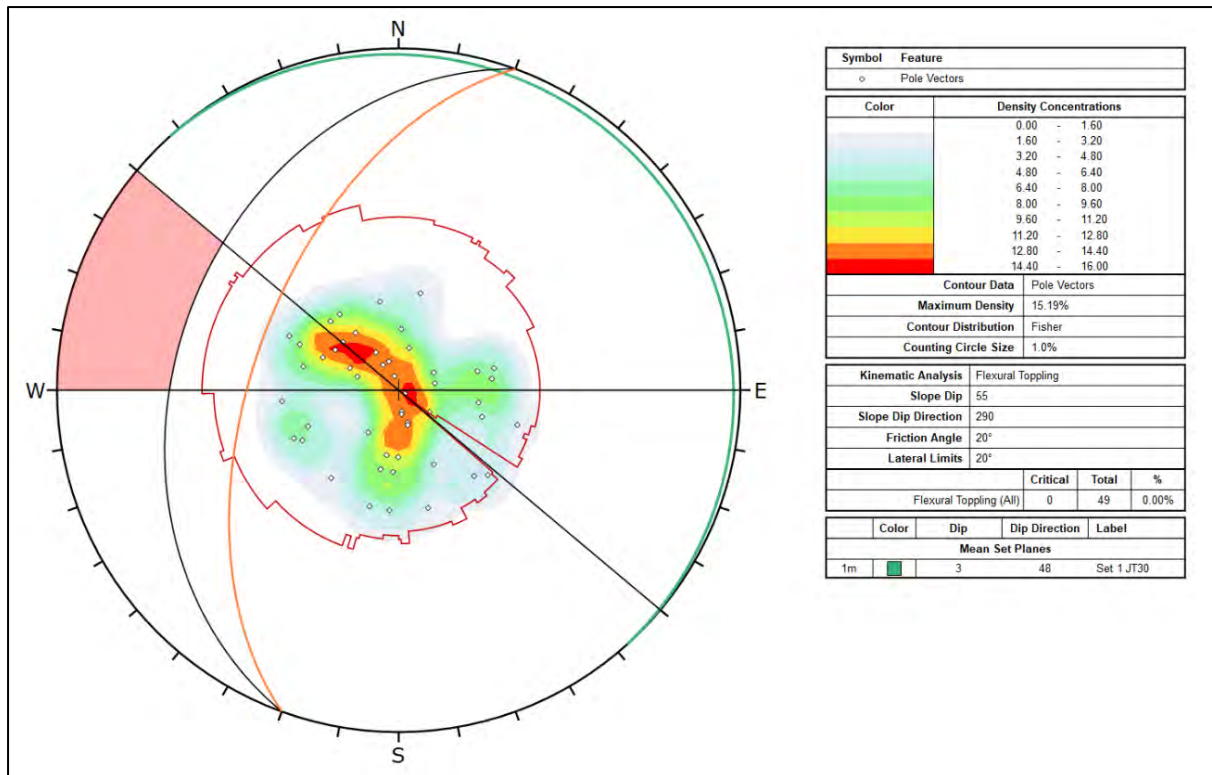


Figure C442 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (East Wall) – Flexural Toppling.

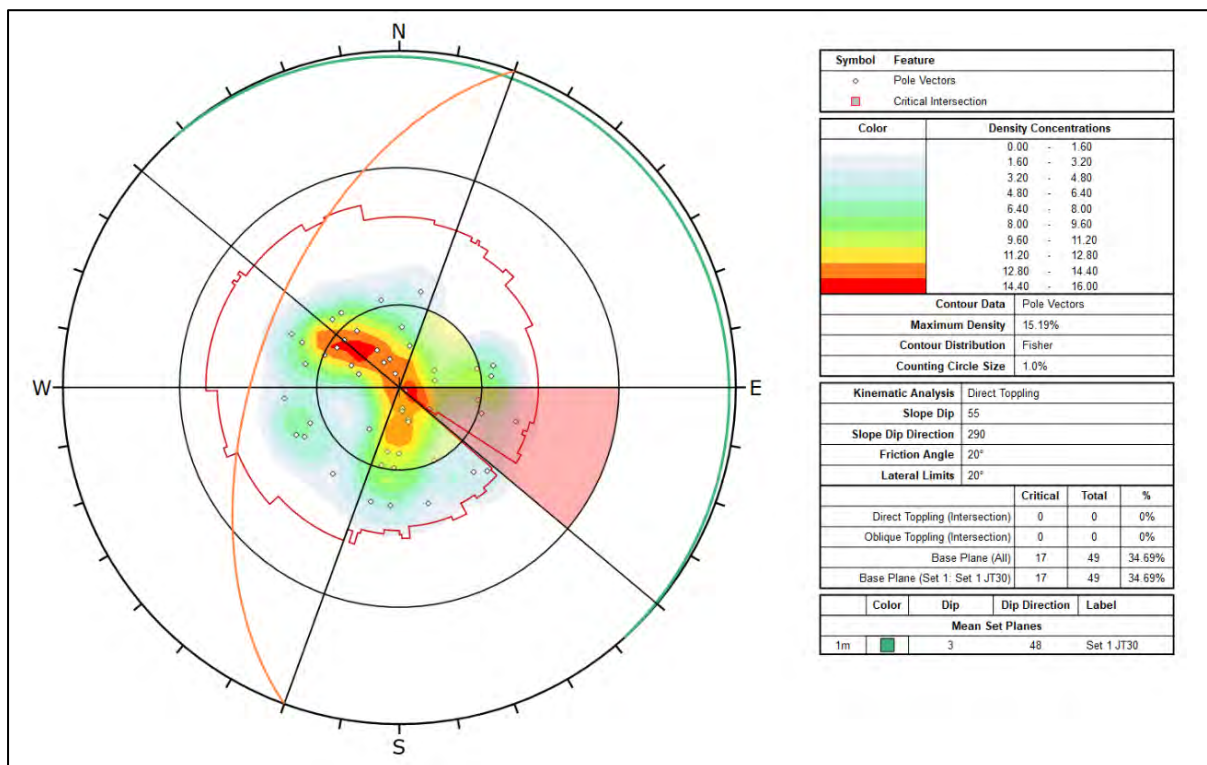


Figure C443 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Joints <30°– Bench Slope

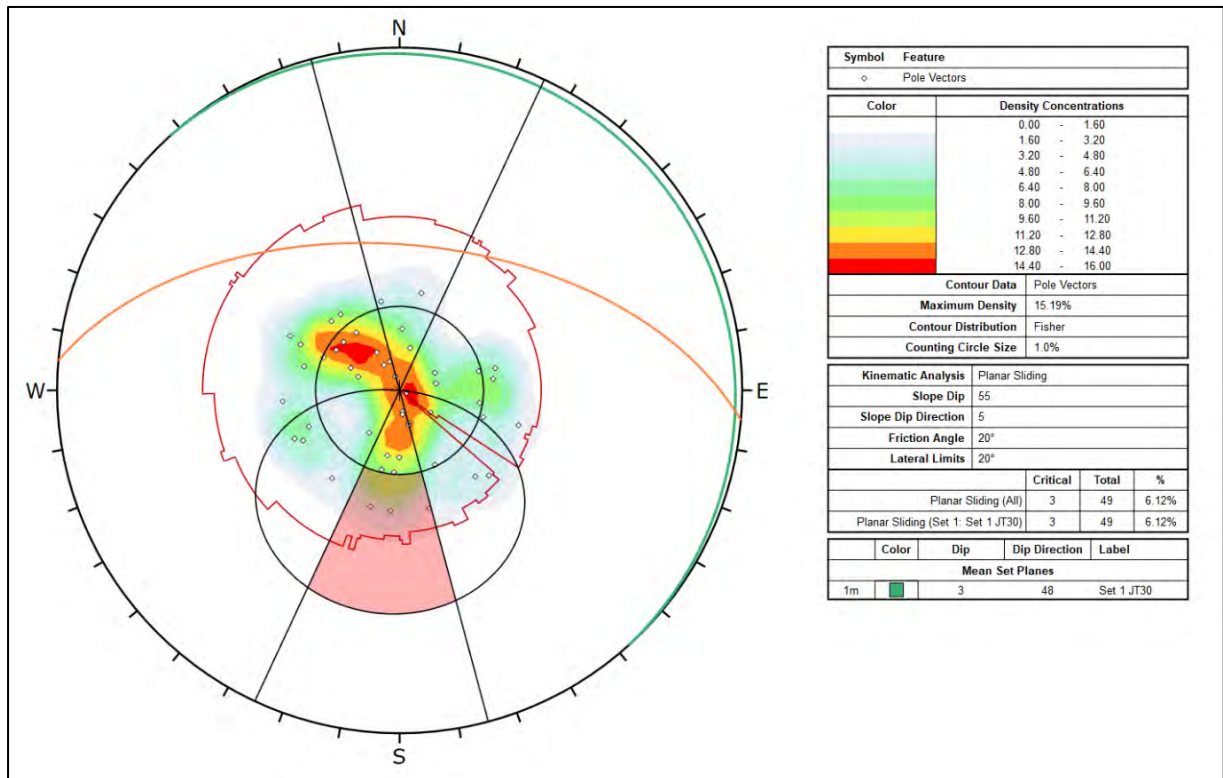


Figure C444 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (South Wall) – Planar Sliding.

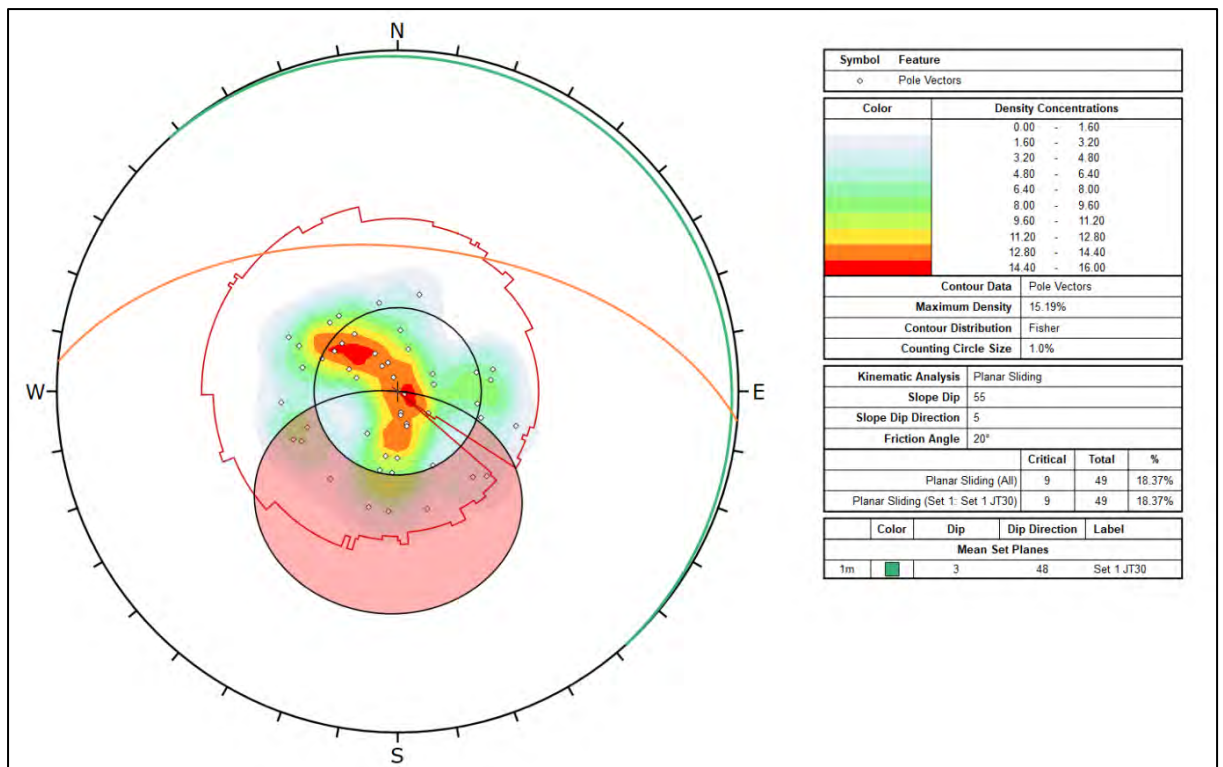
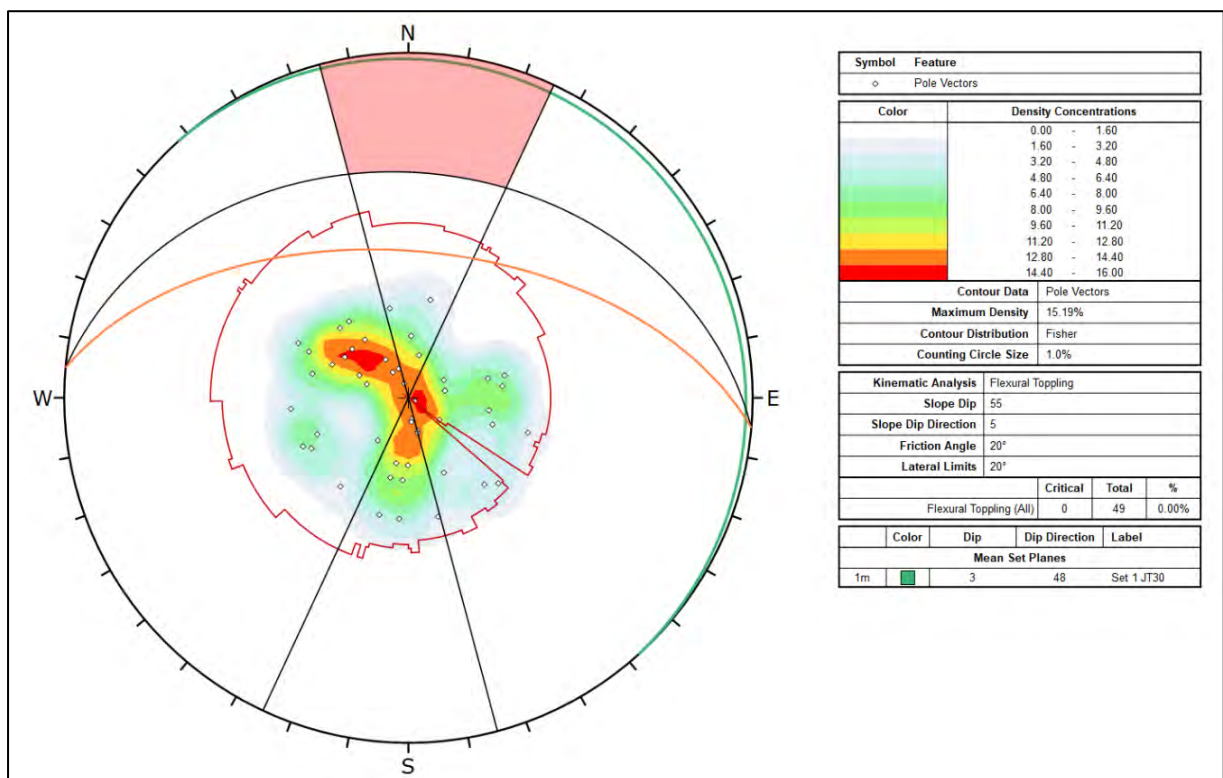
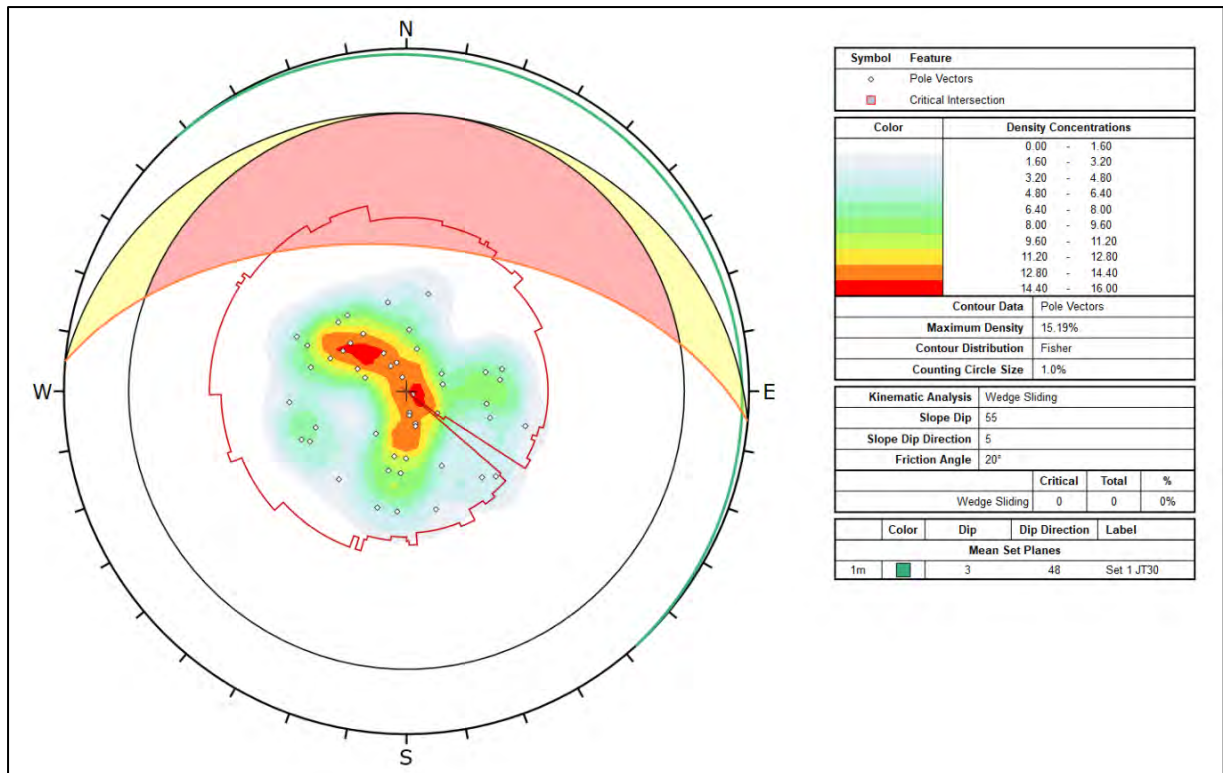


Figure C445 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).



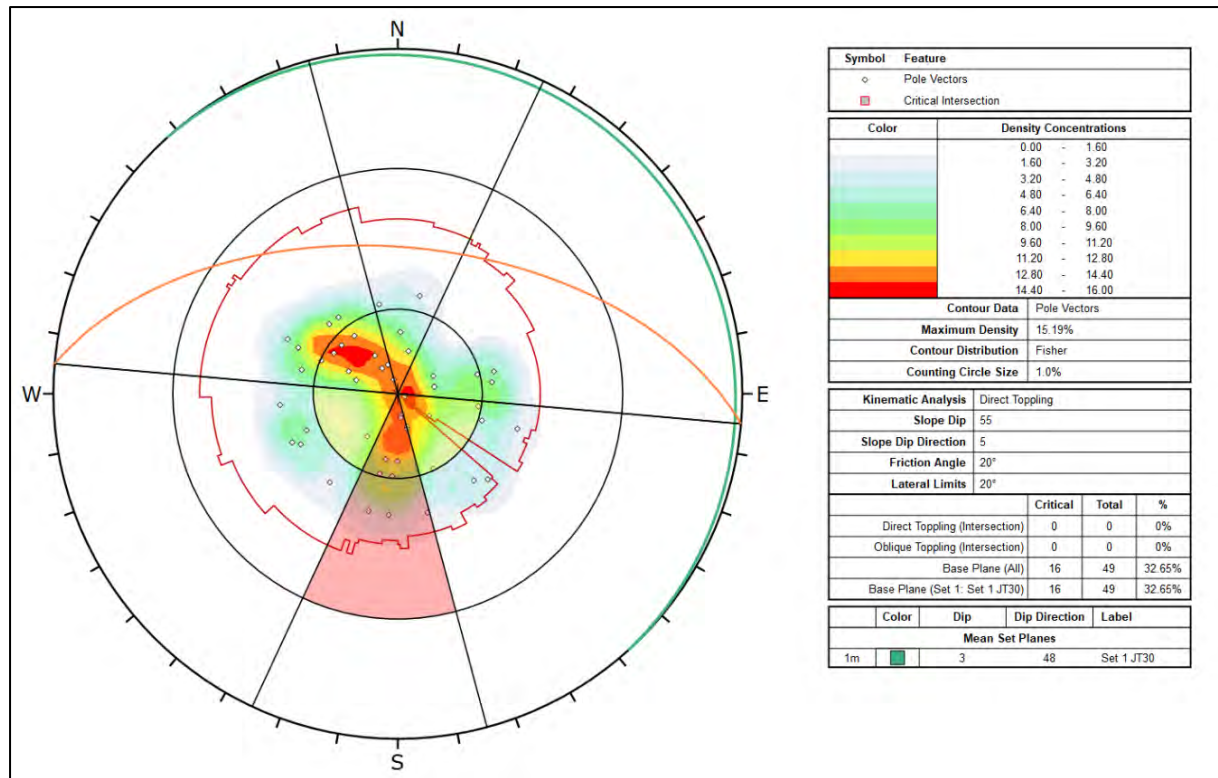


Figure C448 – Kinematic Analysis (Joints <30°) - Bench Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Joints >30°<60°– Overall Slope

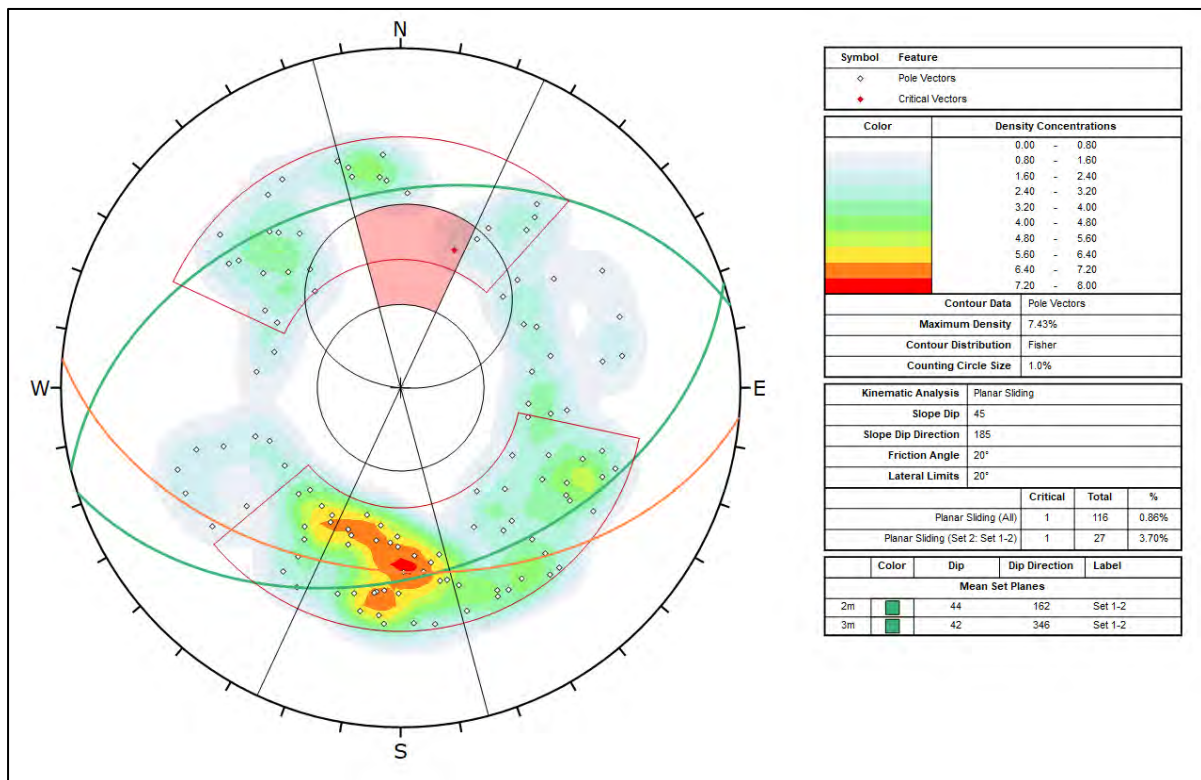


Figure C449 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (North Wall) – Planar Sliding.

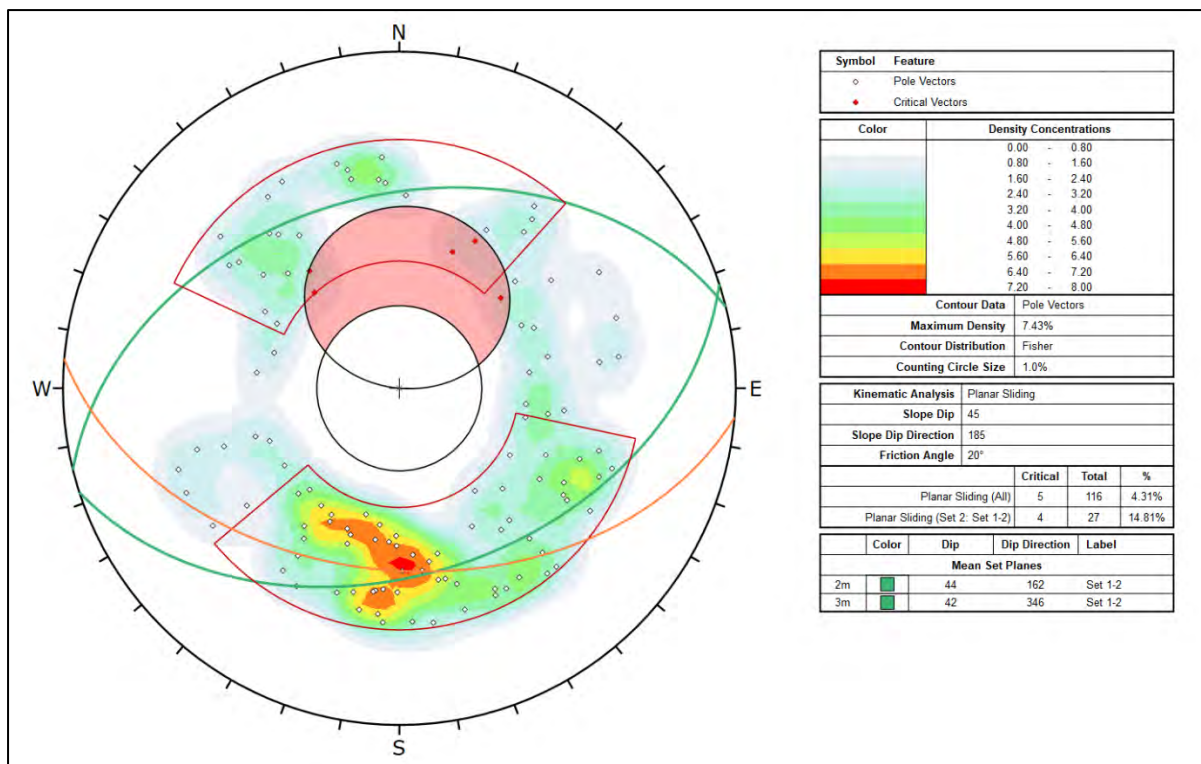


Figure C450 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (North Wall) – Planar Sliding (No Limits).

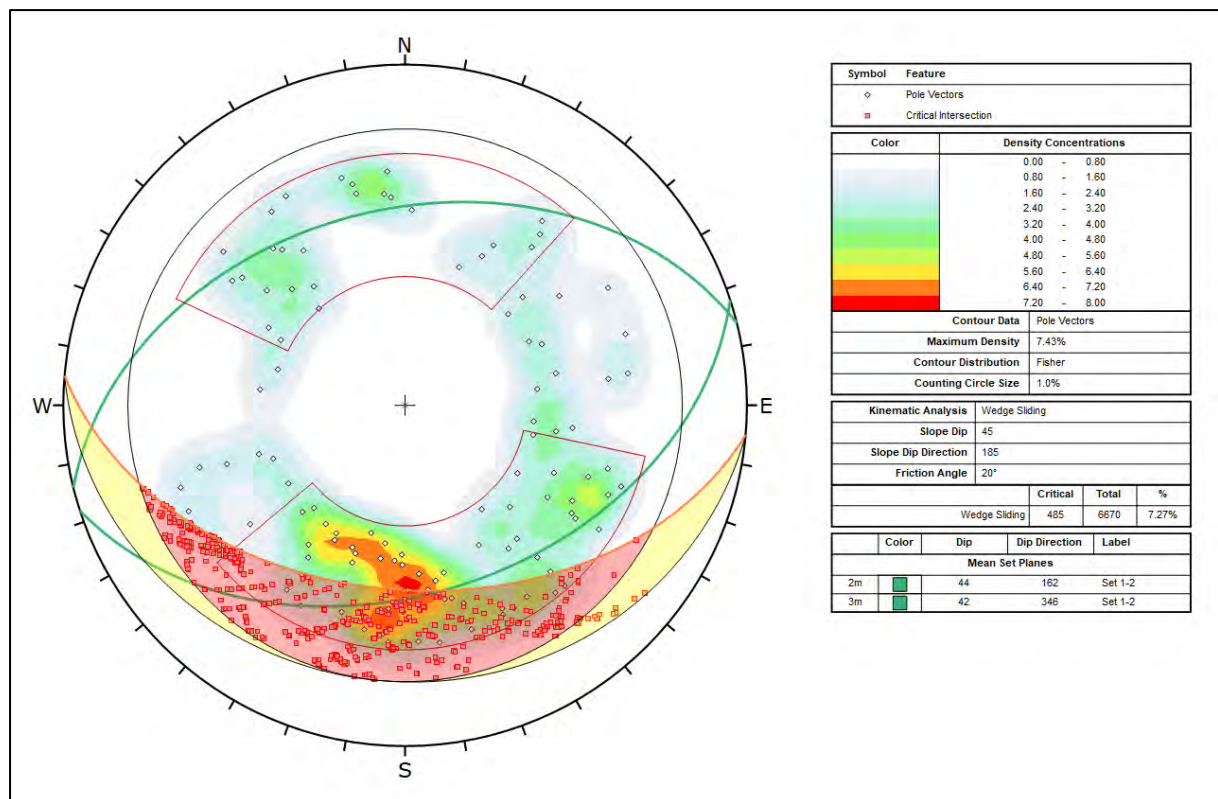


Figure C451 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (North Wall) – Wedge Sliding.

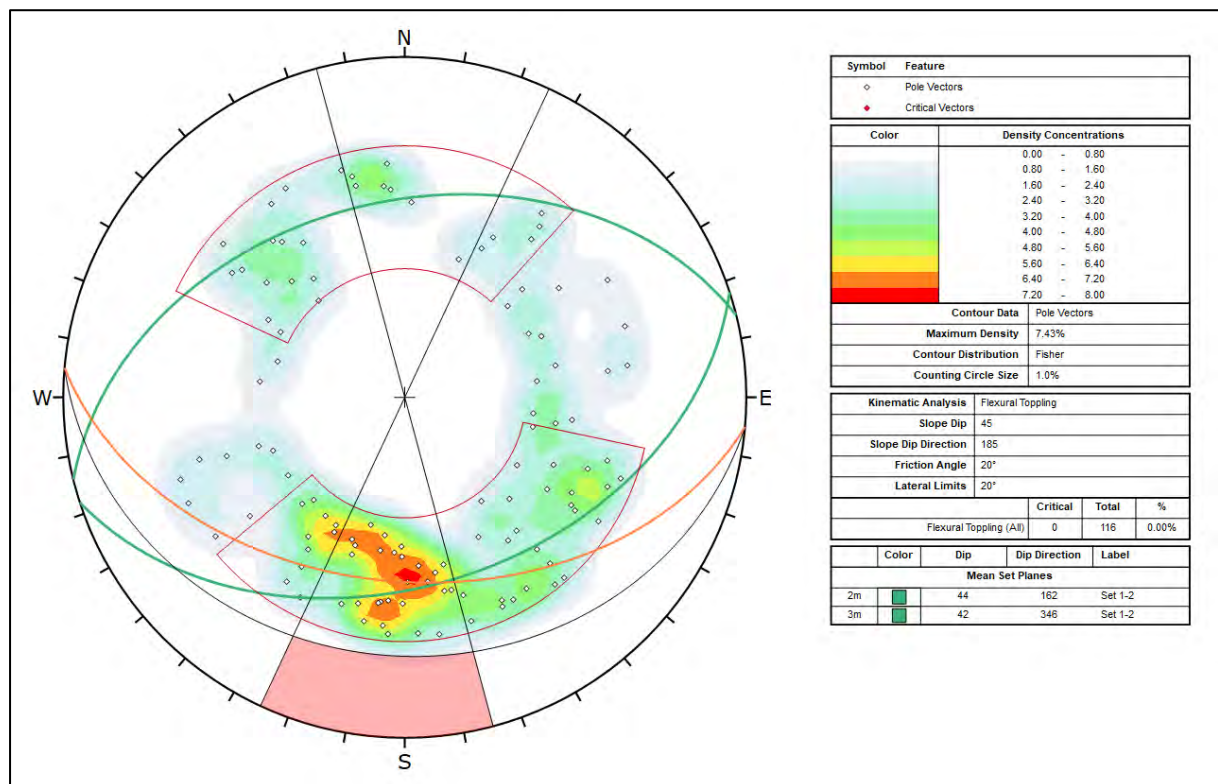


Figure C452 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (North Wall) – Flexural Toppling.

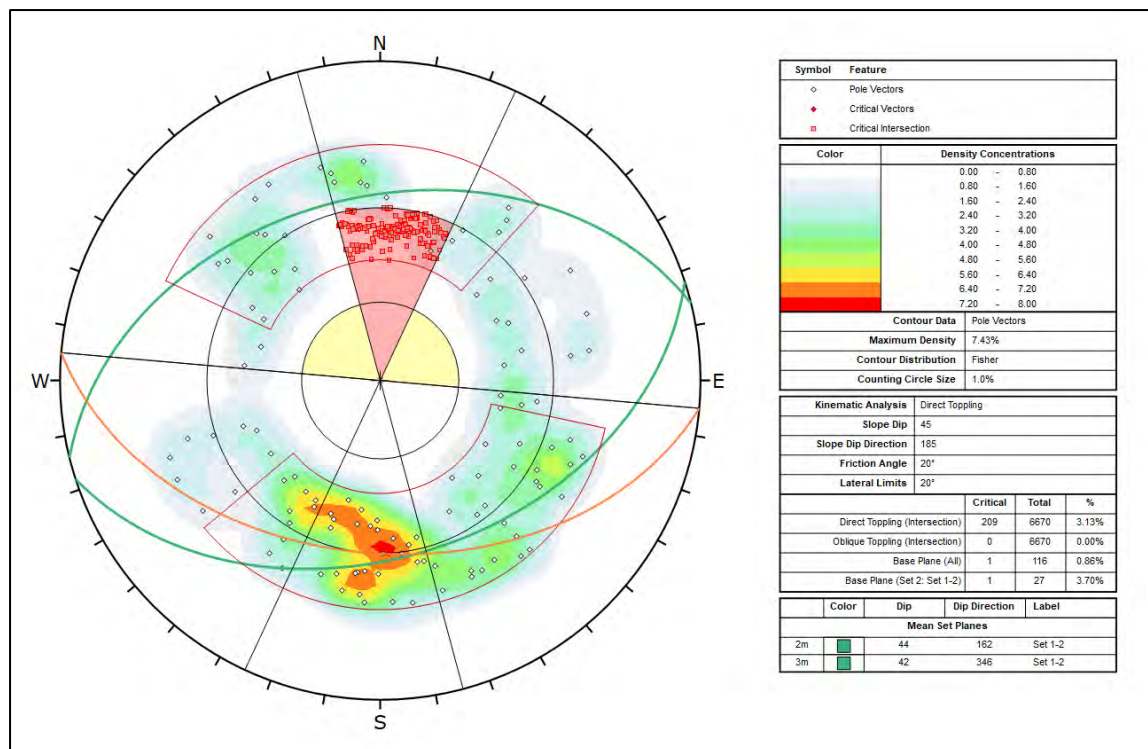


Figure C453 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints >30°<60° – Overall Slope

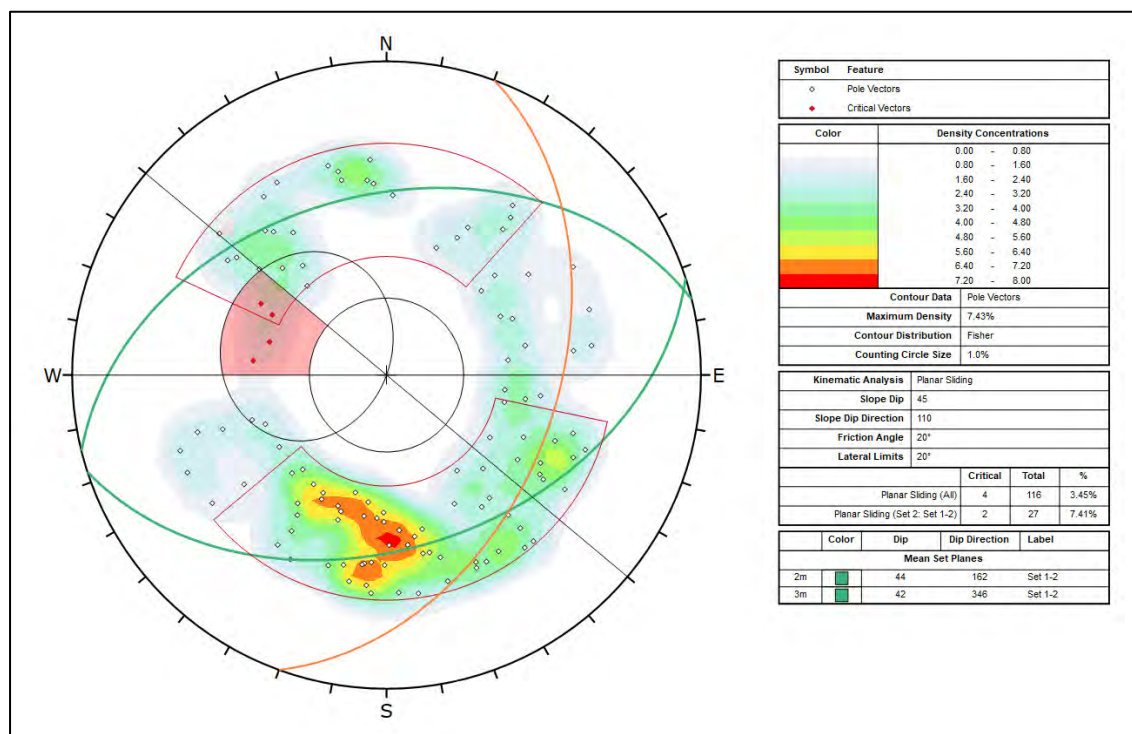


Figure C454 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (West Wall) – Planar Sliding.

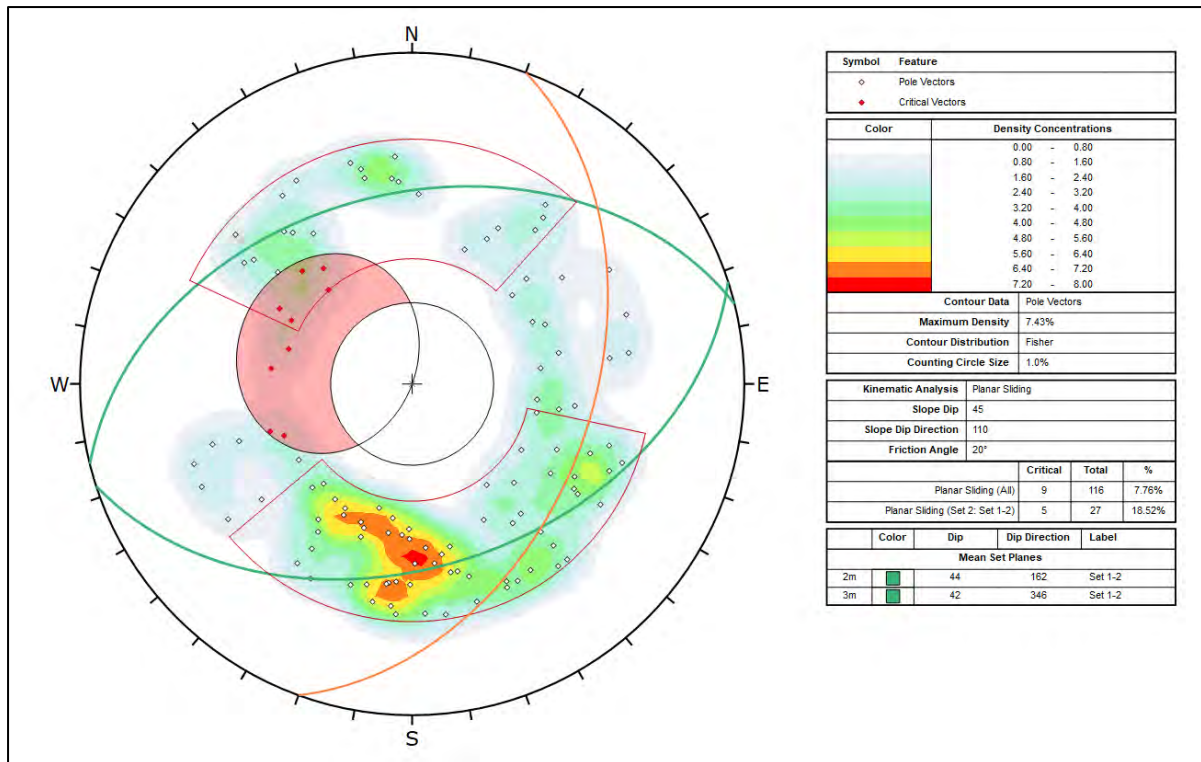


Figure C455 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (West Wall) – Planar Sliding (No Limits).

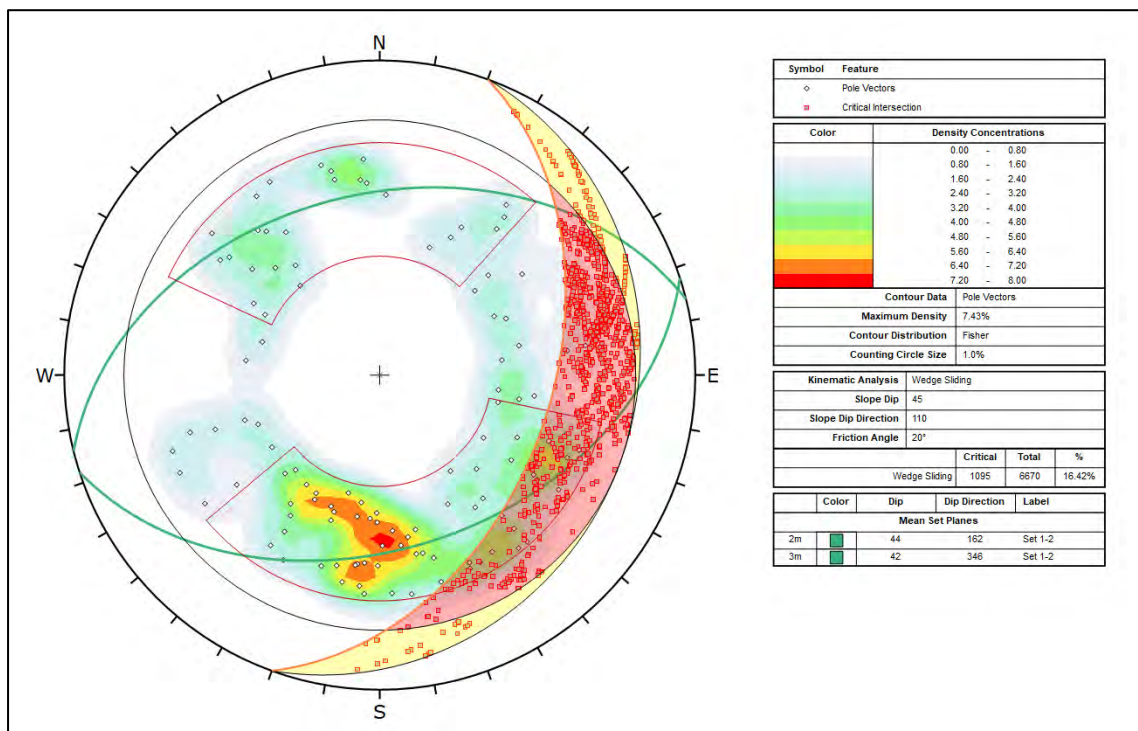


Figure C456 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (West Wall) – Wedge Sliding.

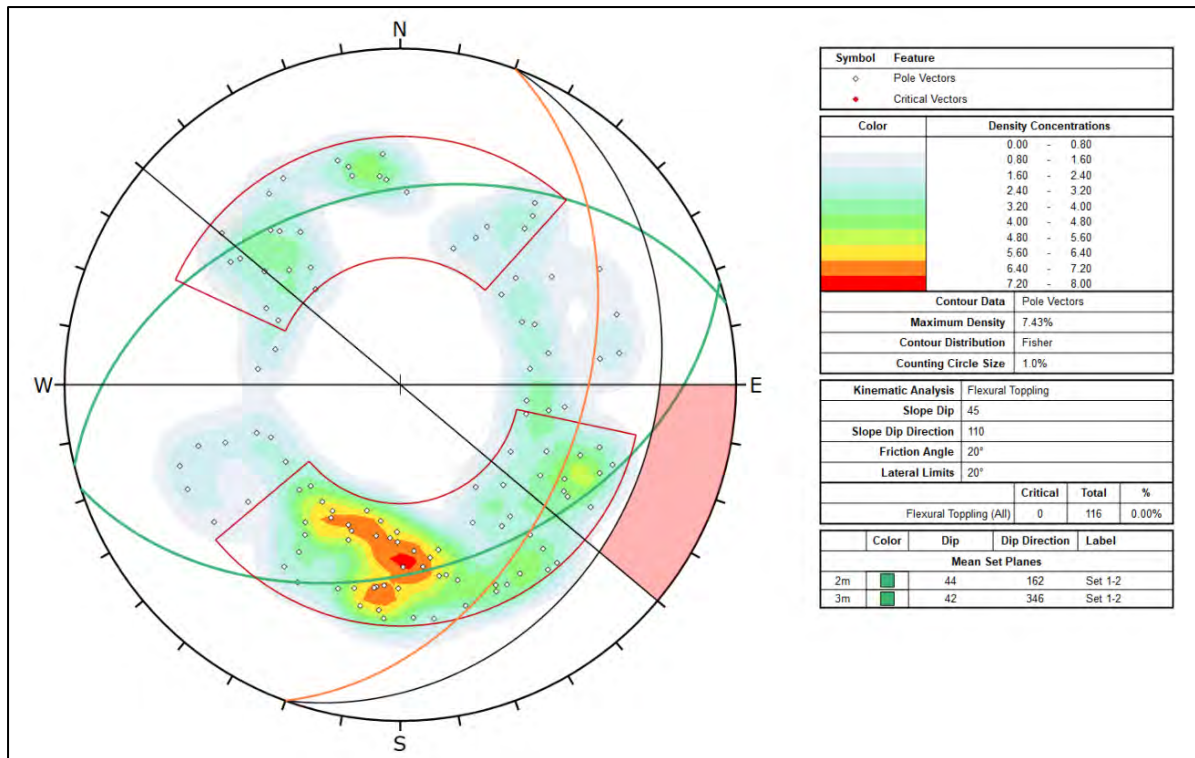


Figure C457 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (West Wall) – Flexural Toppling.

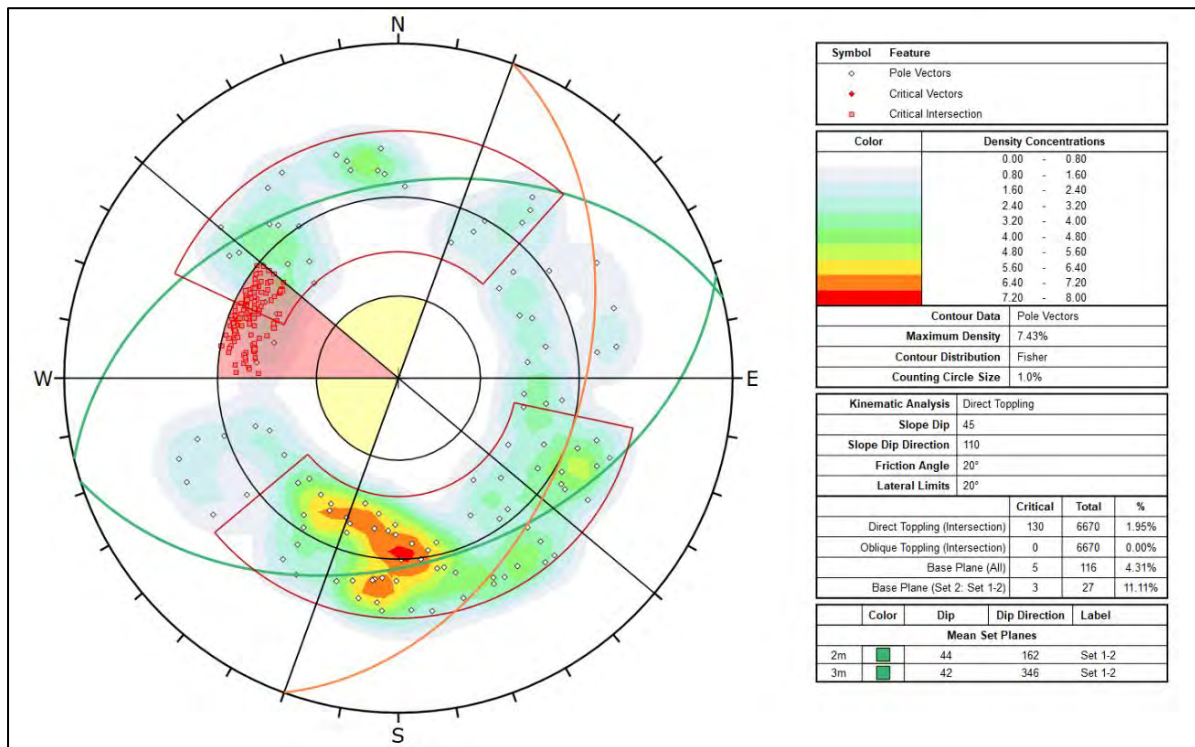


Figure C458 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints $>30^{\circ}<60^{\circ}$ – Overall Slope

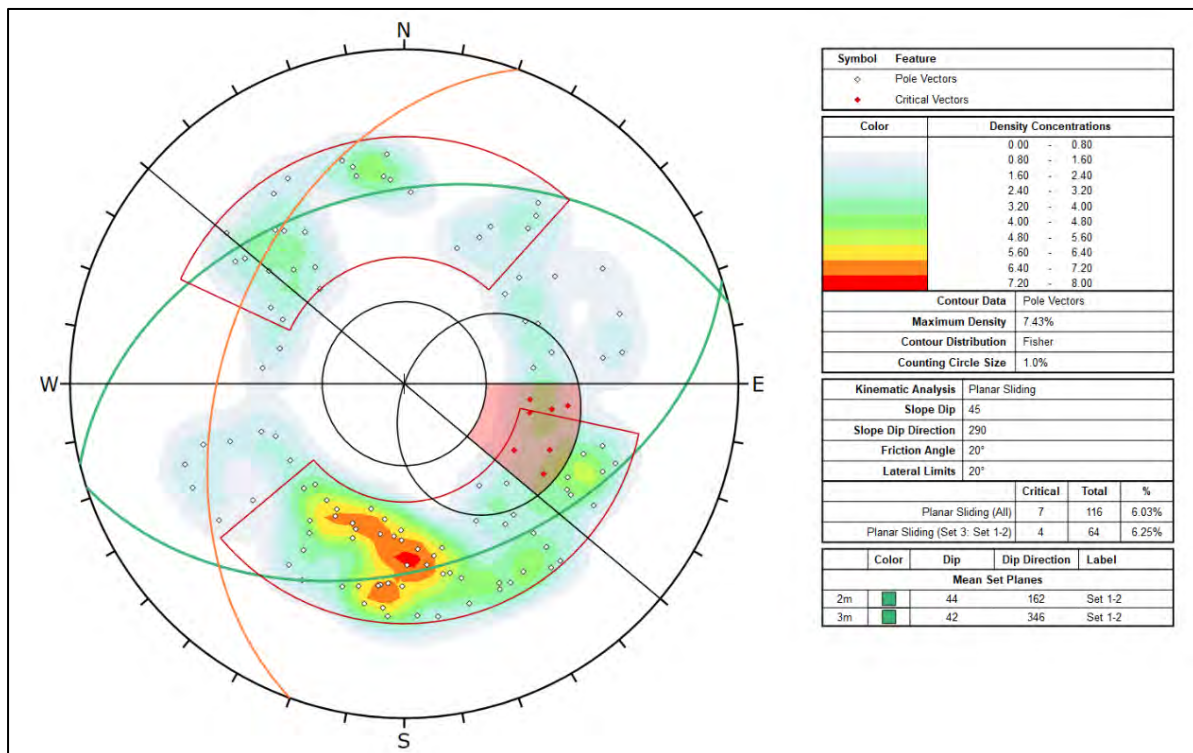


Figure C459 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (East Wall) – Planar Sliding.

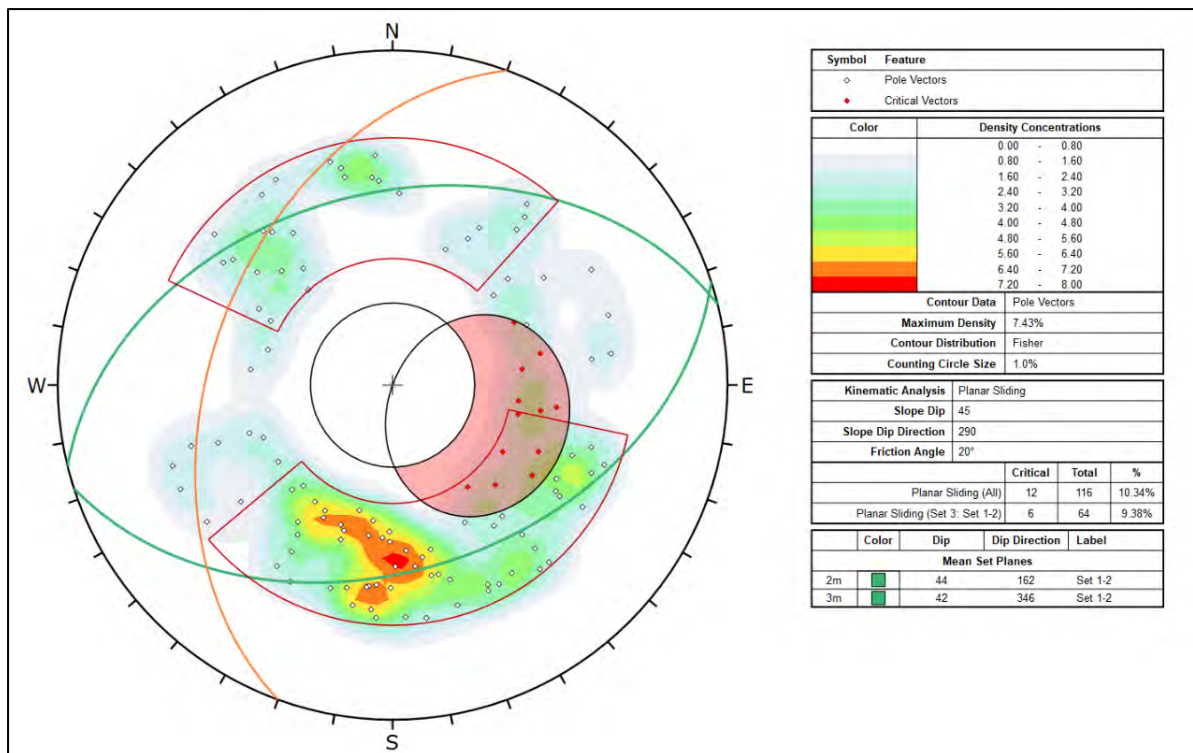


Figure C460 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (East Wall) – Planar Sliding (No limits).

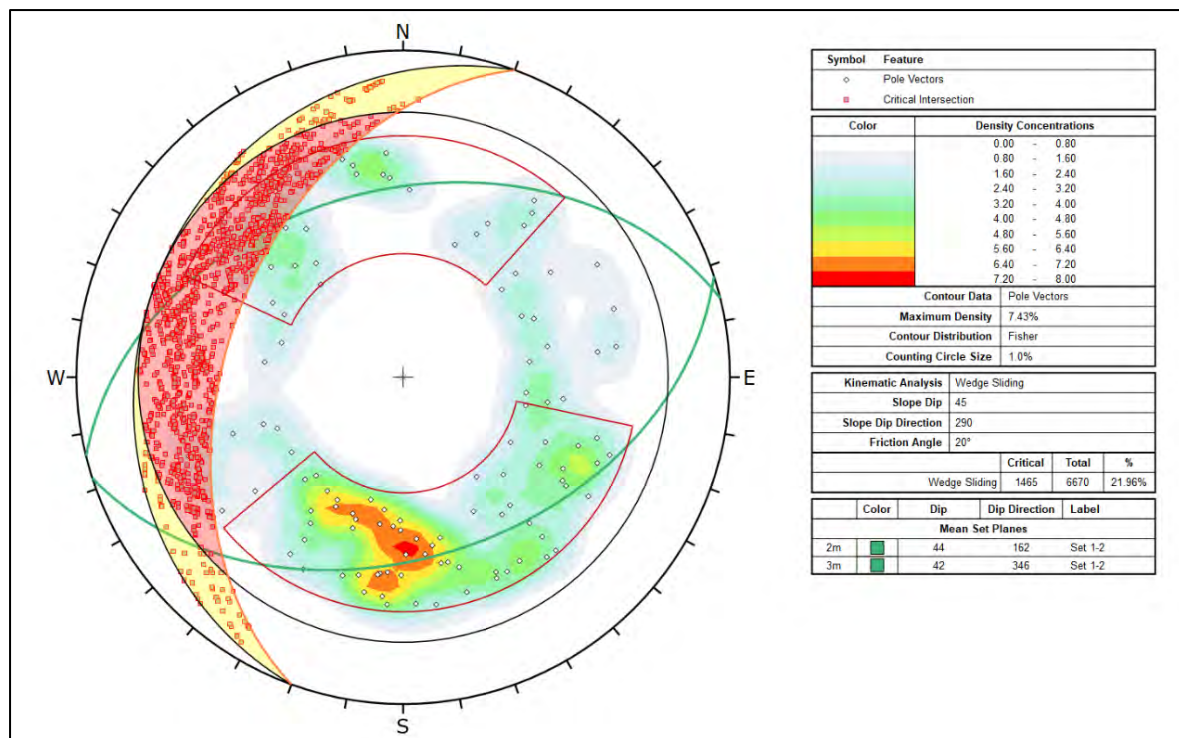


Figure C461 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (East Wall) – Wedge Sliding.

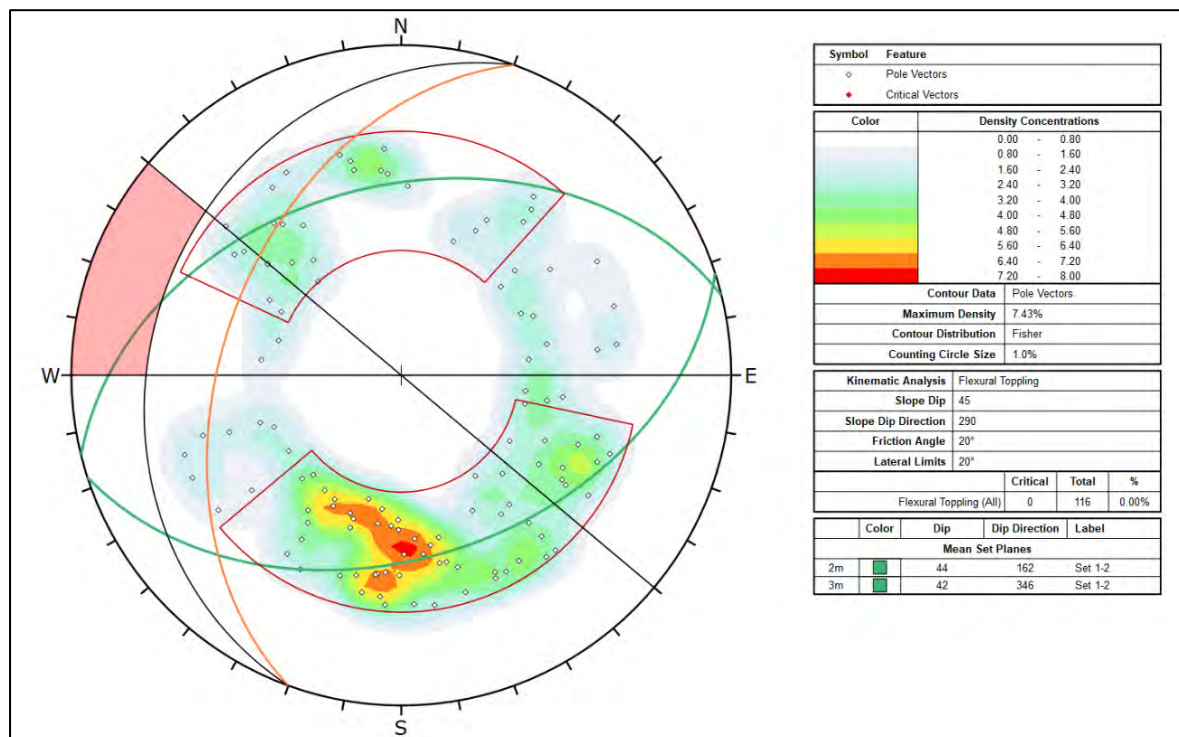


Figure C462 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

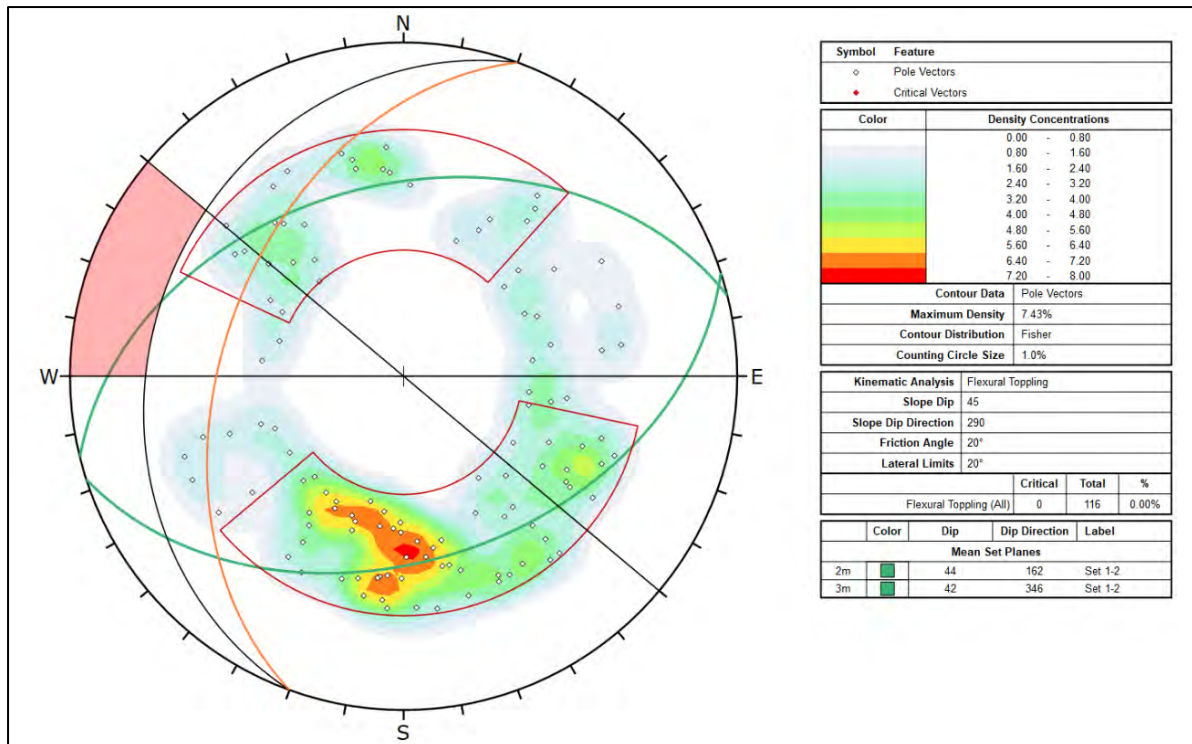
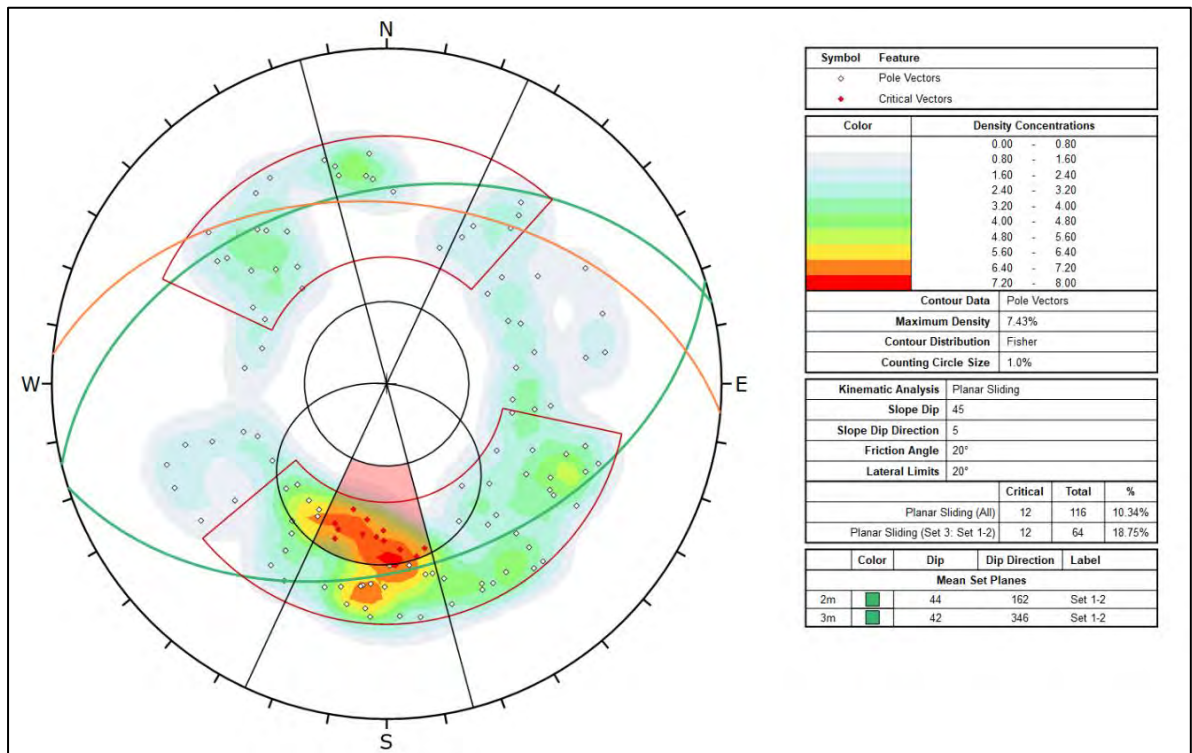


Figure C463 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

West Sump (South Wall) – Joints >30°<60°– Overall Slope



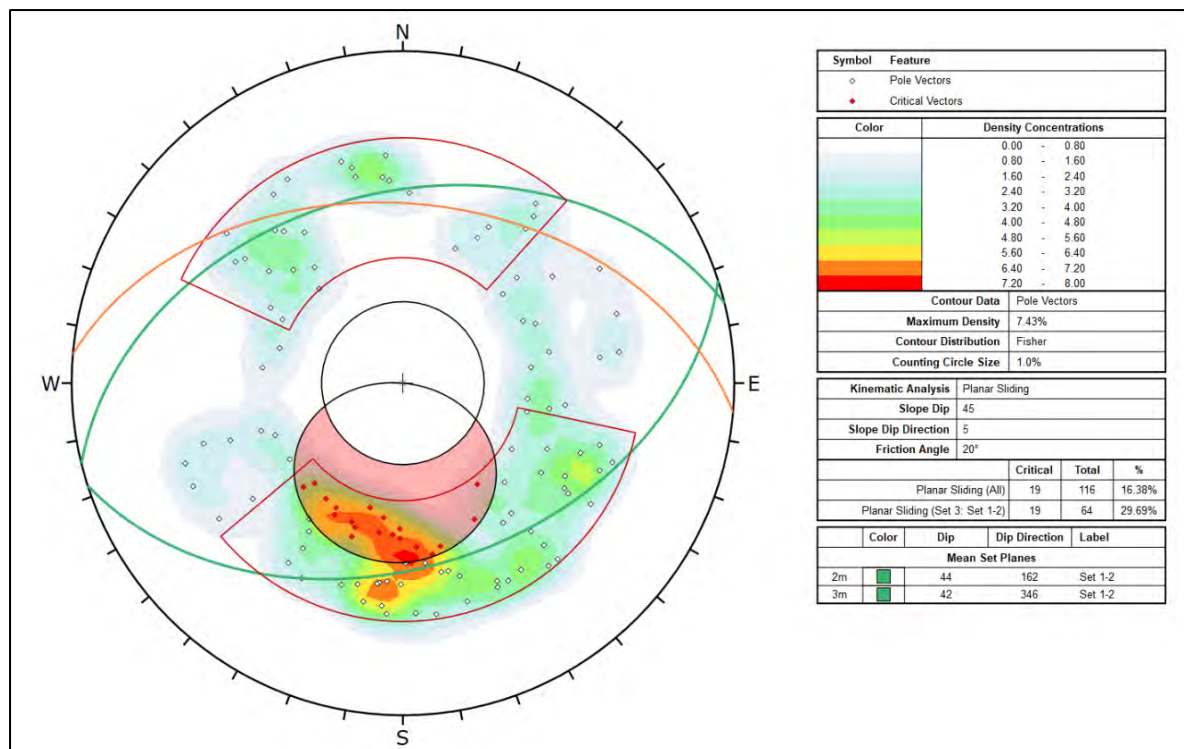


Figure C465 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (South Wall) – Planar Sliding (No Limits).

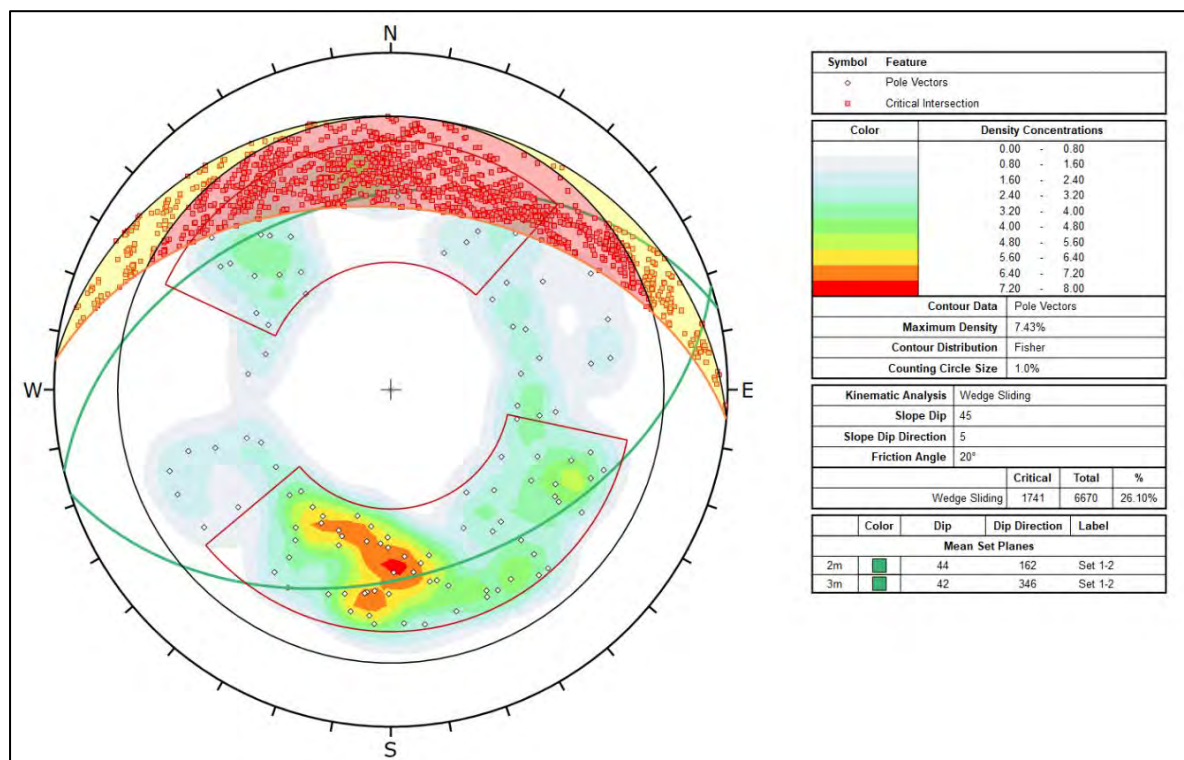


Figure C466 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (South Wall) – Wedge Sliding.

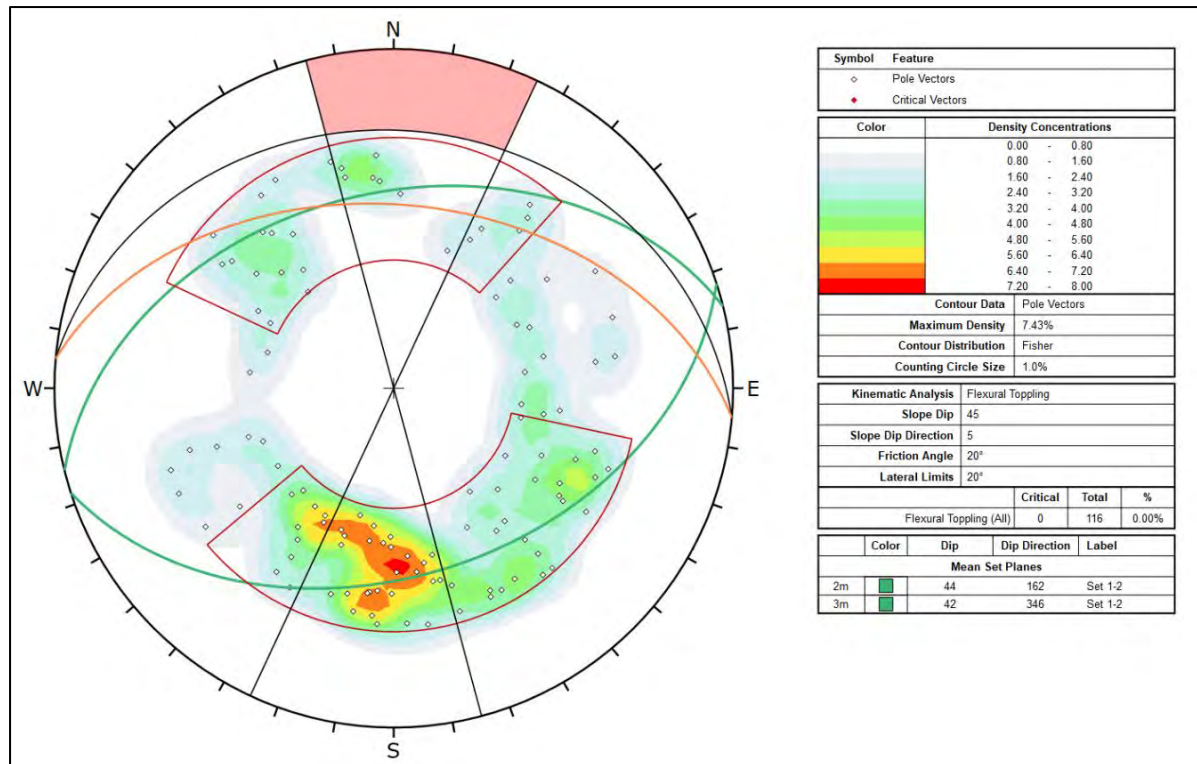


Figure C467 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (South Wall) – Flexural Toppling.

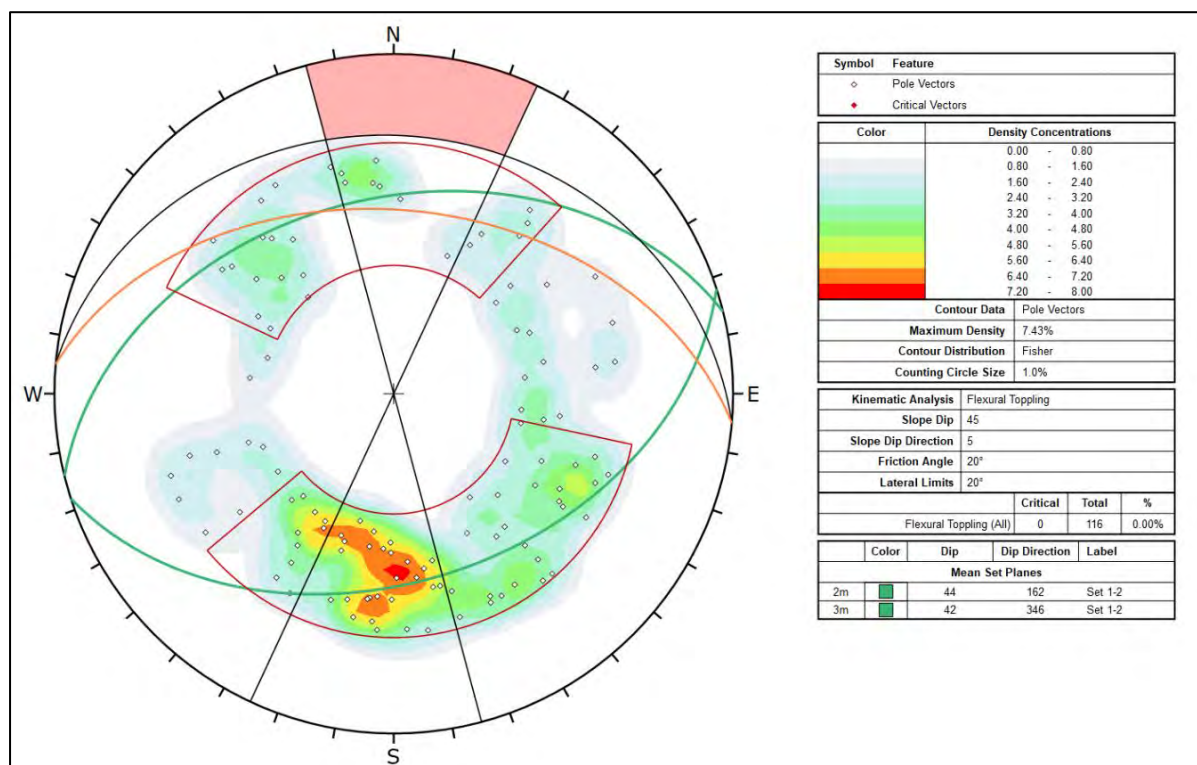


Figure C468 – Kinematic Analysis (Joints >30°<60°) - Overall Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Joints $>30^{\circ}<60^{\circ}$ – Bench Slope

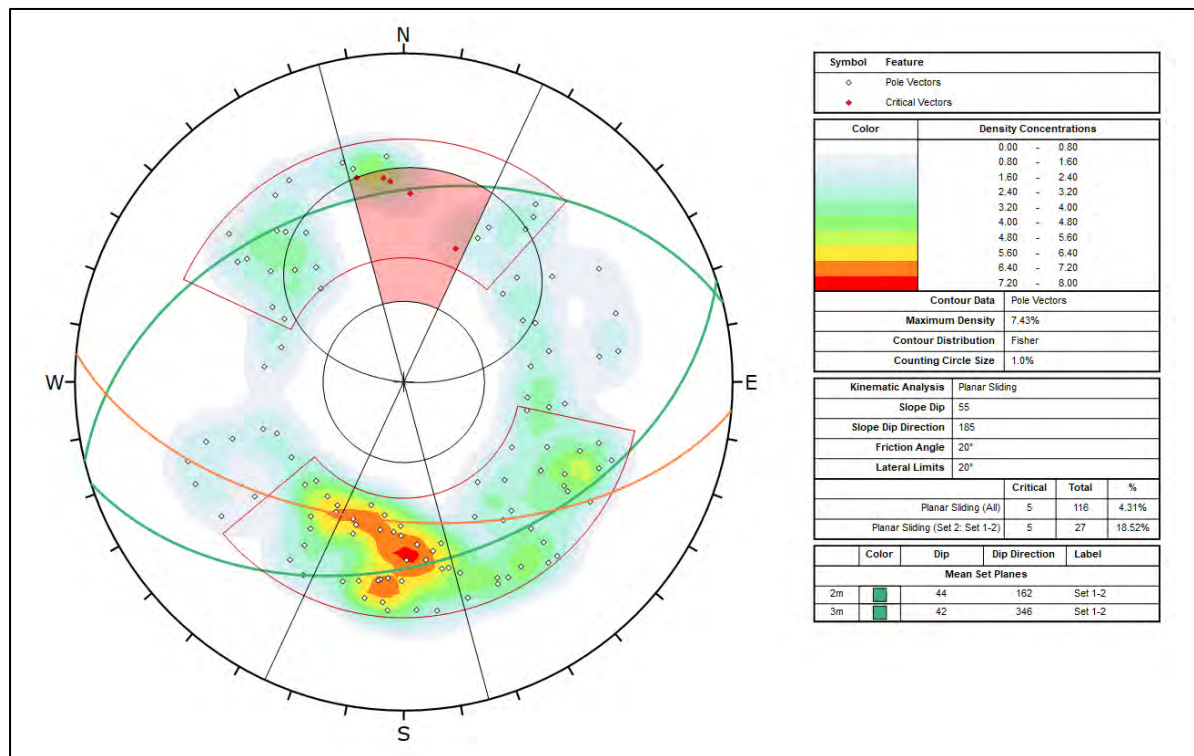


Figure C469 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (North Wall) – Planar Sliding.

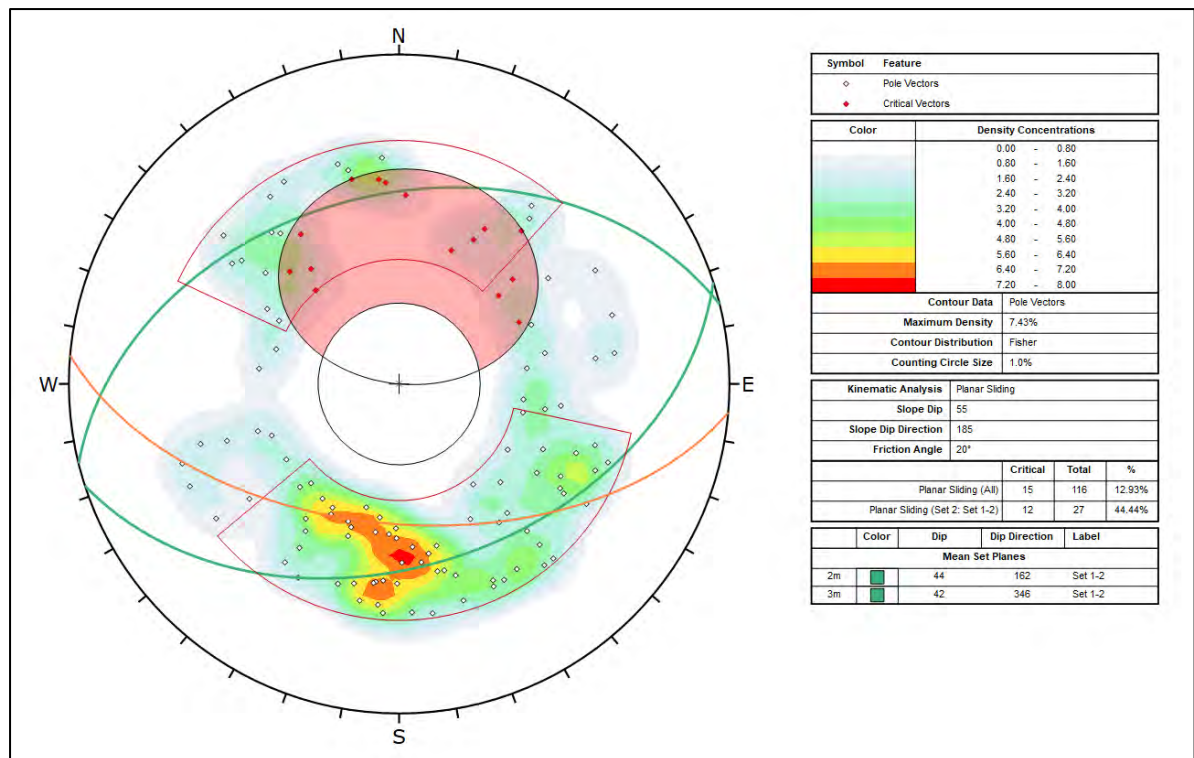


Figure C470 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (North Wall) – Planar Sliding (No Limits).

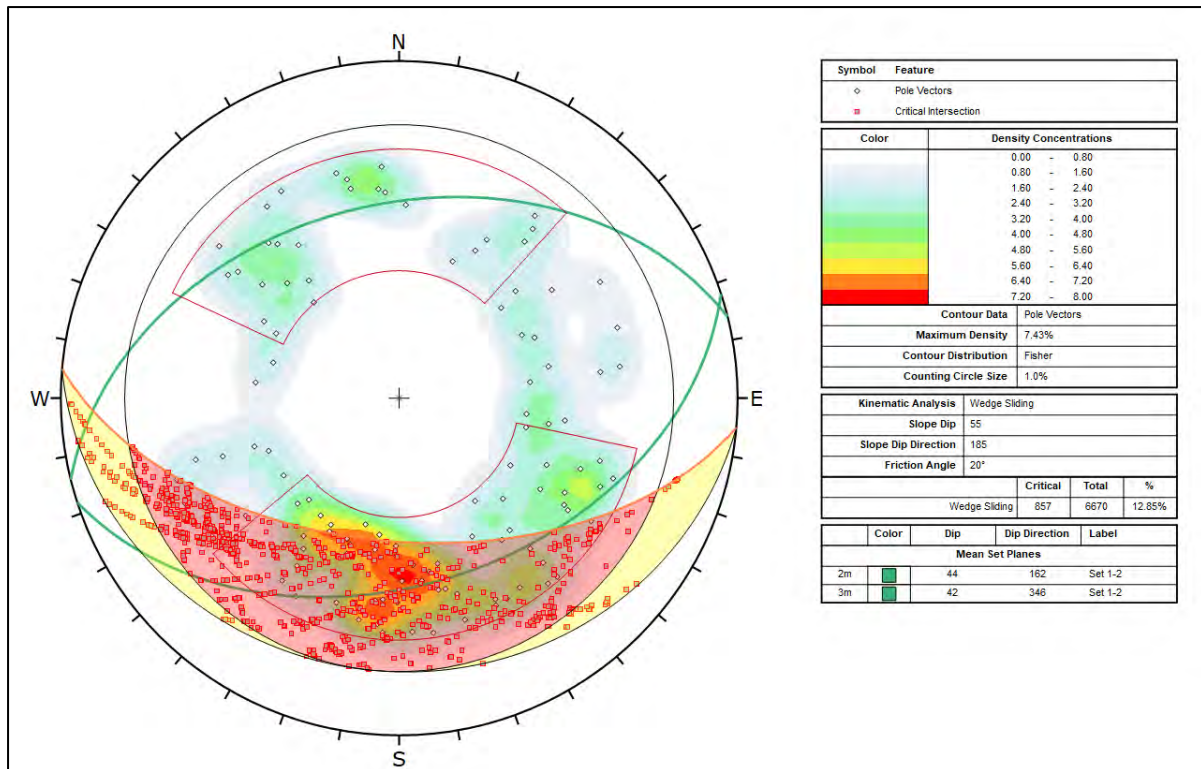


Figure C471 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (North Wall) – Wedge Sliding.

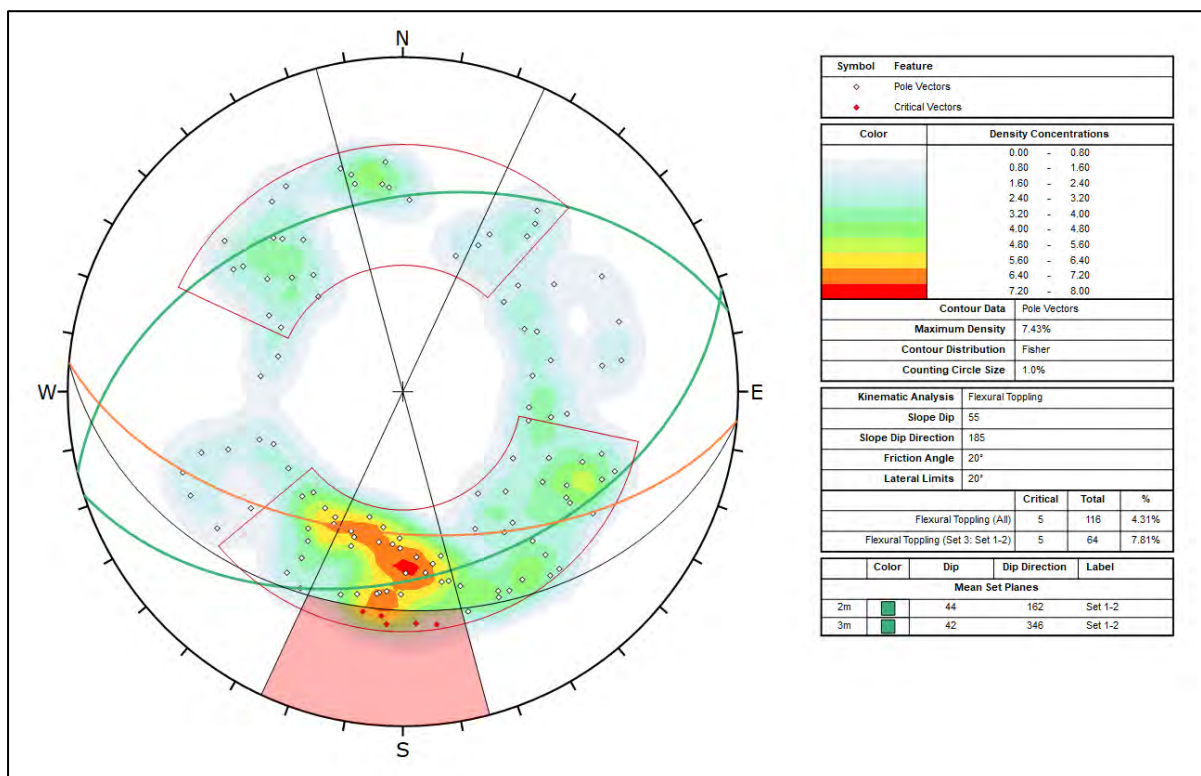


Figure C472 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (North Wall) – Flexural Toppling.

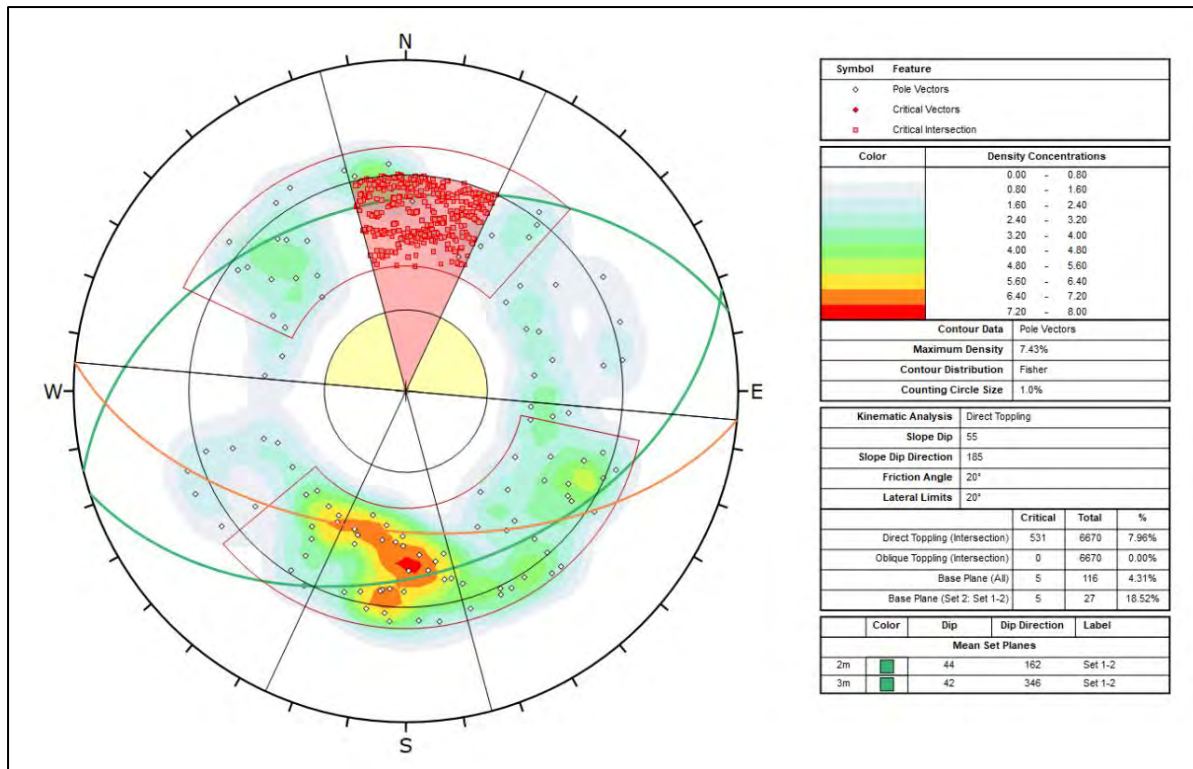


Figure C473 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints $>30^{\circ}<60^{\circ}$ – Bench Slope

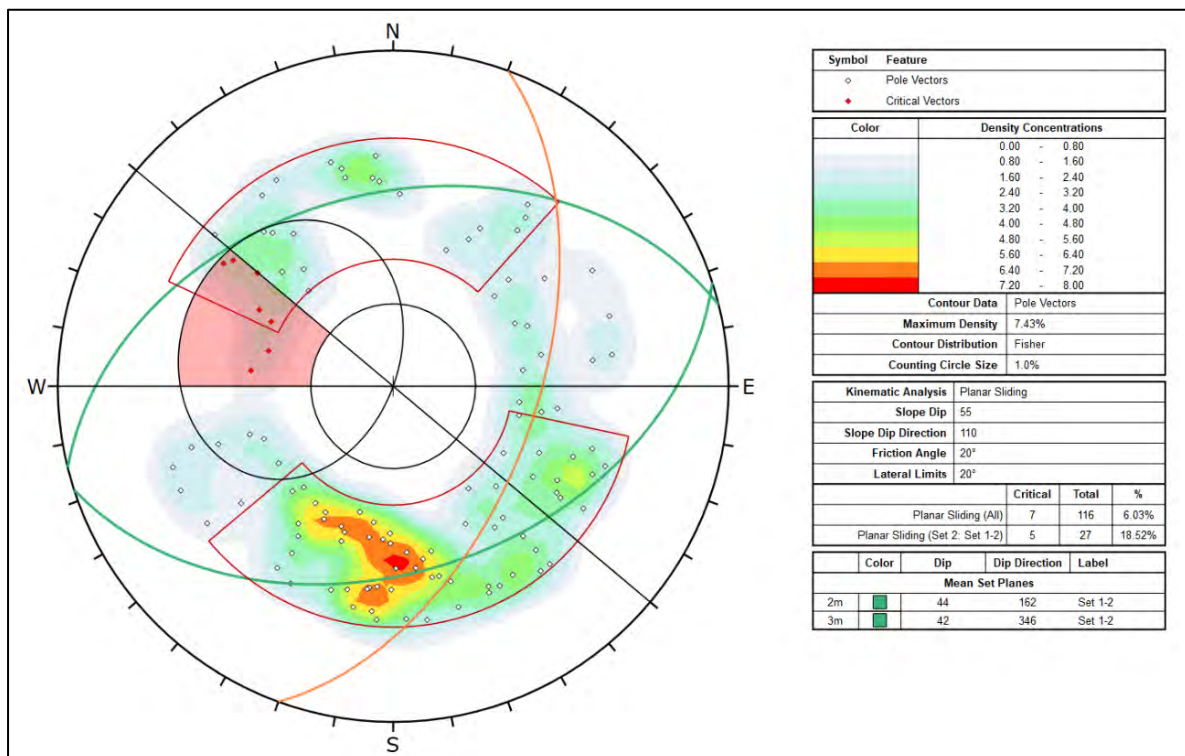


Figure C474 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (West Wall) – Planar Sliding.

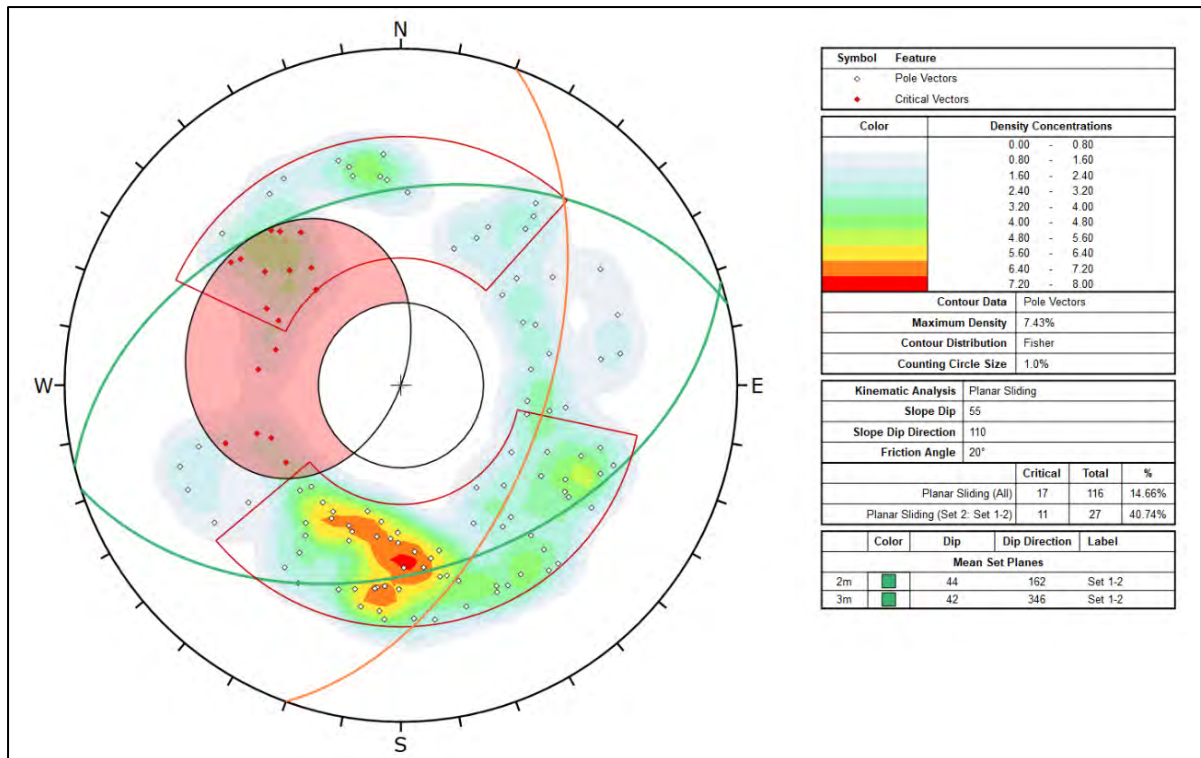


Figure C475 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

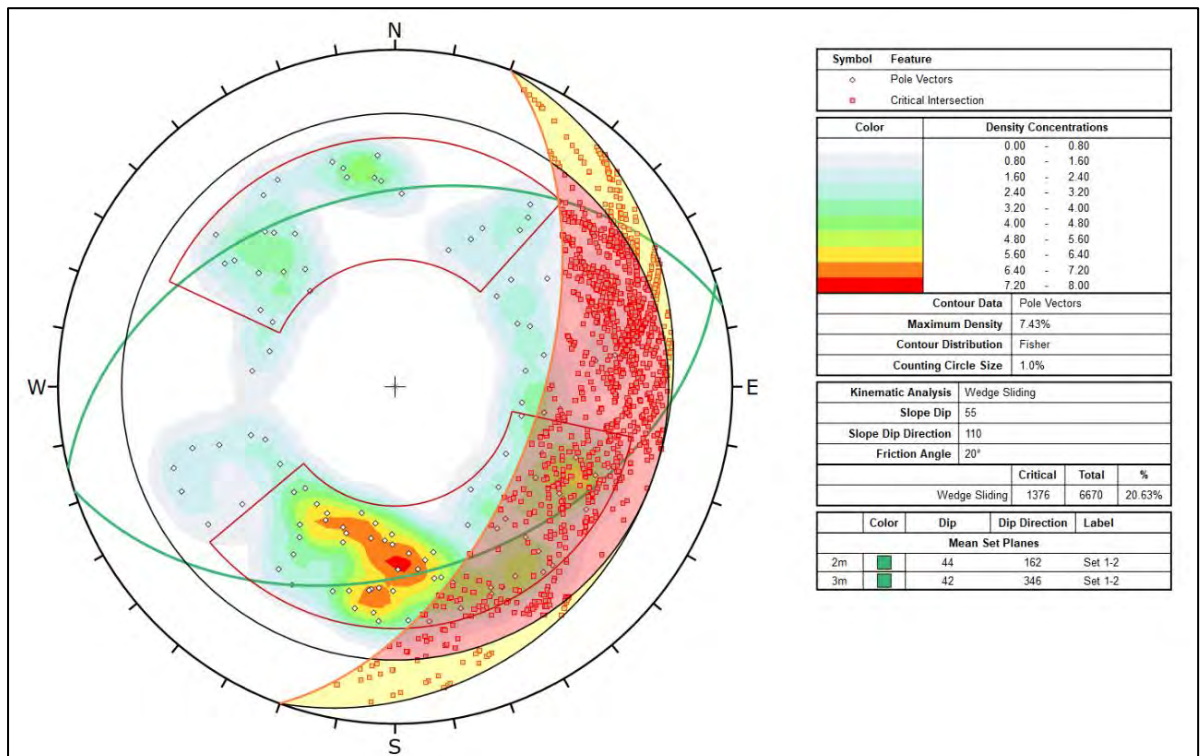


Figure C476 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (West Wall) – Wedge Sliding.

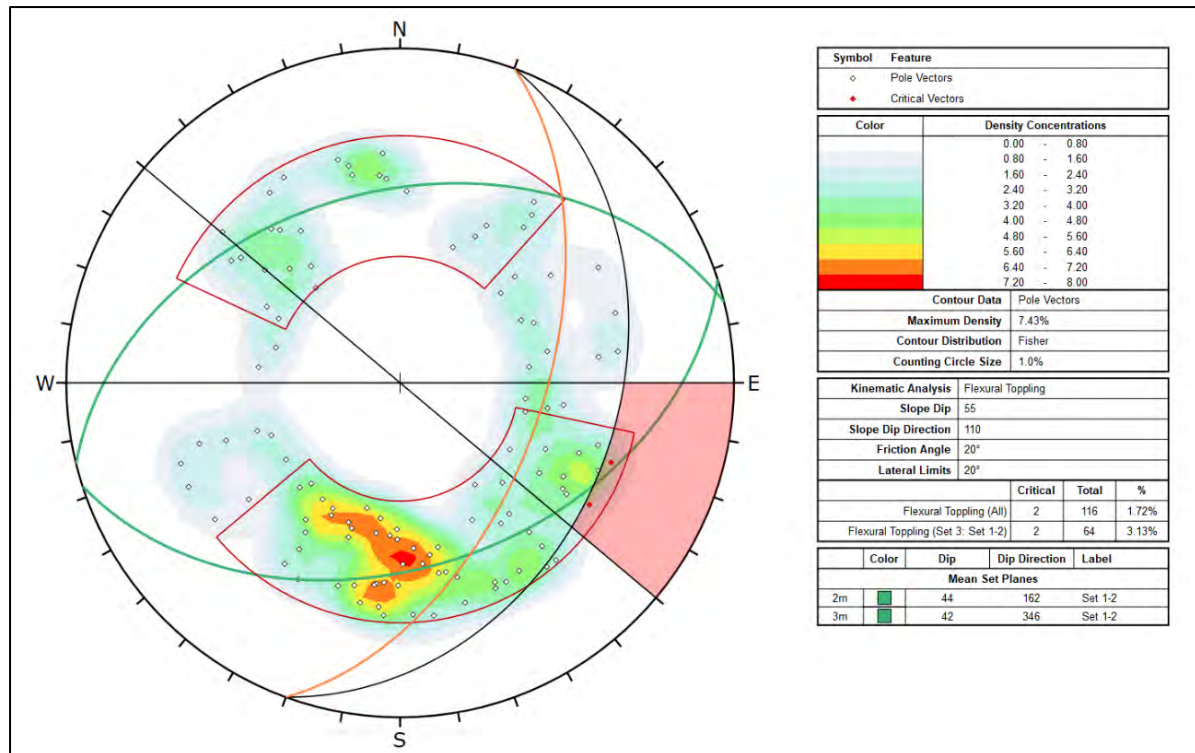


Figure C477 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (West Wall) – Flexural Toppling.

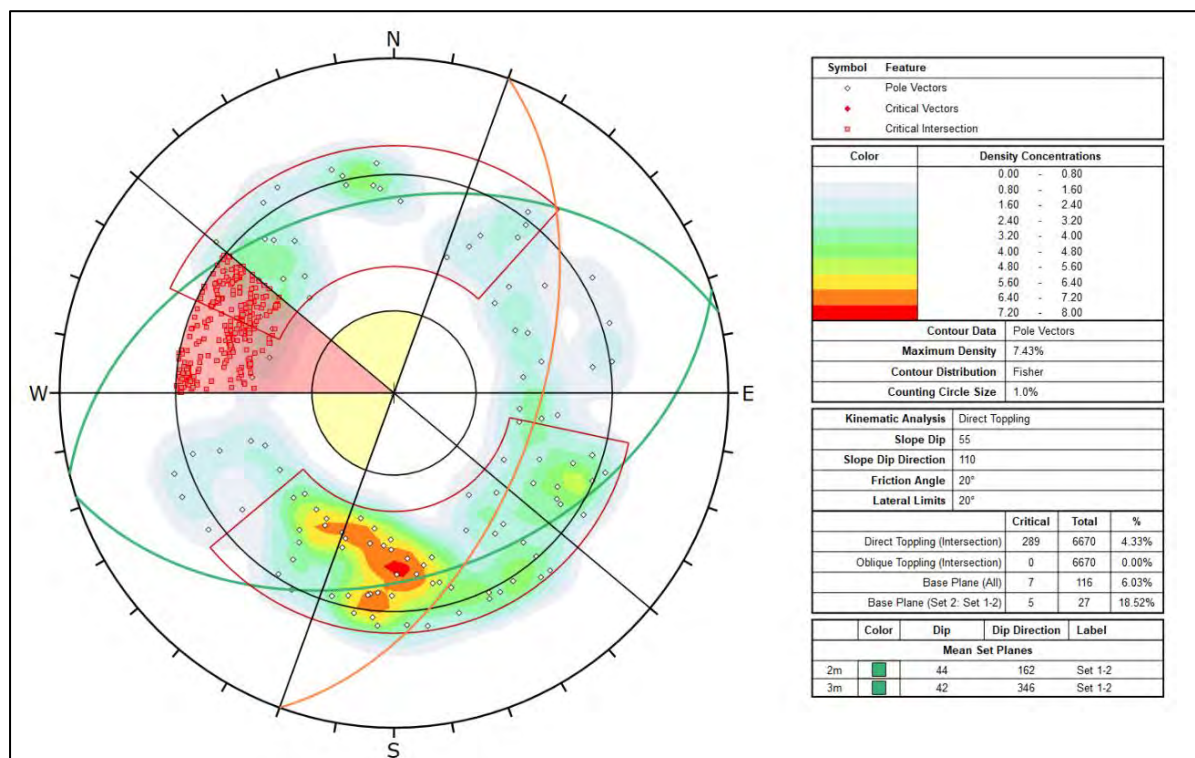


Figure C478 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints $>30^{\circ}<60^{\circ}$ – Bench Slope

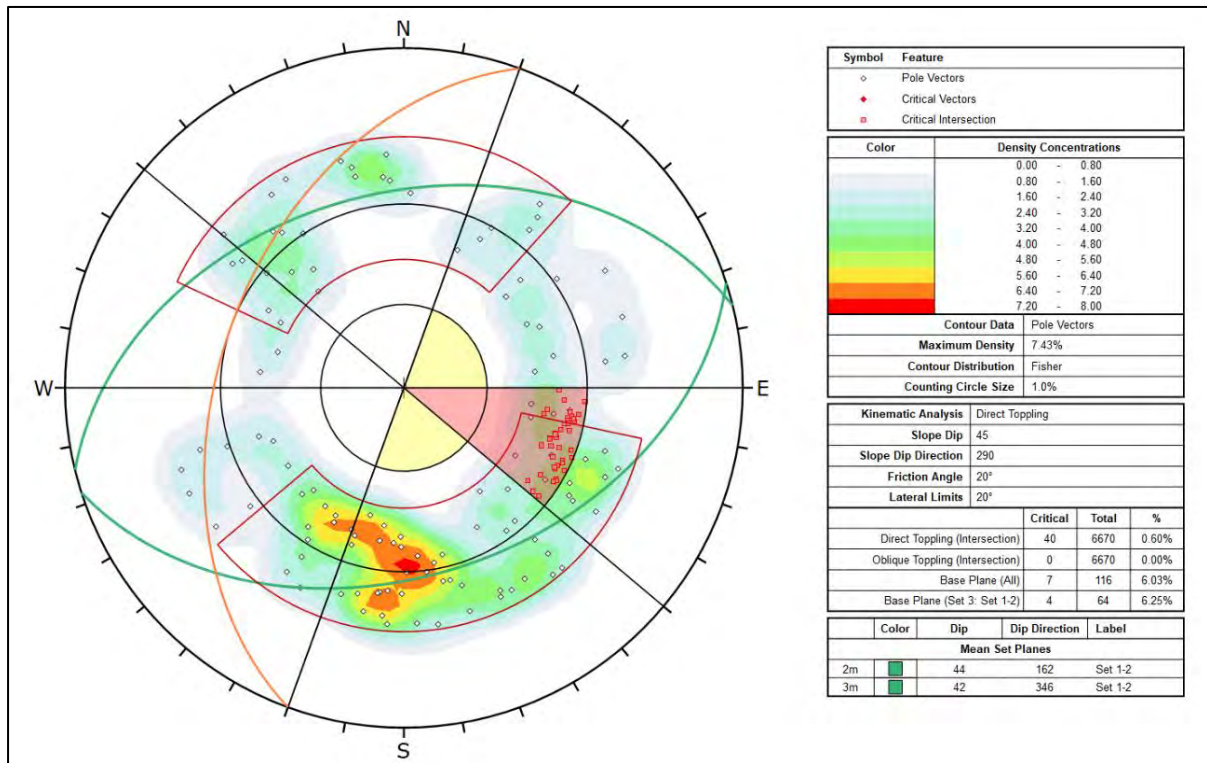


Figure C479 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (East Wall) – Planar Sliding.

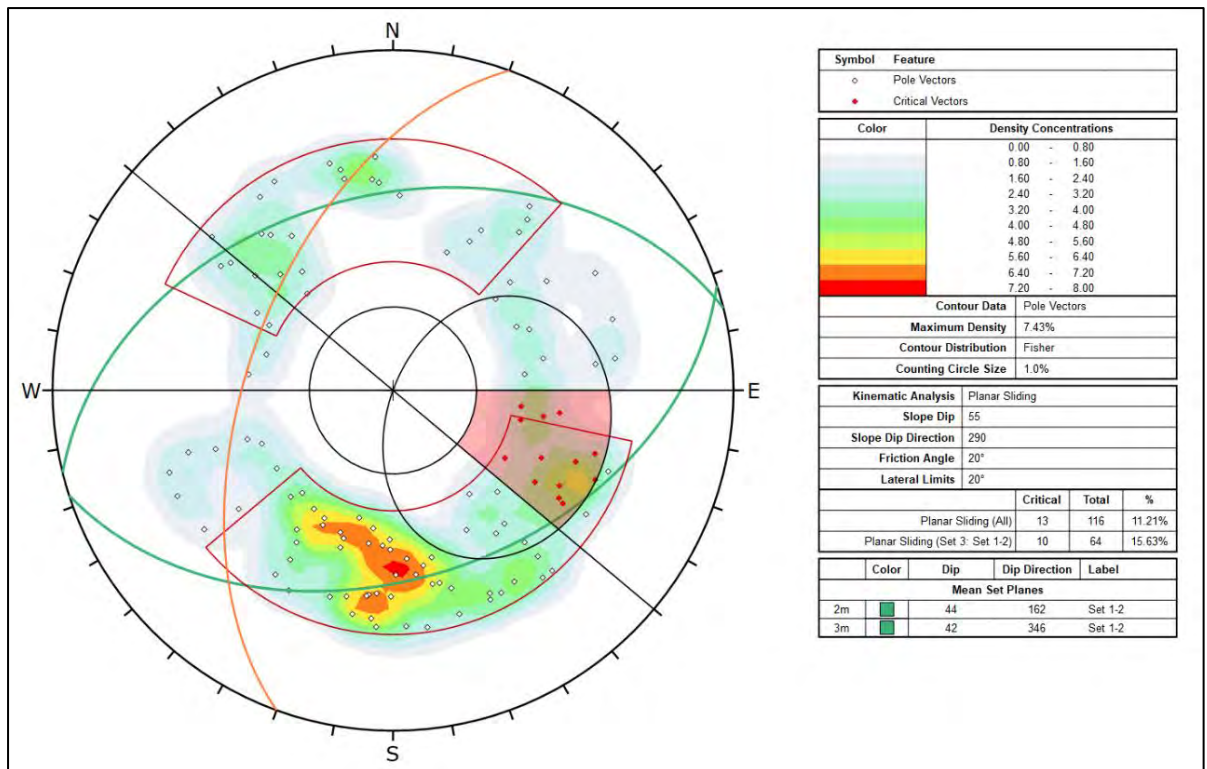


Figure C480 – Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

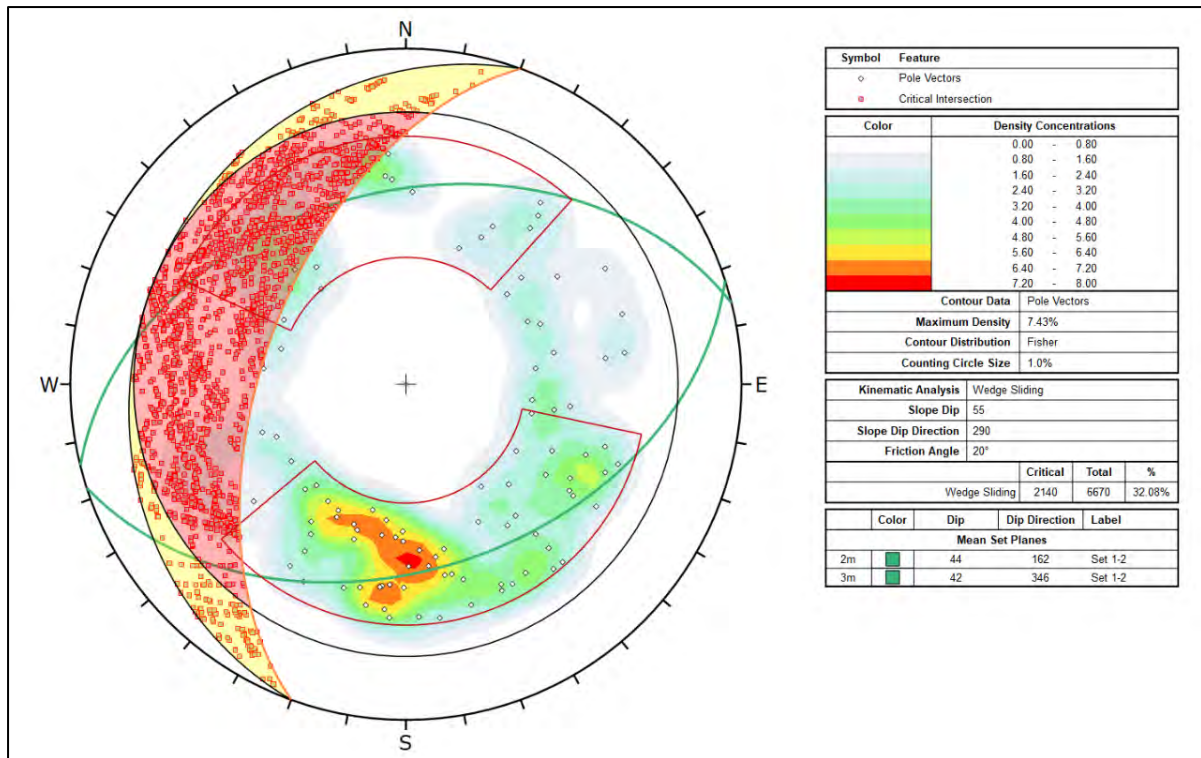


Figure C481 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (East Wall) – Wedge Sliding.

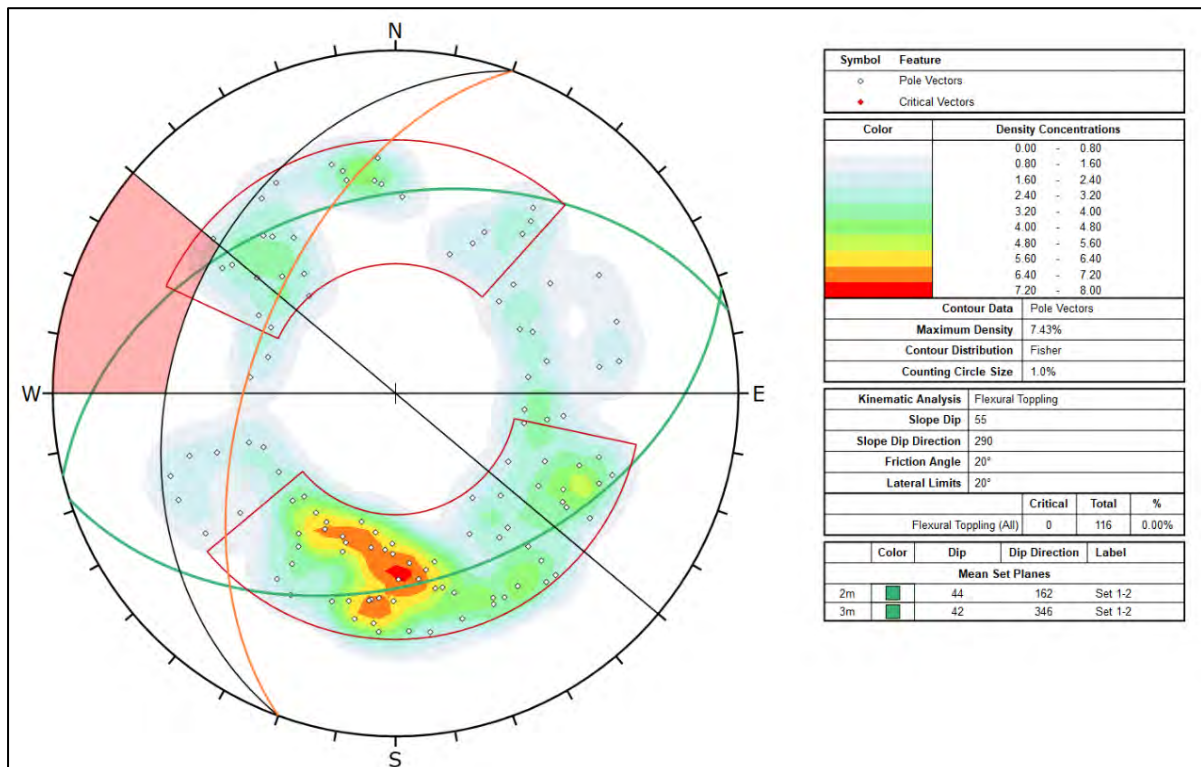


Figure C482 – Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (East Wall) – Flexural Toppling.

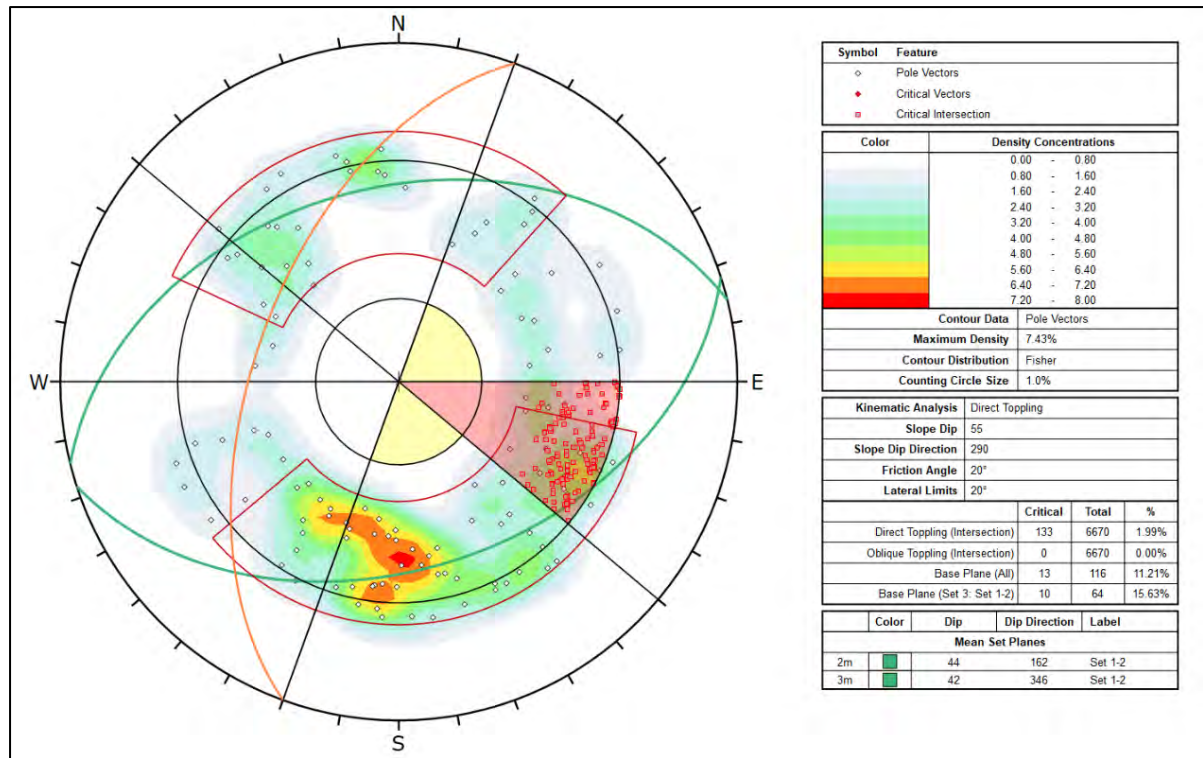


Figure C483– Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (East Wall) – Joints >30°<60° – Bench Slope

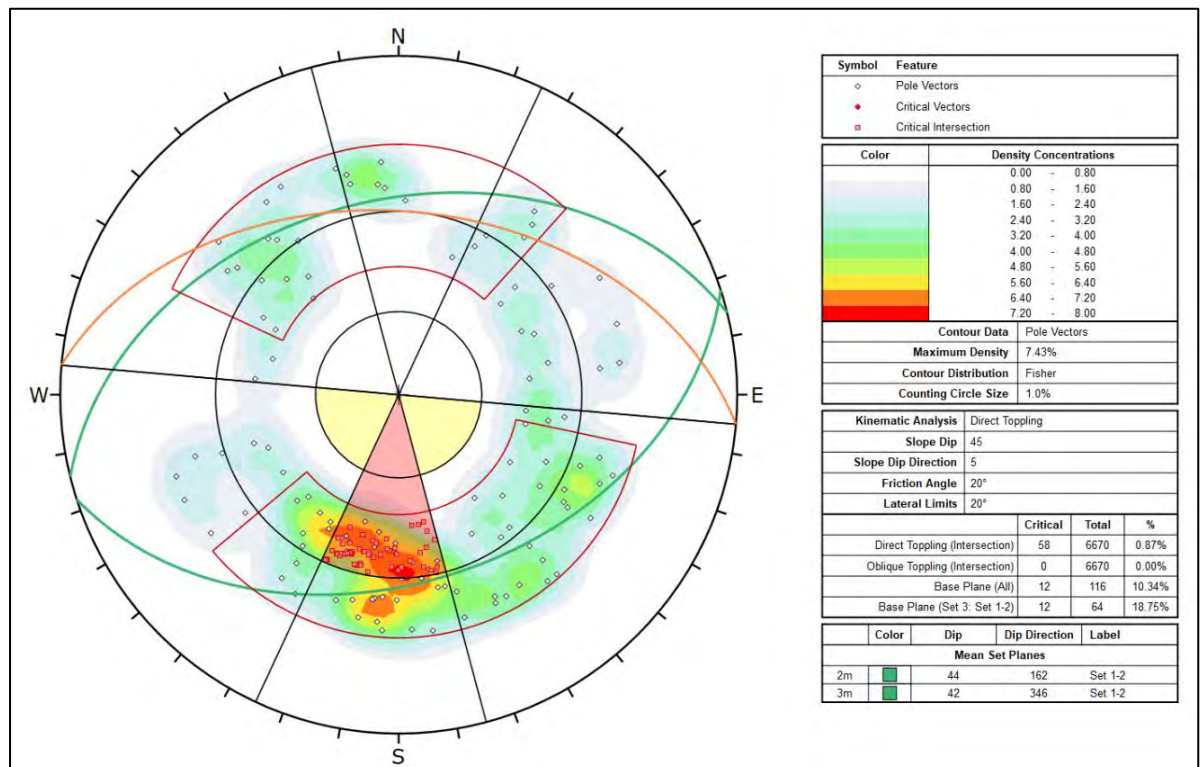


Figure C484– Kinematic Analysis (Joints >30°<60°) - Bench Slope – West Sump (South Wall) – Planar Sliding.

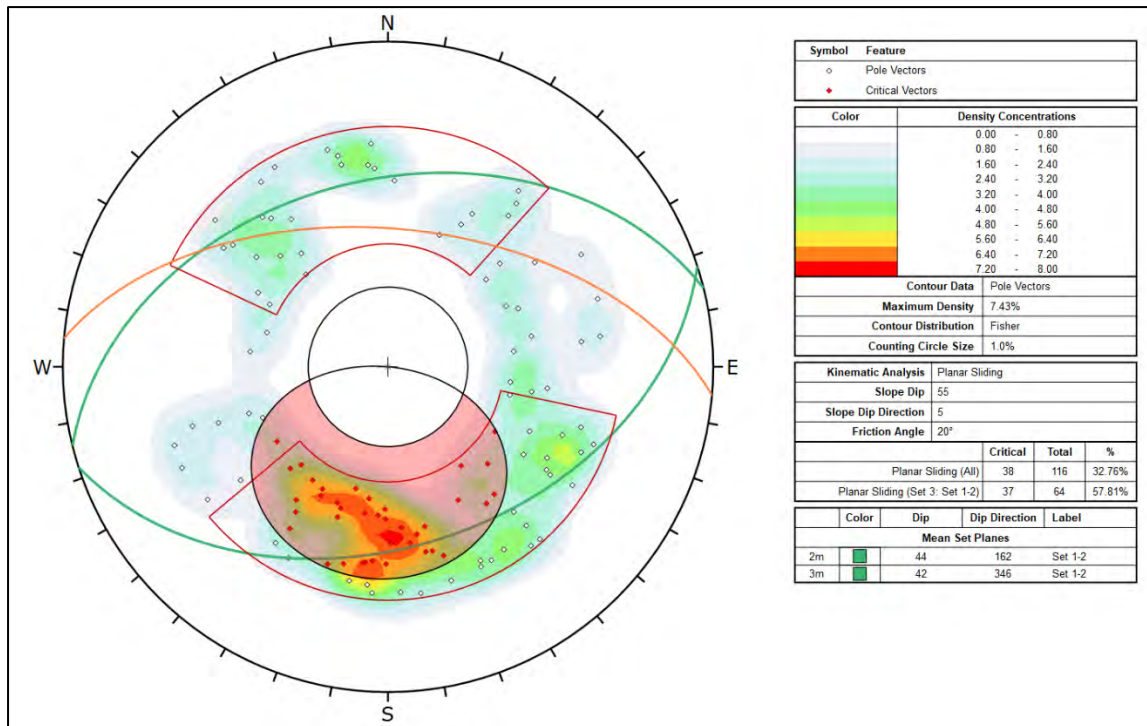


Figure C485– Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).

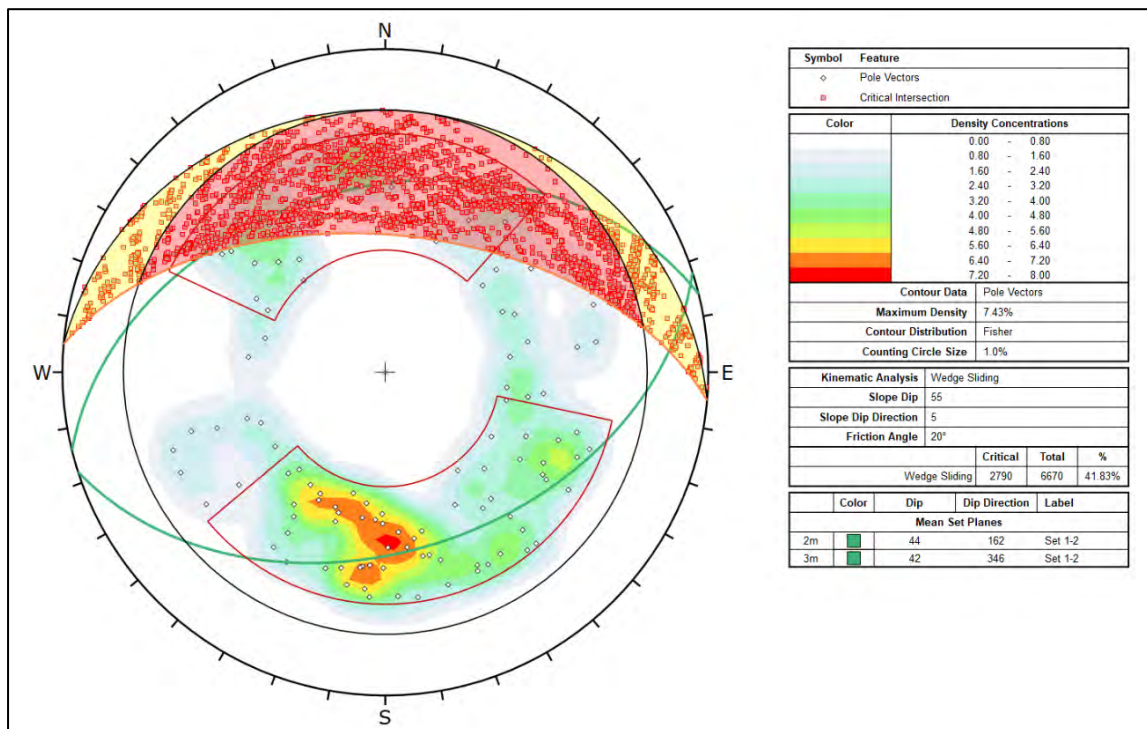


Figure C486– Kinematic Analysis (Joints $>30^{\circ}<60^{\circ}$) - Bench Slope – West Sump (South Wall) – Wedge Sliding.

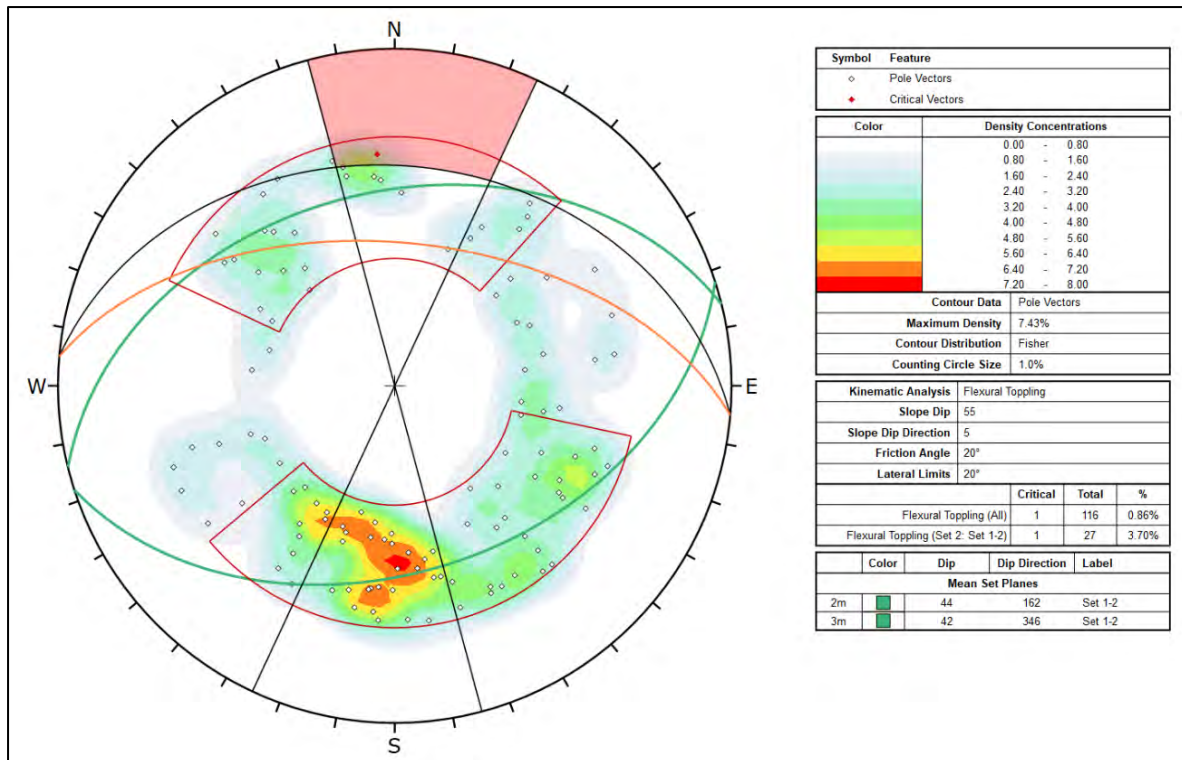


Figure C487- Kinematic Analysis (Joints >30°<60°) - Bench Slope - West Sump (South Wall) - Flexural Toppling.

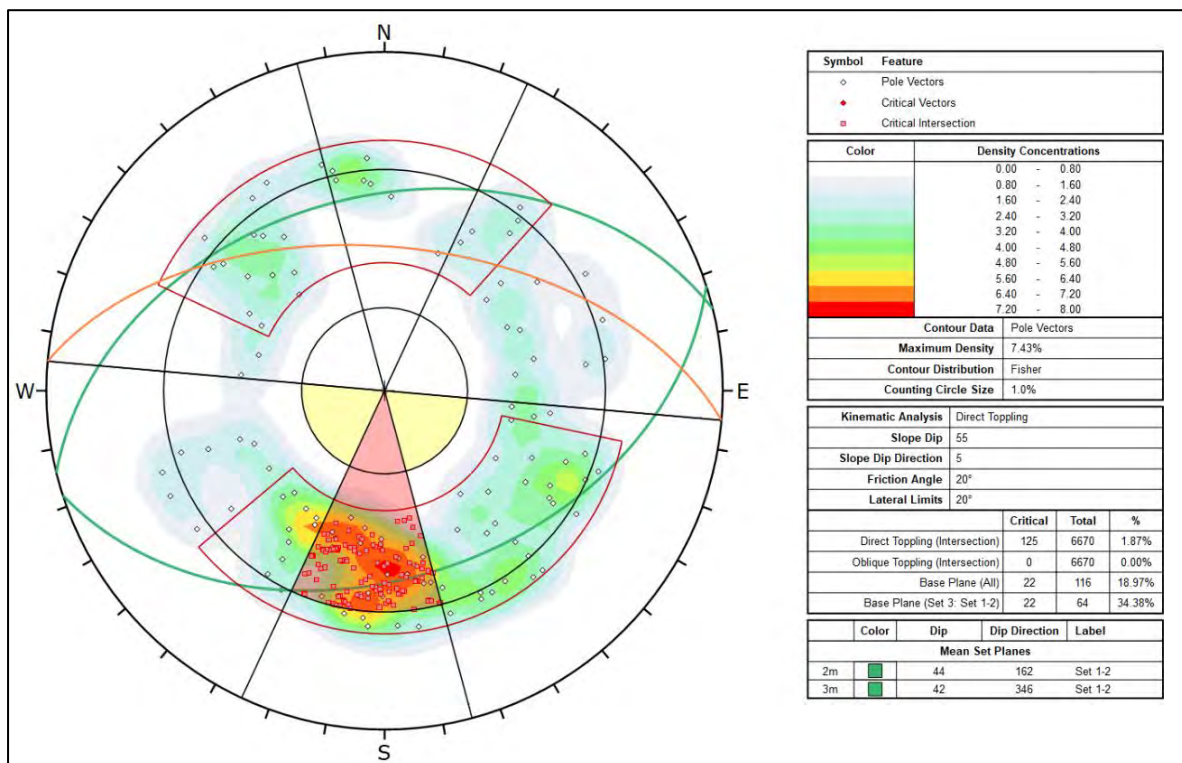


Figure C488- Kinematic Analysis (Joints >30°<60°) - Bench Slope - West Sump (South Wall) - Direct Toppling.

West Sump (North Wall) – Joints >60°– Overall Slope

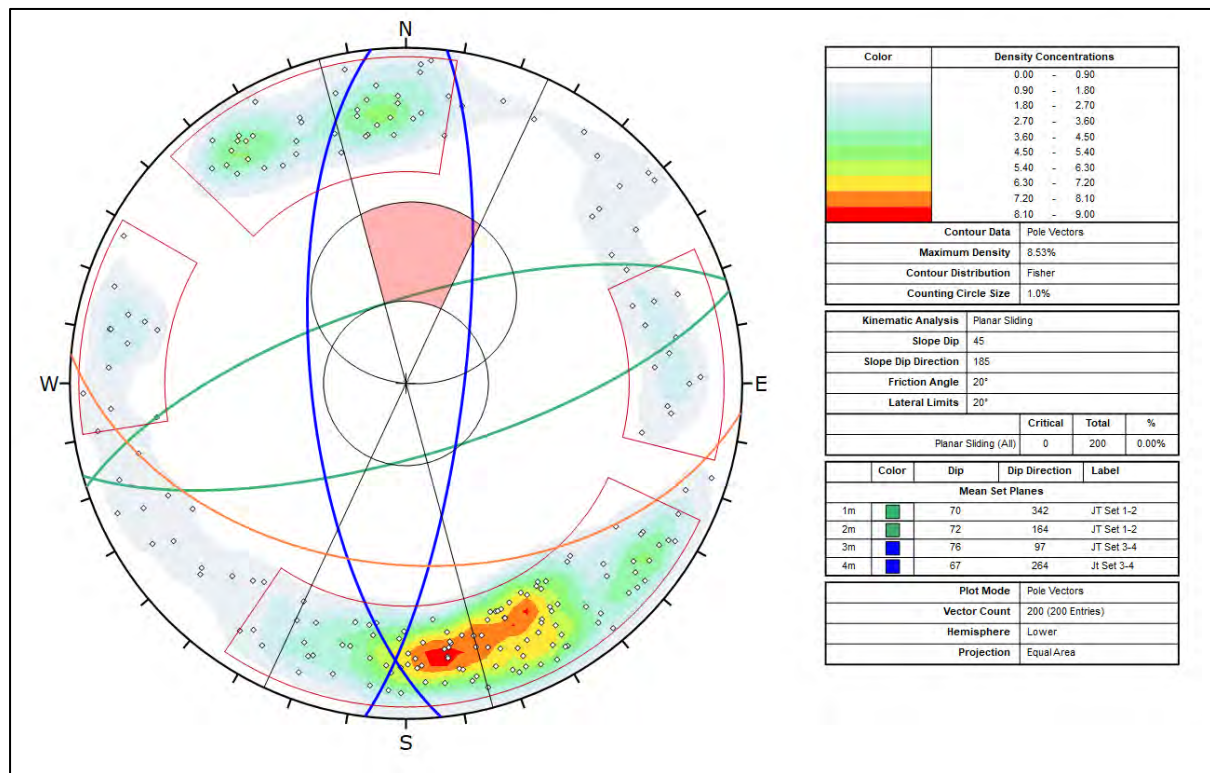


Figure C489– Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (North Wall) – Planar Sliding.

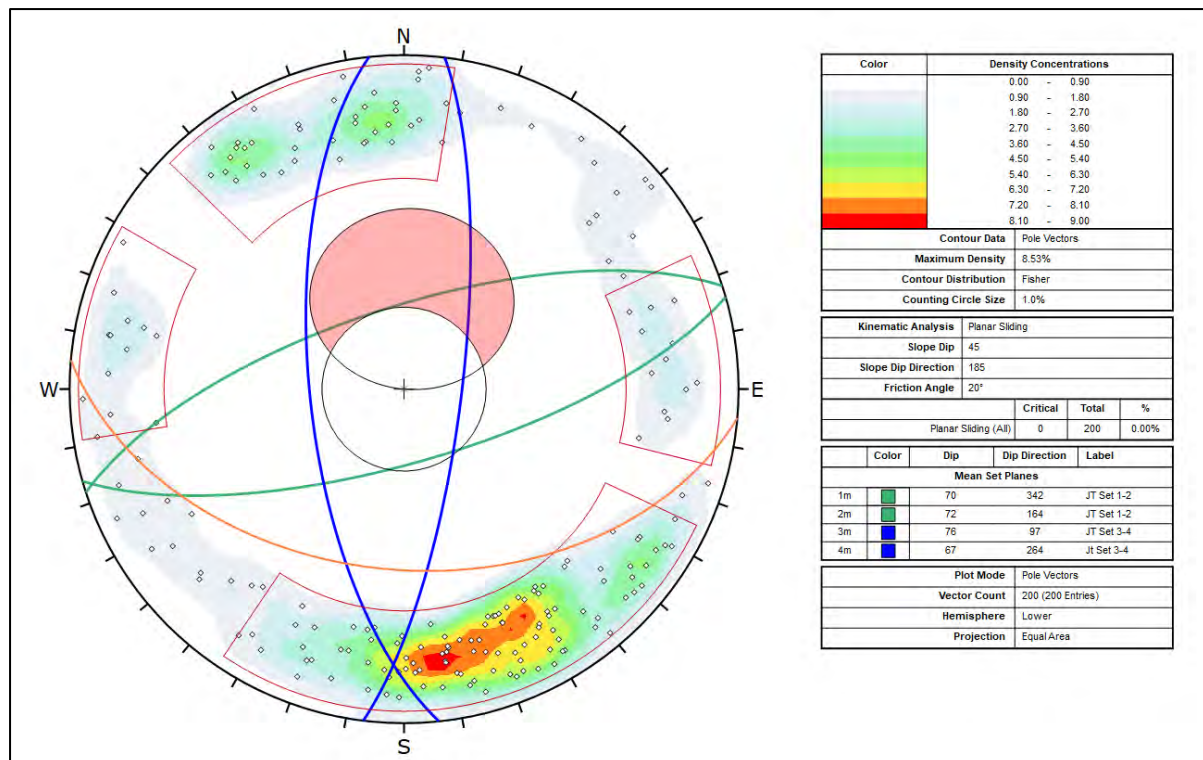


Figure C490– Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (North Wall) – Planar Sliding (No Limits).

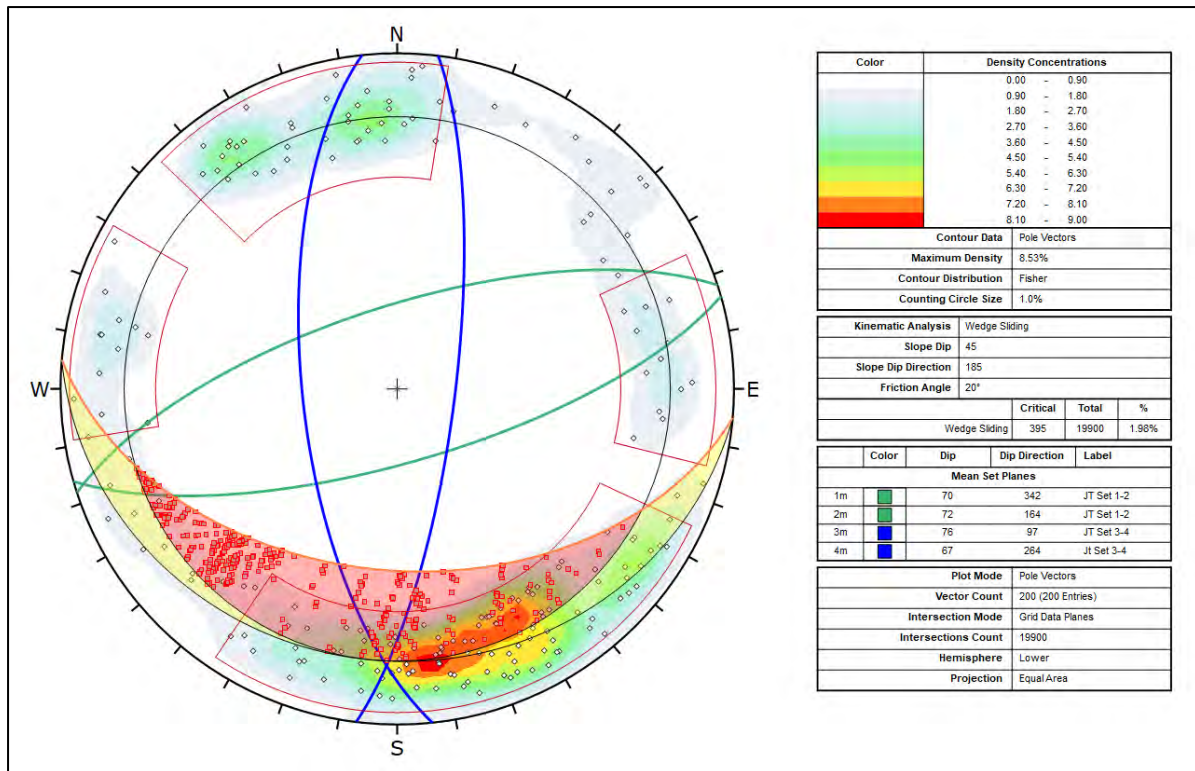


Figure C491- Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (North Wall) – Wedge Sliding.

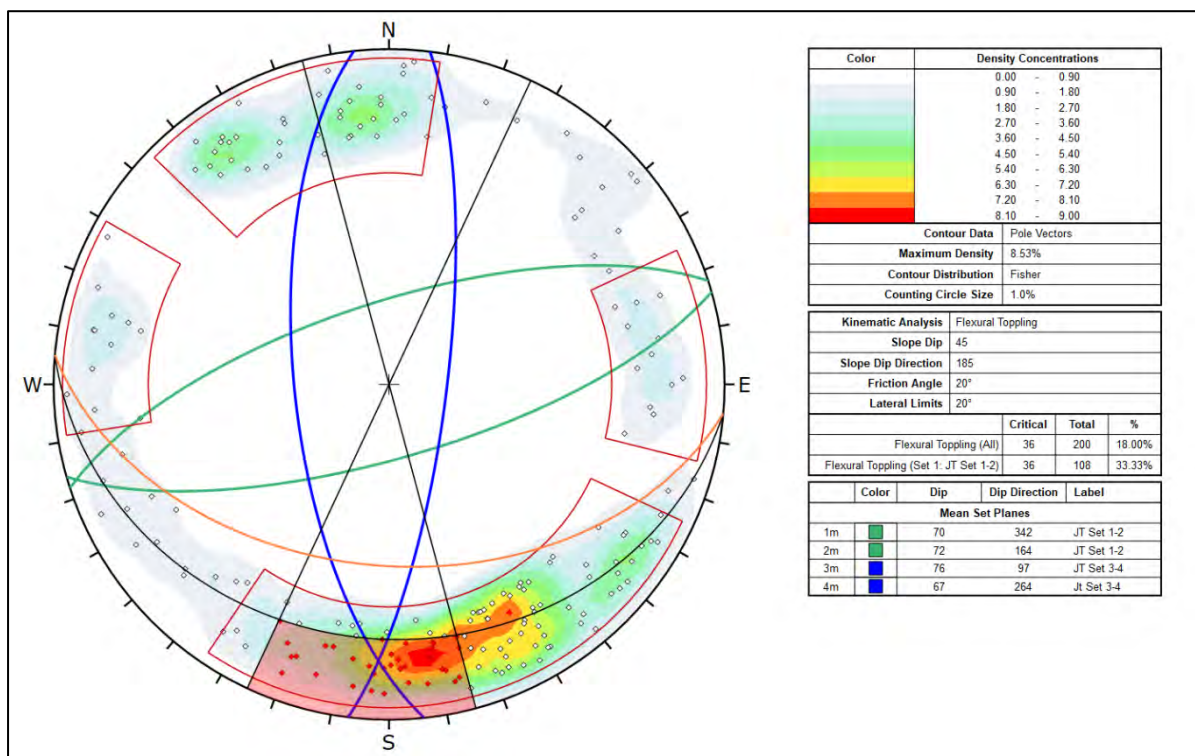


Figure C492- Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (North Wall) – Flexural Toppling.

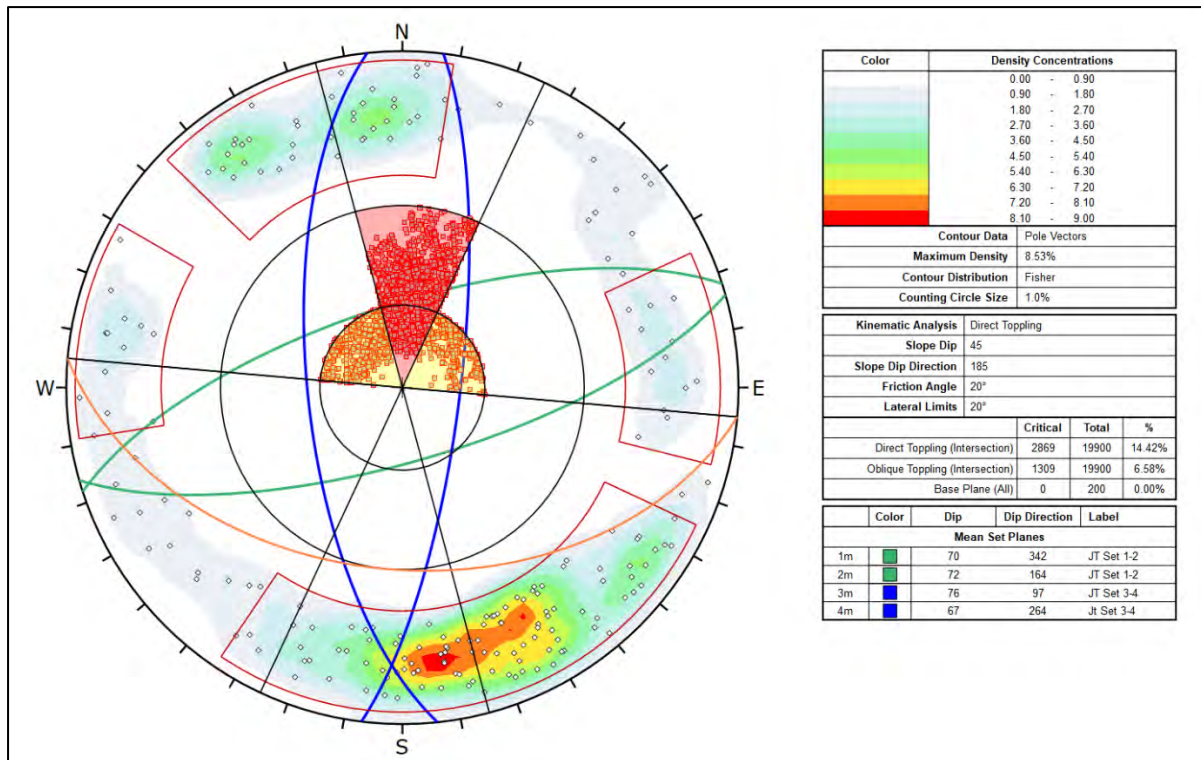


Figure C493– Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints >60°– Overall Slope

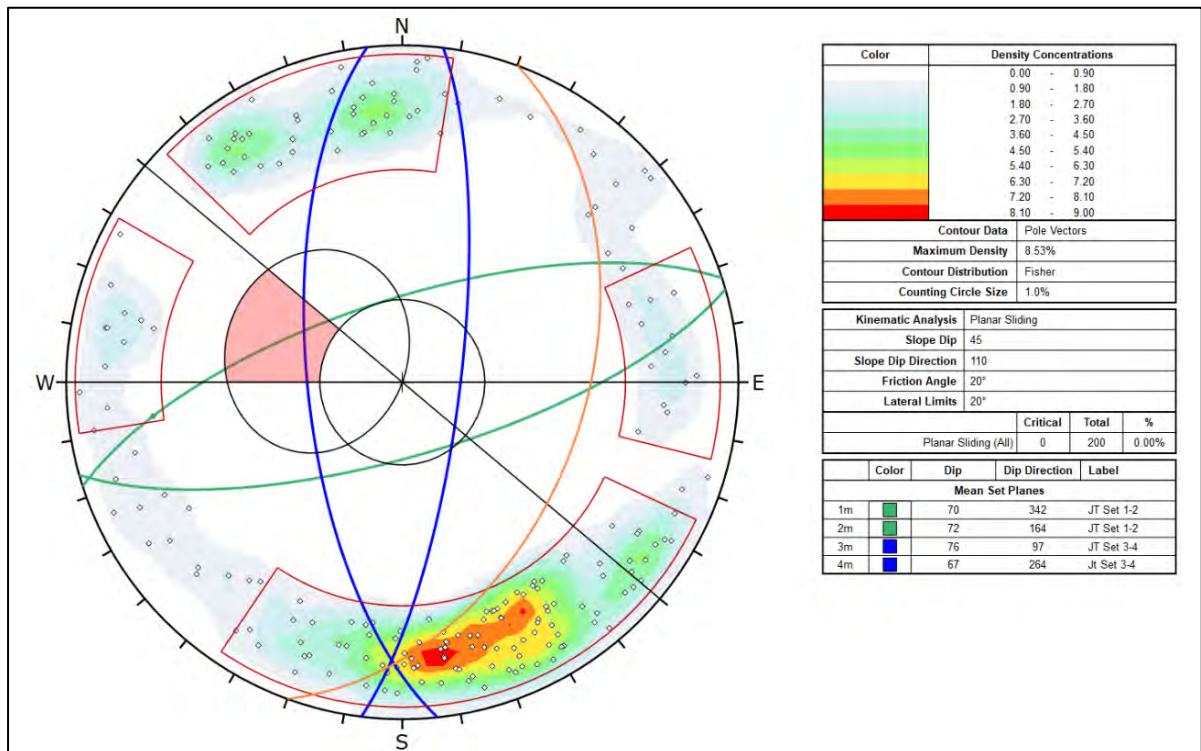


Figure C494– Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (West Wall) – Planar Toppling.

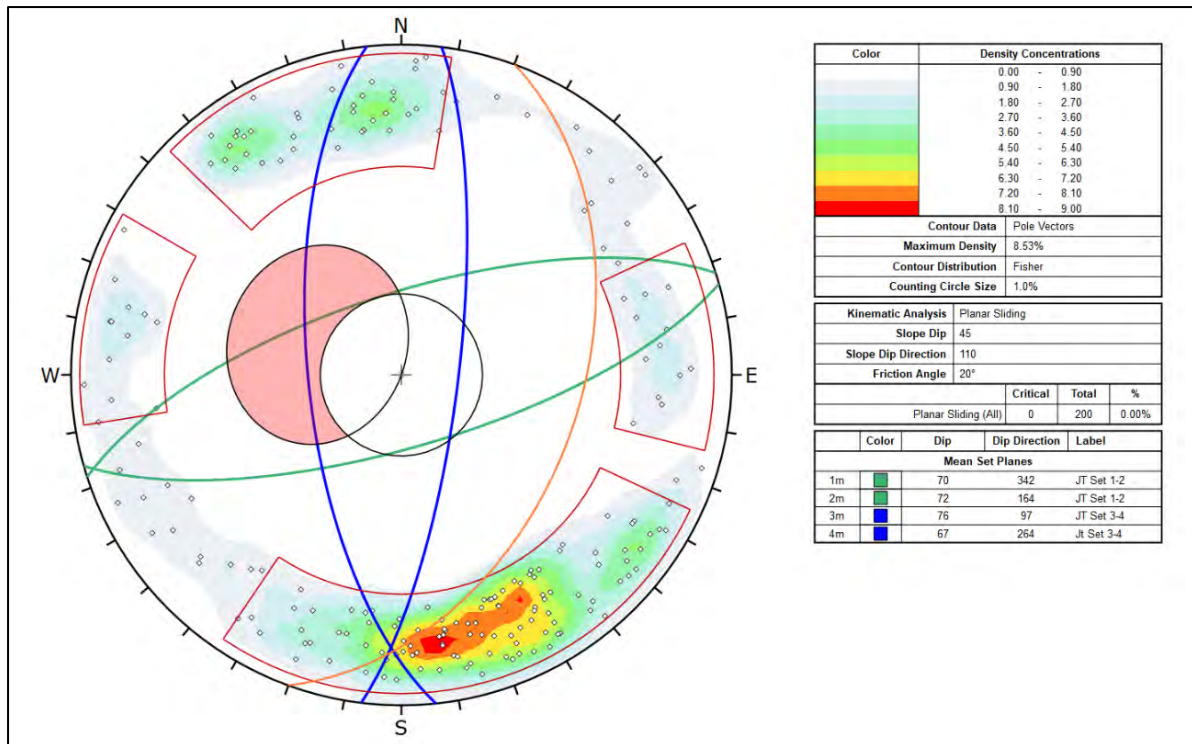


Figure C495- Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (West Wall) – Planar Toppling (No Limits).

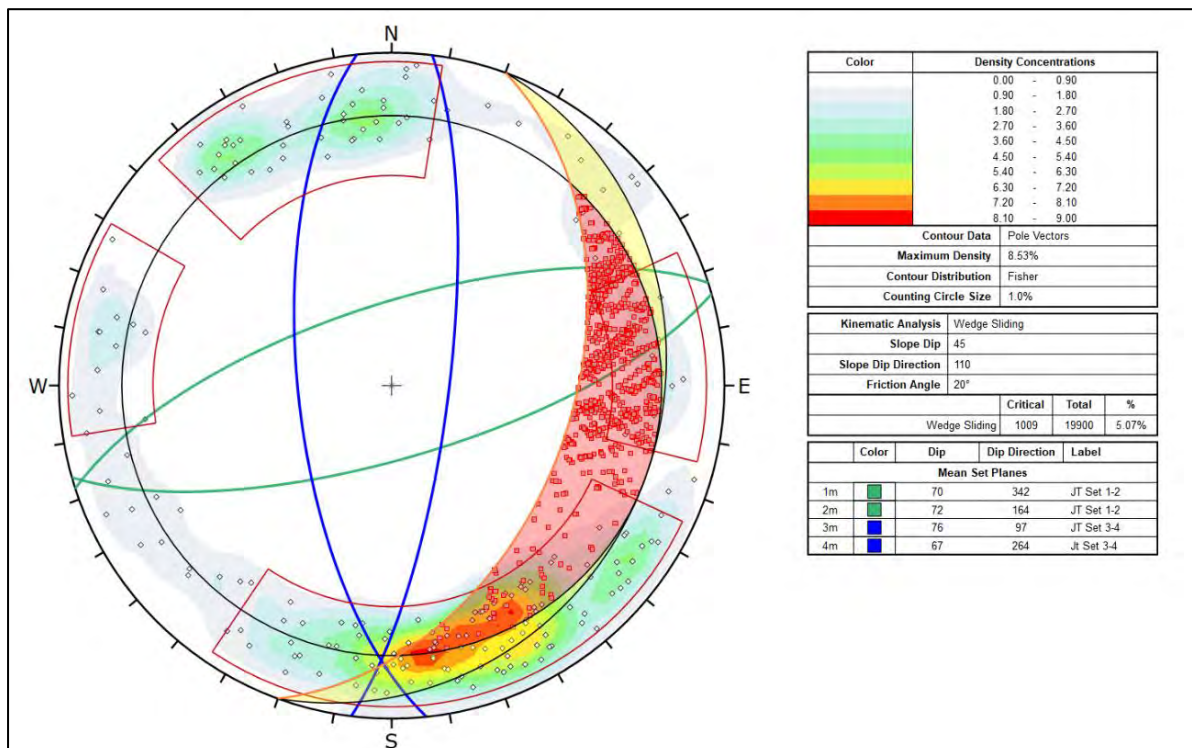


Figure C496- Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (West Wall) – Wedge Sliding.

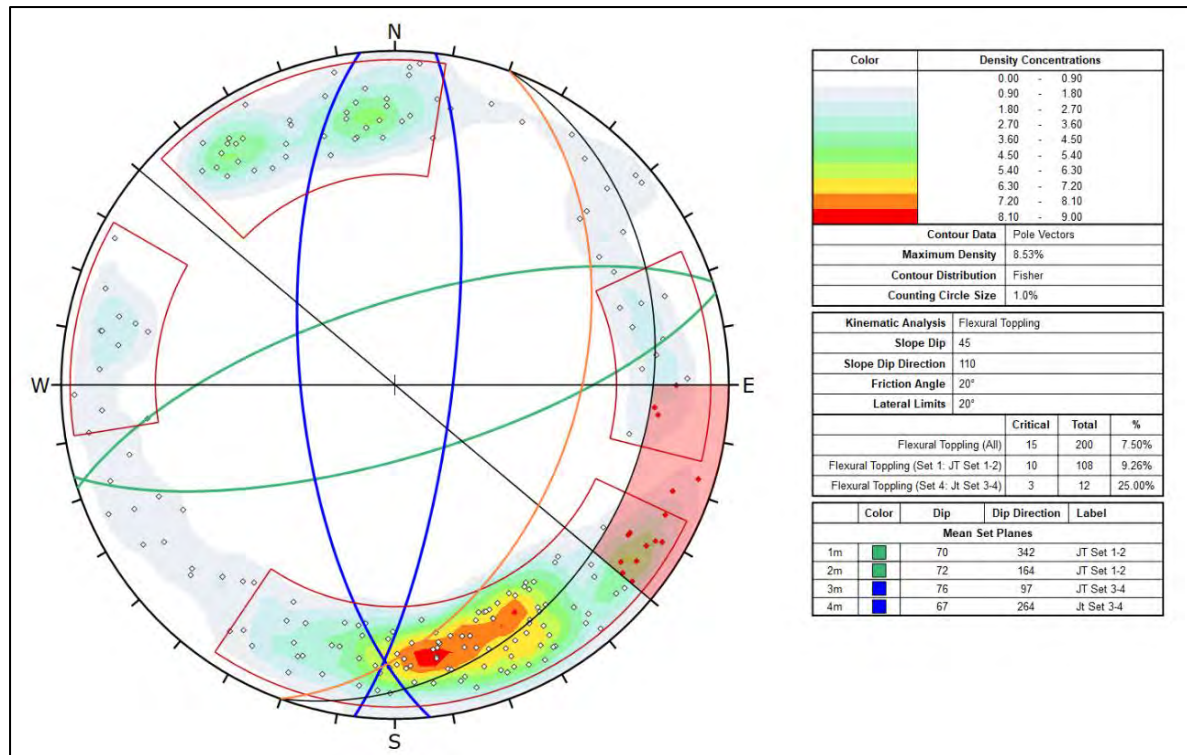


Figure C497 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (West Wall) – Flexural Toppling.

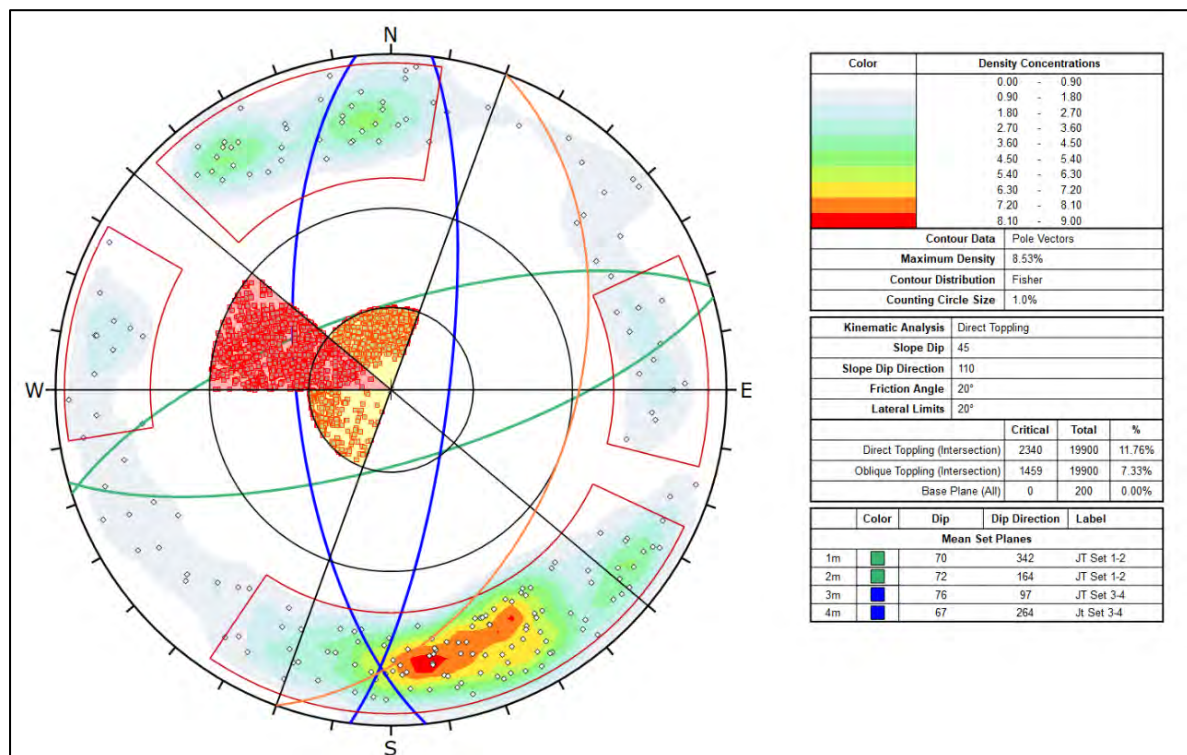


Figure C498 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints >60°– Overall Slope

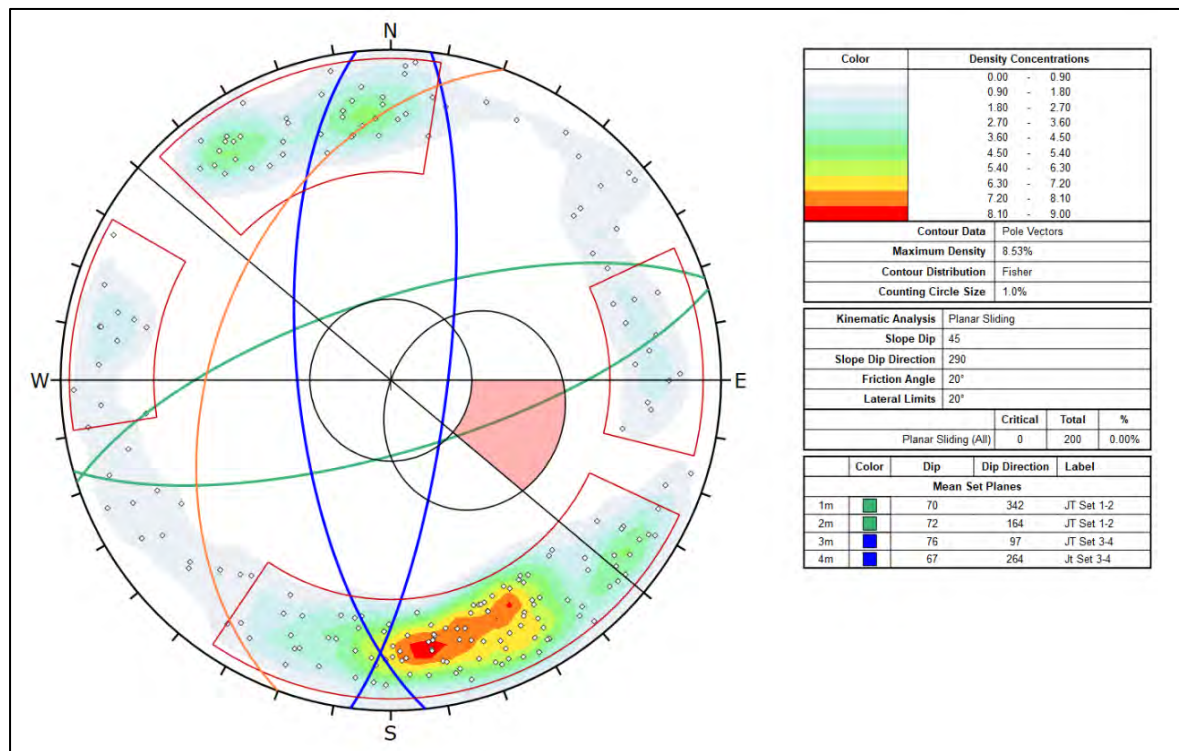


Figure C499 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (East Wall) – Planar Sliding.

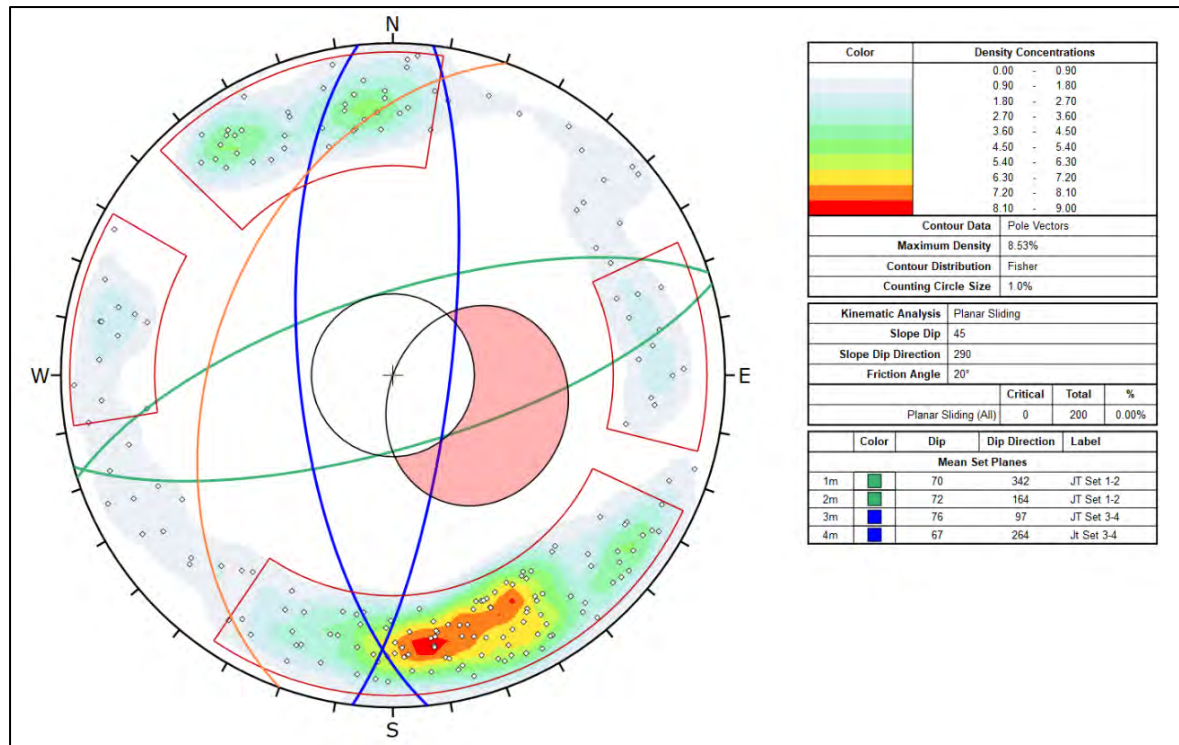


Figure C500 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (East Wall) – Planar Sliding.

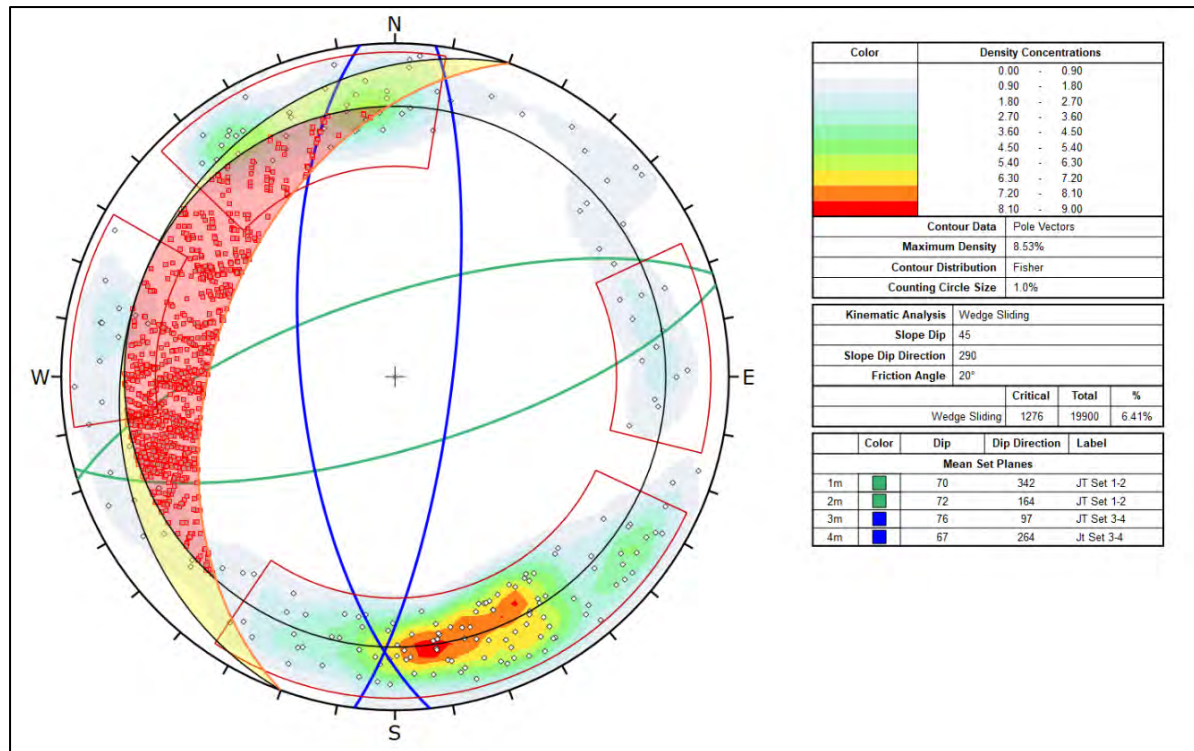


Figure C501 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (East Wall) – Wedge Sliding.

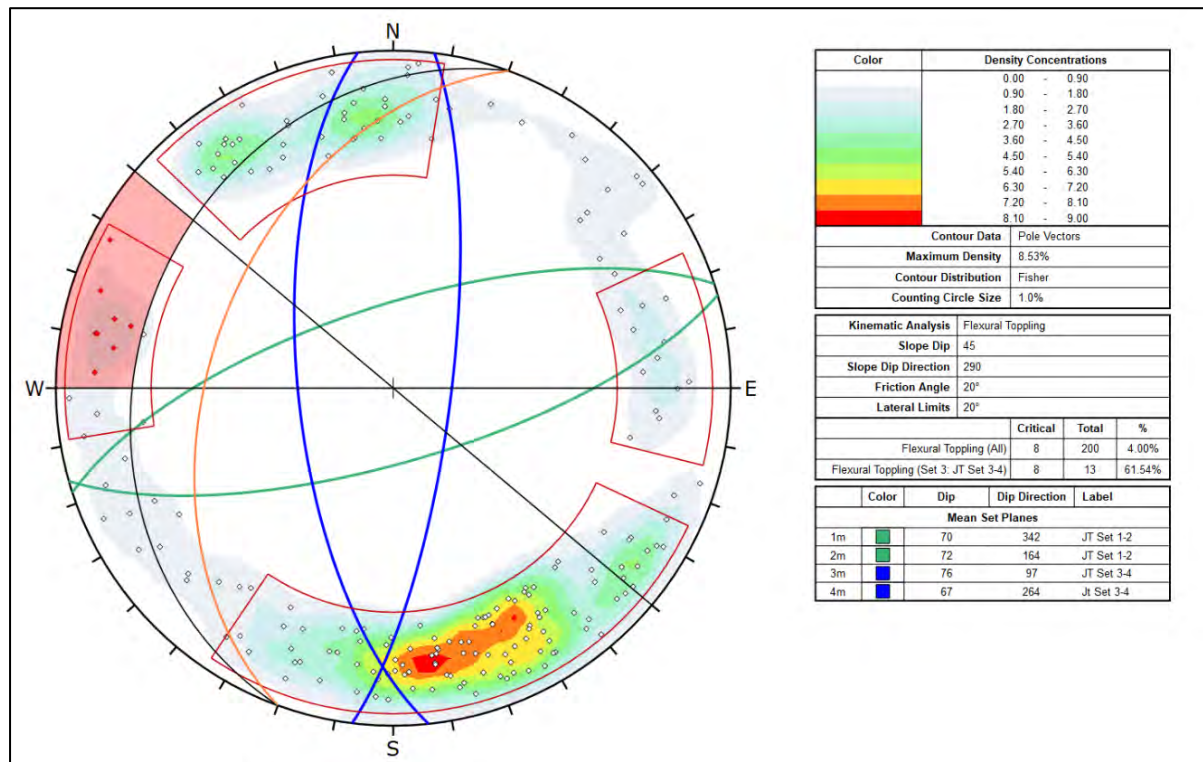


Figure C502 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

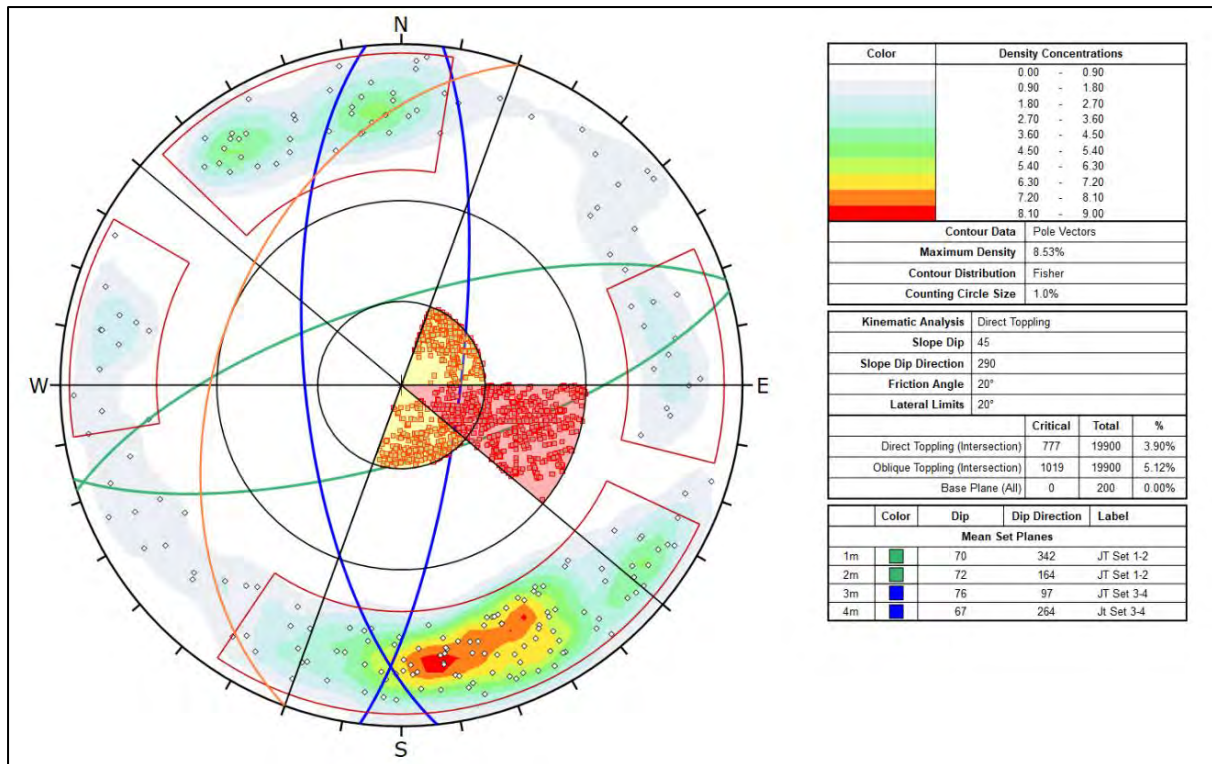


Figure C503 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Joints >60°– Overall Slope

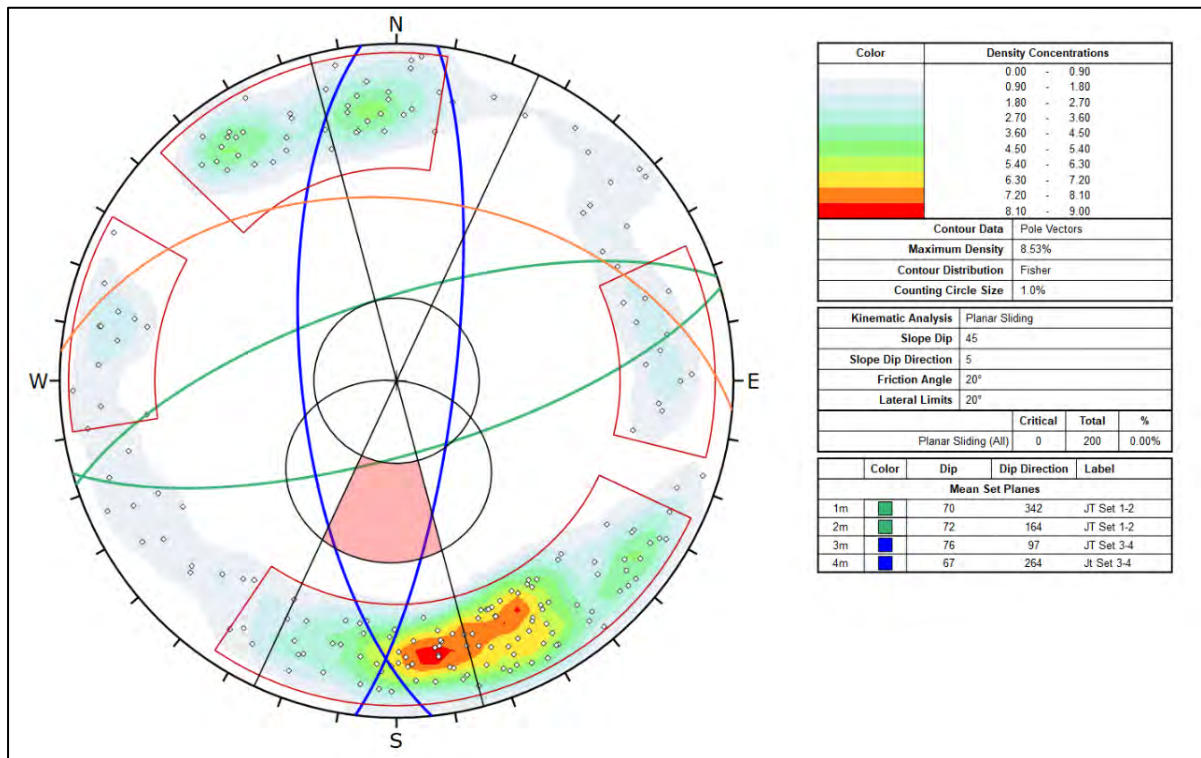


Figure C504 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (South Wall) – Planar Sliding.

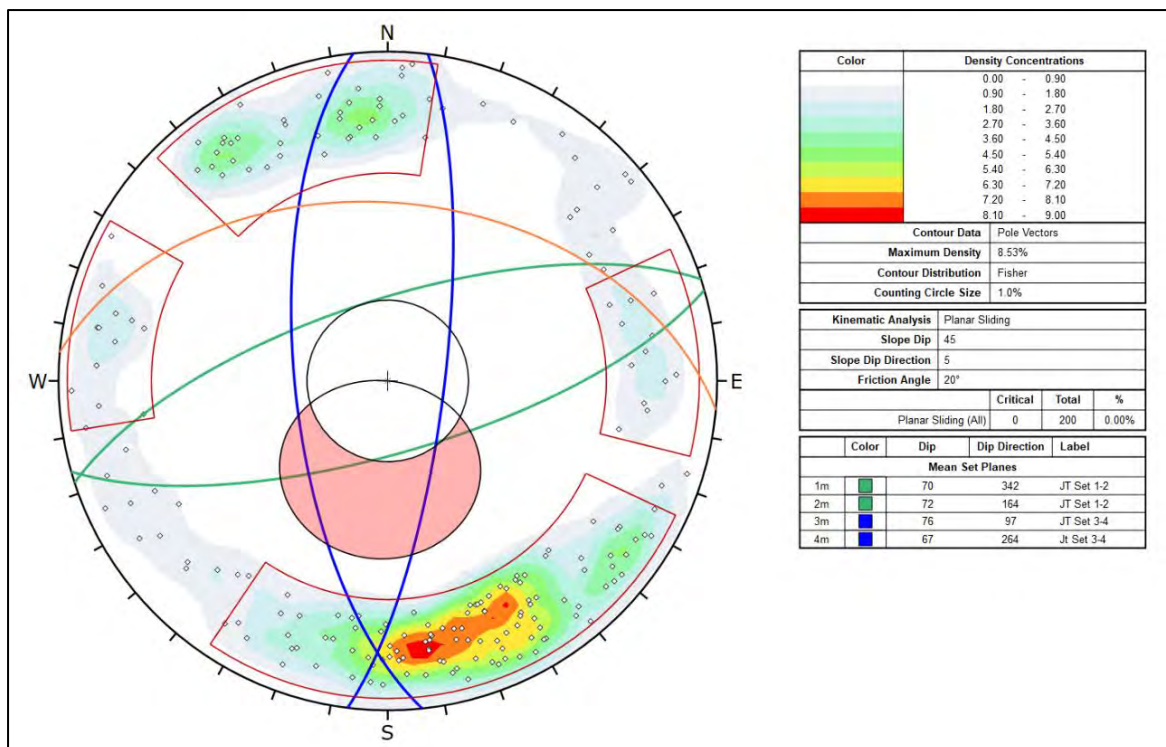


Figure C505 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (South Wall) – Planar Sliding (No Limits).

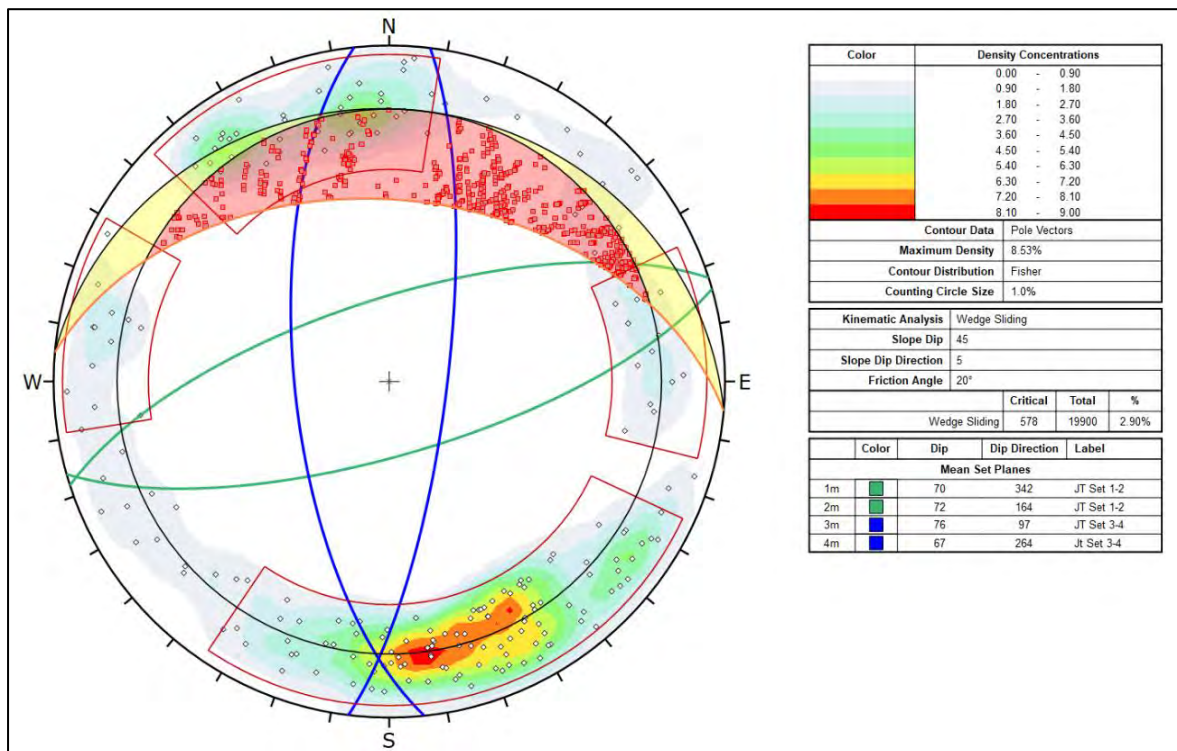


Figure C506 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (South Wall) – Wedge Sliding.

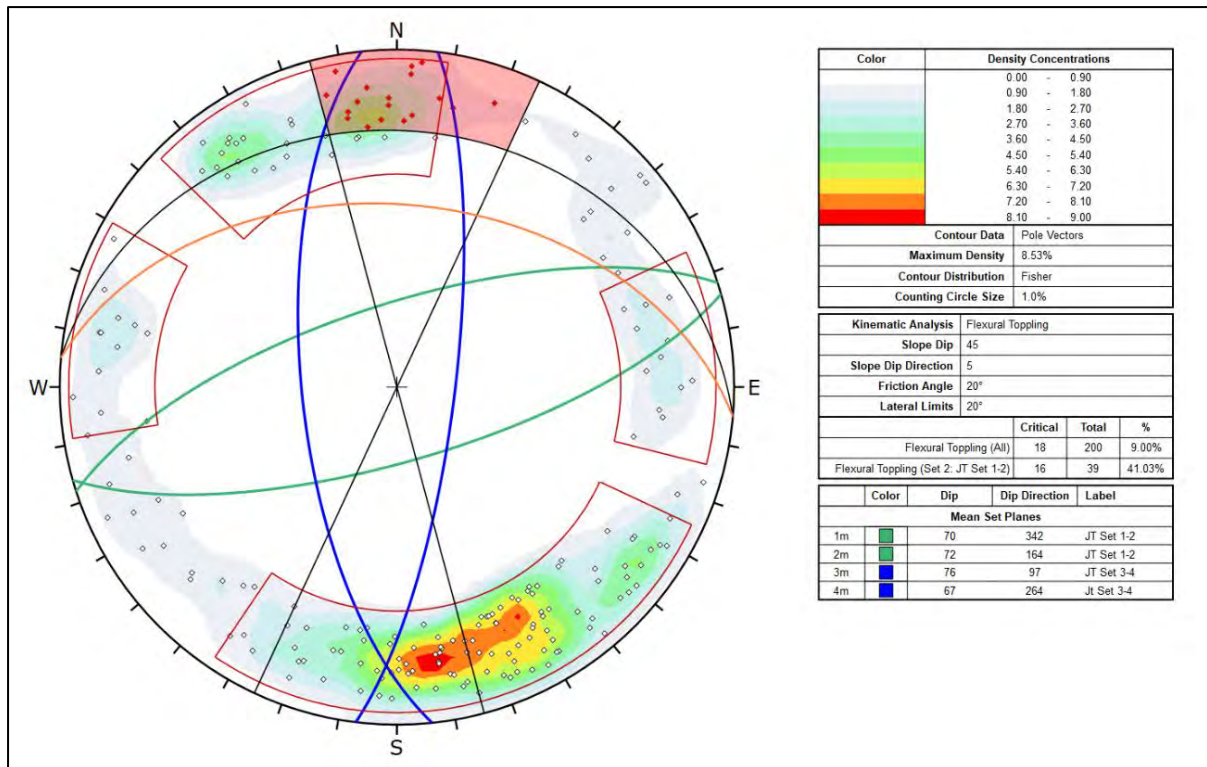


Figure C507 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (South Wall) – Flexural Toppling.

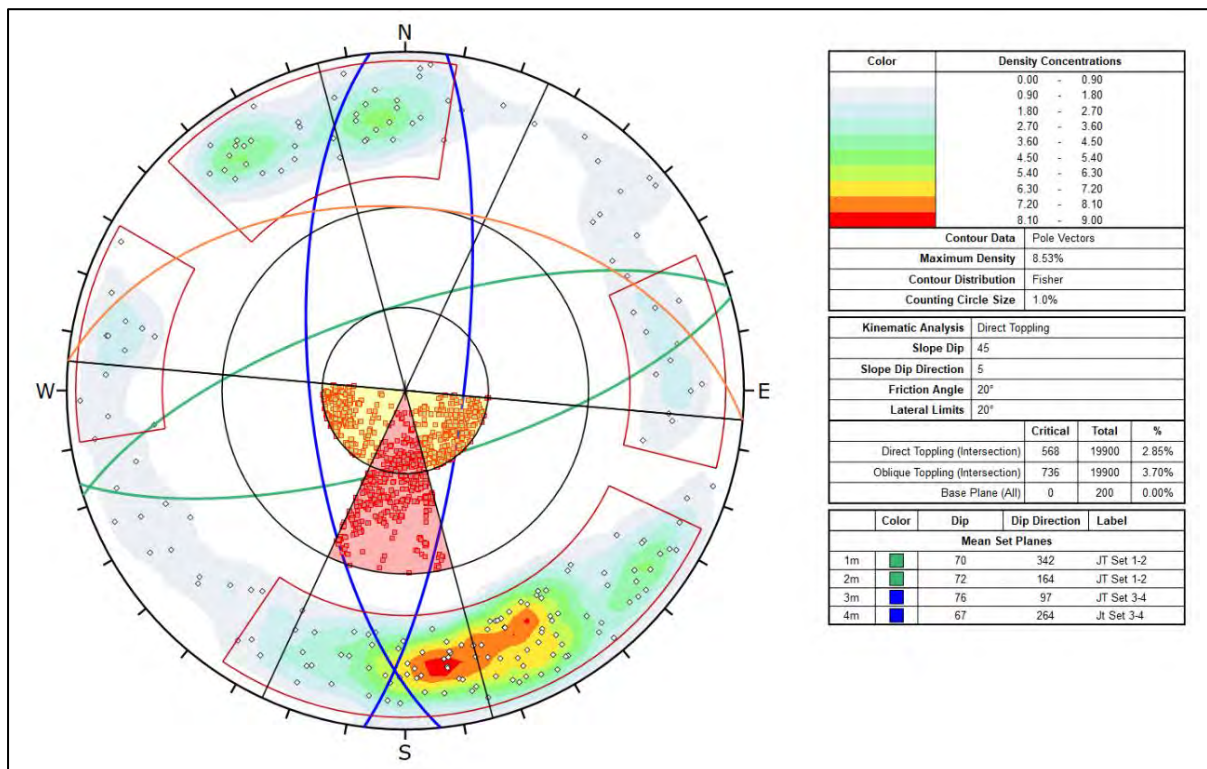


Figure C508 – Kinematic Analysis (Joints >60°) - Overall Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Joints >60°– Bench Slope

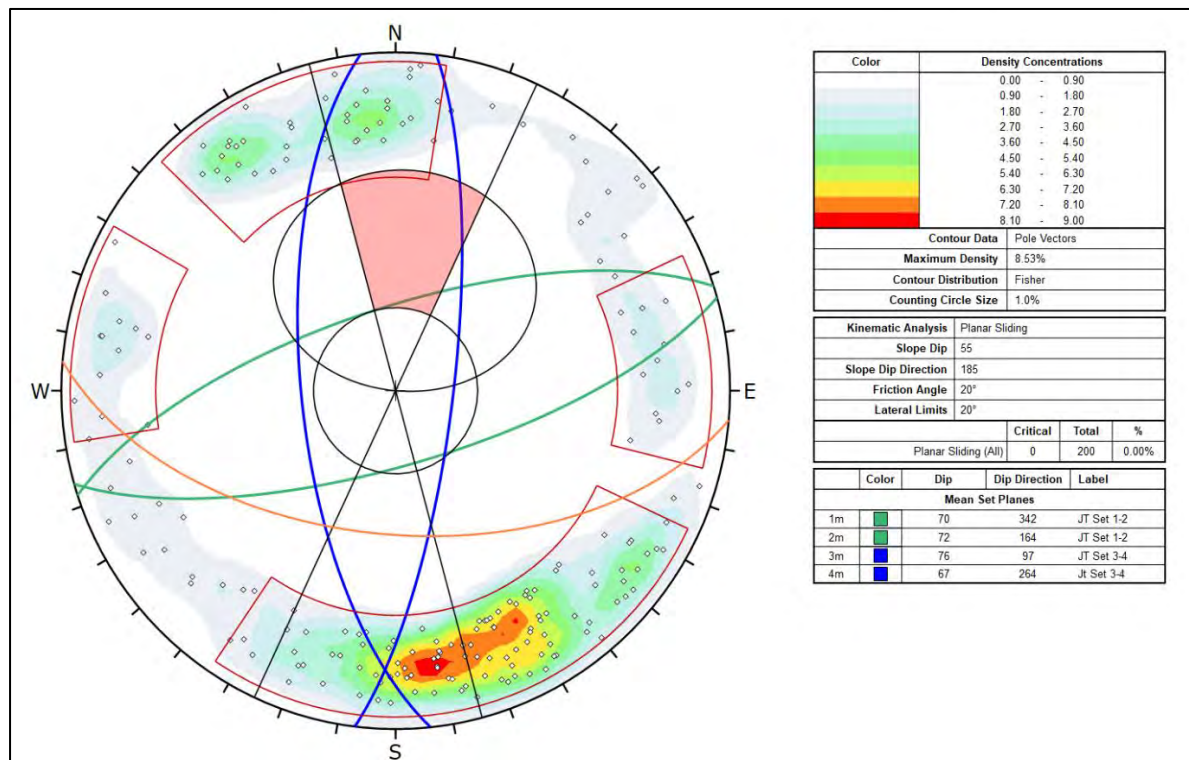


Figure C509 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (North Wall) – Planar Sliding.

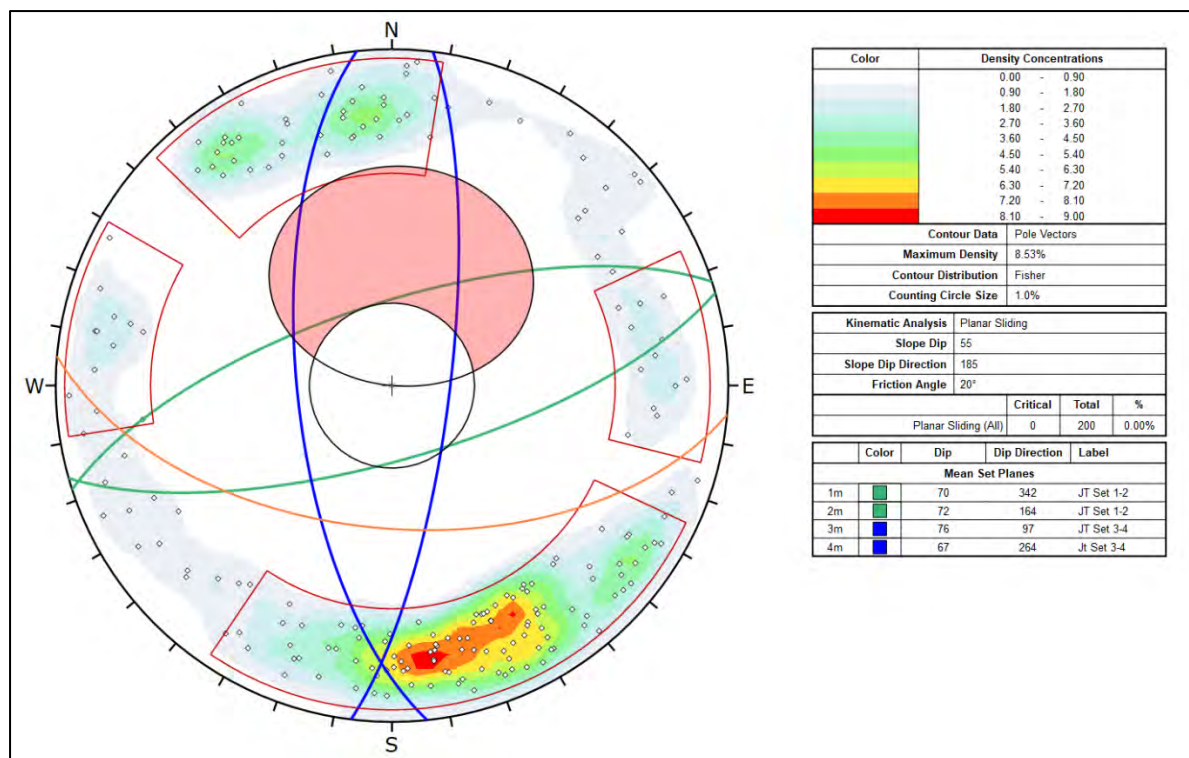


Figure C510 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (North Wall) – Planar Sliding.

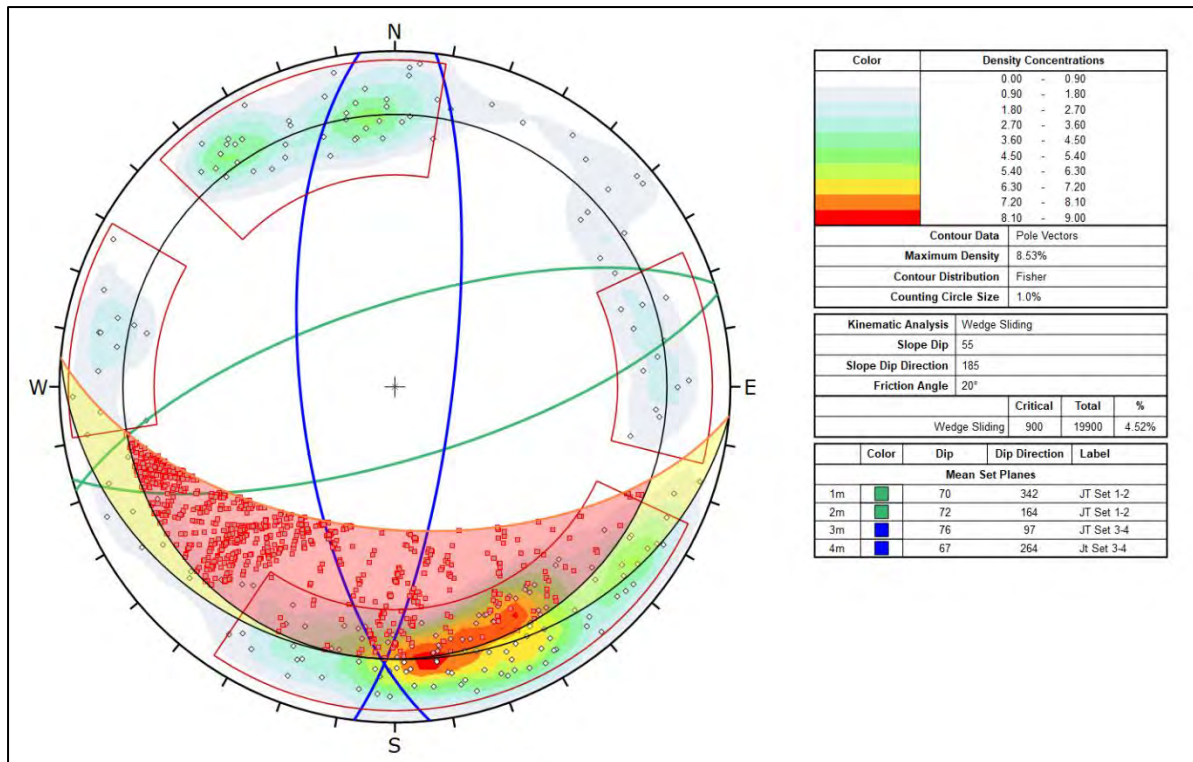


Figure C511 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (North Wall) – Planar Sliding.

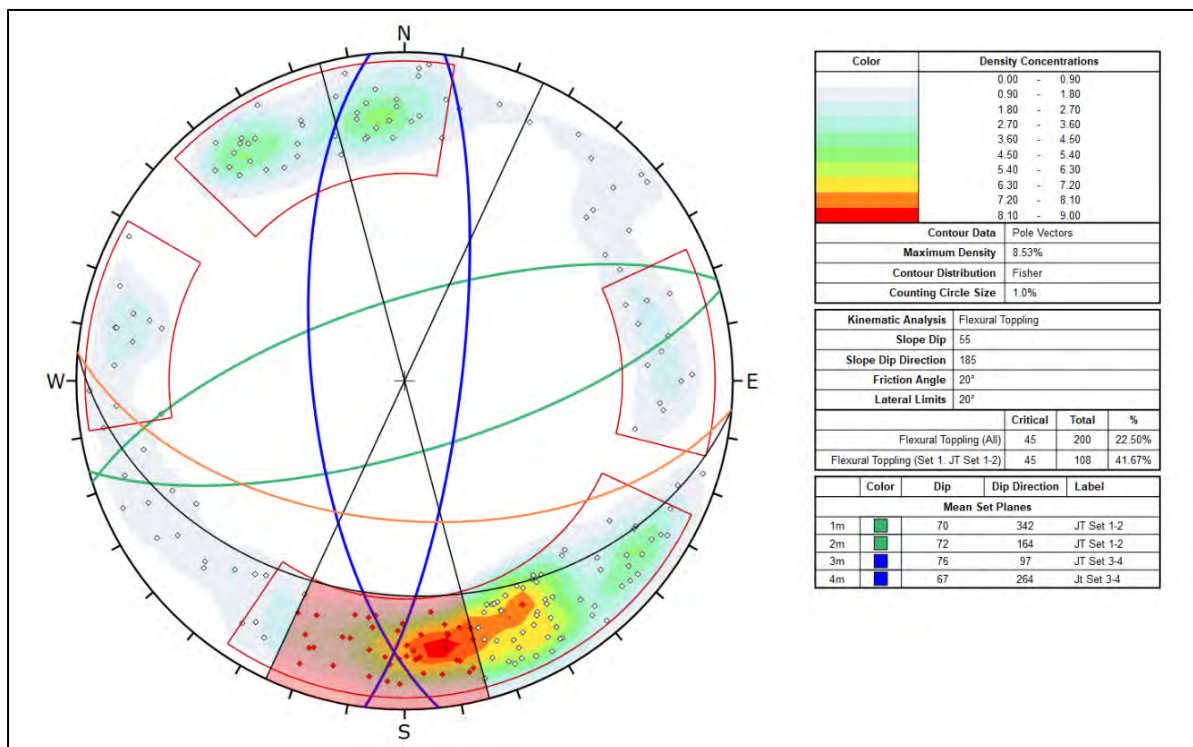


Figure C512 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (North Wall) – Flexural Toppling.

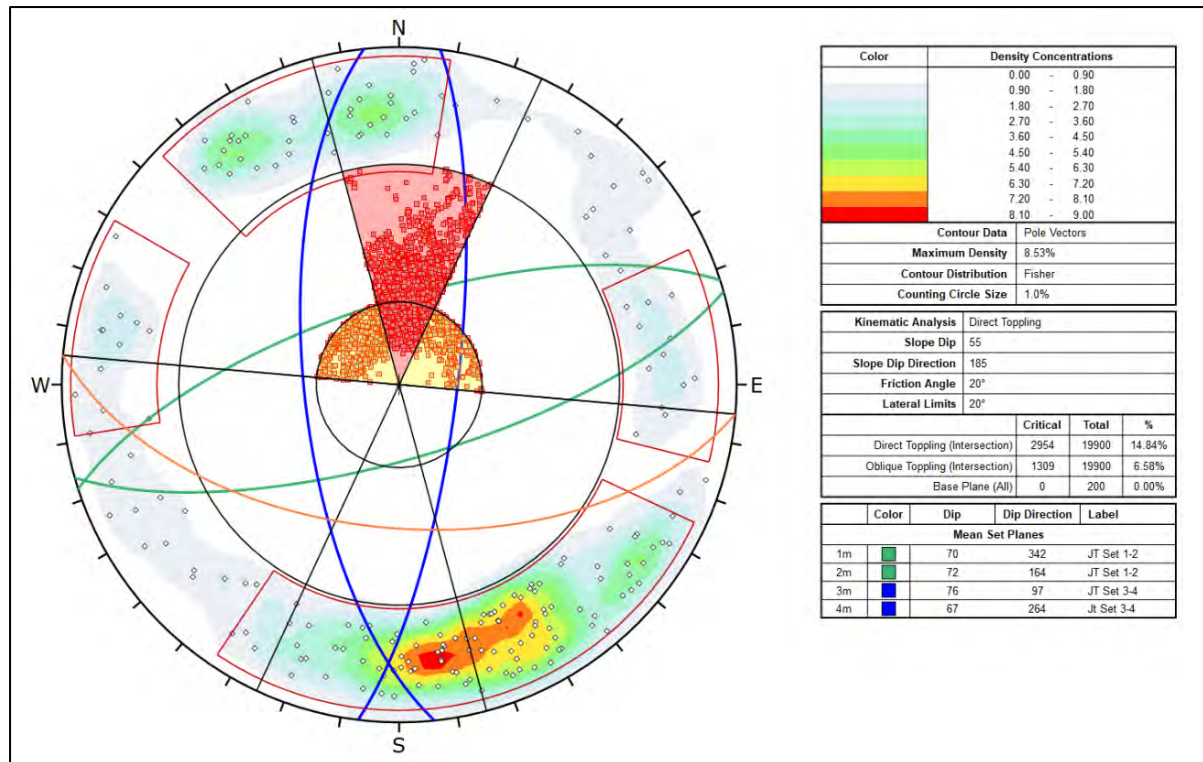


Figure C513 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Joints >60° – Bench Slope

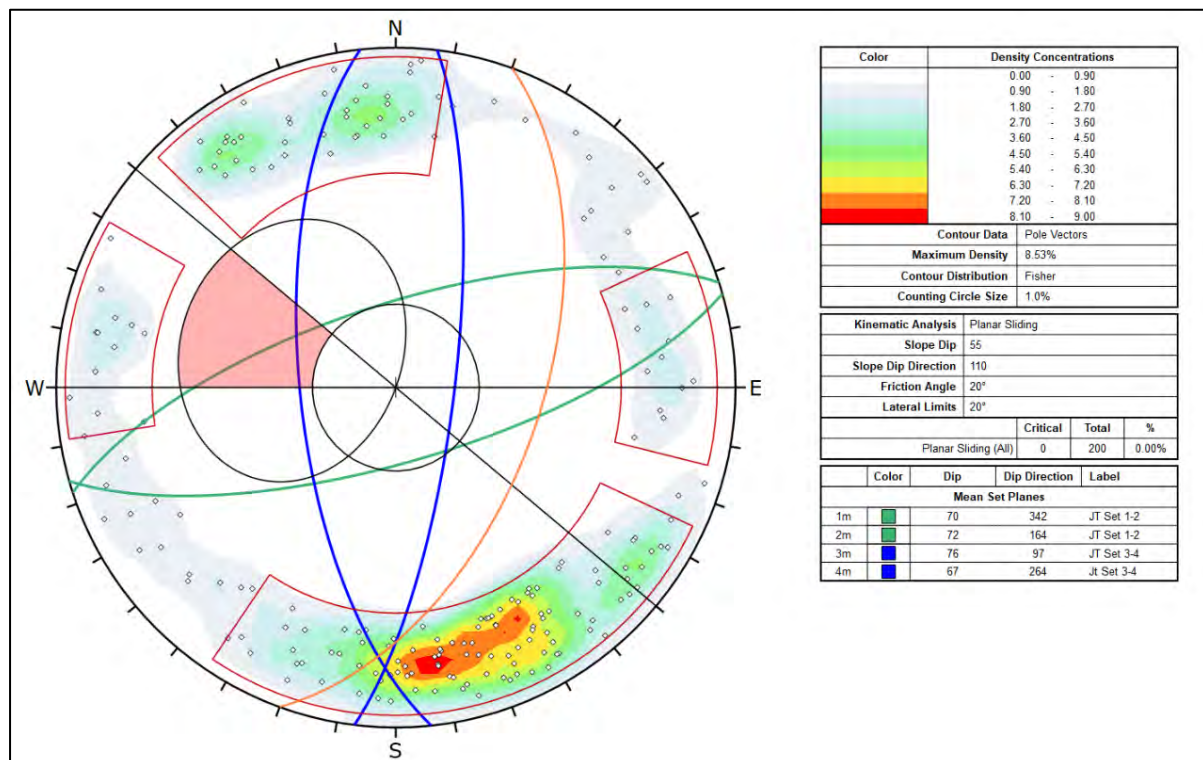


Figure C514 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (West Wall) – Planar Sliding.

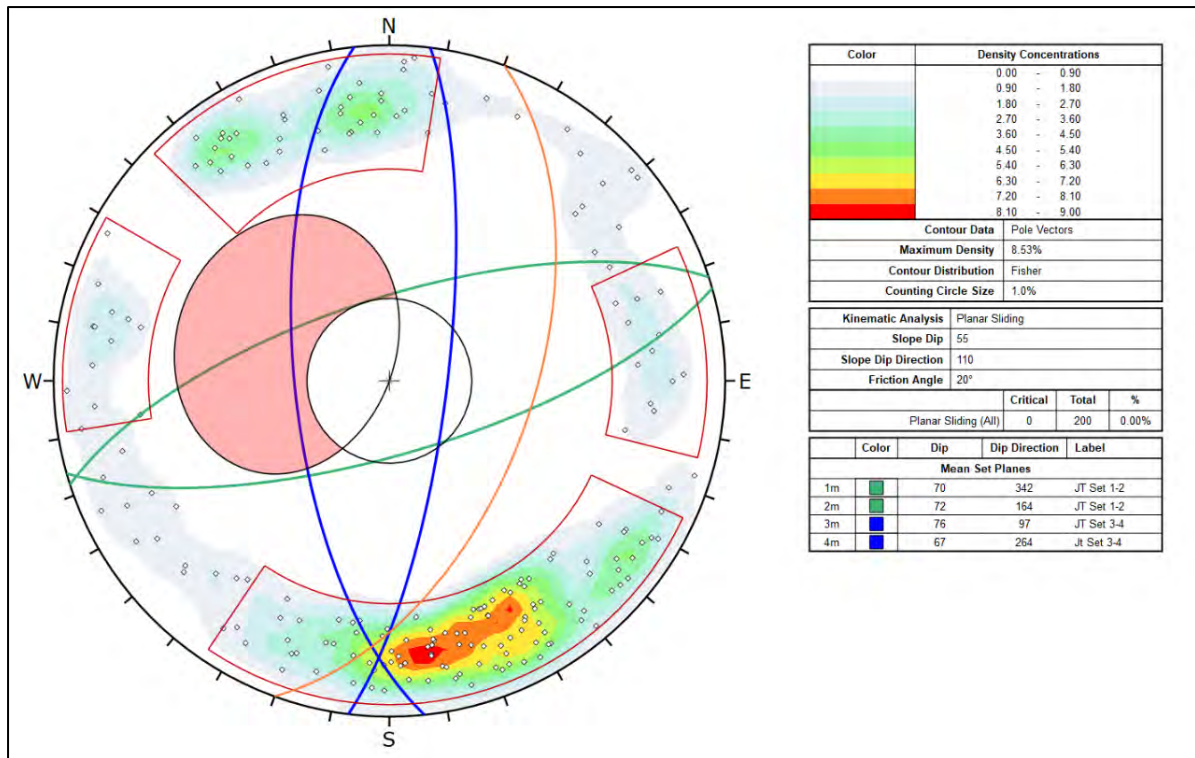


Figure C515 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

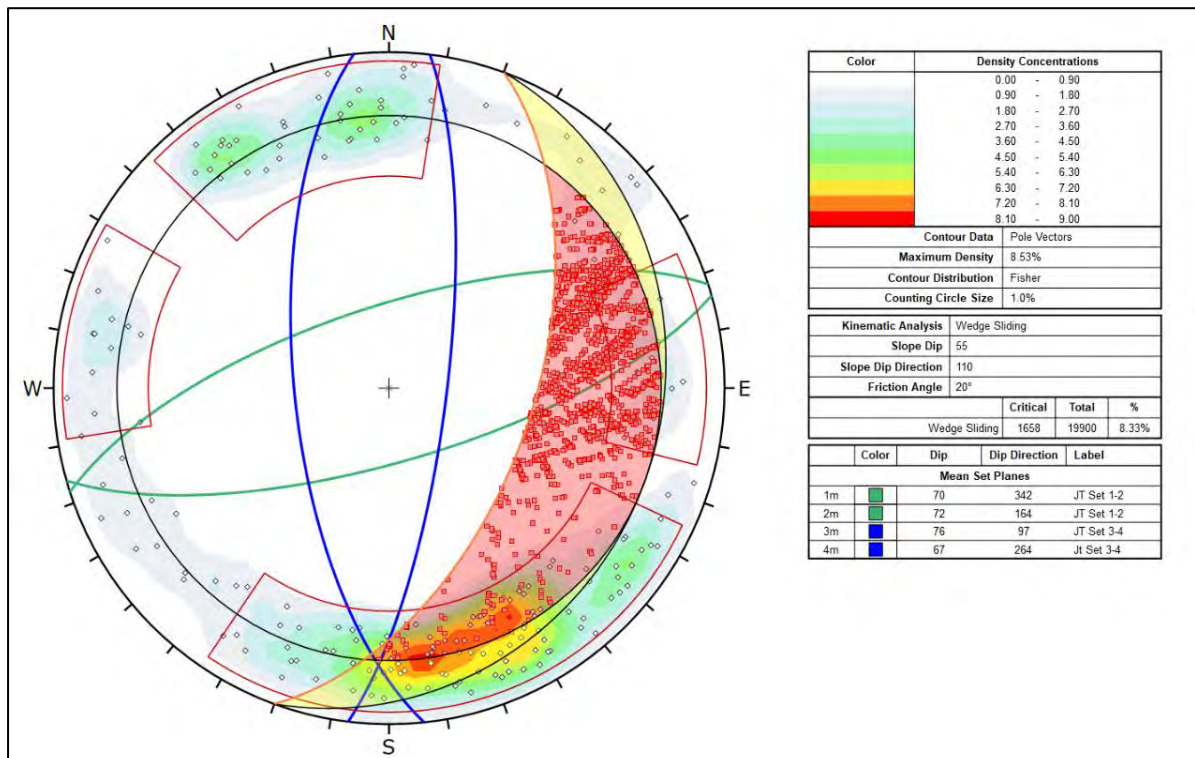


Figure C516 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (West Wall) – Wedge Sliding.

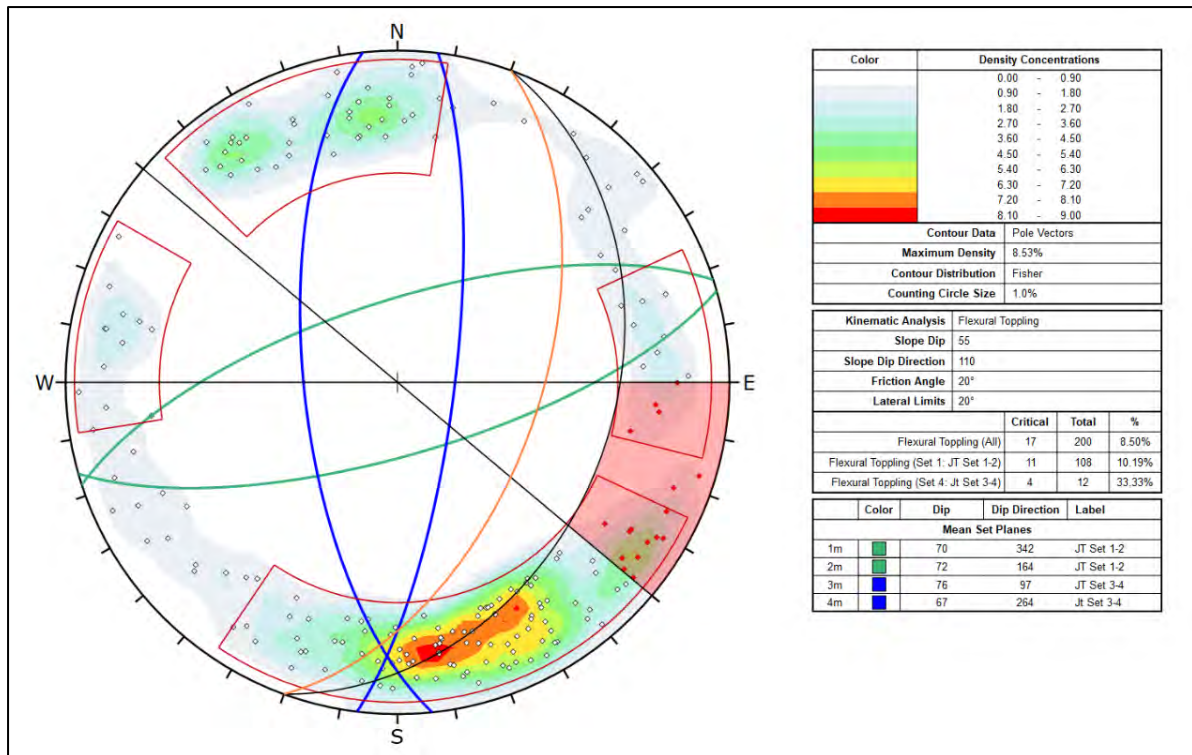


Figure C517 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (West Wall) – Flexural Toppling.

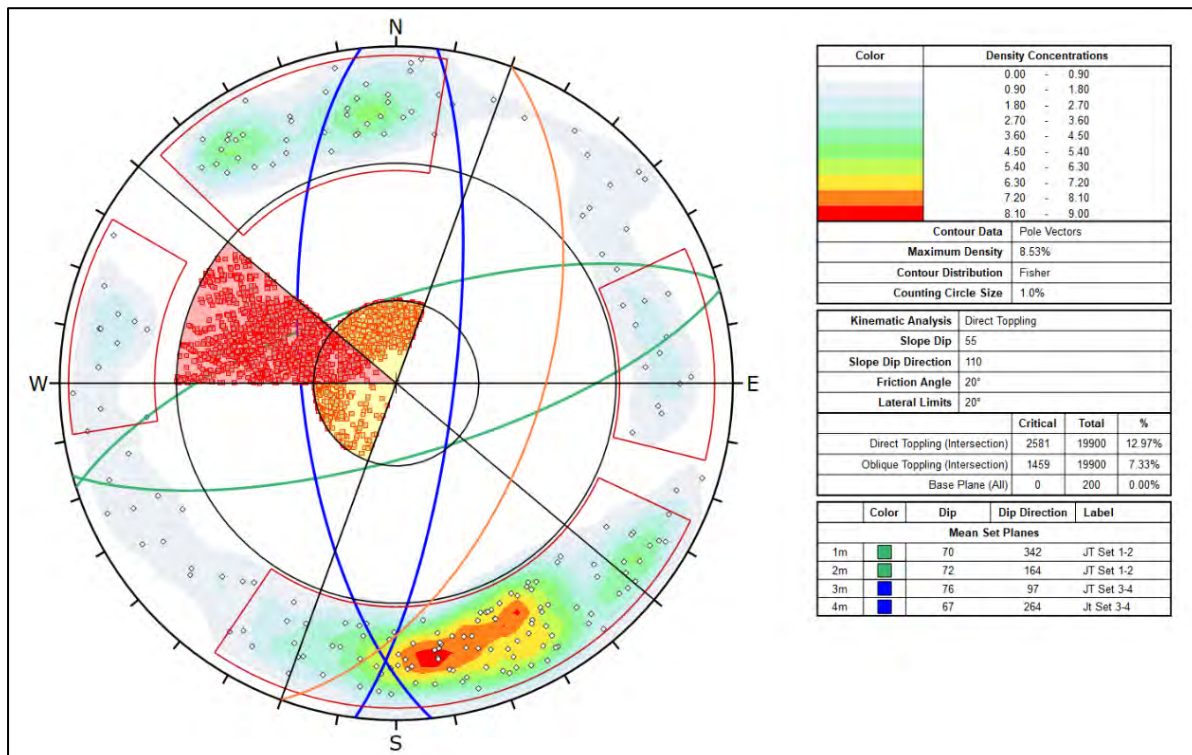


Figure C518 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Joints >60° – Bench Slope

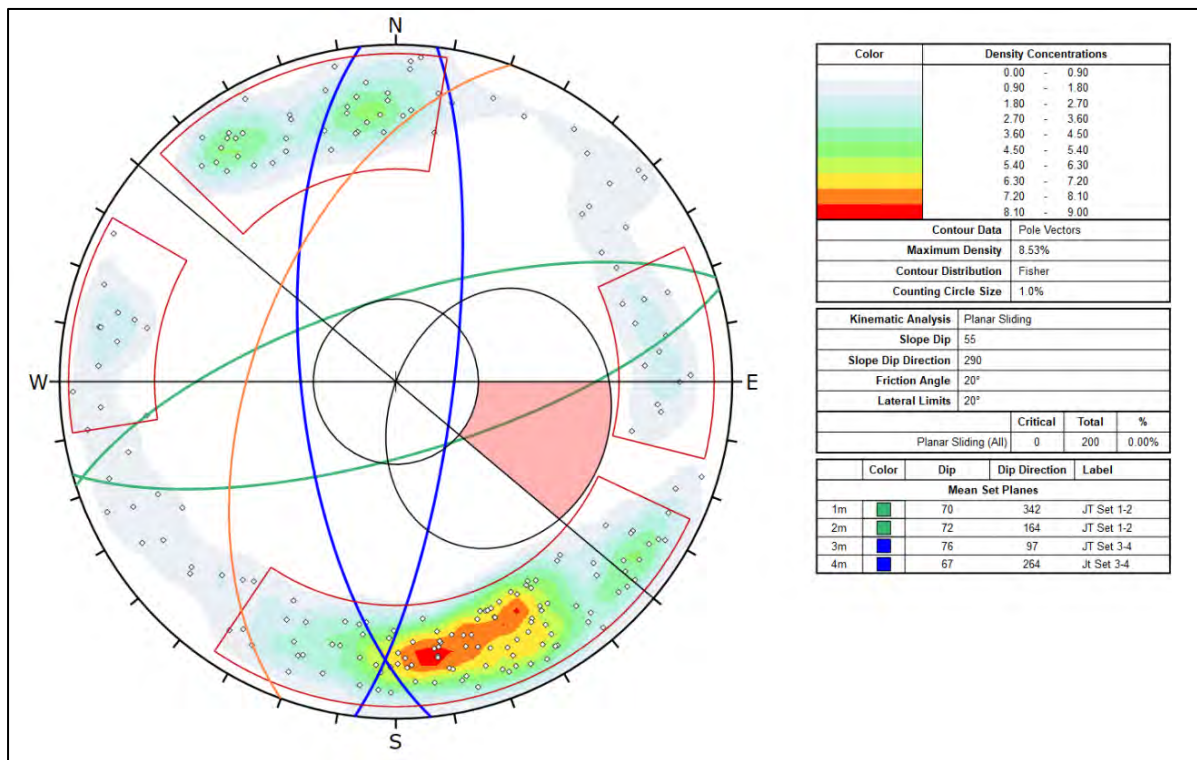


Figure C519 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (East Wall) – Planar Sliding.

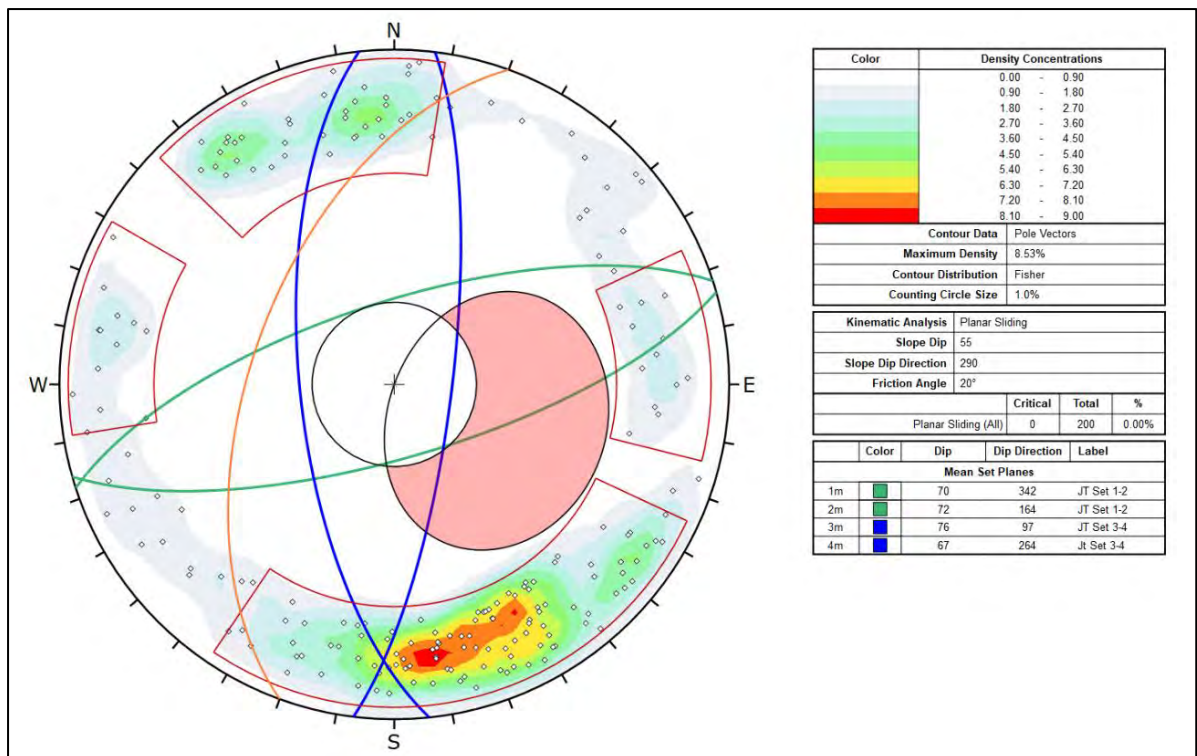


Figure C520 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

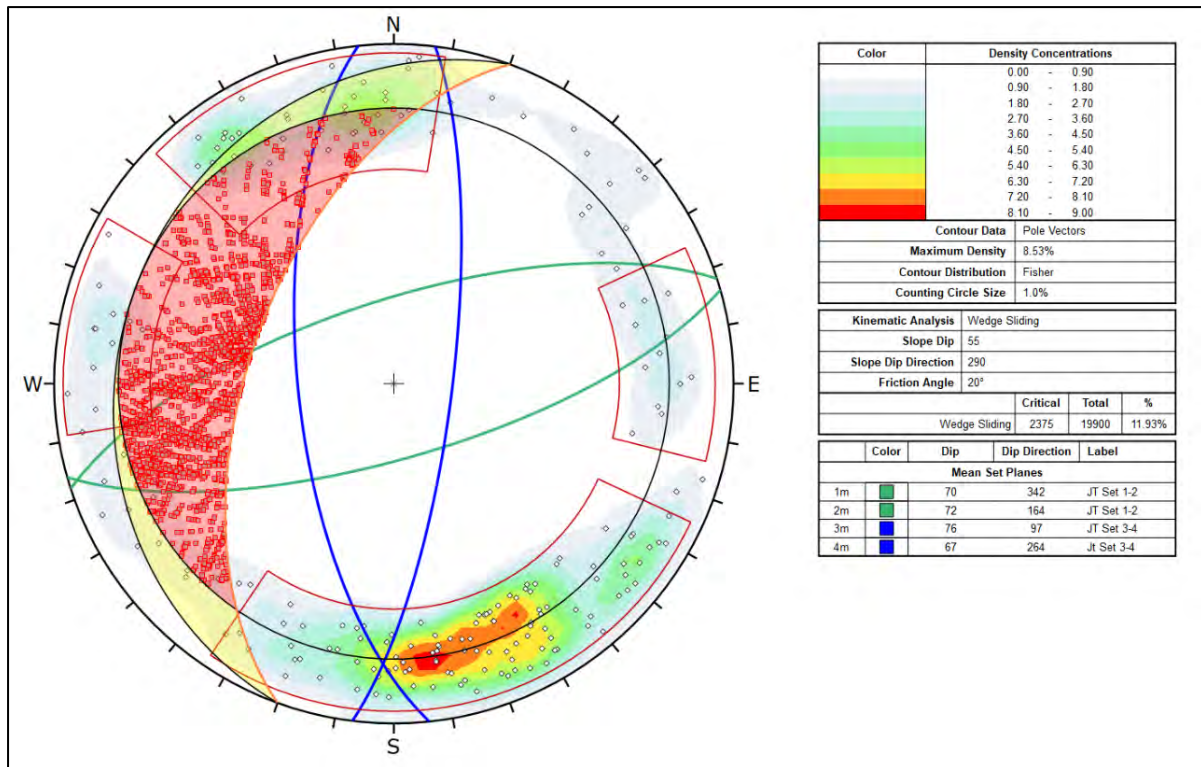


Figure C521 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (East Wall) – Wedge Sliding.

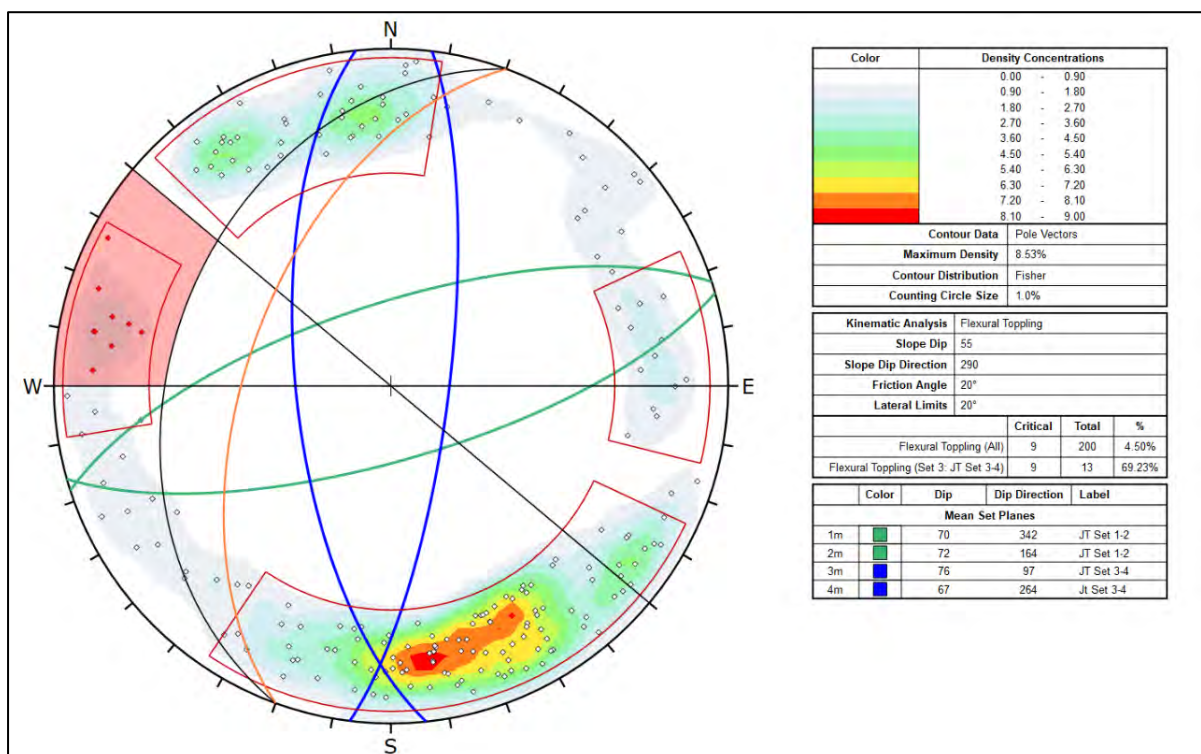


Figure C522 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (East Wall) – Flexural Toppling.

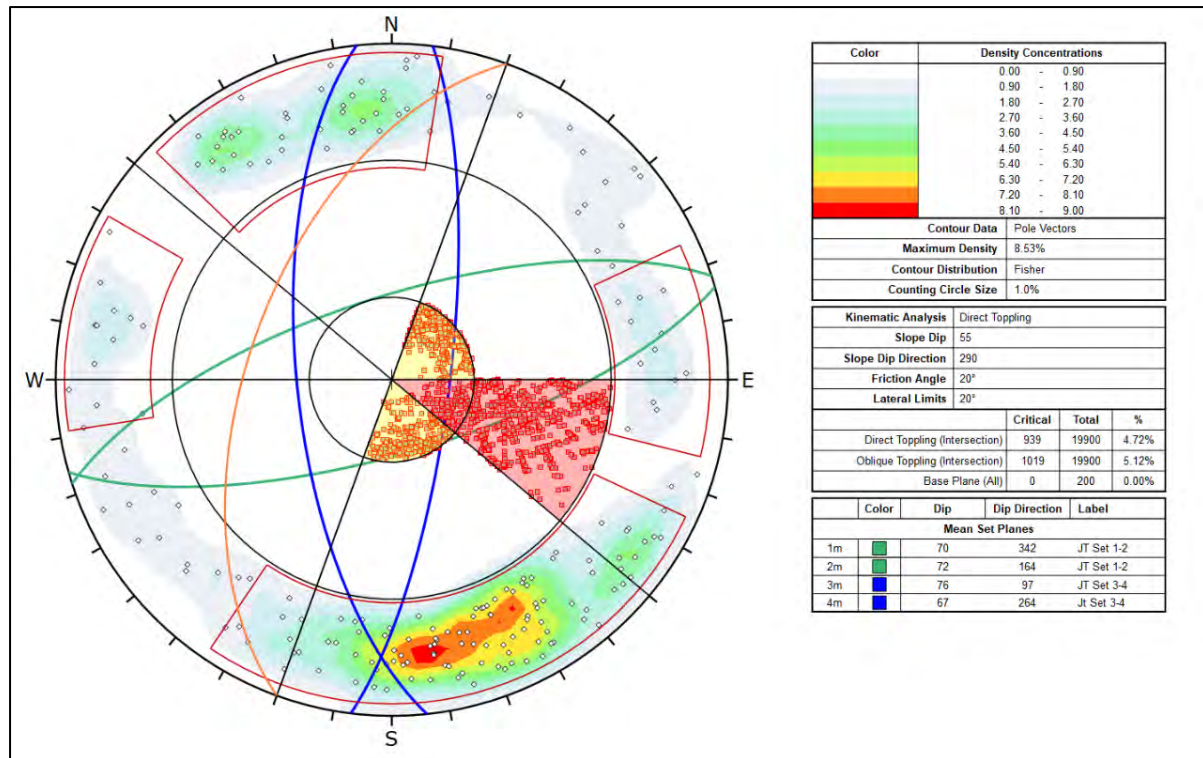


Figure C523 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Joints >60° – Bench Slope

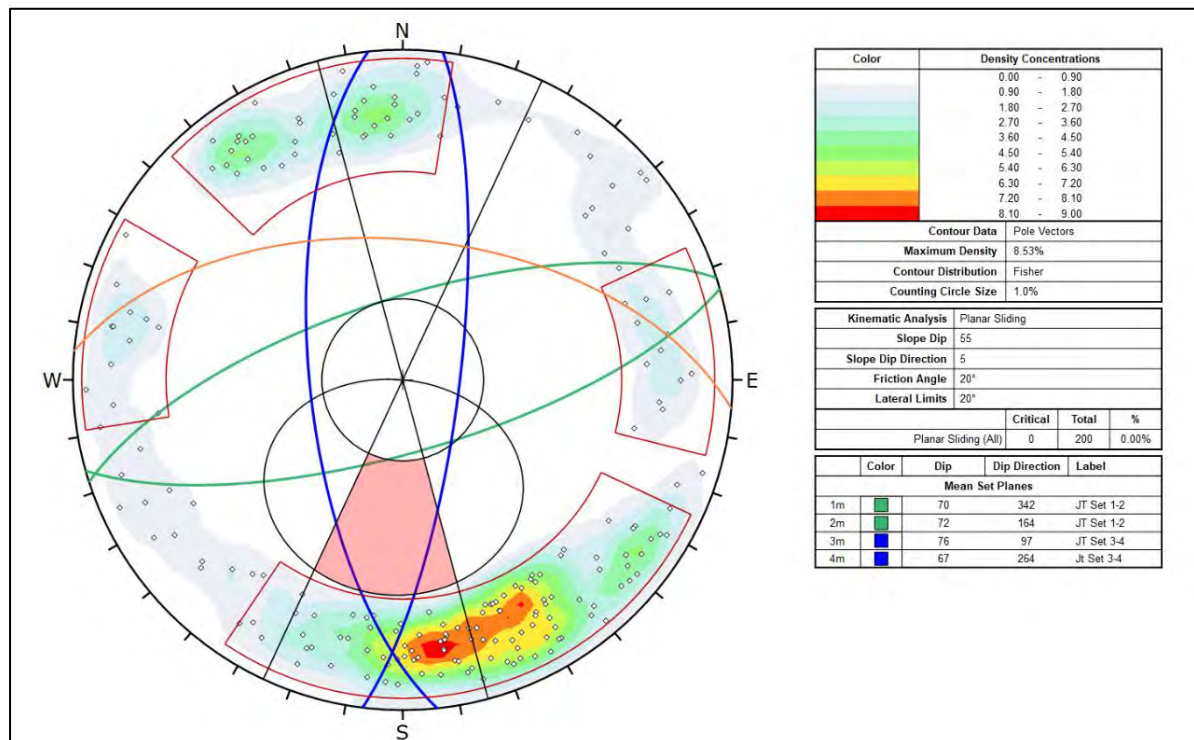


Figure C524 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (South Wall) – Planar Sliding.

Figure C525 – Kinematic Analysis (Joints $>60^\circ$) - Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).

Figure C526 – Kinematic Analysis (Joints $>60^\circ$) - Bench Slope – West Sump (South Wall) – Wedge Failure.

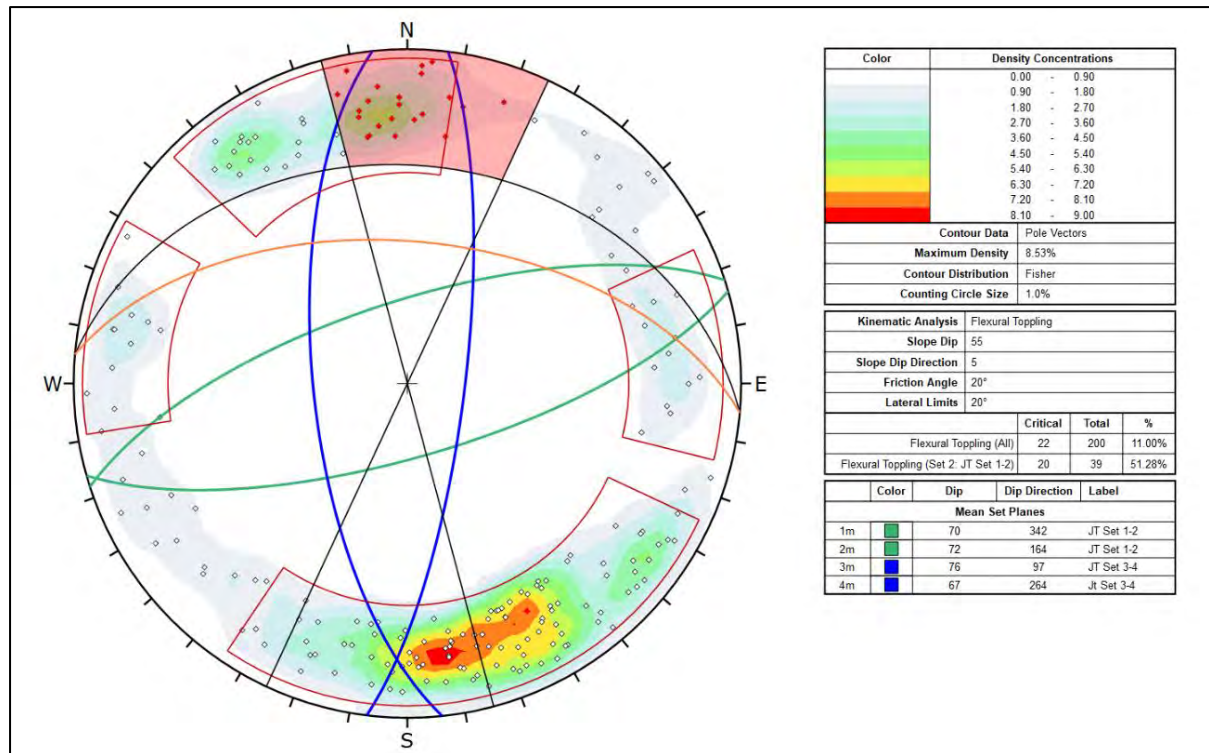


Figure C527 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (South Wall) – Flexural Toppling.

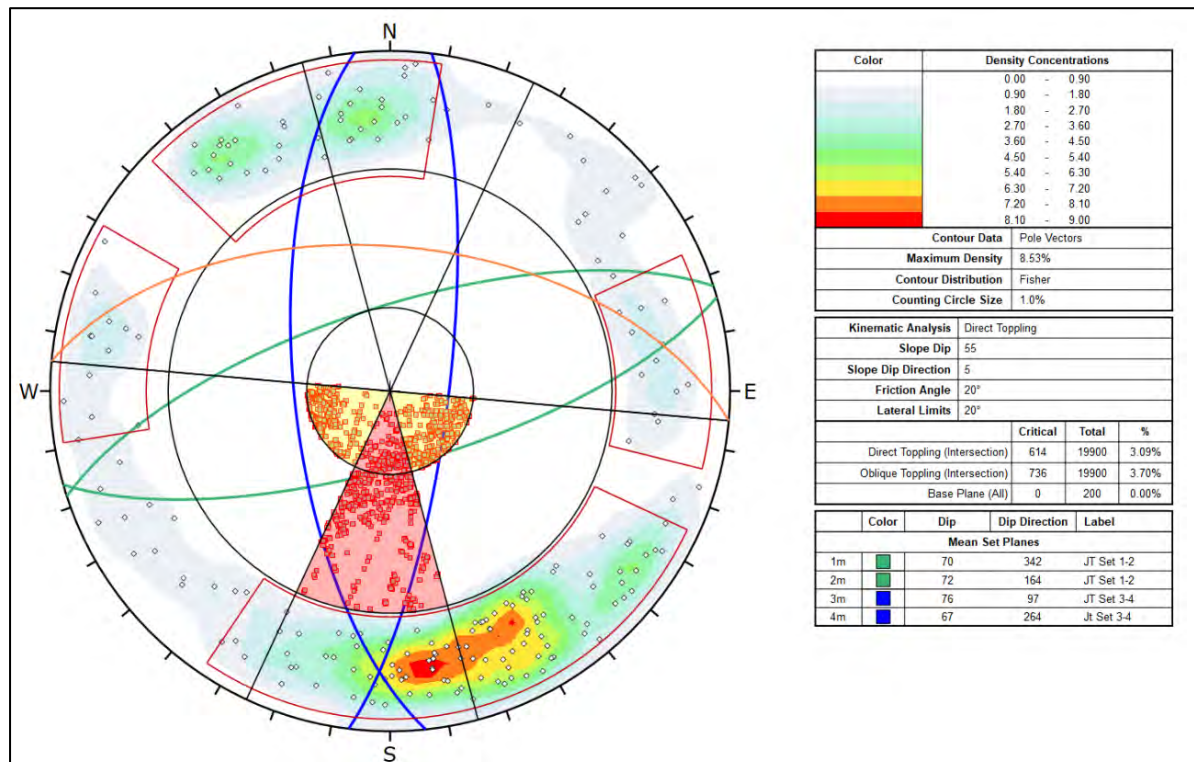


Figure C528 – Kinematic Analysis (Joints >60°) - Bench Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Fractures <30° – Overall Slope

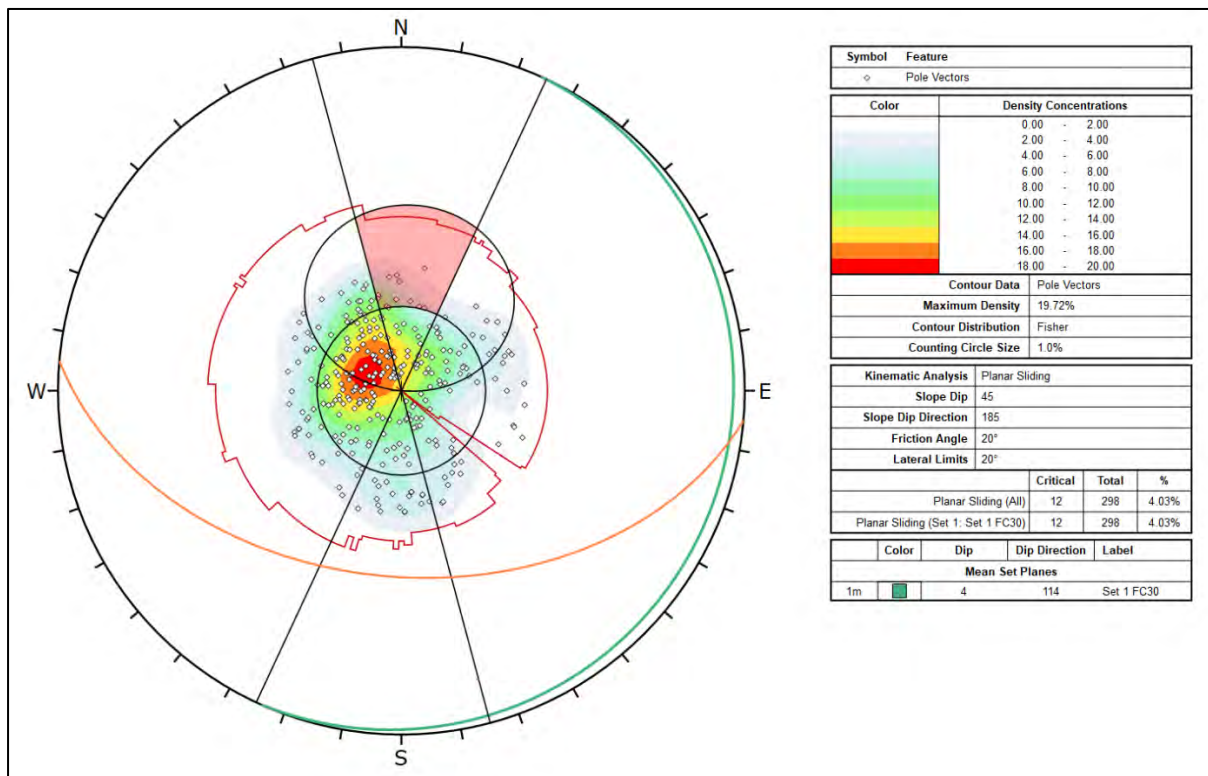


Figure C529 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (North Wall) – Planar Sliding.

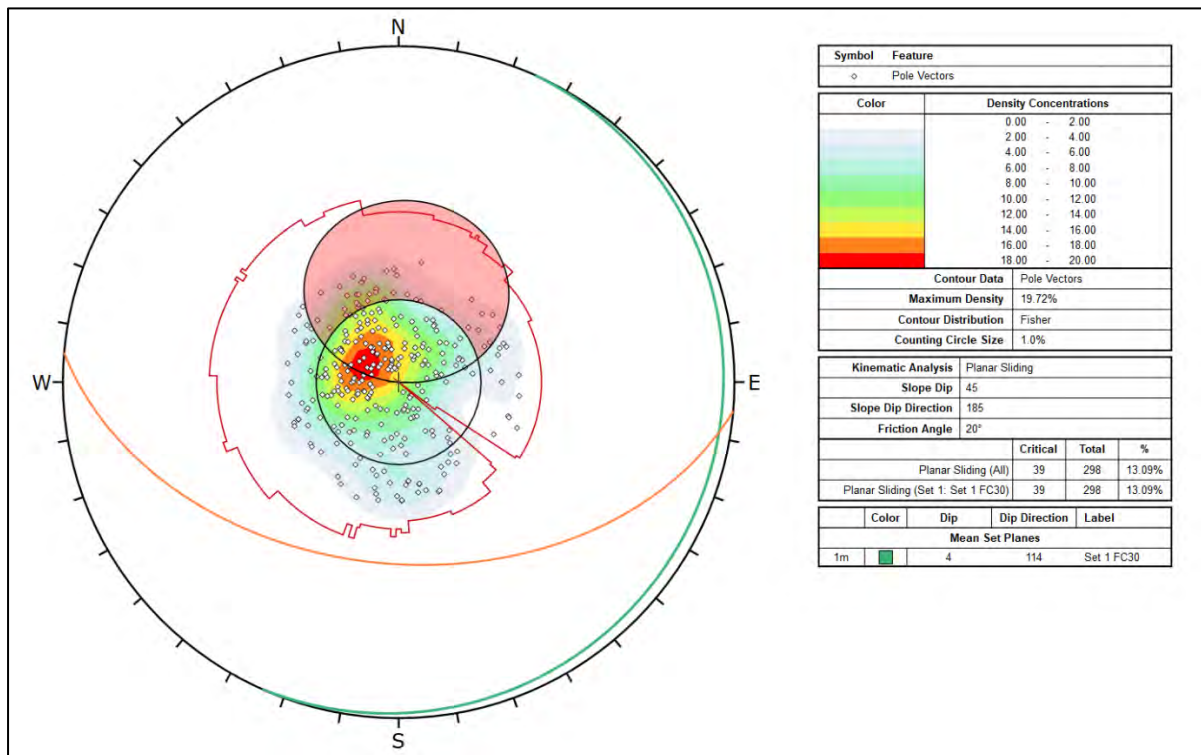


Figure C530 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (North Wall) – Planar Sliding (No Limits).

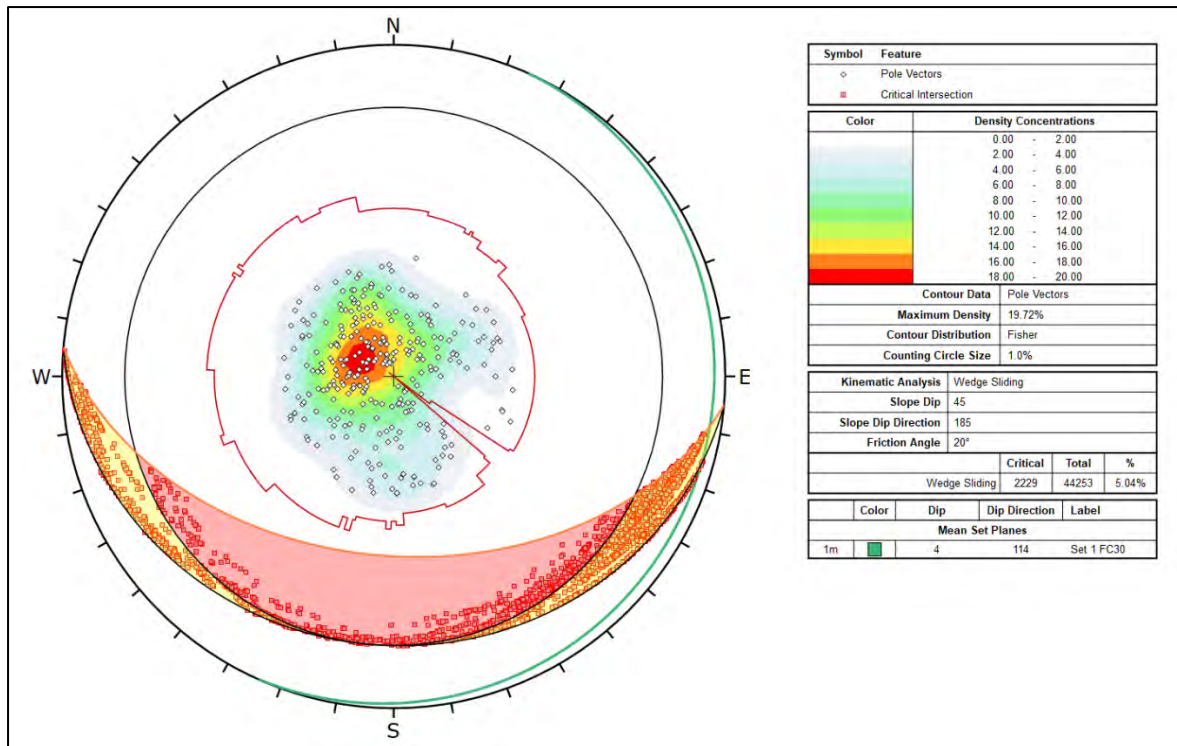


Figure C531 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (North Wall) – Wedge Sliding.

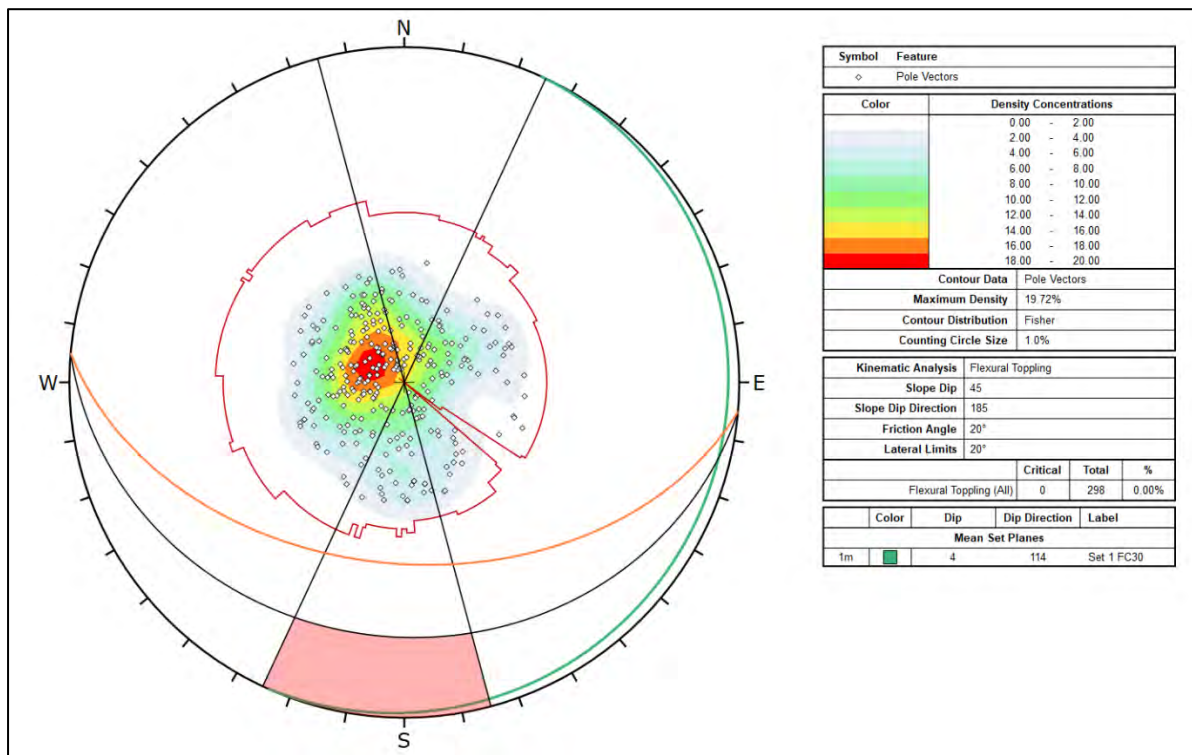


Figure C532 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (North Wall) – Flexural Toppling.

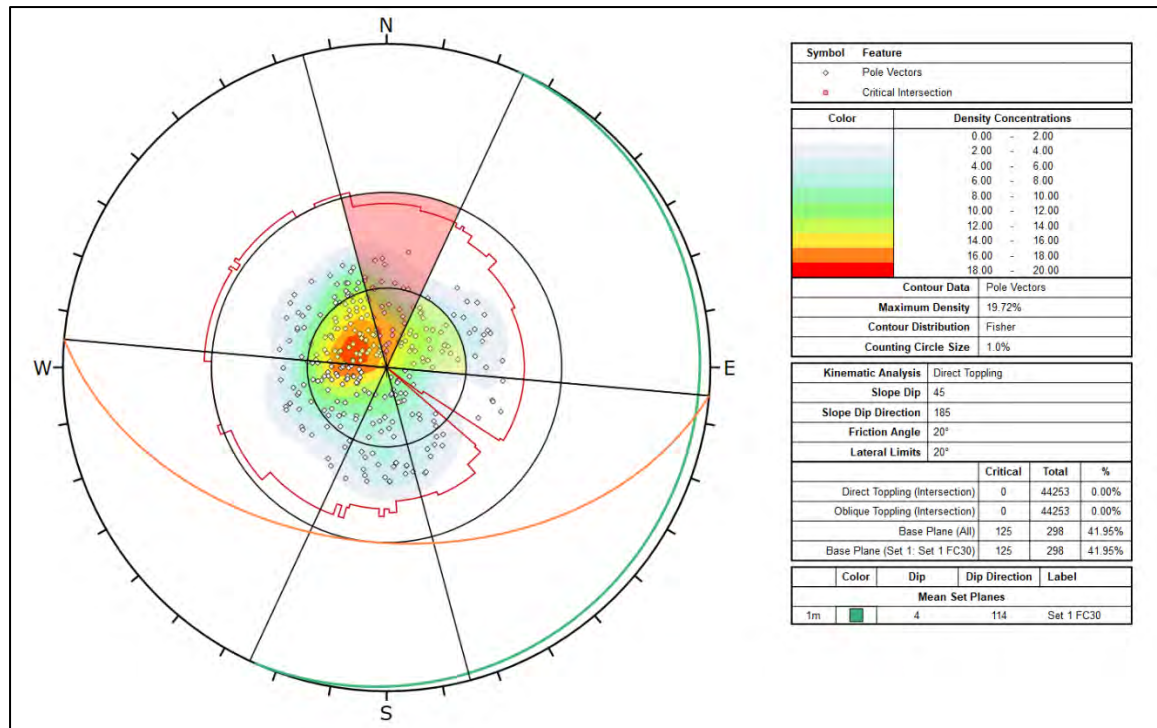


Figure C533 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Fractures <30° – Overall Slope

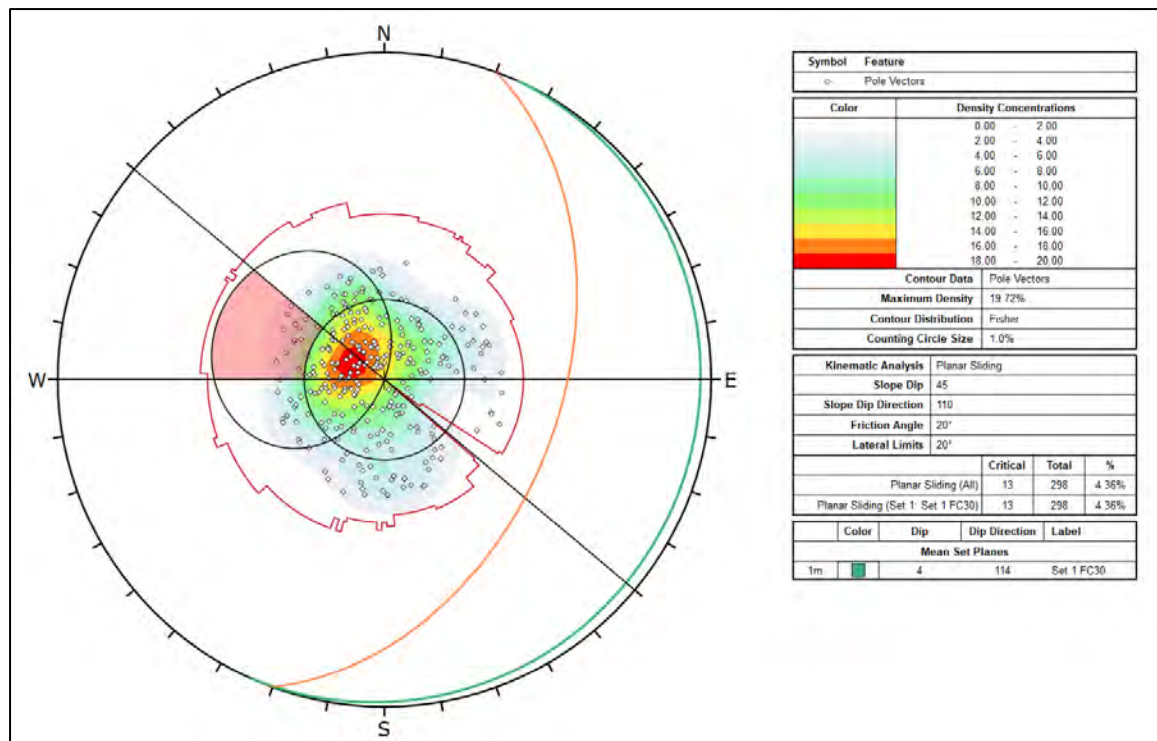


Figure C534 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (West Wall) – Planar Sliding.

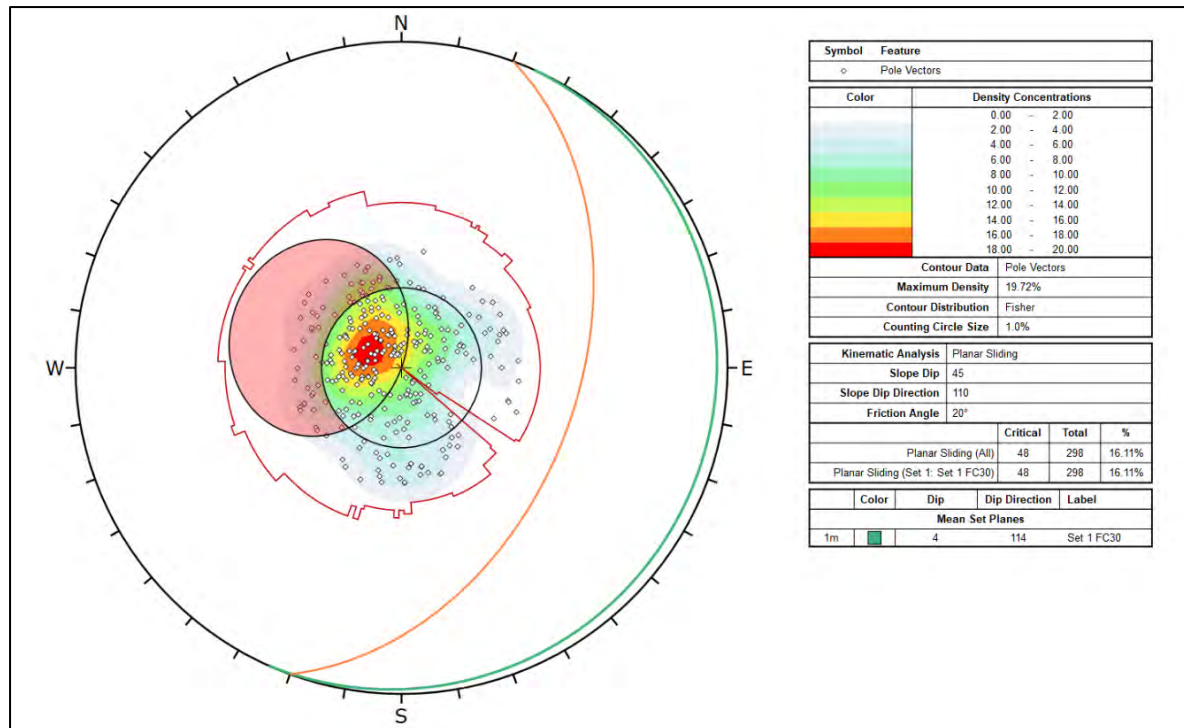


Figure C535 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (West Wall) – Planar Sliding (No Limits).

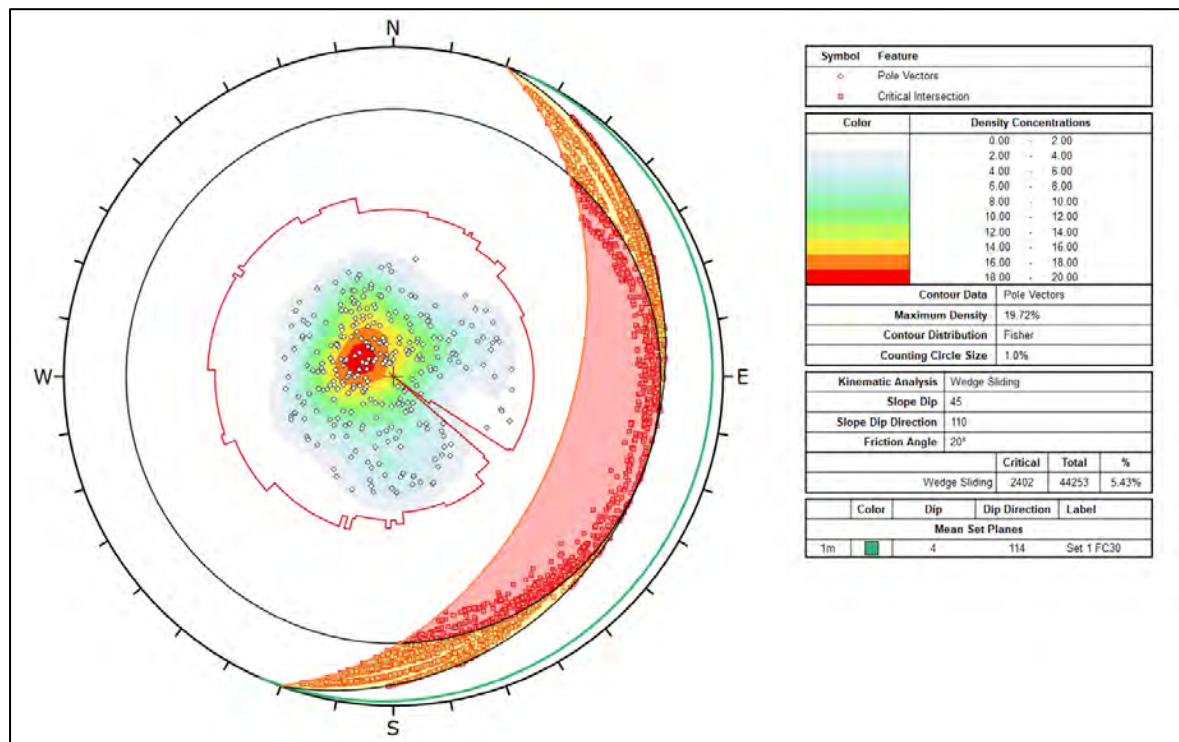


Figure C536 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (West Wall) – Wedge Sliding.

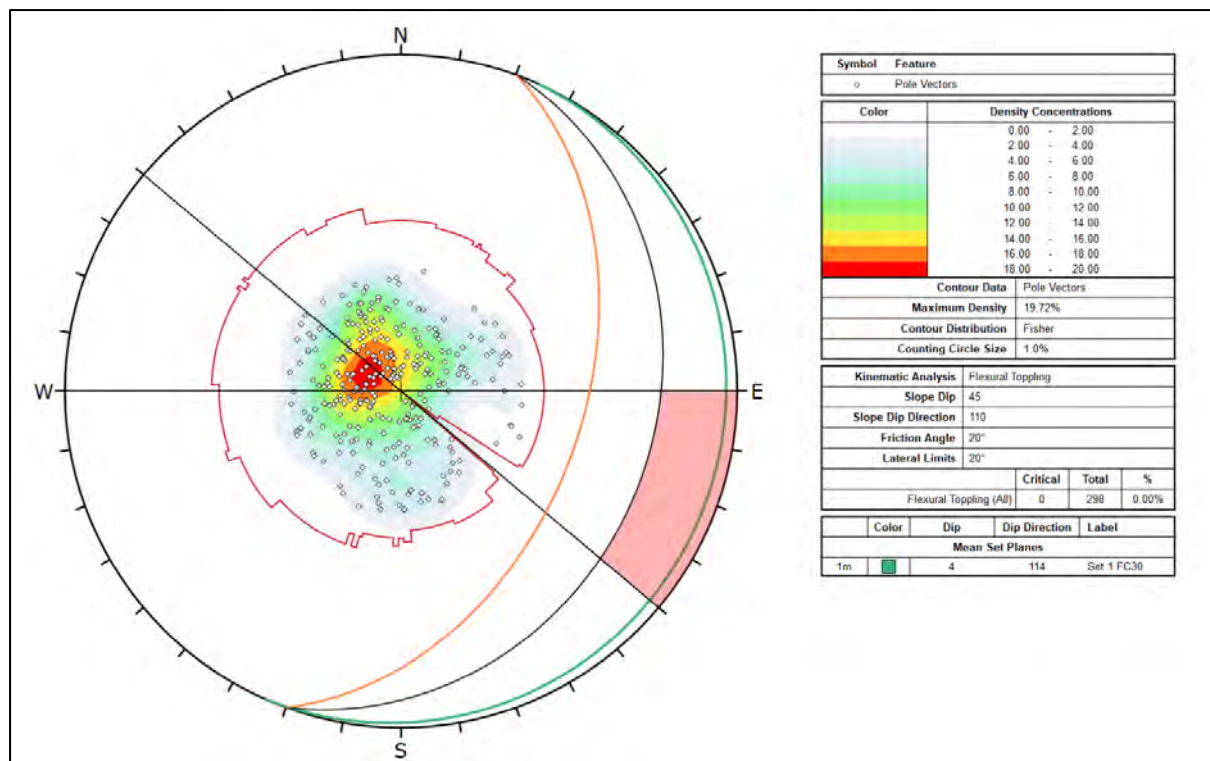


Figure C537 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (West Wall) – Flexural Toppling.

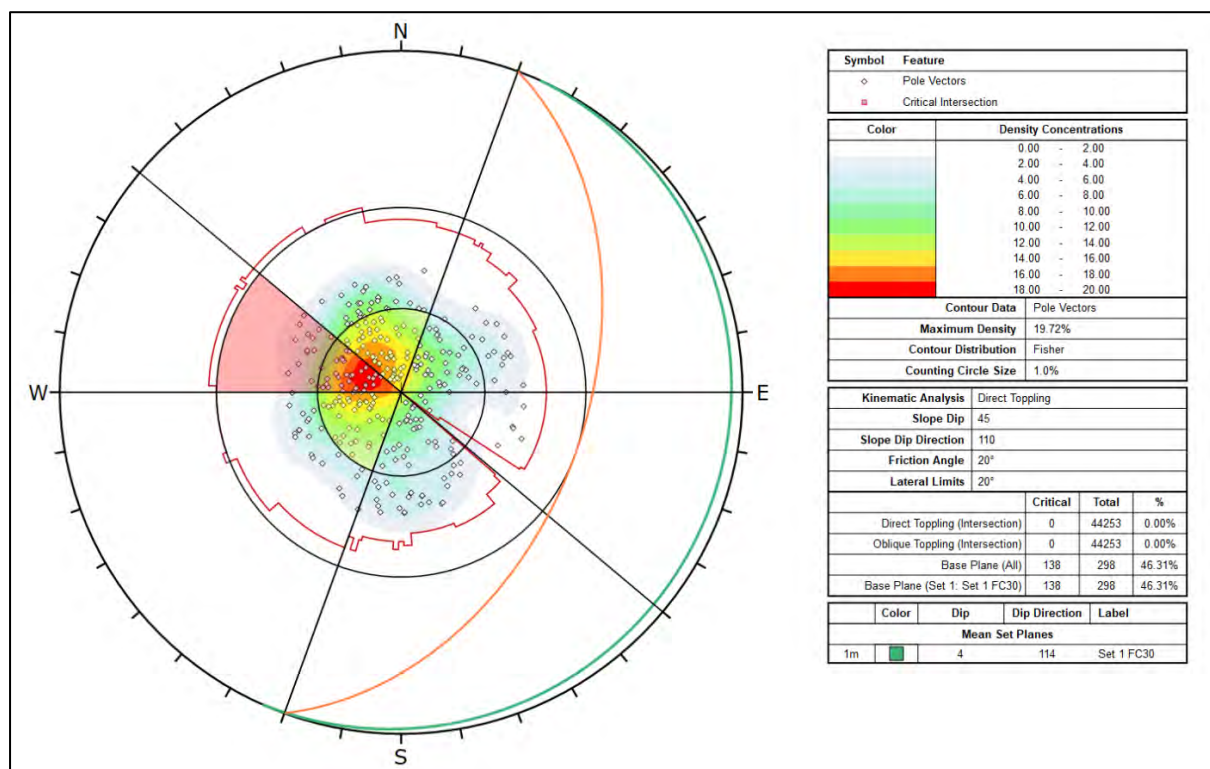


Figure C538– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Fractures <30° – Overall Slope

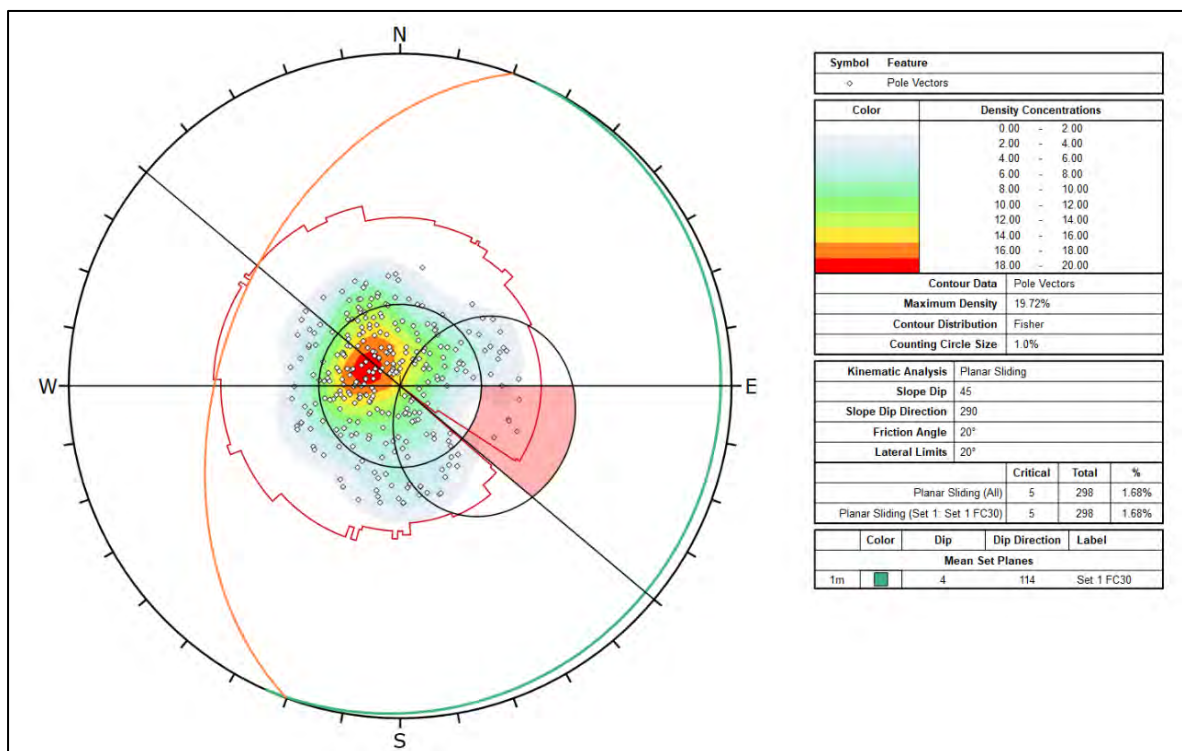


Figure C539– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (East Wall) – Planar Sliding.

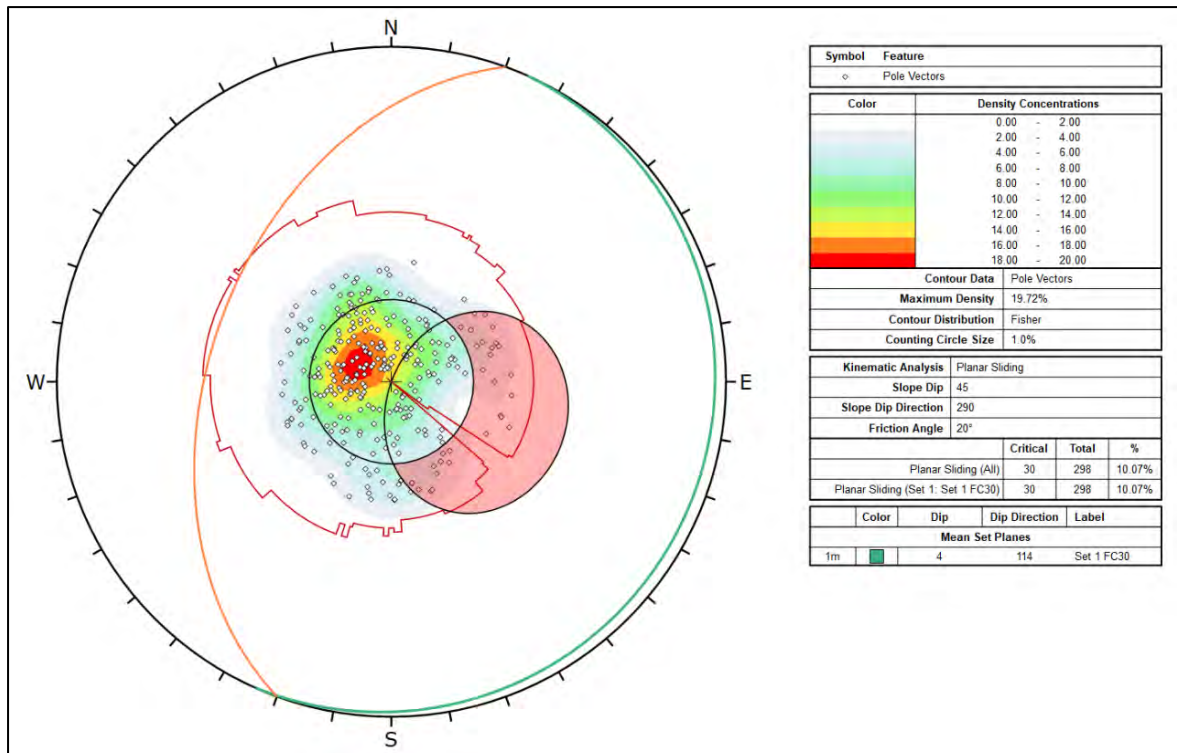


Figure C540– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (East Wall) – Planar Sliding (No Limits).

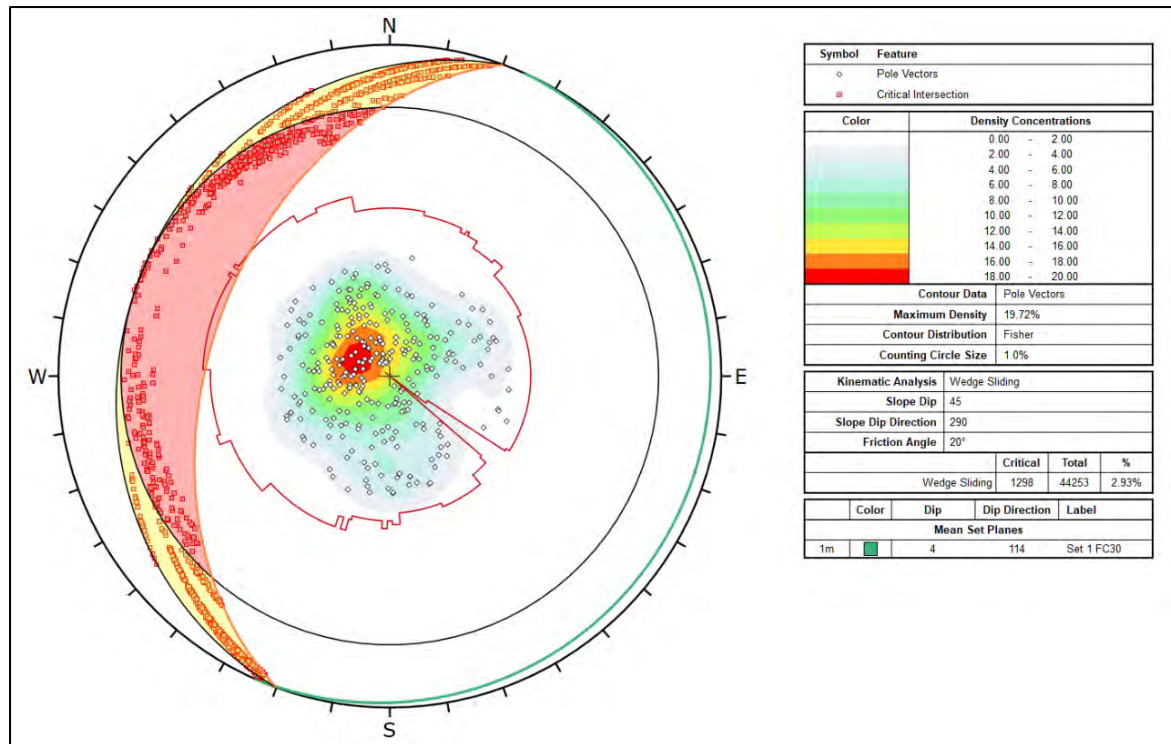


Figure C541- Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (East Wall) – Wedge Sliding.

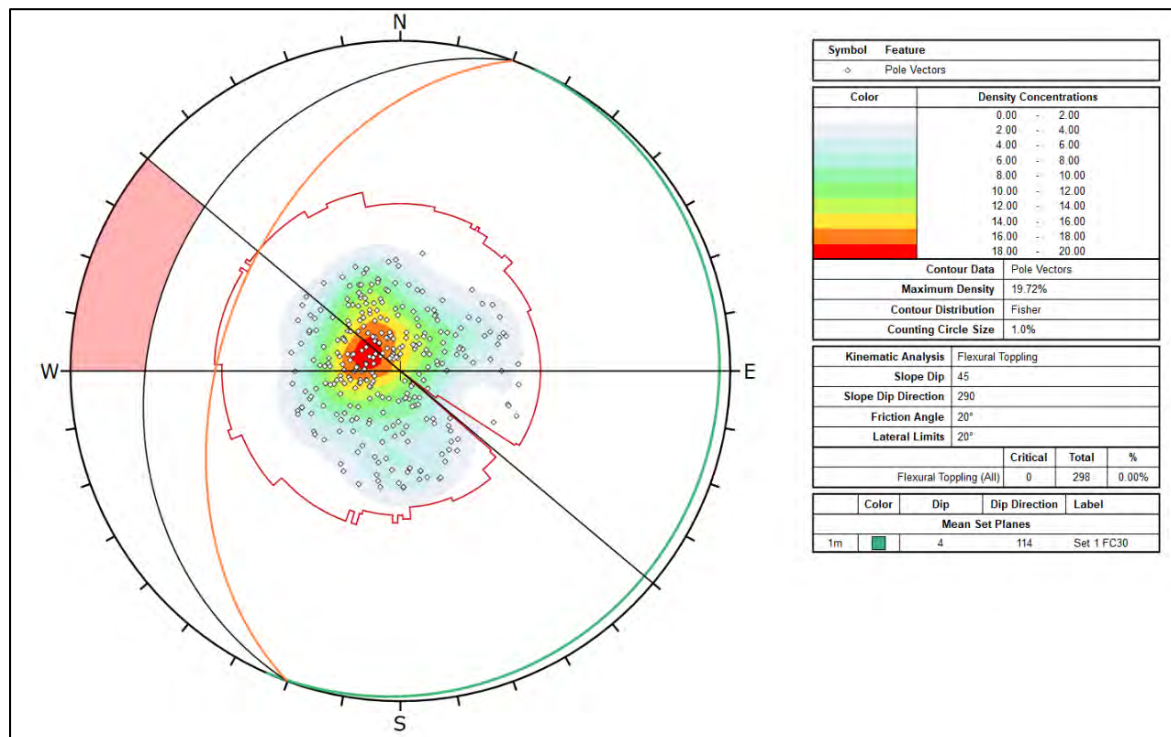


Figure C542- Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (East Wall) – Flexural Toppling.

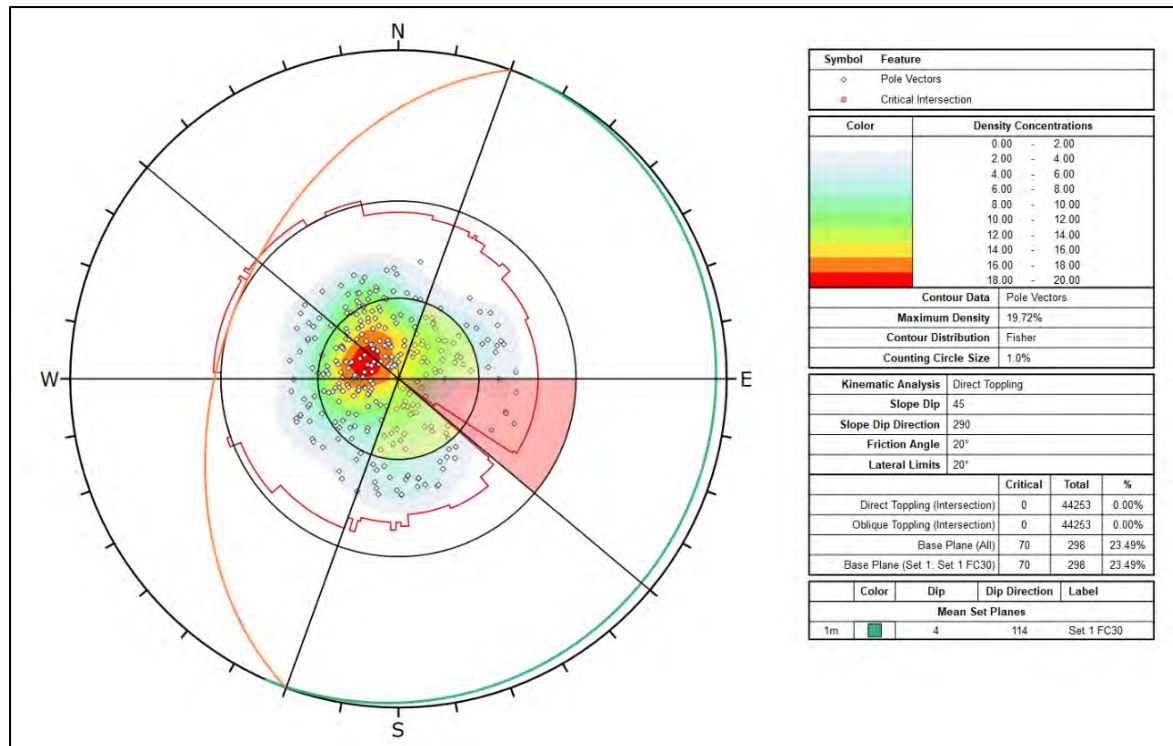


Figure C543– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Fractures <30°– Overall Slope

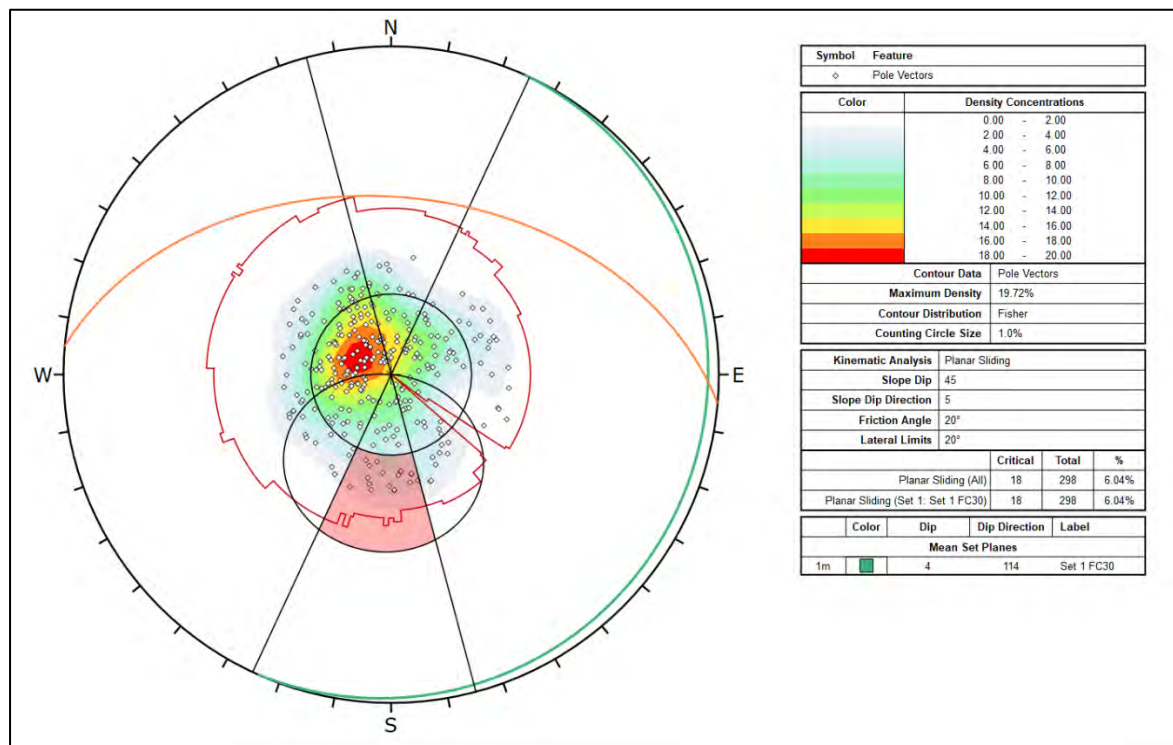


Figure C544– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (South Wall) – Planar Sliding.

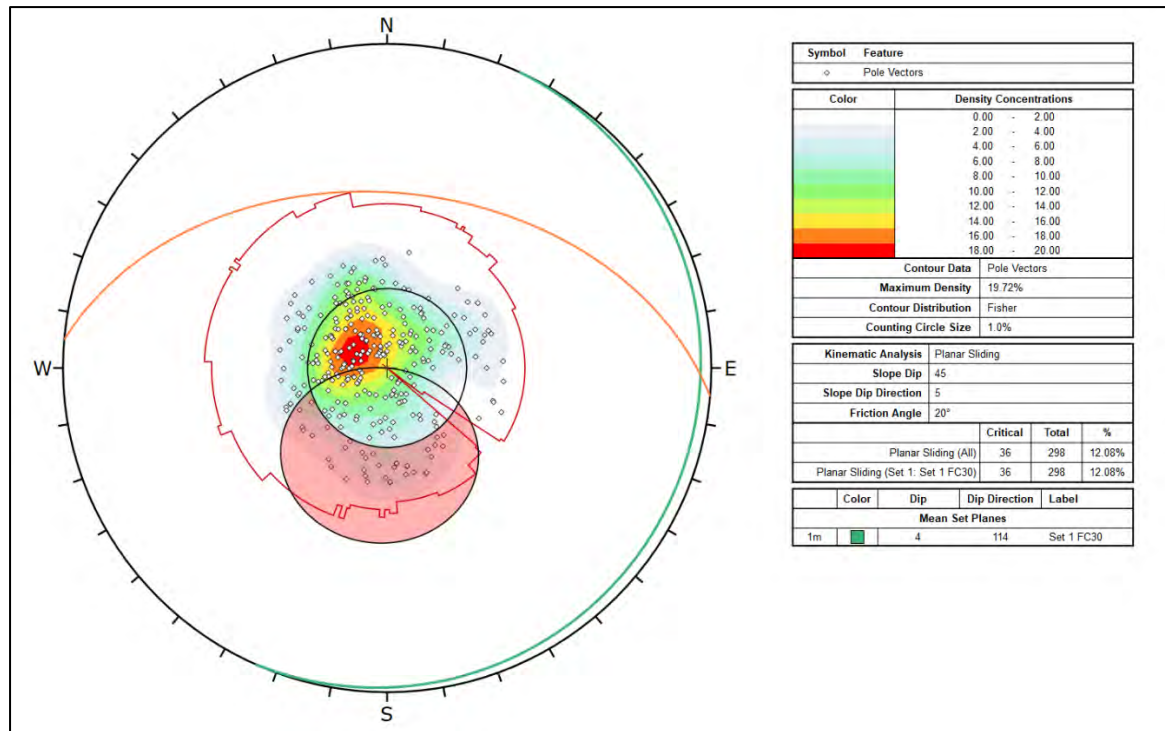


Figure C545– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (South Wall) – Planar Sliding (No Limits).

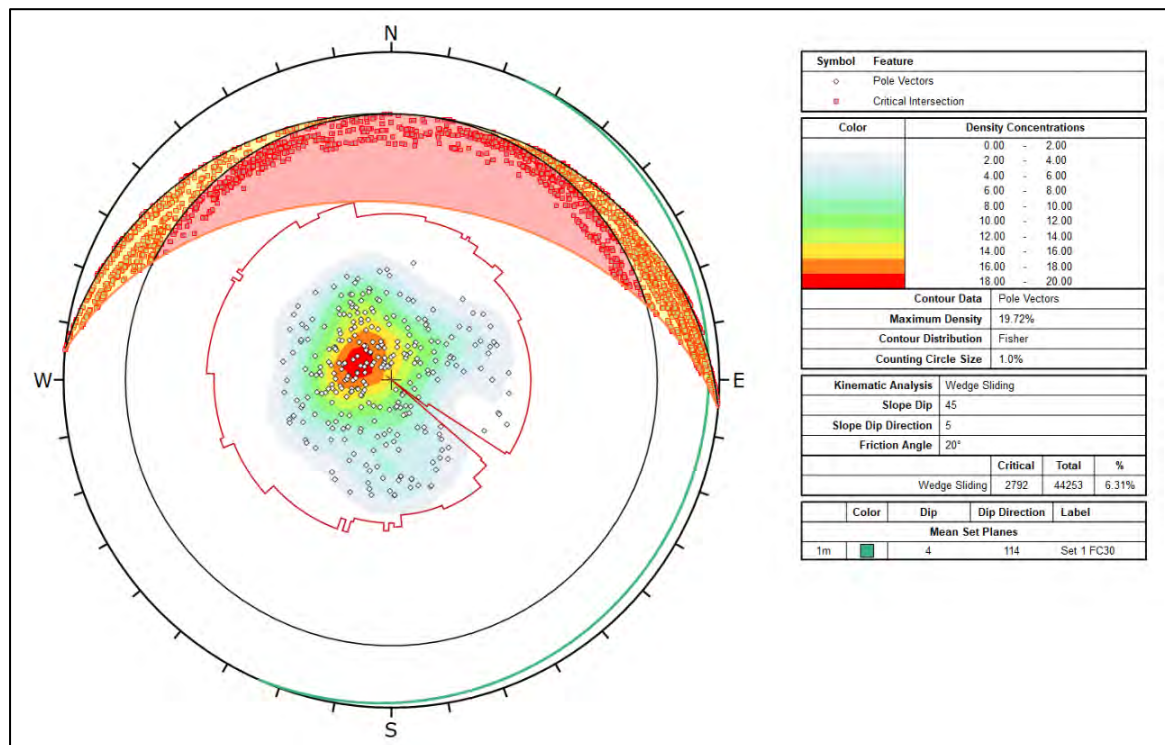


Figure C546– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (South Wall) – Wedge Sliding.

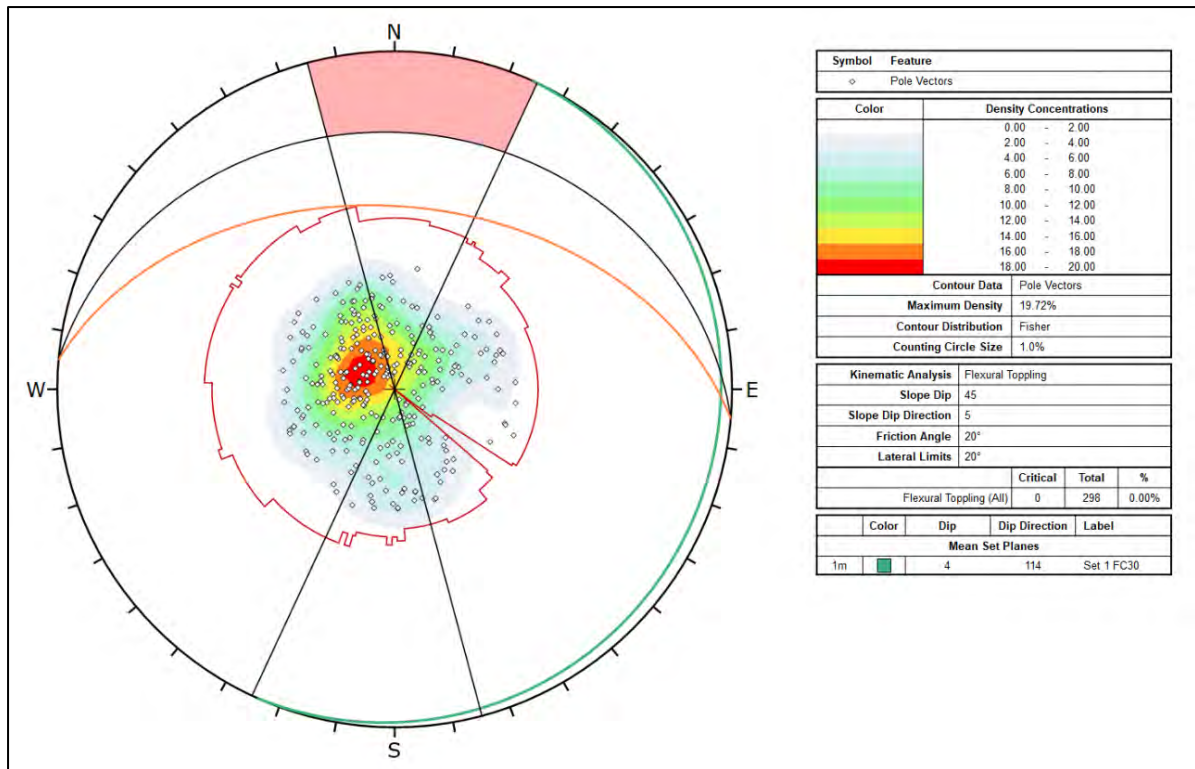


Figure C547– Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (South Wall) – Flexural Toppling.

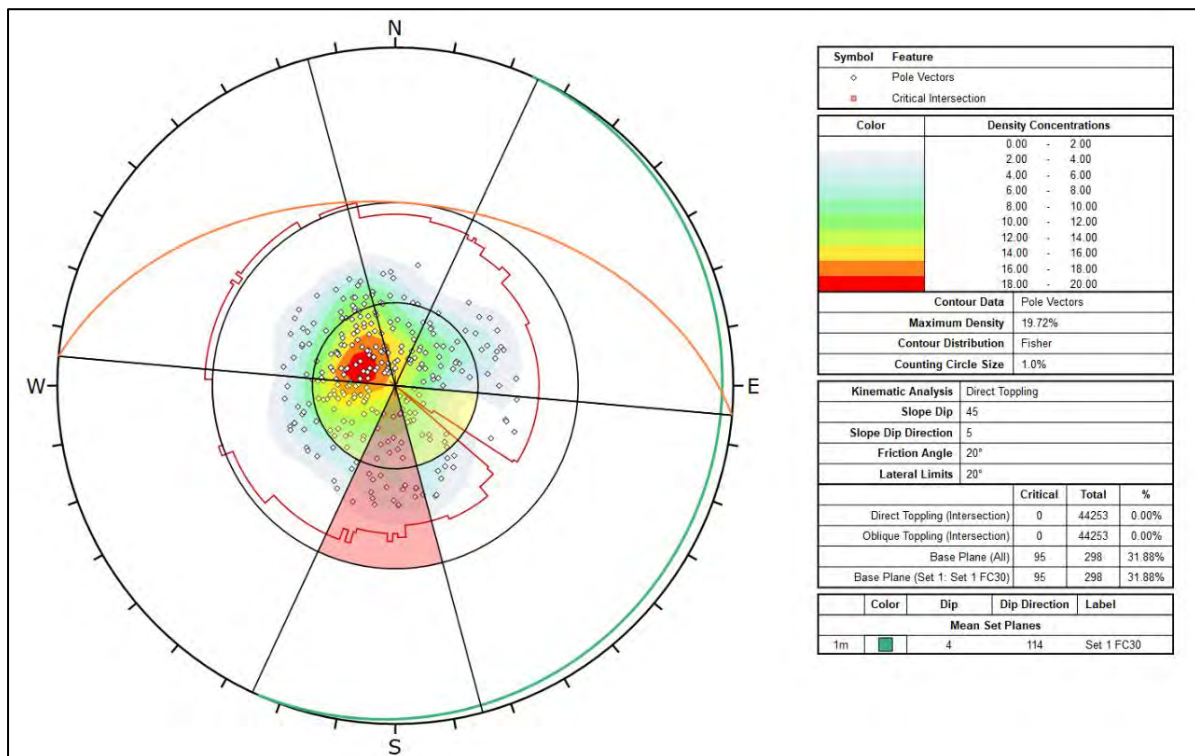


Figure C548 – Kinematic Analysis (Fracture <30°) - Overall Slope – West Sump (South Wall) – Direct Toppling.

West Sump (North Wall) – Fractures <30° – Bench Slope

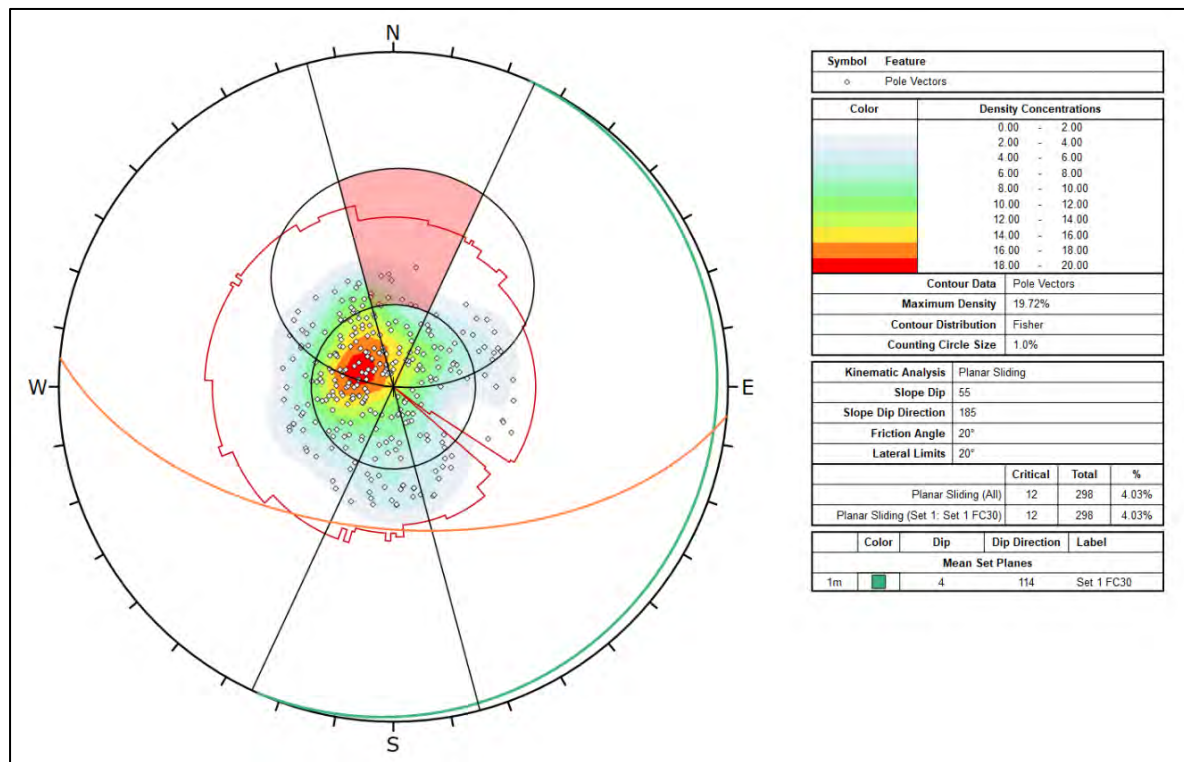


Figure C549 – Kinematic Analysis (Fracture <30°) - Bench Slope – West Sump (North Wall) – Planar Sliding.

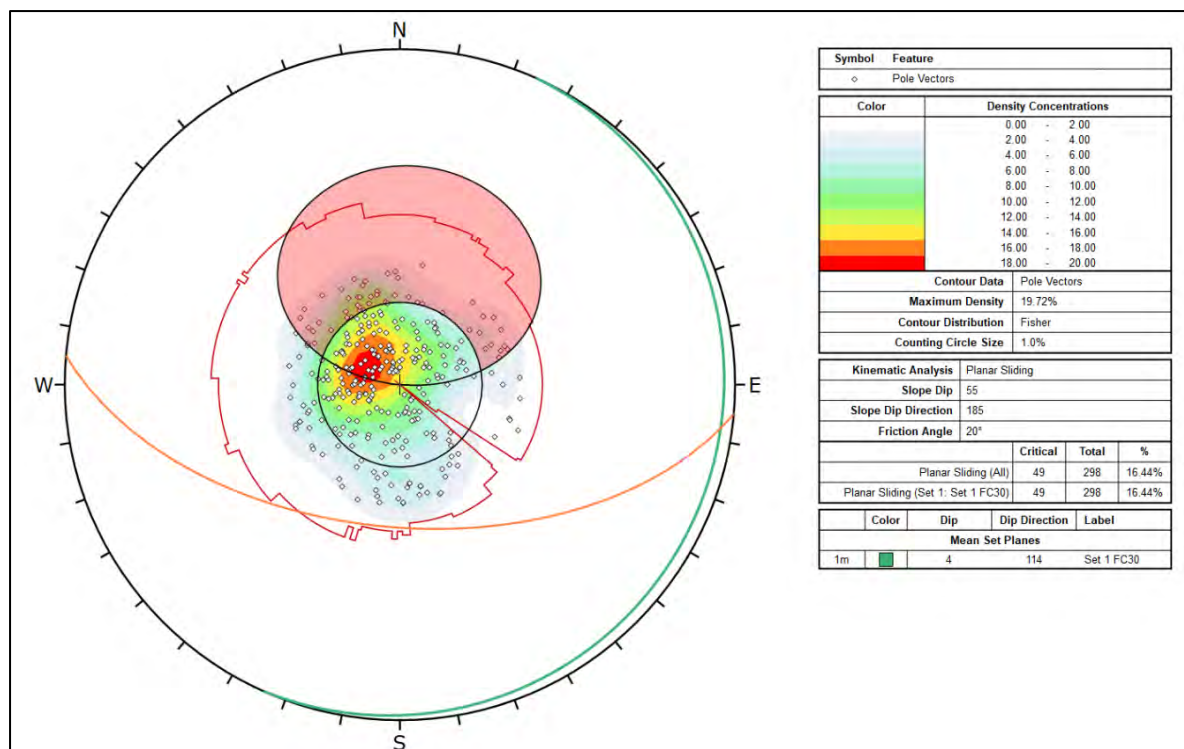


Figure C550 – Kinematic Analysis (Fracture <30°) - Bench Slope – West Sump (North Wall) – Planar Sliding (No Limits).

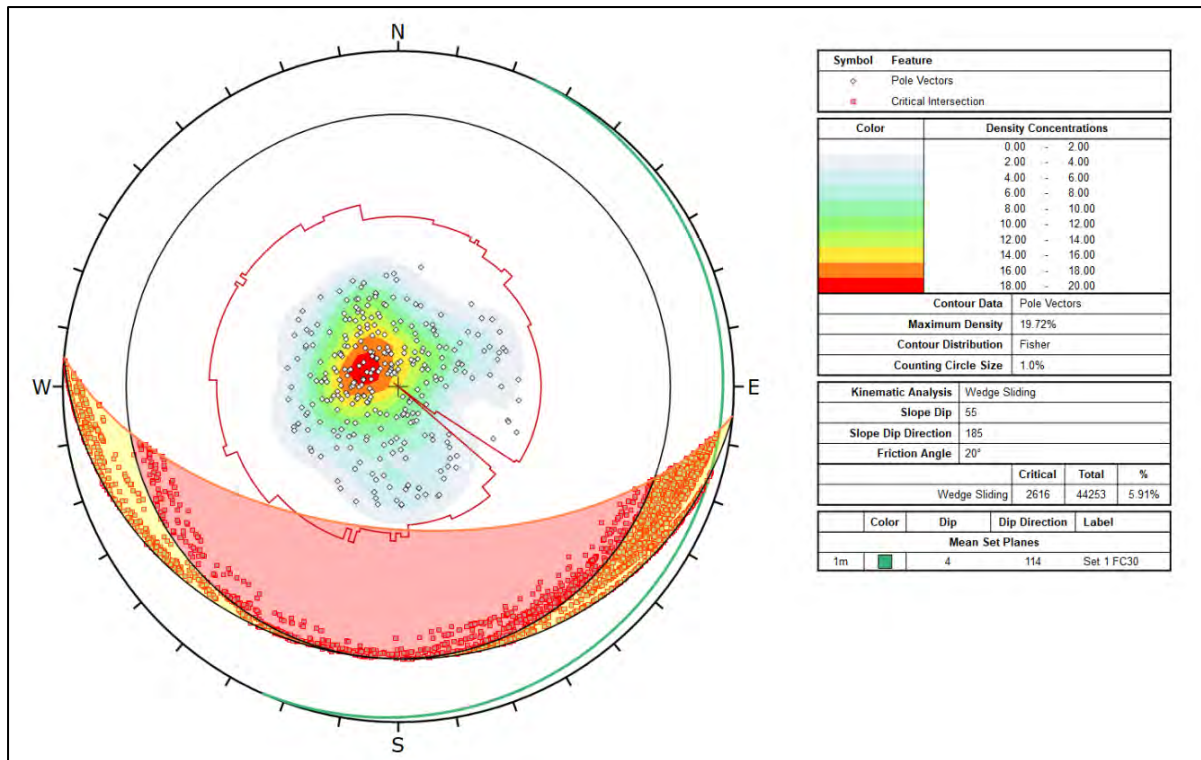
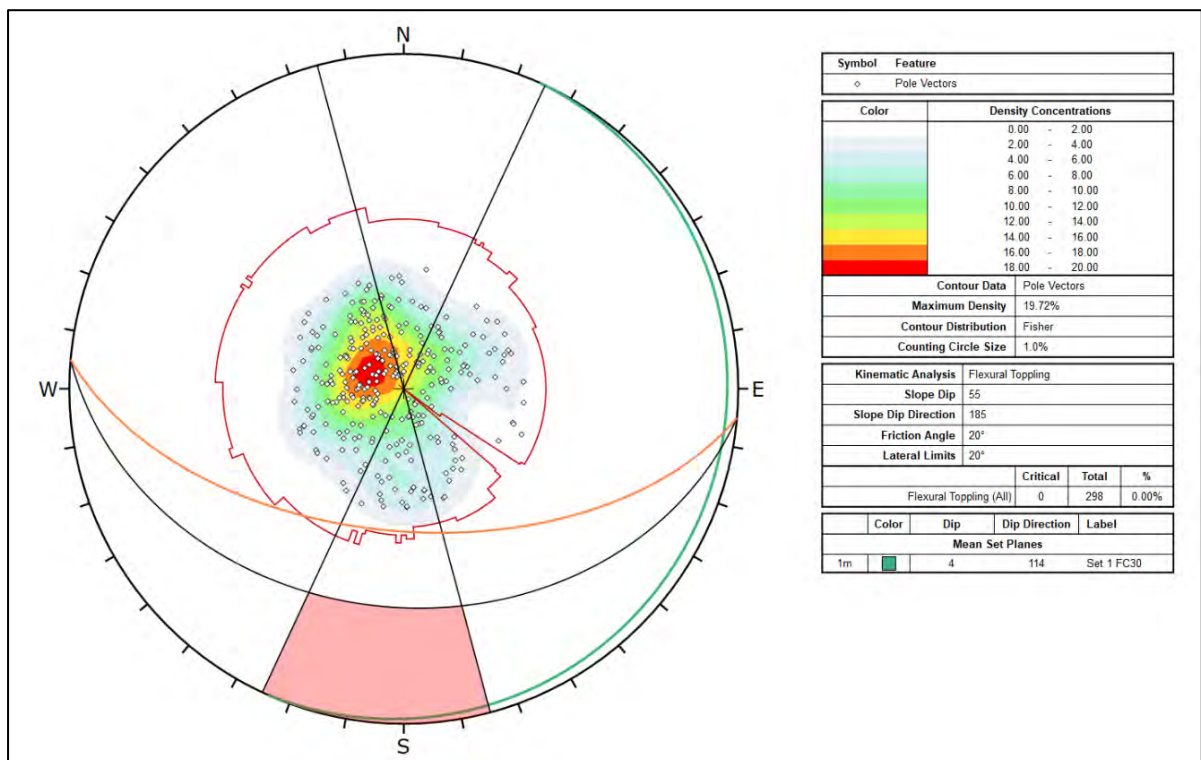


Figure C551 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (North Wall) – Wedge Sliding.



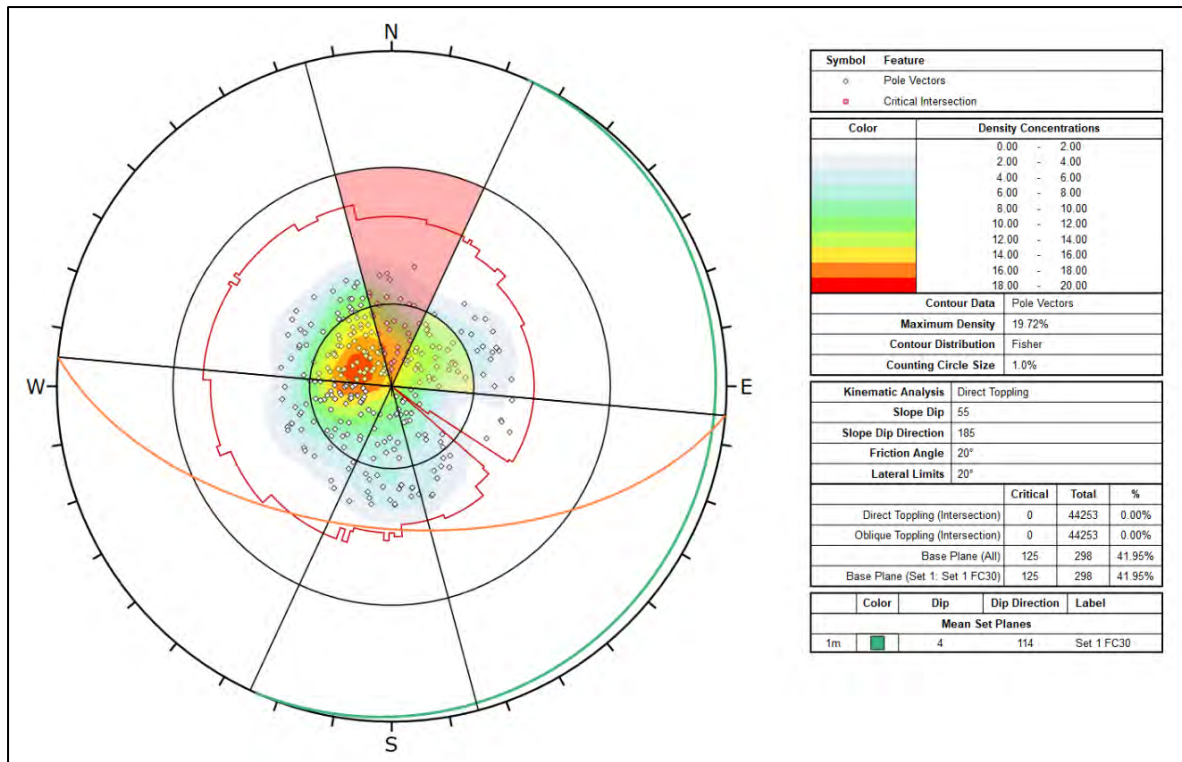


Figure C553 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Fractures <30° – Bench Slope

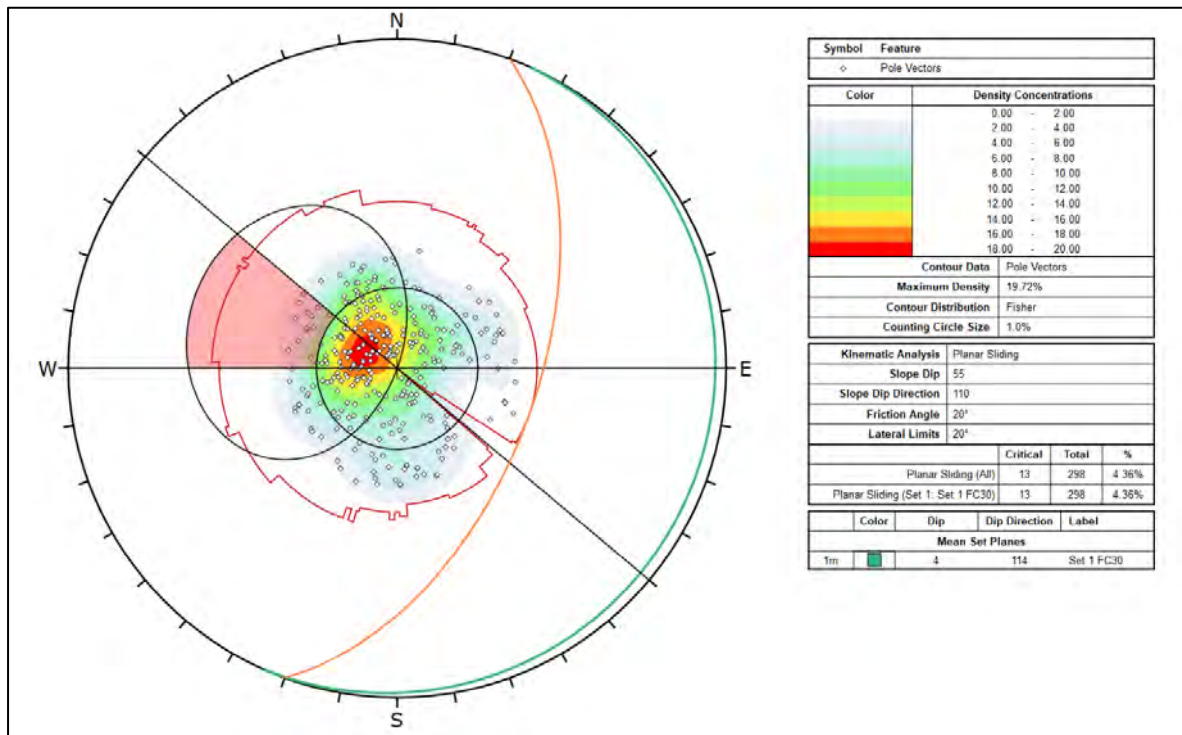


Figure C554 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (West Wall) – Planar Sliding.

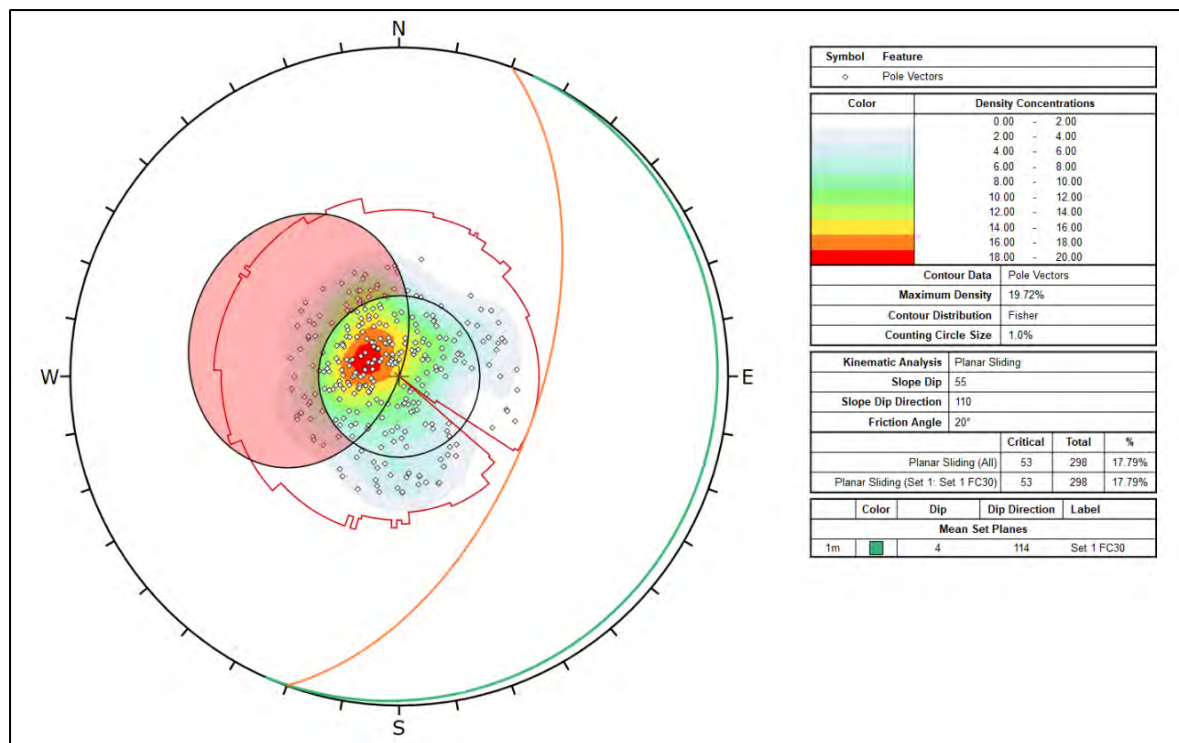


Figure C555 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

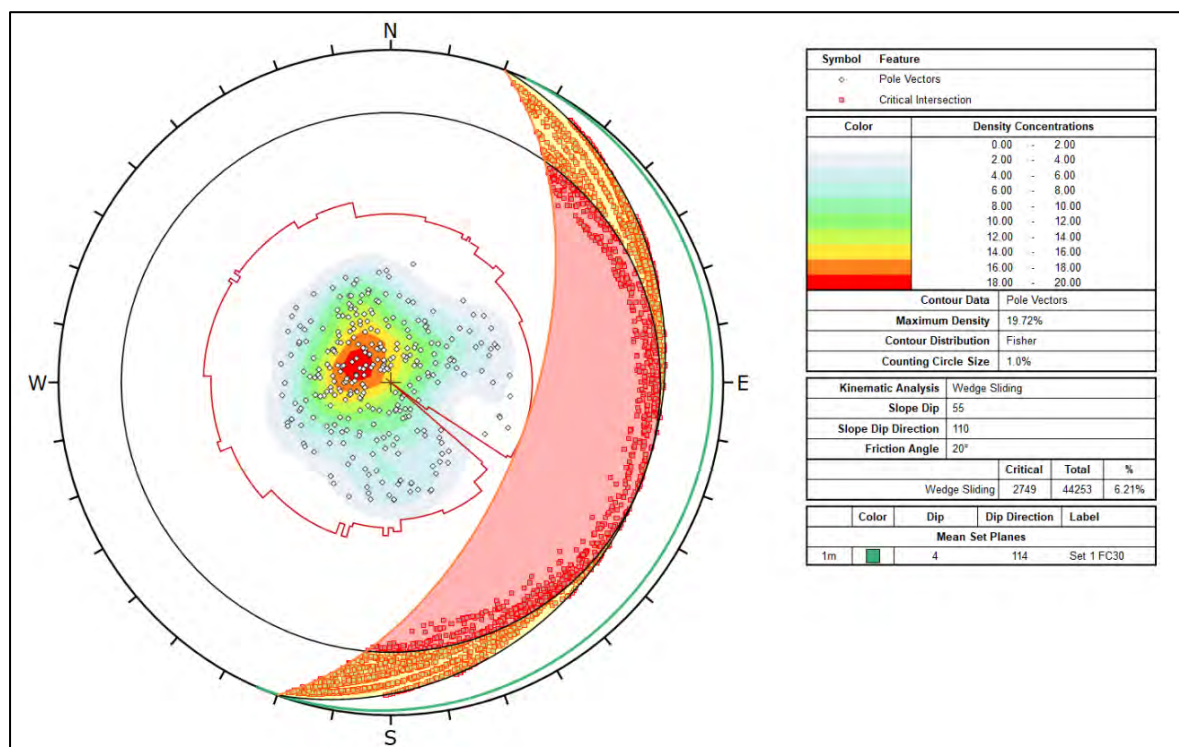


Figure C556 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (West Wall) – Wedge Sliding.

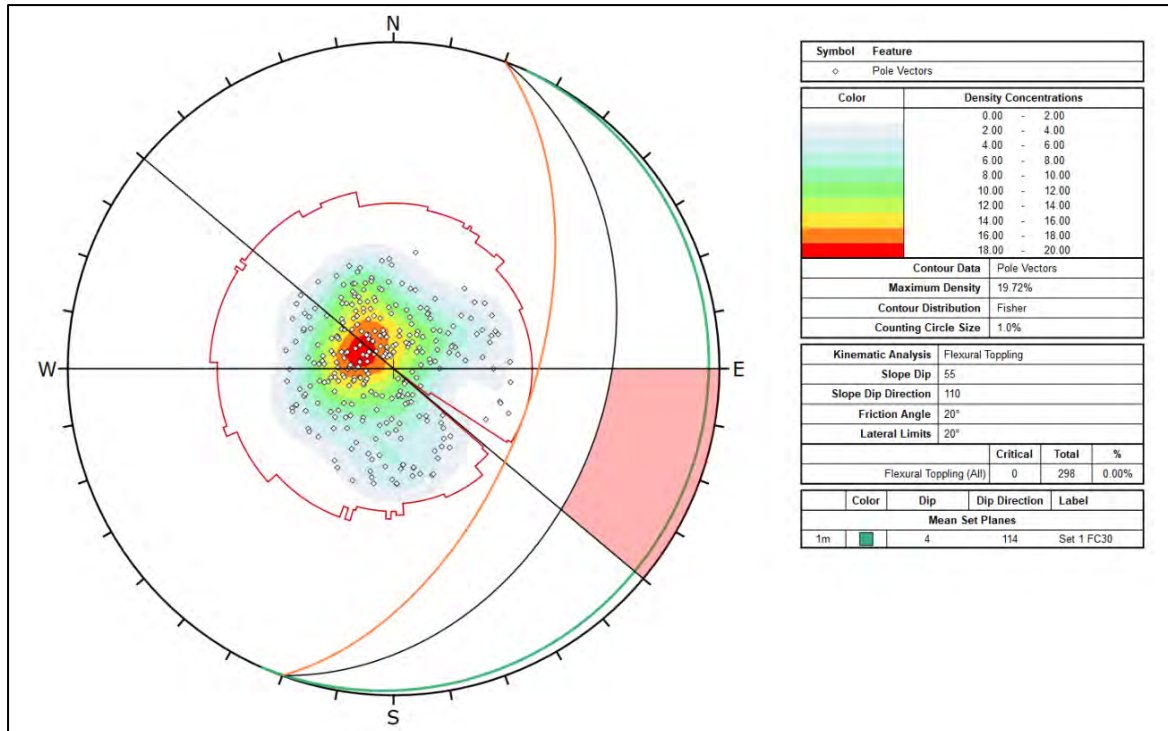


Figure C557 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (West Wall) – Flexural Toppling.

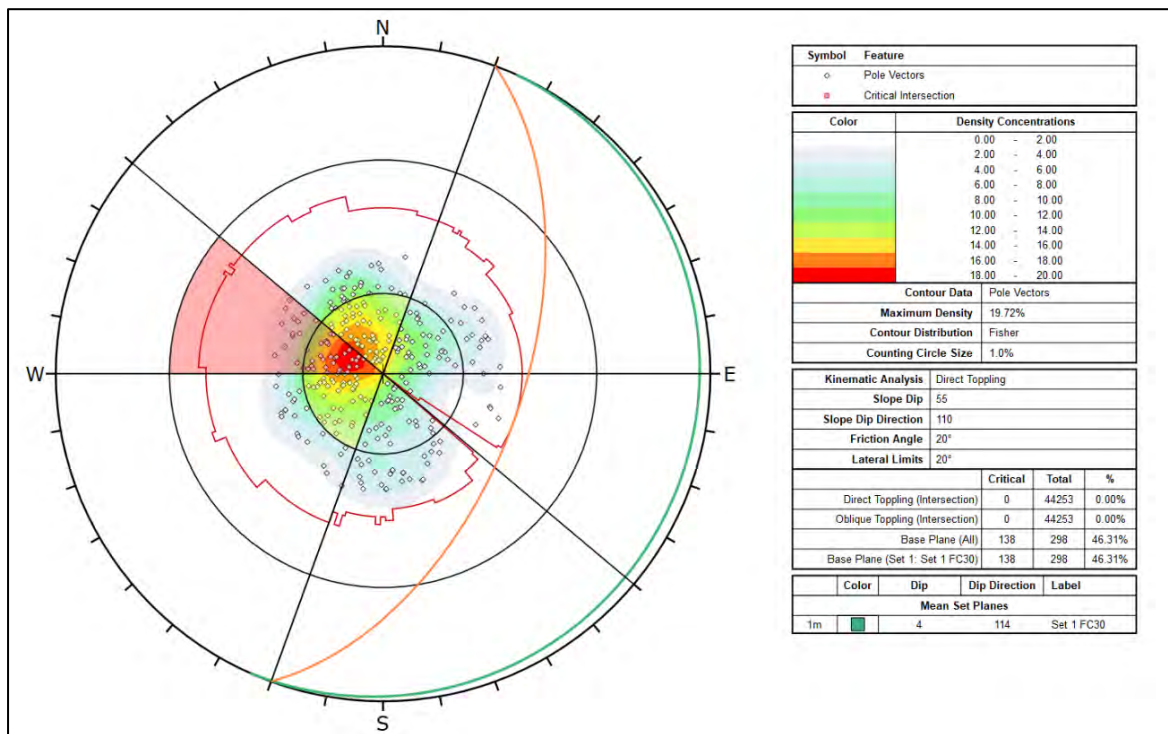


Figure C558 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Fractures <30° – Bench Slope

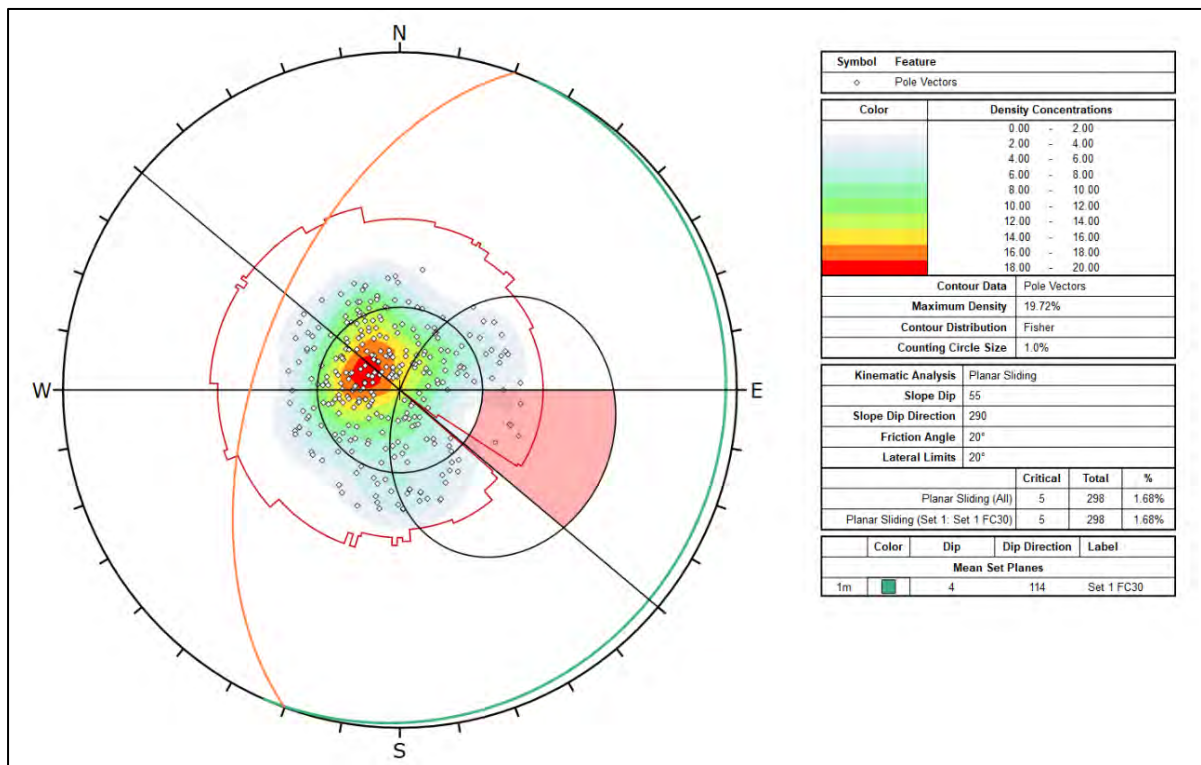


Figure C559 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (East Wall) – Planar Sliding.

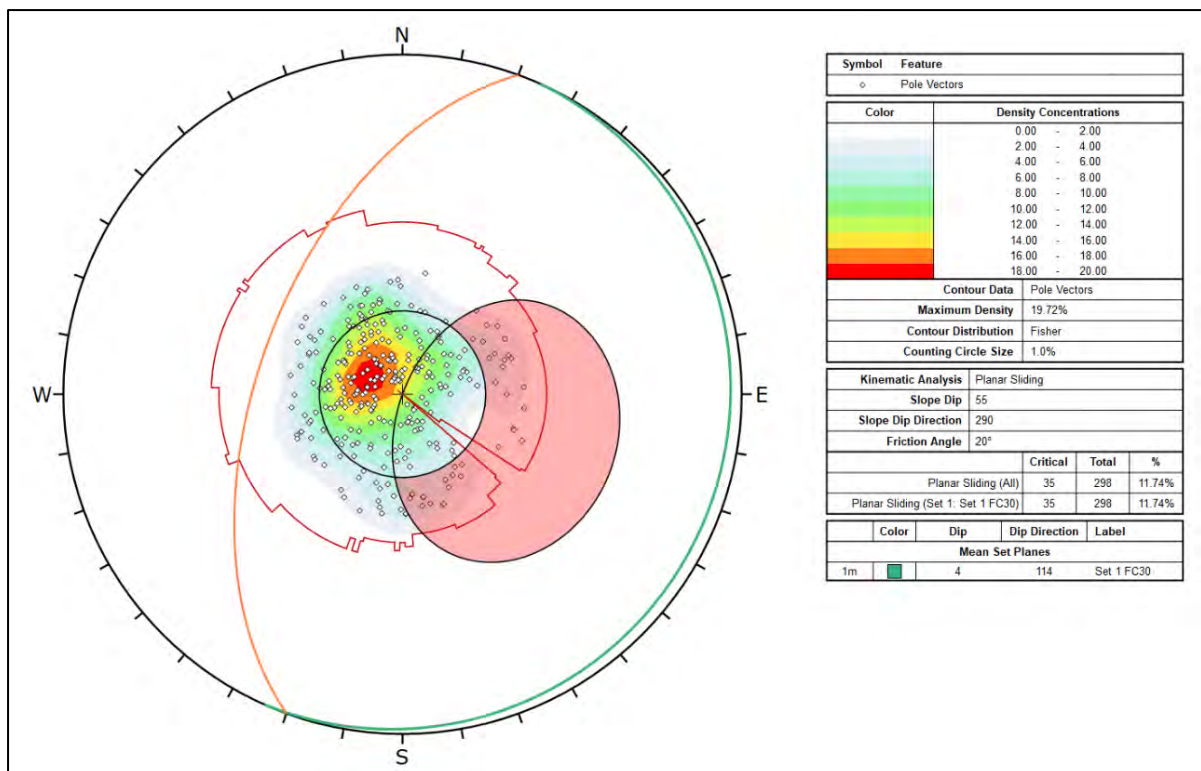


Figure C560 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

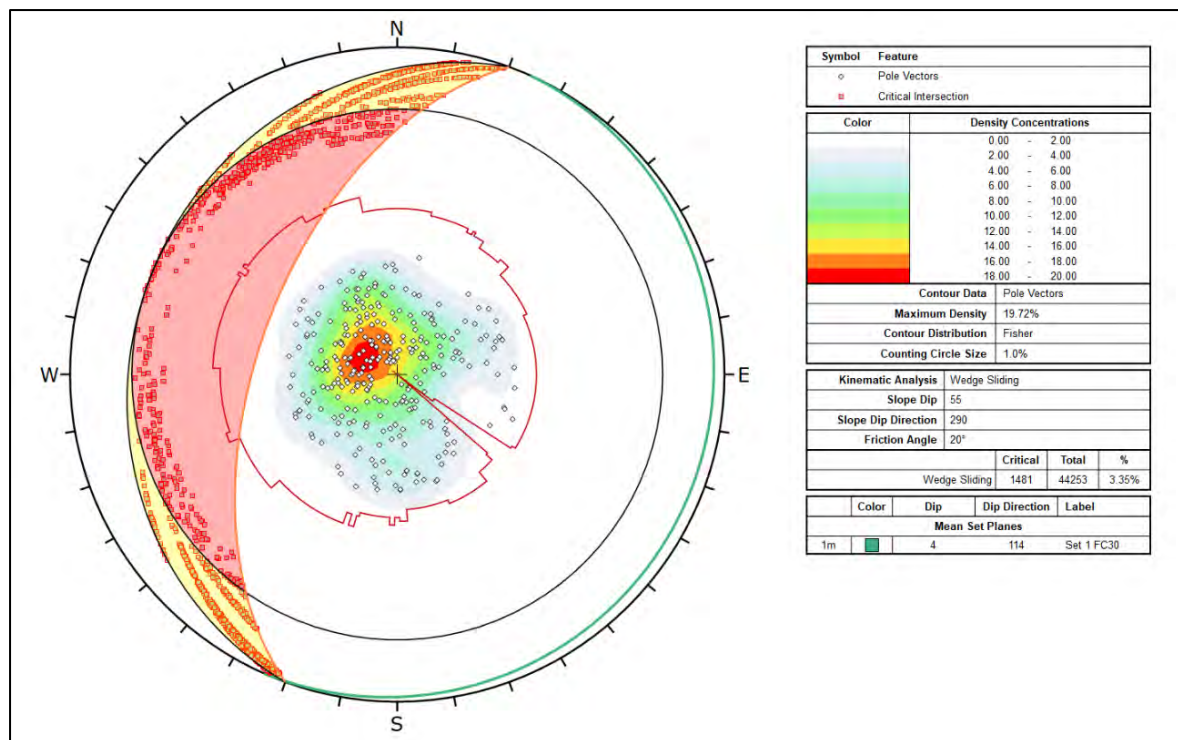


Figure C561 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (East Wall) – Wedge Sliding.

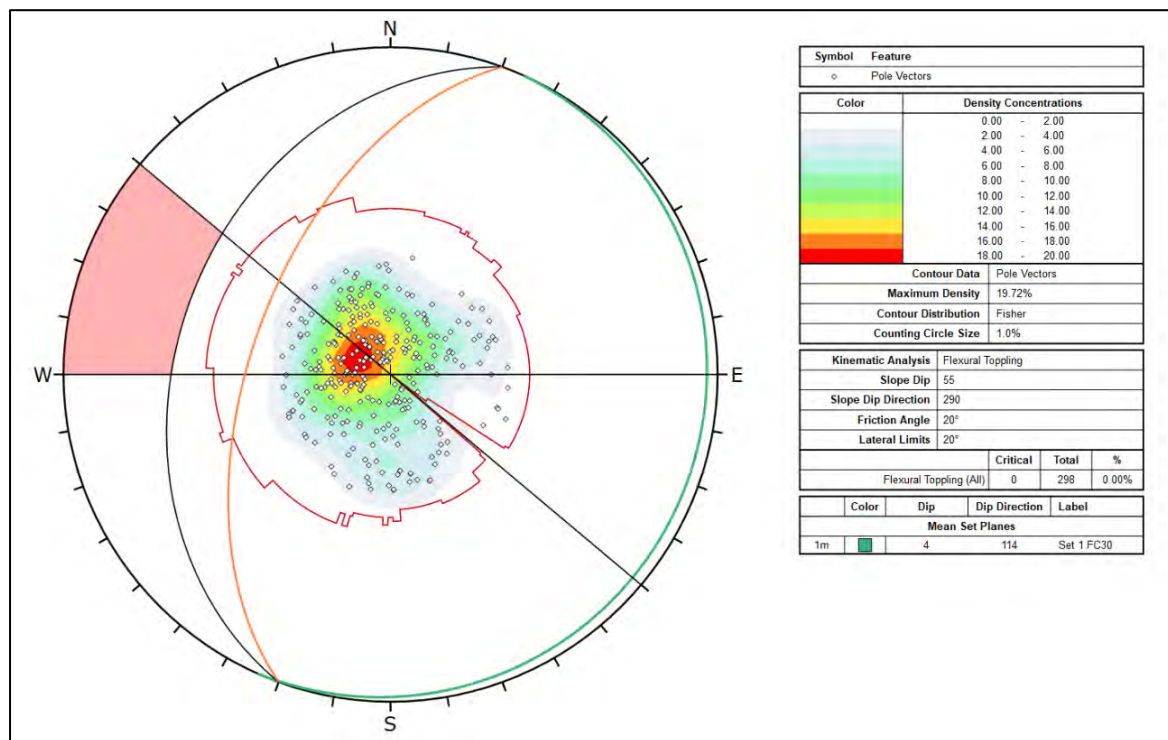


Figure C562 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (East Wall) – Direct Toppling.

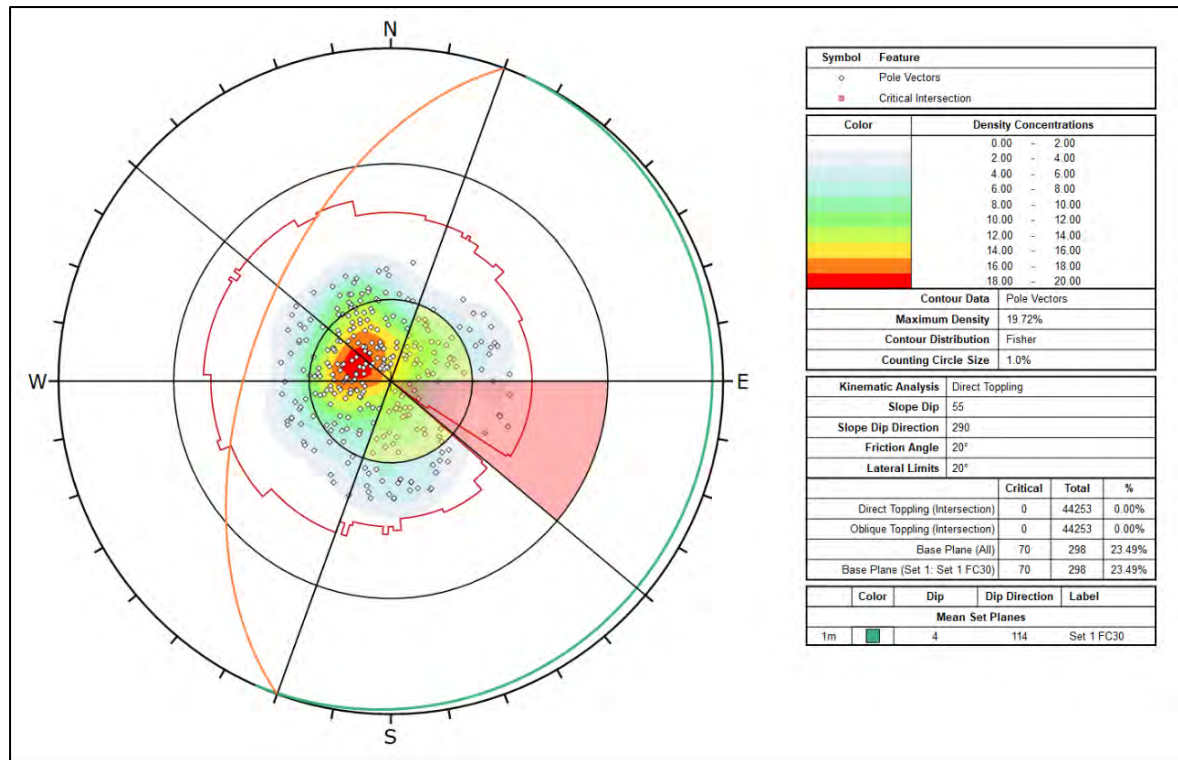


Figure C563 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Fractures <30°– Bench Slope

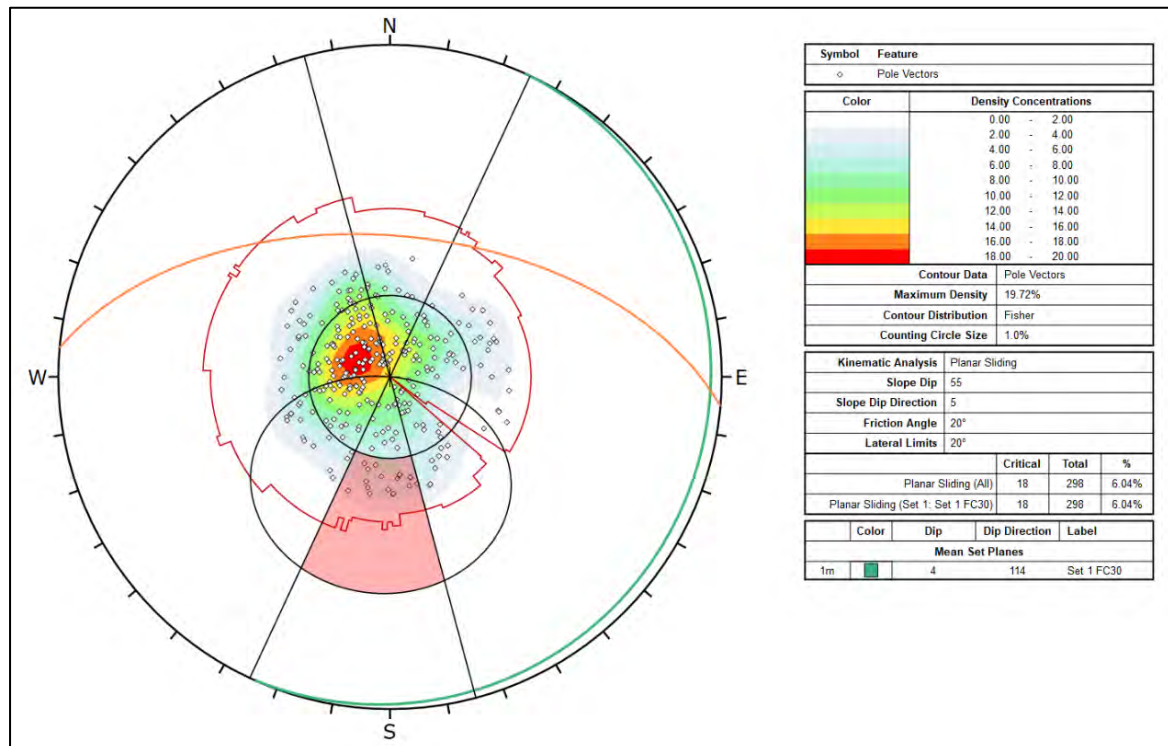


Figure C564 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (South Wall) – Planar Sliding.

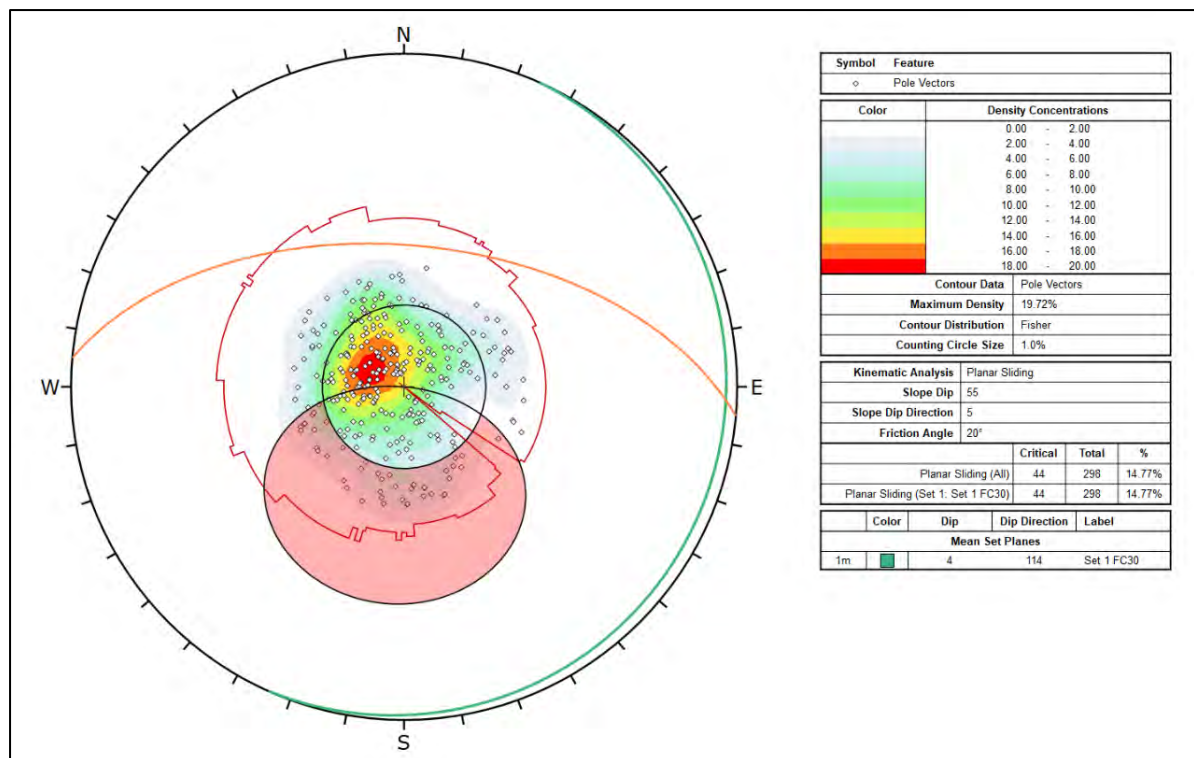


Figure C565 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).

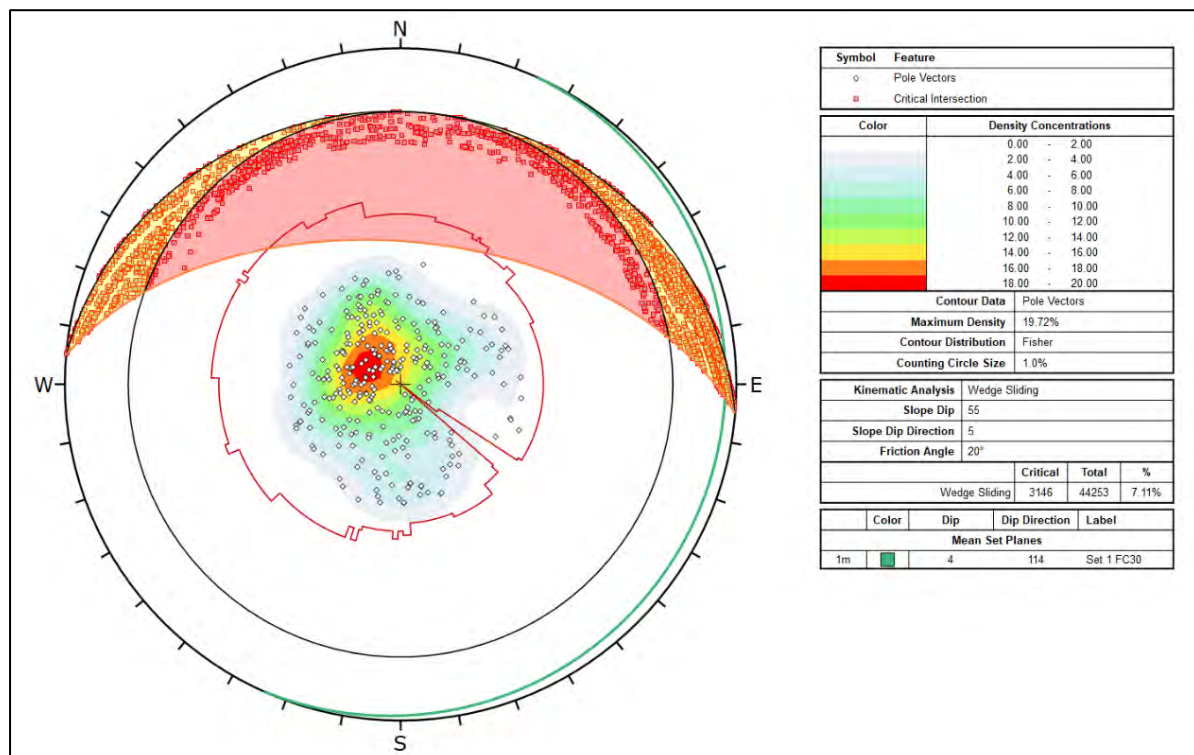


Figure C566 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (South Wall) – Wedge Sliding.

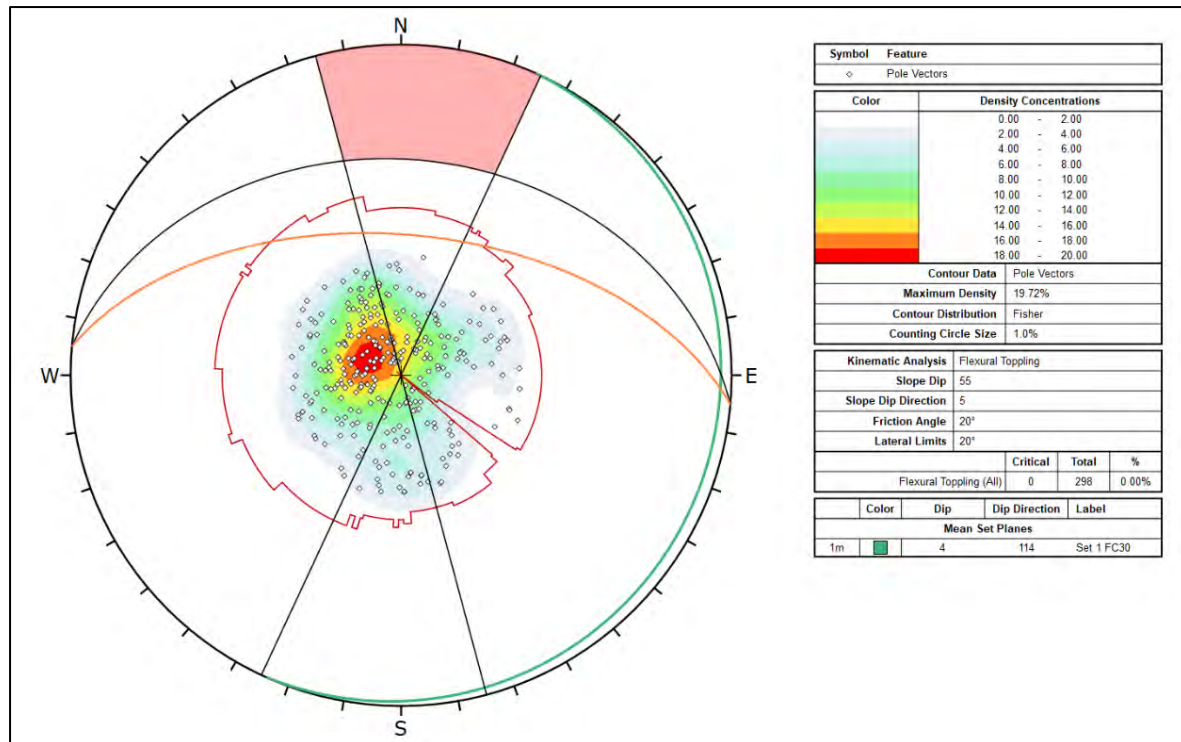


Figure C567 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (South Wall) – Flexural Toppling.

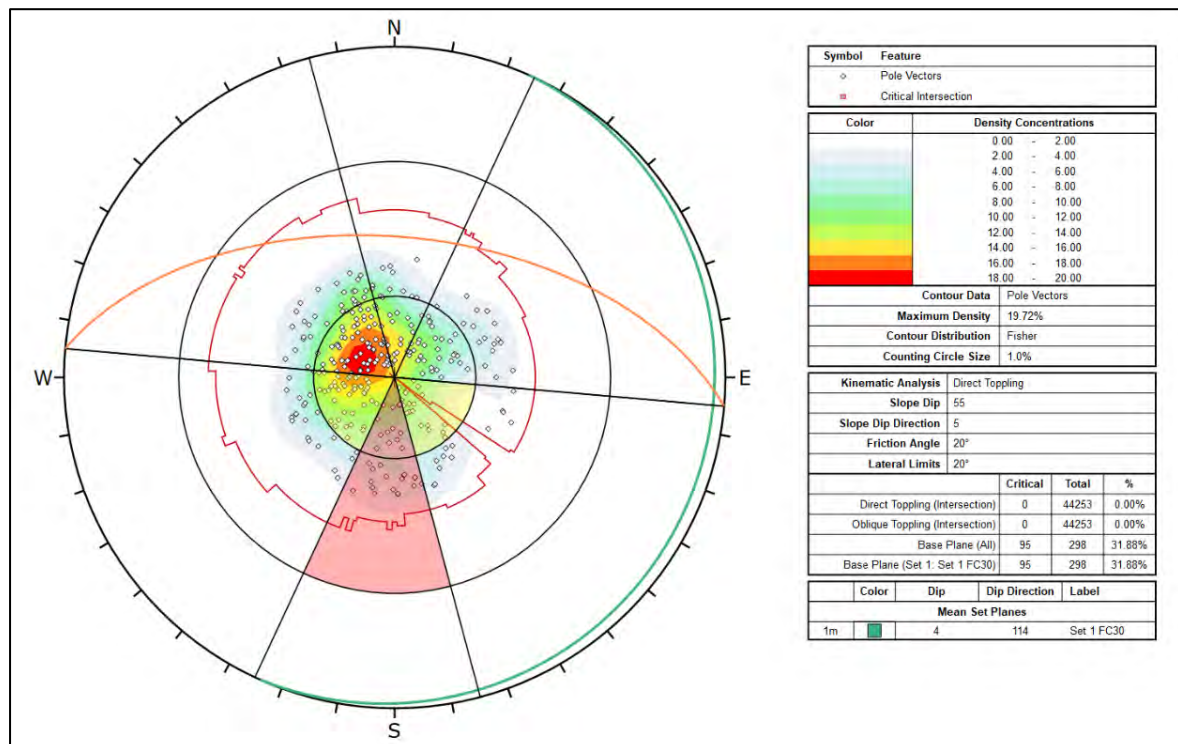


Figure C568 – Kinematic Analysis (Fracture <30°) – Bench Slope – West Sump (South Wall) – Flexural Toppling.

West Sump (North Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Overall Slope

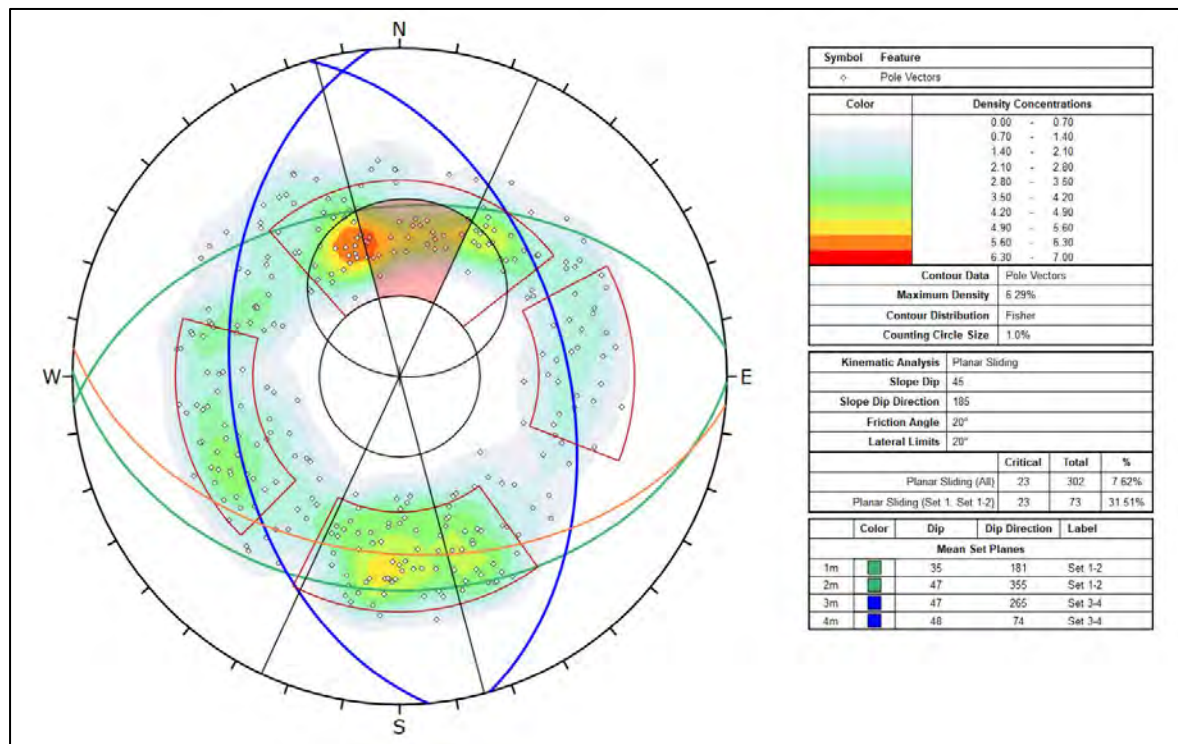


Figure C569 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (North Wall) Planar Sliding.

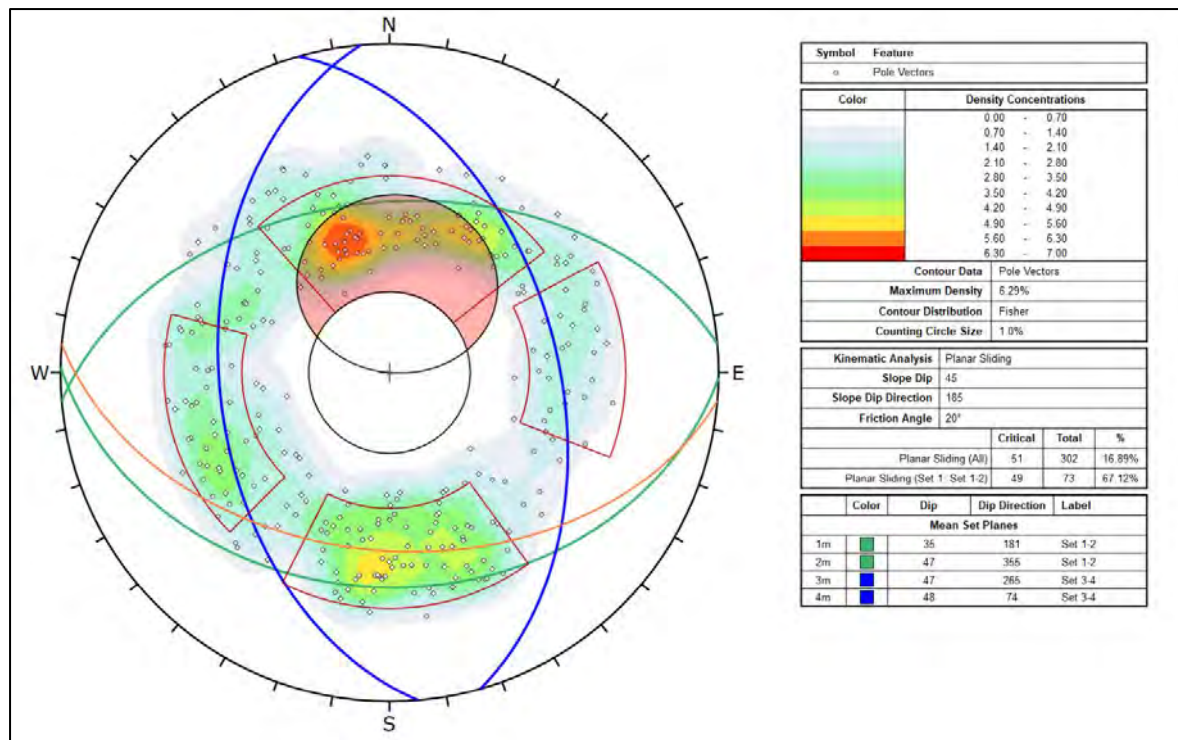


Figure C560 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (North Wall) Planar Sliding (No Limits).

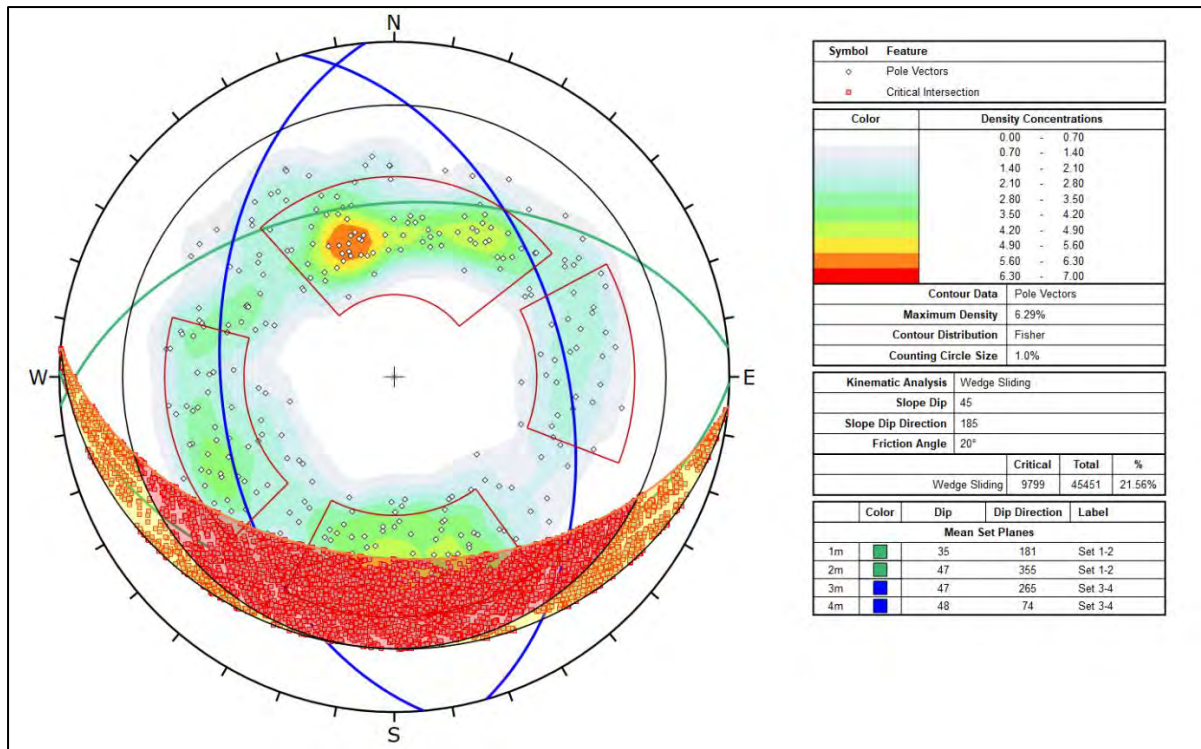


Figure C561 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (North Wall) Wedge Sliding.

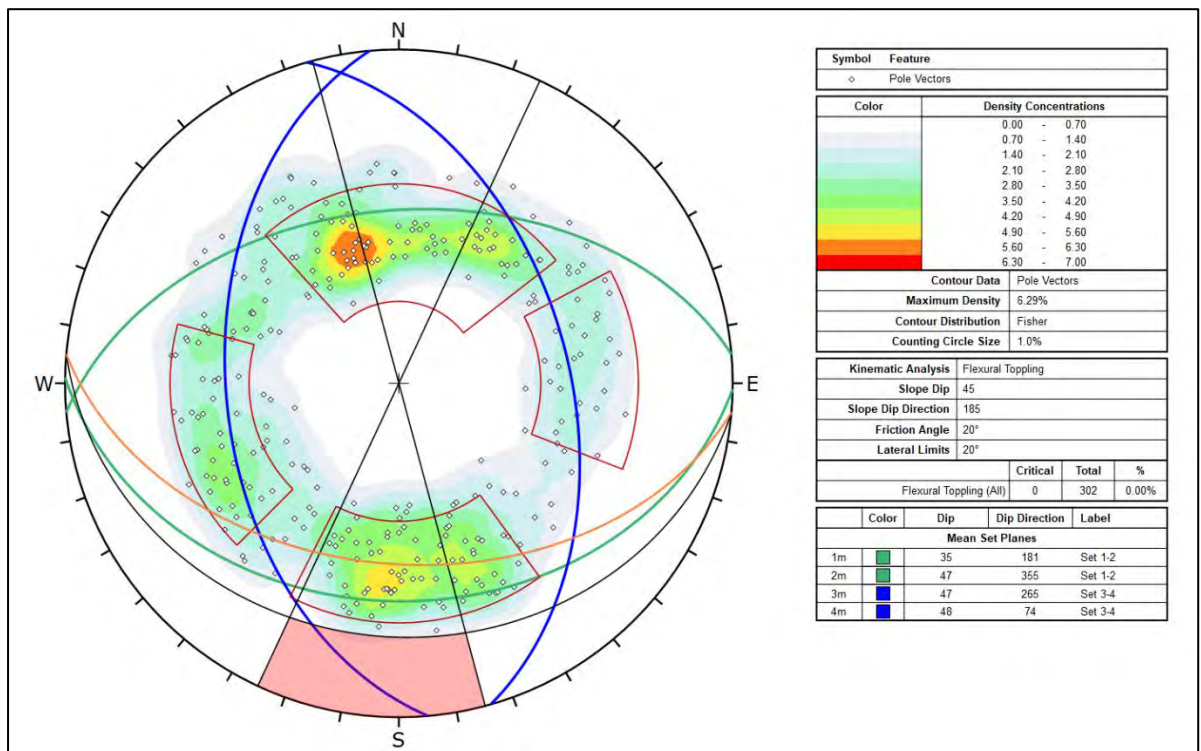


Figure C562 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (North Wall) Flexural Toppling.

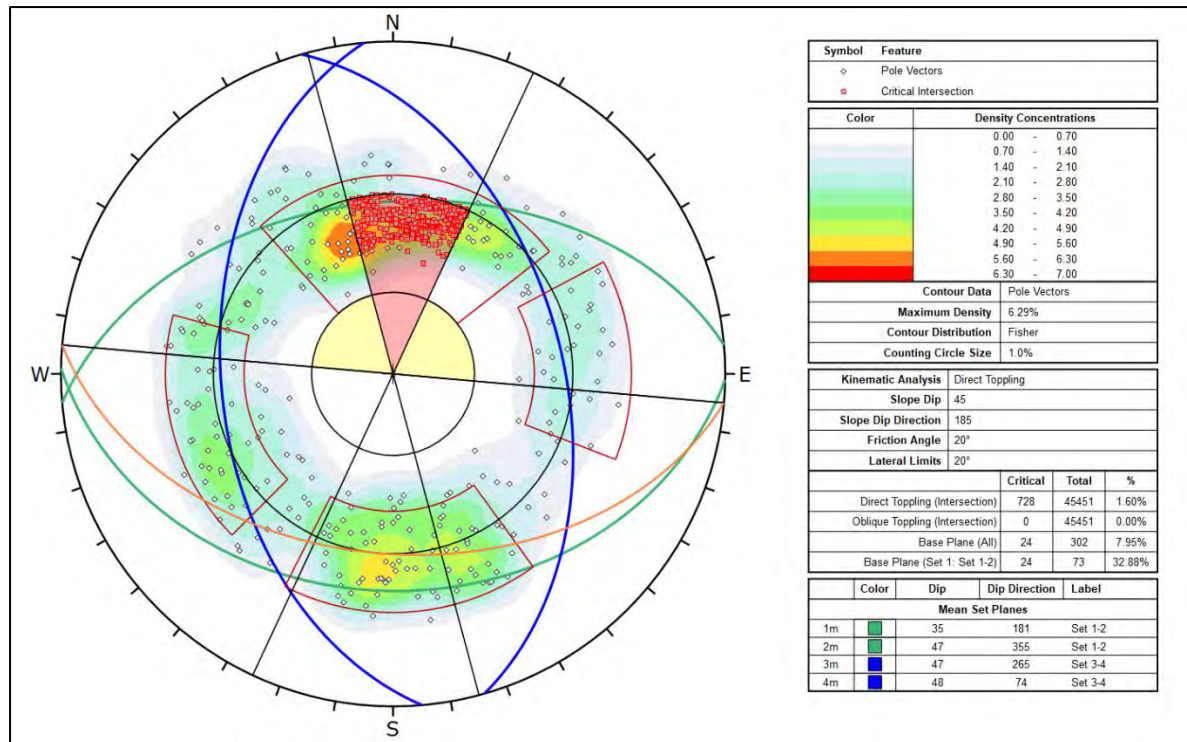


Figure C563 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (North Wall) Direct Toppling.

West Sump (West Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Overall Slope

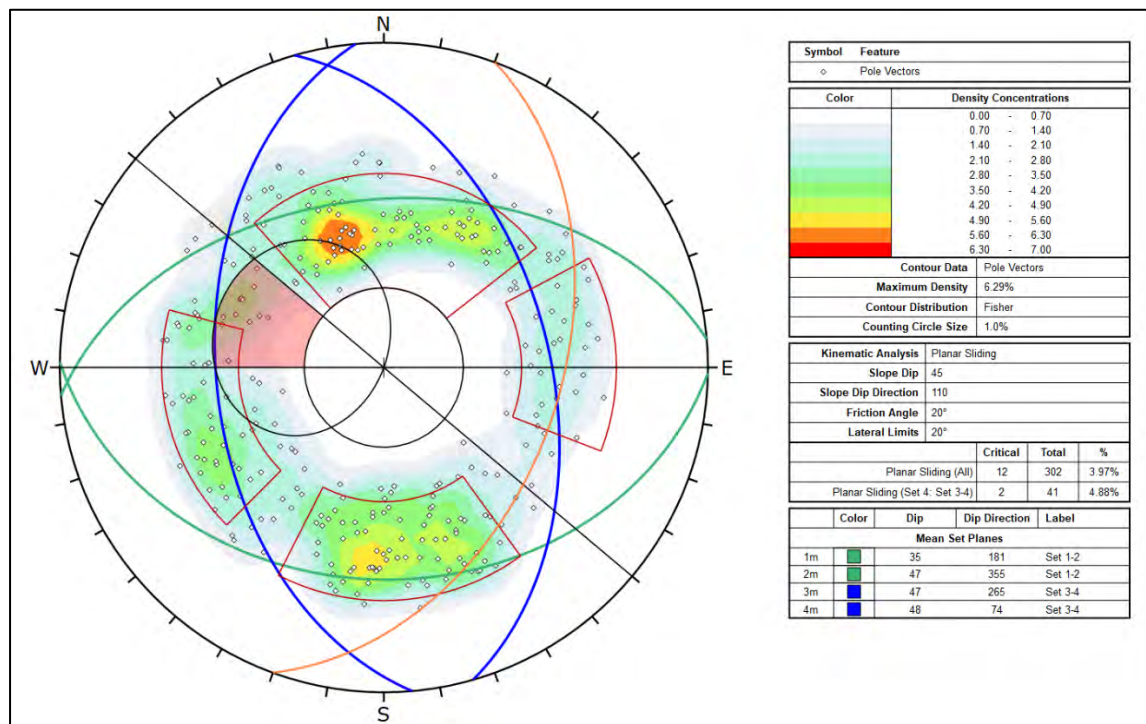


Figure C564 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (West Wall) Planar Sliding.

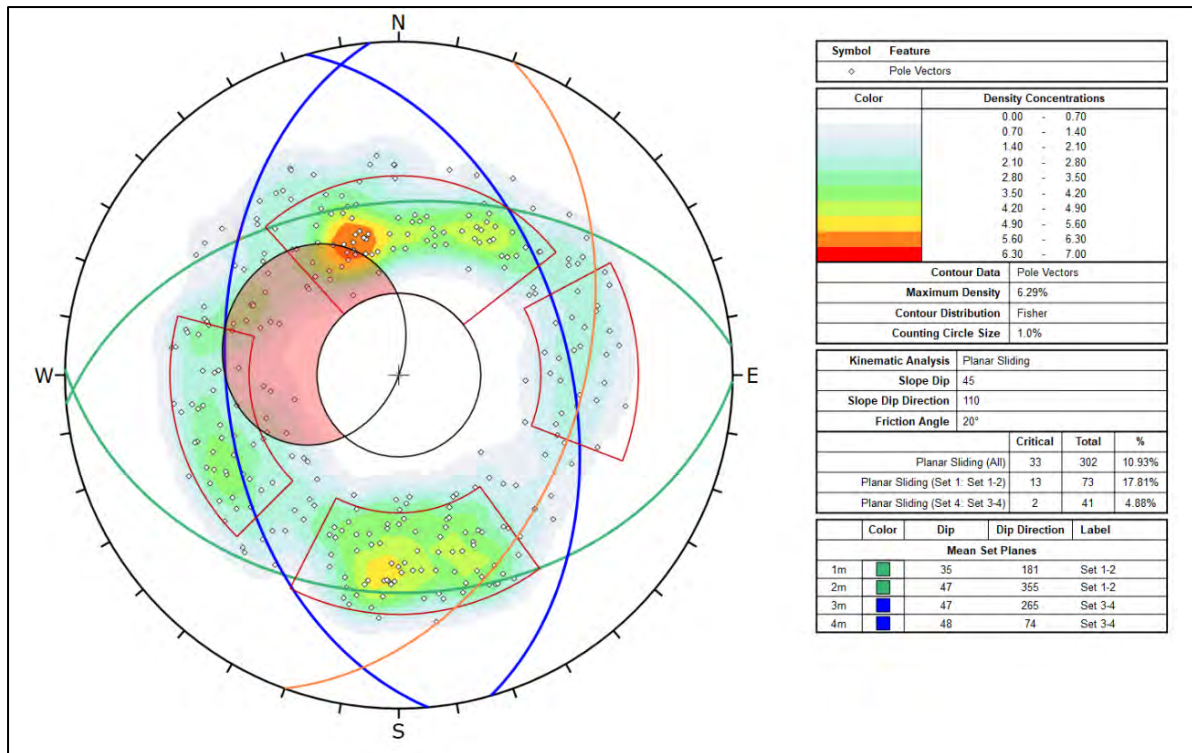


Figure C565 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (West Wall) Planar Sliding (No Limits).

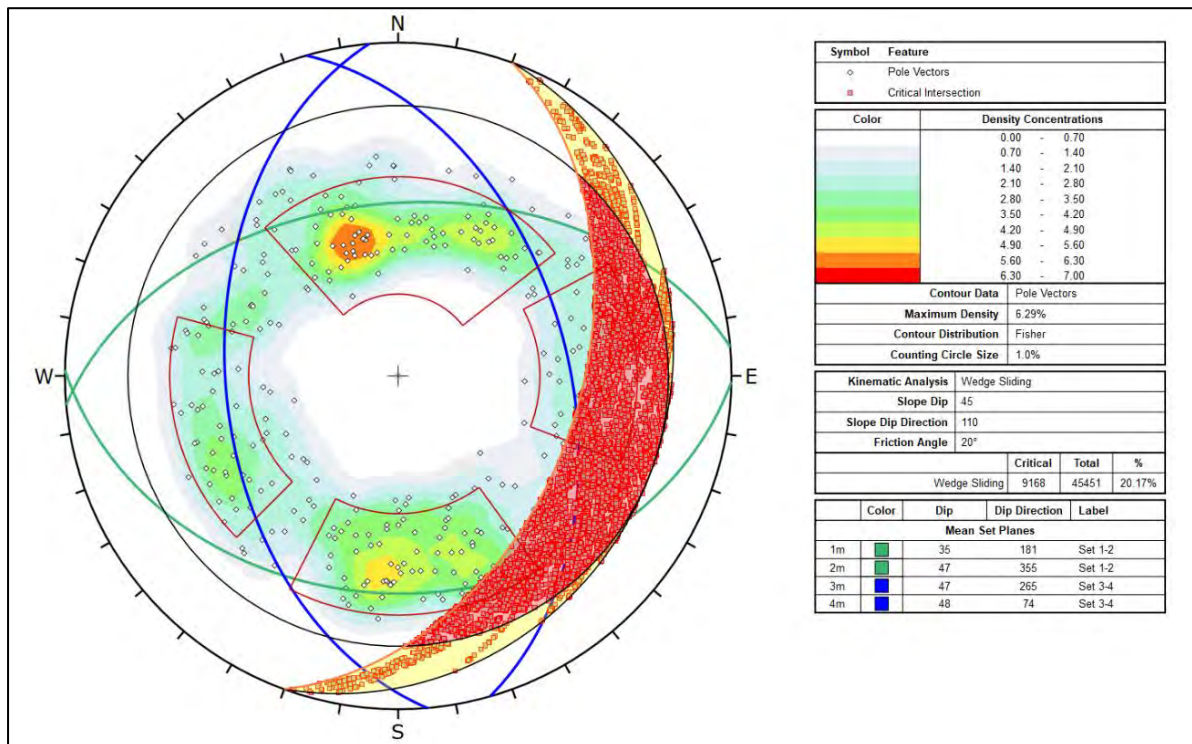


Figure C566 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (West Wall) Wedge Sliding.

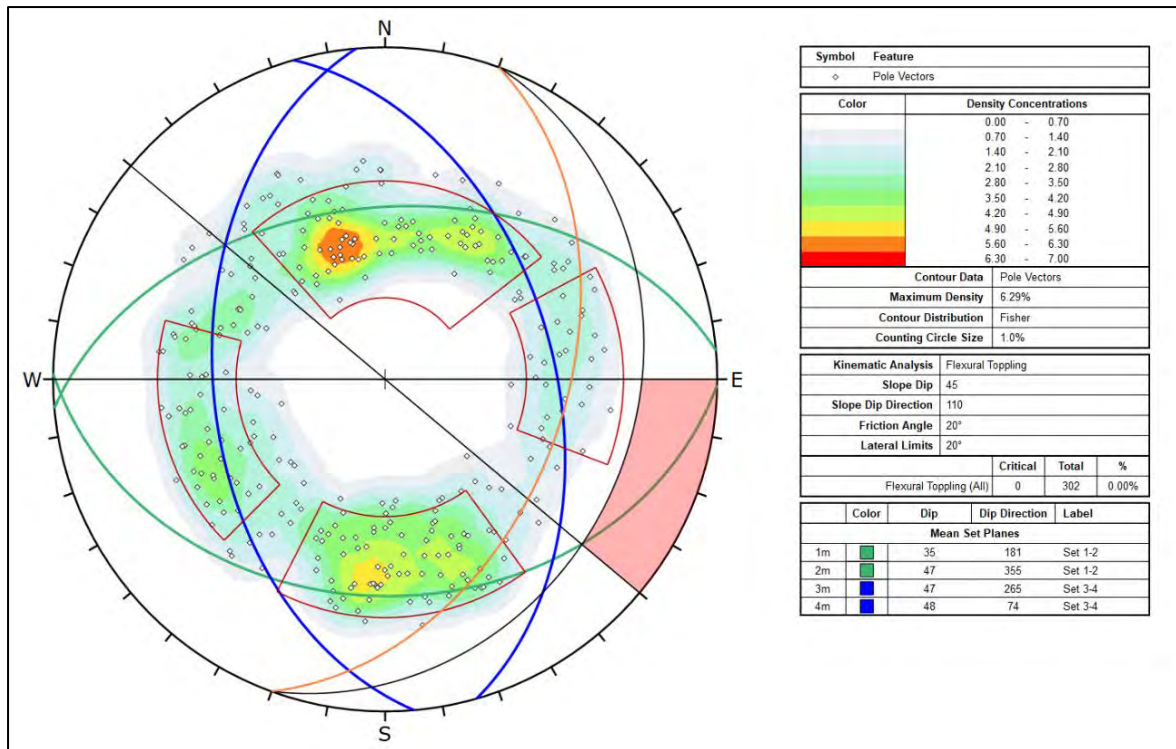


Figure C567 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (West Wall) Flexural Toppling.

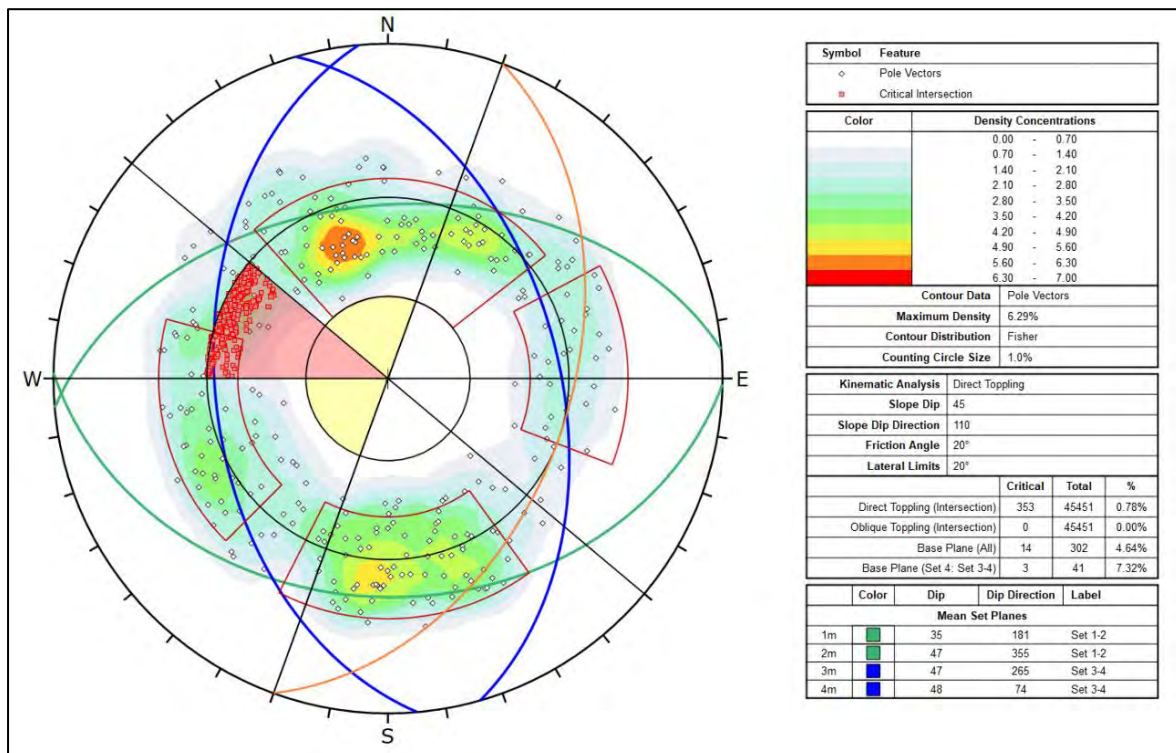


Figure C568 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (West Wall) Direct Toppling.

West Sump (East Wall) – Fractures >30°<60°– Overall Slope

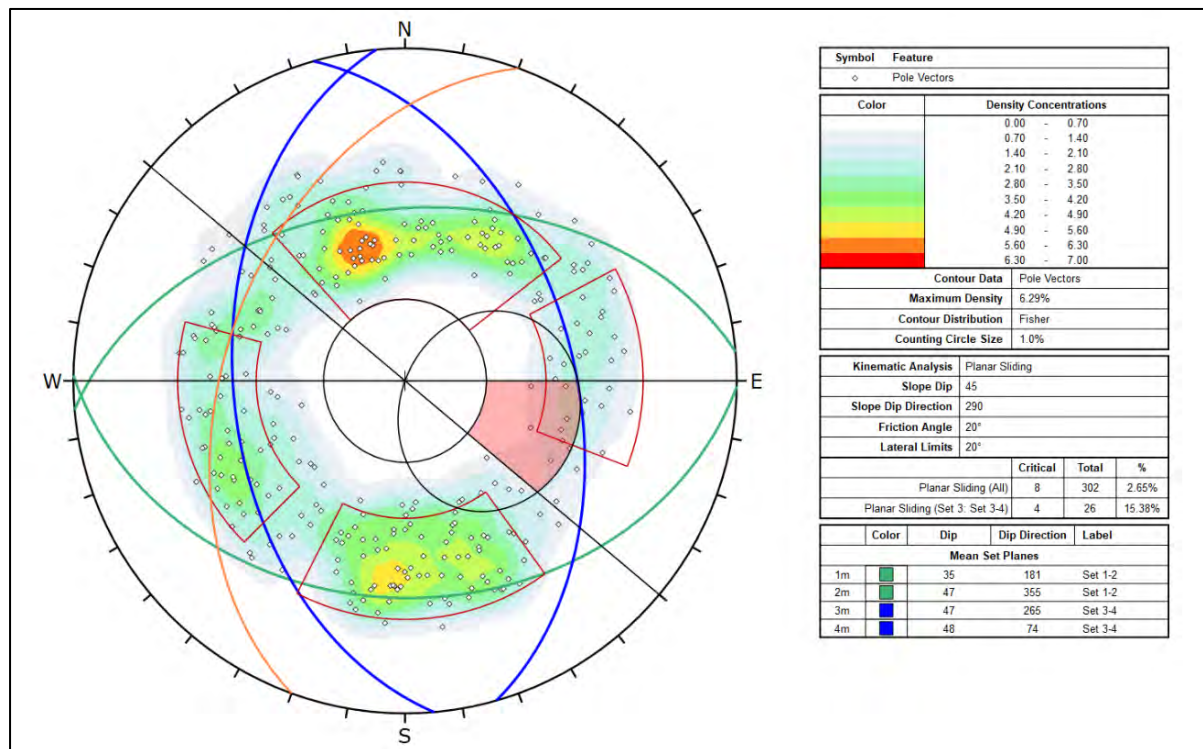


Figure C569 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (East Wall) Planar Sliding.

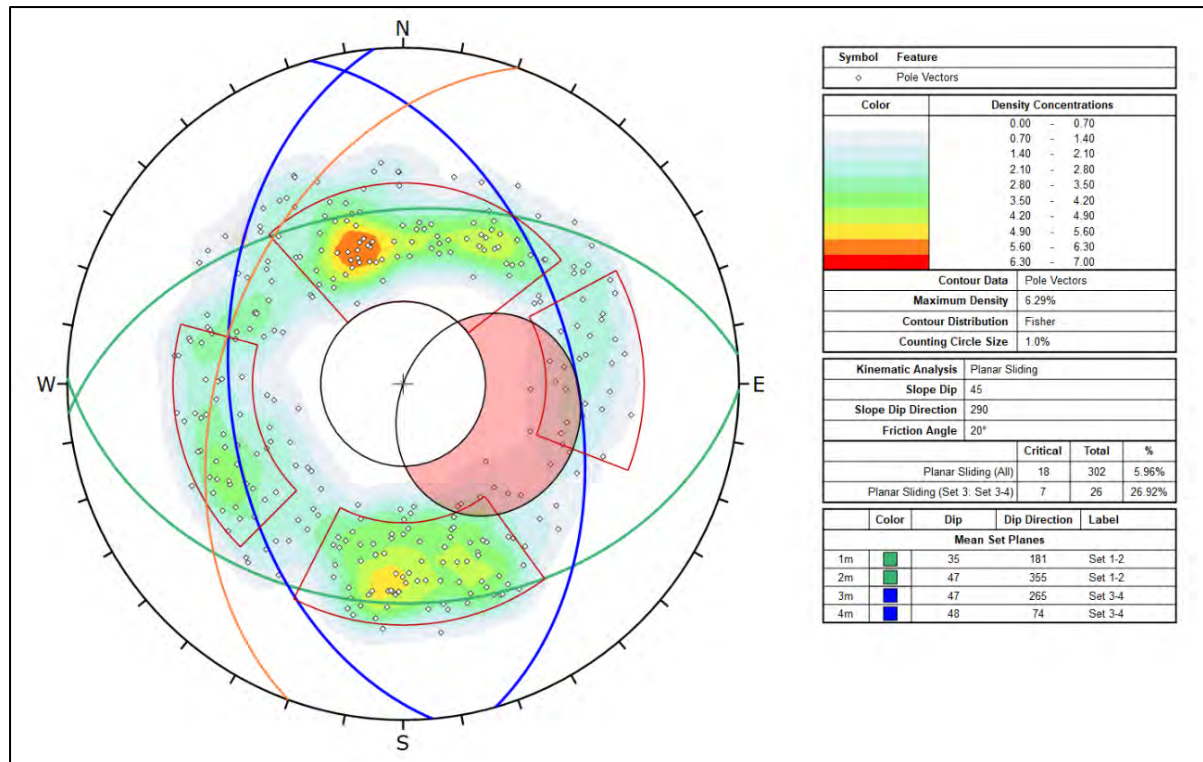


Figure C570 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (East Wall) Planar Sliding (No Limits).

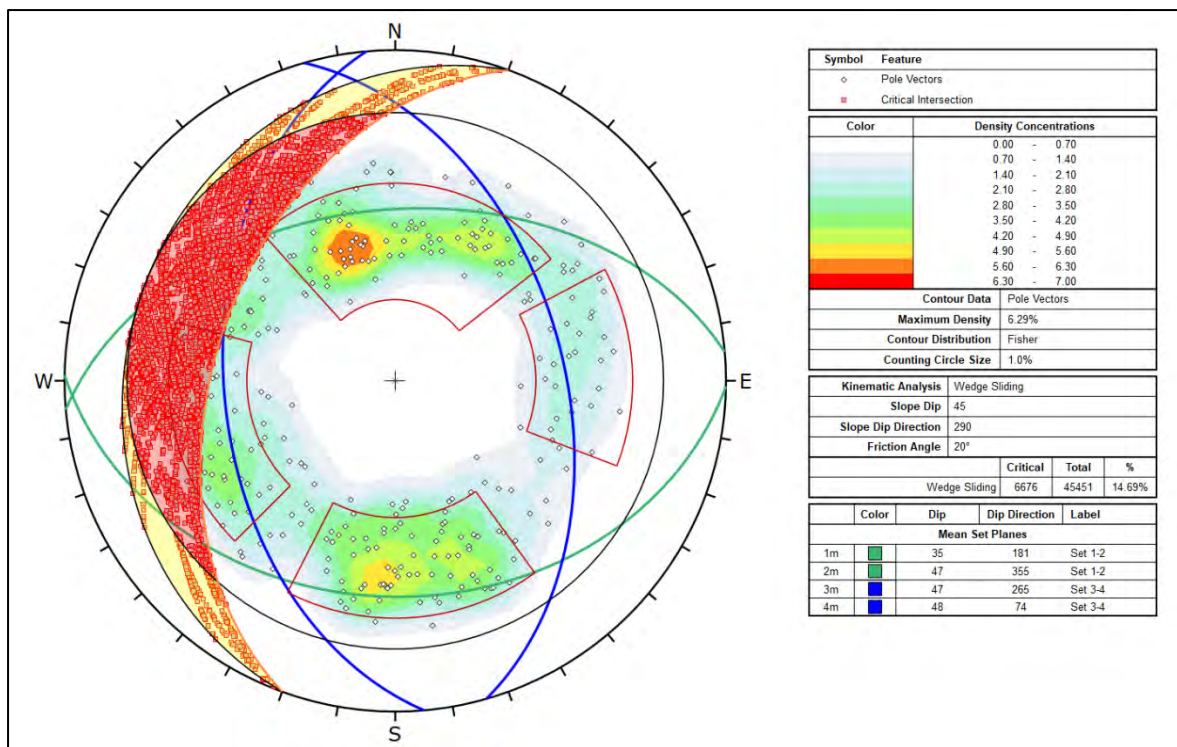


Figure C571 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (East Wall) Wedge Sliding.

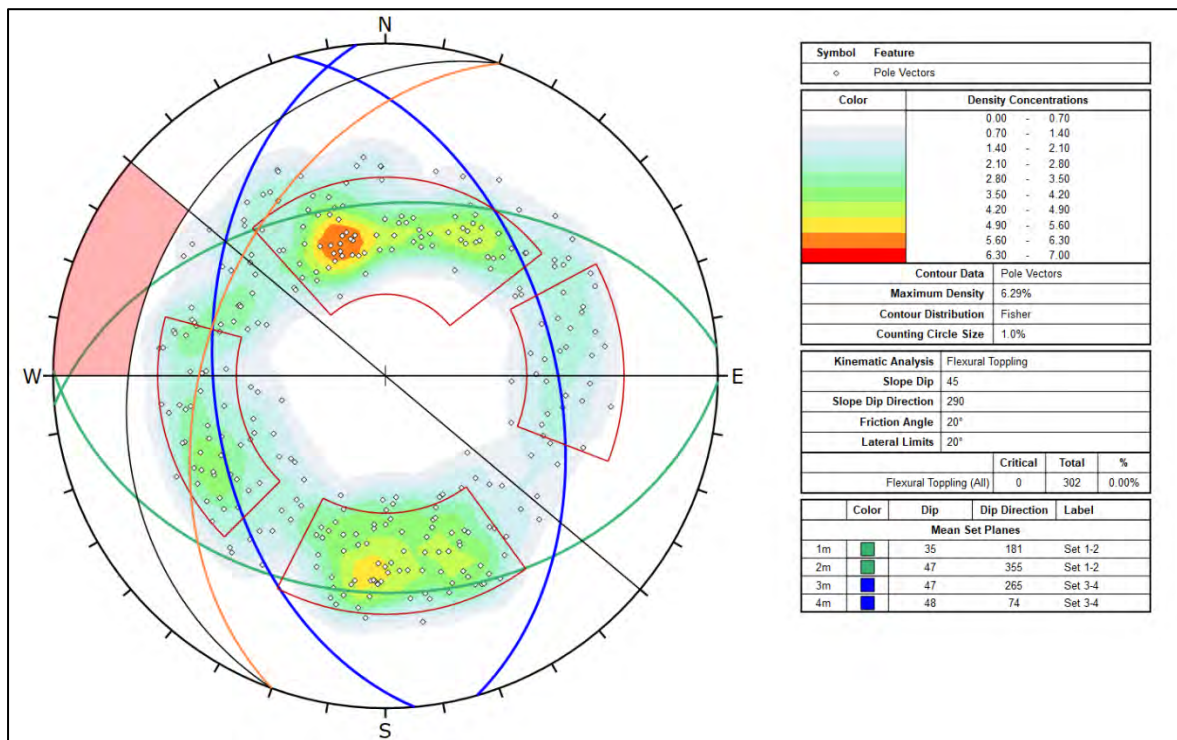


Figure C572 – Kinematic Analysis (Fracture >30°<60°) – Overall Slope – West Sump (East Wall) Flexural Toppling.

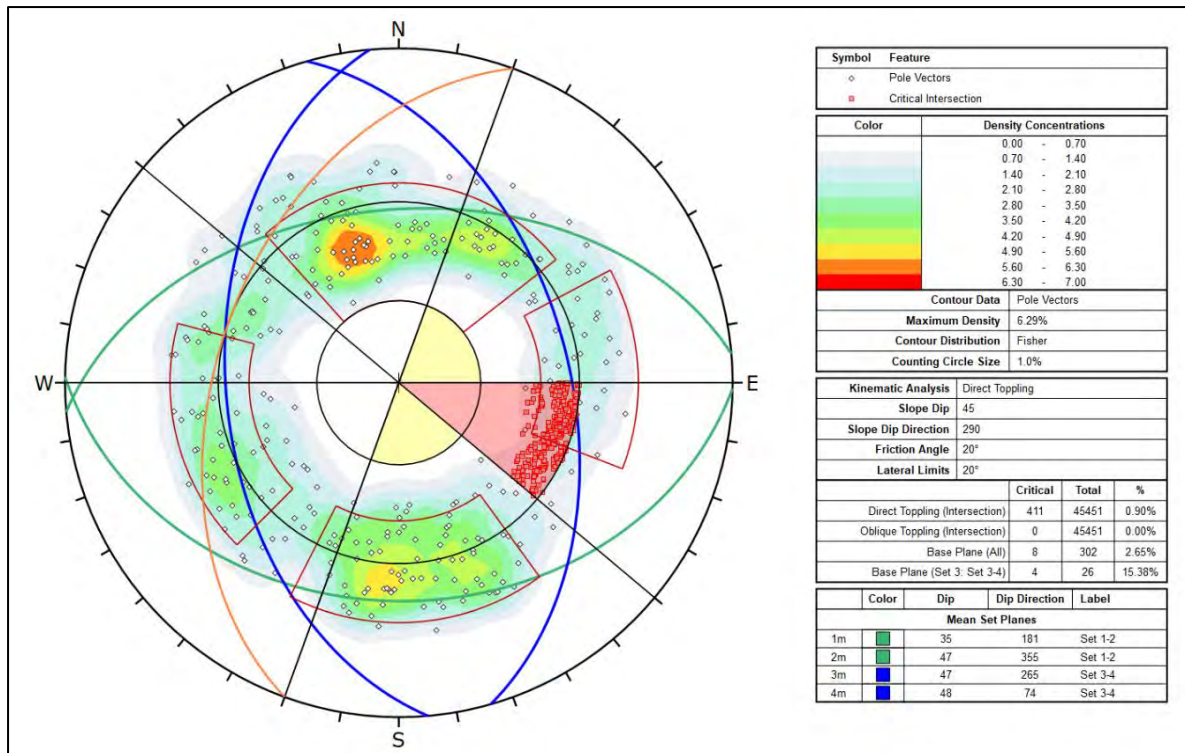


Figure C573 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (East Wall) Direct Toppling.

West Sump (South Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Overall Slope

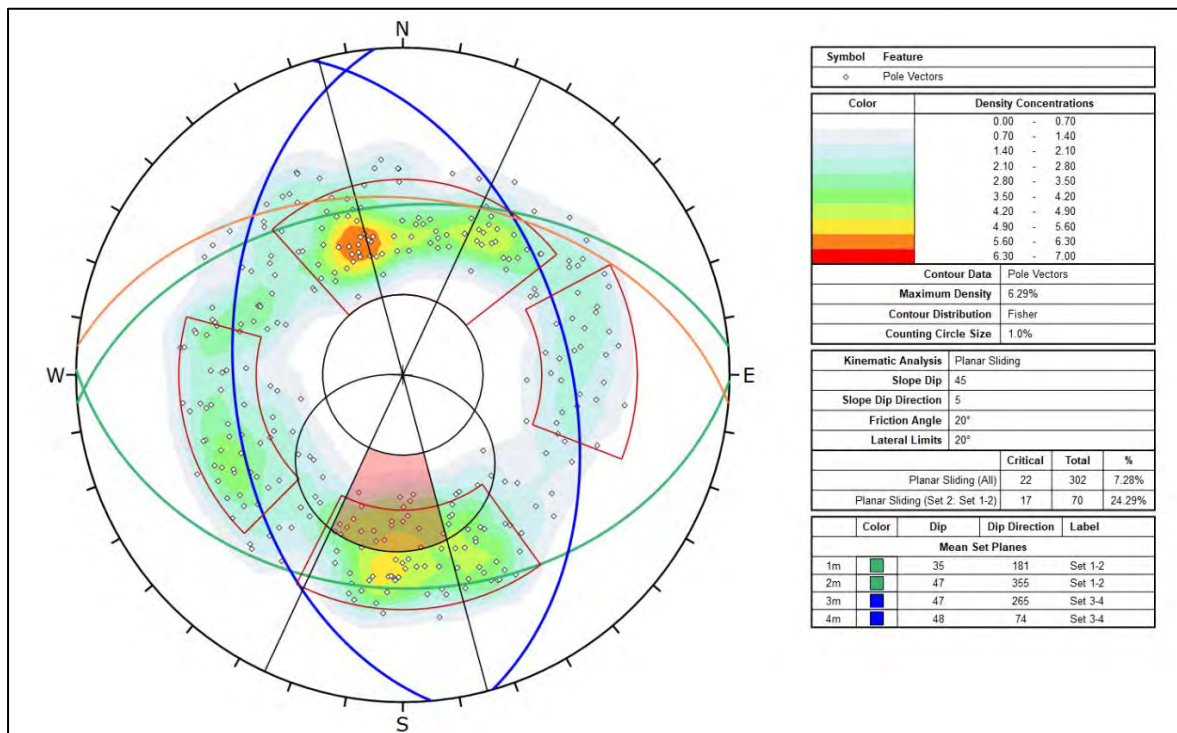


Figure C574 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (South Wall) Planar Sliding.

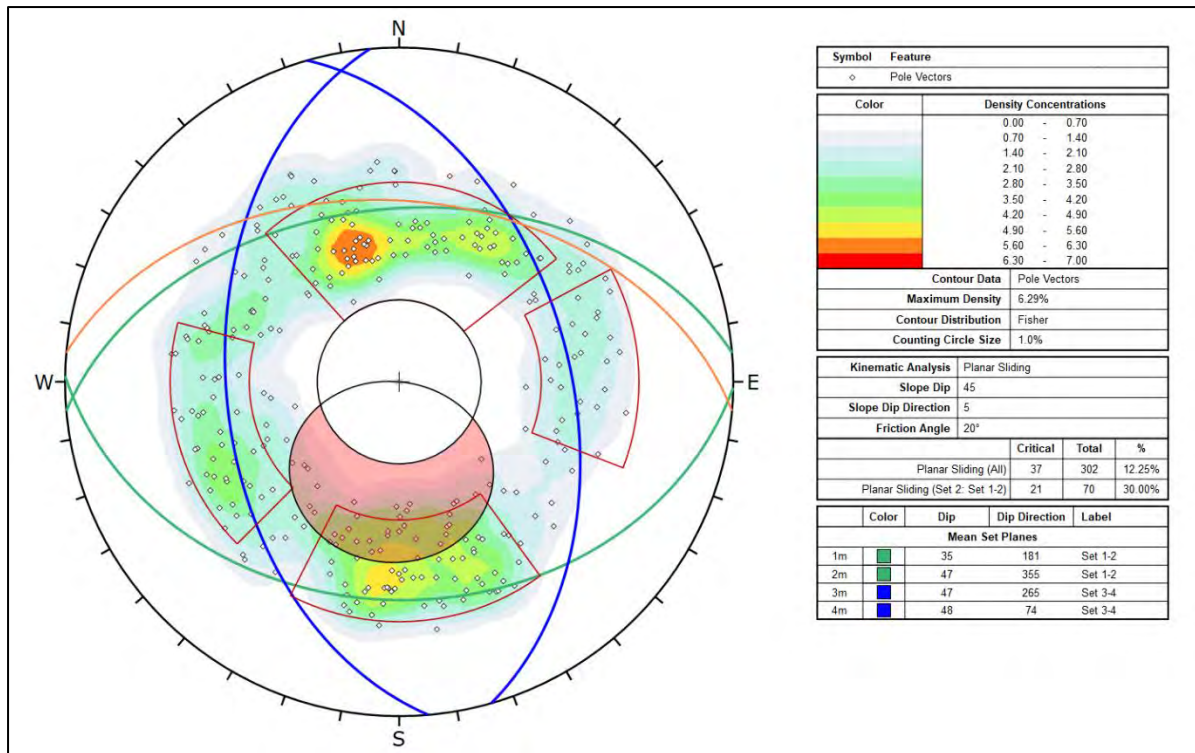


Figure C575 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (South Wall) Planar Sliding (No Limits).

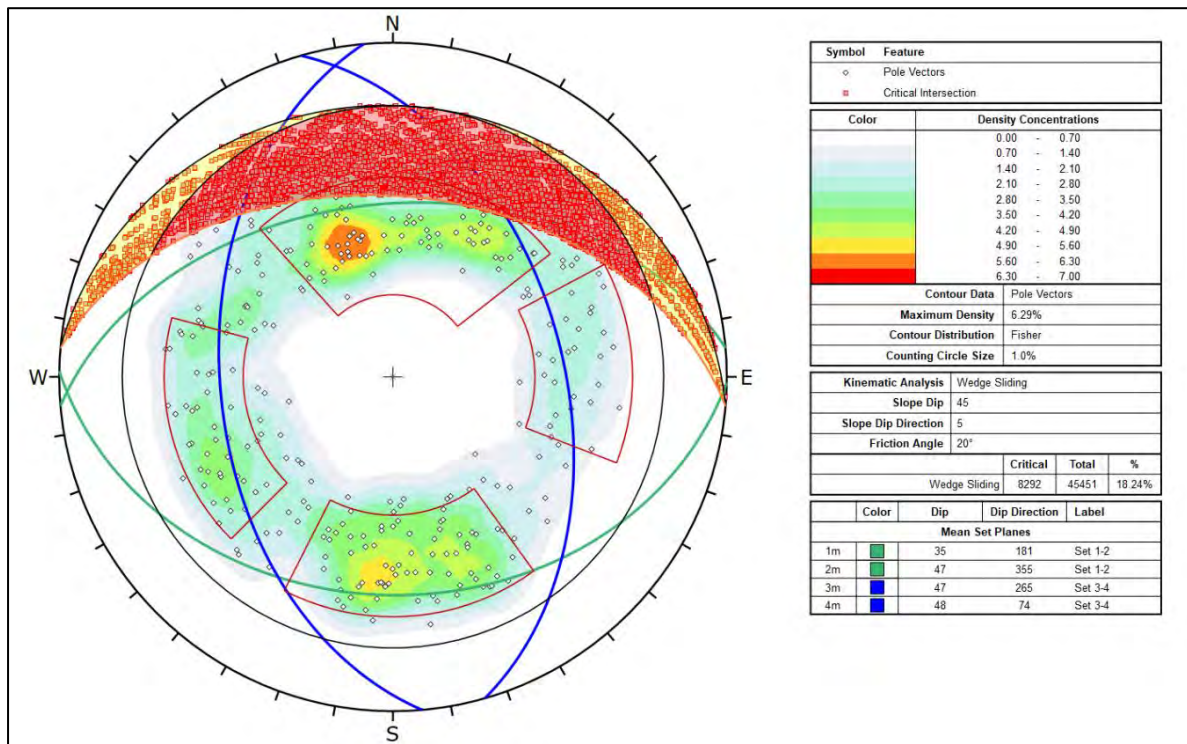


Figure C576 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (South Wall) Wedge Sliding.

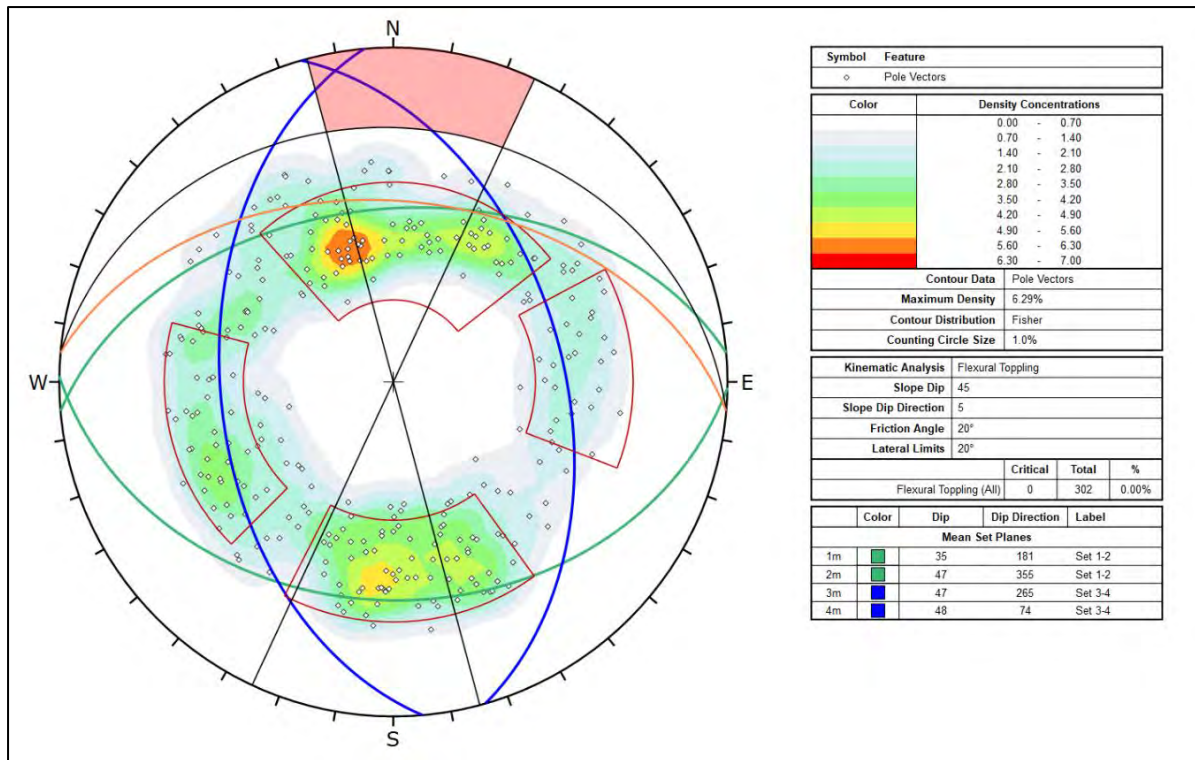


Figure C577 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (South Wall) Flexural Toppling.

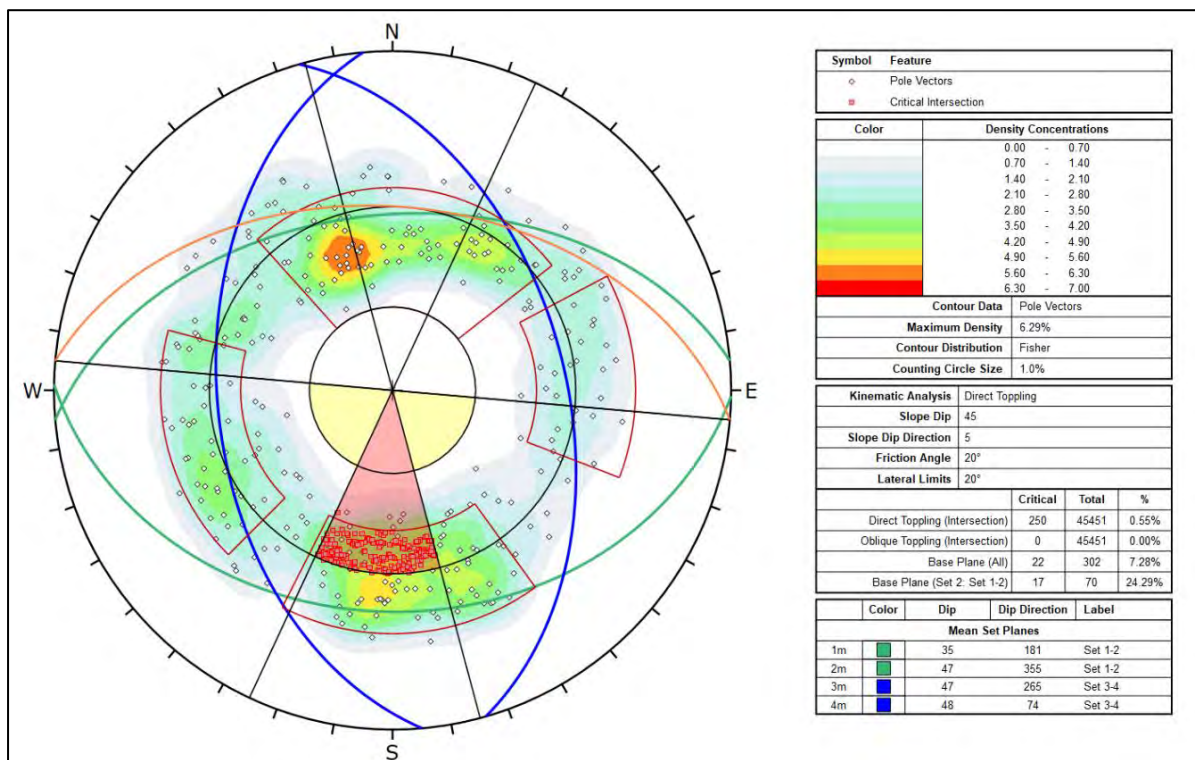


Figure C578 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Overall Slope – West Sump (South Wall) Direct Toppling.

West Sump (North Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Bench Slope

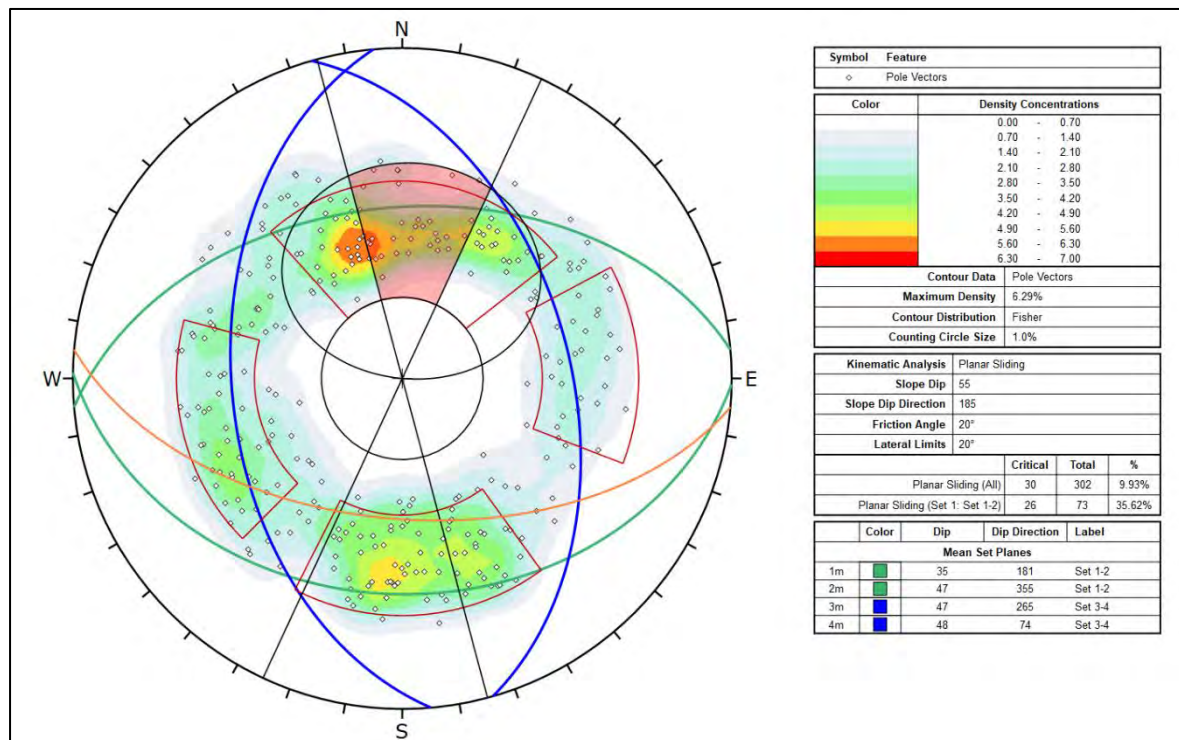


Figure C579 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (North Wall) Planar Sliding.

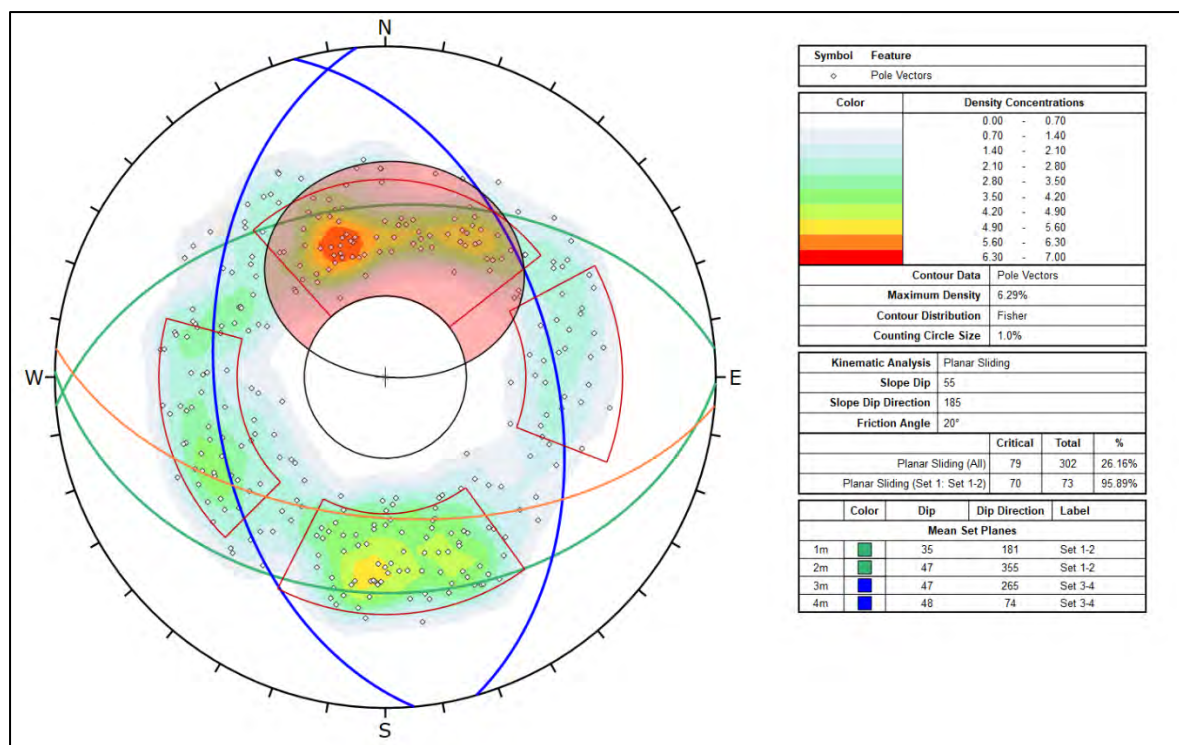


Figure C580 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (North Wall) Planar Sliding (No Limits).

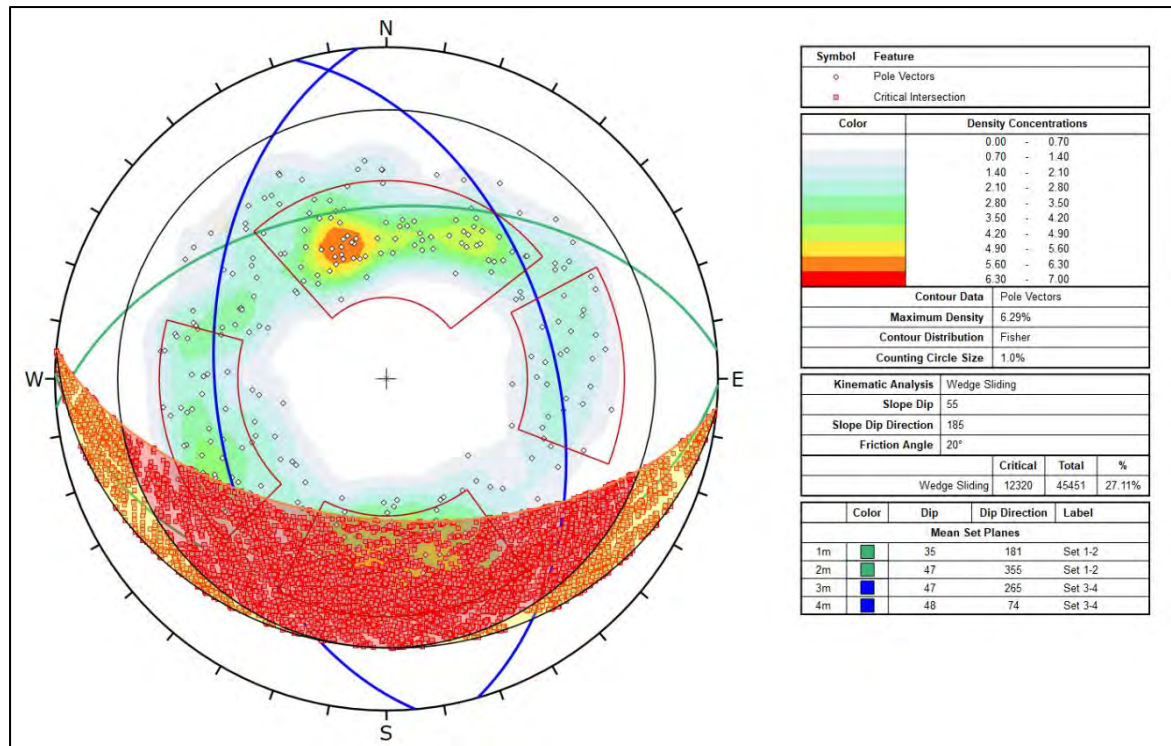


Figure C581 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (North Wall) Wedge Sliding.

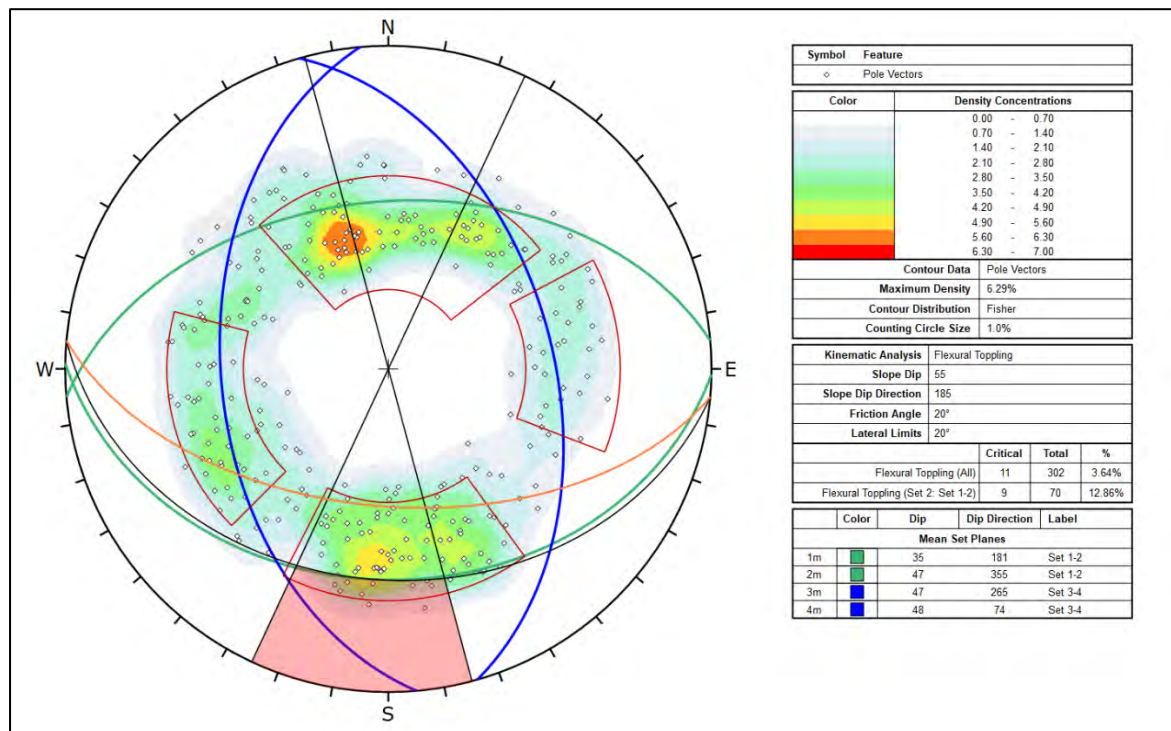


Figure C582 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (North Wall) Flexural Toppling.

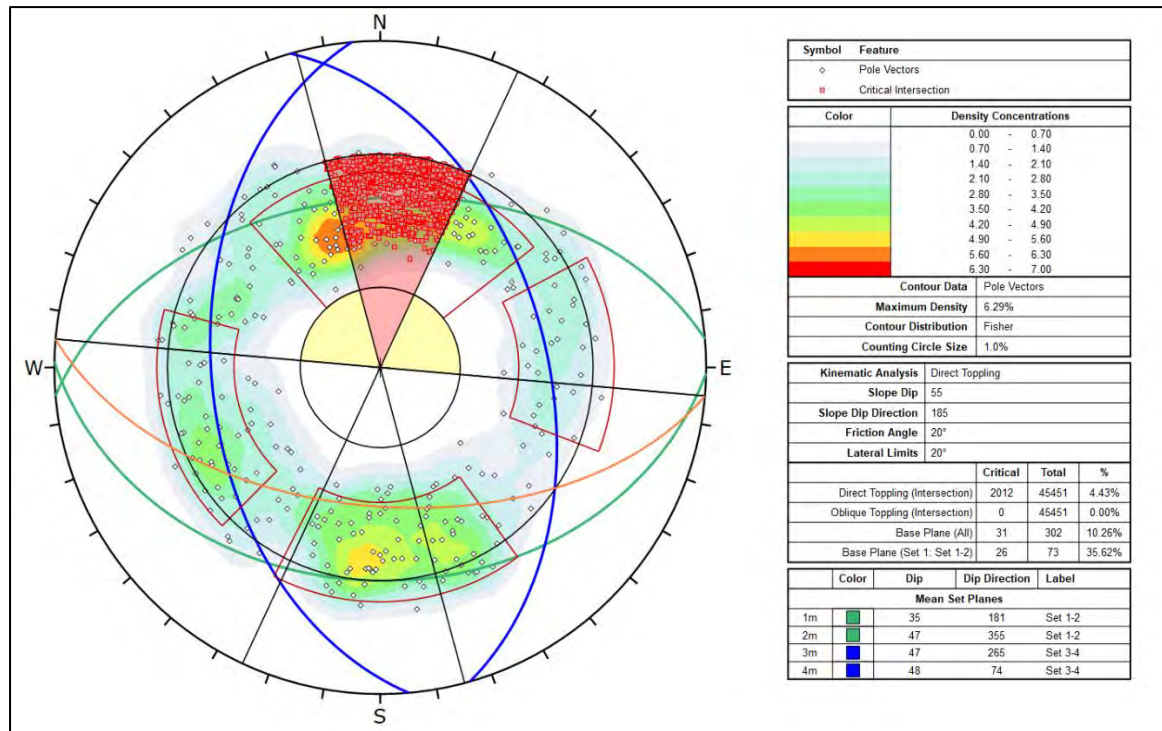


Figure C583 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (North Wall) Direct Toppling.

West Sump (West Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Bench Slope

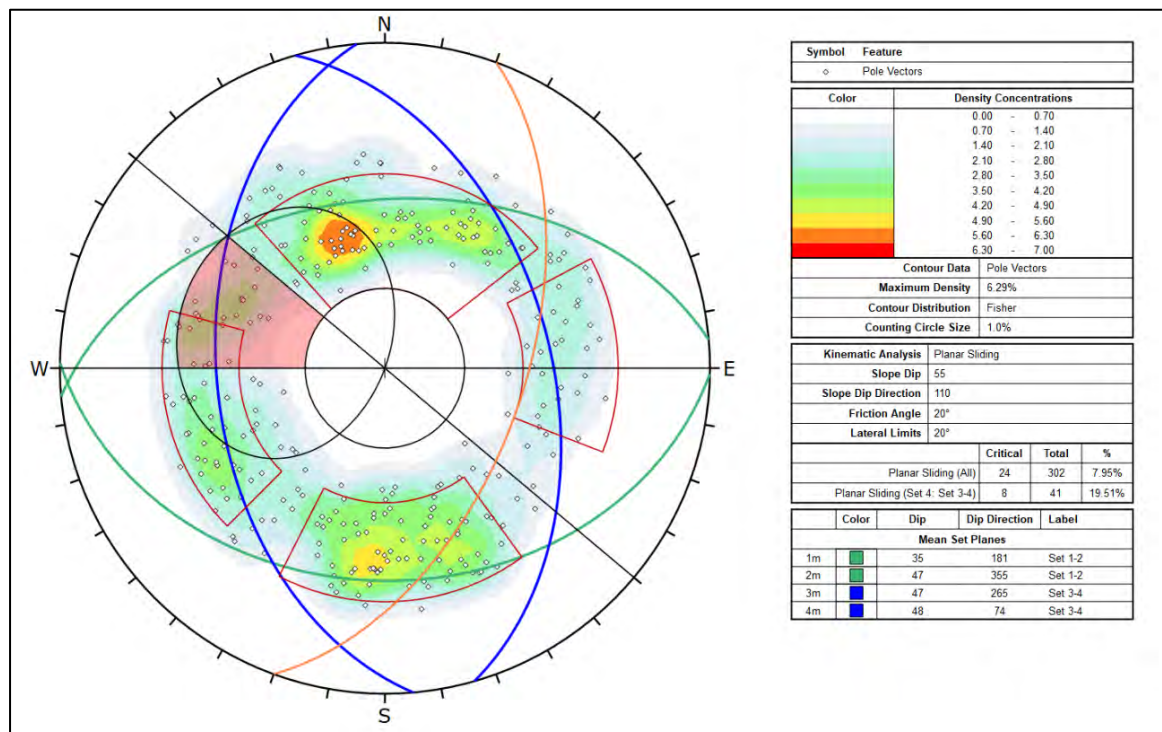


Figure C584 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (West Wall) Planar Sliding.

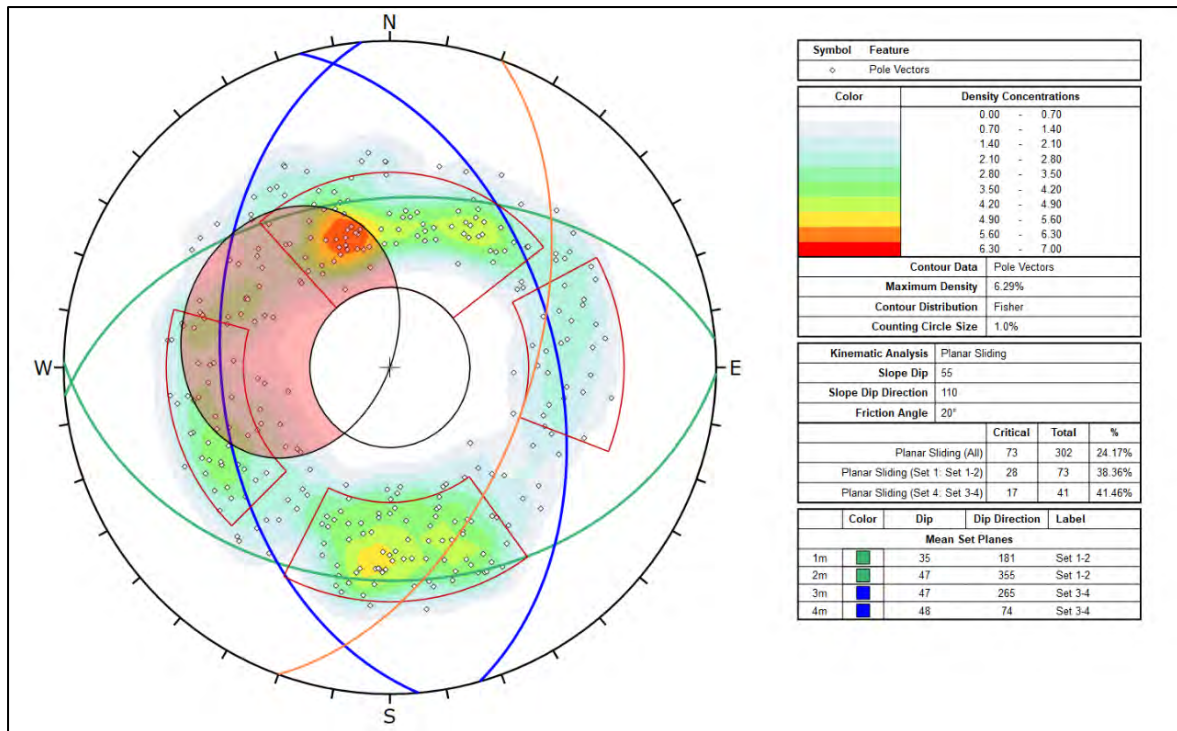


Figure C585 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (West Wall) Planar Sliding (No Limits).

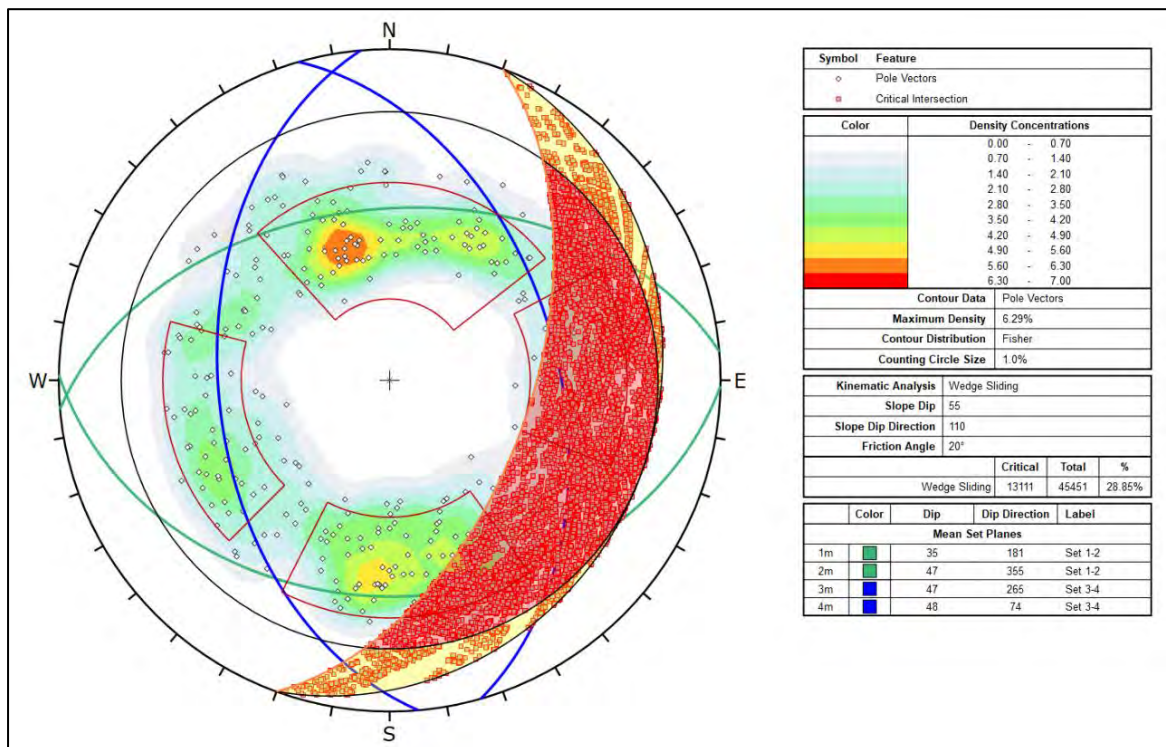


Figure C586 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (West Wall) Wedge Sliding.

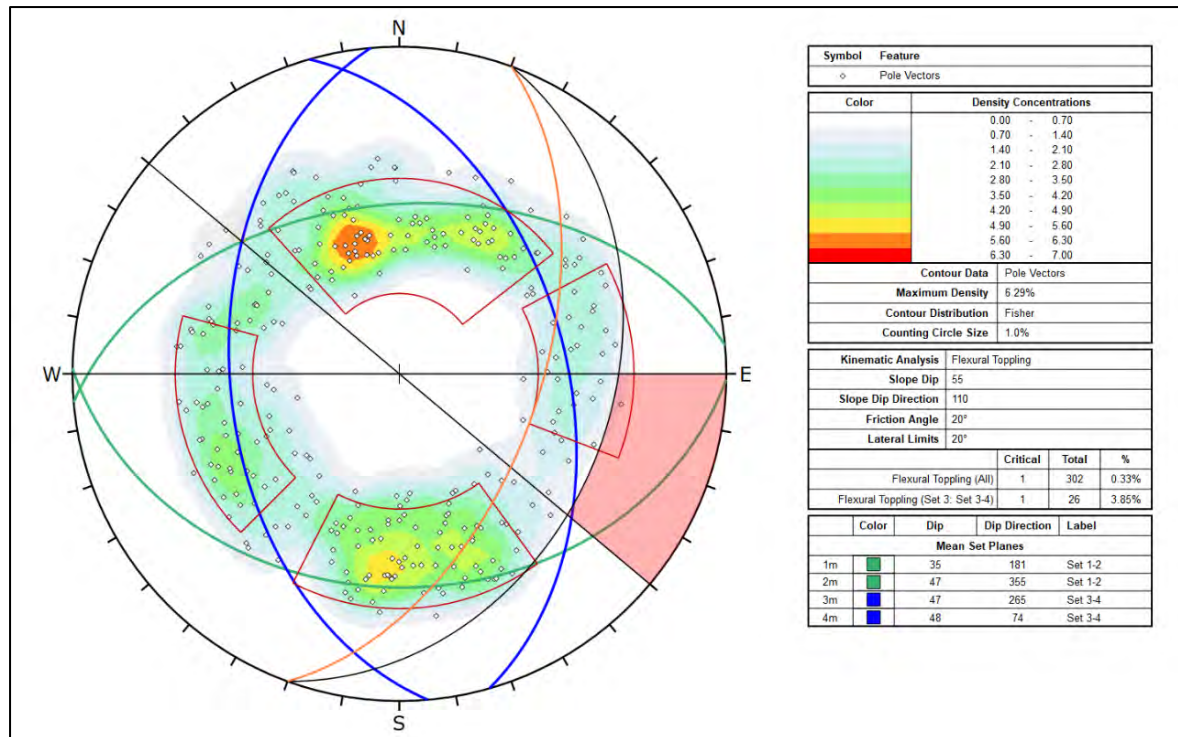


Figure C587 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (West Wall) Flexural Toppling.

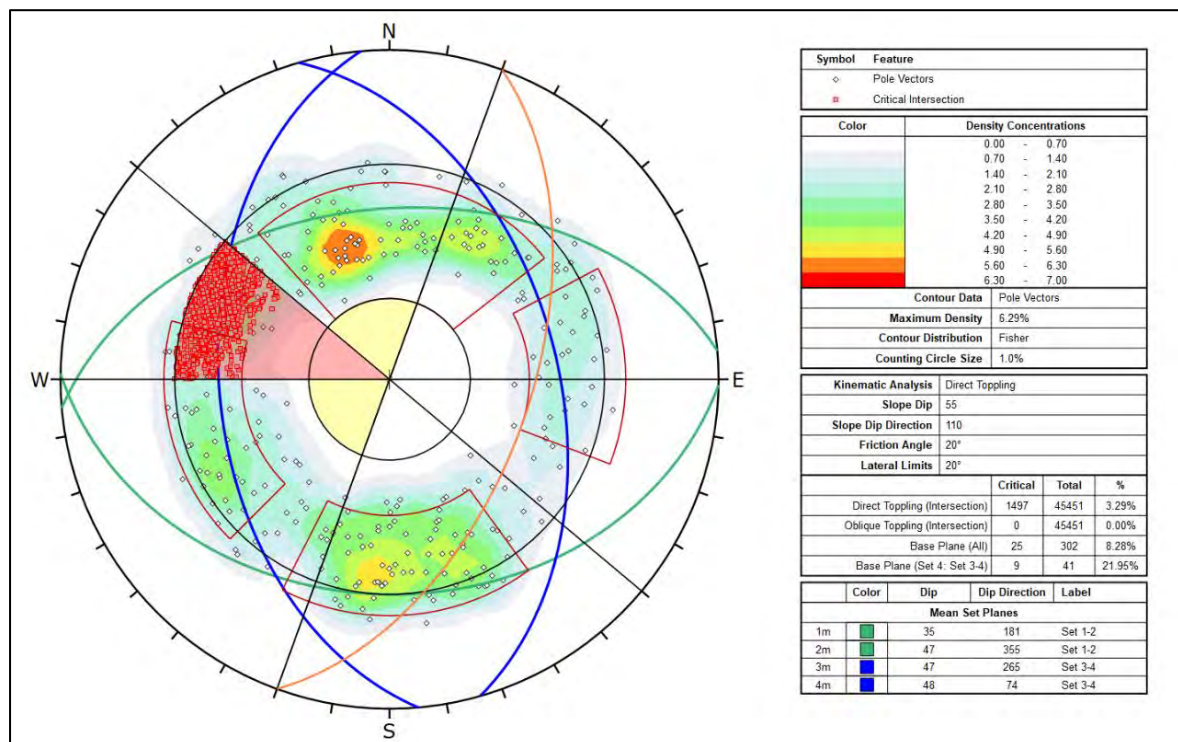


Figure C588 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (West Wall) Direct Toppling.

West Sump (East Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Bench Slope

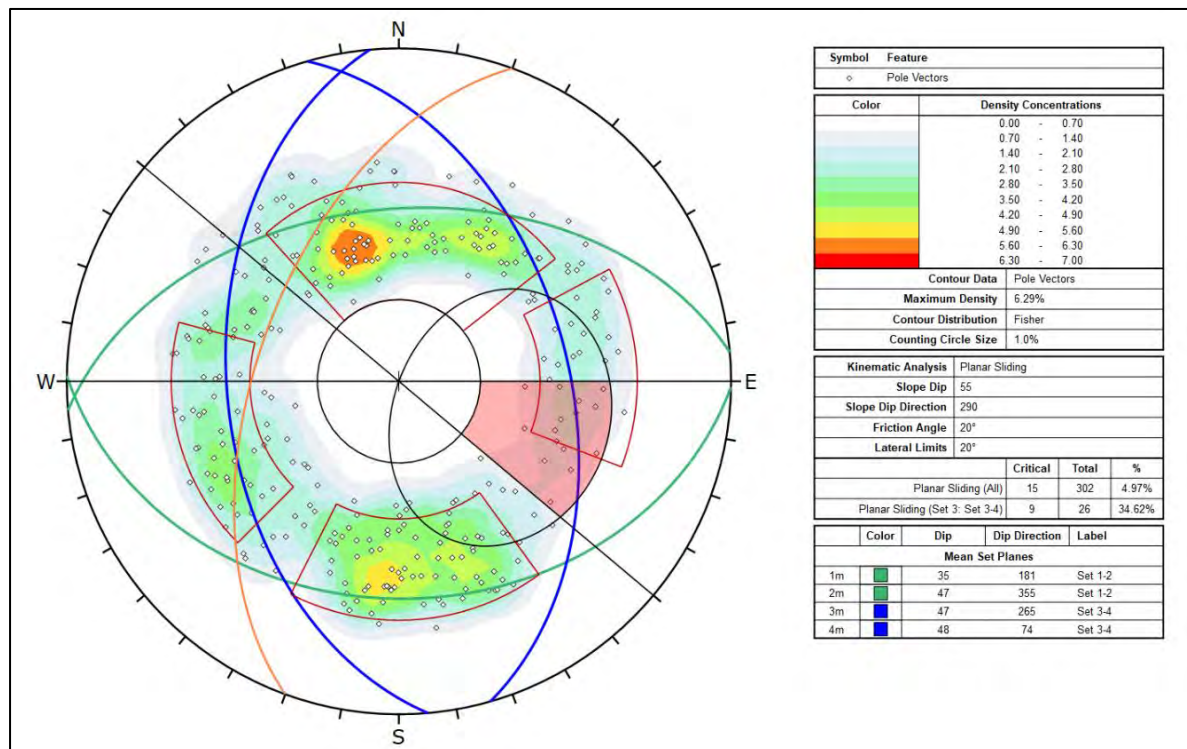


Figure C589 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (East Wall) Planar Sliding.

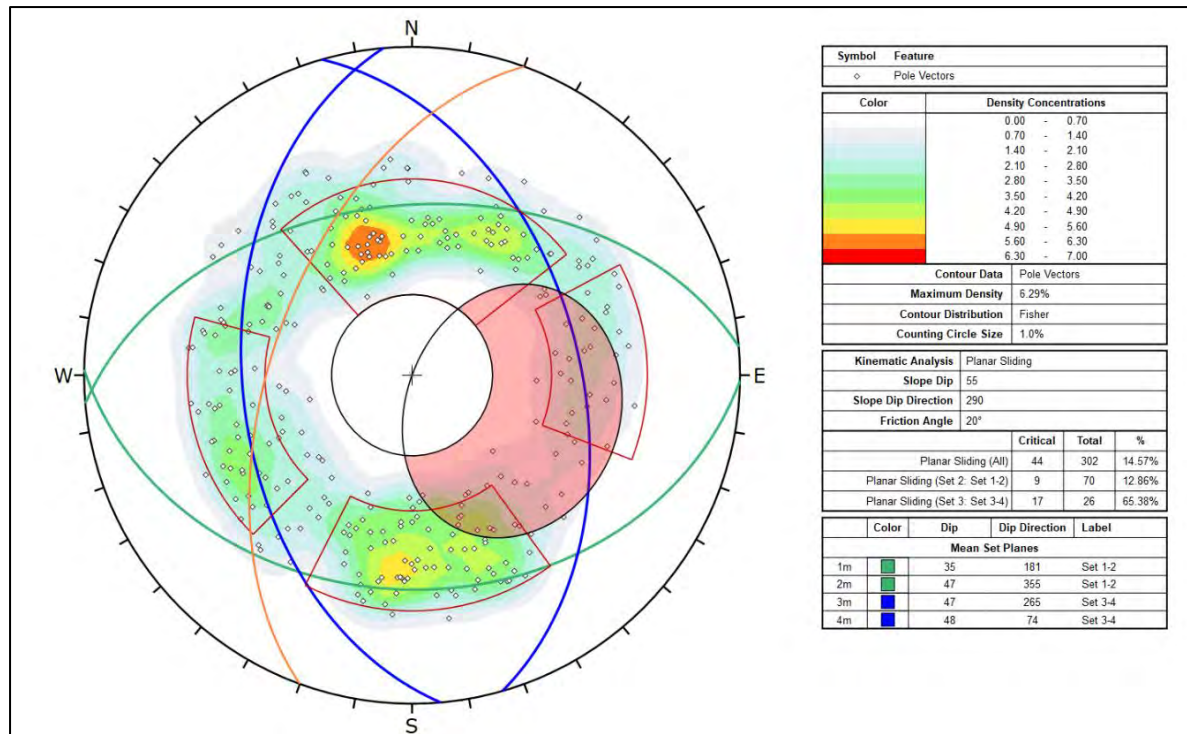


Figure C590 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (East Wall) Planar Sliding (No Limits).

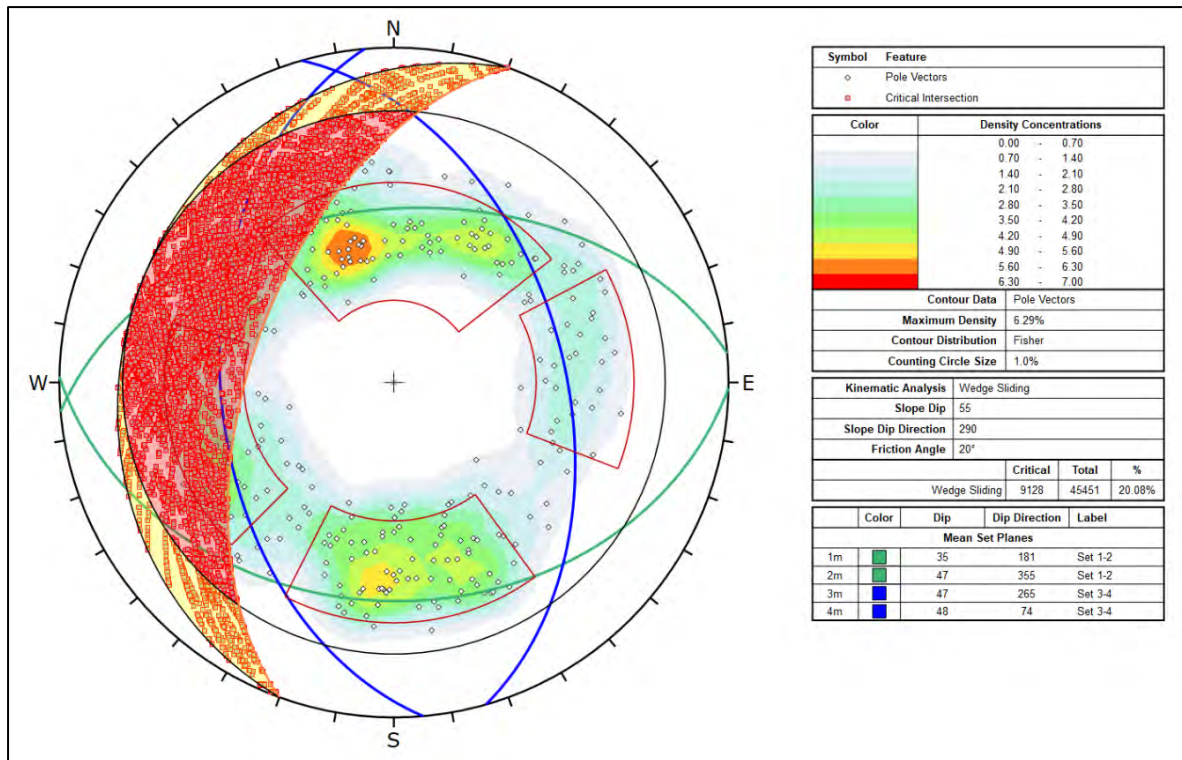


Figure C591 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (East Wall) Wedge Sliding.

Figure C592 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (East Wall) Flexural Toppling.

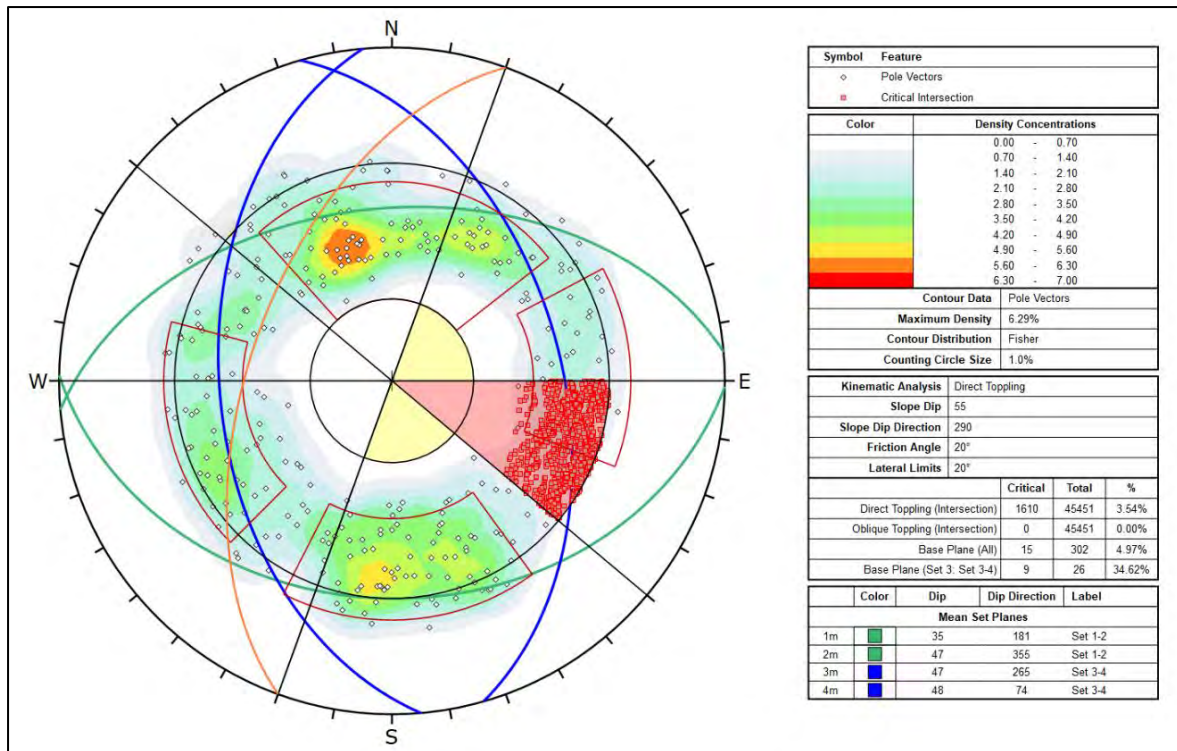


Figure C593 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (East Wall) Direct Toppling.

West Sump (South Wall) – Fractures $>30^{\circ}<60^{\circ}$ – Bench Slope

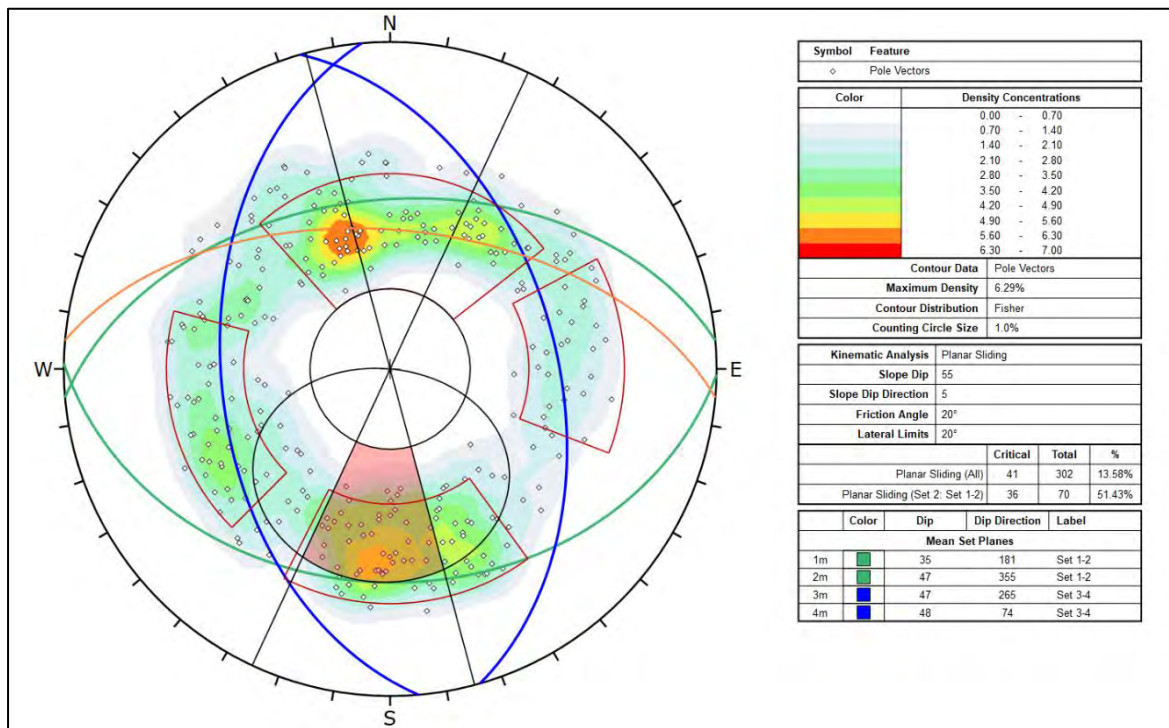


Figure C594 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (South Wall) Planar Sliding.

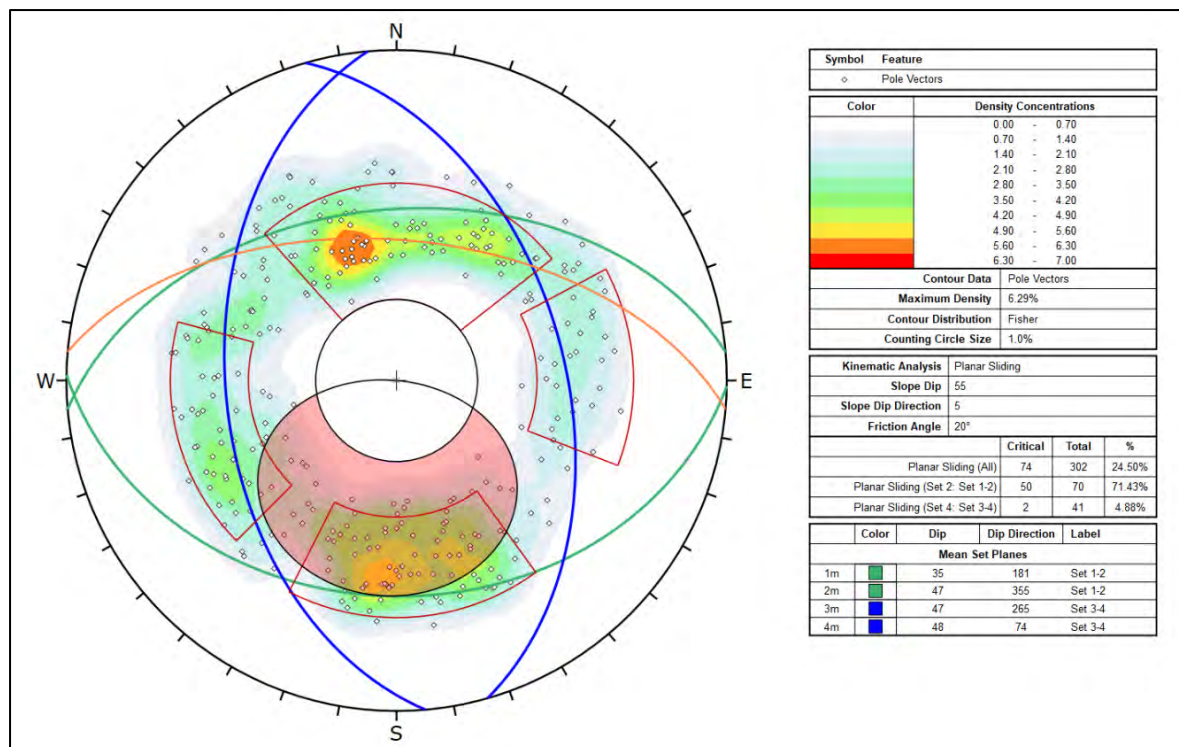


Figure C595 – Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (South Wall) Planar Sliding (No Limits).

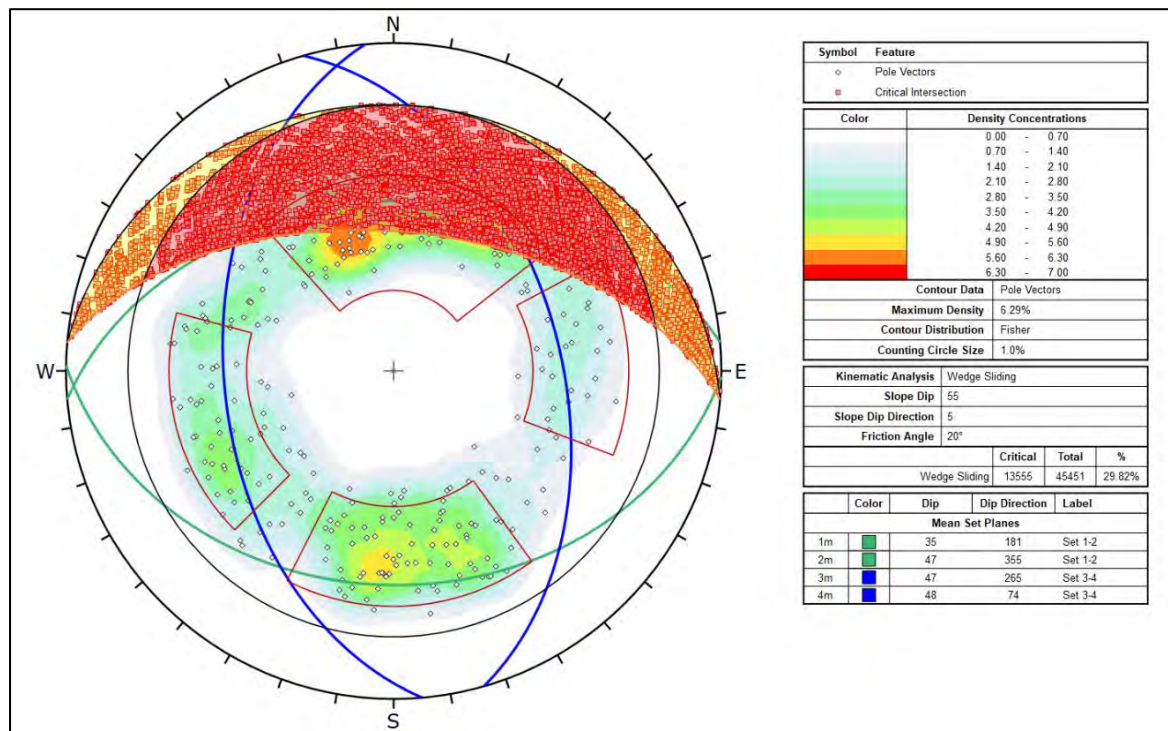


Figure C596– Kinematic Analysis (Fracture $>30^{\circ}<60^{\circ}$) – Bench Slope – West Sump (South Wall) Wedge Sliding.

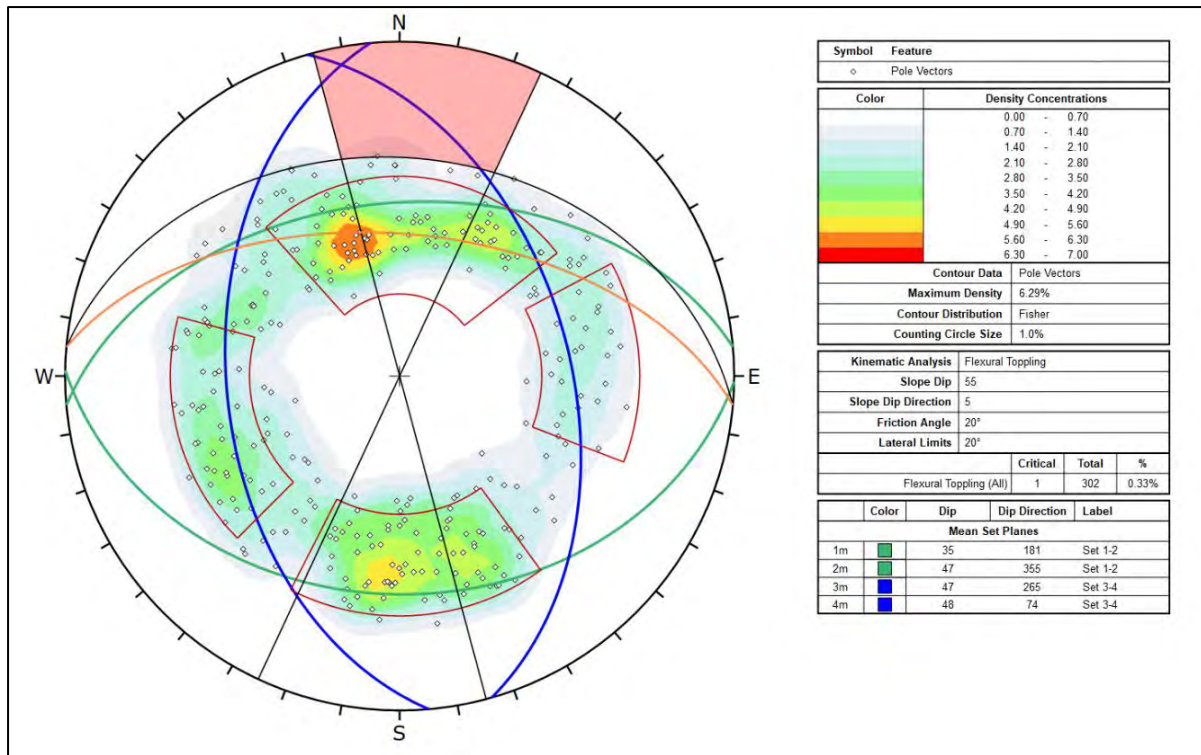


Figure C597– Kinematic Analysis (Fracture >30°<60°) – Bench Slope – West Sump (South Wall) Flexural Toppling.

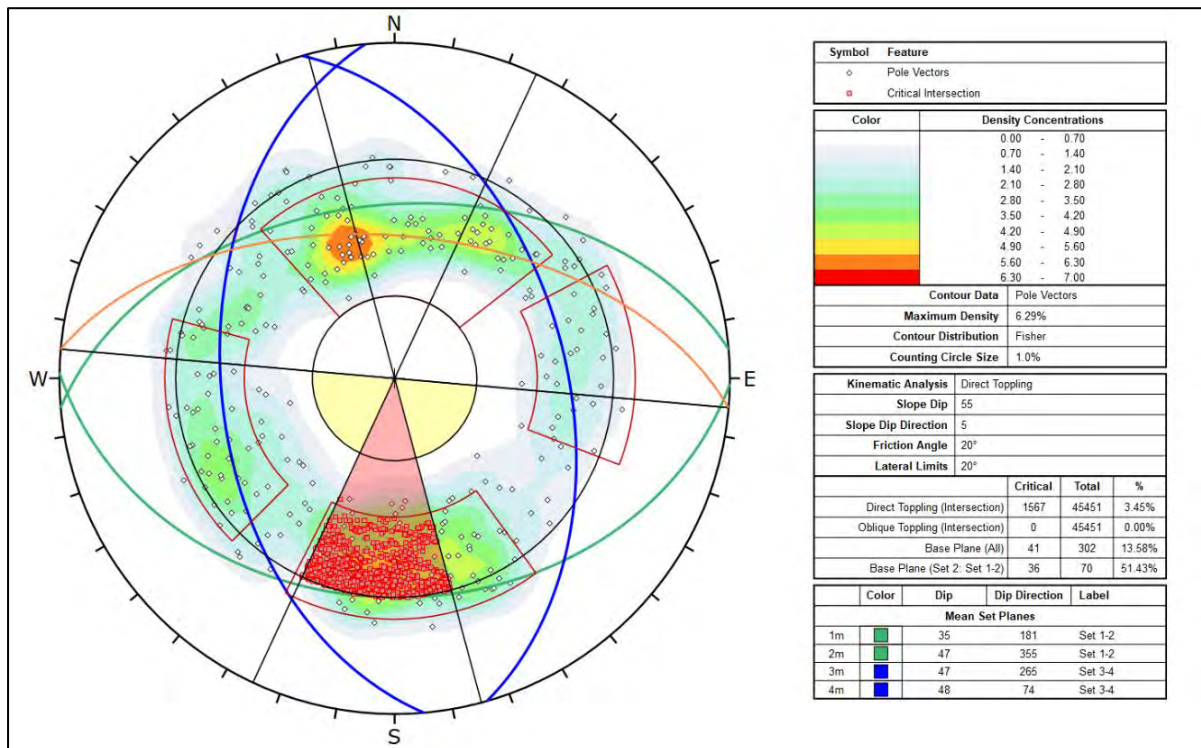


Figure C598 – Kinematic Analysis (Fracture >30°<60°) – Bench Slope – West Sump (South Wall) Direct Toppling.

West Sump (North Wall) – Fractures >60° – Overall Slope

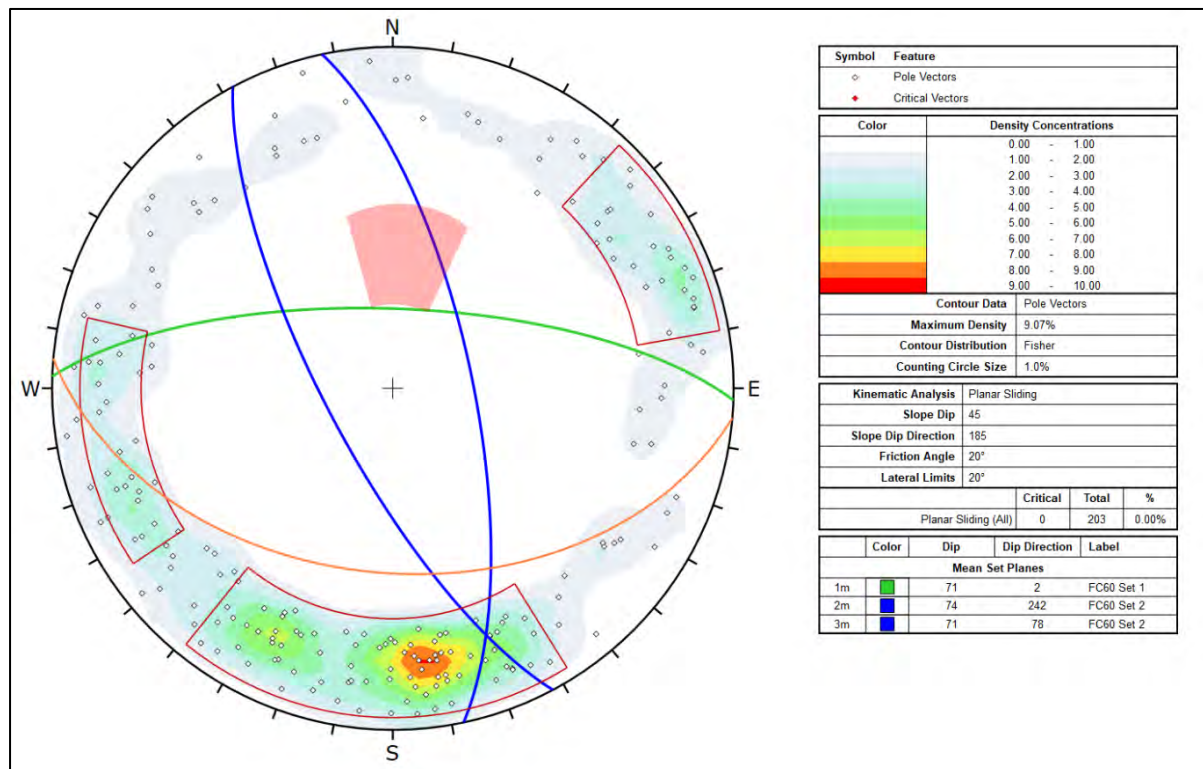


Figure C599 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (North Wall) Planar Sliding.

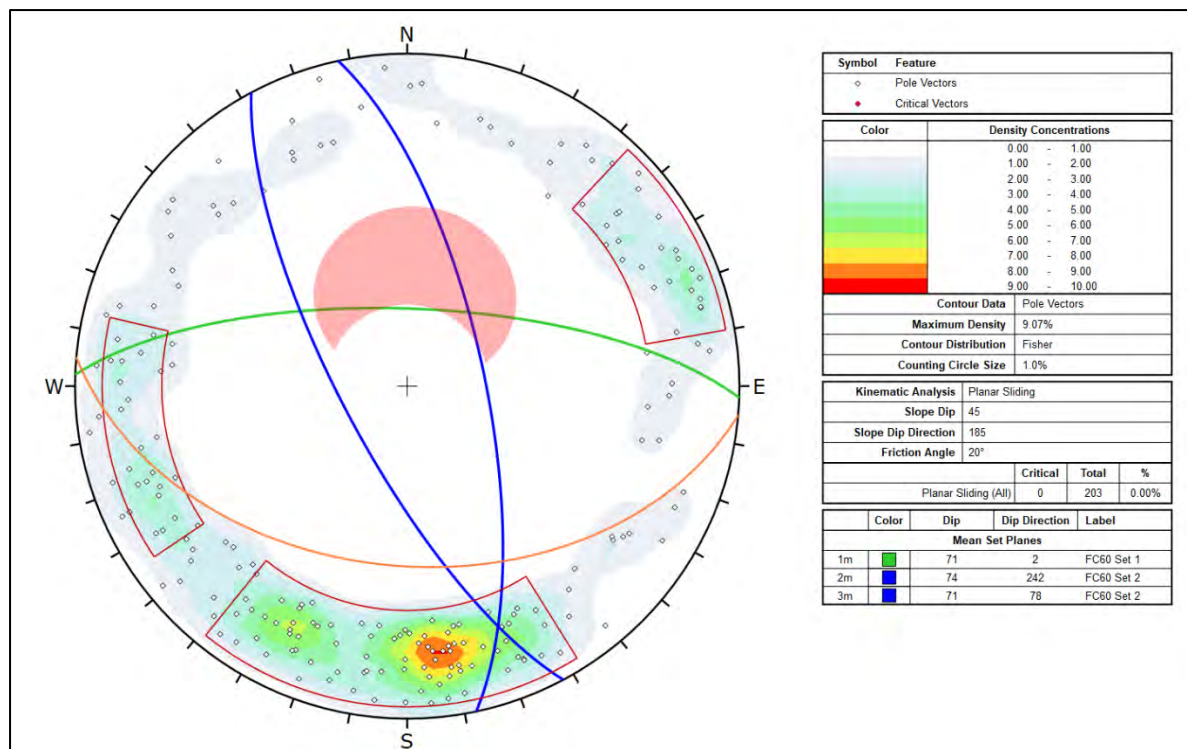


Figure C600 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (North Wall) Planar Sliding (No Limits).

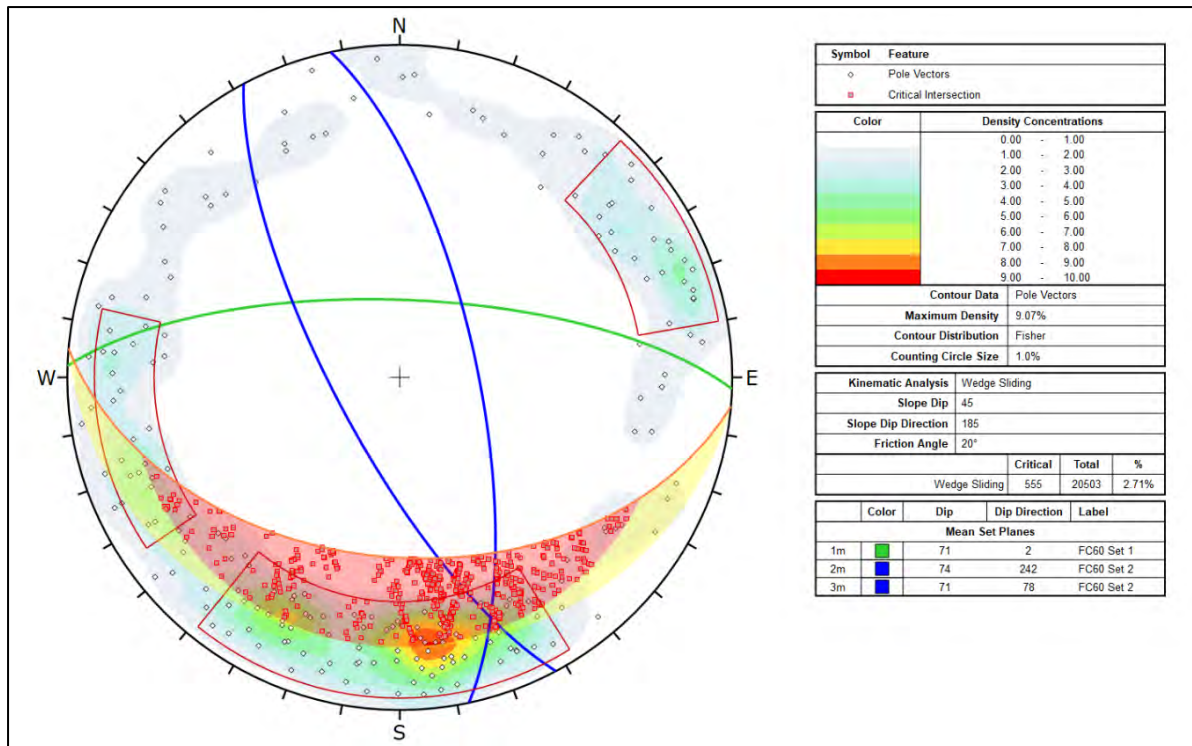


Figure C601 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (North Wall) Wedge Sliding.

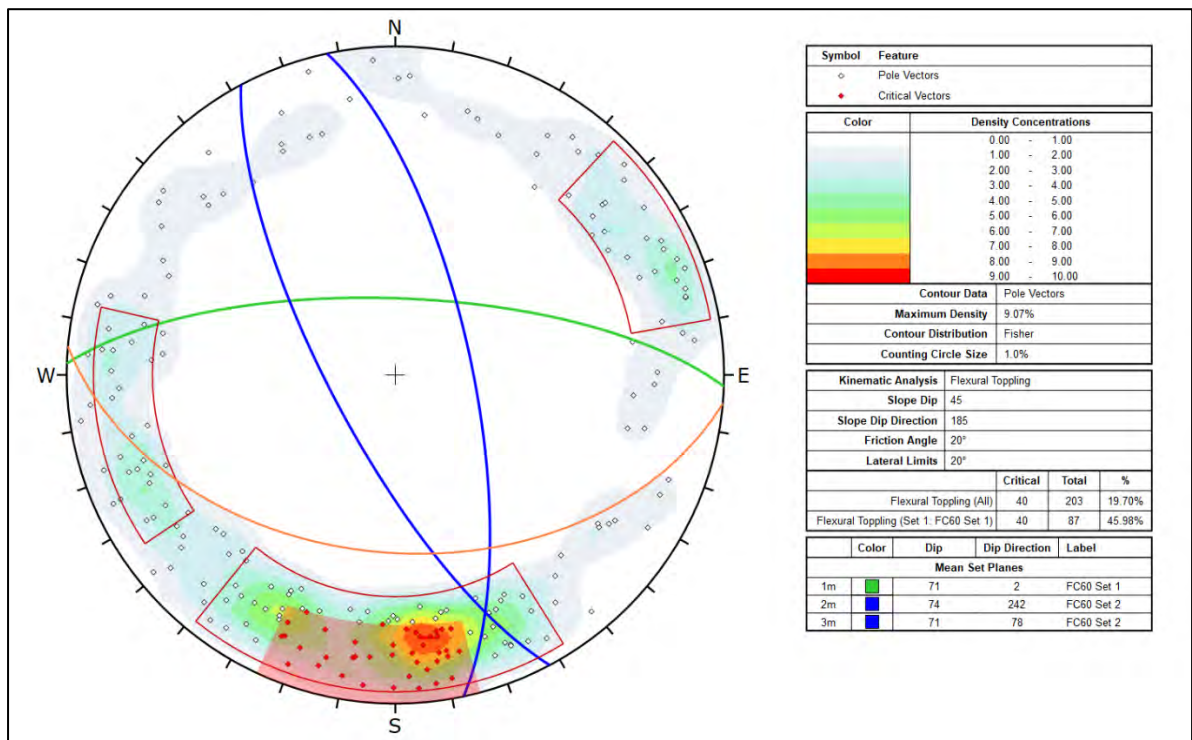


Figure C602 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (North Wall) Flexural Toppling.

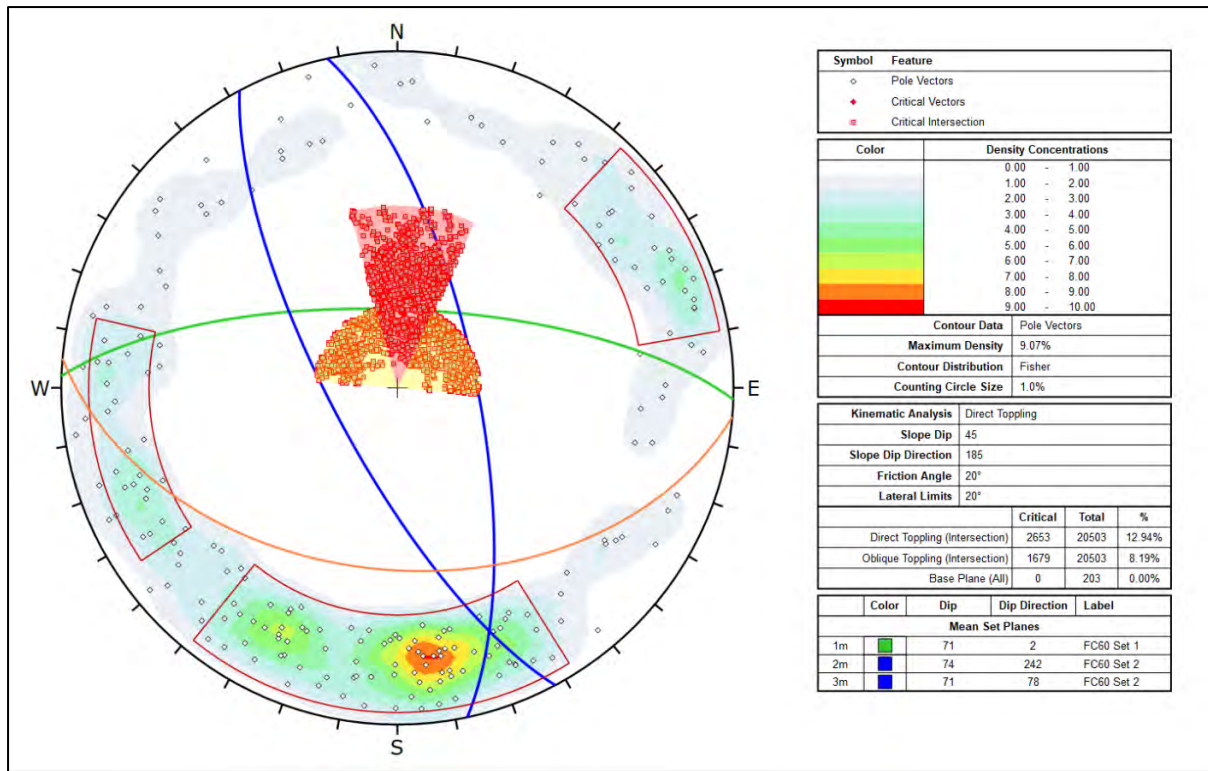


Figure C603 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (North Wall) Direct Toppling.

West Sump (West Wall) – Fractures >60° – Overall Slope

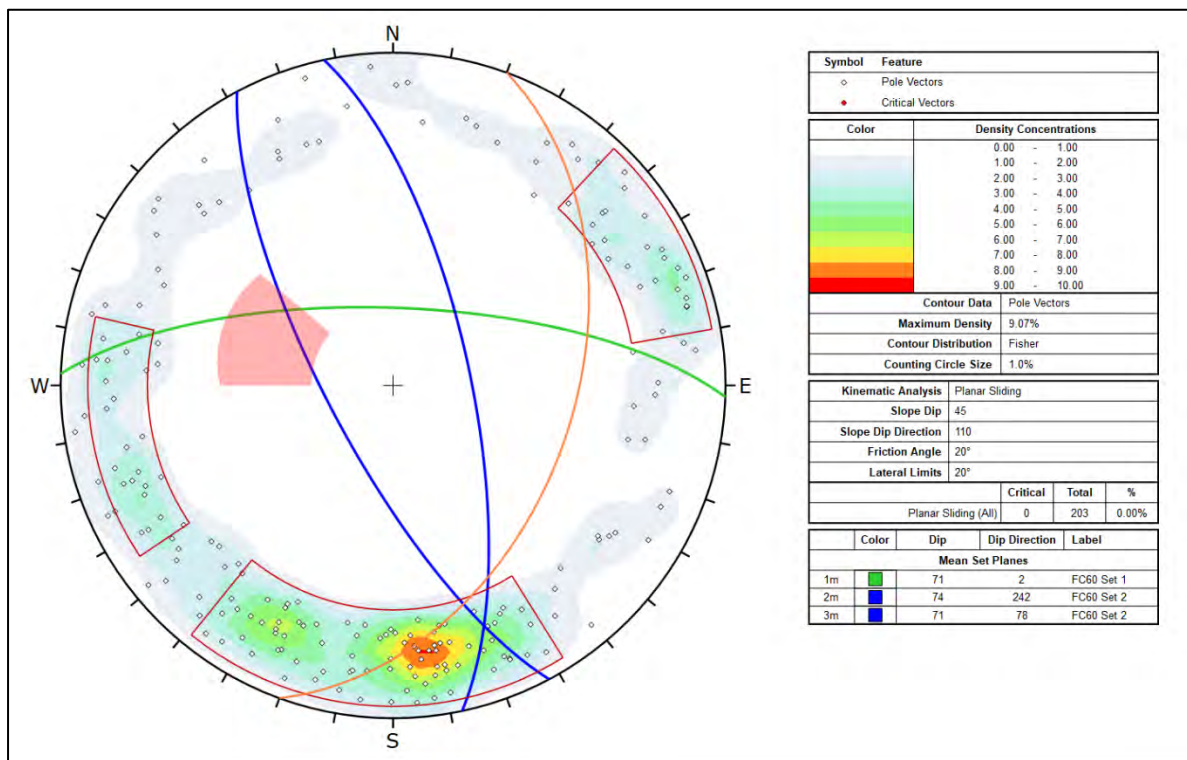


Figure C604 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (West Wall) Planar Sliding.

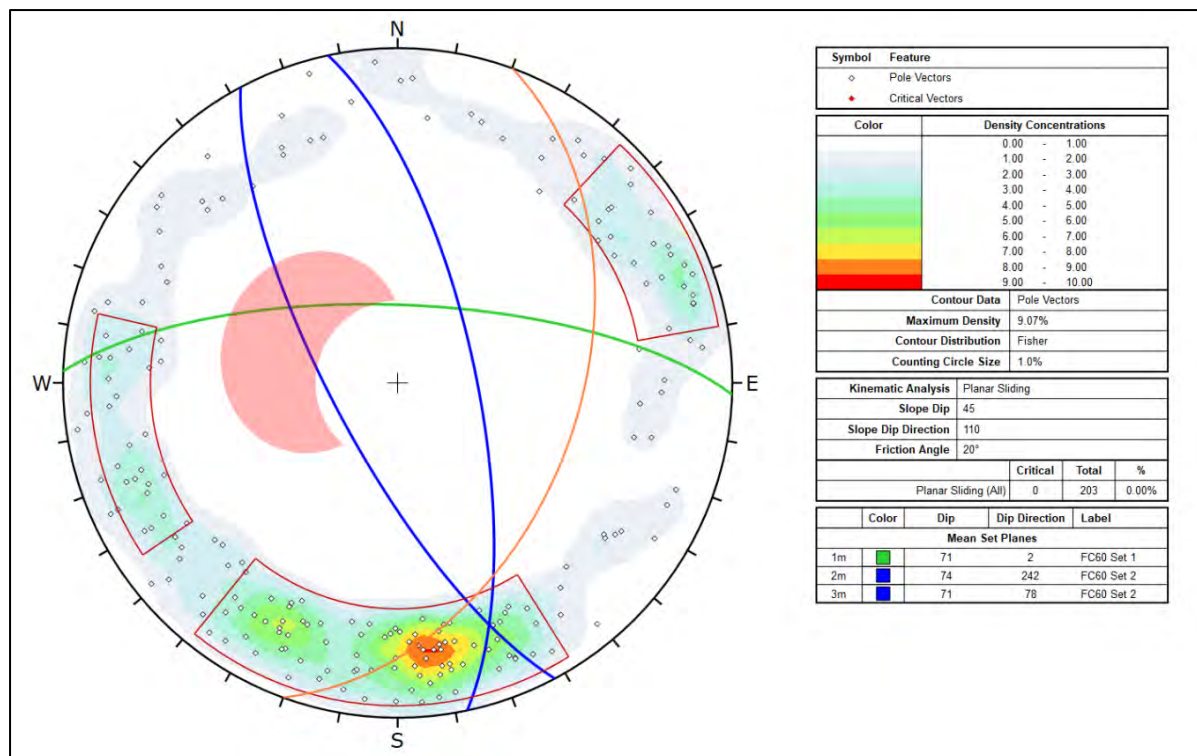


Figure C605 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (West Wall) Planar Sliding (No Limits).

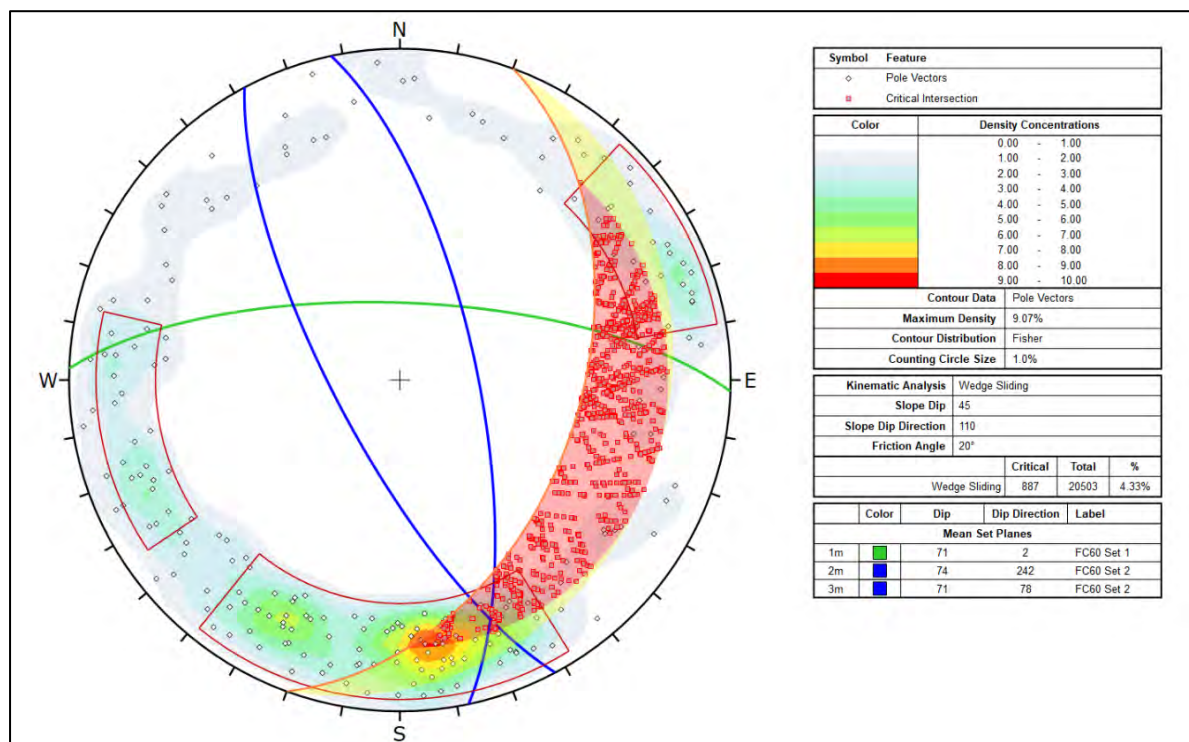


Figure C606 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (West Wall) Wedge Sliding.

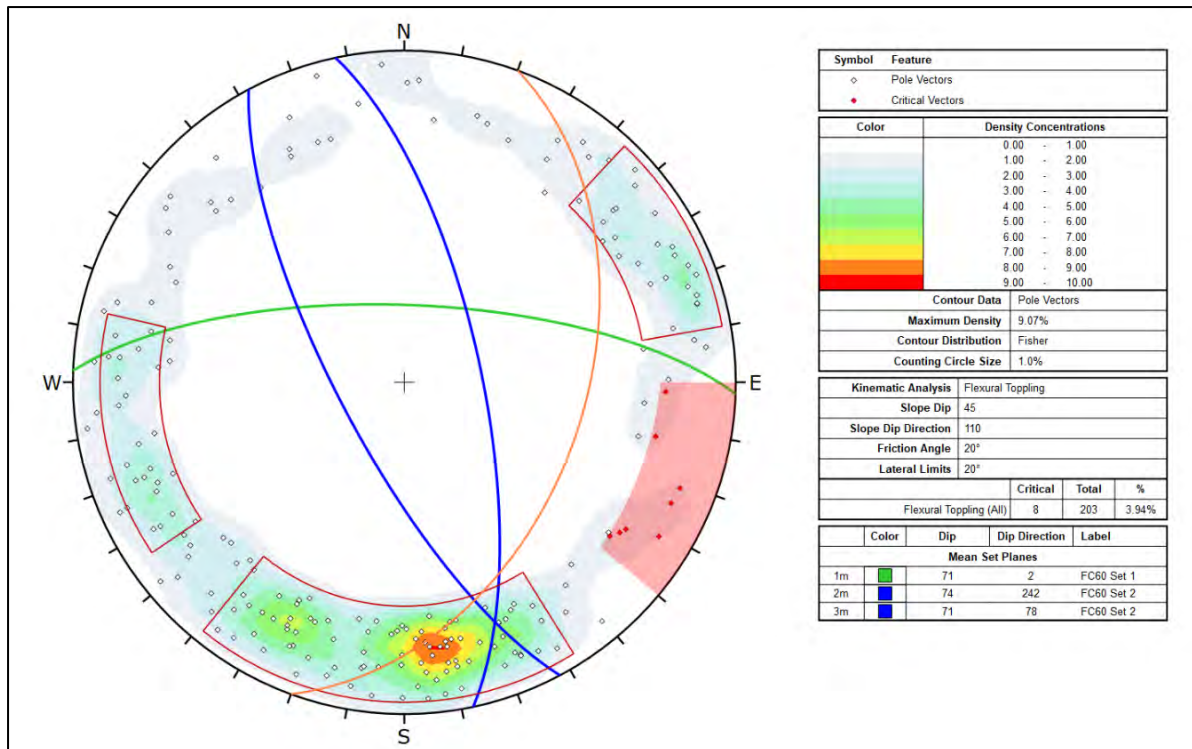


Figure C607 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (West Wall) Flexural Toppling.

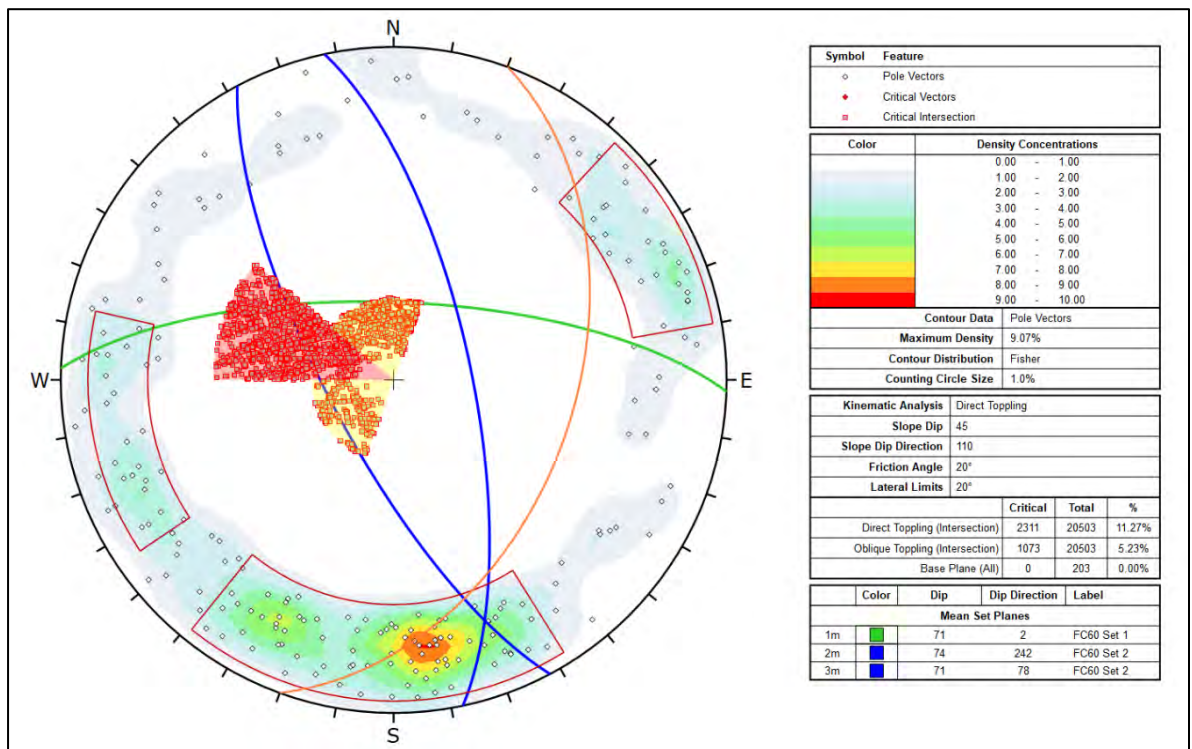


Figure C608 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (West Wall) - Direct Toppling.

West Sump (East Wall) – Fractures >60° – Overall Slope

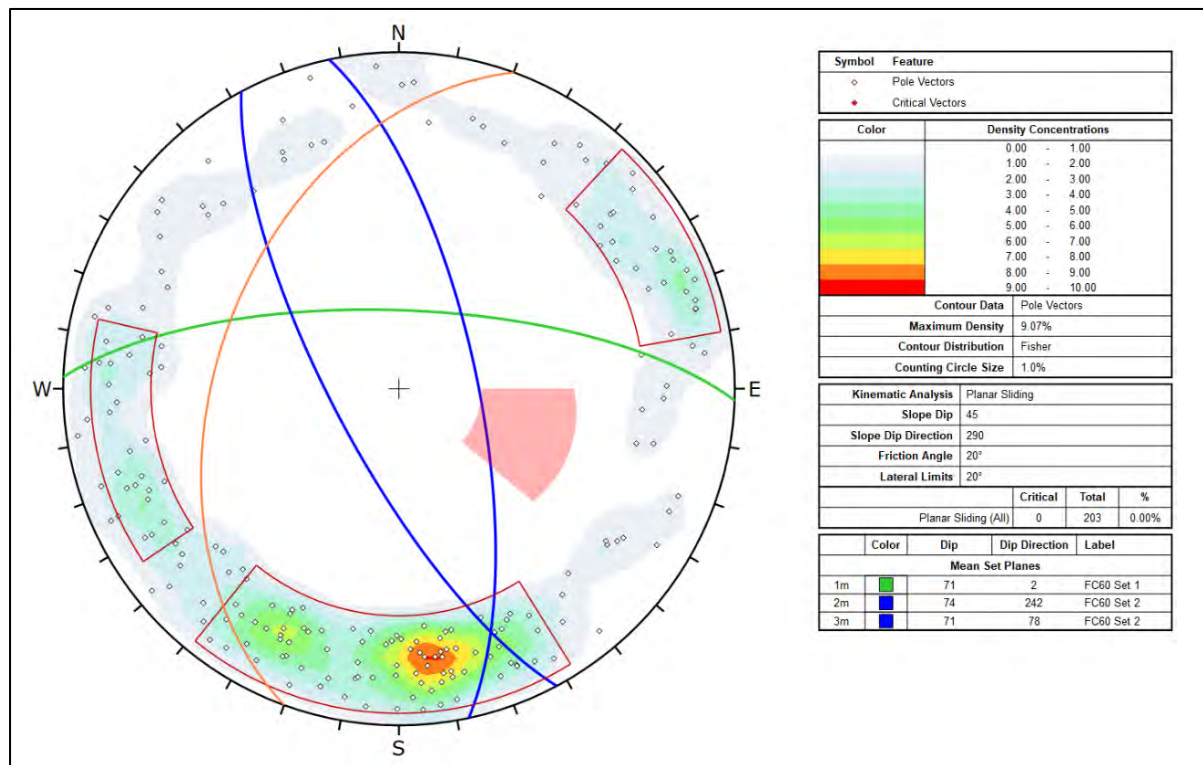


Figure C609 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (East Wall) – Planar Sliding.

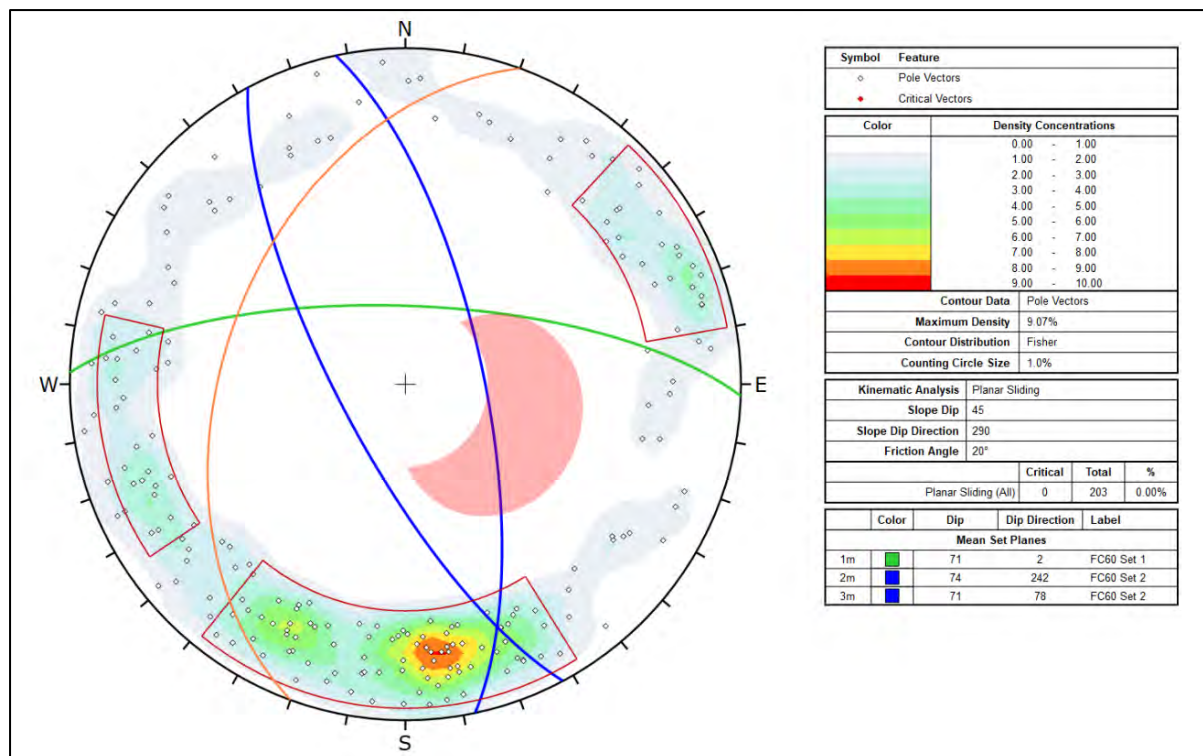


Figure C610 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (East Wall) – Planar Sliding (No Limits).

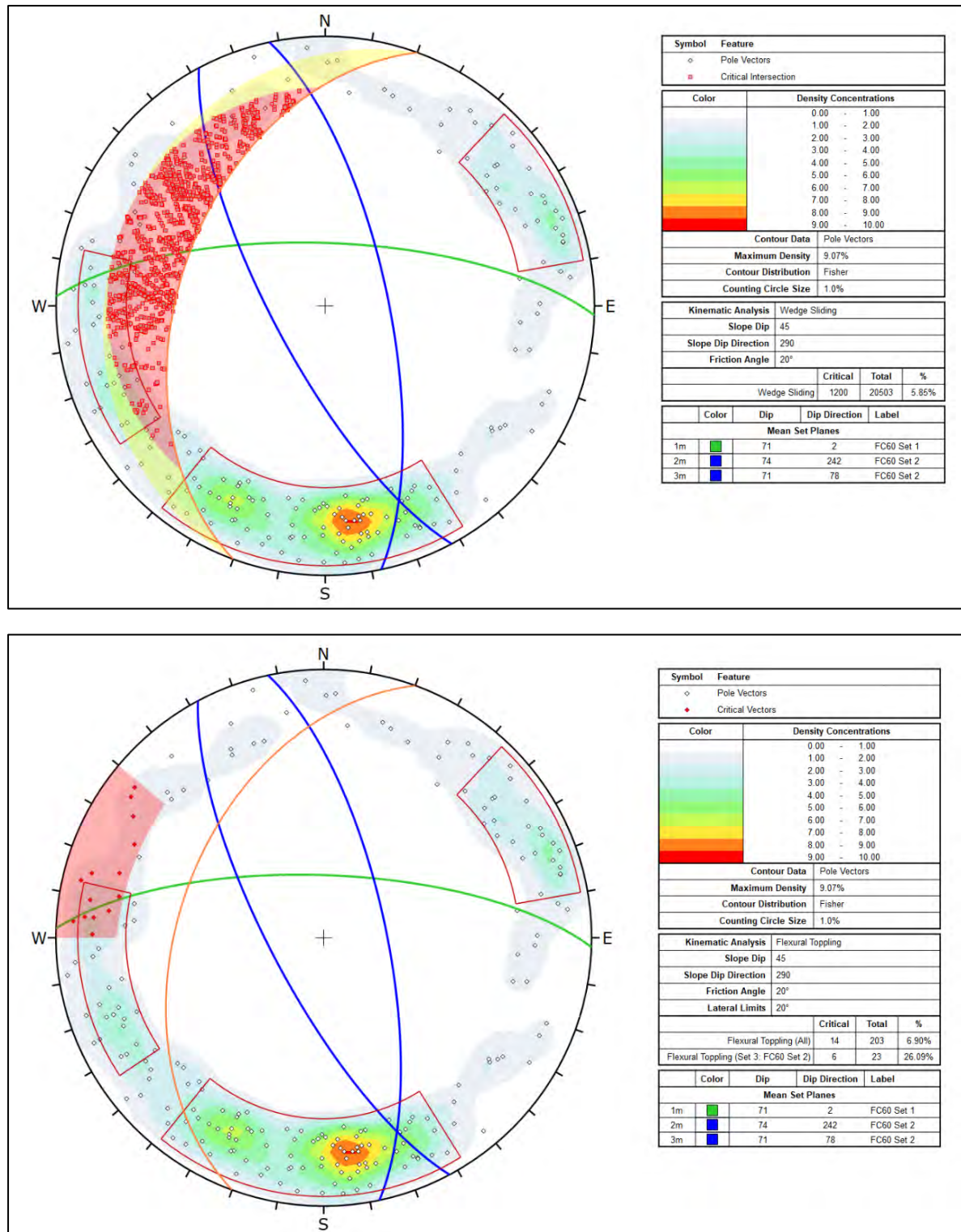


Figure C612 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (East Wall) – Flexural Toppling.

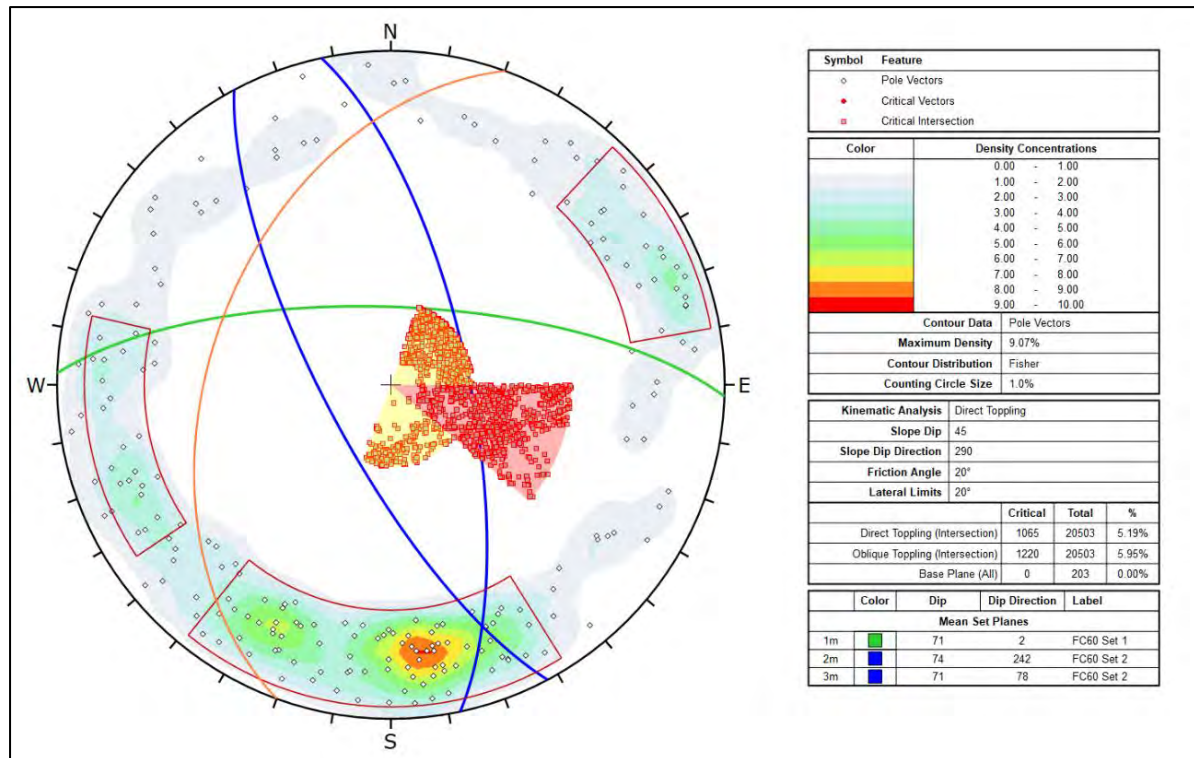


Figure C613 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Fractures >60° – Overall Slope

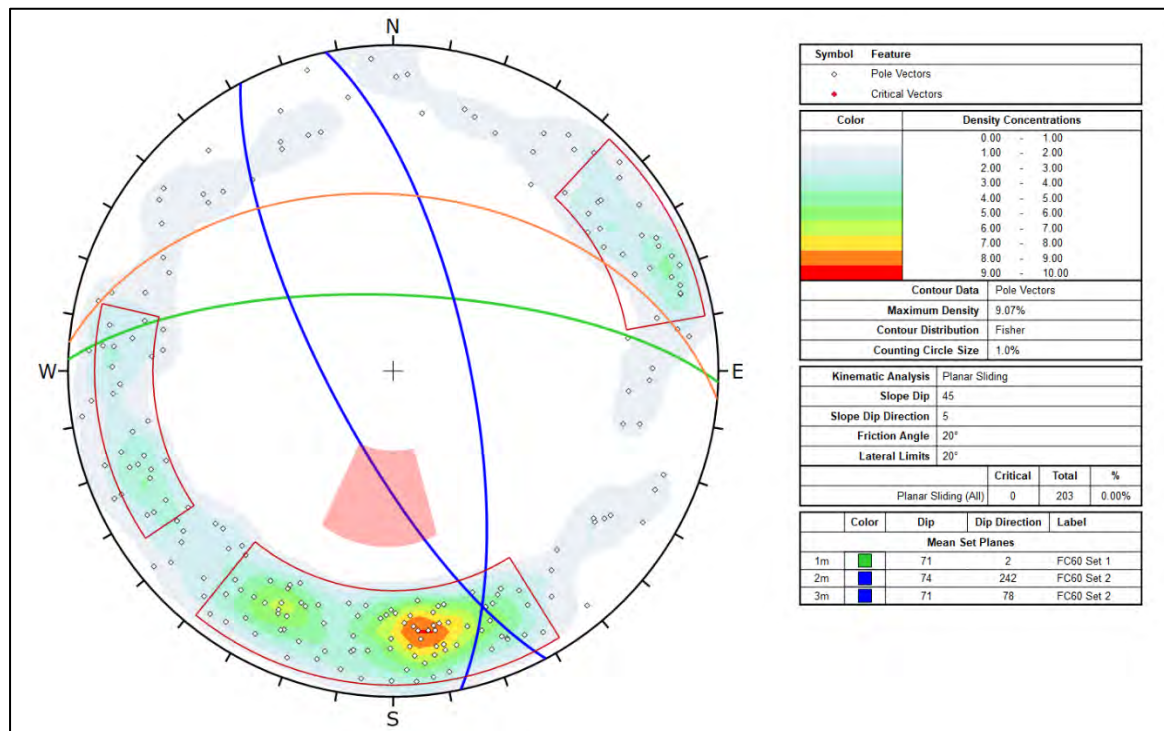


Figure C614 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (South Wall) – Planar Sliding.

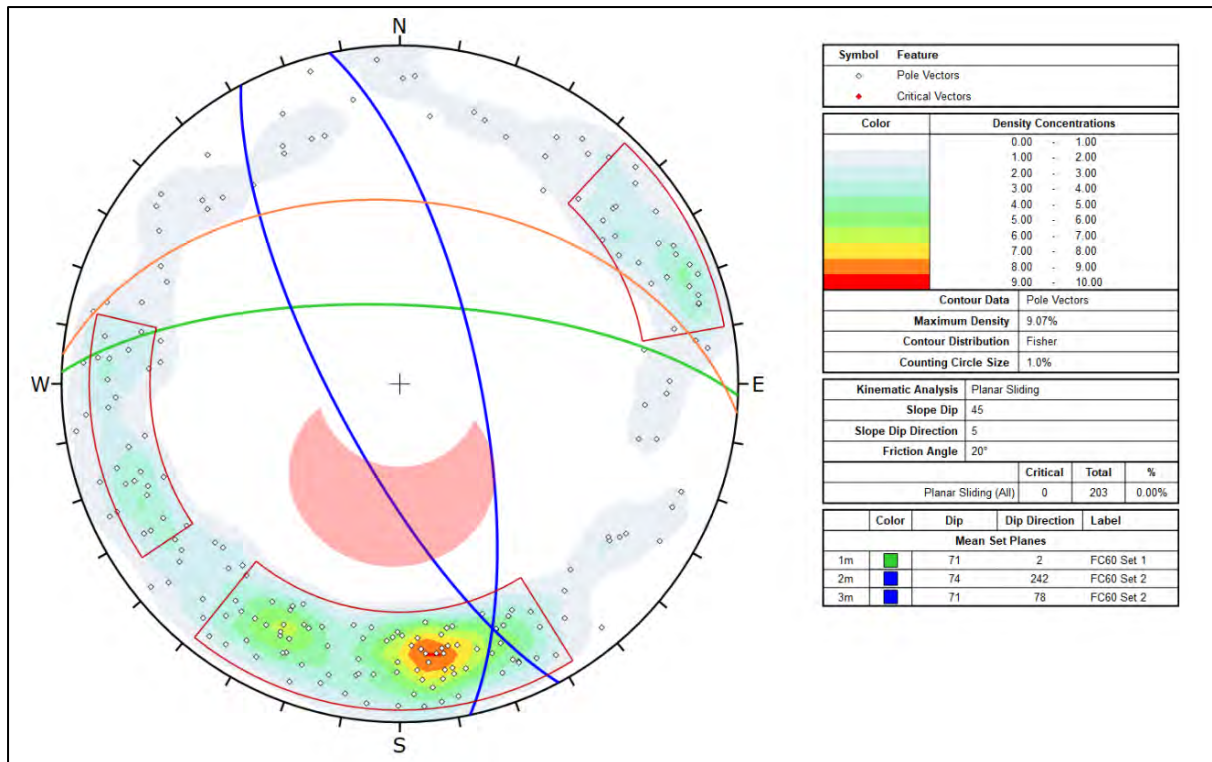


Figure C615 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (South Wall) – Planar Sliding (No Limits).

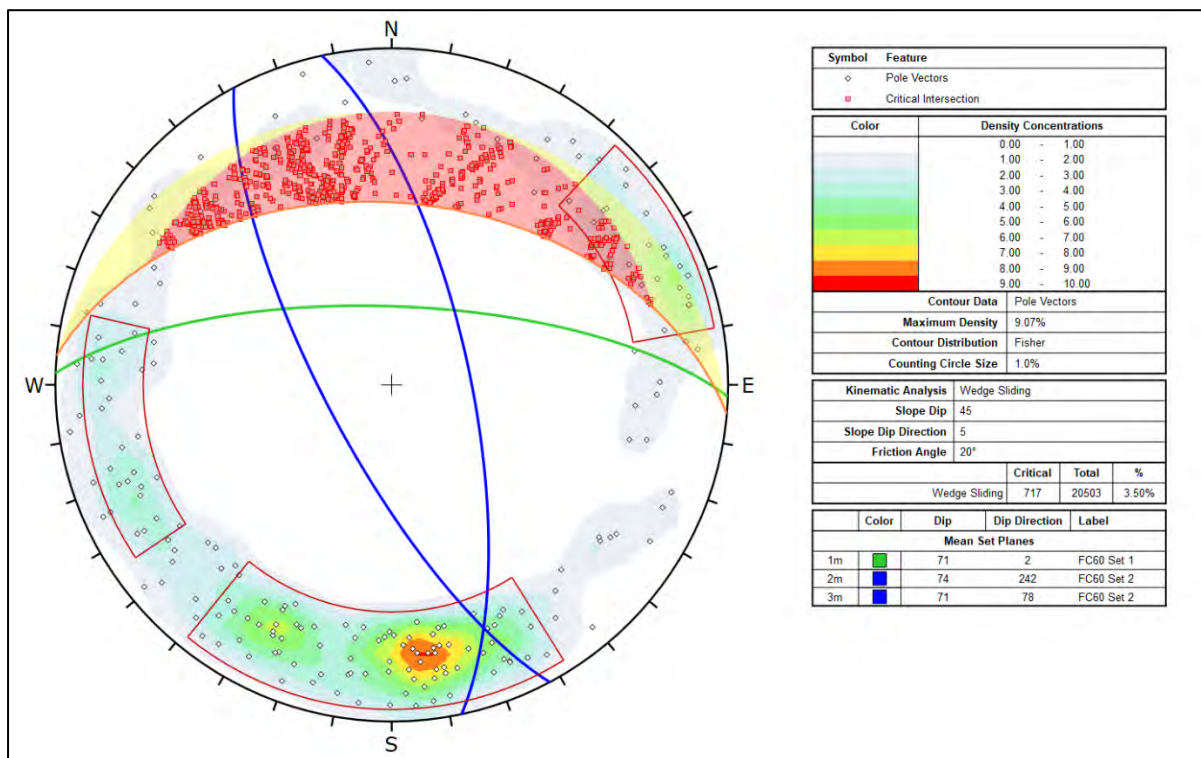


Figure C616 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (South Wall) – Wedge Sliding.

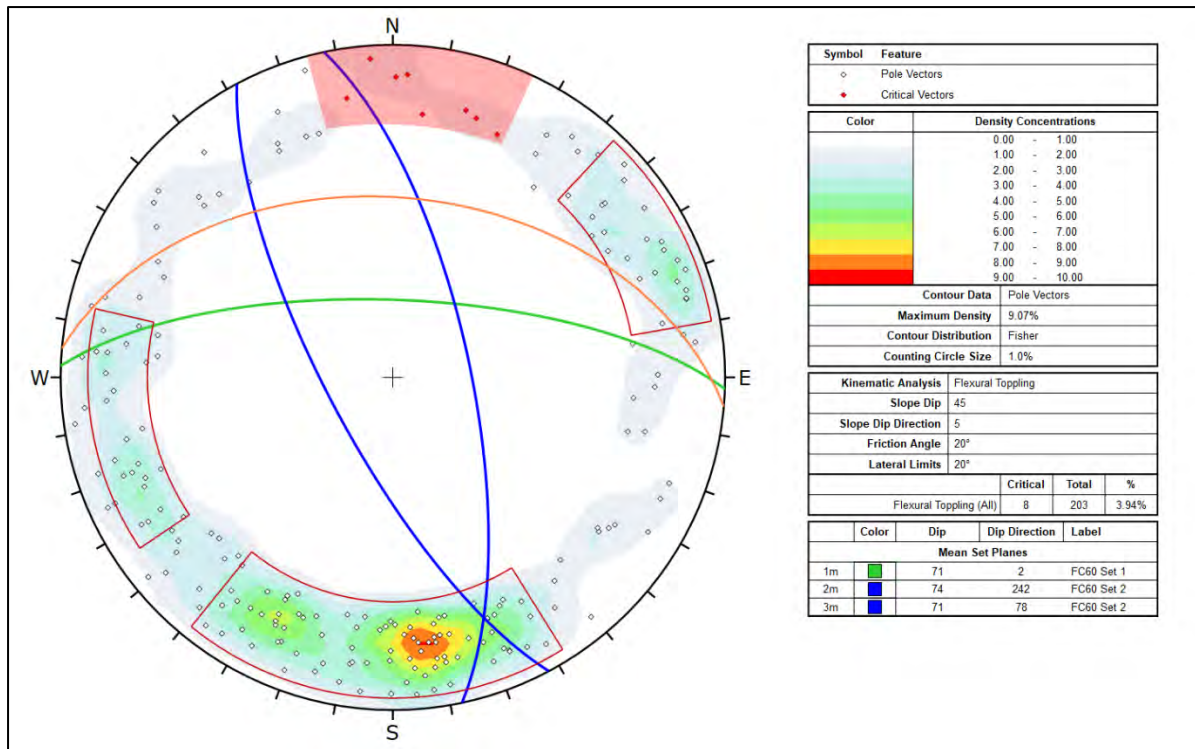


Figure C617 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (South Wall) – Flexural Toppling.

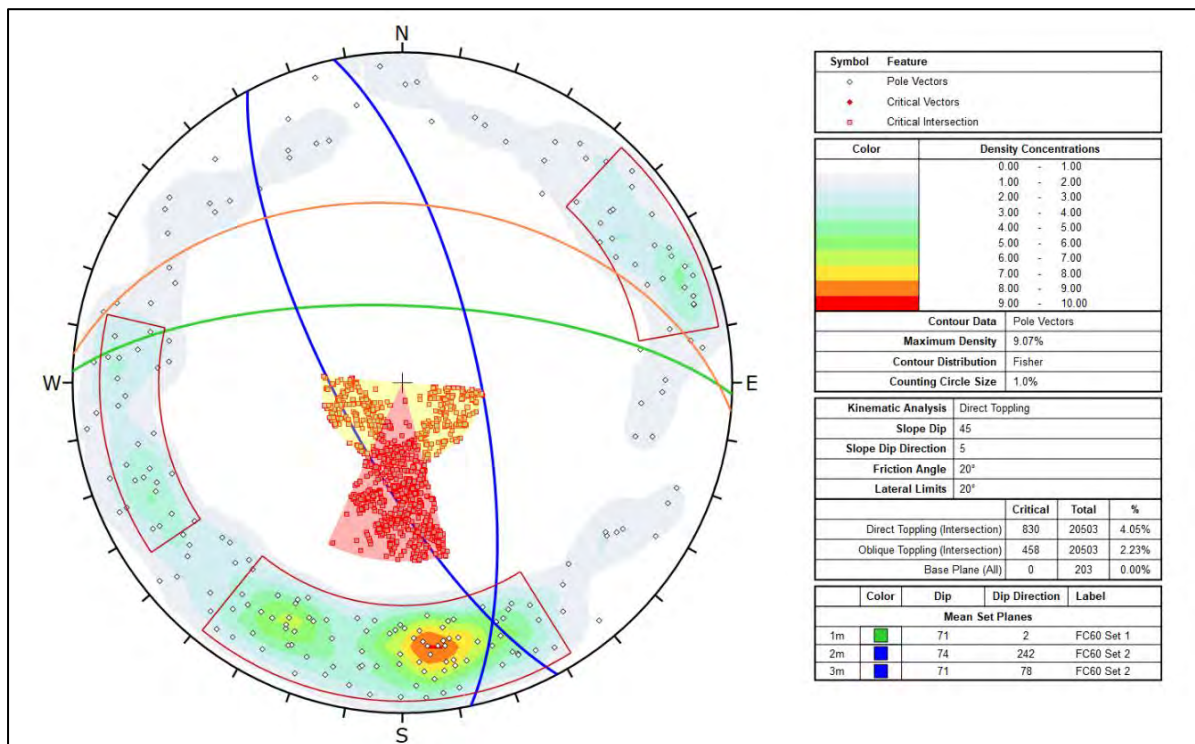


Figure C618 – Kinematic Analysis (Fracture >60°) – Overall Slope – West Sump (South Wall) – Flexural Toppling.

West Sump (North Wall) – Fractures >60°– Bench Slope

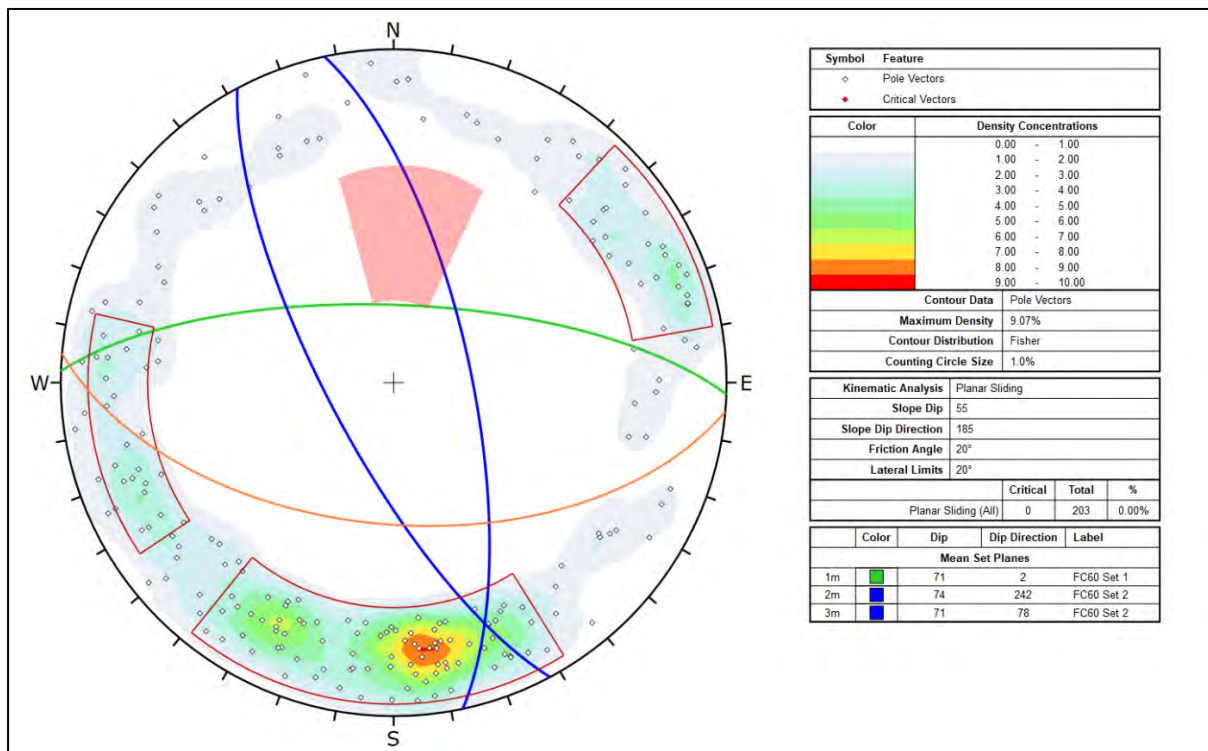


Figure C619 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (North Wall) – Planar Sliding.

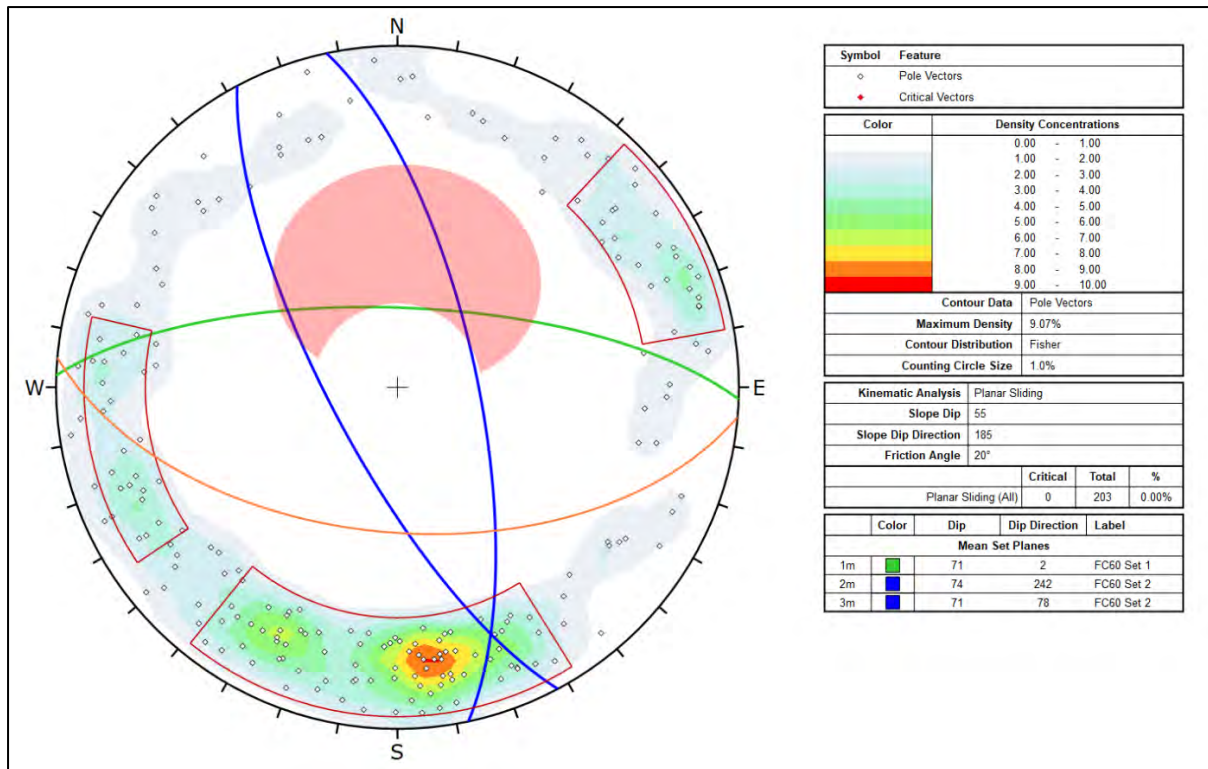


Figure C620 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (North Wall) – Planar Sliding (No Limits).

Symbol Feature

- ◊ Pole Vectors
- Critical Vectors

Density Concentrations

Color	Density Concentrations
0.00	~ 1.00
1.00	~ 2.00
2.00	~ 3.00
3.00	~ 4.00
4.00	~ 5.00
5.00	~ 6.00
6.00	~ 7.00
7.00	~ 8.00
8.00	~ 9.00
9.00	~ 10.00

Contour Data

Contour Data	Pole Vectors
Maximum Density	9.07%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis

Kinematic Analysis	Flexural Topping
Slope Dip	55
Slope Dip Direction	185
Friction Angle	20°
Lateral Limits	20°

Flexural Topping (All)

	Critical	Total	%
Flexural Topping (All)	54	203	26.60%
Flexural Topping (Set 1: FC60 Set 1)	54	87	62.07%

Mean Set Planes

	Color	Dip	Dip Direction	Label
1m	Green	71	2	FC60 Set 1
2m	Blue	74	242	FC60 Set 2
3m	Blue	71	78	FC60 Set 2

PATTLE DELAMORE PARTNERS LTD

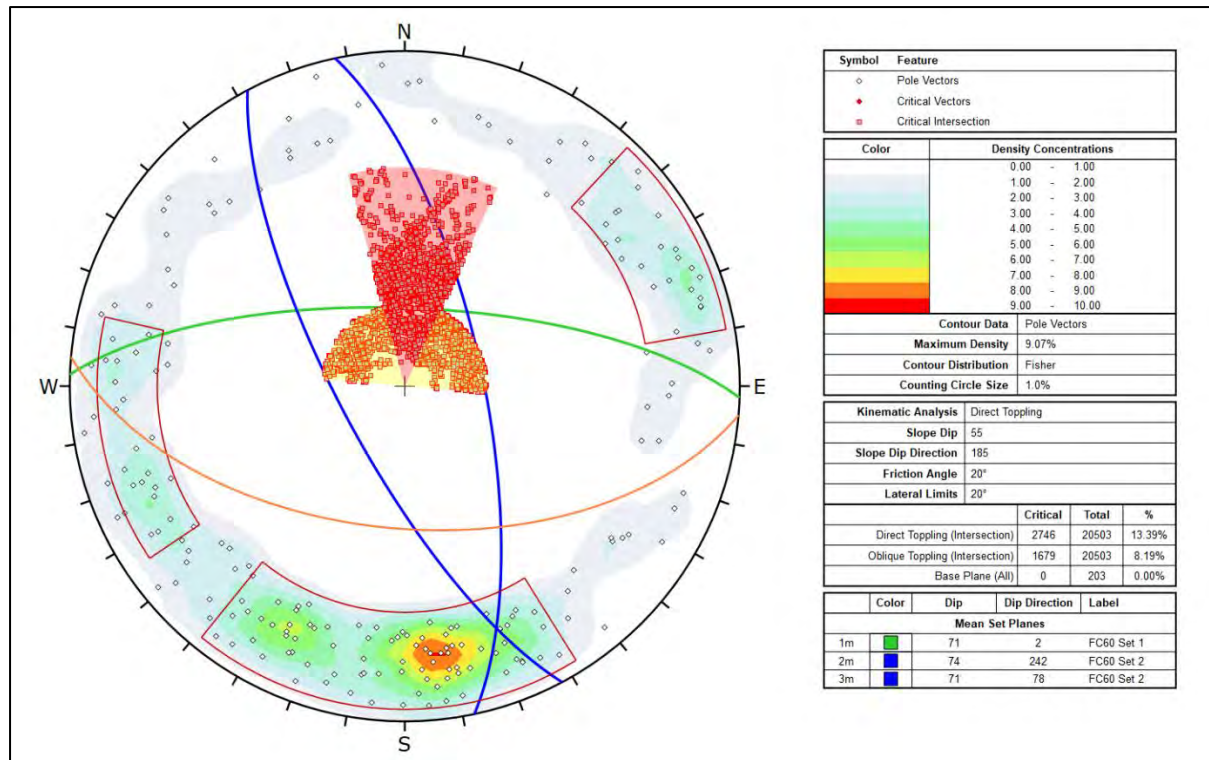


Figure C623 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (North Wall) – Direct Toppling.

West Sump (West Wall) – Fractures >60° – Bench Slope

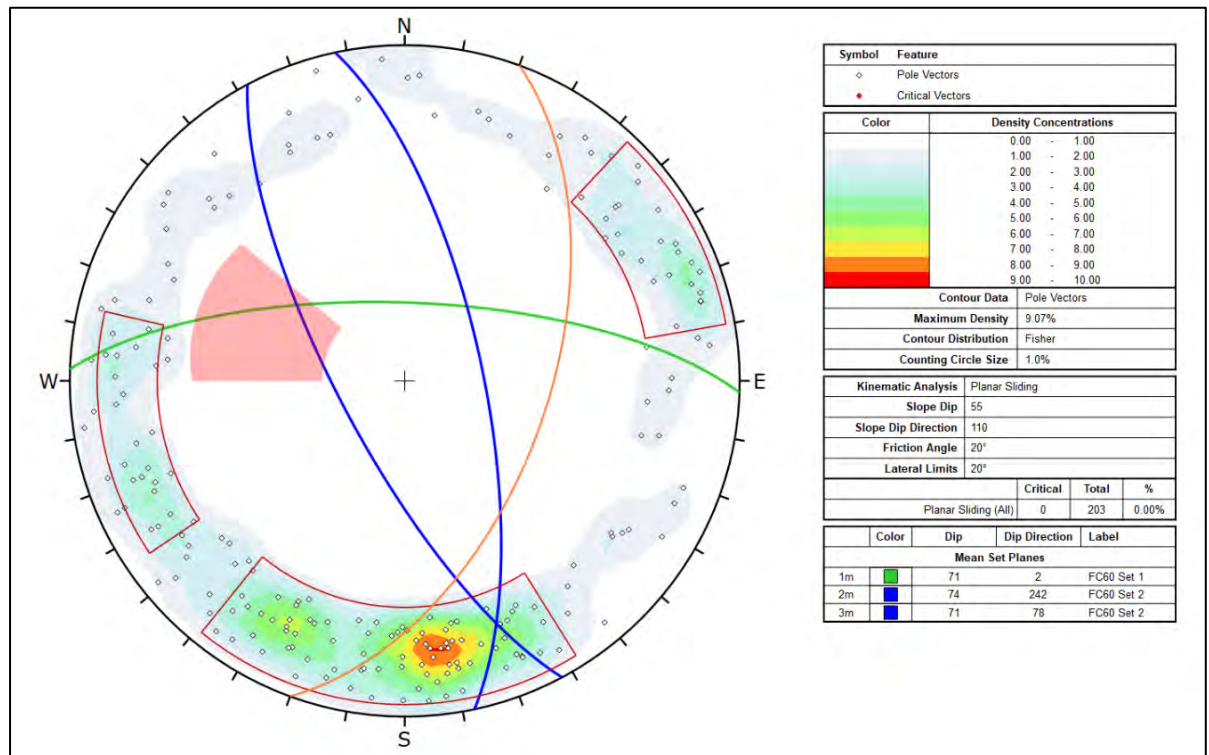


Figure C624 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (West Wall) – Planar Sliding.

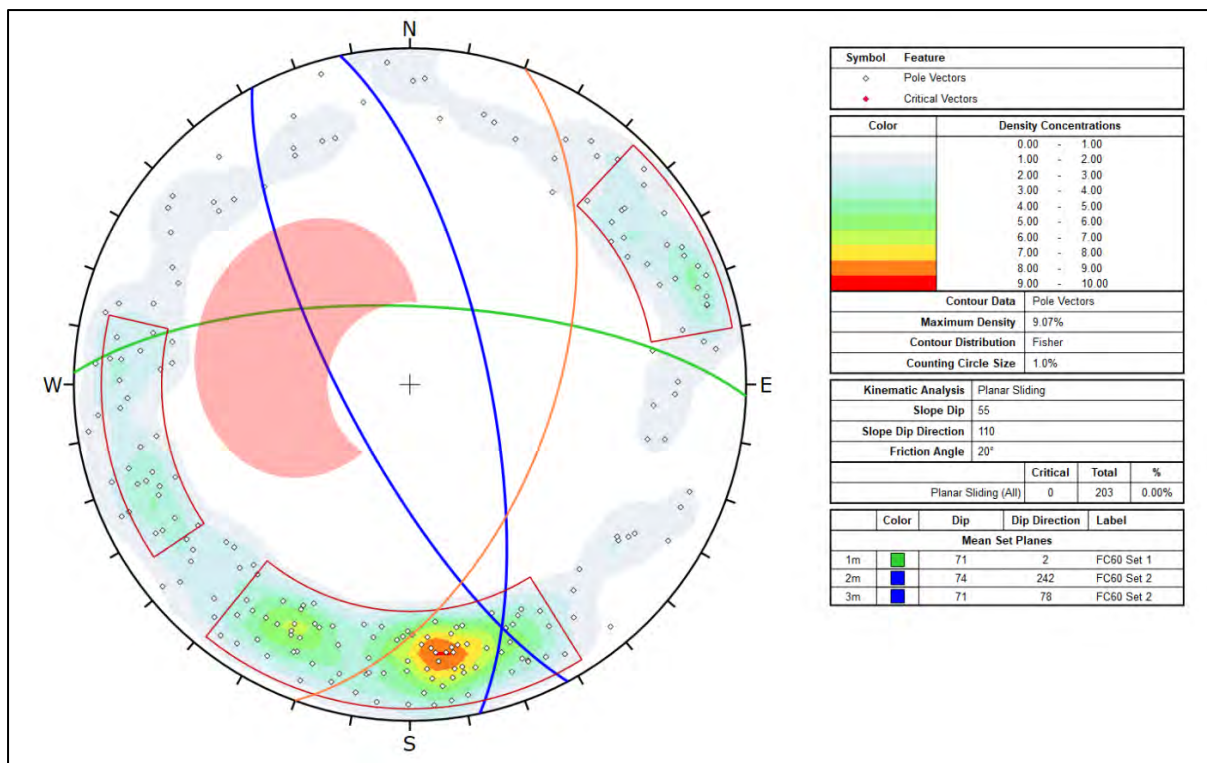


Figure C625 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (West Wall) – Planar Sliding (No Limits).

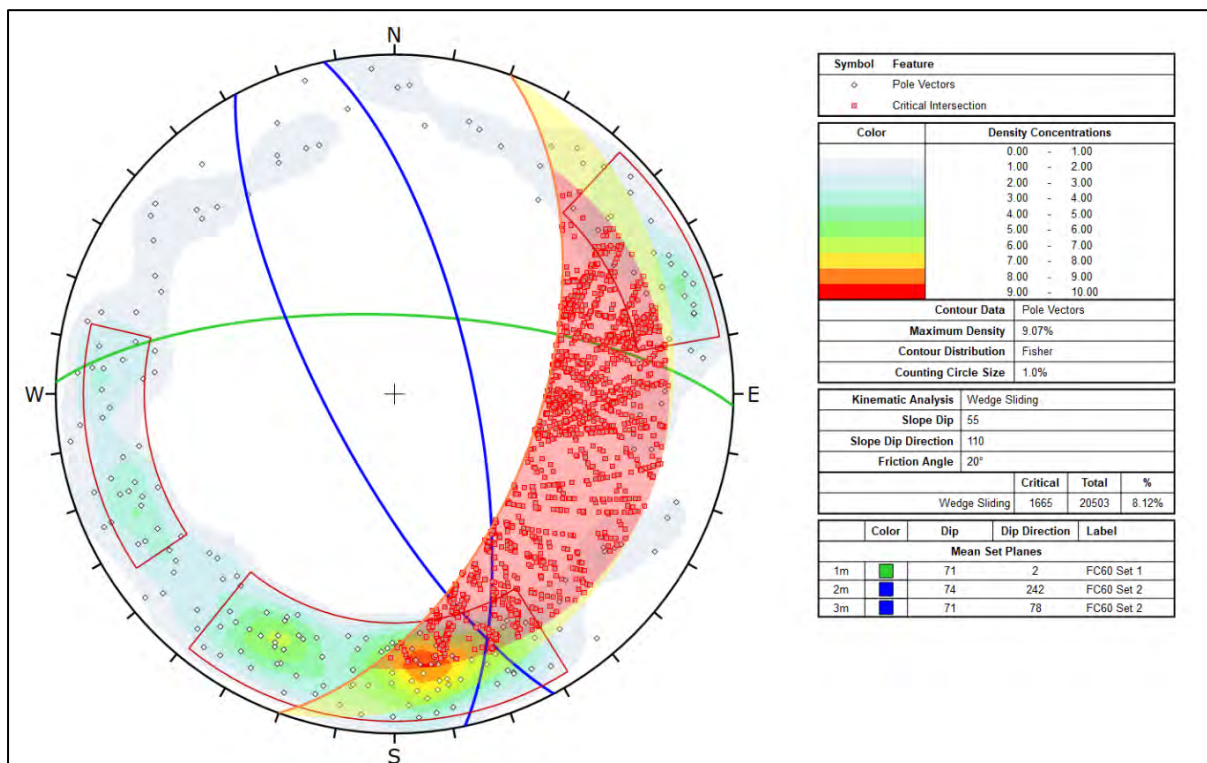


Figure C626 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (West Wall) – Wedge Sliding.

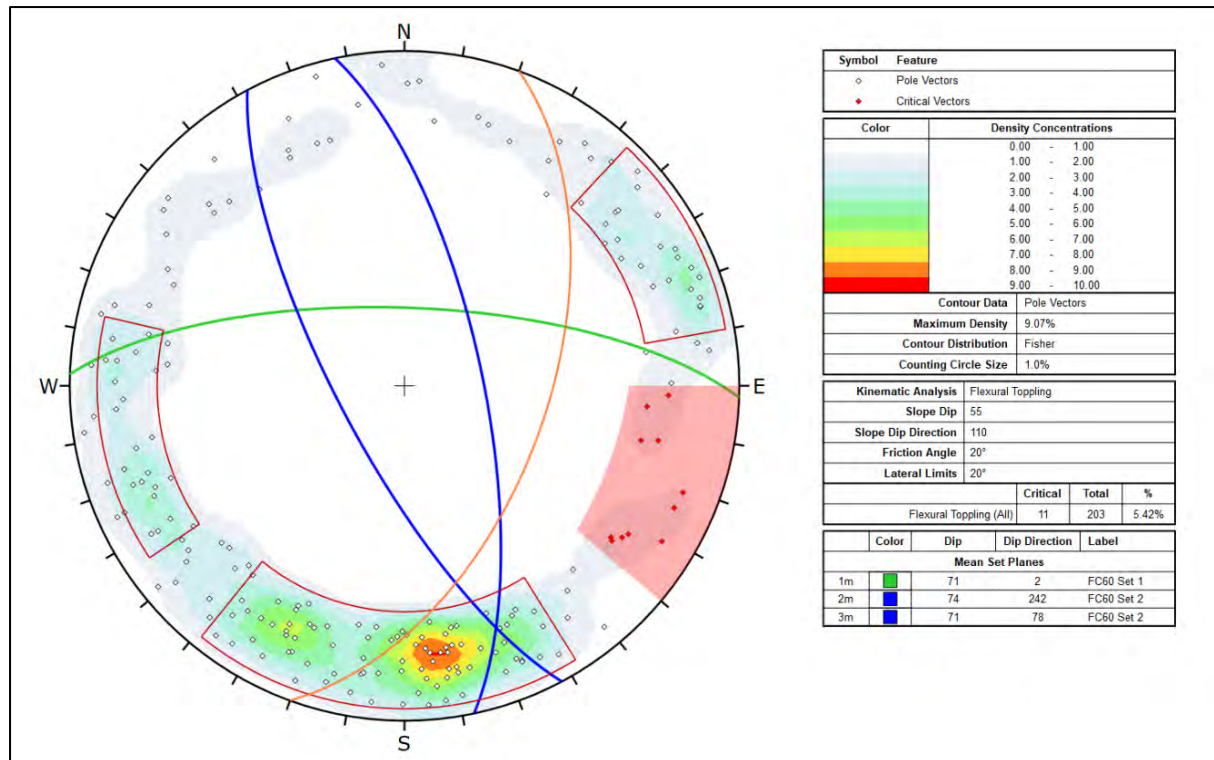


Figure C627 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (West Wall) – Flexural Toppling.

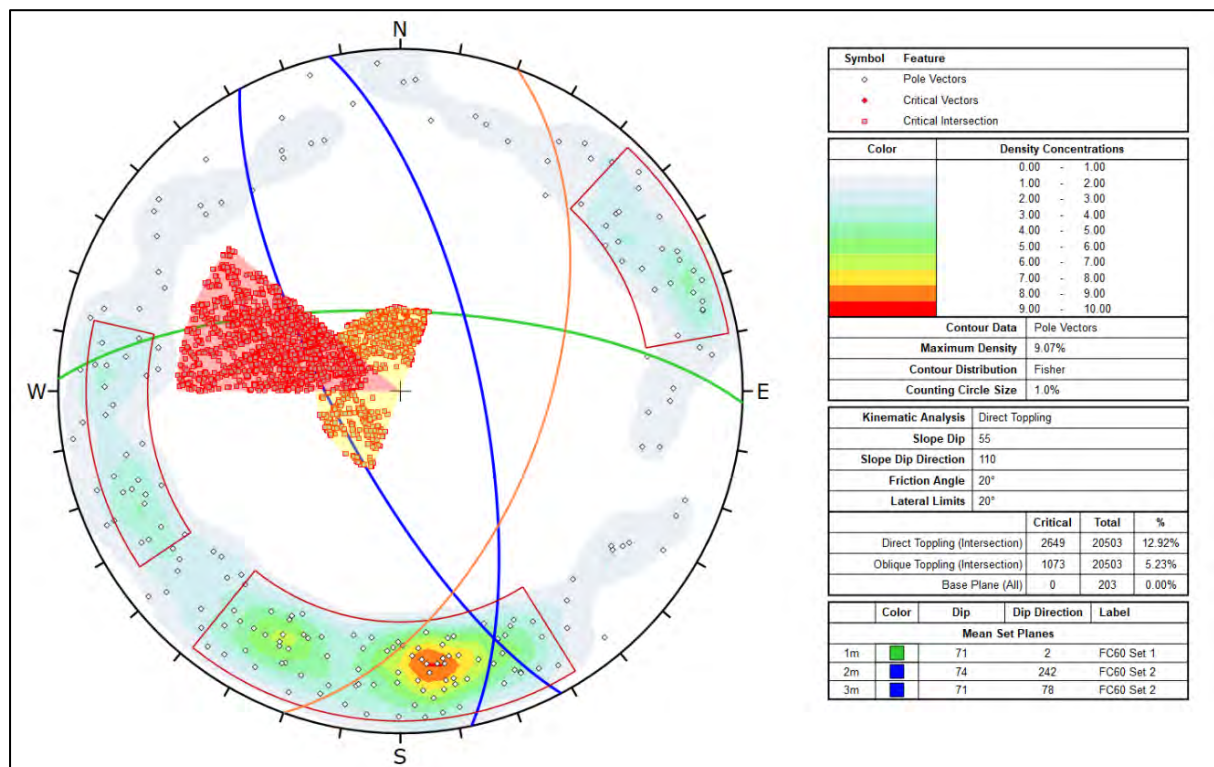


Figure C628 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (West Wall) – Direct Toppling.

West Sump (East Wall) – Fractures >60° – Bench Slope

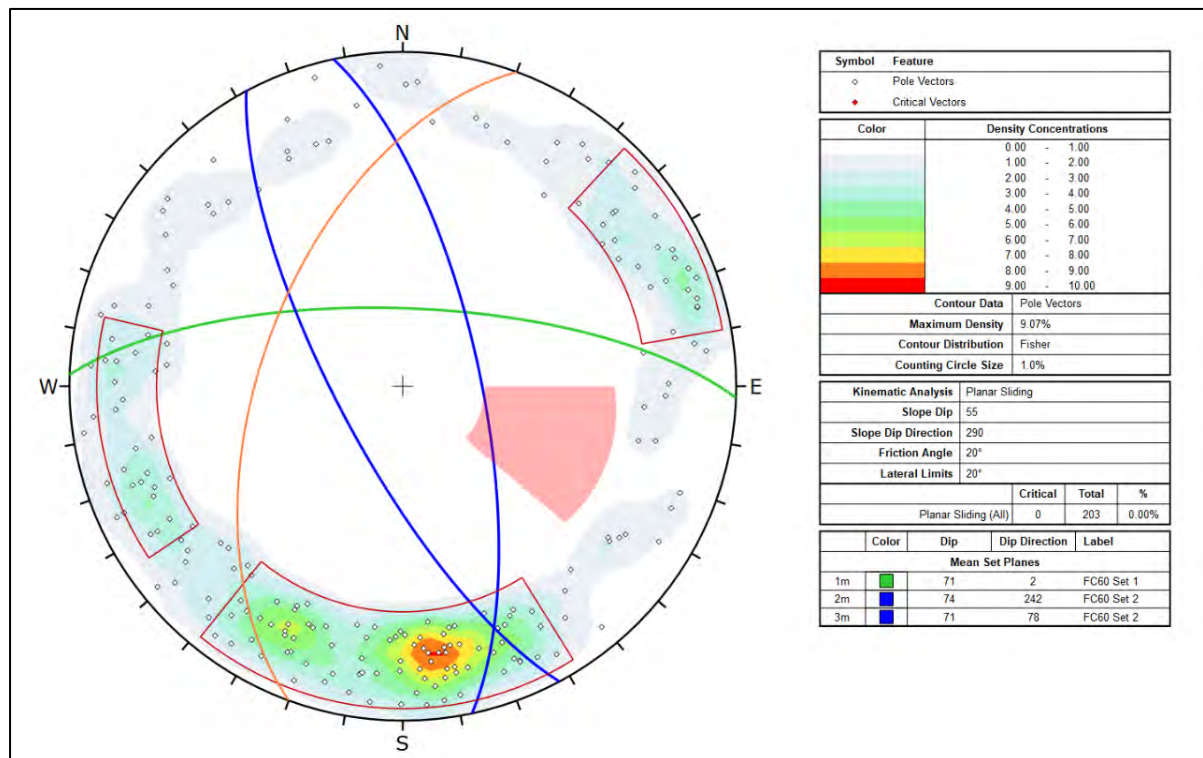


Figure C629 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (East Wall) – Planar Sliding.

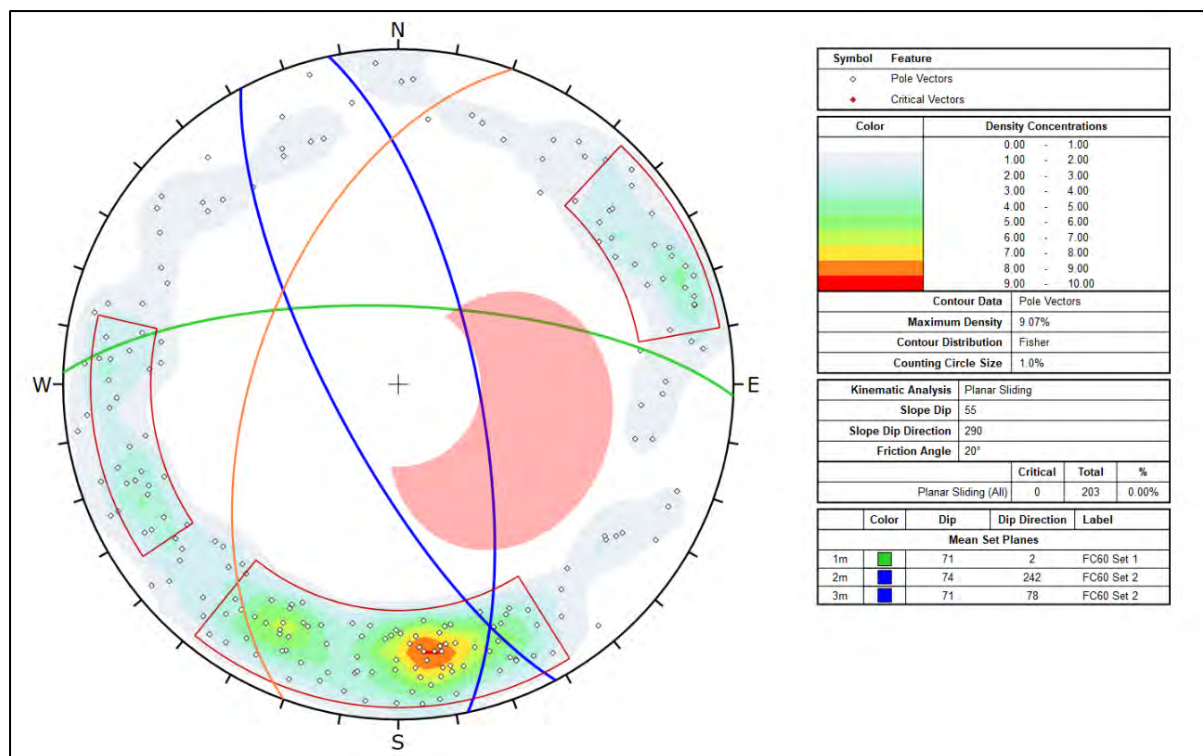


Figure C630 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (East Wall) – Planar Sliding (No Limits).

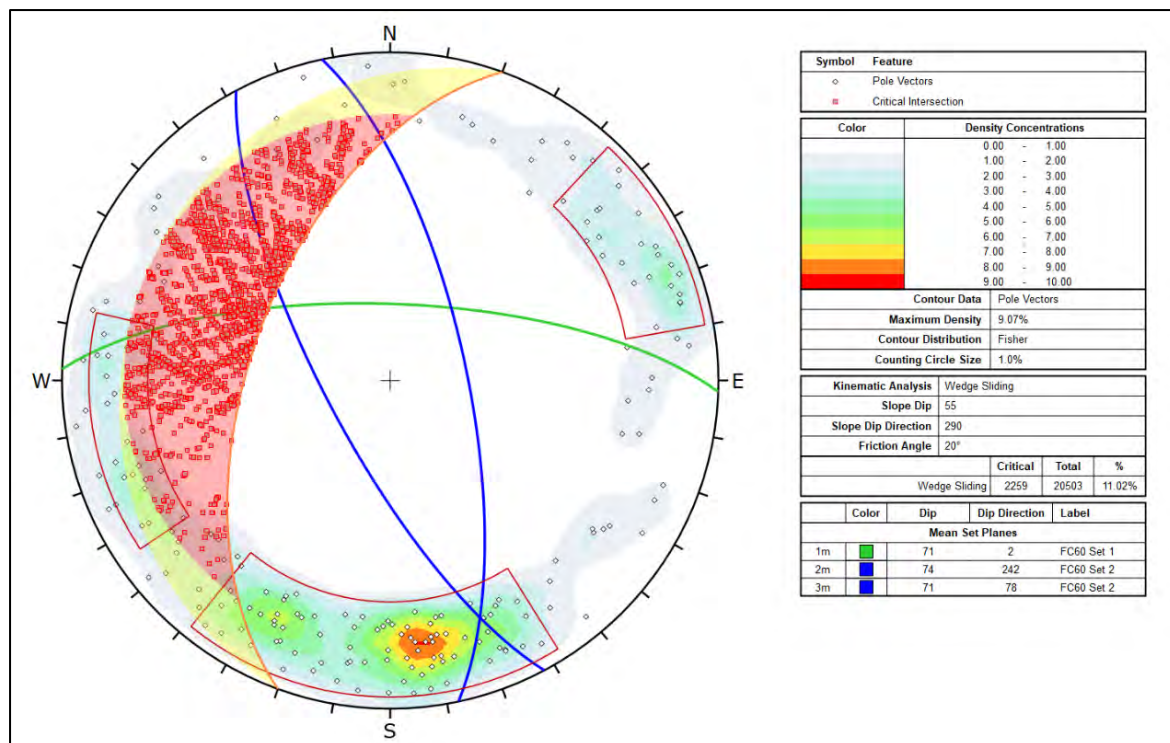


Figure C631 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (East Wall) – Wedge Sliding.

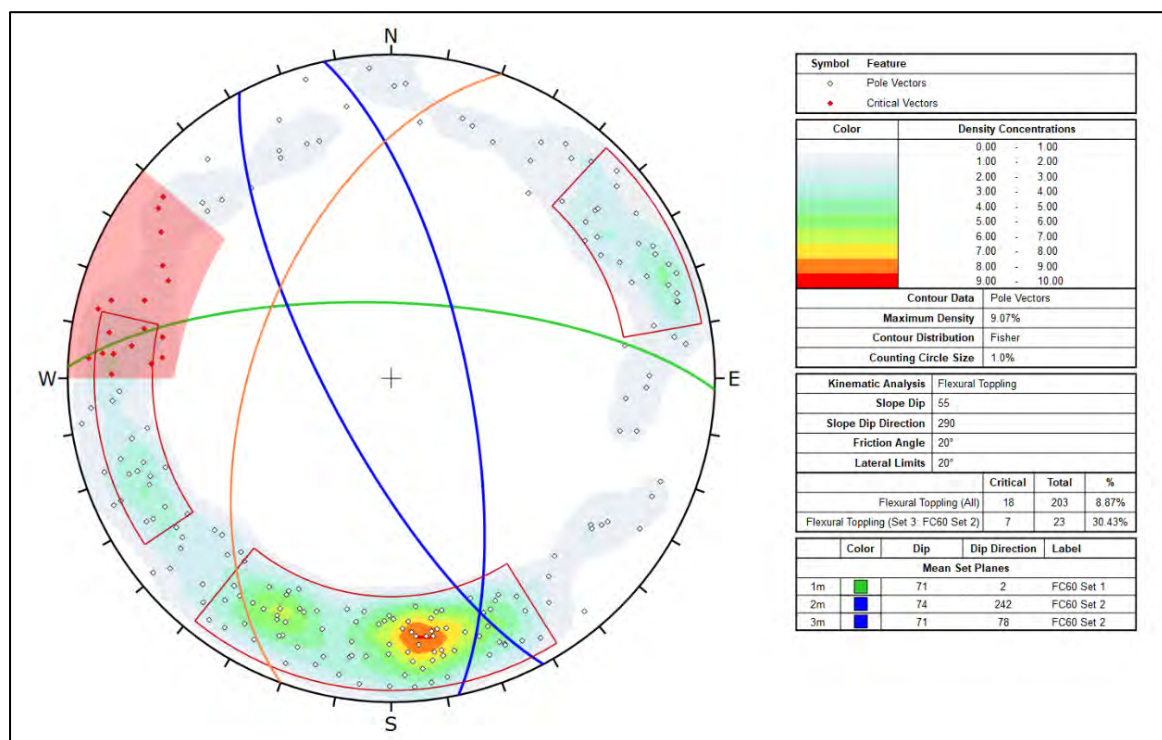


Figure C632 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (East Wall) – Flexural Toppling.

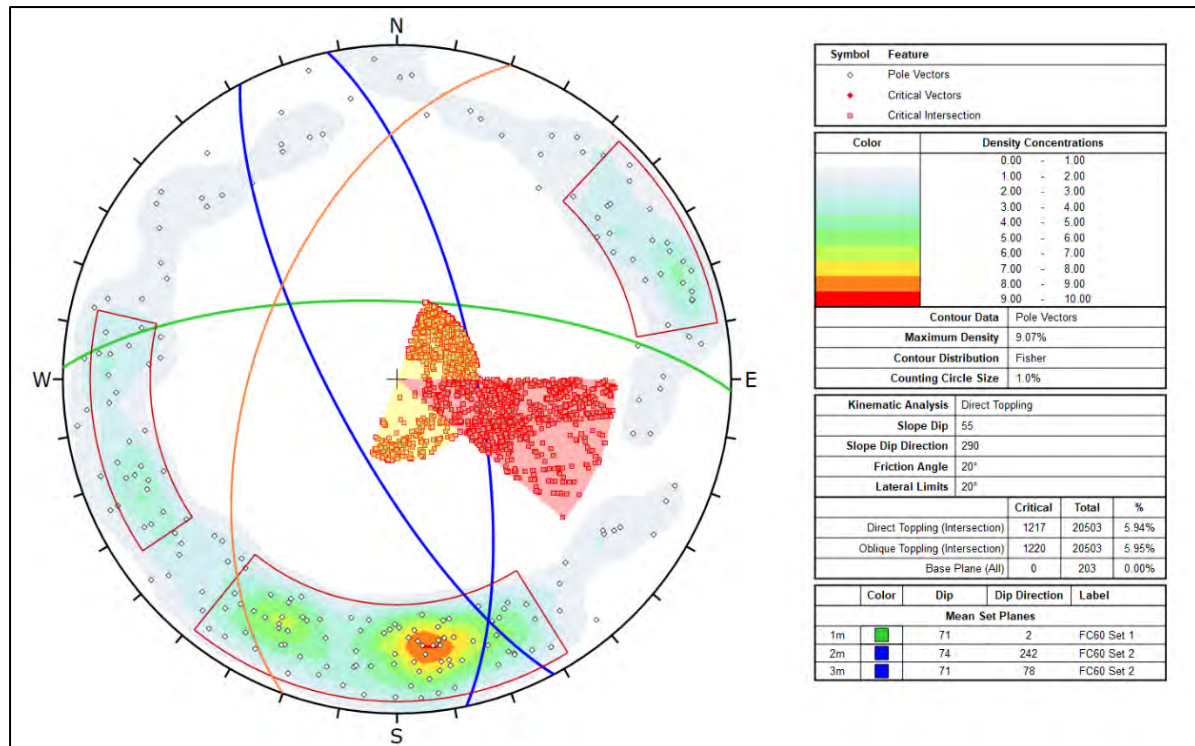


Figure C633 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (East Wall) – Direct Toppling.

West Sump (South Wall) – Fractures $>60^\circ$ – Bench Slope

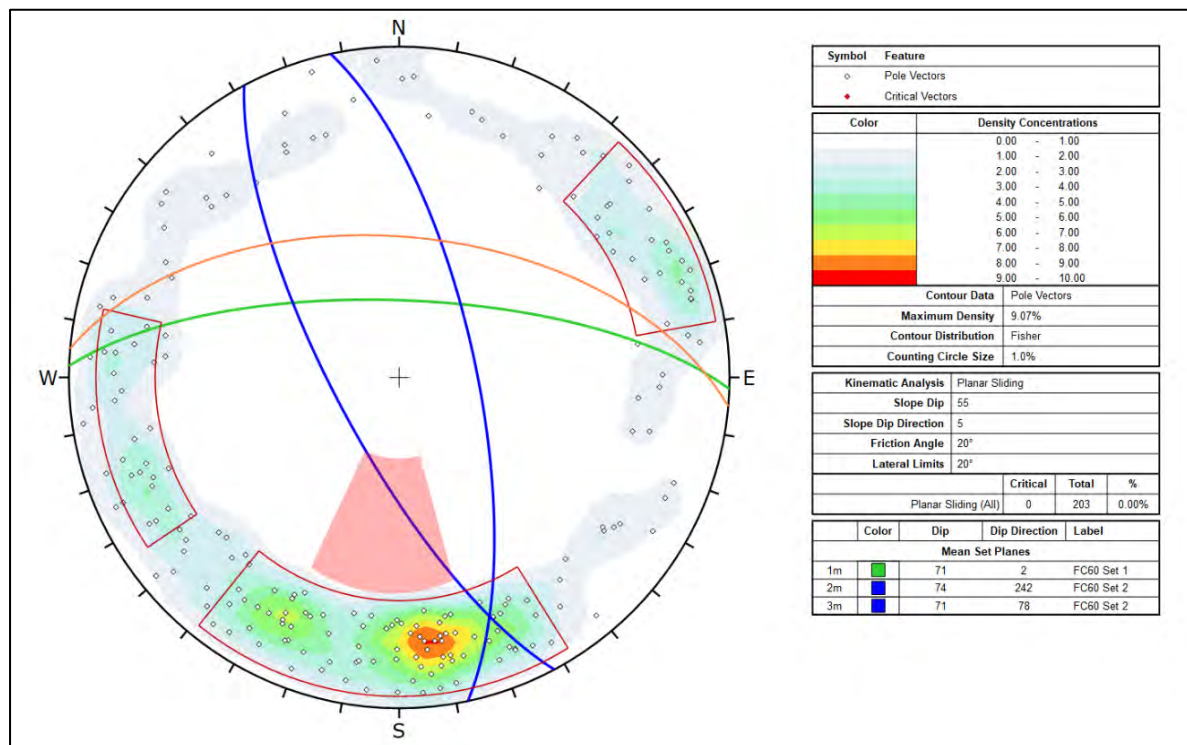


Figure C634 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (South Wall) – Planar Sliding.

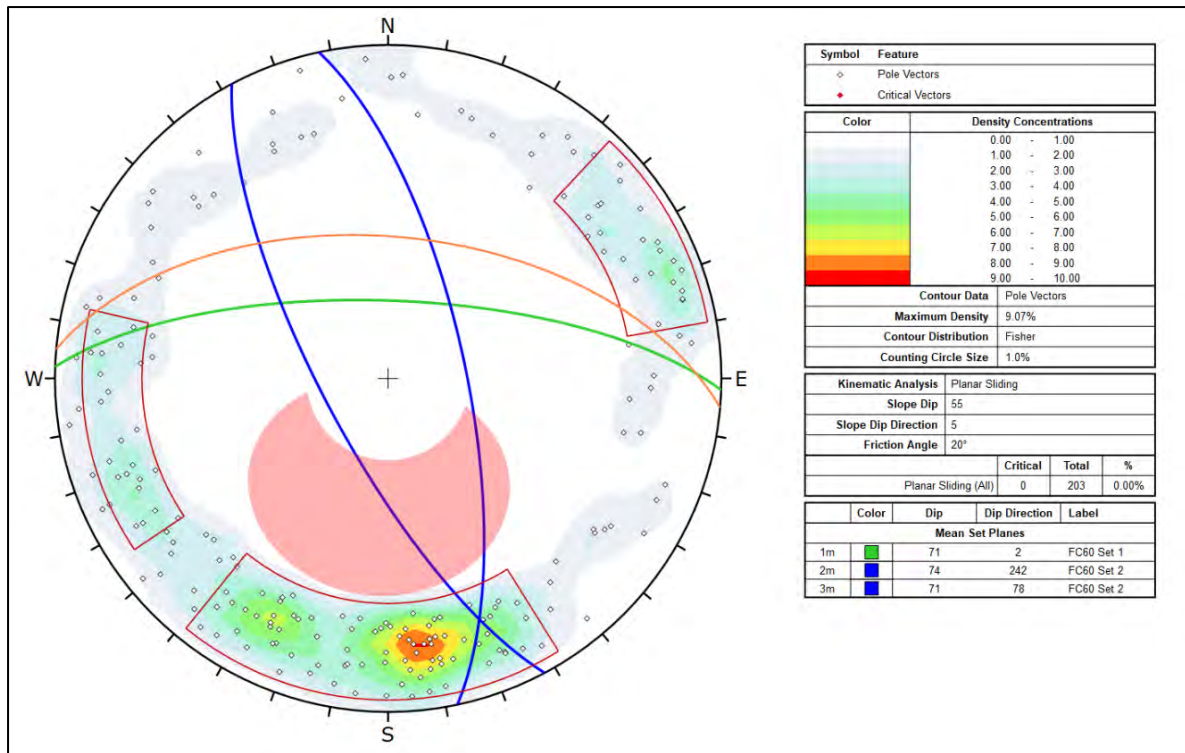


Figure C635 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (South Wall) – Planar Sliding (No Limits).

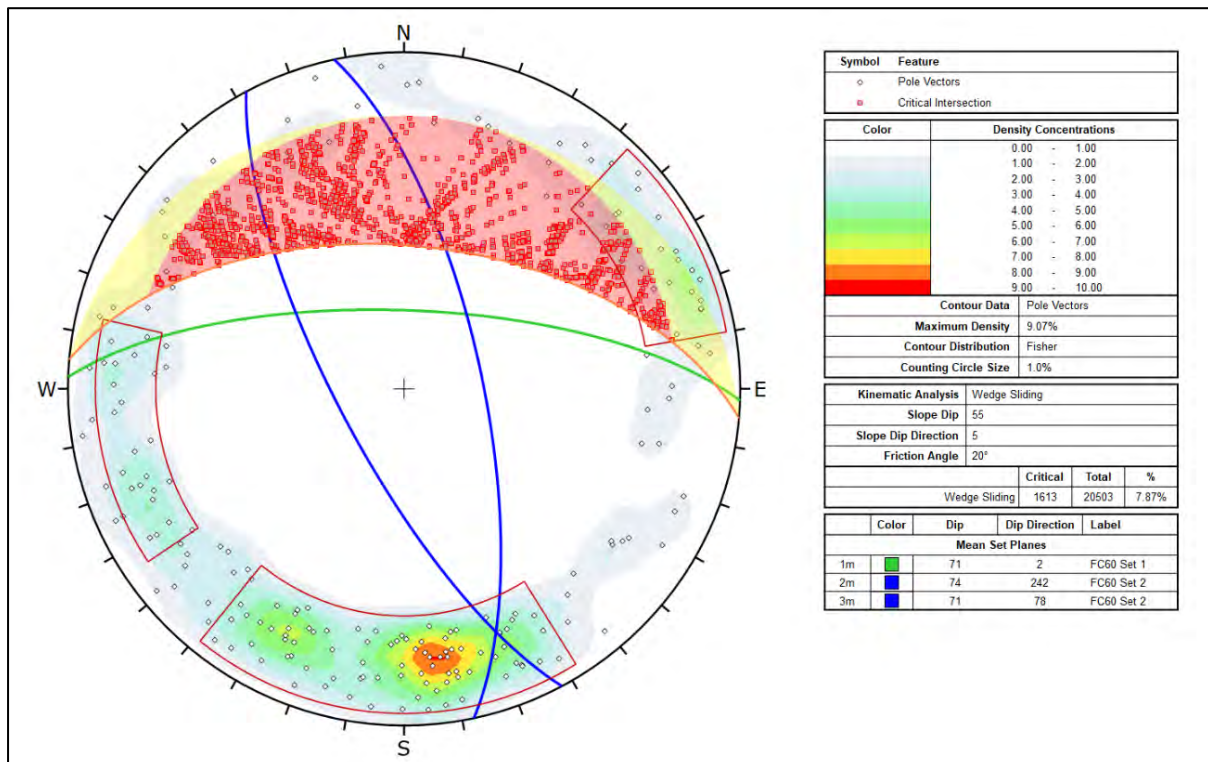


Figure C636 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (South Wall) – Wedge Sliding

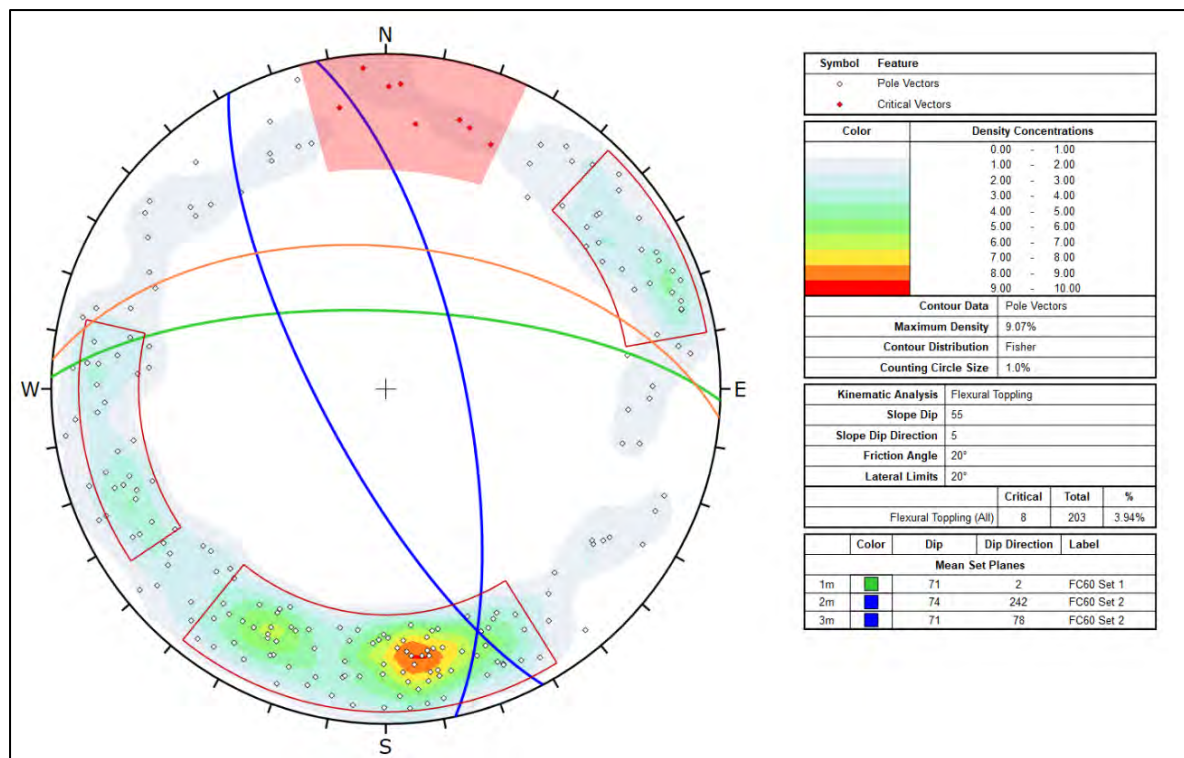


Figure C637 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (South Wall) – Flexural Toppling.

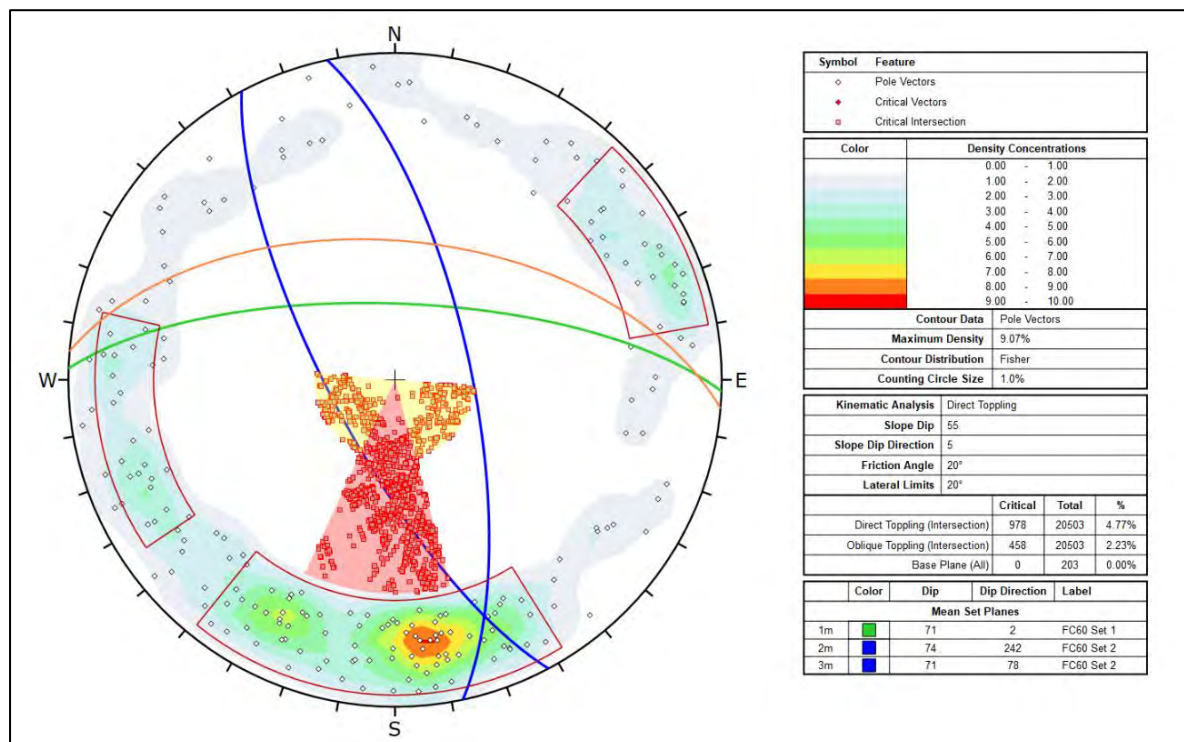


Figure C638 – Kinematic Analysis (Fracture >60°) – Bench Slope – West Sump (South Wall) – Direct Toppling.

West Sump -Crush Zones -Brunner Coal Measures (BCM) – Topple Failure

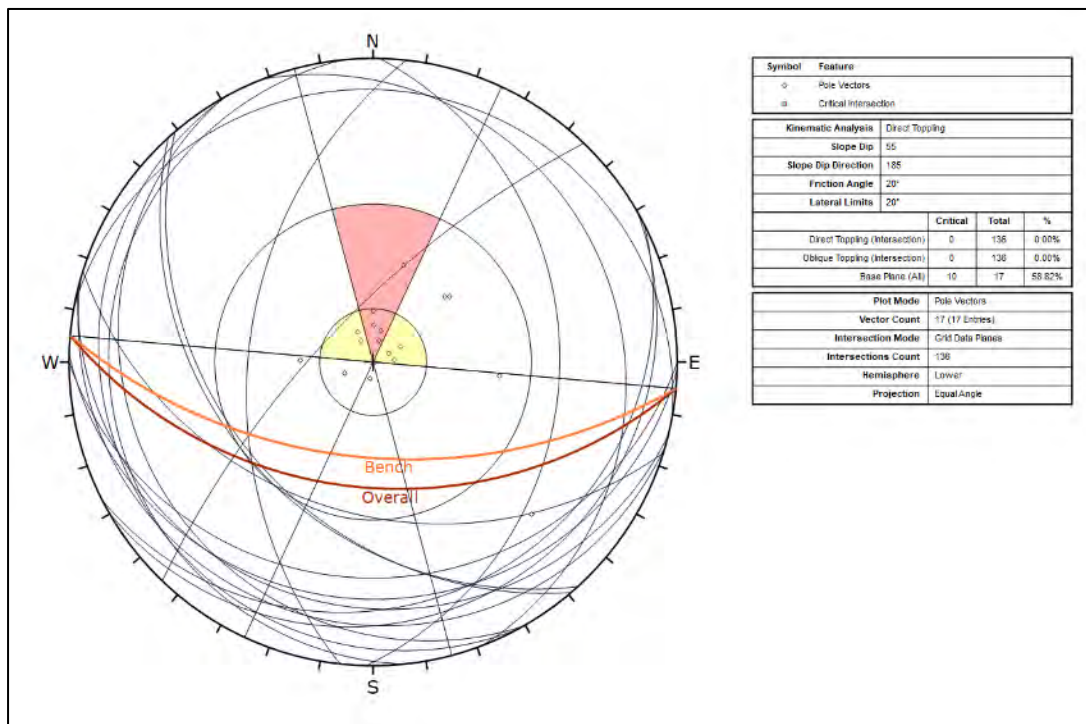


Figure: C639: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Bench Slope–Topple Failure.

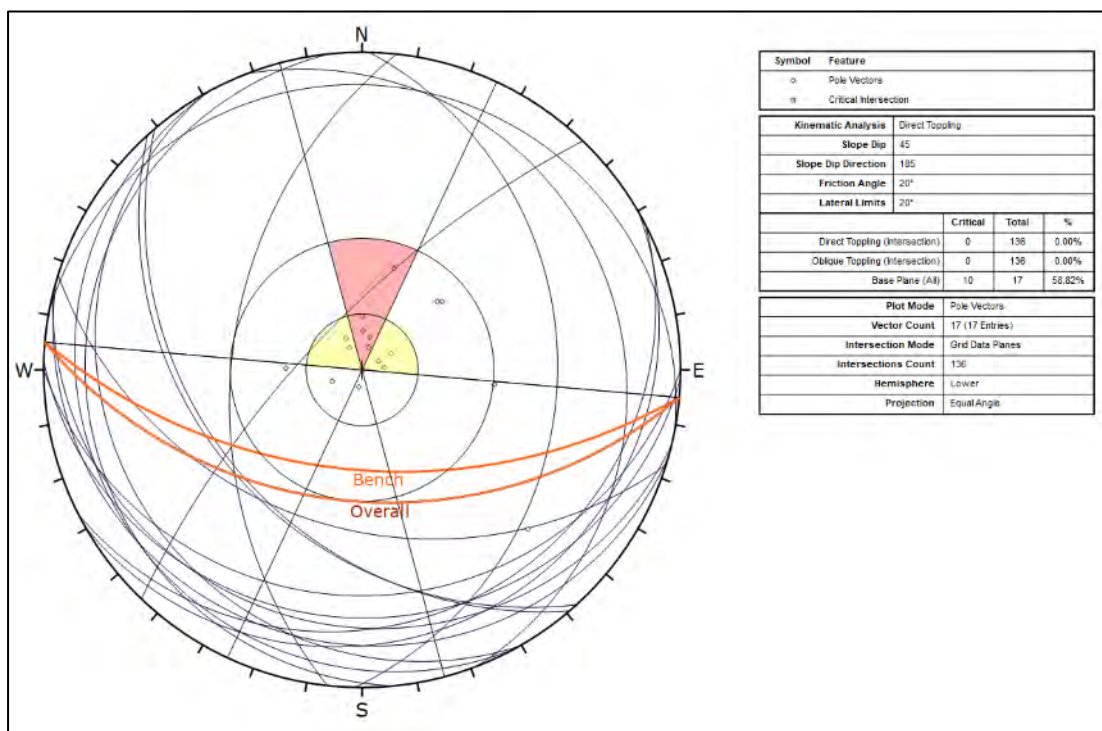


Figure: C640: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Overall Slope–Topple Failure.

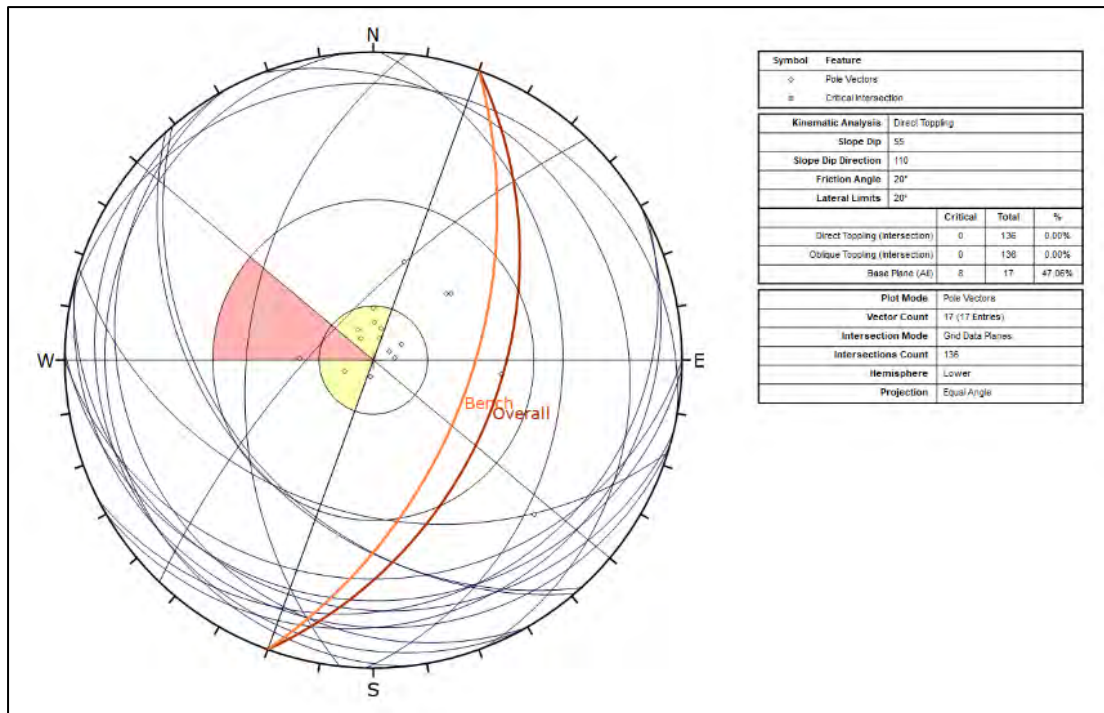


Figure: C641: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Bench Slope–Topple Failure.

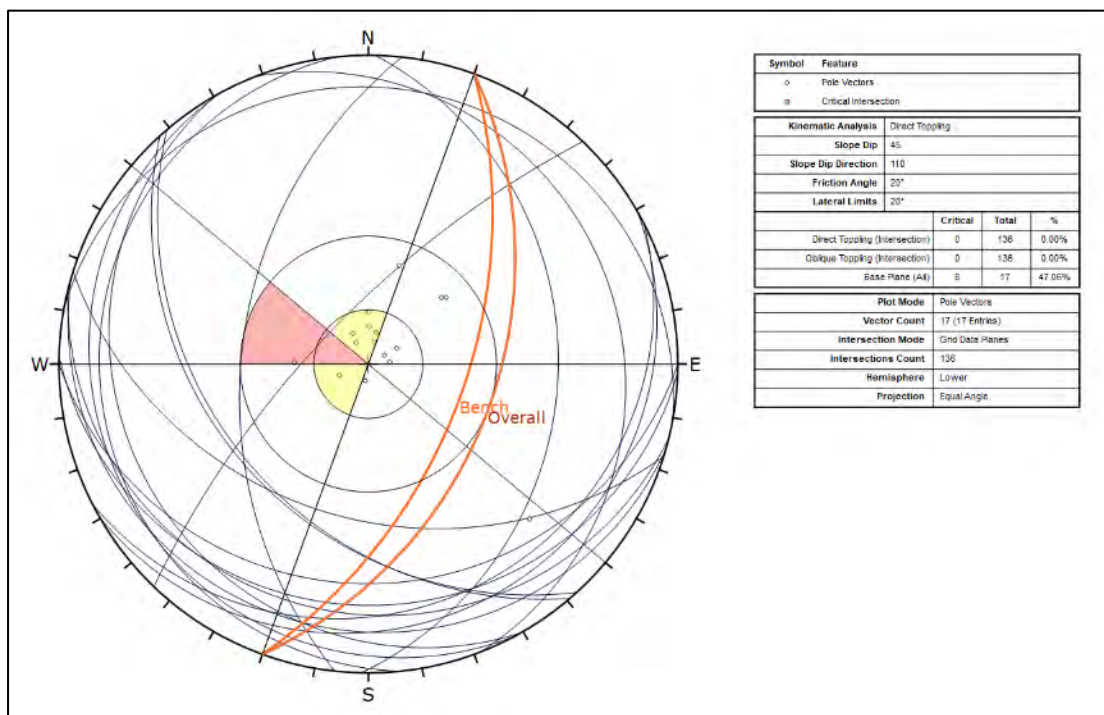


Figure: C642: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Overall Slope–Topple Failure.

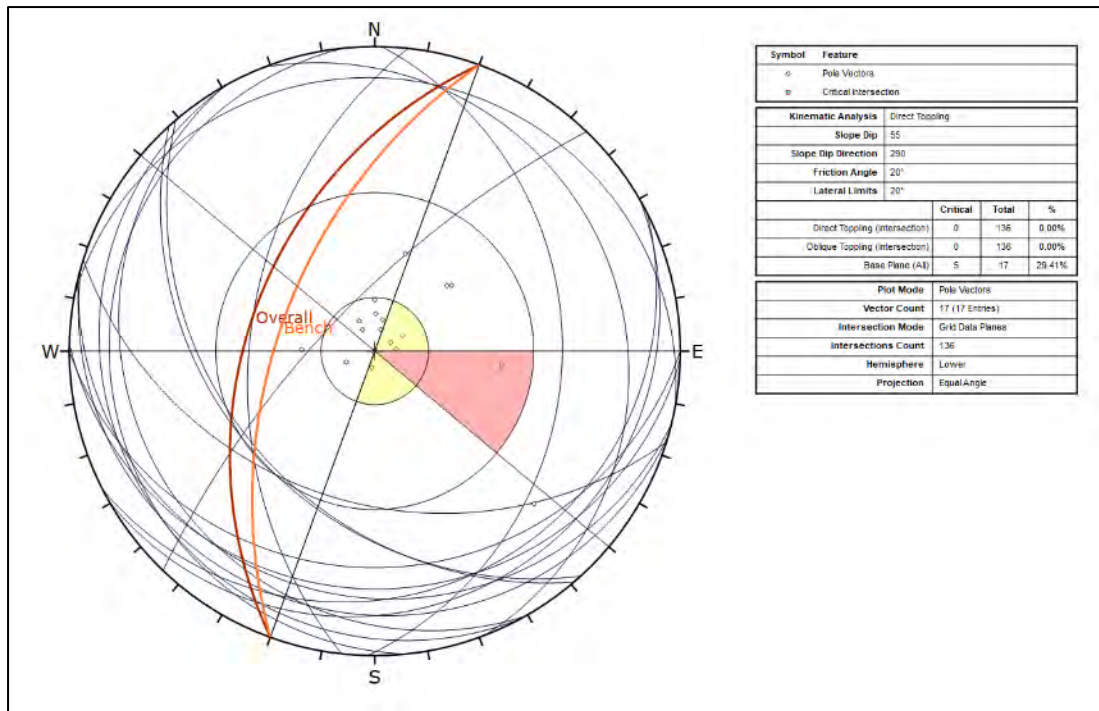


Figure: C643: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Bench Slope–Topple Failure.

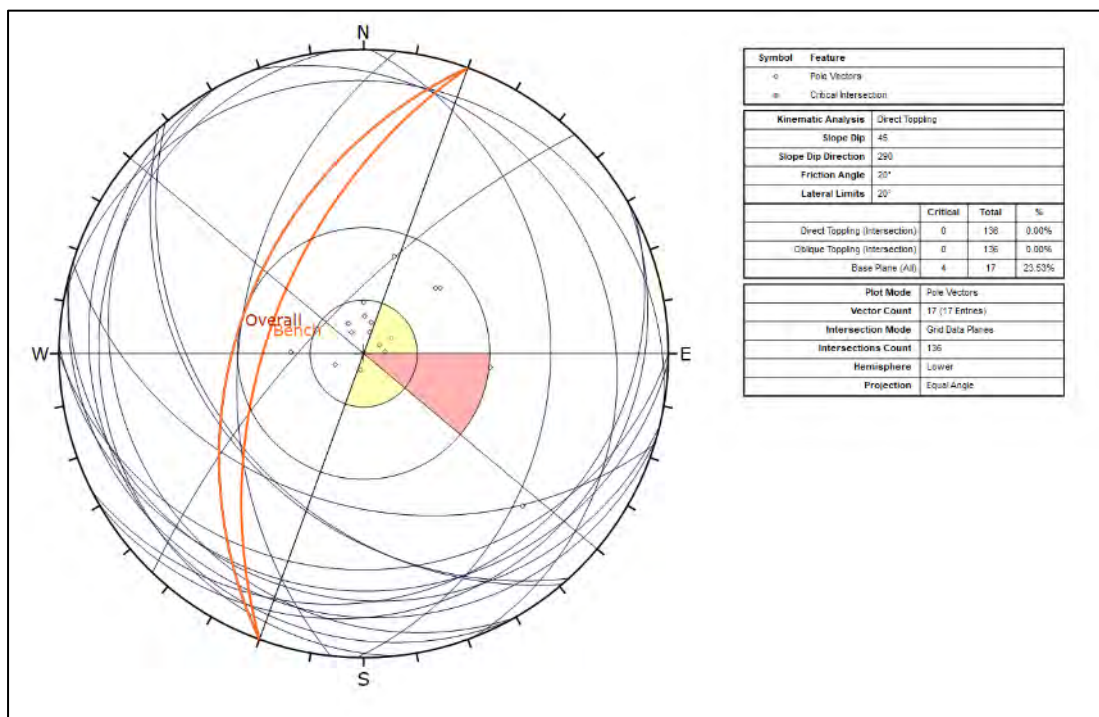


Figure: C644: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Overall Slope–Topple Failure.

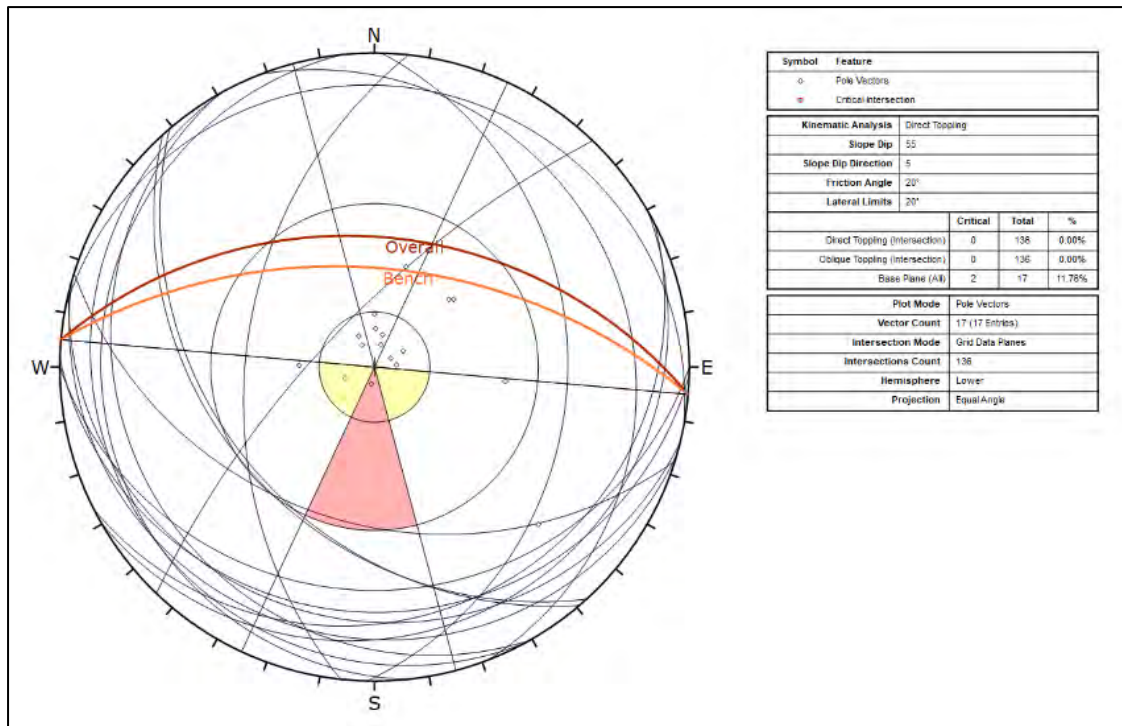


Figure: C645: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Bench Slope–Topple Failure.

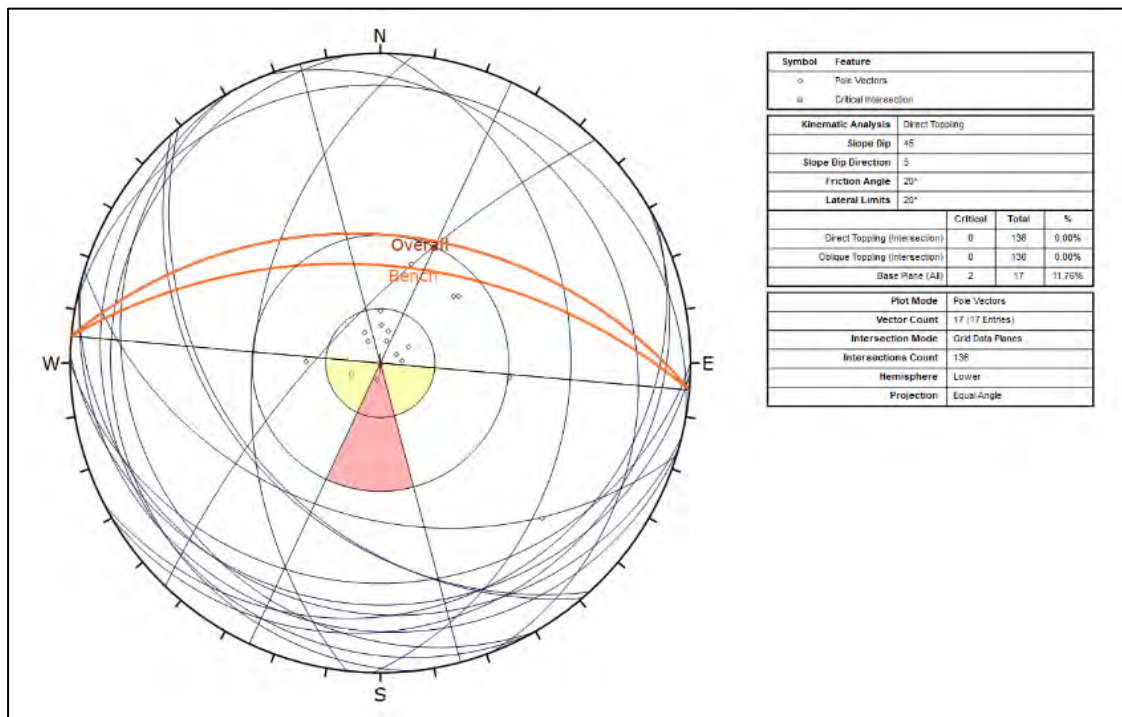


Figure: C646: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Overall Slope–Topple Failure.

West Sump -Crush Zones -Brunner Coal Measures (BCM) – Planar Sliding

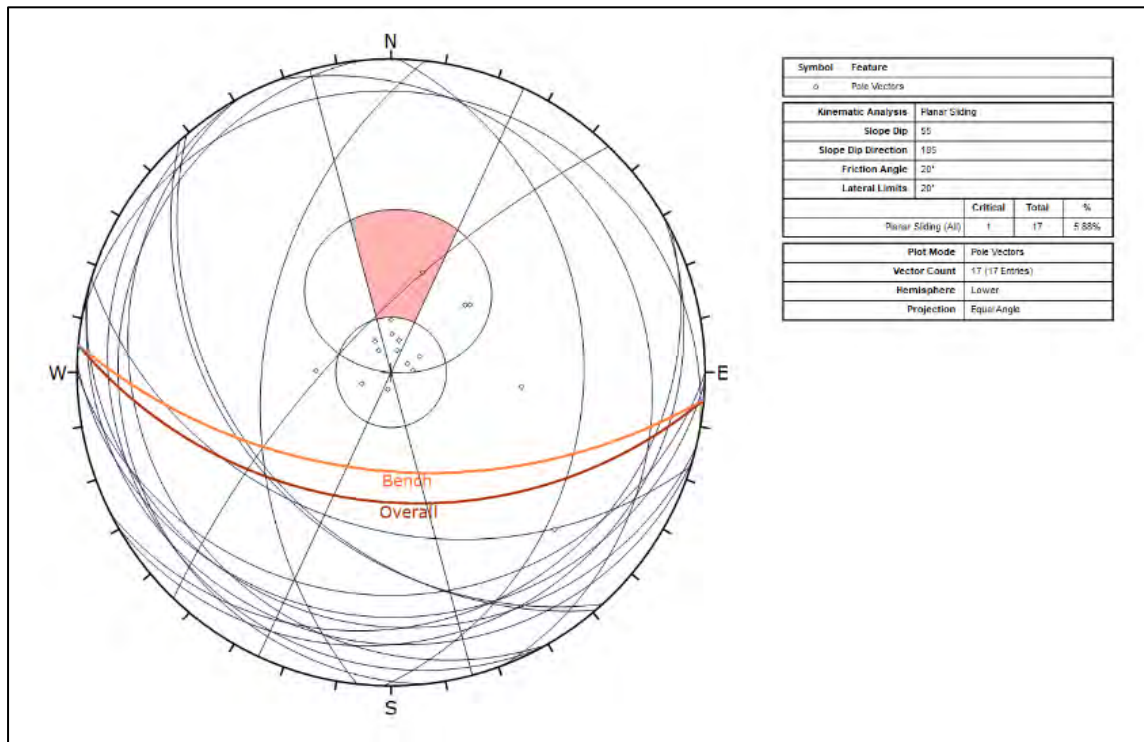


Figure: C647: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Bench Slope–Planar Sliding.

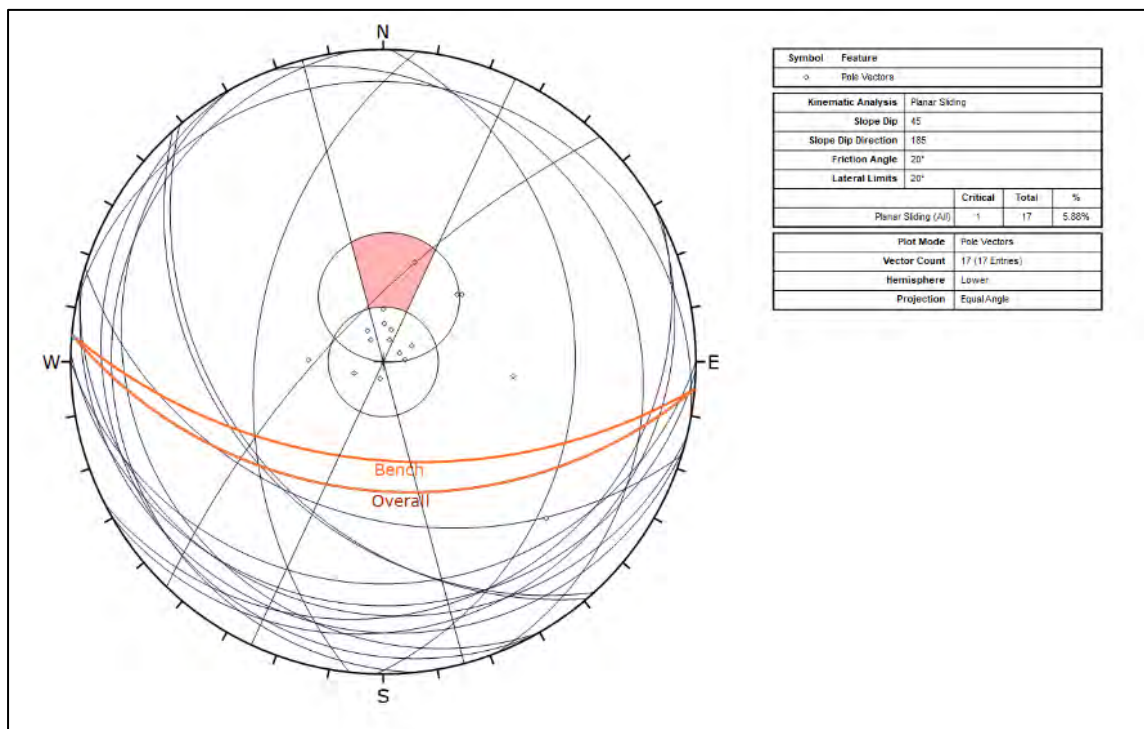


Figure: C448: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Overall Slope–Planar Sliding.

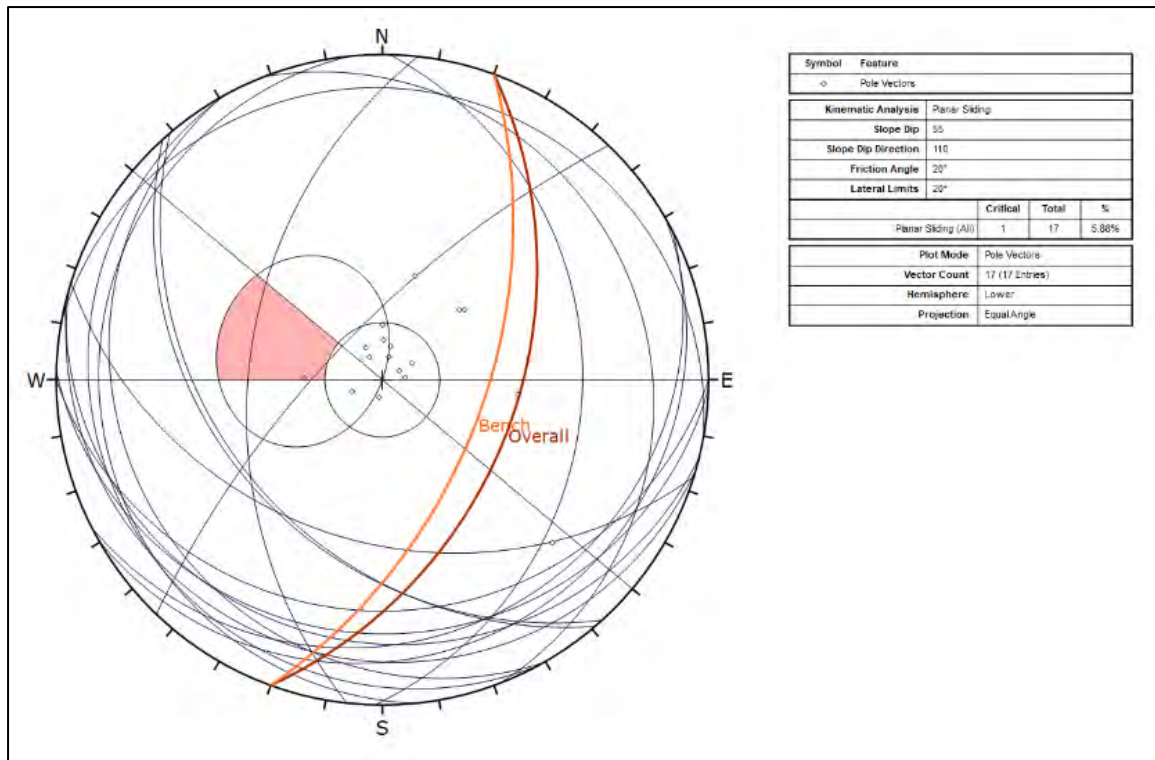


Figure: C649: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Bench Slope–Planar Sliding.

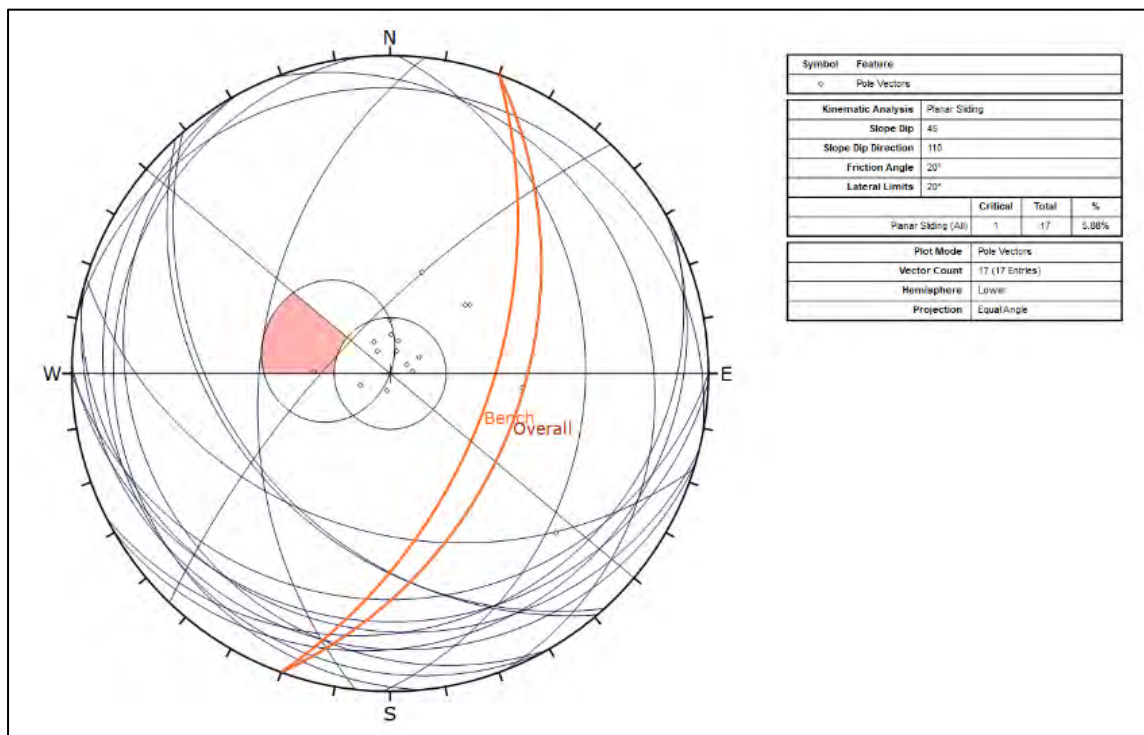


Figure: C650: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Overall Slope–Planar Sliding.

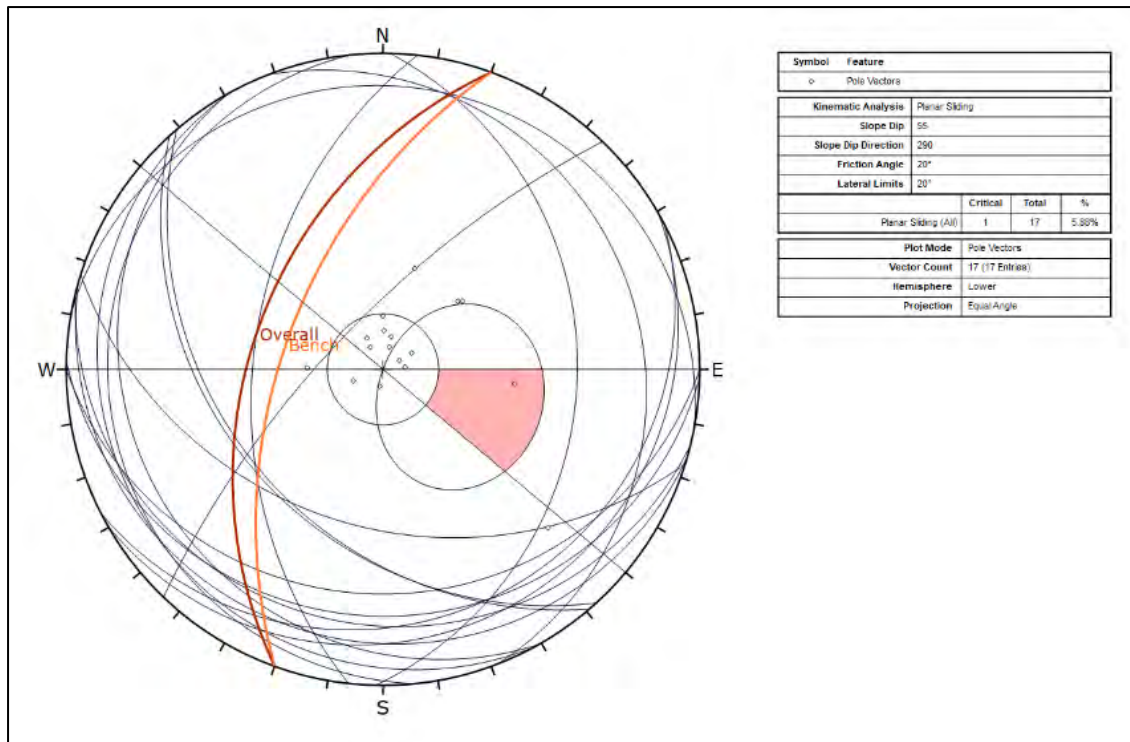


Figure: C651: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Bench Slope—Planar Sliding.

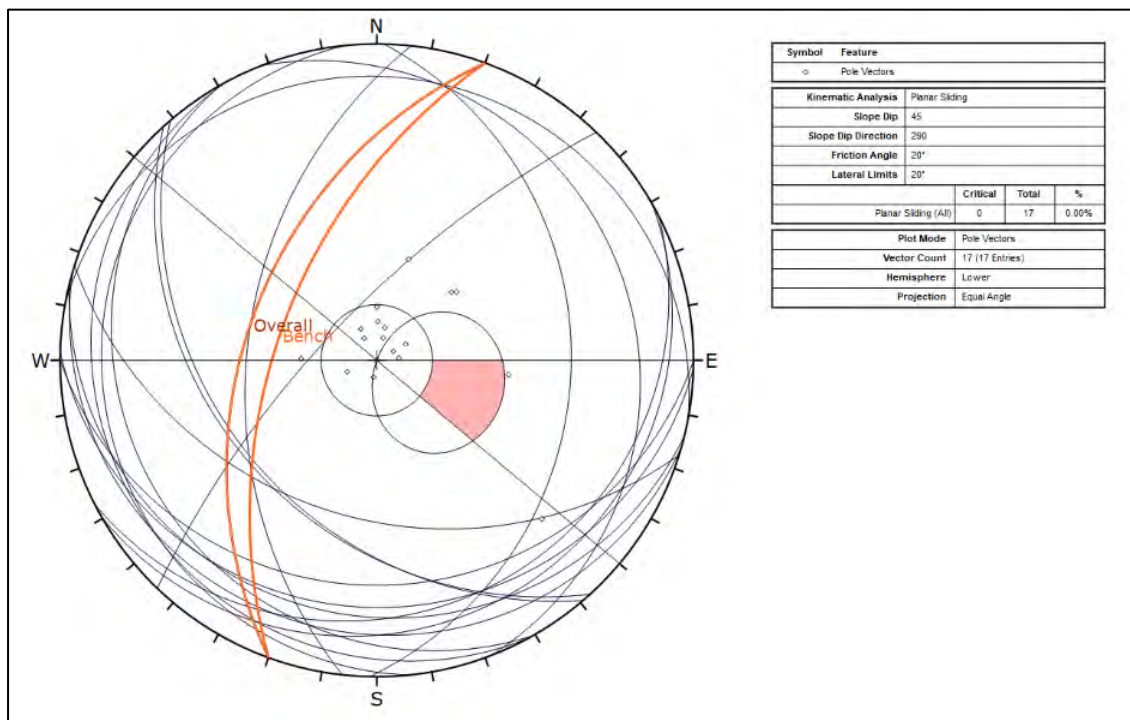


Figure: C652: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Overall Slope—Planar Sliding.

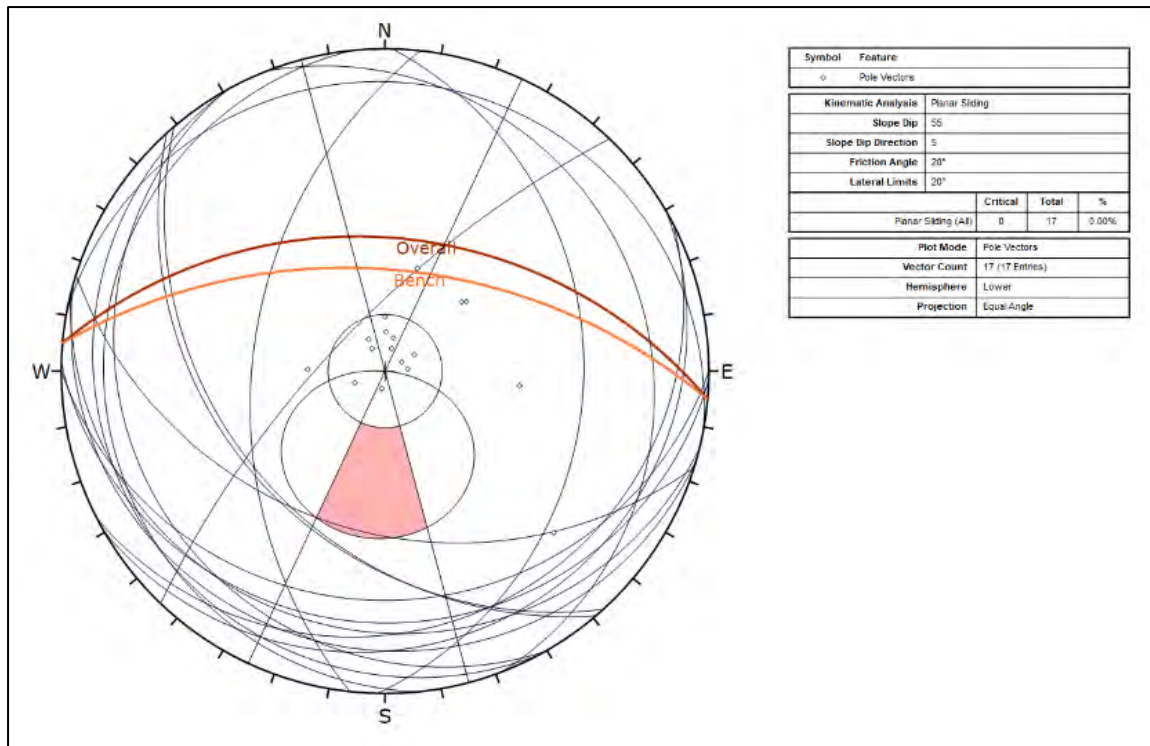


Figure: C653: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Bench Slope—Planar Sliding.

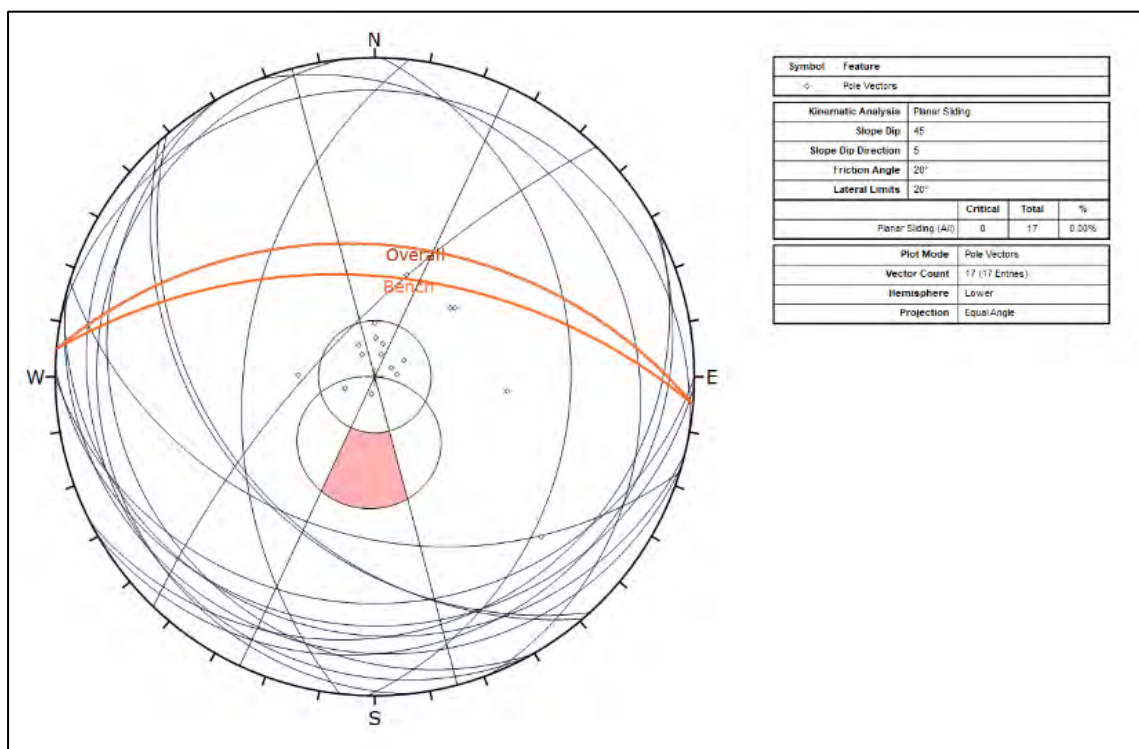


Figure: C654: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Overall Slope—Planar Sliding.

West Sump -Crush Zones -Brunner Coal Measures (BCM) – Wedge Failure

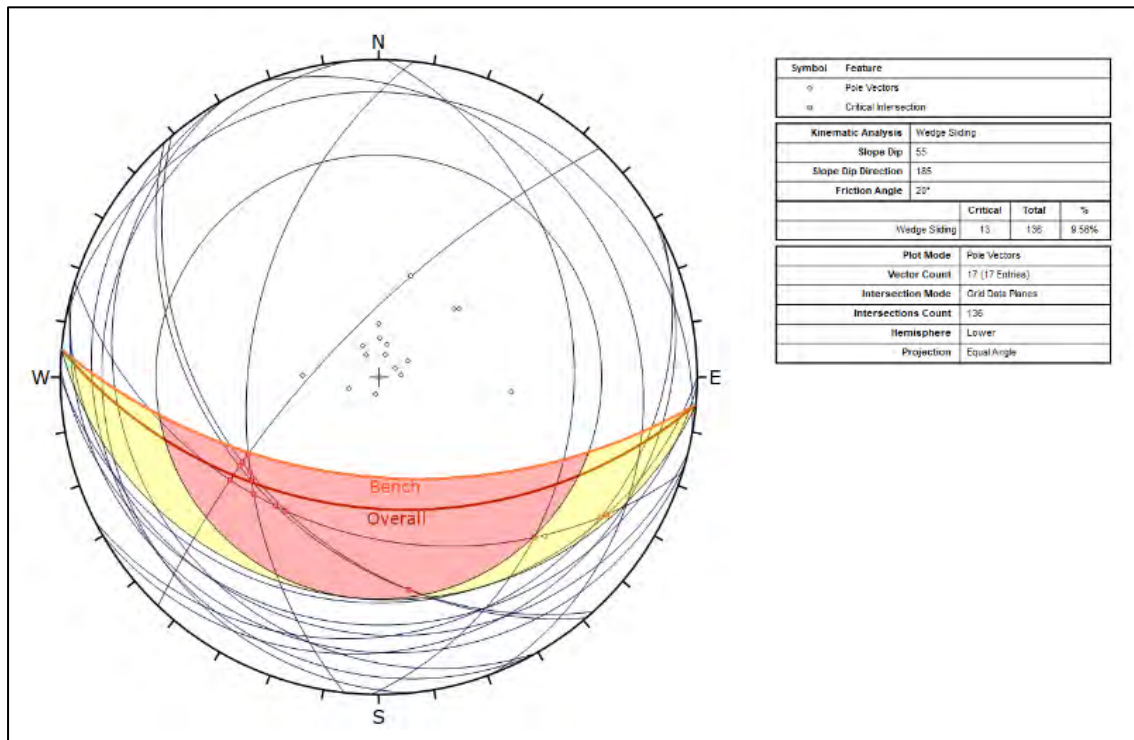


Figure: C655: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Bench Slope–Wedge Failure.

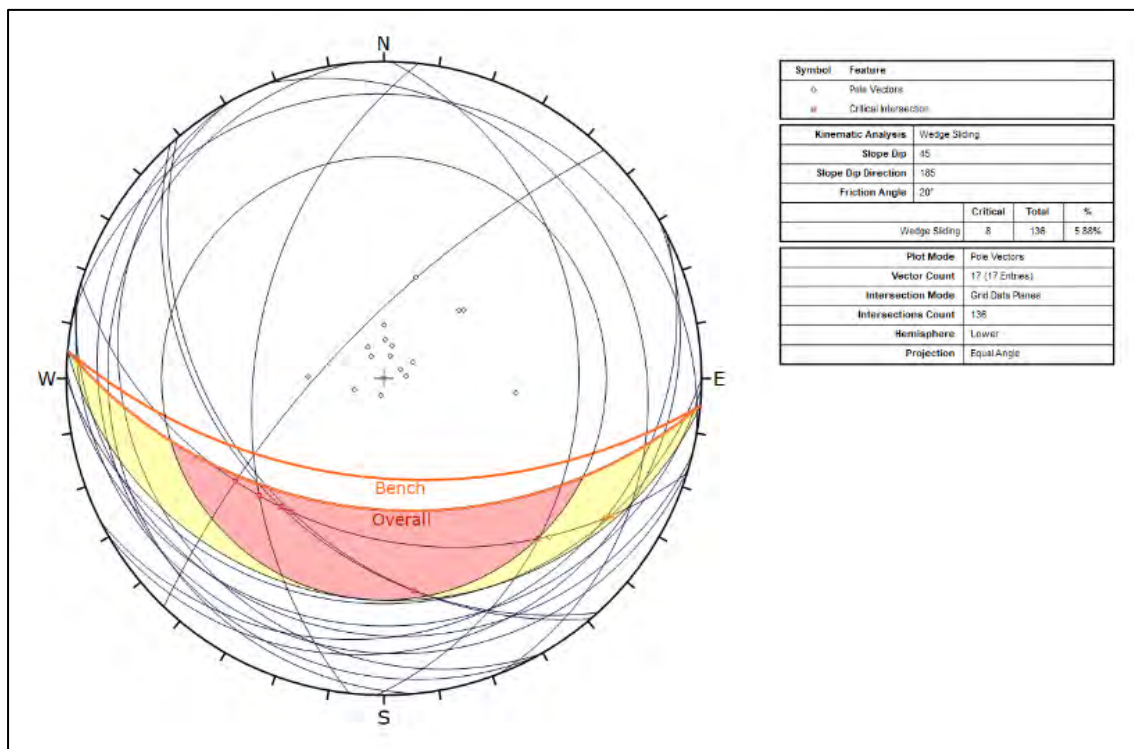


Figure: C656: Kinematic Analysis (BCM Crush Zone) West Sump (North Wall) Overall Slope–Wedge Failure.

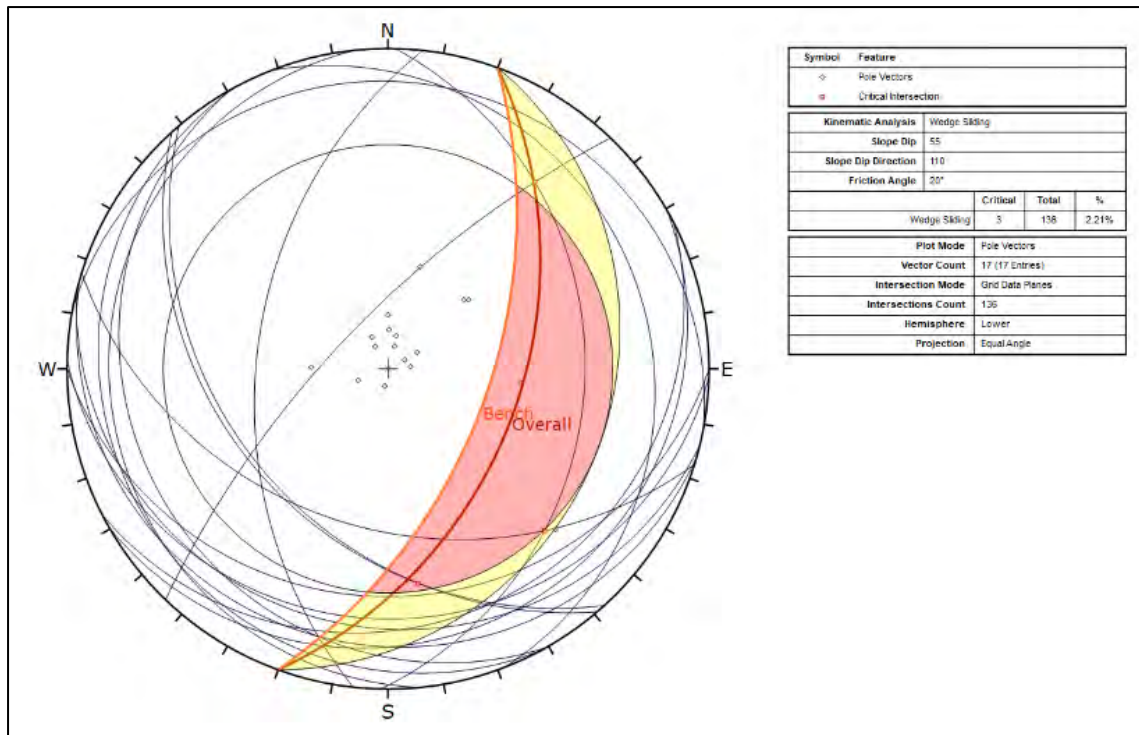


Figure: C657: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Bench Slope-Wedge Failure.

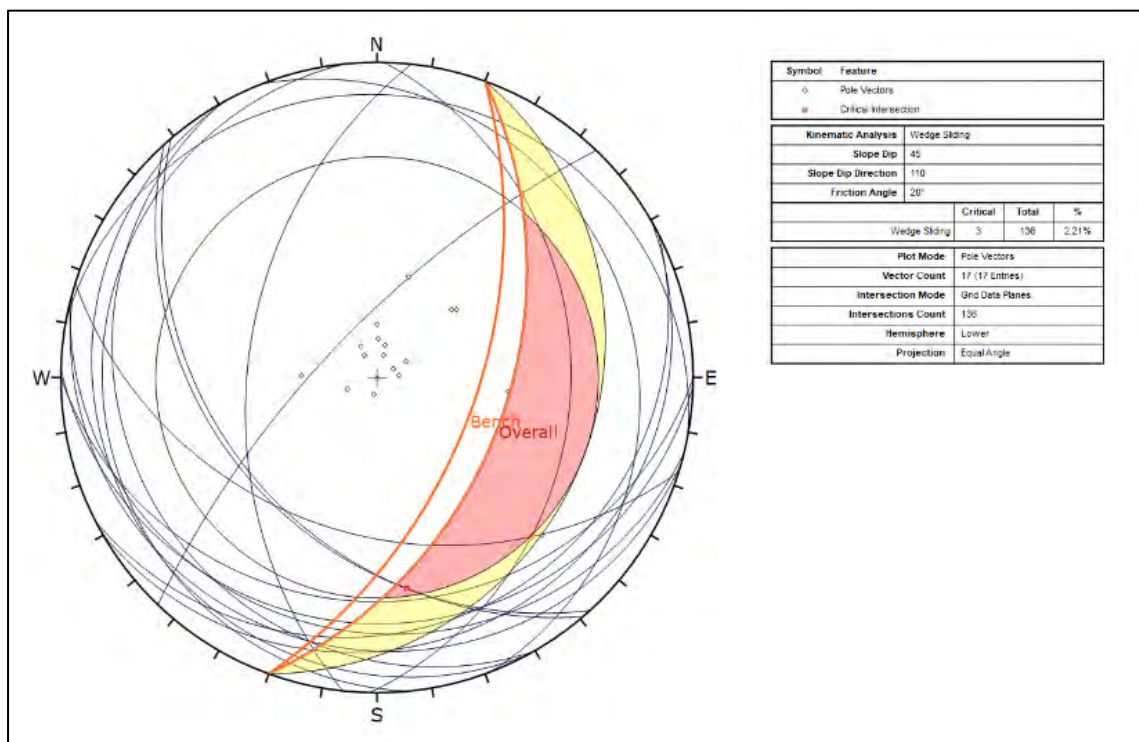


Figure: C658: Kinematic Analysis (BCM Crush Zone) West Sump (West Wall) Overall Slope-Wedge Failure.

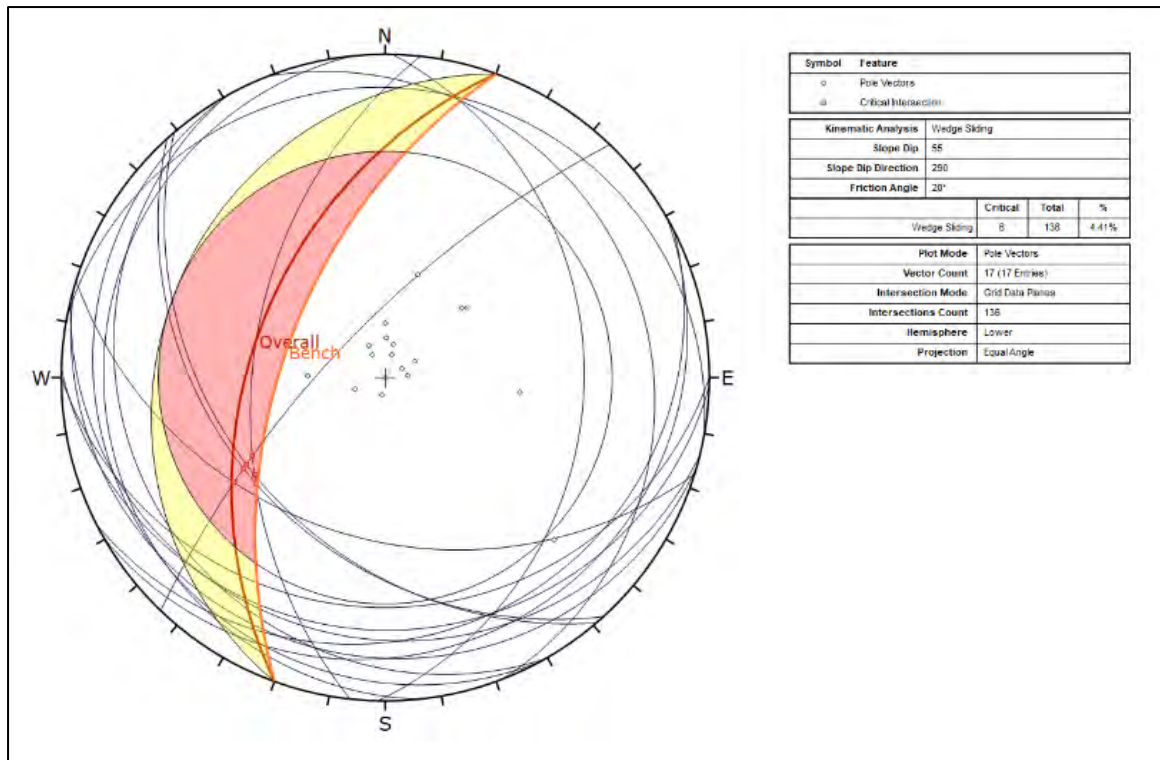


Figure: C659: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Bench Slope–Wedge Failure.

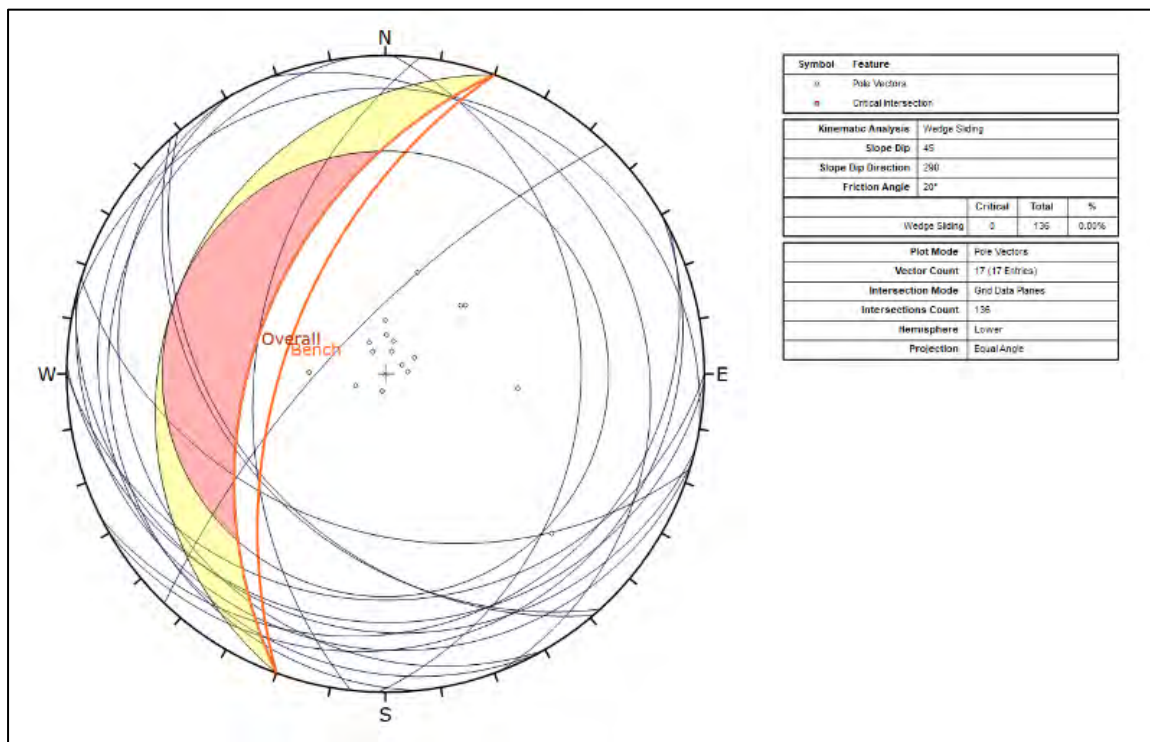


Figure: C660: Kinematic Analysis (BCM Crush Zone) West Sump (East Wall) Overall Slope–Wedge Failure.

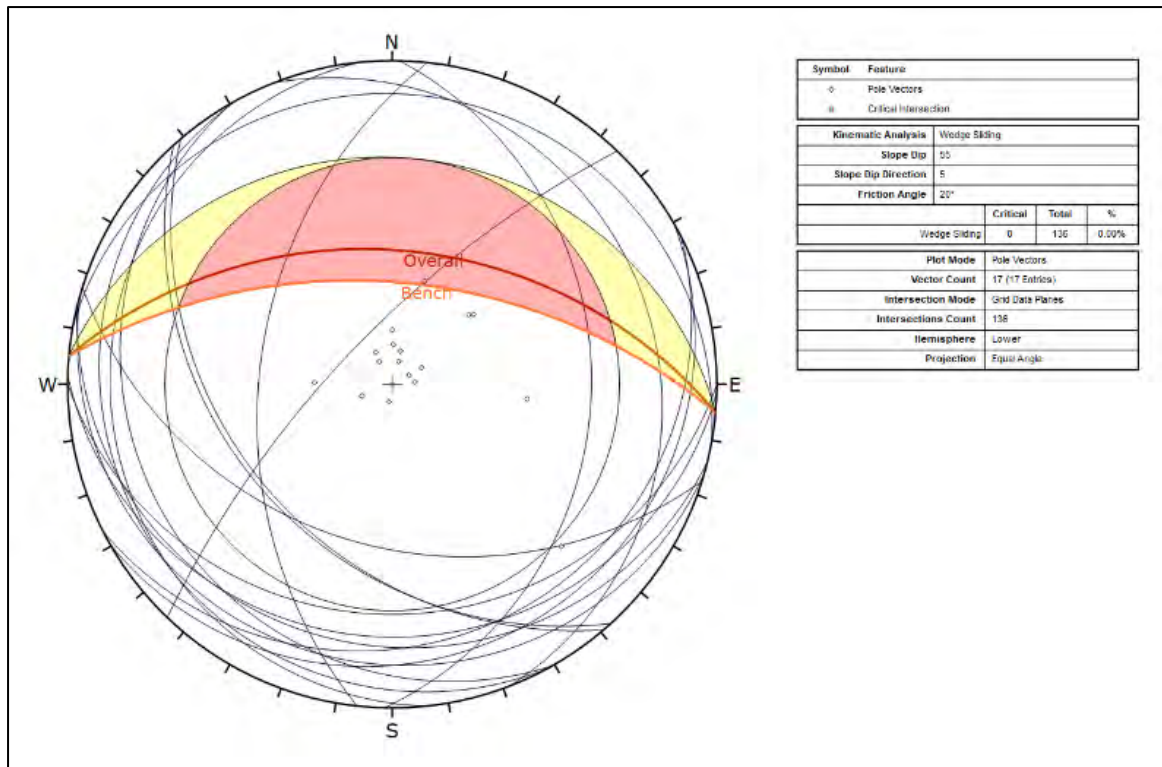


Figure: C661: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Bench Slope–Wedge Failure.

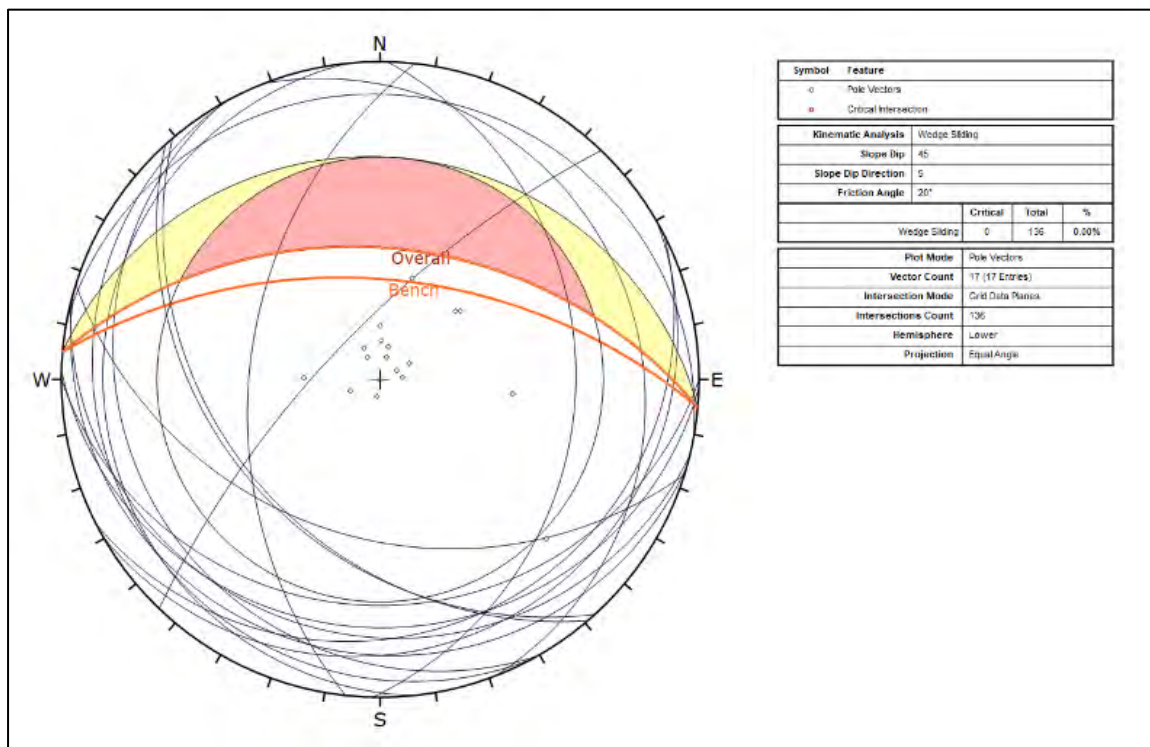


Figure: C662: Kinematic Analysis (BCM Crush Zone) West Sump (South Wall) Overall Slope–Wedge Failure.

Greenland Group Greywacke Basement (BSM) Crush Zones.

BSM – Crush Zones – Topple Failure

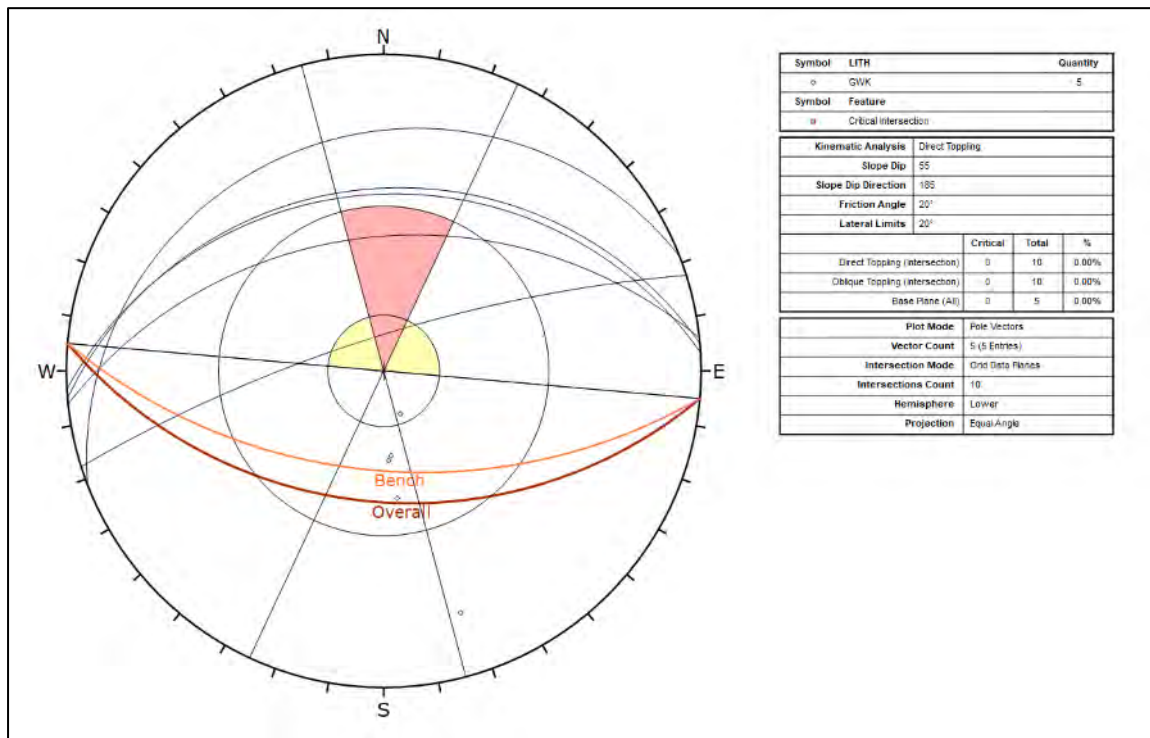


Figure: C663-Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Bench Slope–Topple Failure.

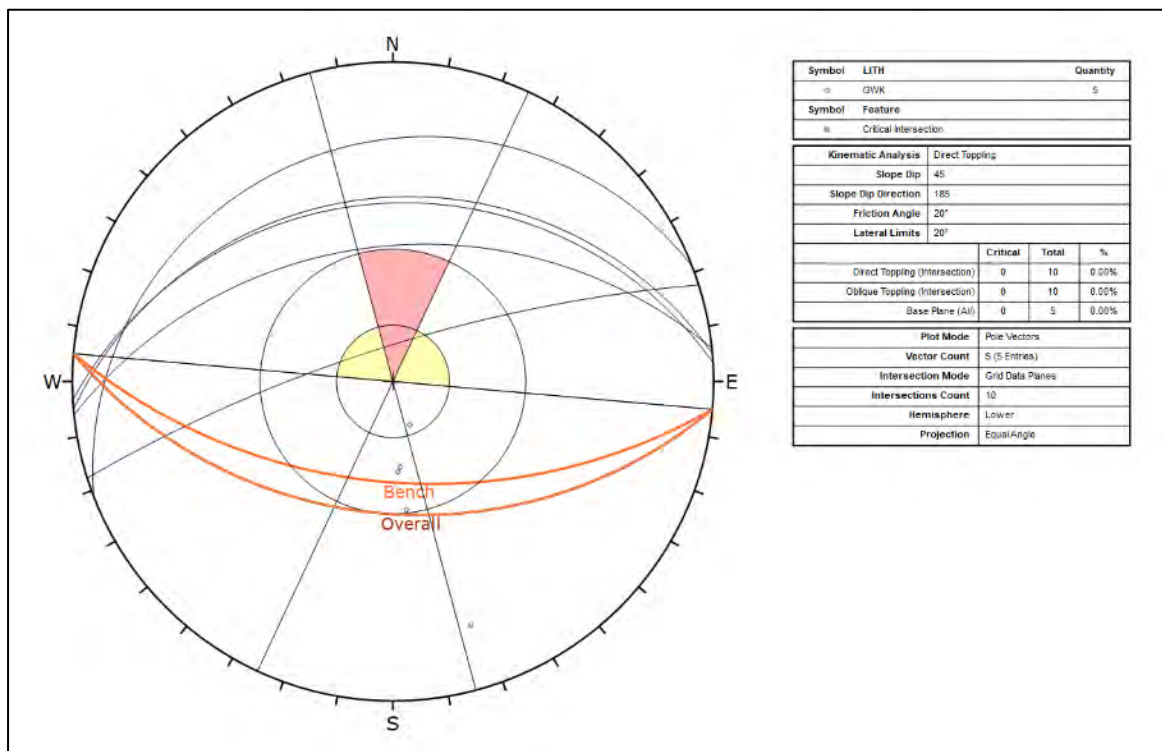


Figure: C664-Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Overall Slope–Topple Failure.

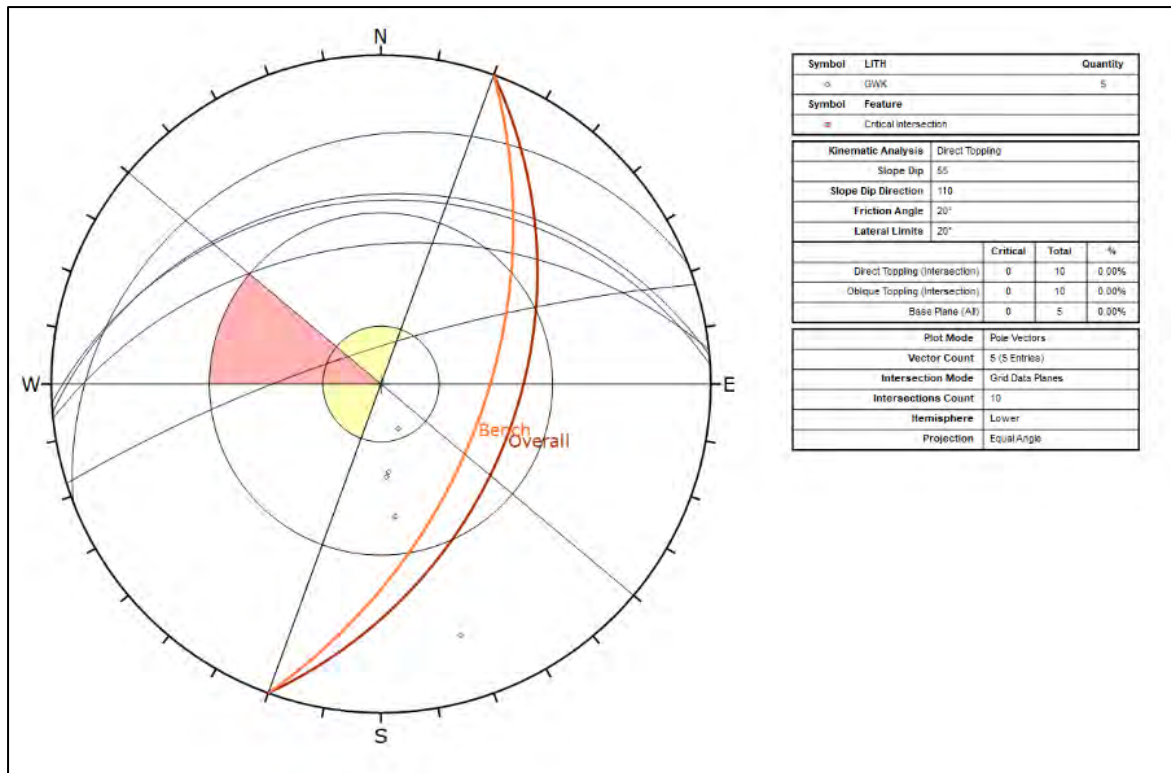


Figure: C665: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Bench Slope–Topple Failure.

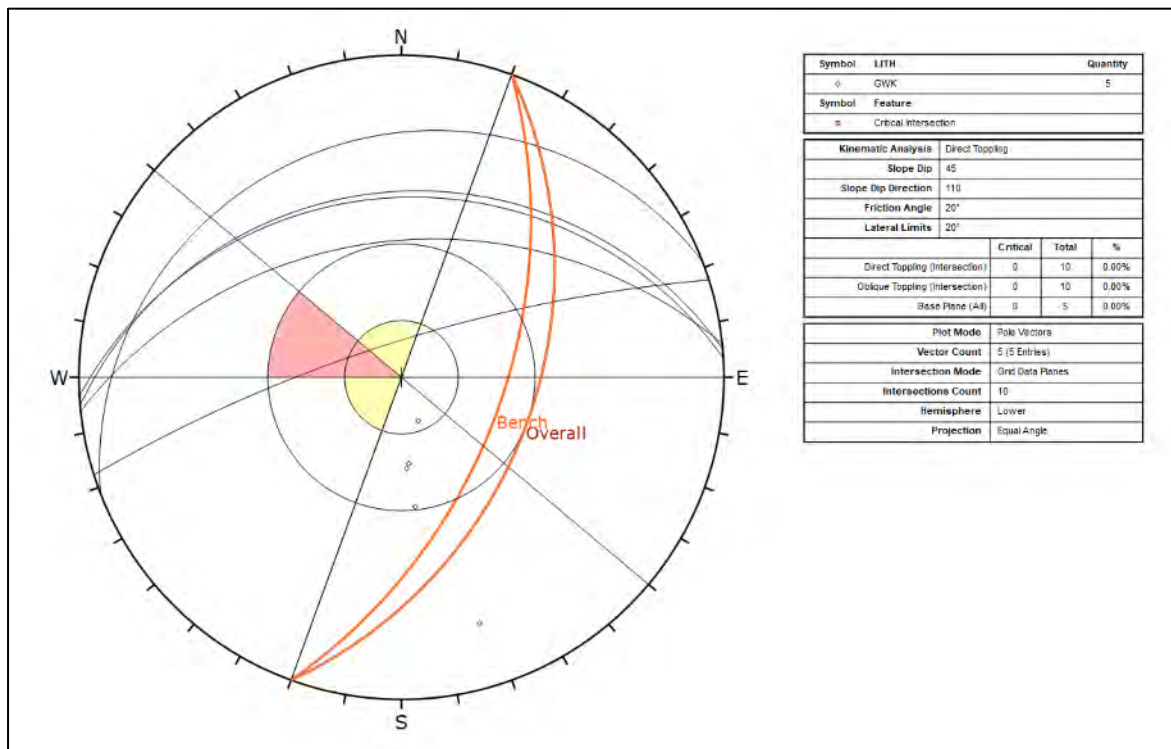


Figure: C666: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Overall Slope–Topple Failure.

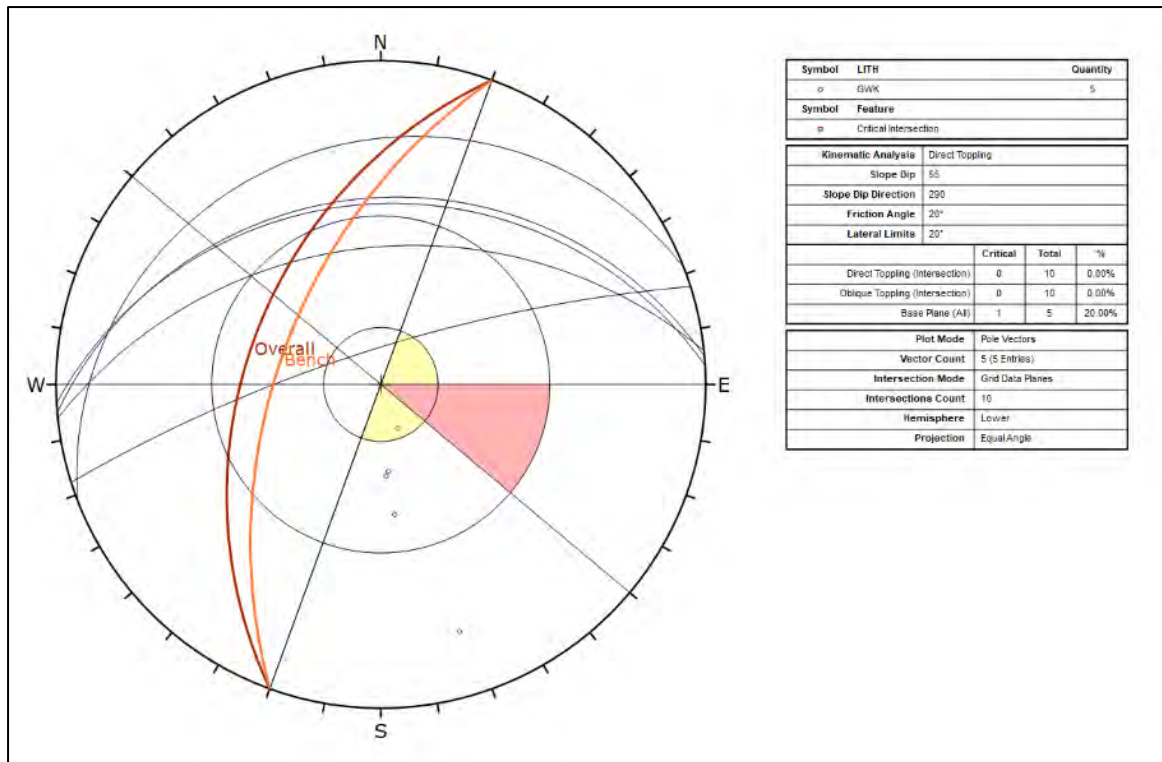


Figure: C667: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Bench Slope–Topple Failure.

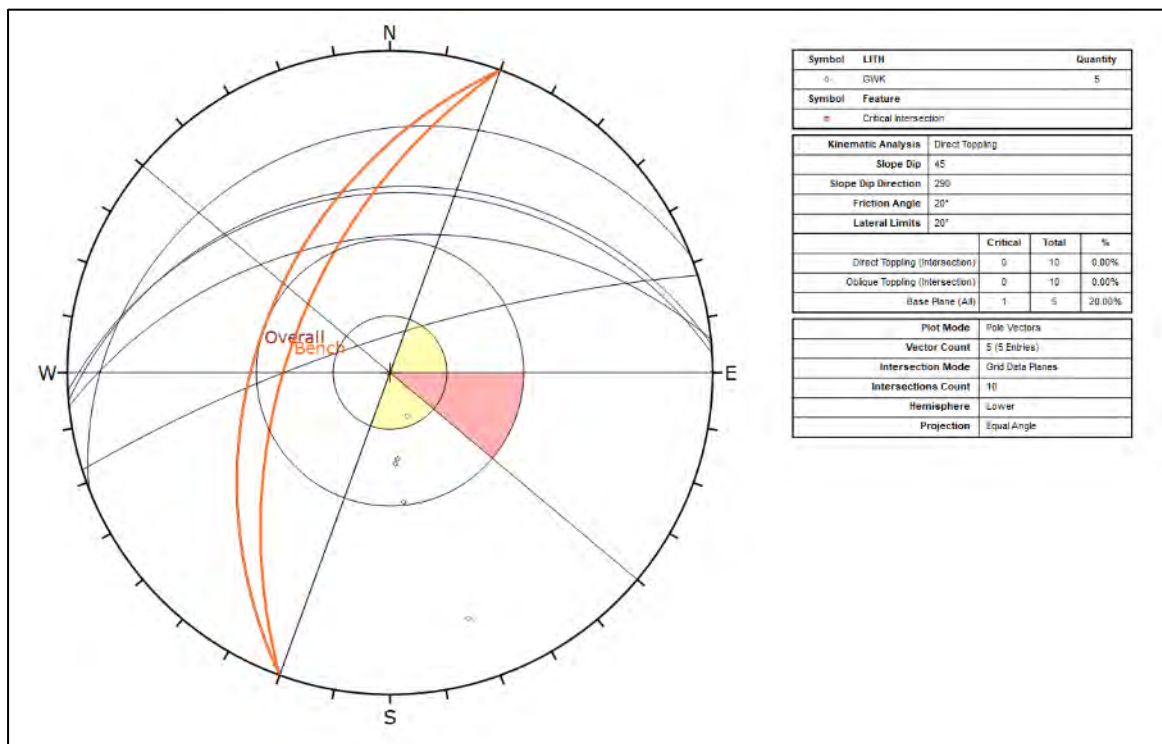


Figure: C668: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Overall Slope–Topple Failure.

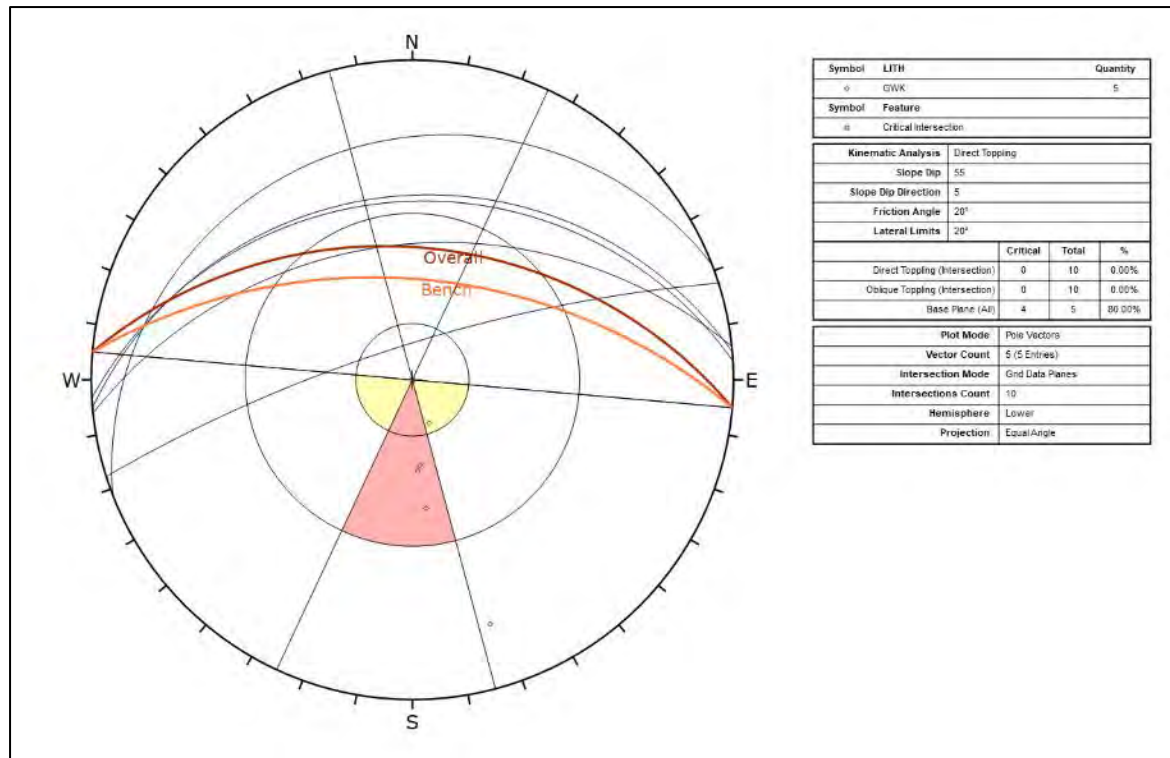


Figure: C669: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Bench Slope–Topple Failure.

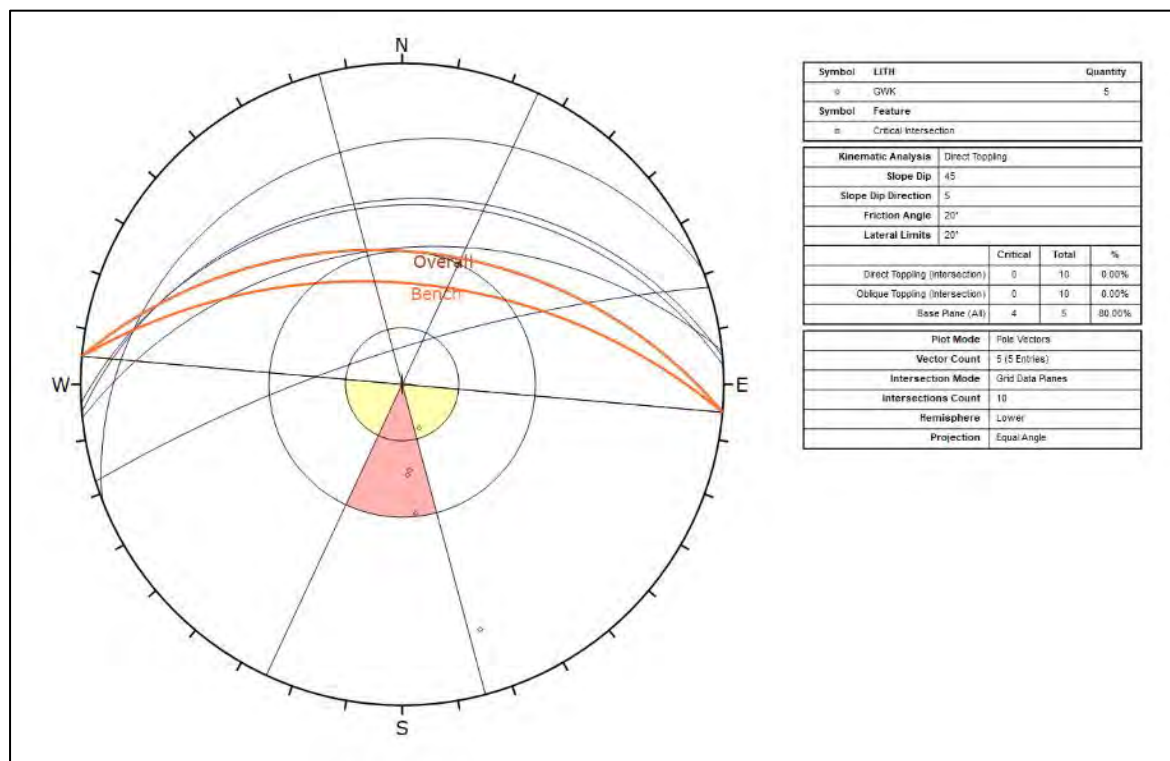


Figure: C670: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Overall Slope–Topple Failure.

BSM – Crush Zones – Planar Sliding

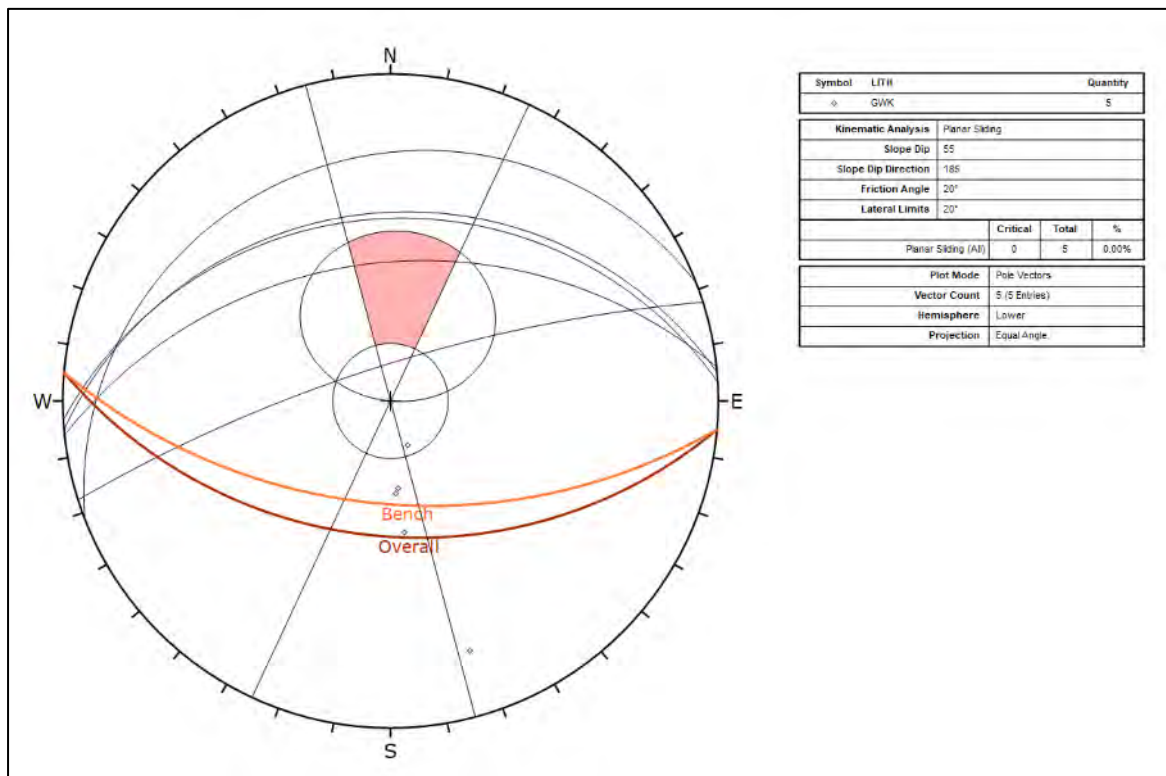


Figure: C671: Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Bench Slope–Planar Sliding.

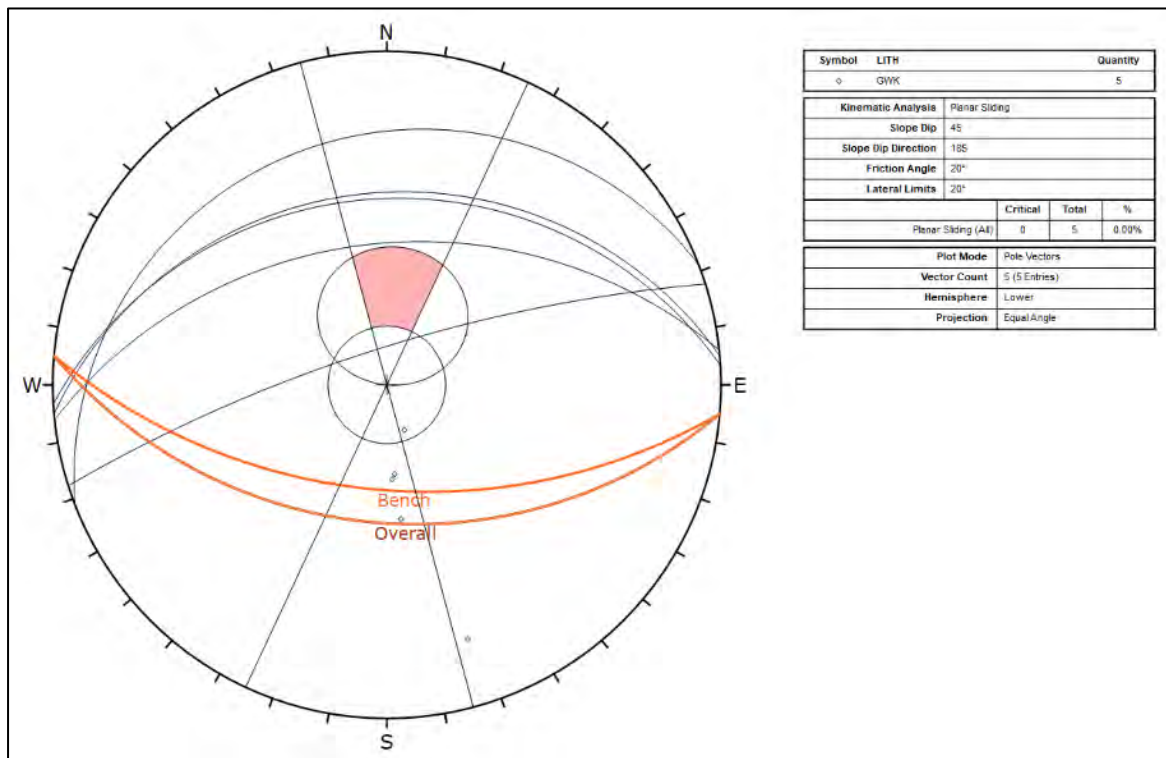


Figure: C672: Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Overall Slope–Planar Sliding

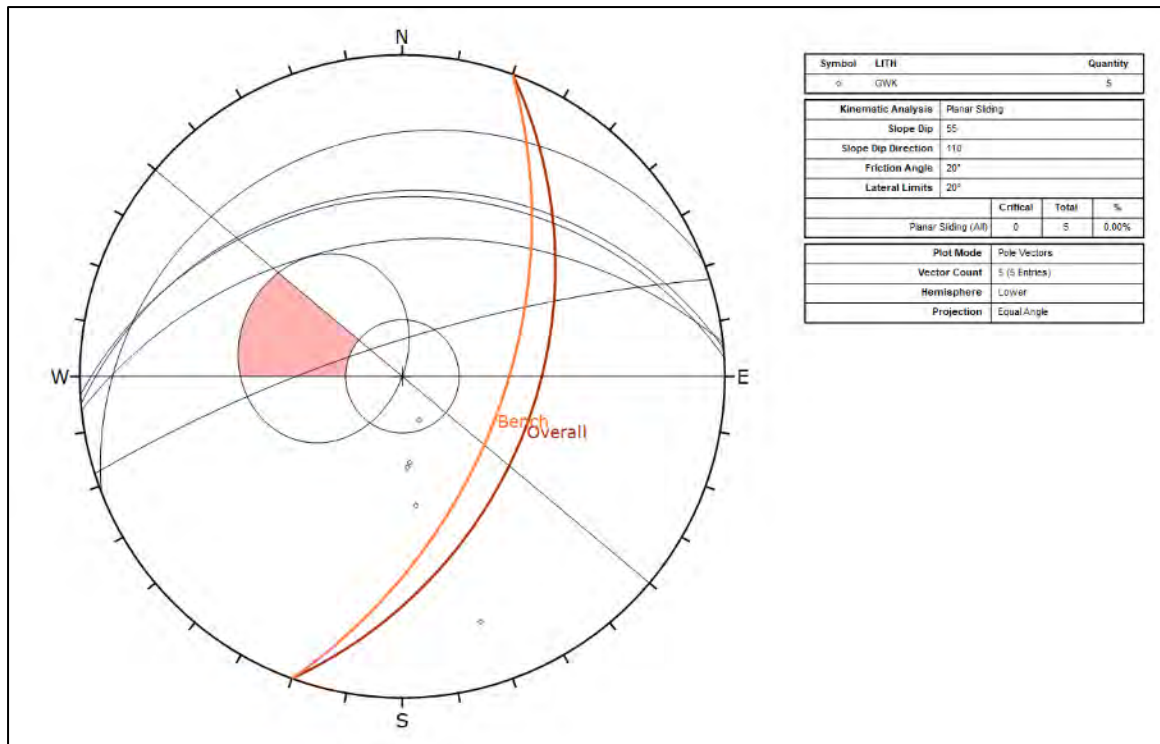


Figure: C673: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Bench Slope–Planar Sliding

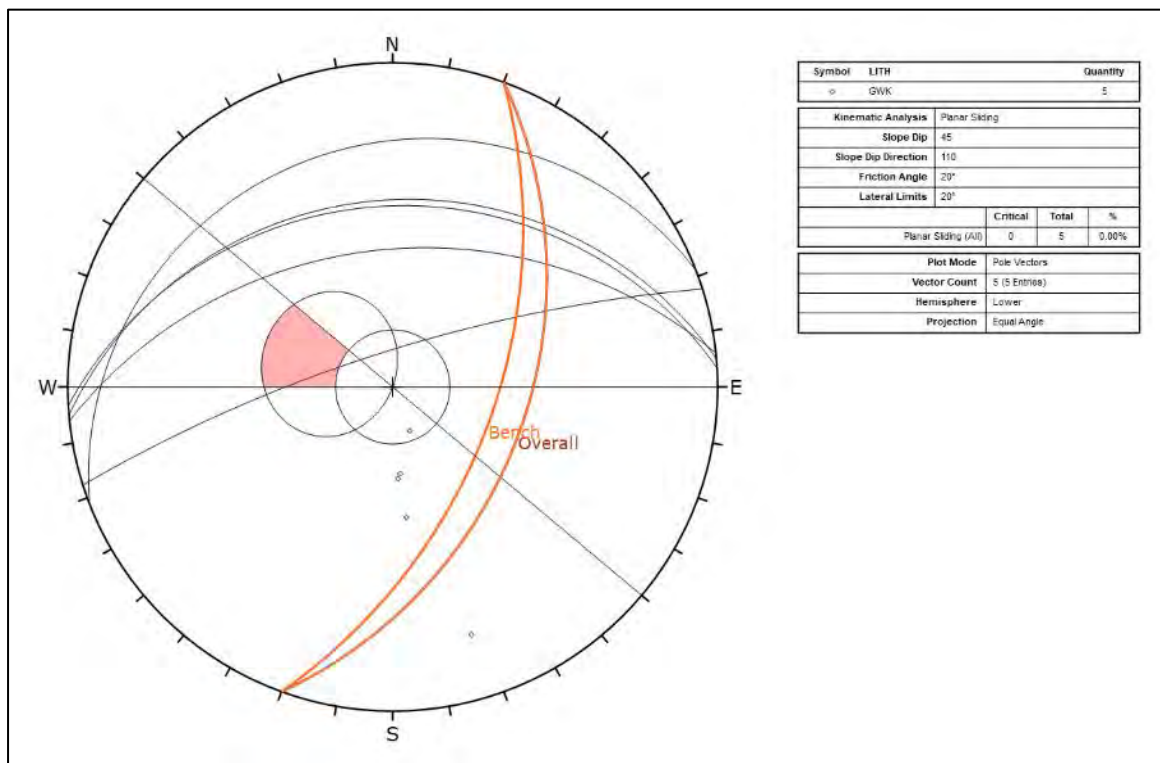


Figure: C674: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Overall Slope–Planar Sliding

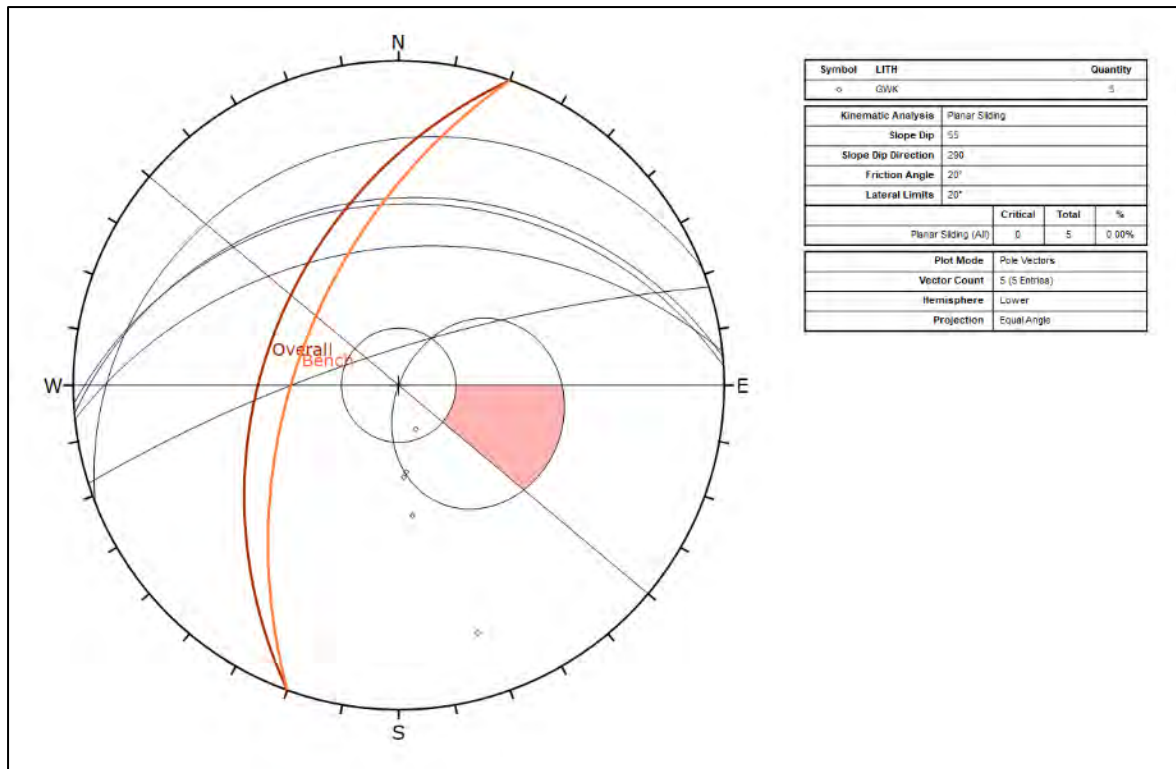


Figure: C675: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Bench Slope–Planar Sliding

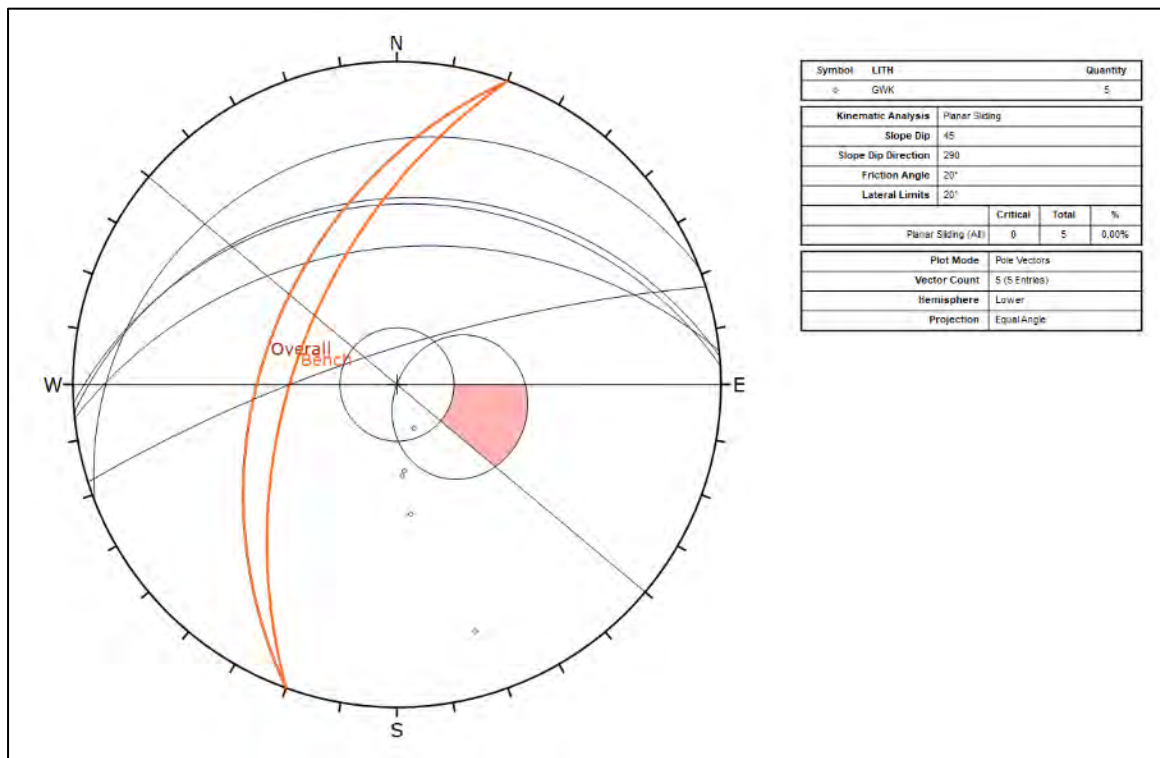


Figure: C676: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Overall Slope–Planar Sliding

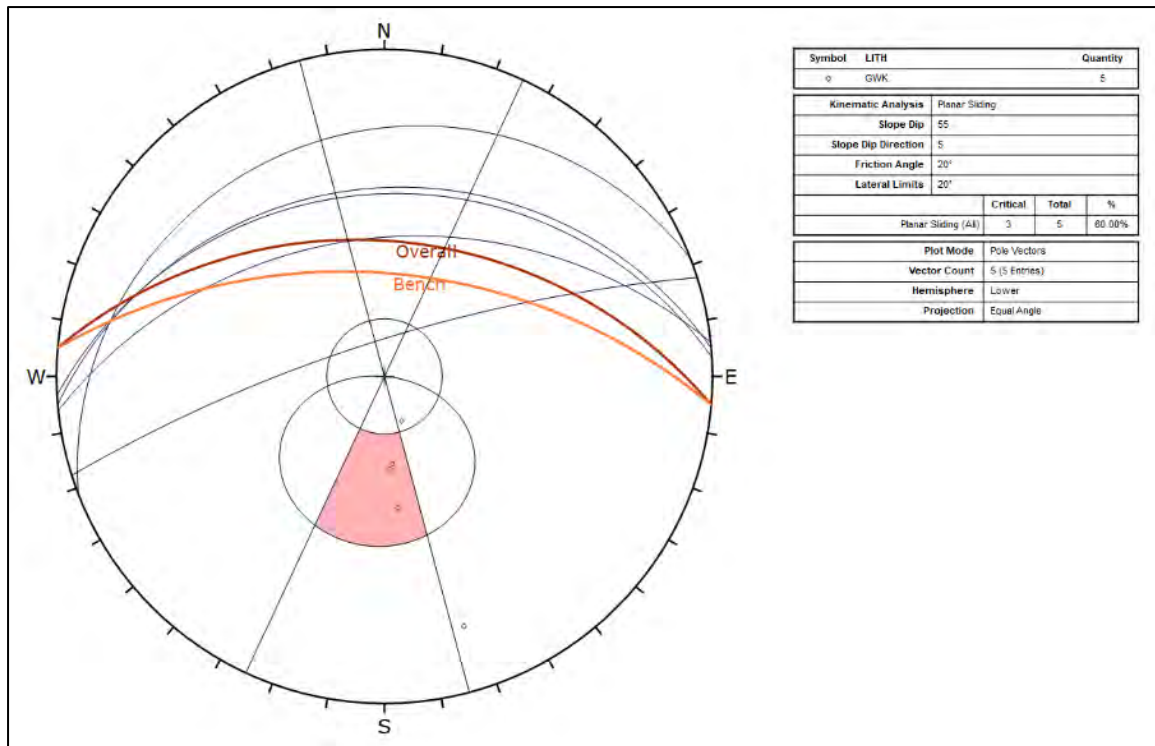


Figure: C677: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Bench Slope—Planar Sliding

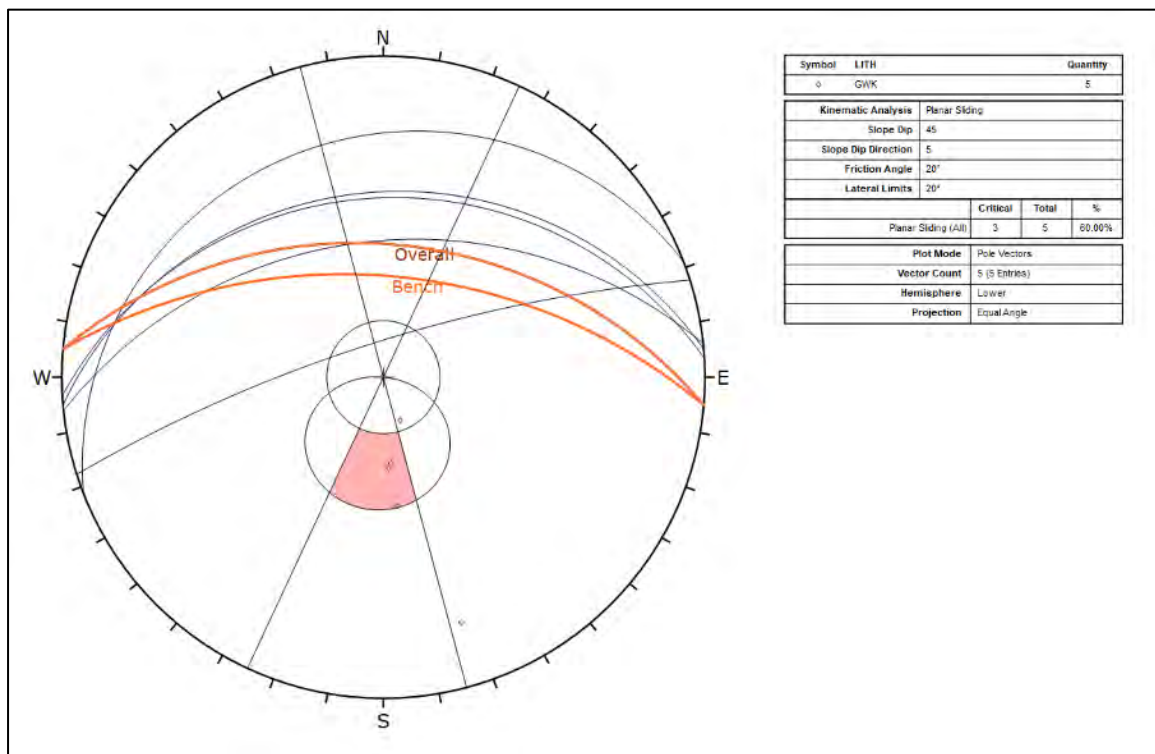


Figure: C678: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Overall Slope—Planar Sliding

BSM – Crush Zones – Wedge Failure

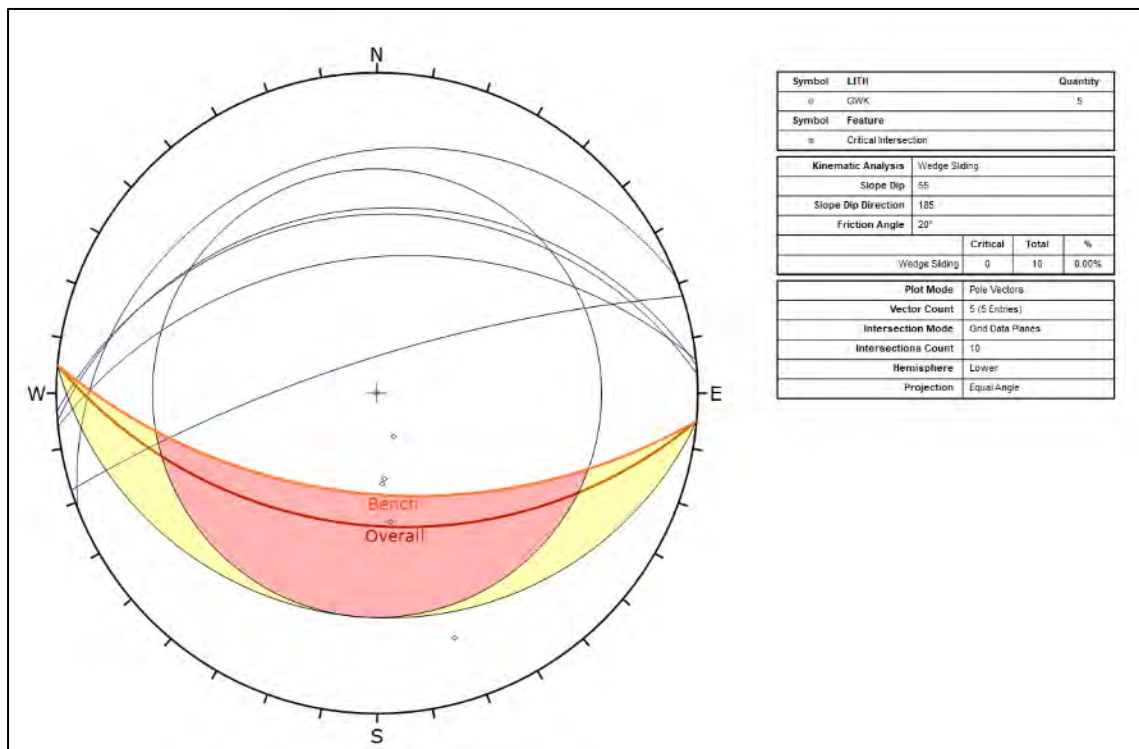


Figure: C679: Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Bench Slope–Wedge Failure

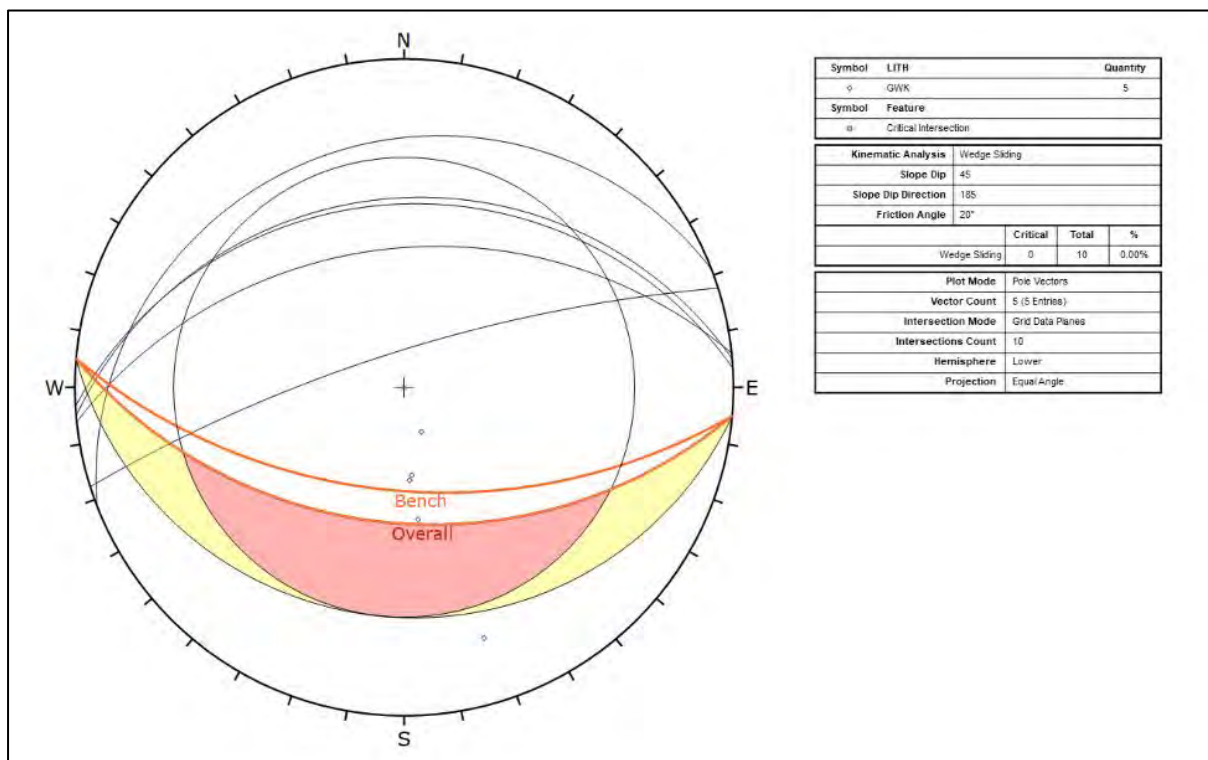


Figure: C680: Kinematic Analysis (BSM Crush Zone) West Sump (North Wall) Overall Slope–Wedge Failure

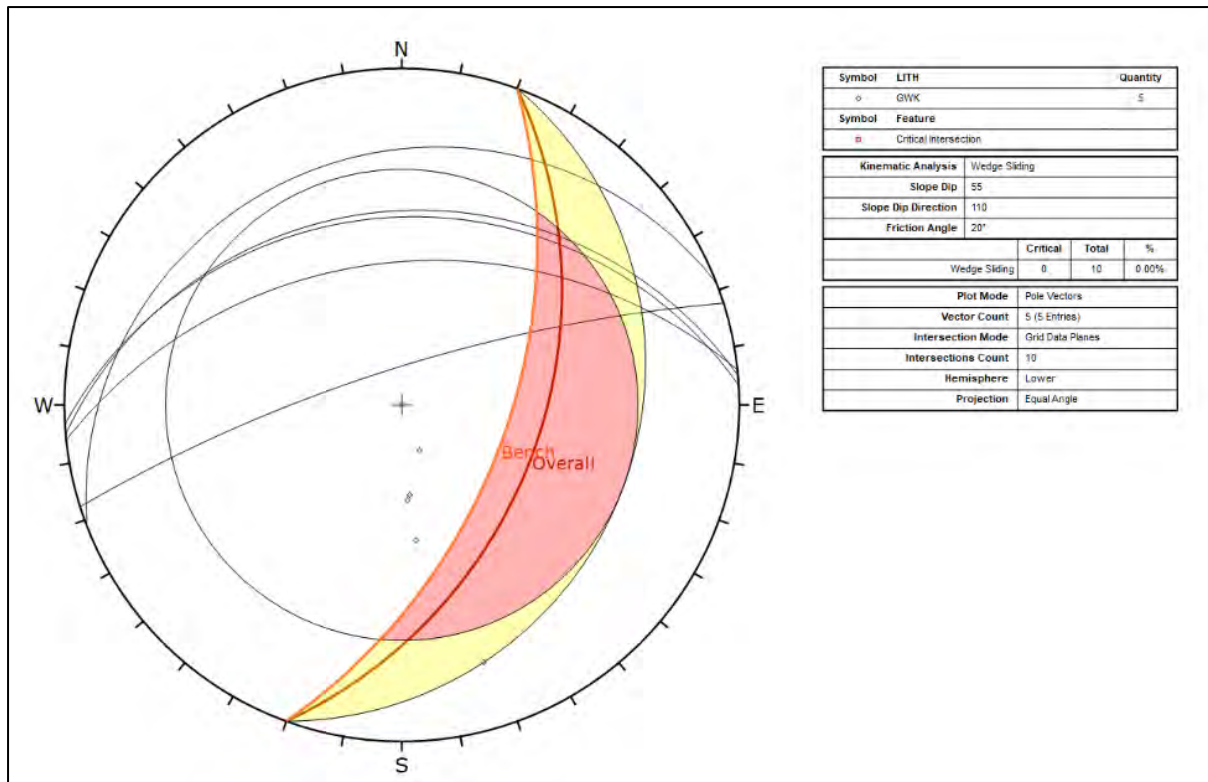


Figure: C681: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Bench Slope–Wedge Failure

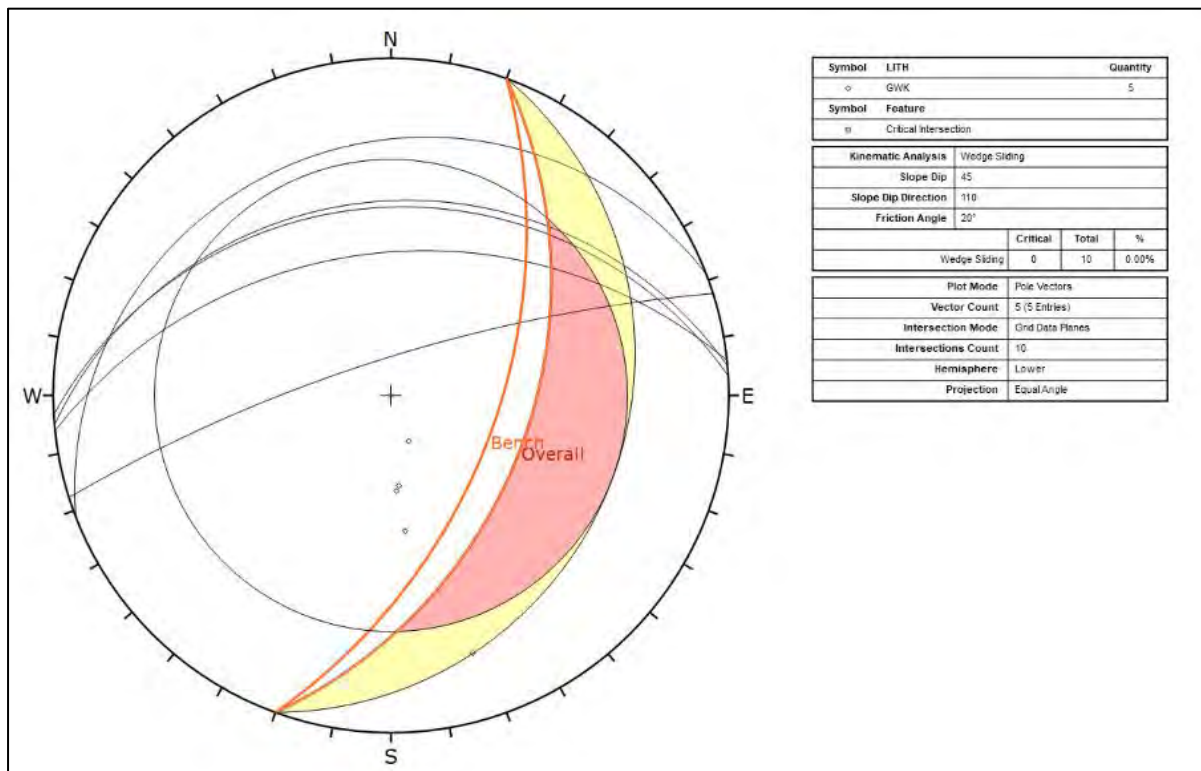


Figure: C682: Kinematic Analysis (BSM Crush Zone) West Sump (West Wall) Overall Slope–Wedge Failure

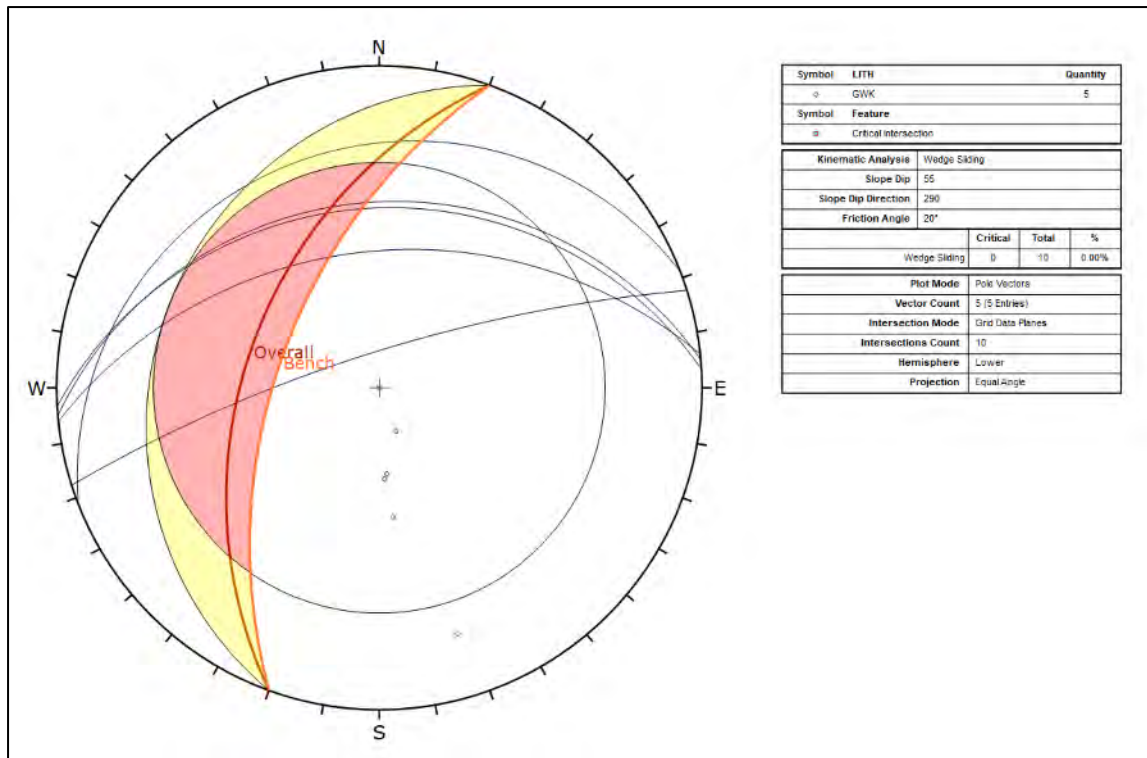


Figure: C683: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Bench Slope–Wedge Failure

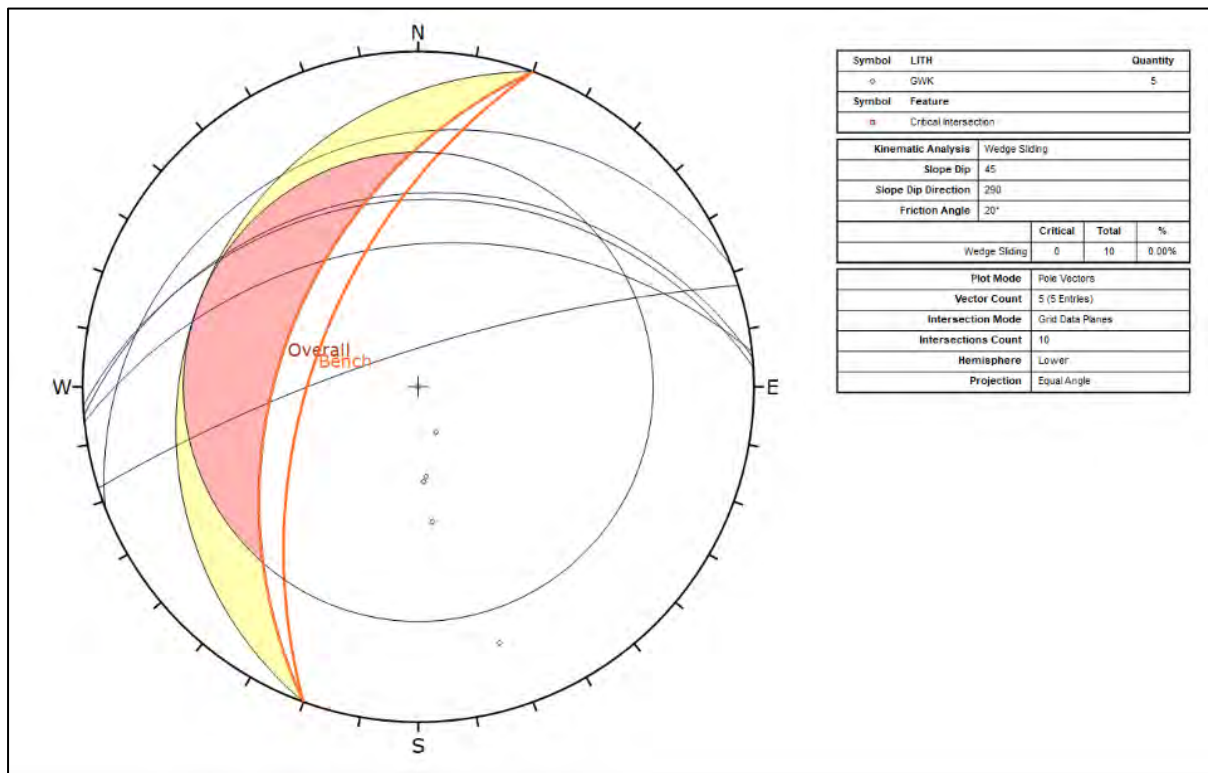


Figure: C684: Kinematic Analysis (BSM Crush Zone) West Sump (East Wall) Overall Slope–Wedge Failure

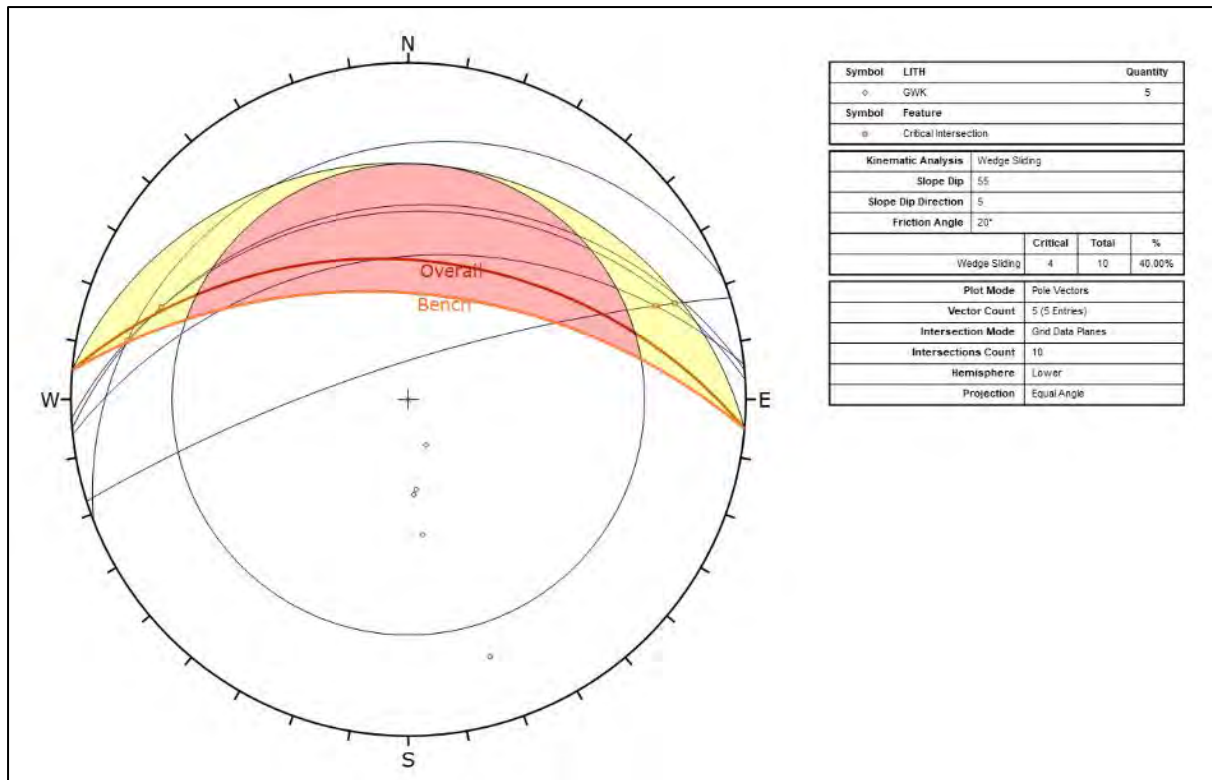


Figure: C685: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Bench Slope–Wedge Failure

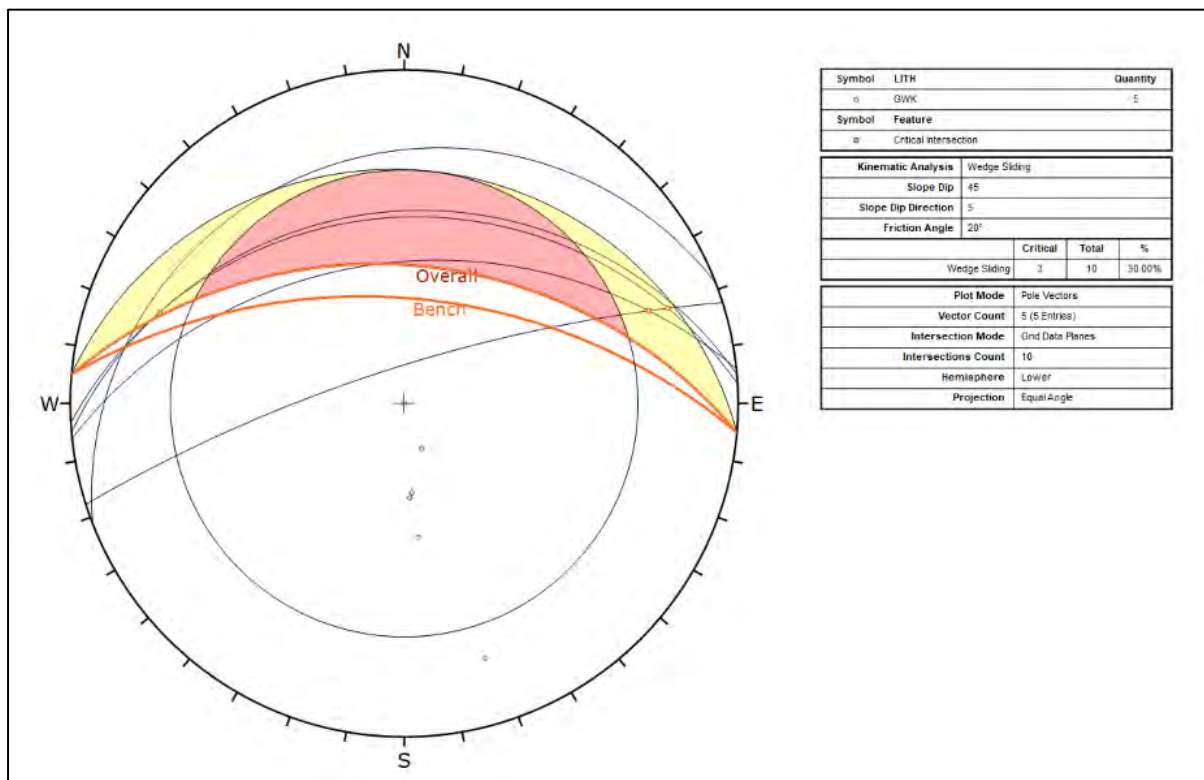


Figure: C686: Kinematic Analysis (BSM Crush Zone) West Sump (South Wall) Overall Slope–Wedge Failure

West Sump – Faults

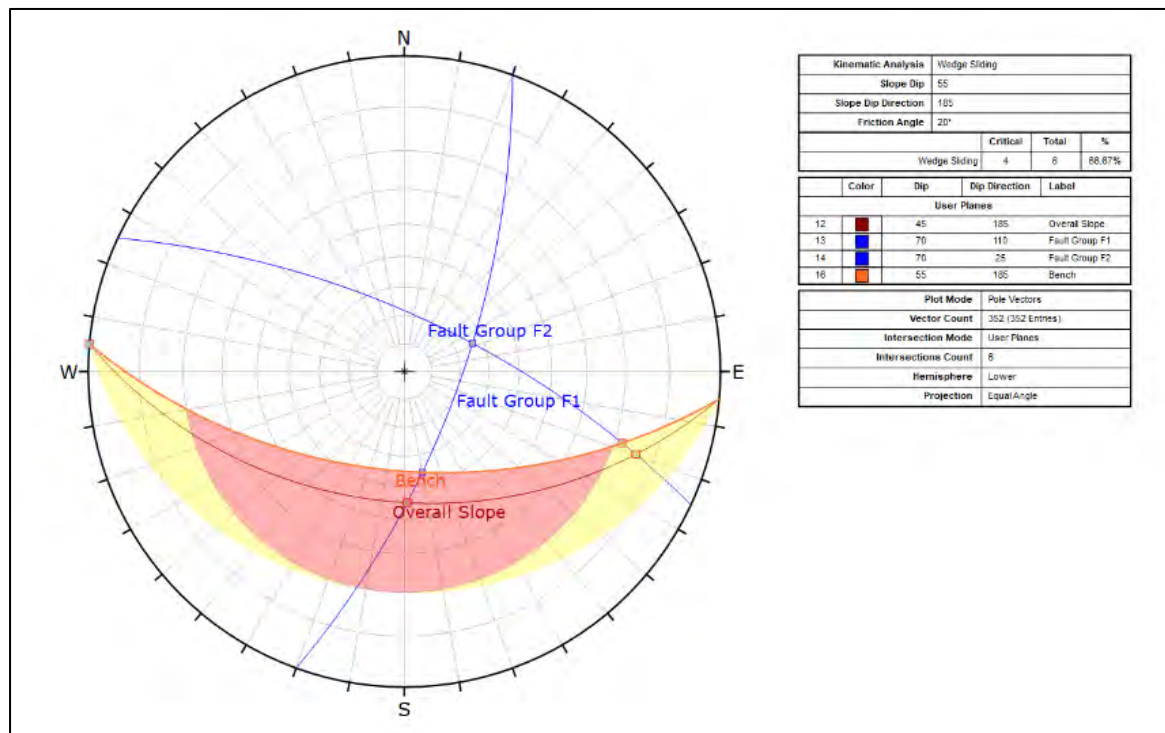


Figure: C687: Kinematic Analysis (Faults) West Sump (North Wall) Bench Slope–Wedge Failure

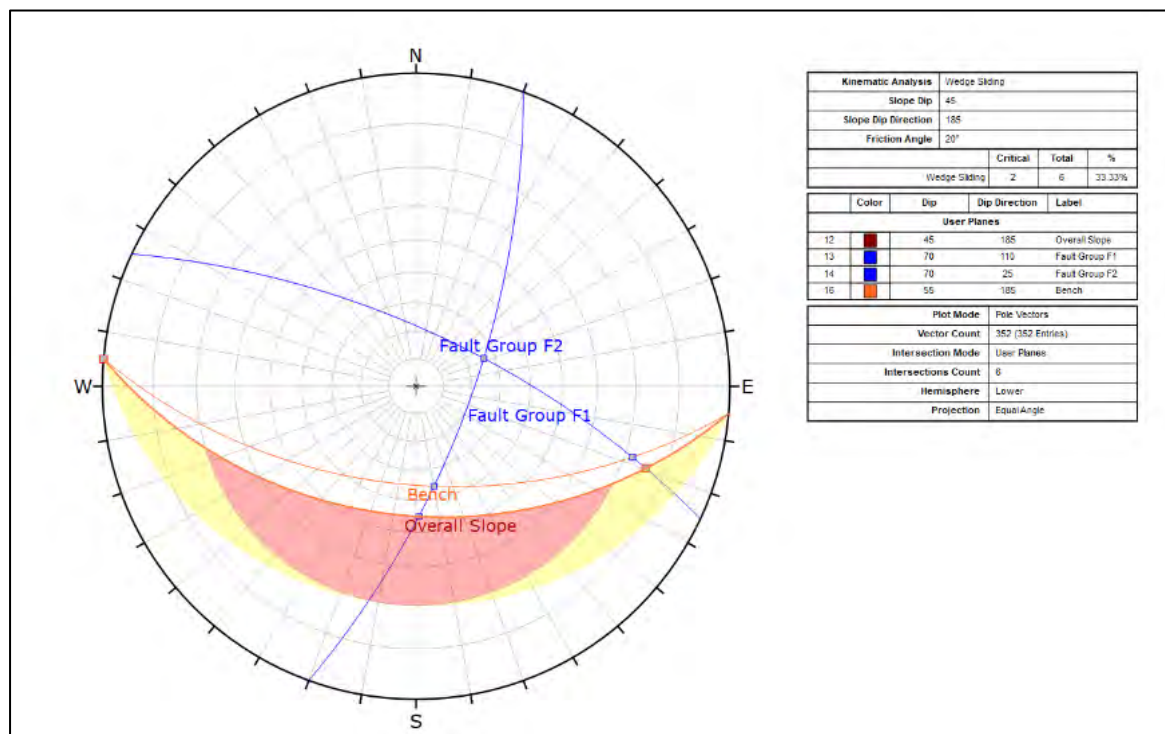


Figure: C688: Kinematic Analysis (Faults) West Sump (North Wall) Overall Slope–Wedge Failure

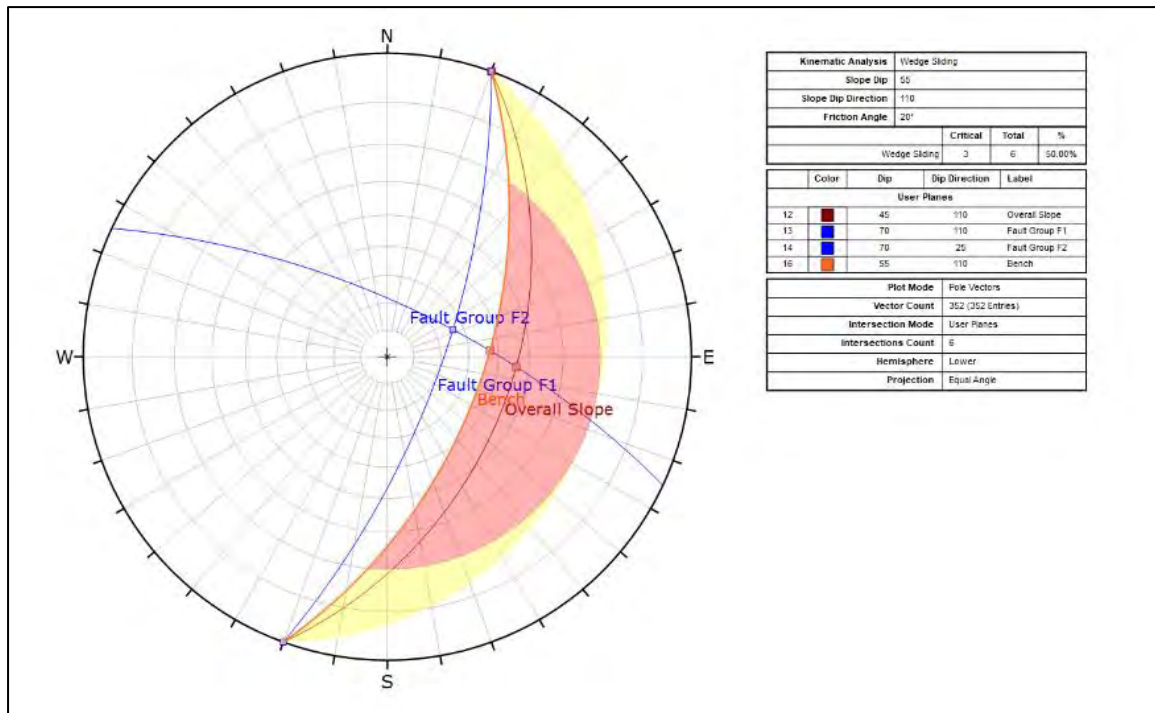


Figure: C689: Kinematic Analysis (Faults) West Sump (West Wall) Bench Slope–Wedge Failure

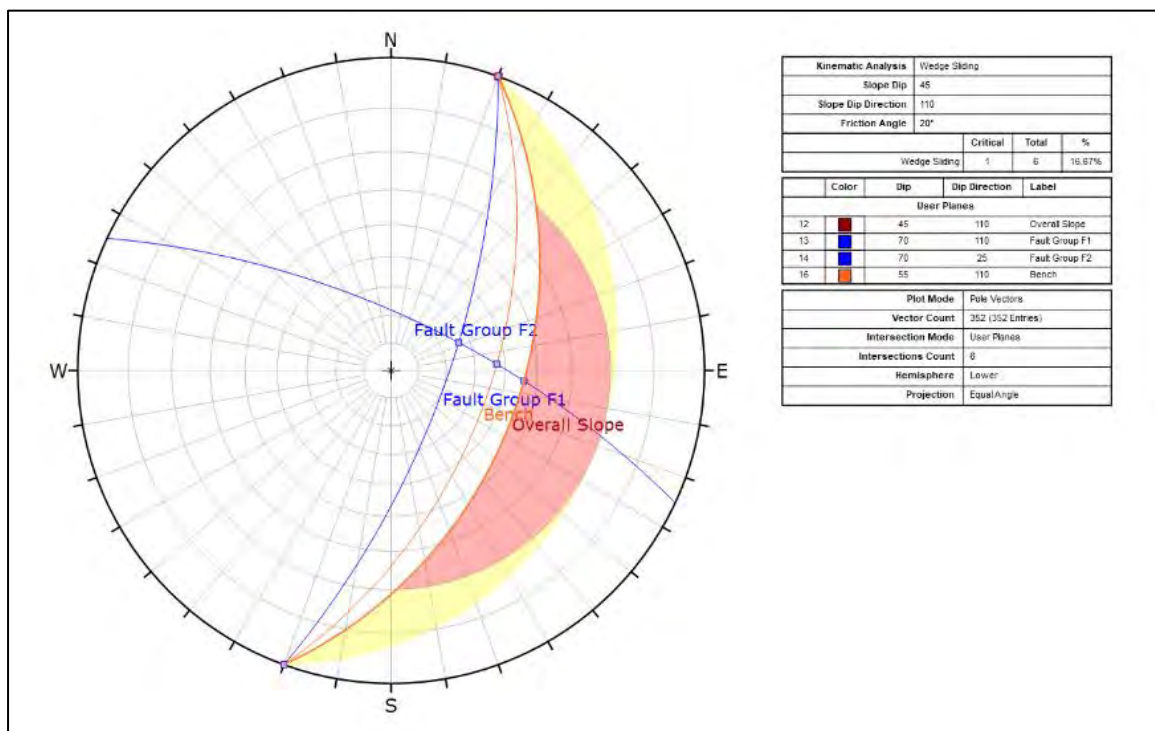


Figure: C690: Kinematic Analysis (Faults) West Sump (West Wall) Overall Slope–Wedge Failure

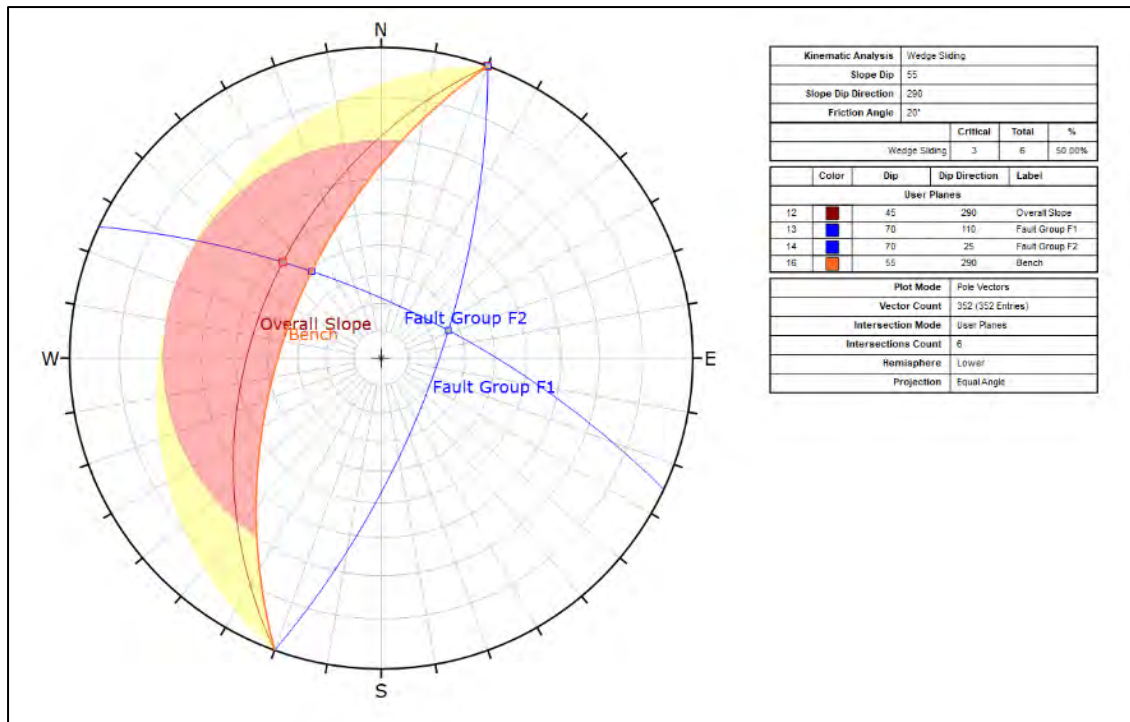


Figure: C691-Kinematic Analysis (Faults) West Sump (East Wall) Bench Slope–Wedge Failure

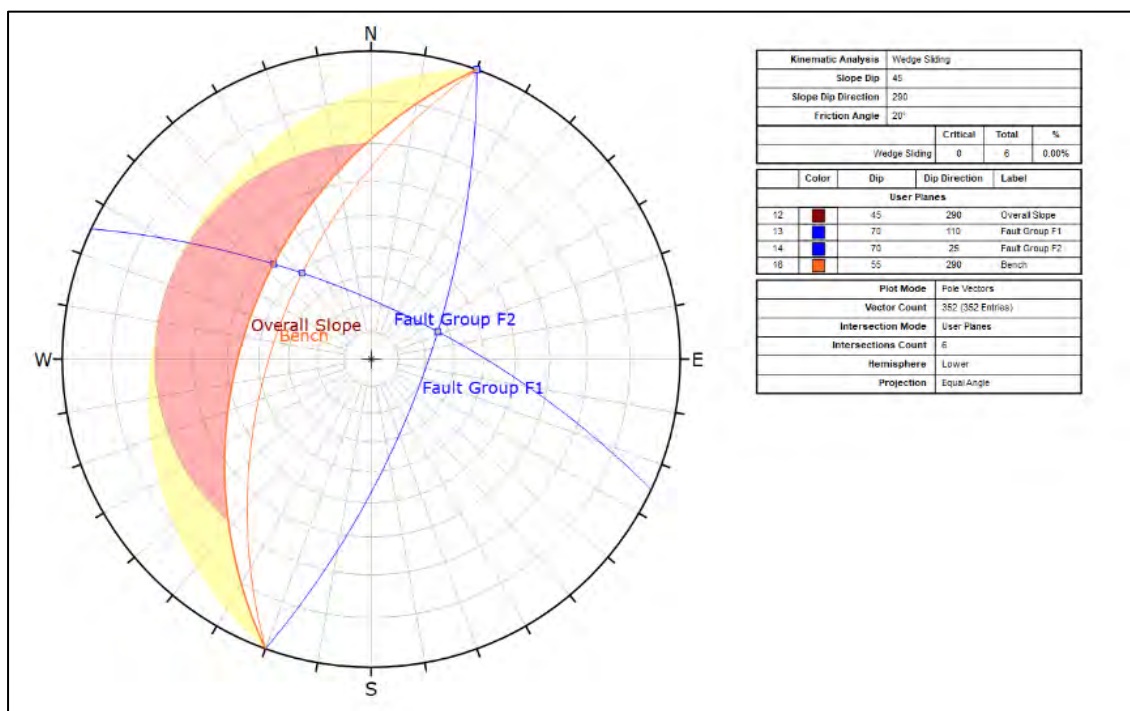


Figure: C692-Kinematic Analysis (Faults) West Sump (East Wall) Overall Slope–Wedge Failure

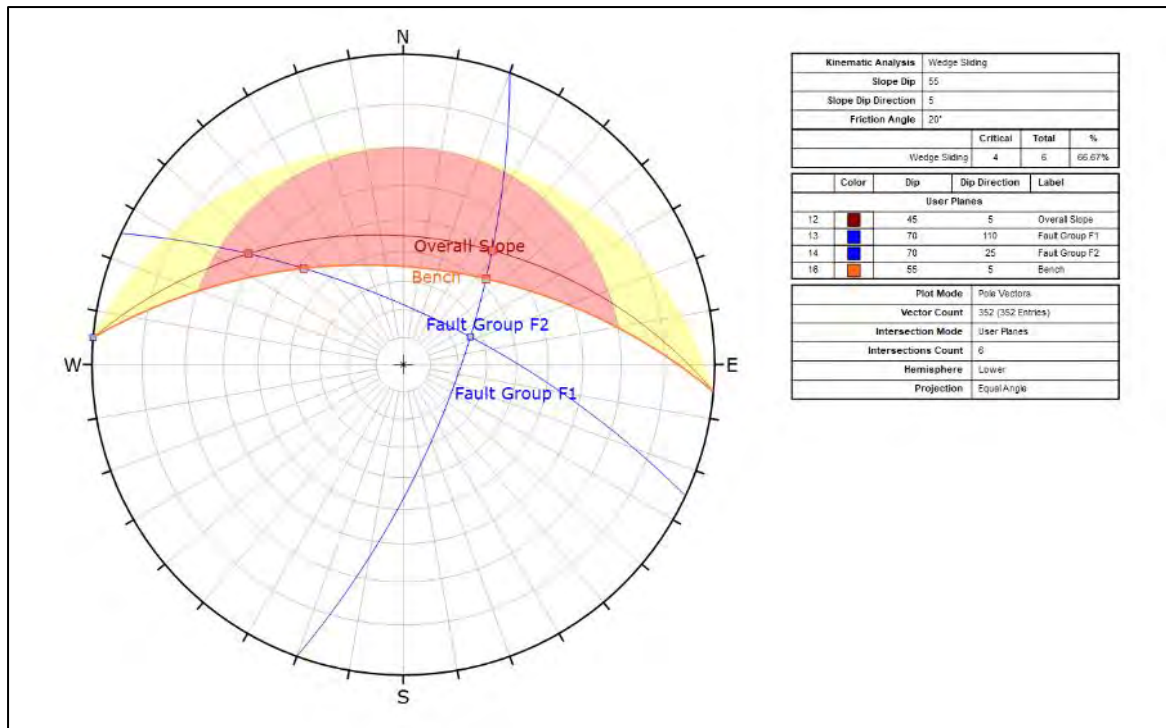


Figure: C693: Kinematic Analysis (Faults) West Sump (South Wall) Bench Slope–Wedge Failure

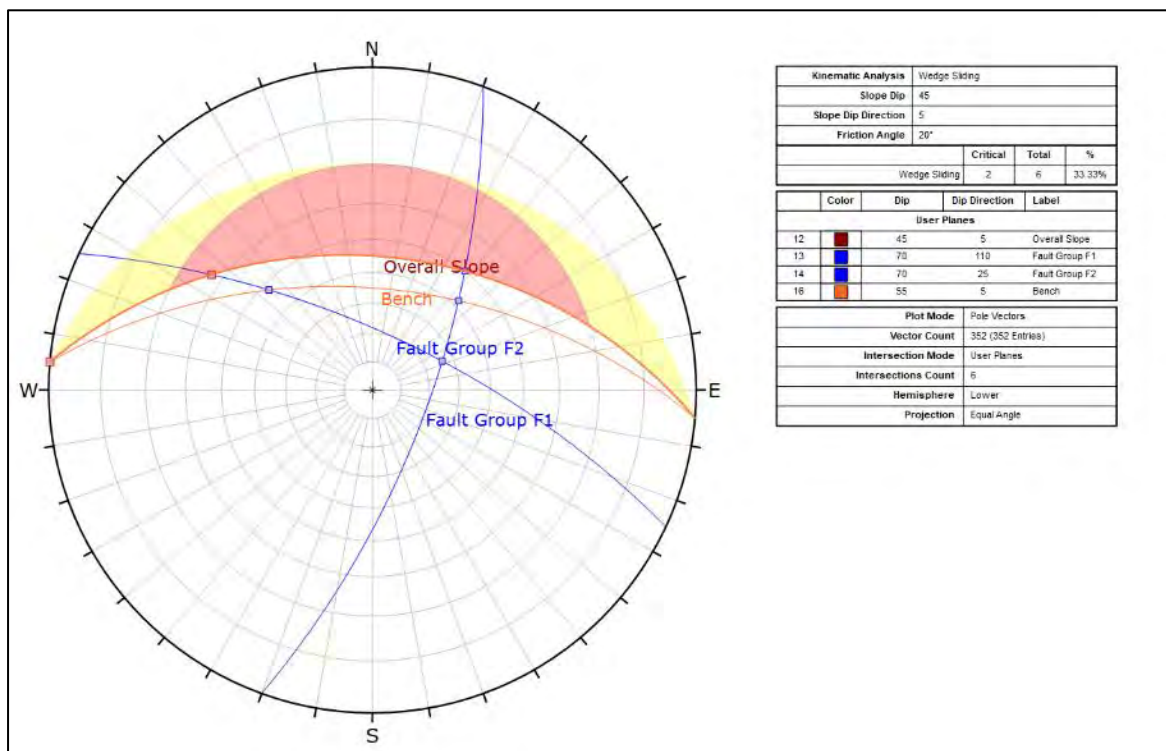


Figure: C694: Kinematic Analysis (Faults) West Sump (South Wall) Overall Slope–Wedge Failure

West Pit – Faults -Topple Failure

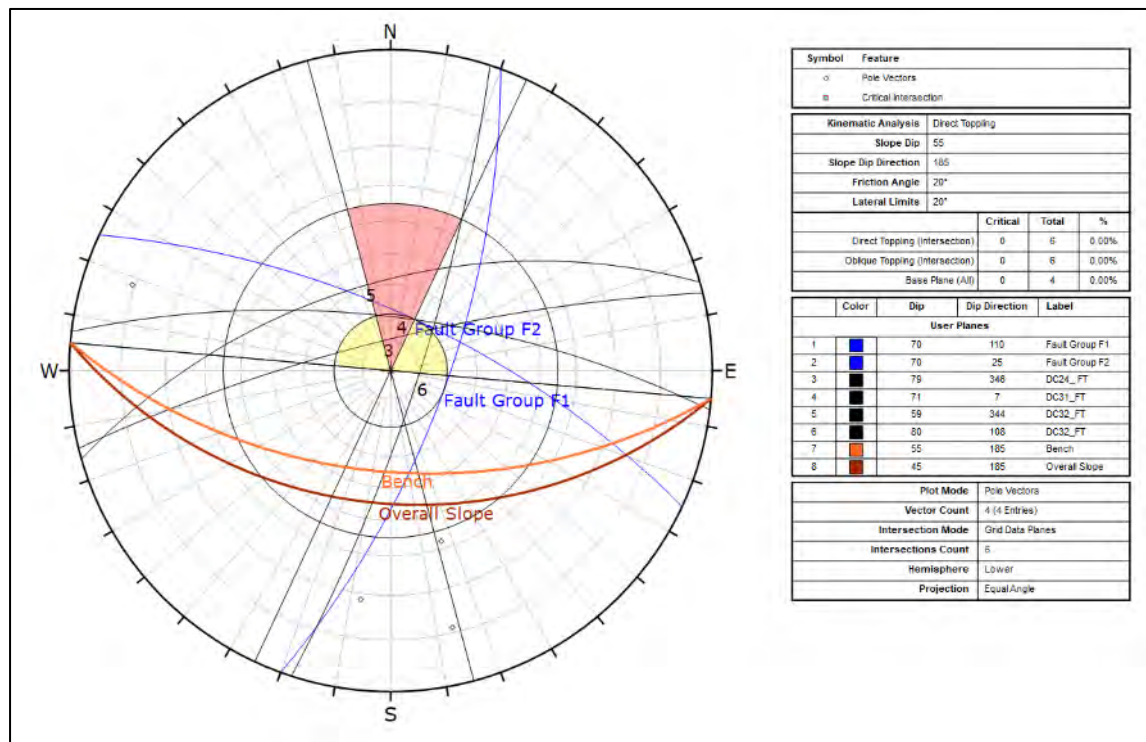


Figure: C695: Kinematic Analysis (Faults) West Sump (North Wall) Bench Slope–Topple Failure

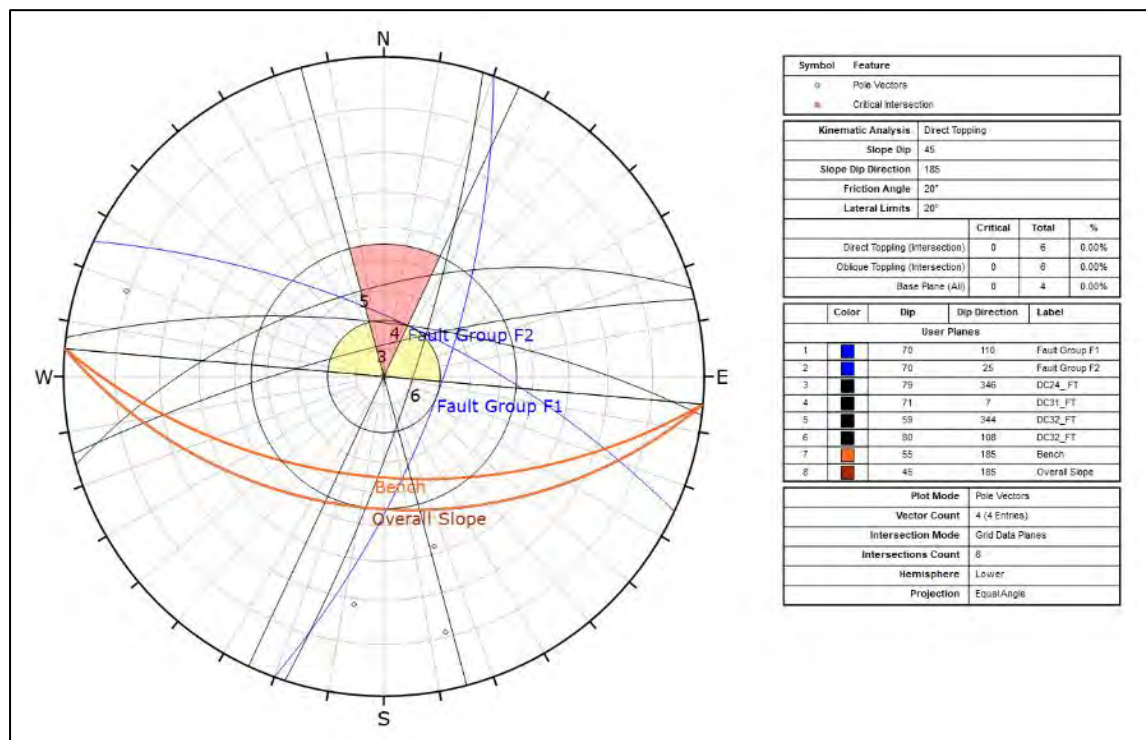


Figure: C696: Kinematic Analysis (Faults) West Sump (North Wall) Overall Slope–Topple Failure

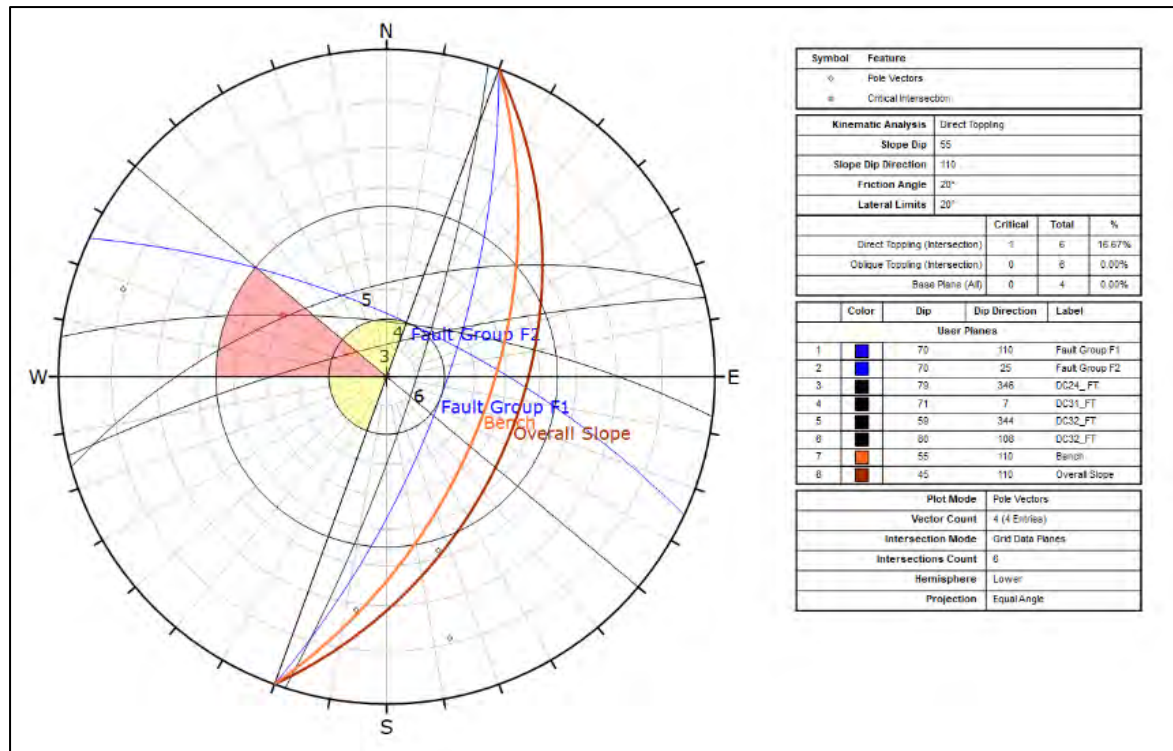


Figure: C697: Kinematic Analysis (Faults) West Sump (West Wall) Bench Slope–Topple Failure

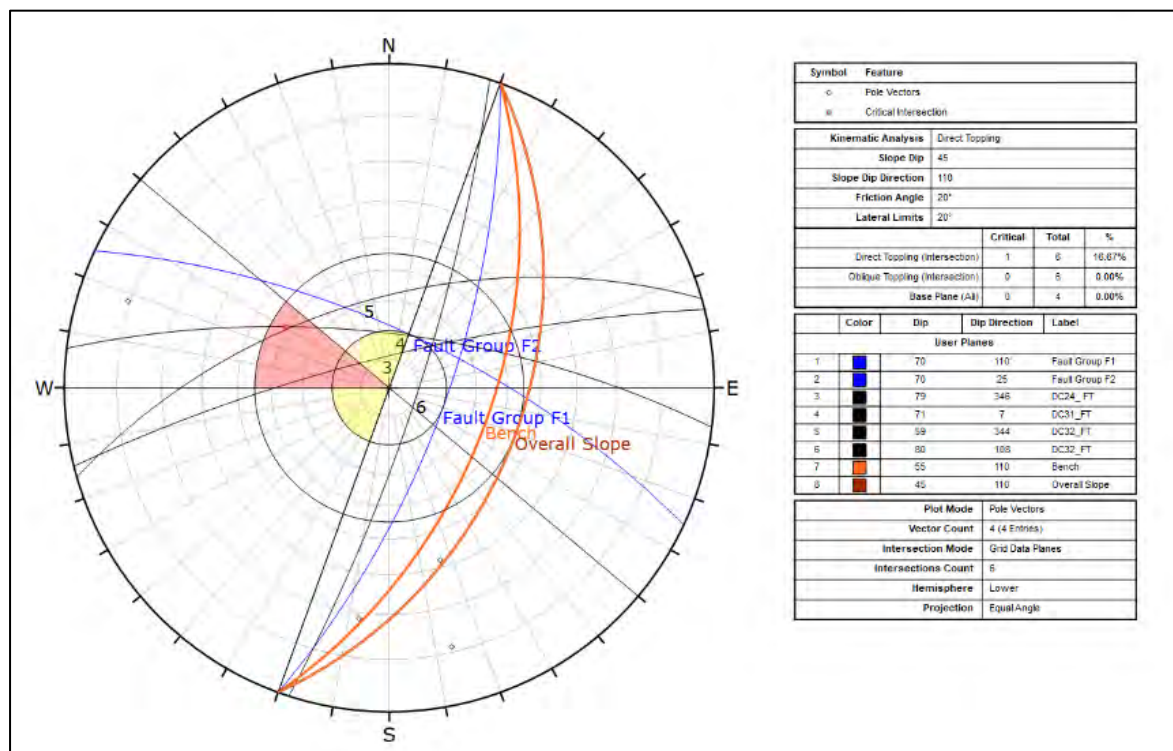


Figure: C698: Kinematic Analysis (Faults) West Sump (West Wall) Overall Slope–Topple Failure

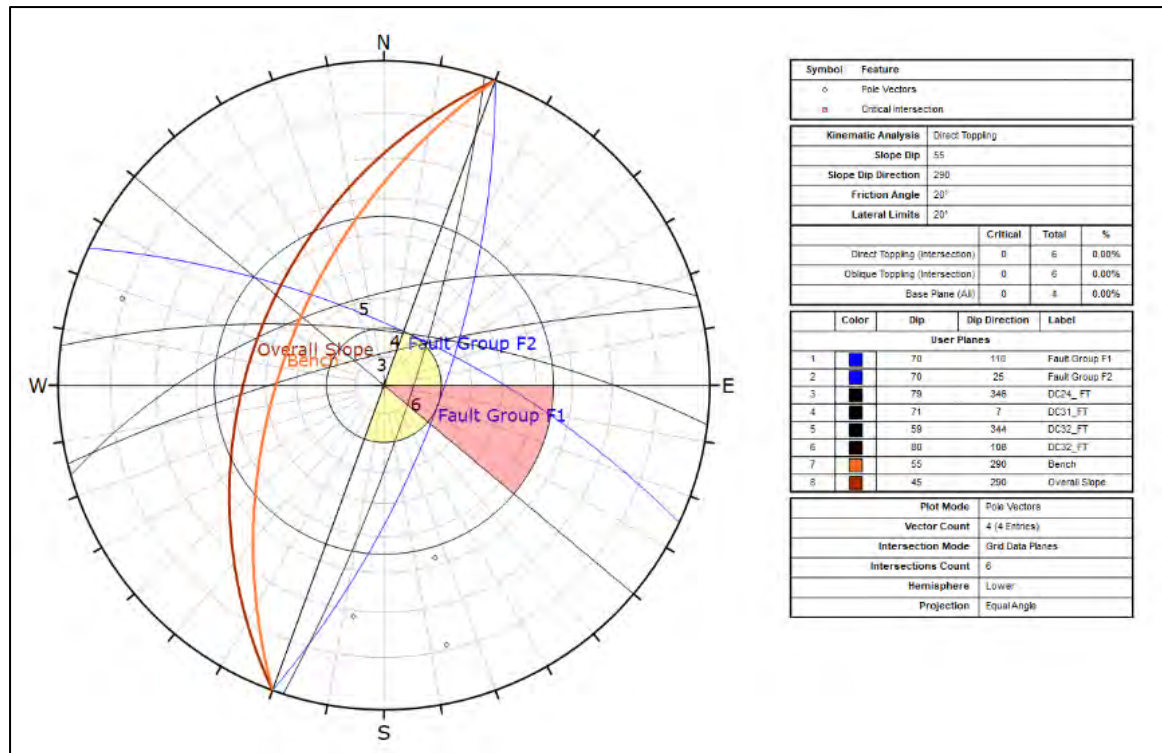


Figure: C699: Kinematic Analysis (Faults) West Sump (East Wall) Bench Slope–Topple Failure

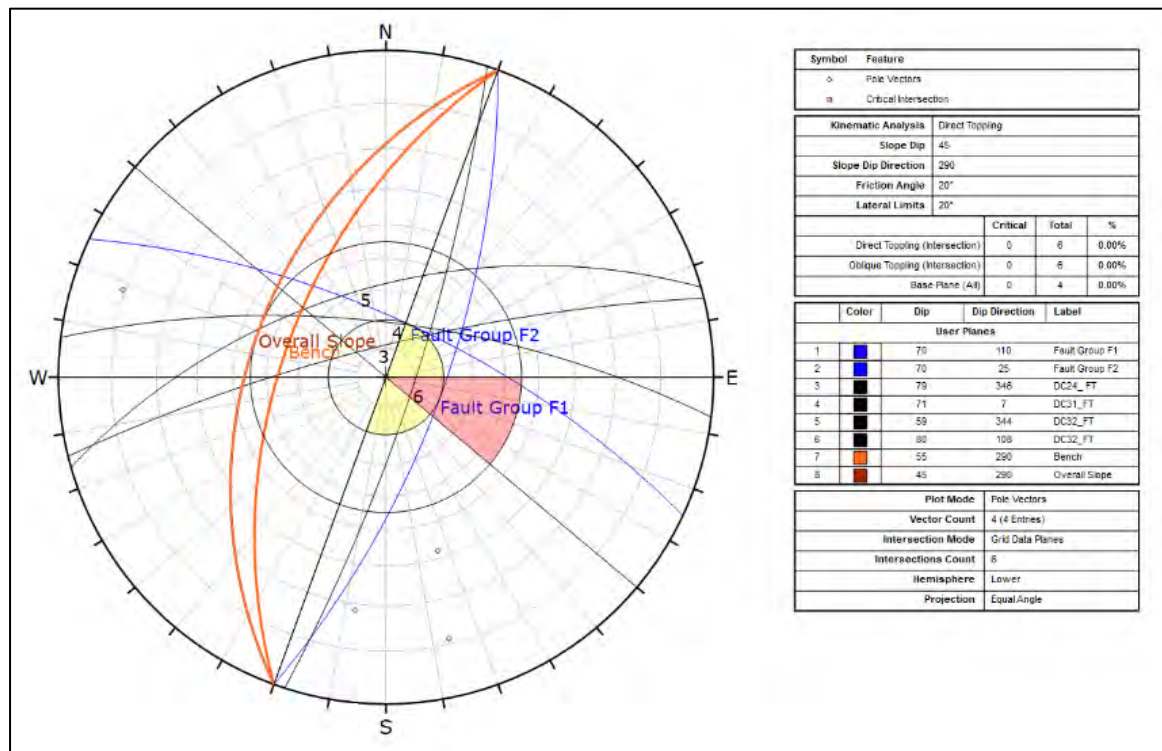


Figure: C700: Kinematic Analysis (Faults) West Sump (East Wall) Overall Slope–Topple Failure

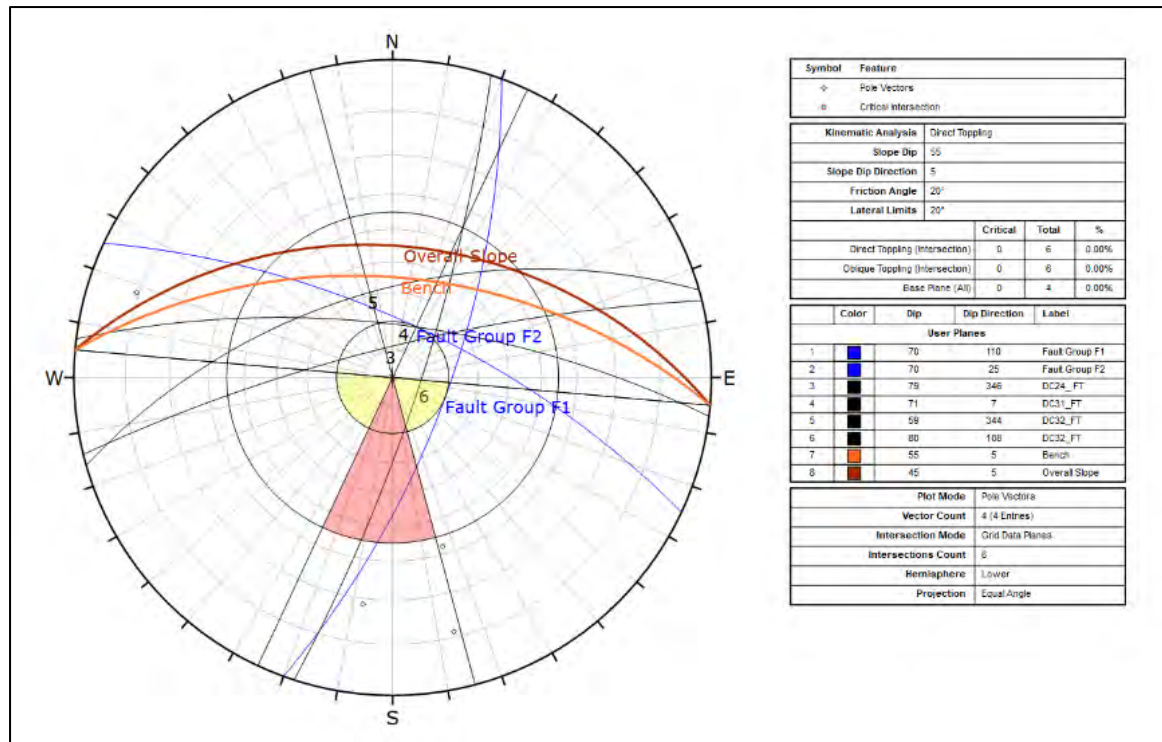


Figure: C701: Kinematic Analysis (Faults) West Sump (South Wall) Bench Slope–Topple Failure

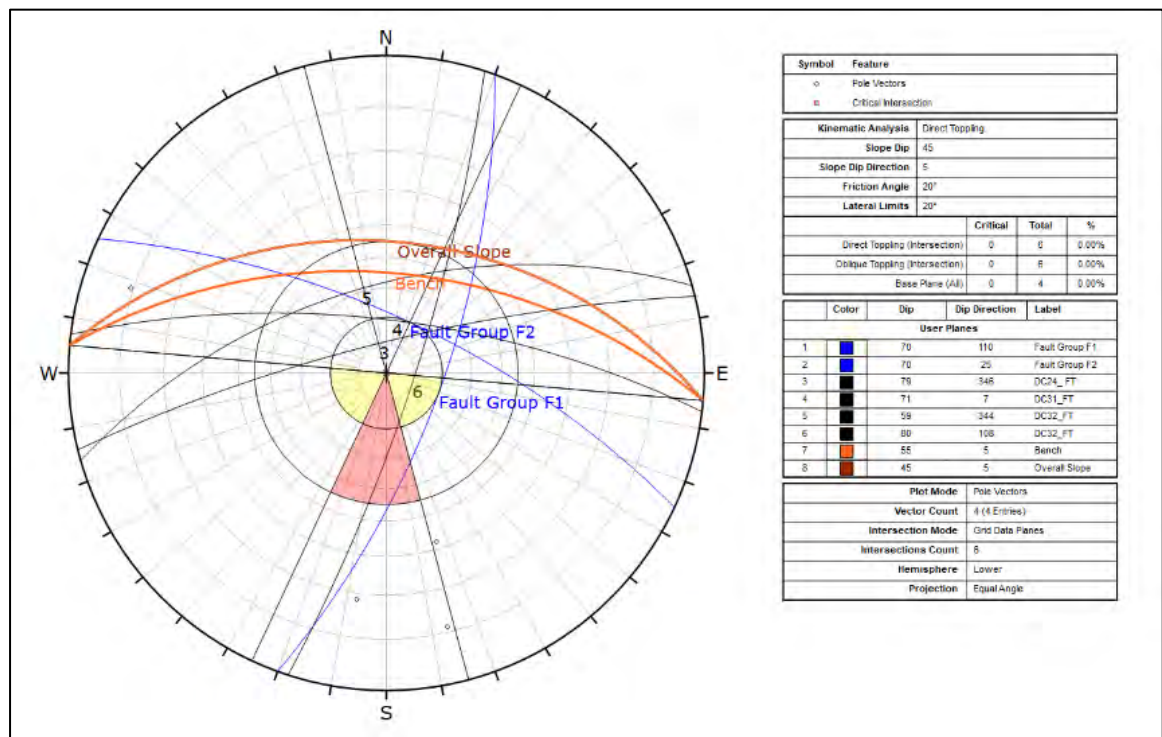


Figure: C702: Kinematic Analysis (Faults) West Sump (South Wall) Bench Slope–Topple Failure

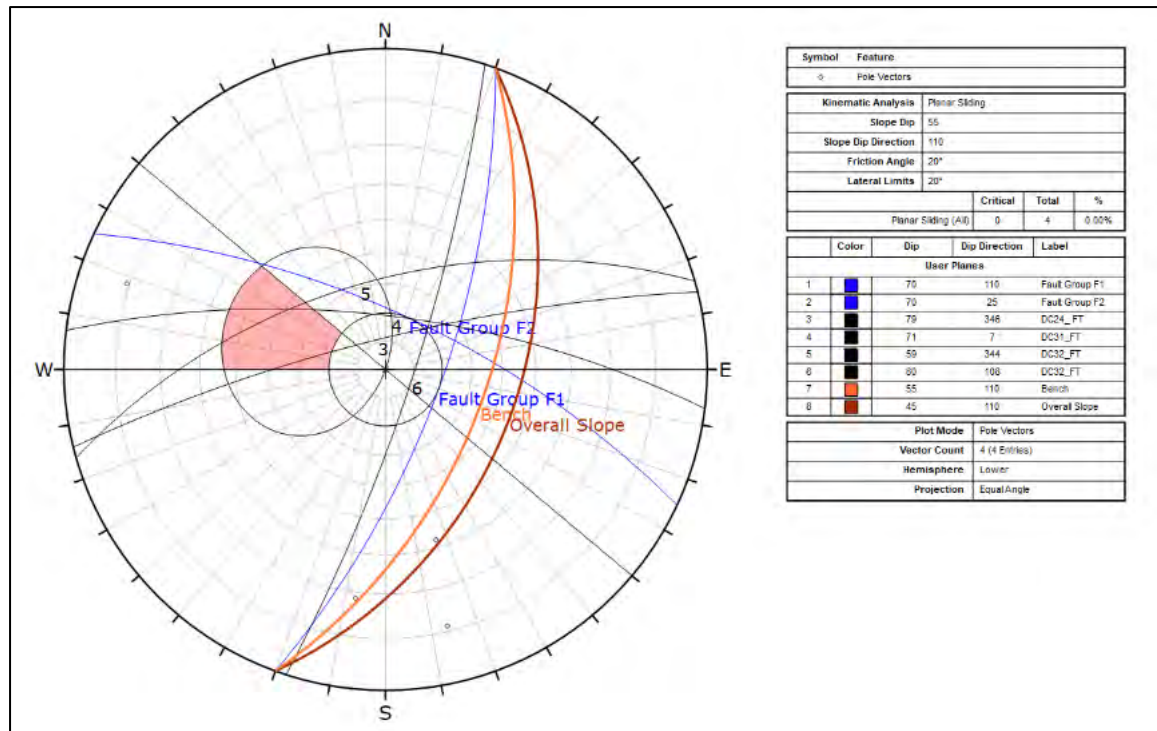


Figure: C705: Kinematic Analysis (Faults) West Sump (West Wall) Bench Slope—Planar Sliding

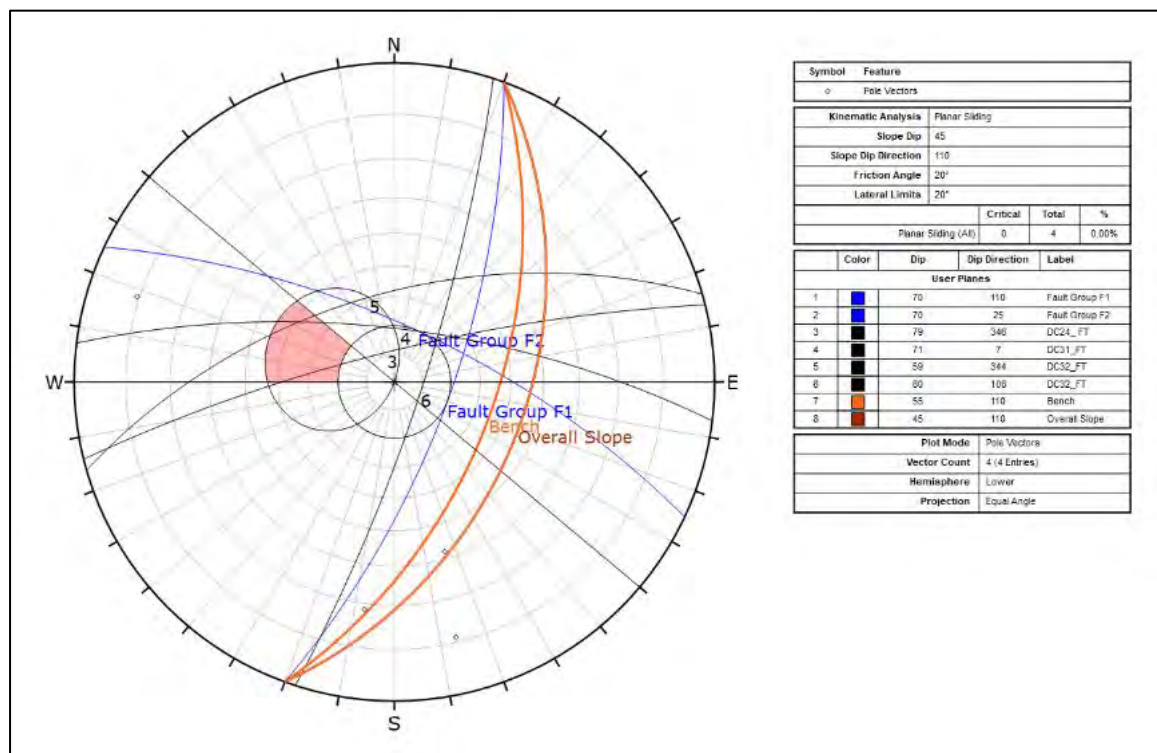


Figure: C706: Kinematic Analysis (Faults) West Sump (West Wall) Overall Slope—Planar Sliding

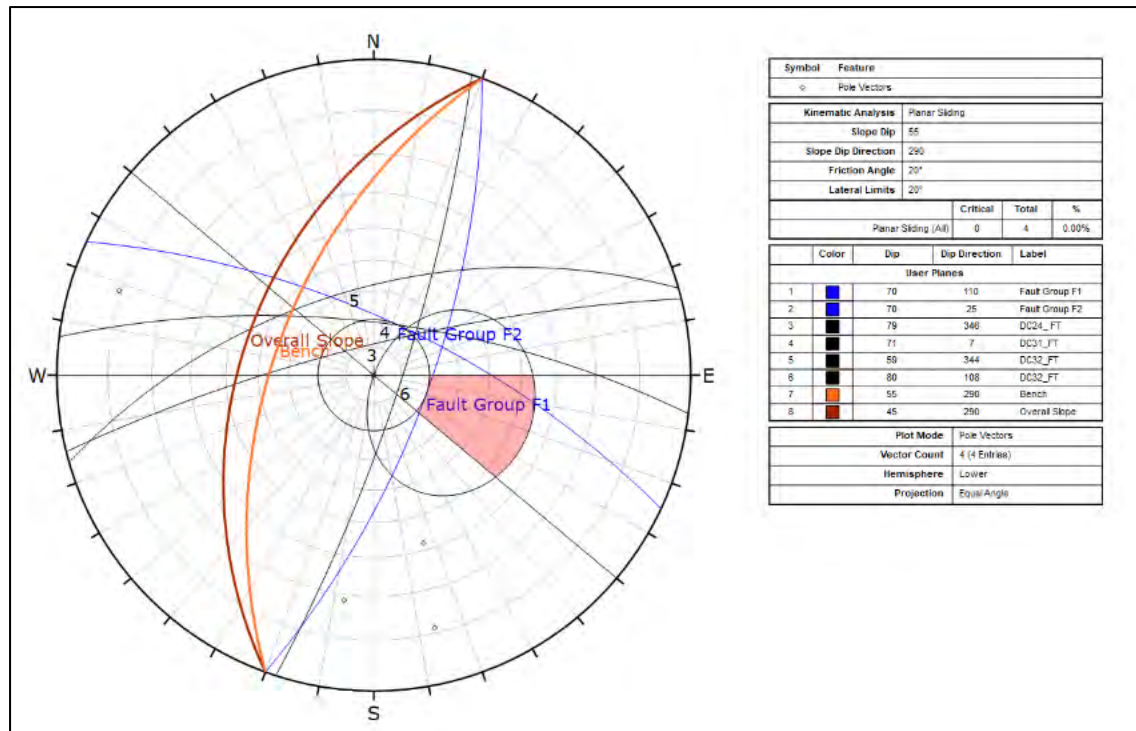


Figure: C707: Kinematic Analysis (Faults) West Sump (East Wall) Bench Slope–Planar Sliding

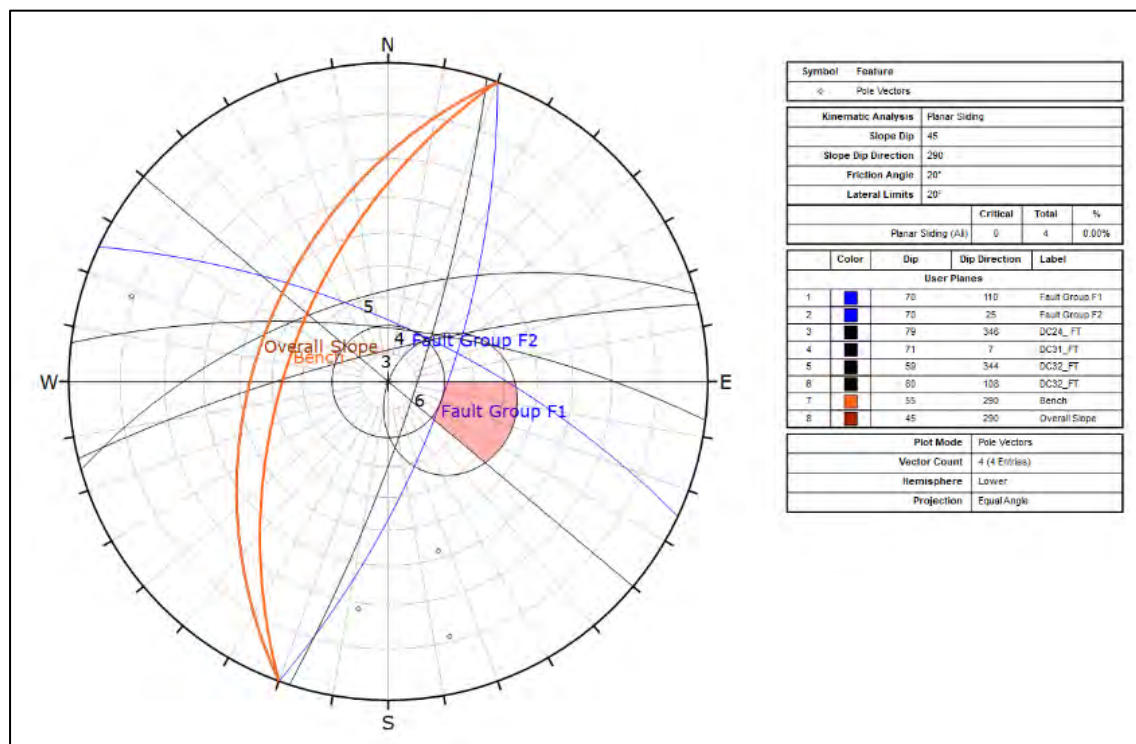


Figure: C708: Kinematic Analysis (Faults) West Sump (East Wall) Overall Slope–Planar Sliding

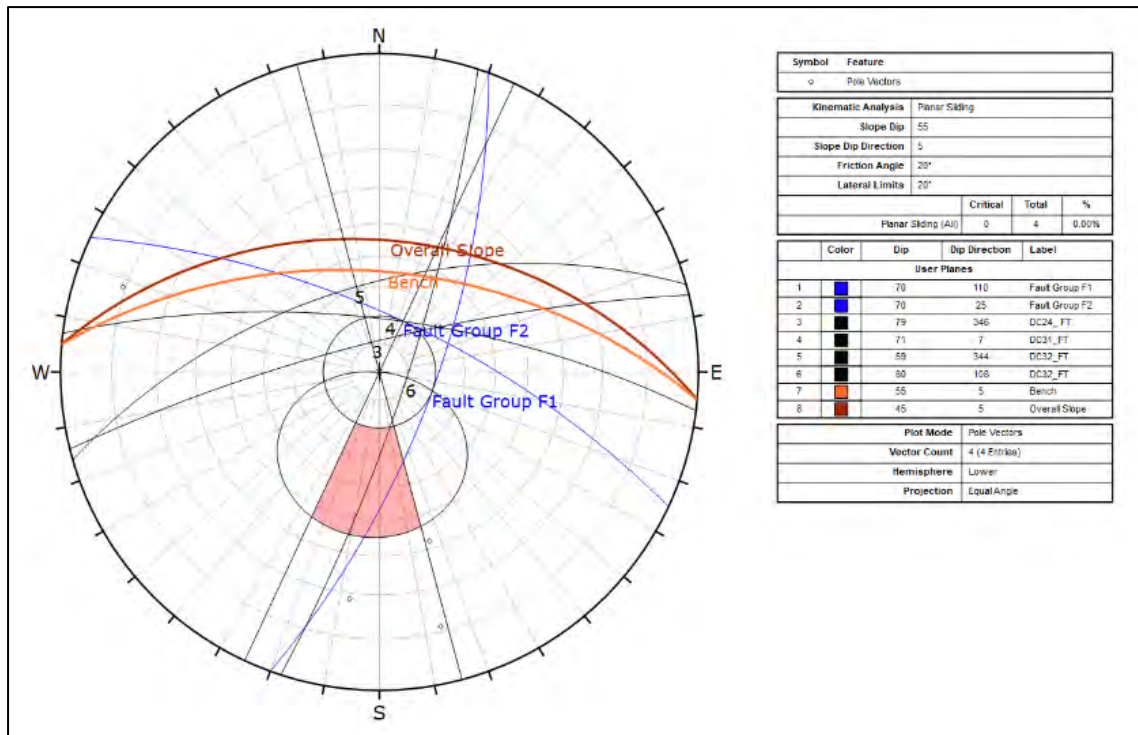


Figure: C709: Kinematic Analysis (Faults) West Sump (South Wall) Bench Slope—Planar Sliding

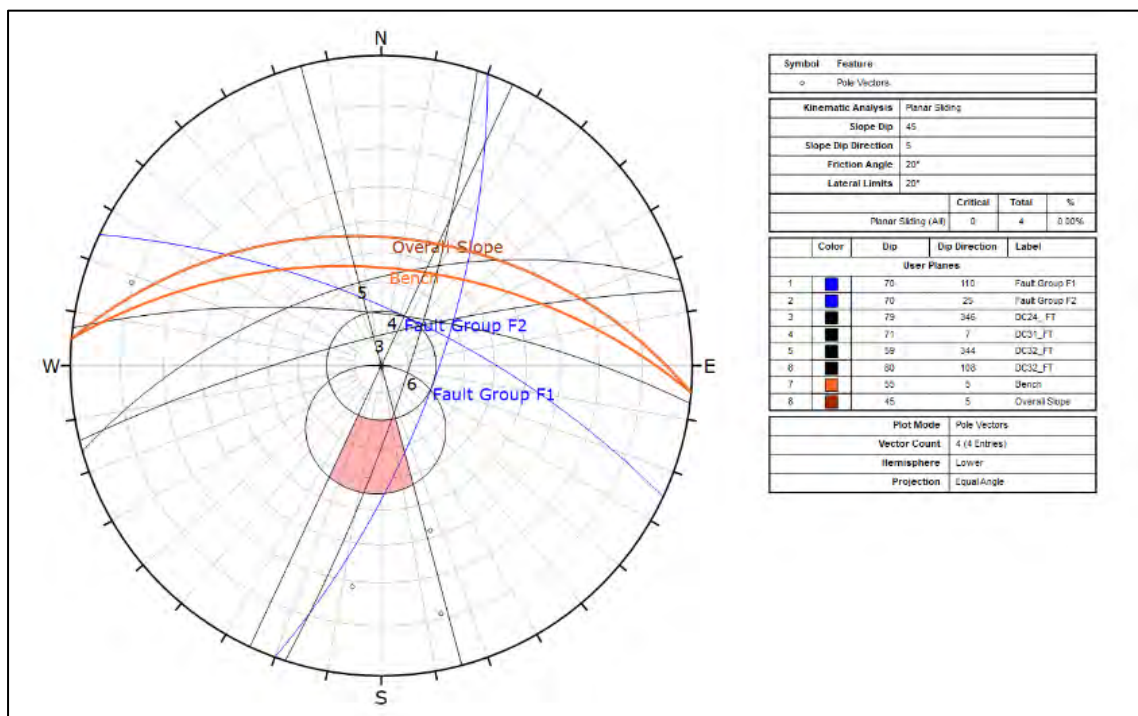


Figure: C710: Kinematic Analysis (Faults) West Sump (South Wall) Overall Slope—Planar Sliding