Project Number: 21-54385

DESIGN COMPUTATIONS FOR:

32 North Peak Street
Borough of Highlands, NJ
Stone Strong Retaining Walls

PREPARED FOR:

Home & Land Development
16A Bellview Ave., Rumson, NJ 07760
TEL: (917) 686-4111 FAX: (732) 450-8404

PREPARED BY:

9/3/2024

1630 Wyckoff Road, Wall, New Jersey 07719
TEL: 732-938-4436 FAX: 732-938-7096
www.gardenstateprecast.com

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
24	44.0	3.00	20.0	-22.0	750	41.2	594	44.8	89	66.2			10.67	6.65	12.89	7.68	OK!
24	44.0	3.00	16.0	-26.0	750	37.2	594	40.8	378	67.0			3.84	3.65	4.19	3.90	OK!
24	44.0	3.00	12.0	-30.0	750	33.2	594	36.8	667	68.2			2.01	2.44	2.12	2.54	OK!
24-ME	56.0	3.00	8.0	-22.0	1,250	40.7	618	33.8	626	75.5			1.84	2.15	1.89	2.20	OK!
24-86	86.0	3.00	4.0	4.0	950	44.0	1,621	49.1	0	0.0			2.07	2.11	2.10	2.13	OK!
24-86	86.0	3.00	0.0	0.0	950	40.0	1,621	45.1	0	0.0							
													External Stability OK!				
	86.0	18.00	20.0	-22.0	5,400	39.7	5,643	43.7	1,760	70.4	12,803						

backfill height **18.00** feet ω= 6.34 deg interface friction angle
exposed height 14.00 feet ω'= -5.82 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **48** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **3,500** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	40 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 69.33 H:1V slope β 0.8 deg avg q 50 psf
failure plane α 57.31 deg zone of influence 18.84 ft

Analysis

K_a =	0.345	Q_{lh} =	273	lb	ΔK_{AE} =	0.007	e=	1.56 ft
P_h =	5,903 lb	Q_{lv} =	147	lb	P_{IR} =	135 lb	B_f' =	4.79 ft
P_v =	3,180 lb	R_s =	9,701	lb	ΔP_{AEh} =	122 lb	e_{eq}=	1.55 ft
		q_{ult} =	17,638	psf	ΔP_{AEv} =	66 lb	$B_{f\,eq}'$ =	4.82 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.70**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.57**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,500 psf	q_c = 2,865 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 1.71**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 1.58**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,667 psf	q_c = 2,832 psf	***OK!***	

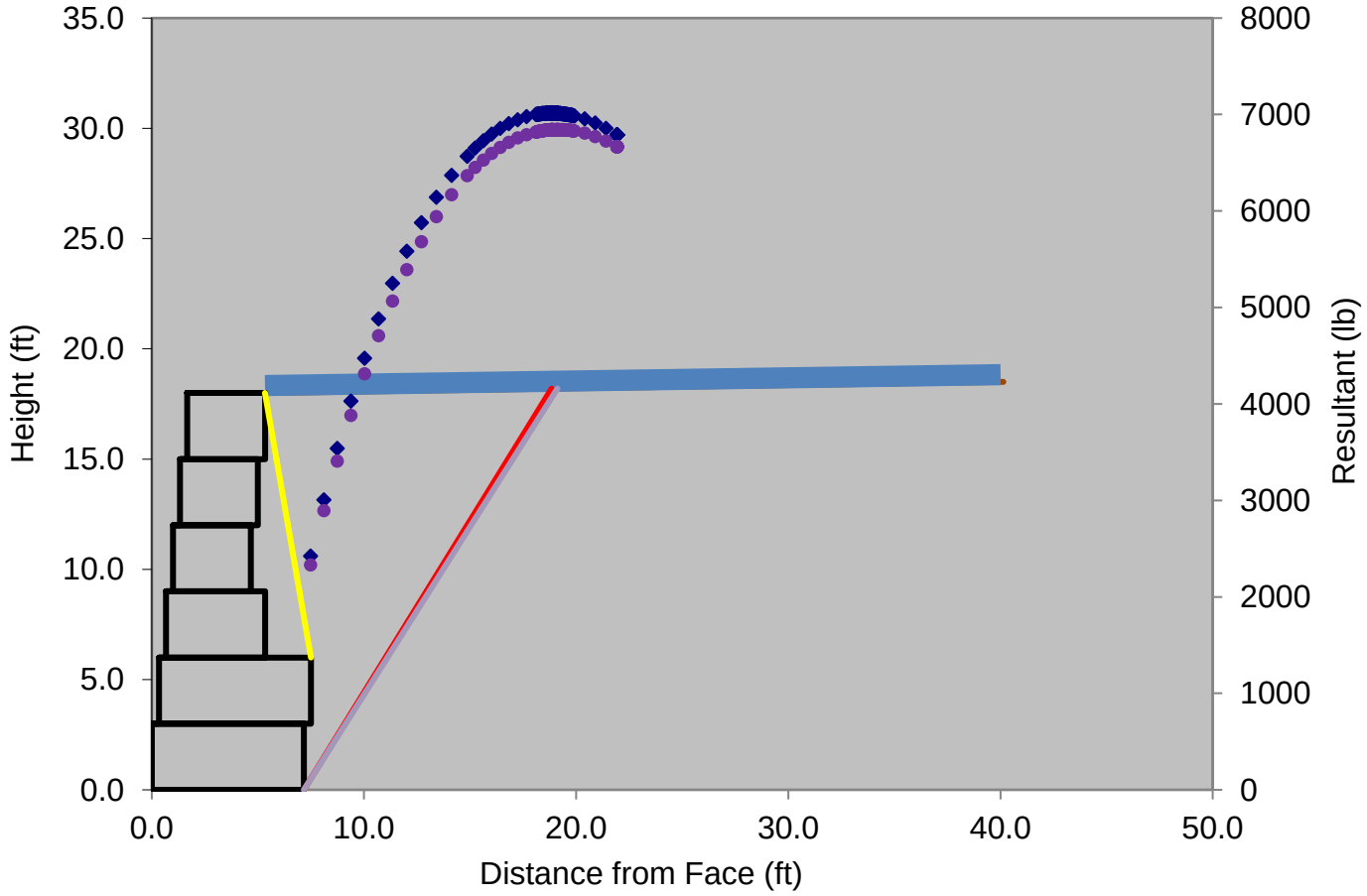
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	18.0	-24.0	375	39.0	301	41.5	10	62.7			28.03	9.48	98.57	33.95	OK!
6	44.0	1.50	16.0	-26.0	375	37.0	301	39.5	78	62.9			8.55	5.24	22.35	11.88	OK!
24	44.0	3.00	12.0	-30.0	750	33.2	594	36.8	395	63.3			2.93	2.87	5.37	4.63	OK!
24	44.0	3.00	8.0	-34.0	750	29.2	594	32.8	677	64.4			1.63	2.05	2.52	2.86	OK!
24-ME	56.0	3.00	4.0	-26.0	1,250	36.7	618	29.8	629	71.5			1.60	1.93	2.15	2.43	OK!
24-86	86.0	3.00	0.0	0.0	950	40.0	1,621	45.1	0	0.0							
													External Stability OK!				
	86.0	15.00	18.0	-24.0	4,450	35.8	4,030	39.0	1,788	66.6	10,267						

backfill height **14.50** feet ω= 6.34 deg interface friction angle
exposed height 13.50 feet ω'= -7.85 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **3,317** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	30	feet (horizontal)		ft	250	psf	ft
length 2		feet (horizontal)		ft		psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	ft

effective slope H:1V slope β 0.0 deg avg q 250 psf

failure plane α 58.21 deg zone of influence 16.15 ft

Analysis

K_a =	0.358	Q_{lh} =	1,121	lb	ΔK_{AE} =	0.007	e=	1.45 ft
P_h =	3,902 lb	Q_{lv} =	657	lb	P_{IR} =	109 lb	B_f' =	5.02 ft
P_v =	2,285 lb	R_s =	8,014	lb	ΔP_{AEh} =	78 lb	e_{eq}=	1.09 ft
		q_{ult} =	11,054	psf	ΔP_{AEv} =	46 lb	$B_{f\,eq}'$ =	5.73 ft

Results

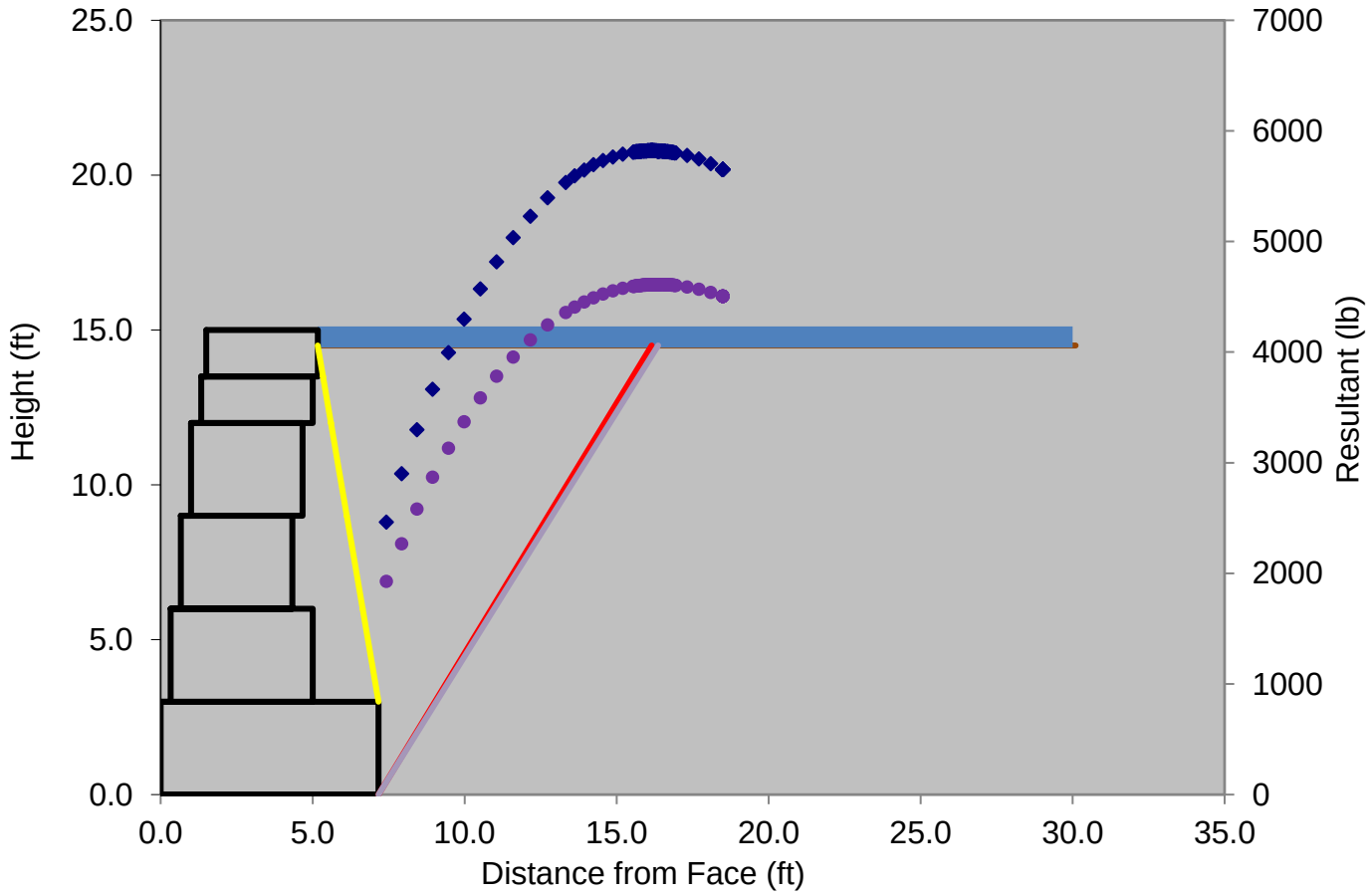
					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.87**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.60**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,317 psf	q_c = 2,506 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.34**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 1.89**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,423 psf	q_c = 2,072 psf	***OK!***		

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**North Peak Street Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
24	44.0	3.00	16.0	-26.0	750	37.2	594	40.8	89	62.2			10.64	6.63	12.85	7.65	OK!
24	44.0	3.00	12.0	-30.0	750	33.2	594	36.8	378	63.0			3.83	3.64	4.18	3.89	OK!
24	44.0	3.00	8.0	-34.0	750	29.2	594	32.8	667	64.2			2.01	2.43	2.12	2.53	OK!
24-ME	56.0	3.00	4.0	-26.0	1,250	36.7	618	29.8	626	71.5			1.83	2.15	1.88	2.19	OK!
24-86	86.0	3.00	0.0	0.0	950	40.0	1,621	45.1	0	0.0							
													External Stability OK!				
	86.0	15.00	16.0	-26.0	4,450	35.6	4,021	39.1	1,760	66.4	10,231						

backfill height **15.00** feet ω= 6.34 deg interface friction angle
exposed height 12.00 feet ω'= -8.22 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **36** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

allowable bearing pressure **3,317** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	30	feet (horizontal)	0.5	ft	50	psf	
length 2		feet (horizontal)		ft		psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	ft

effective slope 50.00 H:1V slope β 1.1 deg avg q 50 psf

failure plane α 57.97 deg zone of influence 16.70 ft

Analysis

K_a =	0.367	Q_{lh} =	236	lb	ΔK_{AE} =	0.007	e=	1.25 ft
P_h =	4,262 lb	Q_{lv} =	140	lb	P_{IR} =	108 lb	B_f' =	5.42 ft
P_v =	2,532 lb	R_s =	7,838	lb	ΔP_{AEh} =	86 lb	e_{eq}=	1.23 ft
		q_{ult} =	16,217	psf	ΔP_{AEv} =	51 lb	$B_{f\,eq}'$ =	5.45 ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.11**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.74**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,317 psf	q_c = 2,005 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.14**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 1.76**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,423 psf	q_c = 1,975 psf	***OK!***		

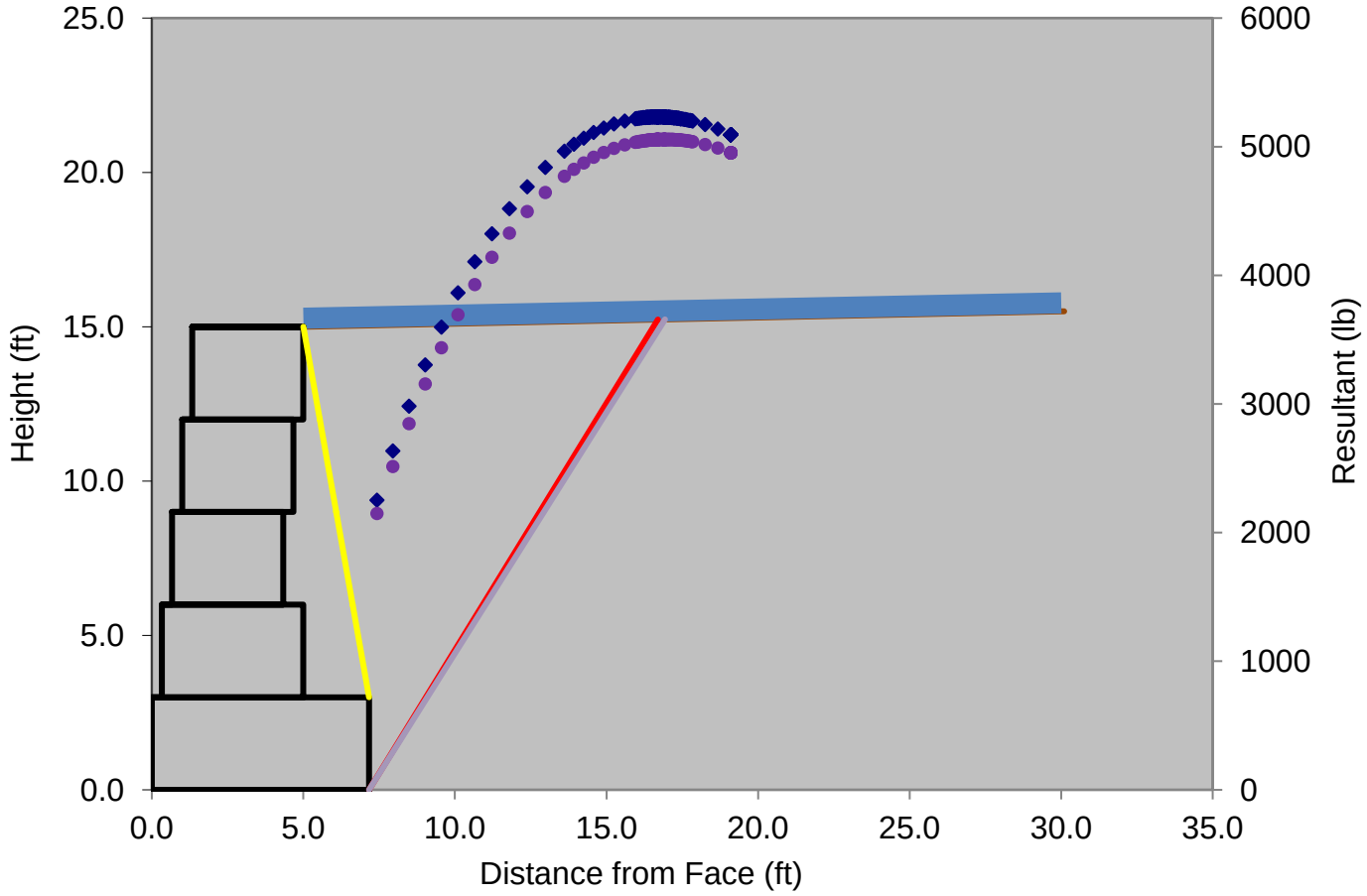
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
24	44.0	3.00	12.0	0.0	750	33.2	594	36.8	0	0.0			10.64	6.63	12.85	7.65	OK!
24	44.0	3.00	8.0	-4.0	750	29.2	594	32.8	110	54.0			3.83	3.64	4.18	3.89	OK!
24	44.0	3.00	4.0	-8.0	750	25.2	594	28.8	220	52.0			2.01	2.43	2.12	2.53	OK!
24-ME	56.0	3.00	0.0	0.0	1,250	32.7	618	25.8	0	0.0							
													External Stability OK!				
	56.0	12.00	12.0	0.0	3,500	30.5	2,400	31.0	330	52.7	6,230						

backfill height **12.00** feet ω= 6.34 deg interface friction angle
exposed height 11.00 feet ω'= 0.00 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

allowable bearing pressure **3,500** psf (net)
(if specified)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.68

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 50.67 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 55.28 deg zone of influence 13.10 ft

Analysis

K_a =	0.300	Q_{lh} =	167 lb	ΔK_{AE} =	0.007	e=	0.84 ft
P_h =	2,398 lb	Q_{lv} =	69 lb	P_{IR} =	66 lb	B_f' =	3.74 ft
P_v =	993 lb	R_s =	4,463 lb	ΔP_{AEh} =	54 lb	e_{eq}=	0.81 ft
		q_{ult} =	9,260 psf	ΔP_{AEv} =	23 lb	$B_{f\,eq}'$ =	3.81 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.88**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.74**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,500 psf	q_c = 1,826 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 1.94**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 1.78**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,667 psf	q_c = 1,779 psf	***OK!***	

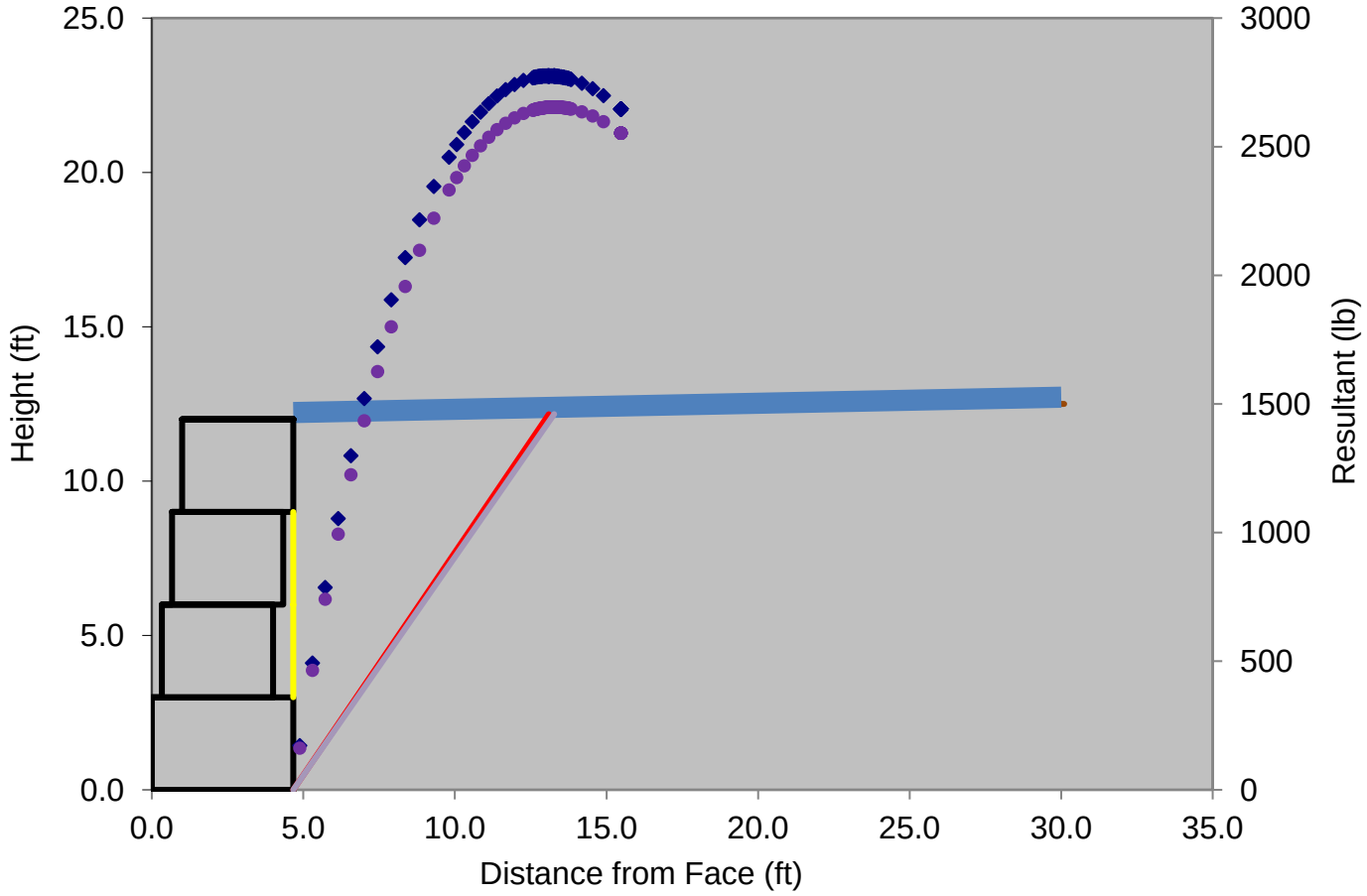
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
24	44.0	3.00	8.0	8.0	750	29.2	594	32.8					10.64	6.63	12.85	7.65	OK!
24	44.0	3.00	4.0	4.0	750	25.2	594	28.8					3.83	3.64	4.18	3.89	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	9.00	8.0	8.0	2,250	25.2	1,782	28.8	0	0.0	4,032						

backfill height **9.00** feet ω= 6.34 deg interface friction angle
exposed height 8.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **3,500** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load

Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 50.67 H:1V slope β 1.1 deg avg q 50 psf

failure plane α 54.06 deg zone of influence 10.27 ft

Analysis

K_a =	0.263	Q_{lh} =	117 lb	ΔK_{AE} =	0.006	e=	0.53 ft
P_h =	1,262 lb	Q_{lv} =	18 lb	P_{IR} =	43 lb	B_f' =	3.36 ft
P_v =	192 lb	R_s =	2,648 lb	ΔP_{AEh} =	30 lb	e_{eq}=	0.48 ft
		q_{ult} =	8,727 psf	ΔP_{AEv} =	5 lb	$B_{f\,eq}'$ =	3.46 ft

Results

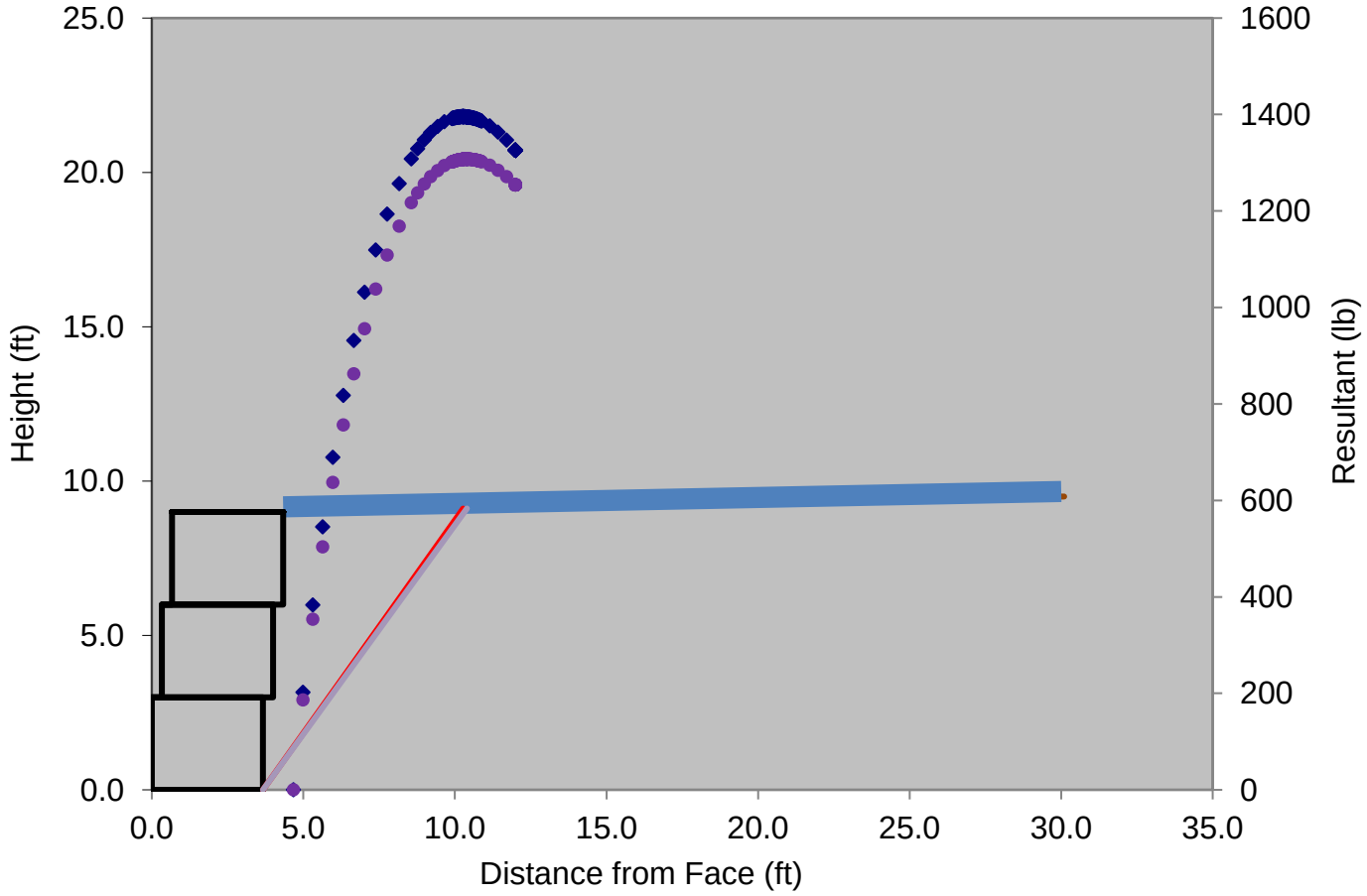
				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.08**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.92**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,500 psf	q_c = 1,139 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.20**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.00**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,667 psf	q_c = 1,099 psf	***OK!***	

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	6.0	6.0	375	27.0	301	29.5					31.13	13.74	43.47	17.86	OK!
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					11.86	7.45	14.18	8.52	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	6.00	6.0	6.0	1,500	23.6	1,196	26.7	0	0.0	2,696						

backfill height **6.00** feet ω= 6.34 deg interface friction angle
exposed height 5.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

allowable bearing pressure **884** psf (net)
(if specified)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 51.33 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 54.06 deg zone of influence 8.07 ft

Analysis

K_a =	0.263	Q_{lh} =	78	lb	ΔK_{AE} =	0.006	e=	0.18	ft
P_h =	561	lb	Q_{lv} =	12	lb	P_{IR} =	29	lb	B_f' =	4.07	ft
P_v =	85	lb	R_s =	1,811	lb	ΔP_{AEh} =	13	lb	e_{eq}=	0.14	ft
			q_{ult} =	9,718	psf	ΔP_{AEv} =	2	lb	$B_{f\,eq}'$ =	4.14	ft

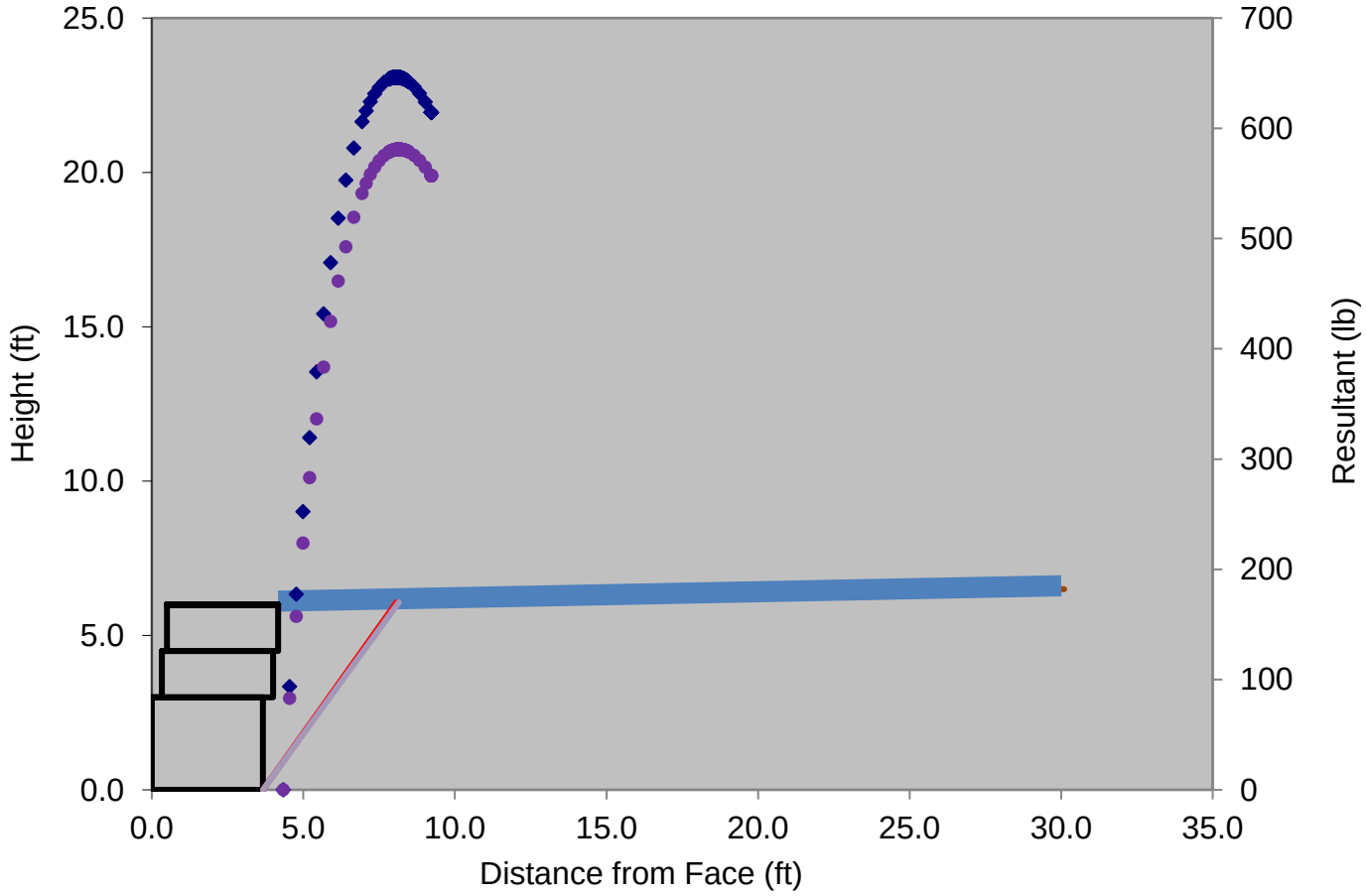
Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 4.02**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 2.83**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 884 psf	q_c = 562 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 4.39**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 3.03**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 1,179 psf	q_c = 548 psf	***OK!***		

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					31.13	13.74	43.48	17.86	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	4.50	4.0	4.0	1,125	22.5	895	25.7	0	0.0	2,020						

backfill height **4.50** feet ω= 6.34 deg interface friction angle
exposed height 3.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

allowable bearing pressure **1,078** psf (if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load

Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 51.67 H:1V slope β 1.1 deg avg q 50 psf

failure plane α 54.06 deg zone of influence 6.97 ft

Analysis

K_a =	0.263		Q_{lh} =	59	lb	ΔK_{AE} =	0.006	e=	0.08 ft
			Q_{lv} =	9	lb	P_{IR} =	21 lb	B_f' =	4.25 ft
P_h =	316	lb	R_s =	1,398	lb	ΔP_{AEh} =	8 lb	e_{eq}=	0.06 ft
P_v =	48	lb	q_{ult} =	9,980	psf	ΔP_{AEv} =	1 lb	$B_{f\,eq}'$ =	4.31 ft

Results

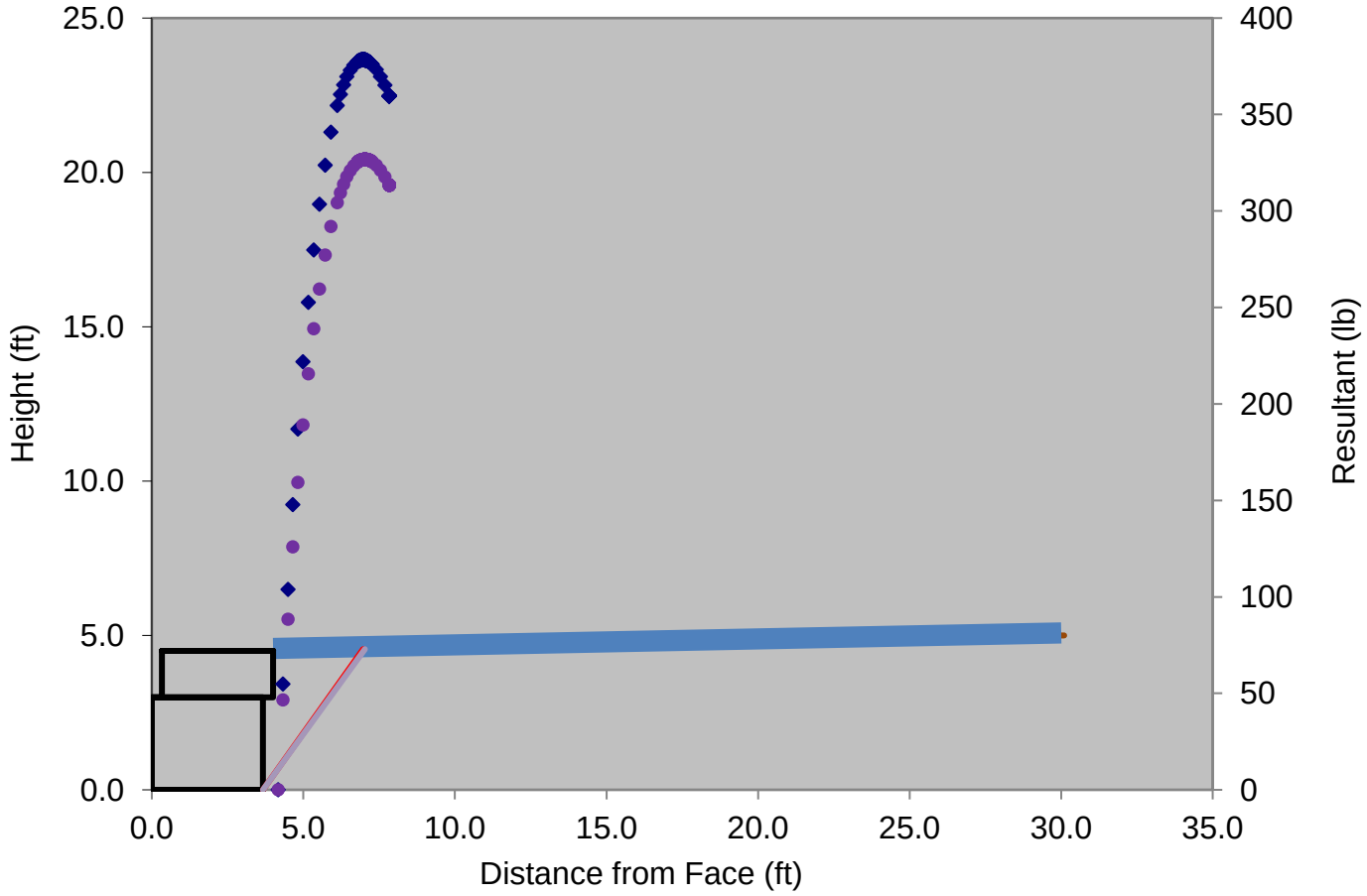
						Internal Safety Factors
Overturning:	Desired FS =	1.5	**Actual FS =**	**6.38**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS =	1.5	**Actual FS =**	**3.74**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} =	1,078 psf	q_c =	363 psf	***OK!***	
Seismic Overturning:	Desired FS =	1.13	**Actual FS =**	**7.20**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS =	1.13	**Actual FS =**	**4.09**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} =	1,437 psf	q_c =	356 psf	***OK!***	

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS	
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8								
													External Stability OK!			
	44.0	3.00	0.0	0.0	750	21.2	594	24.8	0	0.0	1,344					

backfill height **3.00** feet ω= 0.00 deg interface friction angle
exposed height 2.00 feet ω'= 0.00 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **2,101** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

Seismic Load

Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 52.67 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 56.59 deg zone of influence 5.67 ft

Analysis

K_a =	0.305	Q_{lh} =	44 lb	ΔK_{AE} =	0.007	e=	0.03 ft
P_h =	159 lb	Q_{lv} =	12 lb	P_{IR} =	14 lb	B_f' =	4.36 ft
P_v =	43 lb	R_s =	960 lb	ΔP_{AEh} =	3 lb	e_{eq}=	0.01 ft
		q_{ult} =	10,135 psf	ΔP_{AEv} =	1 lb	$B_{f\,eq}'$ =	4.39 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 11.12**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 4.72**	***OK!***	Desired FS = 1.5
Bearing Capacity:				
(net)	q_{all} = 2,101 psf	q_c = 196 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 13.43**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 5.43**	***OK!***	Desired FS = 1.13
Seismic Bearing:				
(net)	q_{all} = 2,801 psf	q_c = 191 psf	***OK!***	

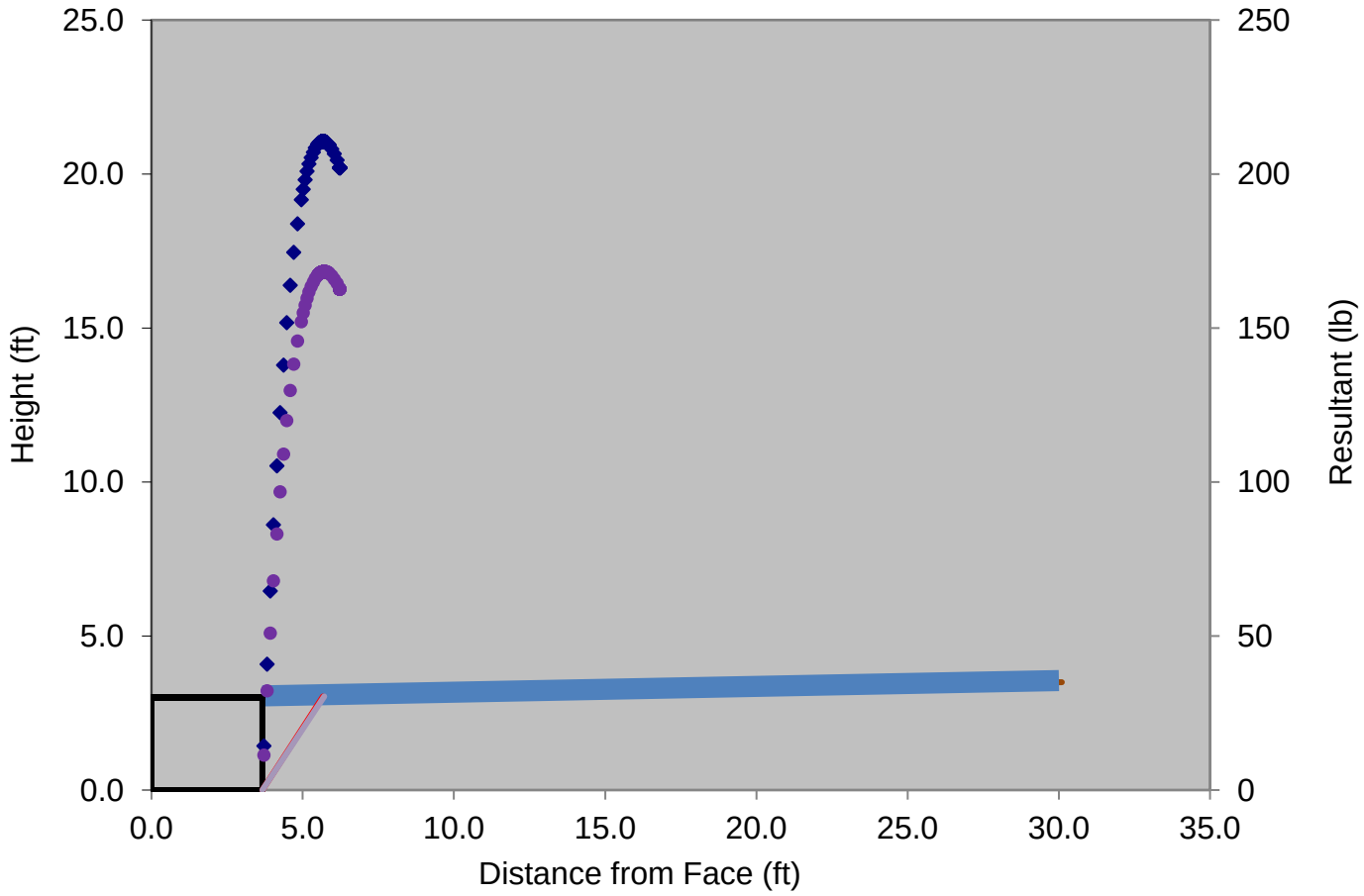
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	2.0	2.0	375	23.0	301	25.5					31.14	13.74	43.48	17.87	OK!
6	44.0	1.50	0.0	0.0	375	21.0	301	23.5									
													External Stability OK!				
	44.0	3.00	2.0	2.0	750	22.0	602	24.5	0	0.0	1,352						

backfill height **3.00** feet ω= 6.34 deg interface friction angle
exposed height 2.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **1,078** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 52.00 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 54.06 deg zone of influence 5.87 ft

Analysis

K_a =	0.263	Q_{lh} =	39	lb	ΔK_{AE} =	0.006	e=	0.01	ft
P_h =	140	lb	Q_{lv} =	6	lb	P_{IR} =	14	lb	B_f' =	4.39	ft
P_v =	21	lb	R_s =	947	lb	ΔP_{AEh} =	3	lb	e_{eq}=	0.00	ft
			q_{ult} =	10,169	psf	ΔP_{AEv} =	1	lb	$B_{f\,eq}'$ =	4.41	ft

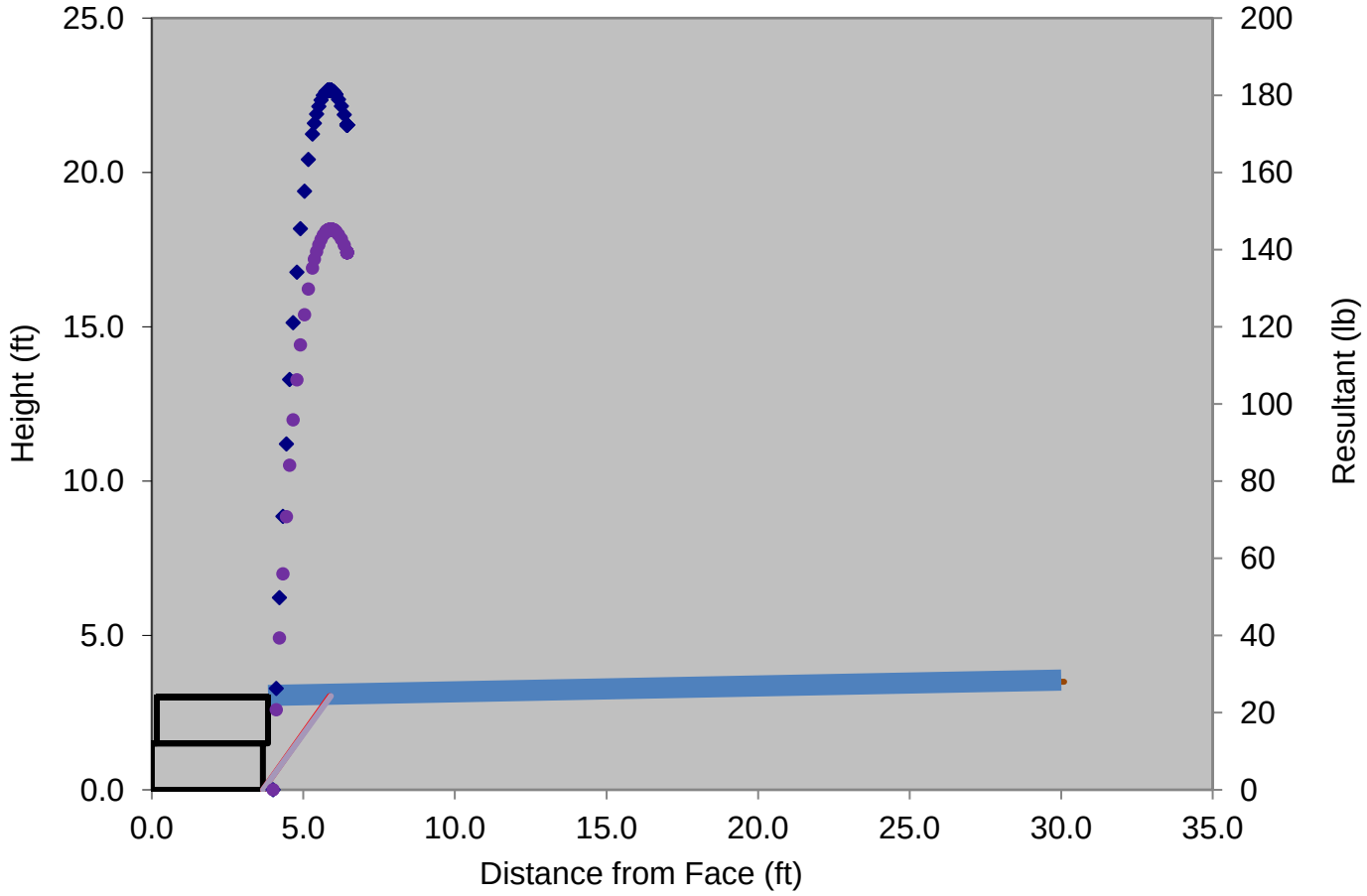
Results

					Internal Safety Factors
Overturning:	Desired FS =	1.5	**Actual FS =**	**12.39** ***OK!***	Desired FS = 1.5
Sliding:	Desired FS =	1.5	**Actual FS =**	**5.28** ***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} =	1,078 psf	q_c =	189 psf ***OK!***	
Seismic Overturning:	Desired FS =	1.13	**Actual FS =**	**14.82** ***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS =	1.13	**Actual FS =**	**6.03** ***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} =	1,437 psf	q_c =	186 psf ***OK!***	

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS	
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear
6	44.0	1.50	0.0	0.0	375	21.0	301	23.5								
													External Stability OK!			
	44.0	1.50	0.0	0.0	375	21.0	301	23.5	0	0.0	676					

backfill height **1.50** feet ω= 0.00 deg interface friction angle
exposed height 0.50 feet ω'= 0.00 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **4** H:1V slope

allowable bearing pressure **2,101** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 52.67 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 56.59 deg zone of influence 4.67 ft

Analysis

K_a =	0.305		Q_{lh} =	22	lb	ΔK_{AE} =	0.007	e=	0.00 ft
P_h =	40	lb	Q_{lv} =	6	lb	P_{IR} =	7 lb	B_f' =	4.42 ft
P_v =	11	lb	R_s =	475	lb	ΔP_{AEh} =	1 lb	e_{eq}=	0.00 ft
			q_{ult} =	10,209	psf	ΔP_{AEv} =	0 lb	$B_{f\,eq}'$ =	4.42 ft

Results

					Internal Safety Factors
Overturning:	Desired FS =	1.5	**Actual FS =**	**32.59** ***OK!***	Desired FS = 1.5
Sliding:	Desired FS =	1.5	**Actual FS =**	**7.68** ***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} =	2,101 psf	q_c =	32 psf ***OK!***	
Seismic Overturning:	Desired FS =	1.13	**Actual FS =**	**45.52** ***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS =	1.13	**Actual FS =**	**9.95** ***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} =	2,801 psf	q_c =	31 psf ***OK!***	

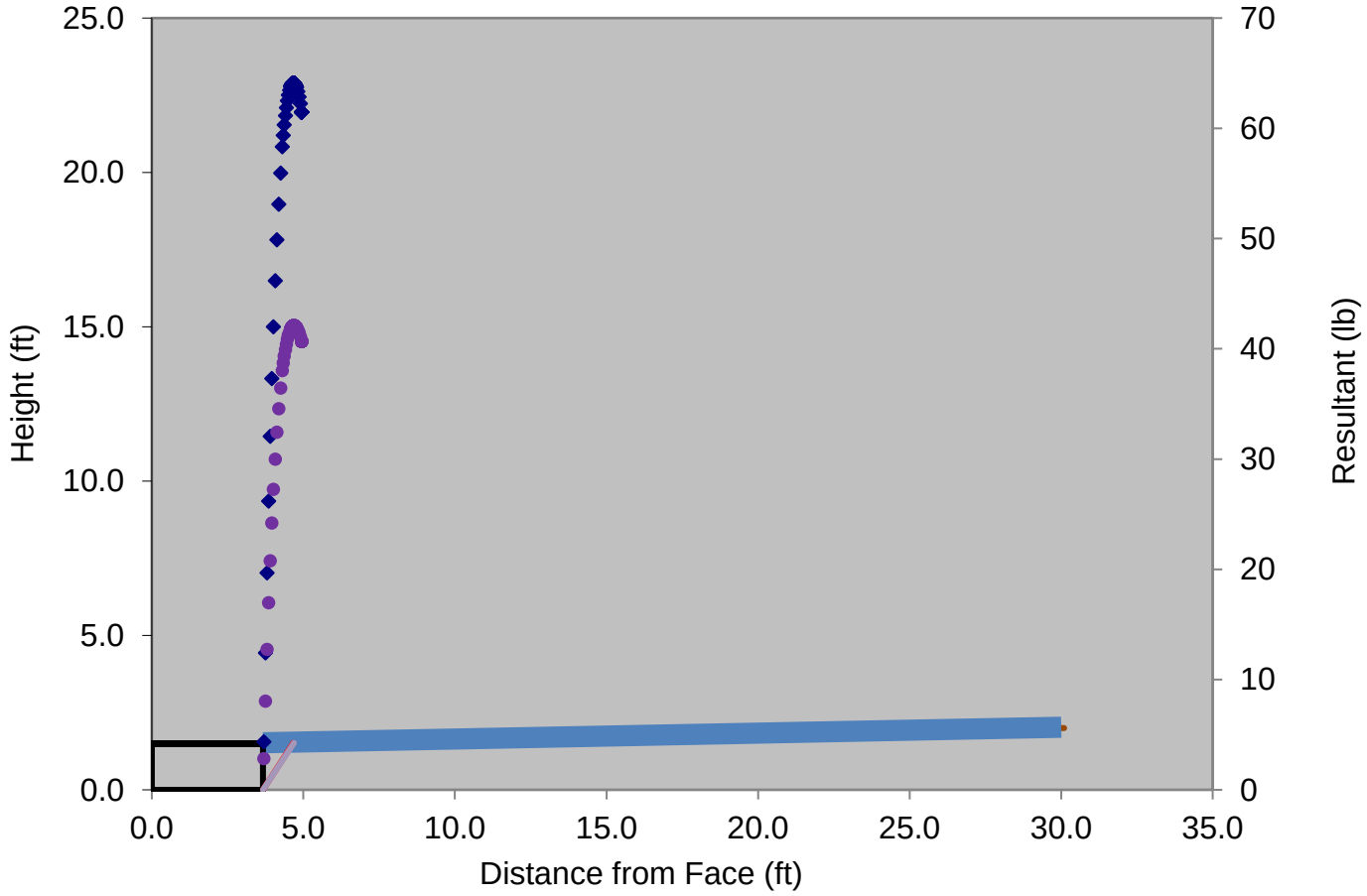
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	20.0	-22.0	375	41.0	301	43.5	17	64.8			31.12	13.73	43.46	17.85	OK!
24	44.0	3.00	16.0	-26.0	750	37.2	594	40.8	244	64.6			6.11	4.88	6.90	5.34	OK!
24	44.0	3.00	12.0	-30.0	750	33.2	594	36.8	489	64.9			2.69	2.91	2.88	3.07	OK!
24	44.0	3.00	8.0	-34.0	750	29.2	594	32.8	733	65.4			1.58	2.09	1.65	2.16	OK!
24-ME	56.0	3.00	4.0	-26.0	1,250	36.7	618	29.8	648	71.8			1.56	1.97	1.60	2.01	OK!
24-86	86.0	3.00	0.0	0.0	950	40.0	1,621	45.1	0	0.0							
													External Stability OK!				
	86.0	16.50	20.0	-22.0	4,825	36.1	4,323	39.4	2,131	67.1	11,279						

backfill height **16.50** feet ω= 6.34 deg interface friction angle
exposed height 12.50 feet ω'= -6.34 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **48** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **3,500** psf (net)
(if specified)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade		LL surcharge		tier height	
length 1	30 feet (horizontal)	0.5	ft	50	psf		ft
length 2	feet (horizontal)		ft		psf		ft
length 3	feet (horizontal)		ft		psf		ft
length 4	feet (horizontal)		ft		psf		

effective slope 49.33 H:1V slope β 1.2 deg avg q 50 psf
failure plane α 57.38 deg zone of influence 17.89 ft

Analysis

K_a =	0.351		Q_{lh} =	253	lb	ΔK_{AE} =	0.007	e=	1.48 ft
P_h =	5,021	lb	Q_{lv} =	139	lb	P_{IR} =	119 lb	B_f' =	4.97 ft
P_v =	2,765	lb	R_s =	8,576	lb	ΔP_{AEh} =	104 lb	e_{eq}=	1.46 ft
			q_{ult} =	17,879	psf	ΔP_{AEv} =	57 lb	$B_{f\,eq}'$ =	4.99 ft

Results

					Internal Safety Factors
Overturning:	Desired FS =	1.5	**Actual FS =**	**1.83** ***OK!***	Desired FS = 1.5
Sliding:	Desired FS =	1.5	**Actual FS =**	**1.63** ***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} =	3,500 psf	q_c =	2,356 psf ***OK!***	
Seismic Overturning:	Desired FS =	1.13	**Actual FS =**	**1.85** ***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS =	1.13	**Actual FS =**	**1.64** ***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} =	4,667 psf	q_c =	2,323 psf ***OK!***	

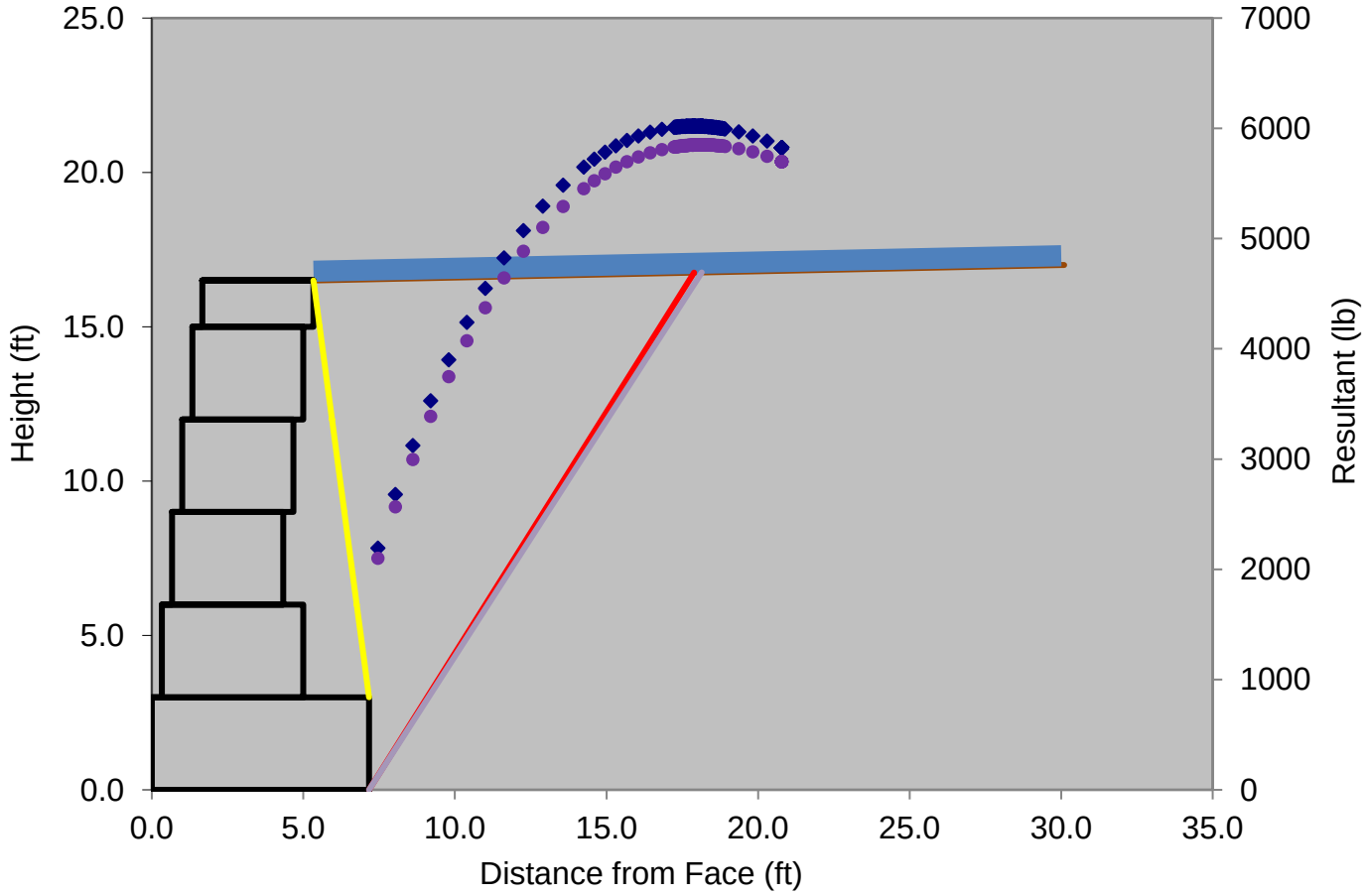
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	12.0	0.0	375	33.0	301	35.5	0	0.0			31.13	13.73	43.47	17.86	OK!
24	44.0	3.00	8.0	-4.0	750	29.2	594	32.8	110	54.0			6.12	4.88	6.90	5.34	OK!
24	44.0	3.00	4.0	-8.0	750	25.2	594	28.8	220	52.0			2.69	2.91	2.88	3.07	OK!
24-ME	56.0	3.00	0.0	0.0	1,250	32.7	618	25.8	0	0.0							
													External Stability OK!				
	56.0	10.50	12.0	0.0	3,125	30.1	2,107	30.0	330	52.7	5,562						

backfill height **10.50** feet ω= 6.34 deg interface friction angle
exposed height 9.50 feet ω'= 0.00 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **3,500** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.68

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 50.67 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 55.28 deg zone of influence 12.04 ft

Analysis

K_a =	0.300	Q_{lh} =	146	lb	ΔK_{AE} =	0.007	e=	0.58	ft
P_h =	1,836	lb	Q_{lv} =	60	lb	P_{IR} =	59	lb	B_f' =	4.26	ft
P_v =	760	lb	R_s =	3,938	lb	ΔP_{AEh} =	42	lb	e_{eq}=	0.55	ft
			q_{ult} =	9,987	psf	ΔP_{AEv} =	17	lb	$B_{f\,eq}'$ =	4.32	ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.37**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.99**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 3,500 psf	q_c = 1,374 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.45**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.04**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 4,667 psf	q_c = 1,343 psf	***OK!***		

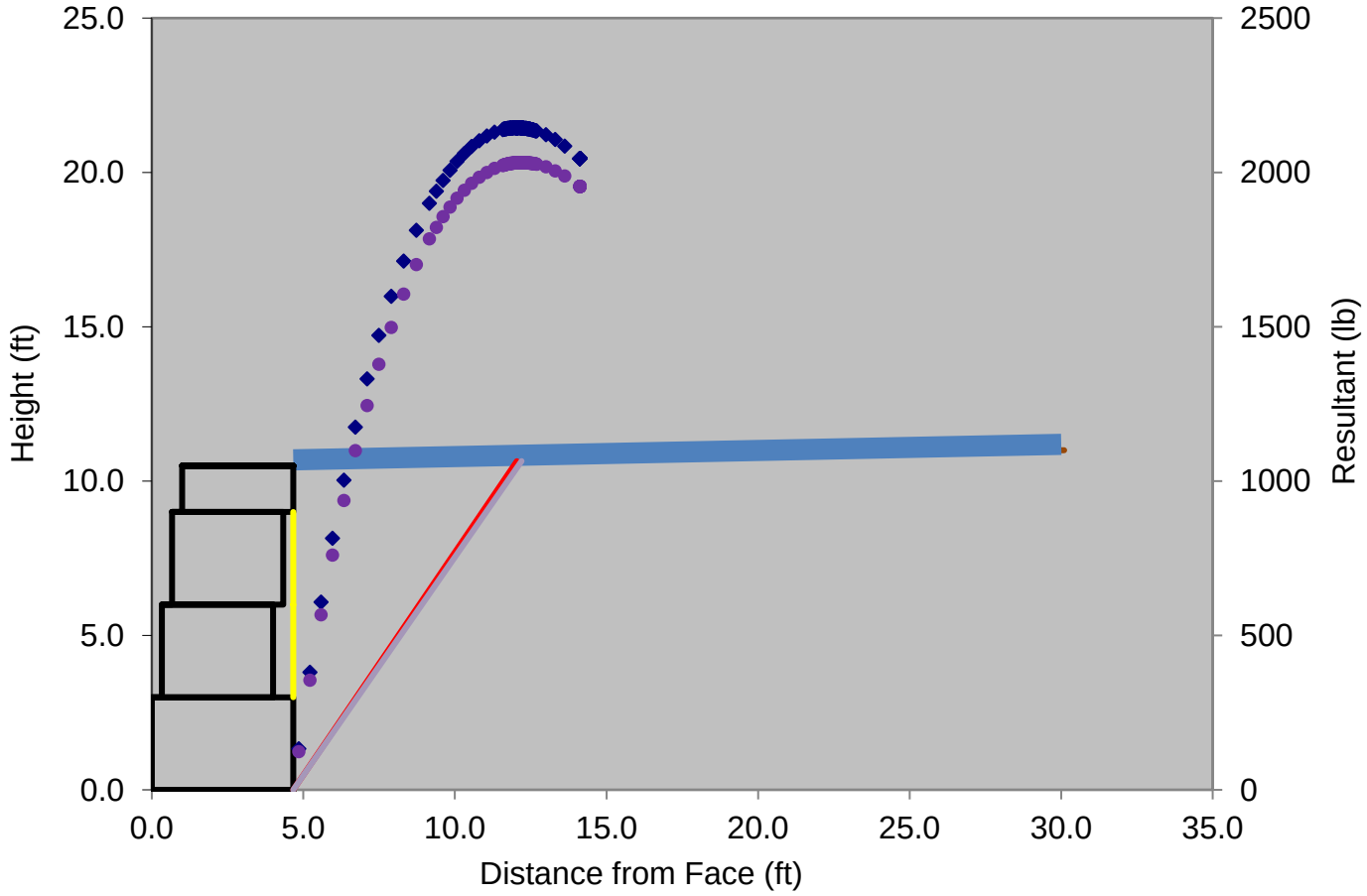
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**Wall**
Calc by:	**DDB**

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	8.0	8.0	375	29.0	301	31.5					31.13	13.73	43.47	17.86	OK!
24	44.0	3.00	4.0	4.0	750	25.2	594	28.8					6.12	4.88	6.90	5.35	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	7.50	8.0	8.0	1,875	24.4	1,489	27.8	0	0.0	3,364						

backfill height **7.50** feet ω= 6.34 deg interface friction angle
exposed height 6.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **1,106** psf (if specified) (net)

composite friction coefficient μ_b 0.69

Aggregate Unit Fill
γ **110** pcf

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade		LL surcharge		tier height
length 1	30 feet (horizontal)	0.5	ft	50	psf	ft
length 2	feet (horizontal)		ft		psf	ft
length 3	feet (horizontal)		ft		psf	ft
length 4	feet (horizontal)		ft		psf	ft

effective slope 51.00 H:1V slope β 1.1 deg avg q 50 psf

failure plane α 54.06 deg zone of influence 9.17 ft

Analysis

K_a =	0.263	Q_{lh} =	98	lb	ΔK_{AE} =	0.006	e=	0.33	ft
P_h =	877 lb	Q_{lv} =	15	lb	P_{IR} =	36 lb	B_f' =	3.76	ft
P_v =	134 lb	R_s =	2,227	lb	ΔP_{AEh} =	21 lb	e_{eq}=	0.29	ft
		q_{ult} =	9,285	psf	ΔP_{AEv} =	3 lb	$B_{f\,eq}'$ =	3.84	ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.80**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 2.29**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 1,106 psf	q_c = 810 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.99**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.40**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 1,475 psf	q_c = 786 psf	***OK!***		

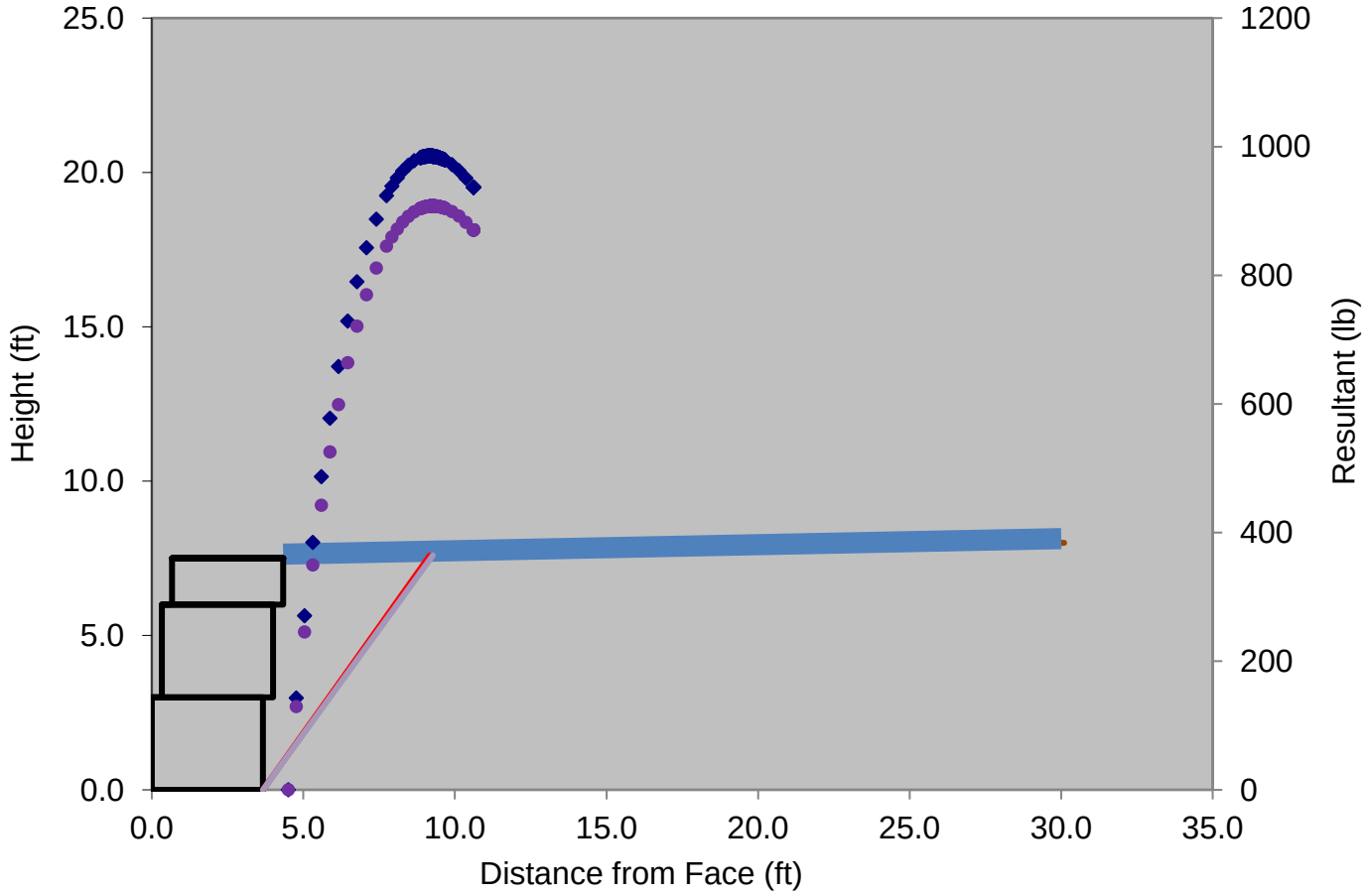
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	6.0	6.0	375	27.0	301	29.5					31.13	13.74	43.47	17.86	OK!
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					11.86	7.45	14.18	8.52	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	6.00	6.0	6.0	1,500	23.6	1,196	26.7	0	0.0	2,696						

backfill height **6.00** feet ω= 6.34 deg interface friction angle
exposed height 5.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **1,106** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade		LL surcharge		tier height	
length 1	30 feet (horizontal)	0.5	ft	50	psf		ft
length 2	feet (horizontal)		ft		psf		ft
length 3	feet (horizontal)		ft		psf		ft
length 4	feet (horizontal)		ft		psf		ft

effective slope 51.33 H:1V slope β 1.1 deg avg q 50 psf

failure plane α 54.06 deg zone of influence 8.07 ft

Analysis

K_a =	0.263	Q_{lh} =	78	lb	ΔK_{AE} =	0.006	e=	0.18	ft
P_h =	561 lb	Q_{lv} =	12	lb	P_{IR} =	29 lb	B_f' =	4.07	ft
P_v =	85 lb	R_s =	1,811	lb	ΔP_{AEh} =	13 lb	e_{eq}=	0.14	ft
		q_{ult} =	9,718	psf	ΔP_{AEv} =	2 lb	$B_{f\,eq}'$ =	4.14	ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 4.02**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 2.83**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 1,106 psf	q_c = 562 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 4.39**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 3.03**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 1,475 psf	q_c = 548 psf	***OK!***		

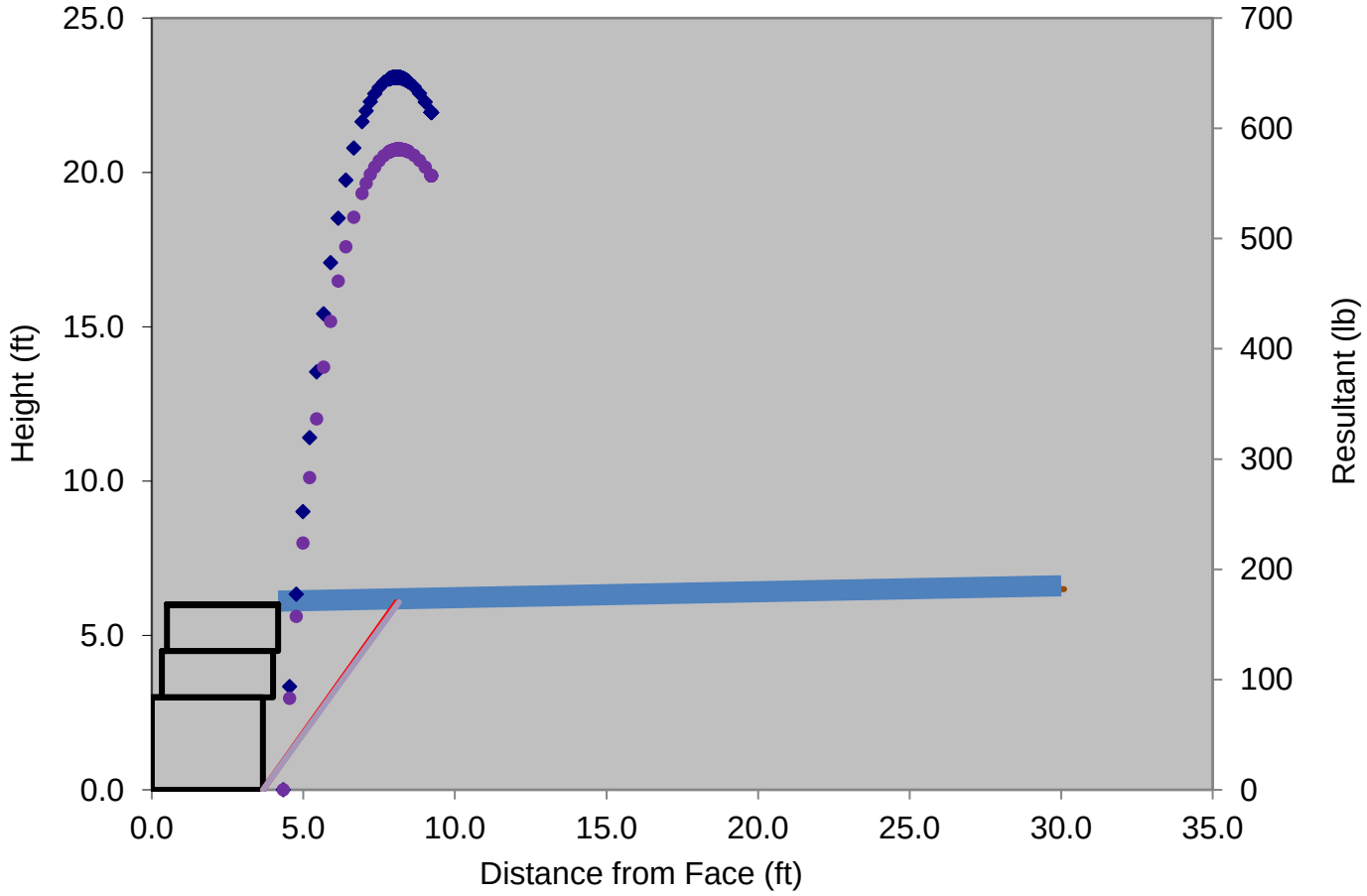
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					31.13	13.74	43.48	17.86	OK!
6	44.0	1.50	2.0	2.0	375	23.0	301	25.5					11.86	7.45	14.18	8.52	OK!
6	44.0	1.50	0.0	0.0	375	21.0	301	23.5									
													External Stability OK!				
	44.0	4.50	4.0	4.0	1,125	23.0	903	25.5	0	0.0	2,028						

backfill height **4.50** feet ω= 6.34 deg interface friction angle
exposed height 3.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **1,078** psf (net)
(if specified)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: Wall
Calc by: DDB

8/12/24 10:53

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	30 feet (horizontal)	0.5 ft	50 psf	ft
length 2	feet (horizontal)	ft	psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	ft

effective slope 51.67 H:1V slope β 1.1 deg avg q 50 psf
failure plane α 54.06 deg zone of influence 6.97 ft

Analysis

K_a =	0.263	Q_{lh} =	59	lb	ΔK_{AE} =	0.006	e=	0.06	ft
P_h =	316	lb	Q_{lv} =	9	lb	P_{IR} =	21	lb	B_f' =	4.29	ft
P_v =	48	lb	R_s =	1,402	lb	ΔP_{AEh} =	8	lb	e_{eq}=	0.04	ft
			q_{ult} =	10,030	psf	ΔP_{AEv} =	1	lb	$B_{f\,eq}'$ =	4.34	ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 6.46**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 3.75**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 1,078 psf	q_c = 361 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 7.29**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 4.10**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 1,437 psf	q_c = 353 psf	***OK!***		

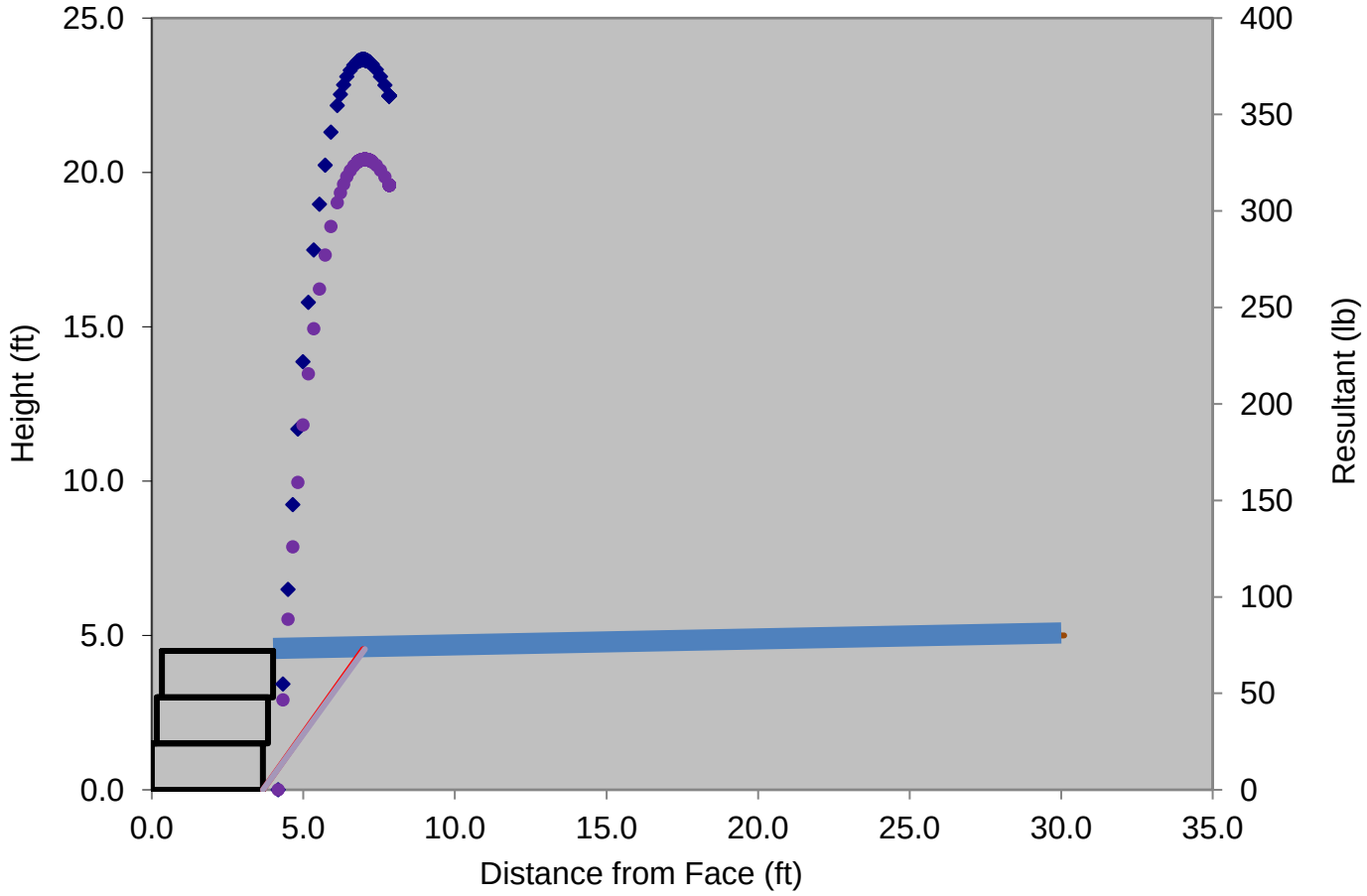
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	Wall
Calc by:	DDB

8/12/24 10:53

Ground Surface & Trial Wedge Plot



WALL ADJACENT TO NORTH PEAK STREET

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	18.0	-36.0	375	39.0	301	41.5	14	63.0			97.28	30.79	99.71	37.32	OK!
6	44.0	1.50	16.0	-38.0	375	37.0	301	39.5	103	63.9			11.97	7.07	22.40	12.03	OK!
24	44.0	3.00	12.0	-42.0	750	33.2	594	36.8	509	65.5			3.27	3.15	5.37	4.64	OK!
24	44.0	3.00	8.0	-46.0	750	29.2	594	32.8	878	68.1			1.72	2.14	2.52	2.86	OK!
24-ME	56.0	3.00	4.0	-38.0	1,250	36.7	618	29.8	916	76.8			1.65	1.98	2.15	2.43	OK!
24-86	98.0	3.00	0.0	0.0	1,385	56.3	1,621	45.1	0	0.0	12						
													External Stability OK!				
	98.0	15.00	18.0	-36.0	4,885	40.8	4,030	39.0	2,420	70.6	11,335						

backfill height **14.50** feet ω= 6.34 deg interface friction angle
exposed height 10.50 feet ω'= -11.69 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **48** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.68

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 232 psf

failure plane α 59.02 deg zone of influence 16.87 ft

Analysis

K_a =	0.393	Q_{lh} =	1,095	lb	ΔK_{AE} =	0.008	e=	1.32 ft
P_h =	4,103 lb	Q_{lv} =	744	lb	P_{IR} =	120 lb	B_f' =	6.28 ft
P_v =	2,787 lb	R_s =	9,025	lb	ΔP_{AEh} =	78 lb	e_{eq}=	1.04 ft
		q_{ult} =	19,719	psf	ΔP_{AEv} =	53 lb	$B_{f\,eq}'$ =	6.85 ft

Results

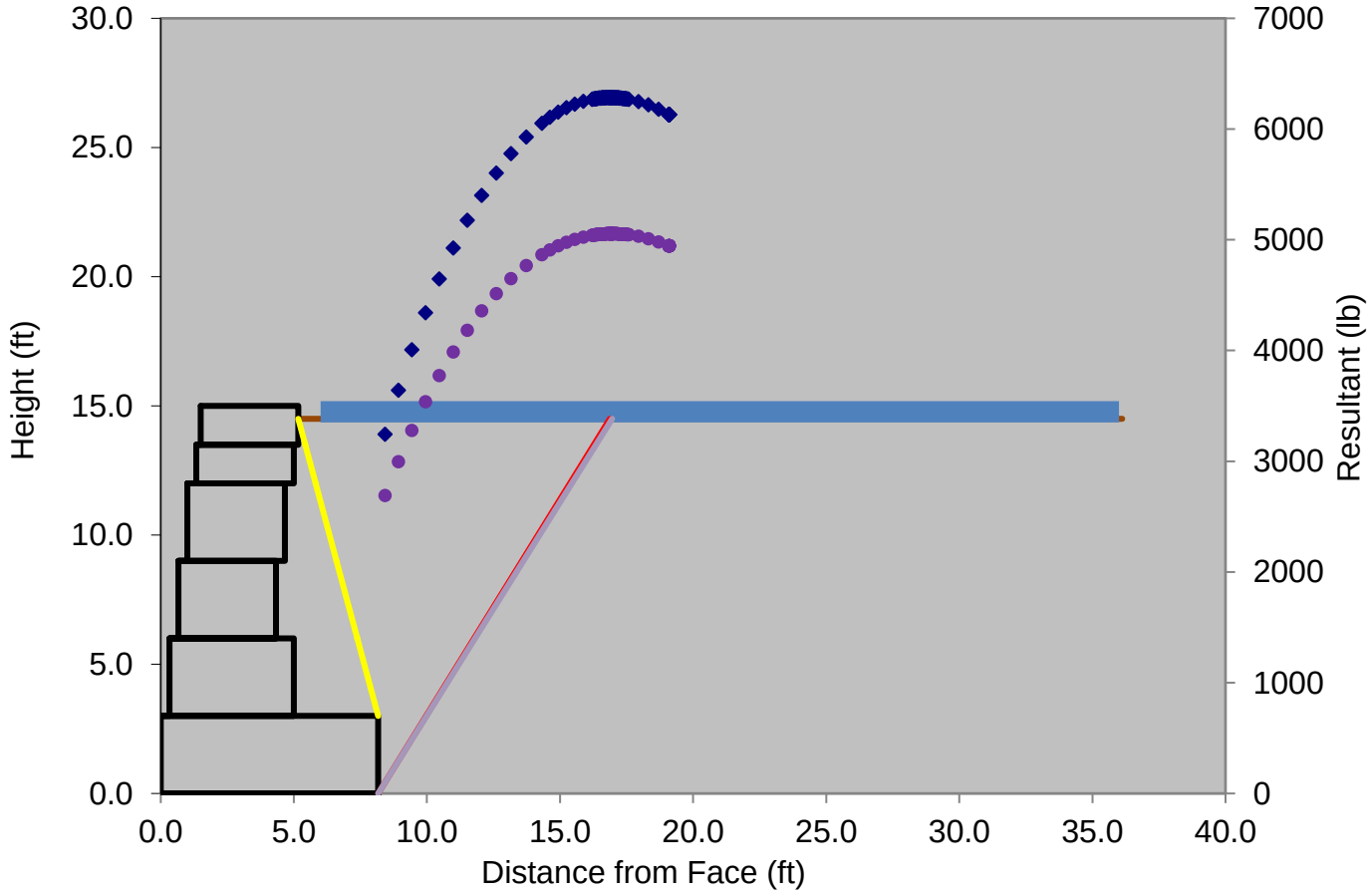
				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.28**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.74**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 1,867 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.80**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.02**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 1,571 psf	***OK!***	

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**North Peak Street Wall**
Calc by:	**DDB**

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
24	44.0	3.00	12.0	-30.0	750	33.2	594	36.8	138	59.3			8.19	5.46	13.02	7.92	OK!
24	44.0	3.00	8.0	-34.0	750	29.2	594	32.8	523	61.7			2.70	2.80	4.23	3.94	OK!
24-ME	56.0	3.00	4.0	-26.0	1,250	36.7	618	29.8	578	70.7			2.27	2.30	3.06	2.90	OK!
24-86	86.0	3.00	0.0	0.0	950	40.0	1,621	45.1	0	0.0							
													External Stability OK!				
	86.0	12.00	12.0	-30.0	3,700	35.3	3,427	38.8	1,238	65.6	8,365						

backfill height **12.00** feet ω= 6.34 deg interface friction angle
exposed height 11.00 feet ω'= -11.77 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 216 psf
failure plane α 58.57 deg zone of influence 14.50 ft

Analysis

K_a =	0.394	Q_{lh} =	844 lb	ΔK_{AE} =	0.008	e=	1.01 ft
P_h =	2,812 lb	Q_{lv} =	575 lb	P_{IR} =	88 lb	B_f' =	5.90 ft
P_v =	1,916 lb	R_s =	6,656 lb	ΔP_{AEh} =	55 lb	e_{eq}=	0.76 ft
		q_{ult} =	12,287 psf	ΔP_{AEv} =	37 lb	$B_{f\,eq}'$ =	6.39 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.50**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.82**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 1,715 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 3.14**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.16**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 1,490 psf	***OK!***	

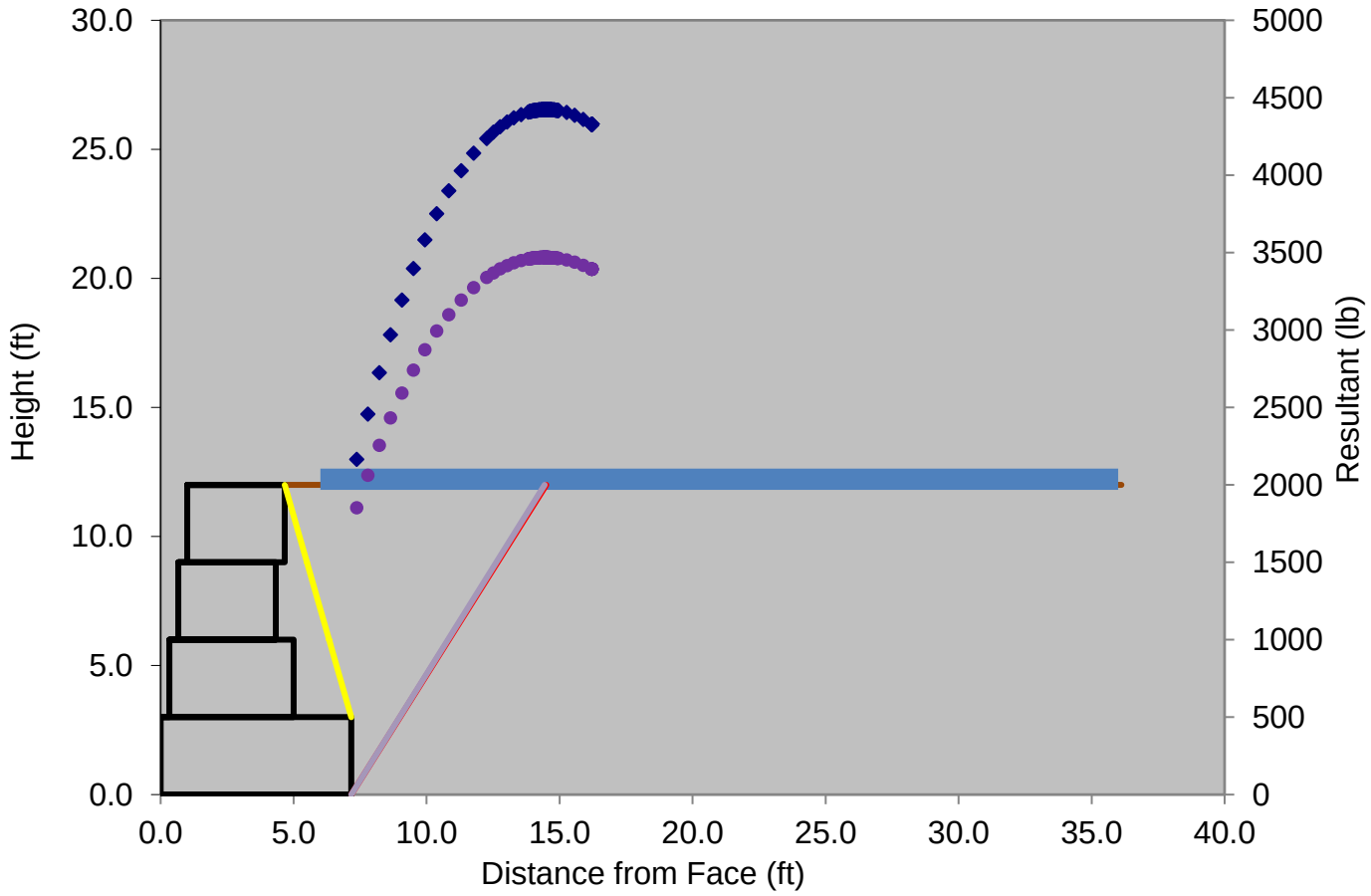
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	14.0	2.0	375	35.0	301	37.5	0	0.0			1485.00	192.29	177.02	72.61	OK!
6	44.0	1.50	12.0	0.0	375	33.0	301	35.5	25	56.9			29.03	13.56	36.37	18.07	OK!
24	44.0	3.00	8.0	-4.0	750	29.2	594	32.8	143	54.6			4.45	3.91	6.88	5.54	OK!
24	44.0	3.00	4.0	-8.0	750	25.2	594	28.8	231	52.2			2.06	2.43	2.95	3.20	OK!
24-ME	56.0	3.00	0.0	0.0	1,250	32.7	618	25.8	0	0.0							
													External Stability OK!				
	56.0	12.00	14.0	2.0	3,500	30.6	2,408	30.9	399	53.4	6,307						

backfill height **11.00** feet ω= 6.34 deg interface friction angle
exposed height 10.00 feet ω'= 0.87 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope H:1V slope

allowable bearing pressure **2,073** psf (net)
(if specified)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.68

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 212 psf

failure plane α 54.40 deg zone of influence 12.54 ft

Analysis

K_a =	0.290	Q_{lh} =	629 lb	ΔK_{AE} =	0.007	e=	0.82 ft
P_h =	1,956 lb	Q_{lv} =	249 lb	P_{IR} =	67 lb	B_f' =	3.79 ft
P_v =	776 lb	R_s =	4,486 lb	ΔP_{AEh} =	46 lb	e_{eq}=	0.51 ft
		q_{ult} =	9,327 psf	ΔP_{AEv} =	18 lb	$B_{f\,eq}'$ =	4.39 ft

Results

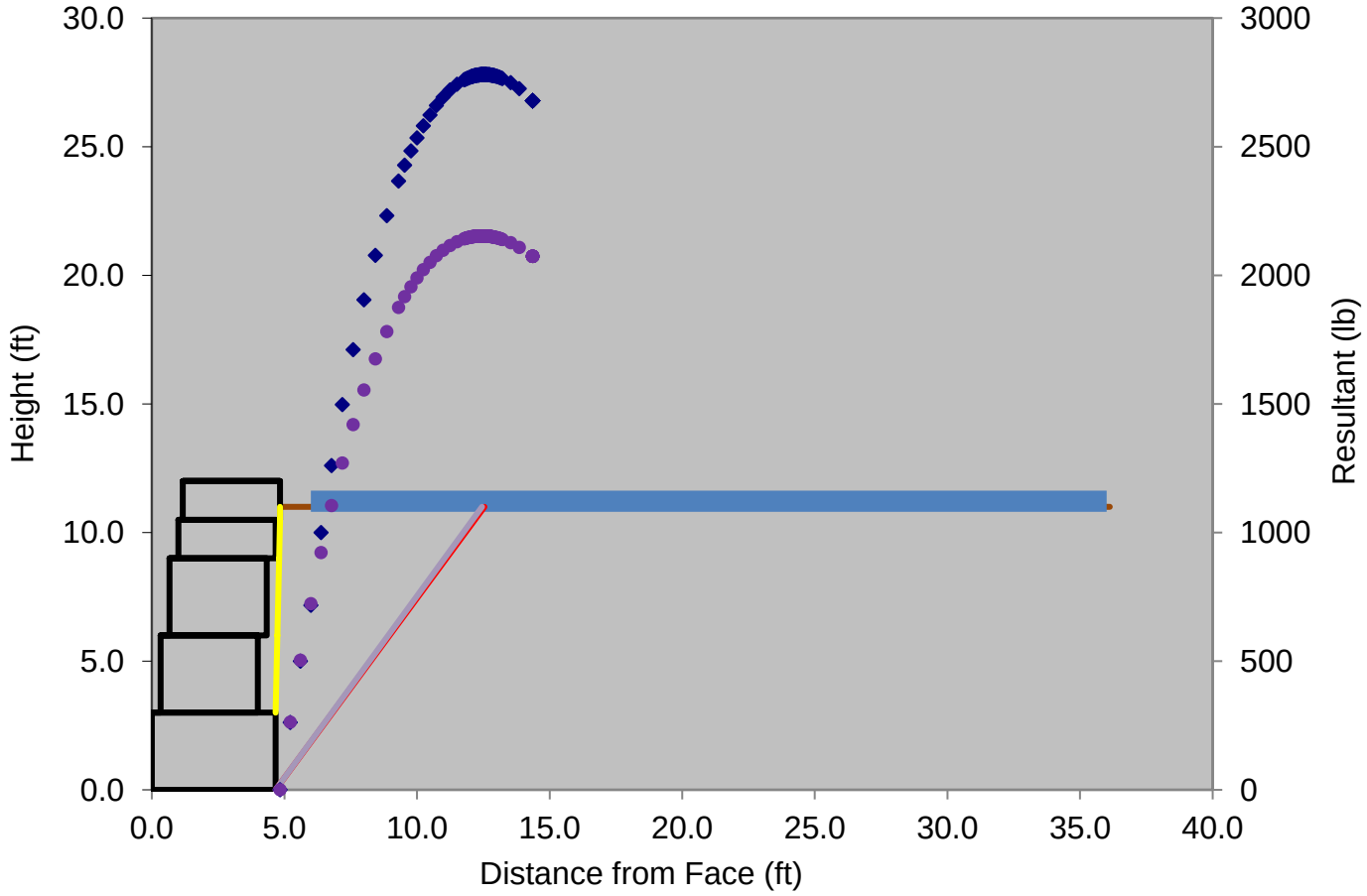
				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.90**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.74**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 1,811 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.47**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.13**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 1,492 psf	***OK!***	

STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	12.0	0.0	375	33.0	301	35.5	0	0.0			40.38	18.07	44.57	20.12	OK!
24	44.0	3.00	8.0	-4.0	750	29.2	594	32.8	110	54.0			4.35	3.78	6.98	5.44	OK!
24	44.0	3.00	4.0	-8.0	750	25.2	594	28.8	220	52.0			1.99	2.33	2.91	3.11	OK!
24-ME	56.0	3.00	0.0	0.0	1,250	32.7	618	25.8	0	0.0							
													External Stability OK!				
	56.0	10.50	12.0	0.0	3,125	30.1	2,107	30.0	330	52.7	5,562						

backfill height **10.50** feet ω= 6.34 deg interface friction angle
exposed height 9.50 feet ω'= 0.00 deg δ 22.5 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.68

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 205 psf
failure plane α 54.51 deg zone of influence 12.15 ft

Analysis

K_a =	0.296	Q_{lh} =	590 lb	ΔK_{AE} =	0.007	e=	0.84 ft
P_h =	1,809 lb	Q_{lv} =	244 lb	P_{IR} =	59 lb	B_f' =	3.73 ft
P_v =	749 lb	R_s =	4,038 lb	ΔP_{AEh} =	42 lb	e_{eq}=	0.54 ft
		q_{ult} =	9,246 psf	ΔP_{AEv} =	18 lb	$B_{f\,eq}'$ =	4.34 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.89**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.68**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 1,633 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.48**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.07**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 1,335 psf	***OK!***	

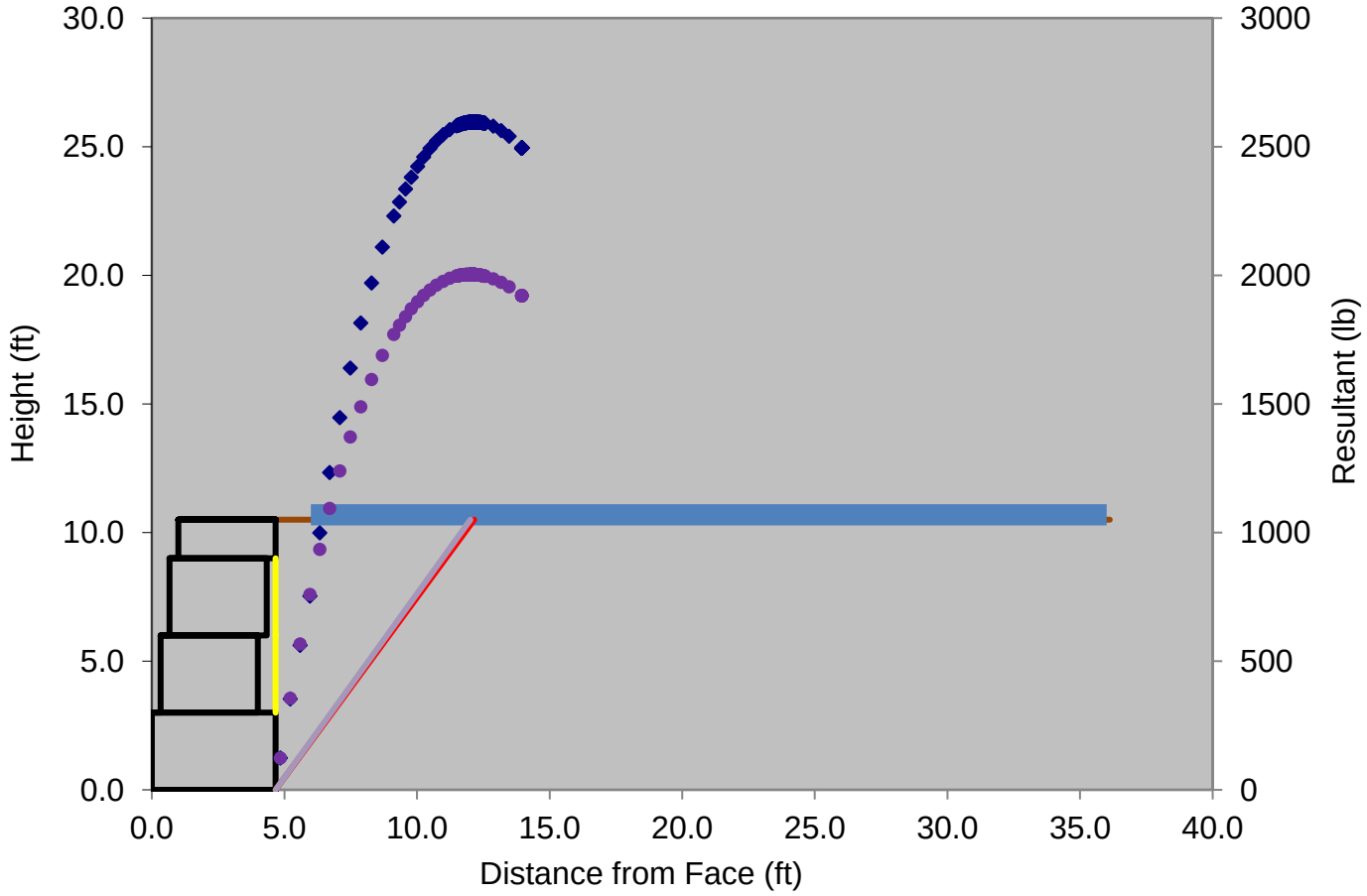
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	10.0	10.0	375	31.0	301	33.5					187.79	48.21	96.80	33.95	OK!
6	44.0	1.50	8.0	8.0	375	29.0	301	31.5					16.89	9.54	22.50	12.39	OK!
24	44.0	3.00	4.0	4.0	750	25.2	594	28.8					3.62	3.43	5.37	4.66	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	9.00	10.0	10.0	2,250	25.5	1,791	28.7	0	0.0	4,041						

backfill height **8.50** feet ω= 6.34 deg interface friction angle
exposed height 7.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	6 feet (horizontal)	ft	psf	ft
length 2	30 feet (horizontal)	ft	250 psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	

effective slope H:1V slope β 0.0 deg avg q 187 psf
failure plane α 52.66 deg zone of influence 10.15 ft

Analysis

K_a =	0.259	Q_{lh} =	407 lb	ΔK_{AE} =	0.007	e=	0.64 ft
P_h =	1,109 lb	Q_{lv} =	62 lb	P_{IR} =	43 lb	B_f' =	3.15 ft
P_v =	169 lb	R_s =	2,665 lb	ΔP_{AEh} =	30 lb	e_{eq}=	0.33 ft
		q_{ult} =	8,429 psf	ΔP_{AEv} =	5 lb	$B_{f\,eq}'$ =	3.76 ft

Results

				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 1.87**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.76**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 1,233 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 2.60**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.25**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 997 psf	***OK!***	

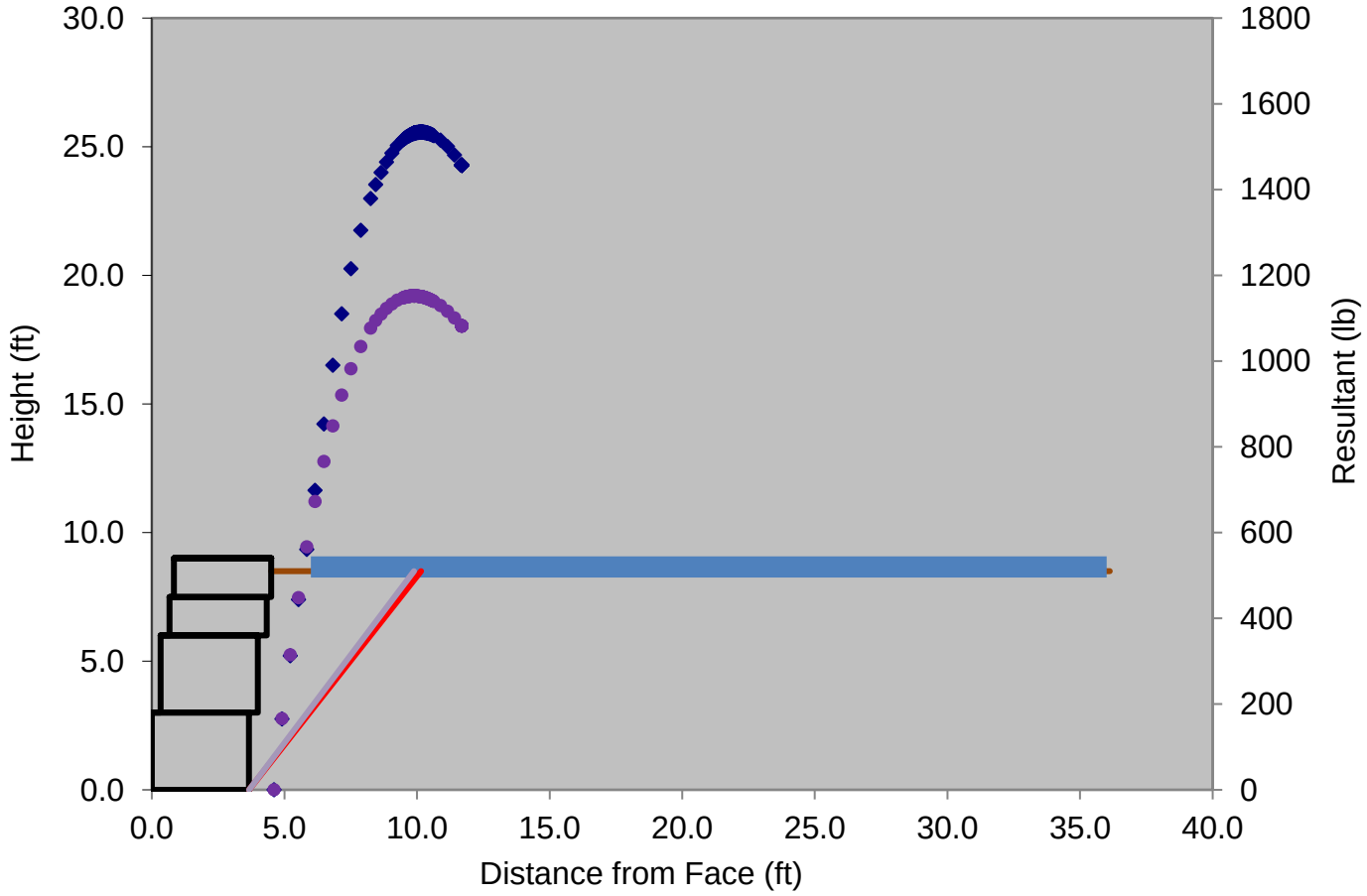
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	8.0	8.0	375	29.0	301	31.5					56.71	21.53	43.91	18.06	OK!
24	44.0	3.00	4.0	4.0	750	25.2	594	28.8					4.67	4.01	6.99	5.47	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	7.50	8.0	8.0	1,875	24.4	1,489	27.8	0	0.0	3,364						

backfill height **7.50** feet ω= 6.34 deg interface friction angle
exposed height 6.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **2,073** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	6 feet (horizontal)	ft	psf	ft
length 2	30 feet (horizontal)	ft	250 psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	

effective slope H:1V slope β 0.0 deg avg q 175 psf
failure plane α 52.14 deg zone of influence 9.50 ft

Analysis

K_a =	0.258	Q_{lh} =	335	lb	ΔK_{AE} =	0.008	e=	0.55	ft
P_h =	861	lb	Q_{lv} =	51	lb	P_{IR} =	36	lb	B_f' =	3.33	ft
P_v =	131	lb	R_s =	2,246	lb	ΔP_{AEh} =	25	lb	e_{eq}=	0.28	ft
			q_{ult} =	8,681	psf	ΔP_{AEv} =	4	lb	$B_{f\,eq}'$ =	3.86	ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 2.14**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 1.88**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 942 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 3.02**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 2.44**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 783 psf	***OK!***		

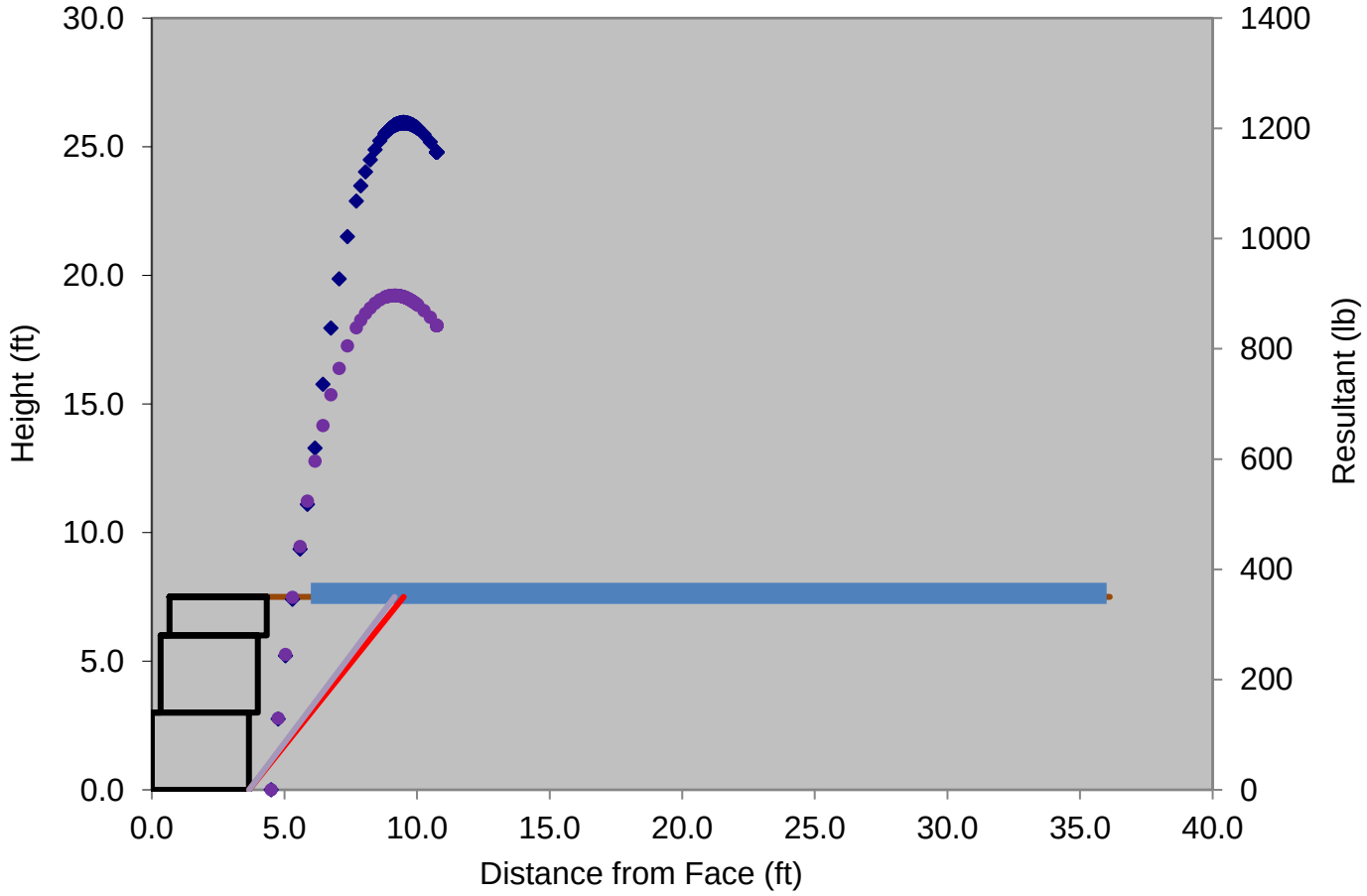
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	6.0	6.0	375	27.0	301	29.5					56.71	21.53	43.91	18.06	OK!
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					10.77	7.09	14.41	8.96	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	6.00	6.0	6.0	1,500	23.6	1,196	26.7	0	0.0	2,696						

backfill height **6.00** feet ω= 6.34 deg interface friction angle
exposed height 5.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	6 feet (horizontal)	ft	psf	ft
length 2	30 feet (horizontal)	ft	250 psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	

effective slope H:1V slope β 0.0 deg avg q 151 psf

failure plane α 50.96 deg zone of influence 8.53 ft

Analysis

K_a =	0.256	Q_{lh} =	229	lb	ΔK_{AE} =	0.010	e=	0.31	ft
P_h =	547 lb	Q_{lv} =	35	lb	P_{IR} =	29 lb	B_f' =	3.80	ft
P_v =	83 lb	R_s =	1,823	lb	ΔP_{AEh} =	20 lb	e_{eq}=	0.14	ft
		q_{ult} =	9,344	psf	ΔP_{AEv} =	3 lb	$B_{f\,eq}'$ =	4.15	ft

Results

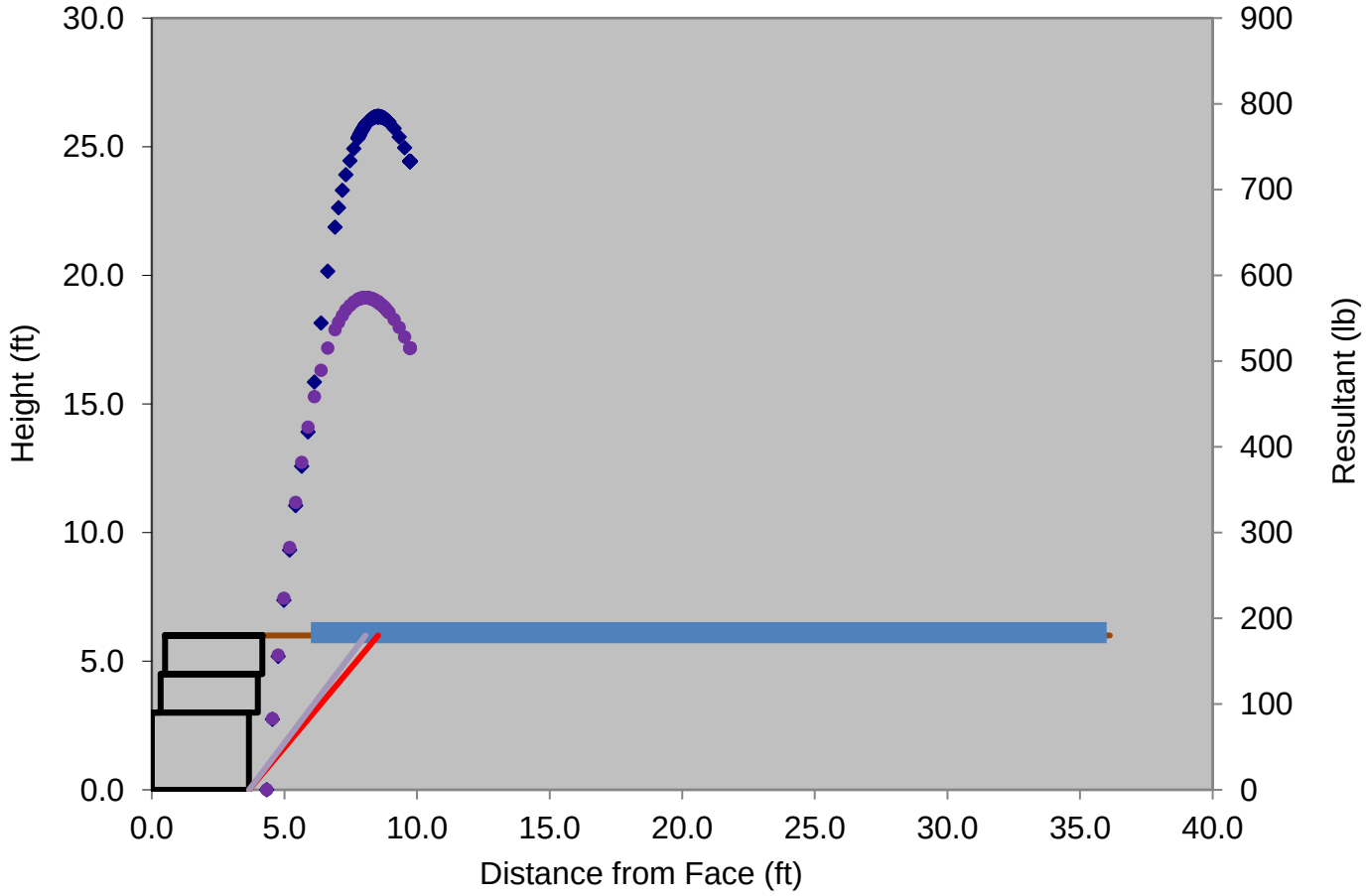
					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 3.11**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 2.35**	***OK!***		Desired FS = 1.5
Bearing Capacity:					
(net)	q_{all} = 2,073 psf	q_c = 616 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 4.44**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 3.08**	***OK!***		Desired FS = 1.13
Seismic Bearing:					
(net)	q_{all} = 2,764 psf	q_c = 546 psf	***OK!***		

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	**North Peak Street**
Location:	**Highlands**
Job#:	**21-54385 Home and Land Development**
Section:	**North Peak Street Wall**
Calc by:	**DDB**

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	4.0	4.0	375	25.0	301	27.5					56.71	21.53	43.91	18.06	OK!
24	44.0	3.00	0.0	0.0	750	21.2	594	24.8									
													External Stability OK!				
	44.0	4.50	4.0	4.0	1,125	22.5	895	25.7	0	0.0	2,020						

backfill height **4.50** feet ω= 6.34 deg interface friction angle
exposed height 3.50 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

allowable bearing pressure **2,073** psf
(if specified) (net)

Aggregate Unit Fill
γ **110** pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

		rise in grade	LL surcharge	tier height
length 1	6 feet (horizontal)	ft	psf	ft
length 2	30 feet (horizontal)	ft	250 psf	ft
length 3	feet (horizontal)	ft	psf	ft
length 4	feet (horizontal)	ft	psf	

effective slope H:1V slope β 0.0 deg avg q 117 psf
failure plane α 48.84 deg zone of influence 7.60 ft

Analysis

K_a =	0.250		Q_{lh} =	130	lb	ΔK_{AE} =	0.015	e=	0.14 ft
P_h =	301	lb	Q_{lv} =	20	lb	P_{IR} =	21 lb	B_f' =	4.14 ft
P_v =	46	lb	R_s =	1,403	lb	ΔP_{AEh} =	18 lb	e_{eq}=	0.05 ft
			q_{ult} =	9,820	psf	ΔP_{AEv} =	3 lb	$B_{f\,eq}'$ =	4.31 ft

Results

					Internal Safety Factors
Overturning:	Desired FS =	1.5	**Actual FS =**	**5.24** ***OK!***	Desired FS = 1.5
Sliding:	Desired FS =	1.5	**Actual FS =**	**3.26** ***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} =	2,073 psf	q_c =	379 psf ***OK!***	
Seismic Overturning:	Desired FS =	1.13	**Actual FS =**	**7.29** ***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS =	1.13	**Actual FS =**	**4.20** ***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} =	2,764 psf	q_c =	355 psf ***OK!***	

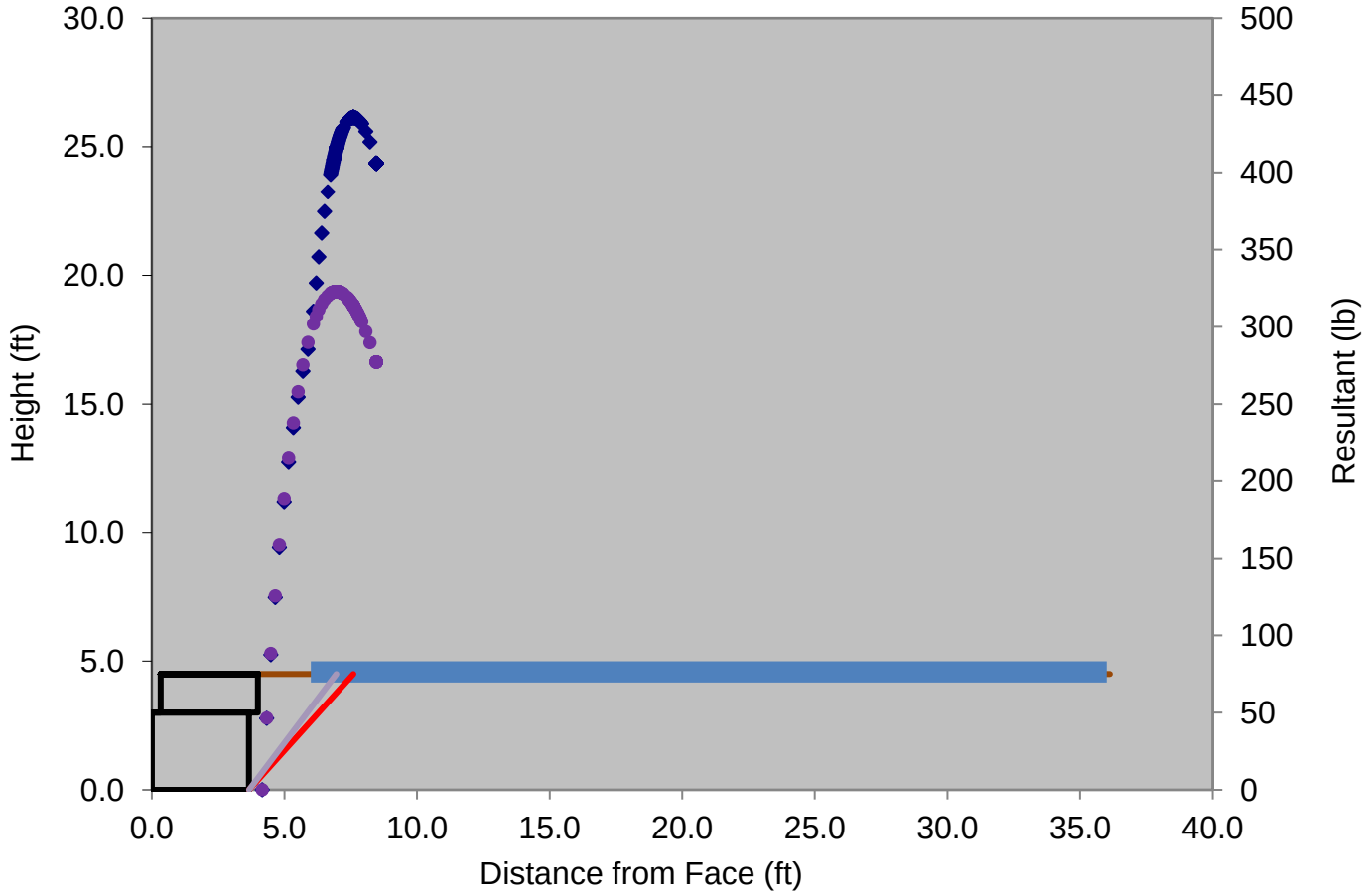
STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS		
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear	
6	44.0	1.50	2.0	2.0	375	23.0	301	25.5					56.71	21.53	43.91	18.06	OK!
6	44.0	1.50	0.0	0.0	375	21.0	301	23.5									
													External Stability OK!				
	44.0	3.00	2.0	2.0	750	22.0	602	24.5	0	0.0	1,352						

backfill height **3.00** feet ω= 6.34 deg interface friction angle
exposed height 2.00 feet ω'= 6.34 deg δ 15.0 deg

Retained Soil
γ **120** pcf
ϕ **30** deg

Foundation Soil
γ **125** pcf
ϕ **30** deg
c' psf

base embedment **12** in
base thickness **9** in
base material **agg**
toe slope **0** H:1V slope

Aggregate Unit Fill
γ **110** pcf

allowable bearing pressure **2,073** psf
(if specified) (net)

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 65 psf
failure plane α 44.62 deg zone of influence 6.71 ft

Analysis

K_a =	0.229	Q_{lh} =	44	lb	ΔK_{AE} =	0.037	e=	0.01 ft
P_h =	122 lb	Q_{lv} =	7	lb	P_{IR} =	14 lb	B_f' =	4.40 ft
P_v =	19 lb	R_s =	945	lb	ΔP_{AEh} =	20 lb	e_{eq}=	0.00 ft
		q_{ult} =	10,182	psf	ΔP_{AEv} =	3 lb	$B_{f\,eq}'$ =	4.41 ft

Results

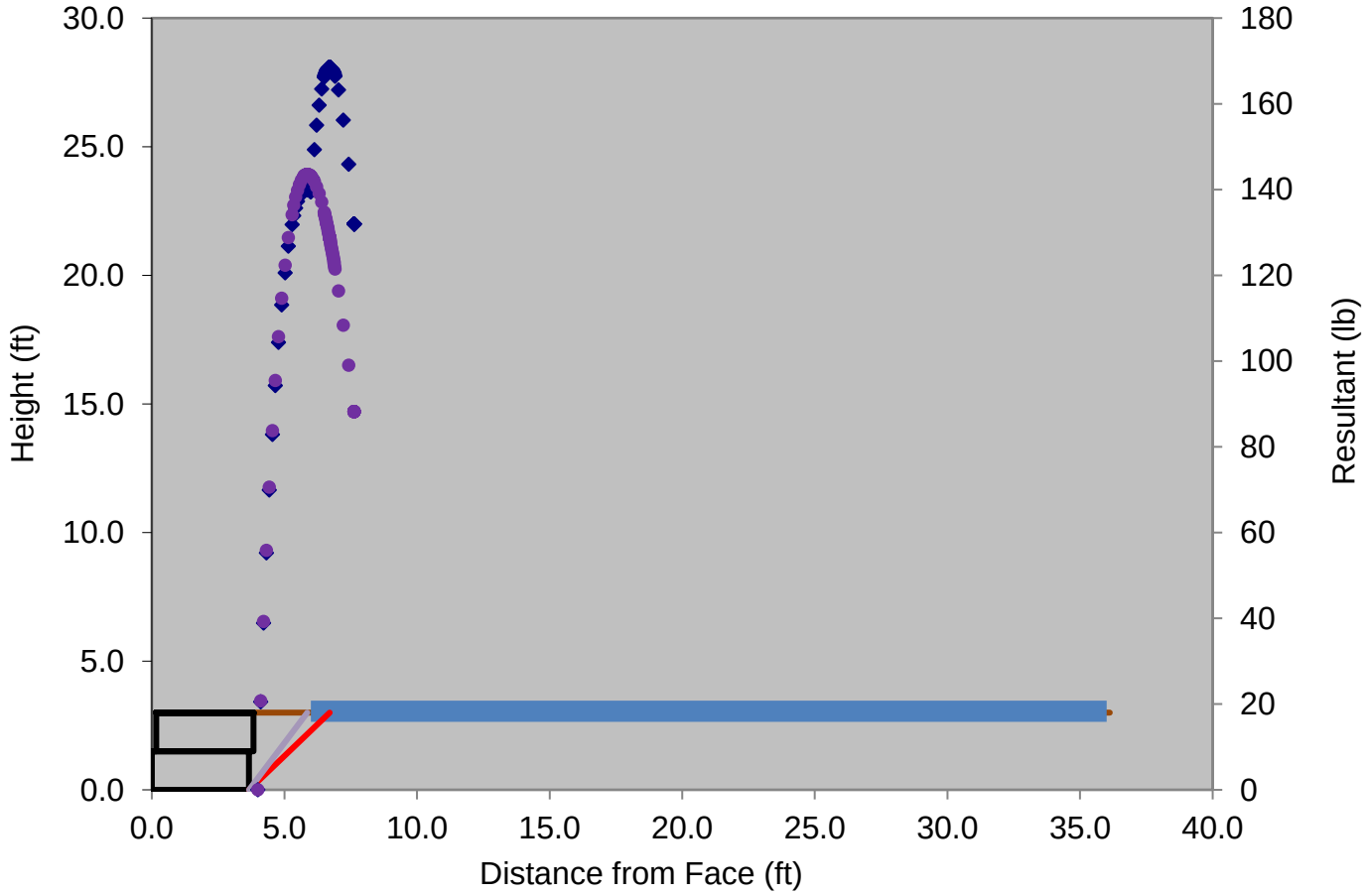
				Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 13.01**	***OK!***	Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 5.68**	***OK!***	Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 188 psf	***OK!***	
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 15.09**	***OK!***	Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 6.43**	***OK!***	Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 186 psf	***OK!***	

STONE STRONG SYSTEMS

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

Ground Surface & Trial Wedge Plot



STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

8/9/24 10:35

Notes Soil properties per Tulmark, LLC Geotechnical Report Dated 7/19/2024
Gloabal Slope Stability By Others

Wall Configuration

			setback (in)		modular units		unit fill		soil wedge		CIP Extension		Internal Stability FS		Seismic Internal FS	
unit	w (in)	h (ft)	face	tail	Wb (lb)	xb (in)	Wa (lb)	xa (in)	Ws (lb)	xs (in)	we (in)	h_t	Topple	Shear	Topple	Shear
6	44.0	1.50	0.0	0.0	375	21.0	301	23.5								
	44.0	1.50	0.0	0.0	375	21.0	301	23.5	0	0.0	676					

External Stability OK!

backfill height 1.50 feet ω= 0.00 deg interface friction angle
exposed height 0.50 feet ω'= 0.00 deg δ 15.0 deg

Retained Soil
γ 120 pcf
ϕ 30 deg

Foundation Soil
γ 125 pcf
ϕ 30 deg
c' psf

base embedment 12 in
base thickness 9 in
base material agg
toe slope 0 H:1V slope

allowable bearing pressure 2,073 psf
(if specified) (net)

Aggregate Unit Fill
γ 110 pcf

composite friction coefficient μ_b 0.69

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name: North Peak Street
Location: Highlands
Job#: 21-54385 Home and Land Development
Section: North Peak Street Wall
Calc by: DDB

Seismic Load Ss 0.10 G site class (A to E or 1) C Fpga 1.20 Fa 1.20 k_h 0.01

Backfill Slope & Surcharge

			rise in grade		LL surcharge		tier height
length 1	6	feet (horizontal)		ft		psf	ft
length 2	30	feet (horizontal)		ft	250	psf	ft
length 3		feet (horizontal)		ft		psf	ft
length 4		feet (horizontal)		ft		psf	

effective slope H:1V slope β 0.0 deg avg q 0 psf
failure plane α 56.86 deg zone of influence 4.65 ft

Analysis

K_a =	0.301	Q_{lh} =	0	lb	ΔK_{AE} =	0.006	e=	-0.01 ft
P_h =	39 lb	Q_{lv} =	0	lb	P_{IR} =	7 lb	B_f' =	4.42 ft
P_v =	11 lb	R_s =	471	lb	ΔP_{AEh} =	1 lb	e_{eq}=	0.00 ft
		q_{ult} =	10,209	psf	ΔP_{AEv} =	0 lb	$B_{f\,eq}'$ =	4.42 ft

Results

					Internal Safety Factors
Overturning:	Desired FS = 1.5	**Actual FS = 59.36**	***OK!***		Desired FS = 1.5
Sliding:	Desired FS = 1.5	**Actual FS = 11.99**	***OK!***		Desired FS = 1.5
Bearing Capacity: (net)	q_{all} = 2,073 psf	q_c = 30 psf	***OK!***		
Seismic Overturning:	Desired FS = 1.13	**Actual FS = 45.96**	***OK!***		Desired FS = 1.13
Seismic Sliding:	Desired FS = 1.13	**Actual FS = 10.05**	***OK!***		Desired FS = 1.13
Seismic Bearing: (net)	q_{all} = 2,764 psf	q_c = 31 psf	***OK!***		

STONE STRONG GRAVITY CALCULATIONS - ver 6.3

Project Name:	North Peak Street
Location:	Highlands
Job#:	21-54385 Home and Land Development
Section:	North Peak Street Wall
Calc by:	DDB

8/9/24 10:35

Ground Surface & Trial Wedge Plot