NORTH TORREY PINES
LIVING & LEARNING NEIGHBORHOOD
San Diego, CA

TEMPORARY SHORING DESIGN REPORT
100% SUBMITTAL

05/23/2018

Revision 0

Prepared For:

CONDON · JOHNSON & ASSOCIATES, INC.
CONTRACTORS AND ENGINEERS

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Prepared By:

PB&A inc.
Structural Engineering
Geo-Structures • Earth Retention

810 5th Ave., Suite 100, San Rafael, CA 94901

FOR: Condon Johnson
JOB: North Torry Pines
JOB NO.: 180200
DESCRIPTION: Temporary Shotcrete
REFERENCE: CBC 2013 & ACI 318-14
LOCATION: San Diego, CA
DATE: 05/22/2018

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Temporary Shotcrete Lagging Design: Input Parameters

$f_c := 4000 \cdot psi$ **(Compressive strength of shotcrete)**

$f_y := 60000 psi$ **(Yield stress of reinforcement)**

$\phi_1 := 0.9$ **(LRFD reduction factor for bending)**

$b := 1 \cdot ft$ **(Linear width of shotcrete)**

$d := 4 \cdot in$ **(Thickness of temporary shotcrete)**

$cc := 2 in$ **(Clear cover)**

$d_e := d - cc = 2.00 \cdot in$ **(Effective thickness, subtract clear cover)**

$$\rho_{min} := 3 \frac{\sqrt{\frac{f_c}{psi}}}{\frac{f_y}{psi}} = 0.0032$$ **(Minimum reinforcement ratio)**

$\phi := 35 deg$ **(Soil Friction Angle)**

$$K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)} = 0.271$$ **(Active Pressure Coefficient)**

$P_{traffic} := 100 psf$ **(Traffic Surcharge)**

Shotcrete Lagging Calculation:

Case 1 (TYPICAL): First Nail @ 3.5 ft Below Top of Wall W/ 1.5 ft BERM

$H := 3.5\text{ft} + 1.5\text{ft} = 5.000\,\text{ft}$ **Maximum depth of excavation**

$Slope := 35 \cdot \text{pcf}$ **Active Pressure for Cantilever**

$PH_{soil} := Slope \cdot H = 175.000 \cdot \text{psf}$ **Soil Active Pressure**

$PH_{surch} := P_{traffic}$ **Traffic surcharge pressure**

$PH := PH_{soil} + PH_{surch} = 275.0 \cdot \text{psf}$ **Total lateral pressure**

$F := \frac{PH \cdot H}{2} \cdot b = 0.7 \cdot \text{kip}$ **Total Lateral Force**

Design of flexural reinforcement

$M_u := 1.6 \cdot F \cdot \frac{H}{3} = 1.833 \cdot \text{kip} \cdot \text{ft}$ **(Ultimate moment)**

$\rho := 0.85 \cdot \frac{f_c}{f_y}\left(1 - \sqrt{1 - \frac{2 \cdot M_u}{\phi_1 \cdot 0.85 \cdot f_c \cdot b \cdot d_e^{\,2}}}\right)$ **(Reinforcement ratio)**

$\rho = 0.00924$ **(Design Reinforcement Ratio)**

$\rho_{design} := \max(\rho, \rho_{min}) = 0.009$

$\max(\rho, \rho_{min}) \cdot b \cdot d_e = 0.222 \cdot \text{in}^2$ **<** $\frac{2 \cdot 0.2\text{in}^2\,1\text{ft}}{6\text{ft}} + 2 \cdot 0.0875\text{in}^2 = 0.242 \cdot \text{in}^2$

Provide 2 - 4x4-W2.9xW2.9

Shotcrete Lagging Calculation:

Case 2: First Nail @ 4.5 ft Below Top of Wall W/ 1.5 ft BERM

$H := 4.5\text{ft} + 1.5\text{ft} = 6.000\,\text{ft}$ **Maximum depth of excavation**

$Slope := 35 \cdot \text{pcf}$ **Active Pressure for Cantilever**

$PH_{soil} := Slope \cdot H = 210.000 \cdot \text{psf}$ **Soil Active Pressure**

$PH_{surch} := P_{traffic}$ **Traffic surcharge pressure**

$PH := PH_{soil} + PH_{surch} = 310.0 \cdot \text{psf}$ **Total lateral pressure**

$F := \frac{PH \cdot H}{2} \cdot b = 0.9 \cdot \text{kip}$ **Total Lateral Force**

Design of flexural reinforcement

$M_u := 1.6 \cdot F \cdot \frac{H}{3} = 2.976 \cdot \text{kip} \cdot \text{ft}$ **(Ultimate moment)**

$\rho := 0.85 \cdot \frac{f_c}{f_y}\left(1 - \sqrt{1 - \frac{2 \cdot M_u}{\phi_1 \cdot 0.85 \cdot f_c \cdot b \cdot d_e^{\,2}}}\right)$ **(Reinforcement ratio)**

$\rho = 0.01605$ **(Design Reinforcement Ratio)**

$\rho_{design} := \max(\rho, \rho_{min}) = 0.016$

$\max(\rho, \rho_{min}) \cdot b \cdot d_e = 0.385 \cdot \text{in}^2$ **<** $0.31\text{in}^2 + 0.0875\text{in}^2 = 0.397 \cdot \text{in}^2$

Provide #5 @ 12" O.C. + 4x4-W2.9xW2.9

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 1-17 FT - 3 LEVELS.snz

Run Date: 05/22/18

Run Time: 14:25:52

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 18 FT

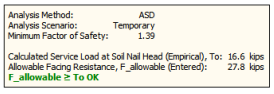
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 18.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 6.00 feet

Number of Soil Nail Rows: 3

Soil Nail Design Parameters: Varying

No.	Soil Nail Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	15.00	20	3.50	6.00	0.875	75.0
2	10.00	15	6.00	6.00	0.875	75.0
3	10.00	15	6.00	6.00	0.875	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	27.8			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

	Distance from Top of Wall		Load	Load
	Begin	End	Begin	End
No.	feet	feet	psf	psf
1	2.50	22.50	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 30.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

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Results

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Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.39

Found at Search Point: 6

Found at Grid Point: 40

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 16.6 kips

Allowable Facing Resistance, F_allowable (Entered): 27.8 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 16.6 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
Search Point	Factor of Safety	From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.29	2.30	74.81	7.90	88.85	11.44	1	41.7	Bar Yield
							2	35.4	Pullout
							3	41.7	Bar Yield
2	1.78	5.07	68.25	12.31	86.20	7.64	1	41.7	Bar Yield
							2	30.8	Pullout
							3	40.9	Pullout
3	1.54	7.84	61.26	13.04	78.38	7.78	1	36.9	Pullout
							2	26.1	Pullout
							3	39.6	Pullout
4	1.43	10.61	57.00	13.64	67.34	8.26	1	31.4	Pullout
							2	23.2	Pullout
							3	38.7	Pullout
5	1.39	13.38	49.89	12.46	60.68	10.93	1	24.6	Pullout
							2	17.8	Pullout
							3	37.1	Pullout

** 6	1.39	16.15	44.52	13.59	55.87	11.51	1	17.4	Pullout
							2	13.4	Pullout
							3	35.8	Pullout
7	1.41	18.92	40.01	14.82	51.55	12.17	1	10.7	Pullout
							2	9.3	Pullout
							3	34.6	Pullout
8	1.45	21.69	41.31	28.88	0.00	0.00	1	11.7	Pullout
							2	10.5	Pullout
							3	35.0	Pullout
9	1.51	24.46	37.93	31.01	0.00	0.00	1	6.8	Pullout
							2	7.2	Pullout
							3	34.0	Pullout
10	1.58	27.23	34.99	33.24	0.00	0.00	1	2.2	Pullout
							2	4.1	Pullout
							3	33.1	Pullout
11	1.66	30.00	32.43	35.54	0.00	0.00	1	0.0	Pullout
							2	1.2	Pullout
							3	32.2	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 2- 21 FT - 4 LEVELS.snz

Run Date: 05/22/18

Run Time: 14:28:40

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

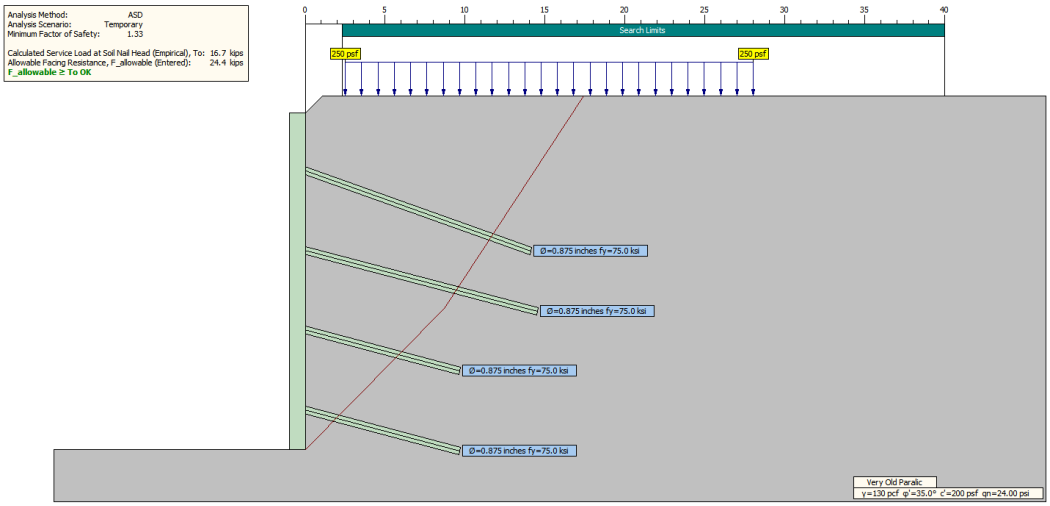
Wall No.: UP TO 21 FT

Structure No.:

Station:

Engineer: BM

Designer



Comments:

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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 21.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 4

Soil Nail Design Parameters: Varying

No.	Soil Nail Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	15.00	20	3.50	6.00	0.875	75.0
2	15.00	15	5.00	6.00	0.875	75.0
3	10.00	15	5.00	6.00	0.875	75.0
4	10.00	15	5.00	6.00	0.875	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	End psf
1	2.50	28.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 40.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

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Results

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Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.33

Found at Search Point: 5

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 16.7 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

		Nominal Pullout Resistance
Layer	Description	klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 16.7 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
Search Point	Factor of Safety	From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.33	2.30	79.37	11.22	88.81	11.03	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	38.9	Pullout
							4	41.7	Bar Yield
2	1.71	6.07	66.24	12.05	83.72	11.10	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	31.3	Pullout
							4	40.5	Pullout
3	1.51	9.84	56.22	10.62	73.44	13.81	1	30.9	Pullout
							2	37.4	Pullout
							3	25.3	Pullout
							4	38.5	Pullout
4	1.38	13.61	52.36	11.14	62.79	14.88	1	22.1	Pullout
							2	32.0	Pullout
							3	22.7	Pullout

							4	37.7	Pullout
**	5	1.33	17.38	45.44	12.38	56.71	15.83	1	11.9	Pullout
							2	23.6	Pullout
							3	17.8	Pullout
							4	36.0	Pullout
	6	1.33	21.15	39.84	13.77	51.38	16.94	1	2.6	Pullout
							2	15.7	Pullout
							3	13.3	Pullout
							4	34.5	Pullout
	7	1.36	24.92	41.52	33.28	0.00	0.00	1	0.4	Pullout
							2	17.1	Pullout
							3	14.7	Pullout
							4	35.0	Pullout
	8	1.44	28.69	37.56	36.19	0.00	0.00	1	0.0	Pullout
							2	11.4	Pullout
							3	11.3	Pullout
							4	33.9	Pullout
	9	1.54	32.46	34.20	39.25	0.00	0.00	1	0.0	Pullout
							2	6.1	Pullout
							3	8.2	Pullout

							4	32.8	Pullout
10	1.64	36.23	31.34	42.42	0.00	0.00	1	0.0	Pullout
							2	1.1	Pullout
							3	5.2	Pullout
							4	31.8	Pullout
11	1.76	40.00	28.88	45.68	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	2.4	Pullout
							4	30.9	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 3 - 26 FT - 5 LEVELS.snz

Run Date: 05/22/18

Run Time: 14:30:12

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 26 FT

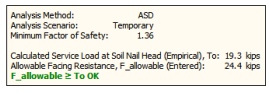
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 26.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	2.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 5

Soil Nail Design Parameters: Varying

No.	Soil Nail Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	25.00	20	3.50	6.00	0.875	75.0
2	20.00	15	5.00	6.00	0.875	75.0
3	15.00	15	5.00	6.00	0.875	75.0
4	15.00	15	5.00	6.00	0.875	75.0
5	10.00	15	5.00	6.00	0.875	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	Distance from Top of Wall End feet	Load Begin psf	Load End psf
1	2.50	34.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 40.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

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Results

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Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.36

Found at Search Point: 5

Found at Grid Point: 40

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 19.3 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 19.3 kips (Clouterre)

			Failure Planes				Reinforcement		
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.24	2.30	79.44	11.30	89.21	16.66	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
2	1.63	6.07	69.07	11.89	83.76	16.76	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.1	Pullout
3	1.44	9.84	66.11	12.15	73.55	17.37	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield

							5	40.5	Pullout
4	1.37	13.61	59.54	16.11	68.59	14.91	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	38.0	Pullout
							4	41.7	Bar Yield
							5	39.2	Pullout
** 5	1.36	17.38	53.09	17.36	63.40	15.53	1	41.7	Bar Yield
							2	39.9	Pullout
							3	31.2	Pullout
							4	41.7	Bar Yield
							5	37.8	Pullout
6	1.37	21.15	47.57	18.81	58.65	16.26	1	41.7	Bar Yield
							2	30.4	Pullout
							3	24.8	Pullout
							4	41.7	Bar Yield
							5	36.6	Pullout
7	1.38	24.92	42.88	20.40	54.32	17.09	1	32.3	Pullout
							2	21.9	Pullout
							3	18.9	Pullout
							4	38.4	Pullout
							5	35.4	Pullout

8	1.39	28.69	38.89	22.12	50.42	18.01	1	23.0	Pullout
							2	14.2	Pullout
							3	13.3	Pullout
							4	35.1	Pullout
							5	34.3	Pullout
9	1.41	32.46	35.48	23.92	46.92	19.01	1	14.2	Pullout
							2	6.9	Pullout
							3	8.2	Pullout
							4	32.0	Pullout
							5	33.2	Pullout
10	1.45	36.23	32.57	25.79	43.77	20.07	1	5.9	Pullout
							2	0.1	Pullout
							3	3.3	Pullout
							4	29.1	Pullout
							5	32.3	Pullout
11	1.51	40.00	34.77	48.69	0.00	0.00	1	10.7	Pullout
							2	5.3	Pullout
							3	7.0	Pullout
							4	31.3	Pullout
							5	33.0	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 4 - 31 FT - 6 LEVELS .snz

Run Date: 05/22/18

Run Time: 14:33:16

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 31 FT

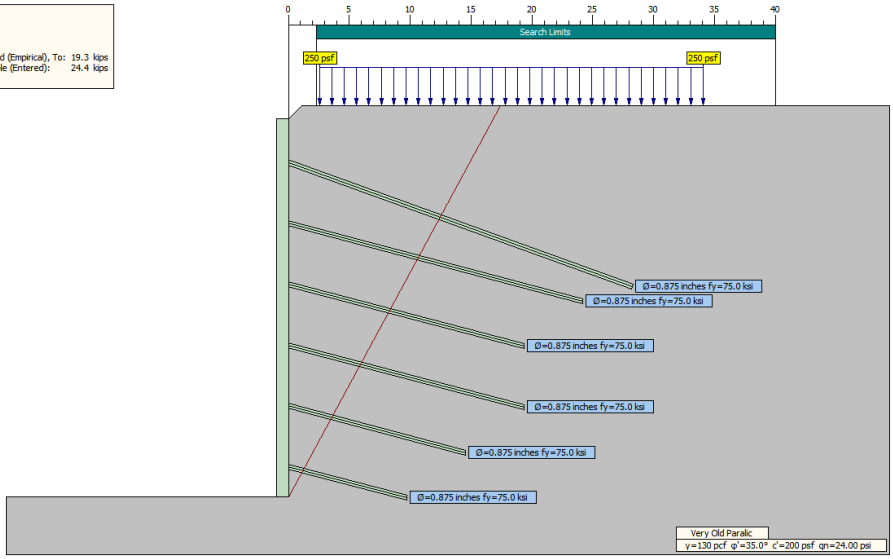
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 31.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 5 feet

Number of Soil Nail Rows: 6

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	30.00	20	3.50	6.00	0.875	75.0
2	25.00	15	5.00	6.00	0.875	75.0
3	20.00	15	5.00	6.00	0.875	75.0
4	20.00	15	5.00	6.00	0.875	75.0
5	15.00	15	5.00	6.00	0.875	75.0
6	10.00	15	5.00	6.00	0.875	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

==========

Loads

==========

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

	Distance from Top of Wall		Load	Load
	Begin	End	Begin	End
No.	feet	feet	psf	psf
1	2.50	34.00	250	250

==========

Factors of Safety

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	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

==========

Search Options

==========

Search Limits:

Begin: 2.30 feet

End: 40.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.27

Found at Search Point: 5

Found at Grid Point: 55

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 19.3 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 19.3 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
Search Point	Factor of Safety	From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.17	2.30	82.64	16.16	89.18	16.03	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
2	1.53	6.07	73.15	16.75	85.67	16.08	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
3	1.34	9.84	67.75	20.78	81.28	12.97	1	41.7	Bar Yield
							2	41.7	Bar Yield

							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	40.8	Pullout
	4	1.27	13.61	63.65	21.47	72.34	13.46	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	40.0	Pullout
**	5	1.27	17.38	61.54	36.47	0.00	0.00	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	39.6	Pullout
	6	1.30	21.15	56.59	38.41	0.00	0.00	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	38.6	Pullout
7	1.34	24.92	52.14	40.61	0.00	0.00	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	37.7	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	37.6	Pullout
8	1.37	28.69	42.96	23.52	54.40	19.71	1	38.5	Pullout
							2	27.2	Pullout
							3	22.1	Pullout
							4	41.6	Pullout
							5	38.5	Pullout
							6	35.4	Pullout
9	1.37	32.46	39.46	25.22	50.99	20.63	1	28.7	Pullout
							2	17.9	Pullout
							3	15.3	Pullout
							4	36.7	Pullout
							5	35.6	Pullout
							6	34.4	Pullout
10	1.39	36.23	36.41	27.01	47.89	21.61	1	19.4	Pullout

							2	9.1	Pullout
							3	8.9	Pullout
							4	32.2	Pullout
							5	32.8	Pullout
							6	33.5	Pullout
11	1.42	40.00	33.74	28.86	45.05	22.65	1	10.5	Pullout
							2	0.5	Pullout
							3	2.9	Pullout
							4	27.9	Pullout
							5	30.3	Pullout
							6	32.7	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 5 - 36 FT - 7 LEVELS.snz

Run Date: 05/22/18

Run Time: 14:35:06

==========

Project Information

==========

Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 36 FT

Structure No.:

Station:

Engineer: BM

Designer

Comments:

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Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 36.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 7

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	30.00	20	3.50	6.00	1.000	75.0
2	30.00	15	5.00	6.00	1.000	75.0
3	30.00	15	5.00	6.00	1.000	75.0
4	20.00	15	5.00	6.00	1.000	75.0
5	20.00	15	5.00	6.00	1.000	75.0
6	15.00	15	5.00	6.00	1.000	75.0
7	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

	Distance from Top of Wall		Load	Load
	Begin	End	Begin	End
No.	feet	feet	psf	psf
1	2.50	40.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 60.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

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Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.29

Found at Search Point: 7

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 18.8 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 18.8 kips (Clouterre)

			Failure Planes				Reinforcement		
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.17	2.30	79.45	11.31	89.49	25.94	1	39.4	Facing
							2	39.0	Facing
							3	38.8	Facing
							4	38.7	Facing
							5	38.5	Facing
							6	35.8	Facing
							7	32.7	Facing
2	1.51	8.07	70.79	19.62	85.02	18.60	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	39.6	Facing

							7	31.7	Pullout
3	1.34	13.84	60.74	16.99	76.02	22.92	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	39.0	Pullout
							5	41.7	Bar Yield
							6	38.8	Pullout
							7	30.2	Pullout
4	1.29	19.61	56.52	17.77	66.21	24.30	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	34.0	Pullout
							5	41.7	Bar Yield
							6	36.8	Pullout
							7	29.5	Pullout
5	1.30	25.38	51.38	28.46	62.82	16.67	1	32.3	Pullout
							2	39.3	Pullout
							3	41.7	Bar Yield
							4	27.9	Pullout
							5	39.7	Pullout
							6	34.2	Pullout

							7	28.7	Pullout
6	1.29	31.15	43.59	21.50	54.99	27.15	1	21.8	Pullout
							2	30.0	Pullout
							3	40.6	Pullout
							4	17.8	Pullout
							5	32.5	Pullout
							6	29.8	Pullout
							7	27.2	Pullout
** 7	1.29	36.92	38.77	23.68	50.30	28.90	1	10.1	Pullout
							2	18.9	Pullout
							3	31.0	Pullout
							4	10.7	Pullout
							5	27.4	Pullout
							6	26.8	Pullout
							7	26.2	Pullout
8	1.31	42.69	34.78	25.99	46.17	30.82	1	0.0	Pullout
							2	8.3	Pullout
							3	22.0	Pullout
							4	4.1	Pullout
							5	22.7	Pullout
							6	24.0	Pullout

							7	25.3	Pullout
9	1.36	48.46	37.41	61.01	0.00	0.00	1	0.0	Pullout
							2	8.4	Pullout
							3	25.7	Pullout
							4	8.5	Pullout
							5	25.8	Pullout
							6	25.9	Pullout
							7	25.9	Pullout
10	1.42	54.23	34.35	65.68	0.00	0.00	1	0.0	Pullout
							2	0.3	Pullout
							3	19.1	Pullout
							4	3.3	Pullout
							5	22.1	Pullout
							6	23.6	Pullout
							7	25.2	Pullout
11	1.50	60.00	31.70	70.52	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	12.8	Pullout
							4	0.0	Pullout
							5	18.6	Pullout
							6	21.5	Pullout

7	24.5	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 6 - 41 FT - 8 LEVELS.snz

Run Date: 05/22/18

Run Time: 14:40:21

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

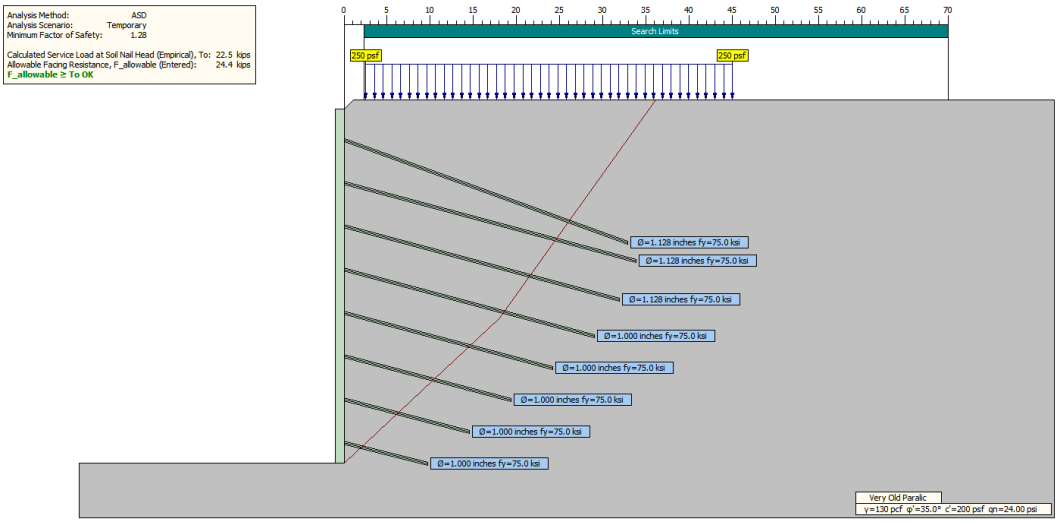
Wall No.: UP TO 41 FT

Structure No.:

Station:

Engineer: BM

Designer



Comments:

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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 41.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 8

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	35.00	20	3.50	6.00	1.128	75.0
2	35.00	15	5.00	6.00	1.128	75.0
3	33.00	15	5.00	6.00	1.128	75.0
4	30.00	15	5.00	6.00	1.000	75.0
5	25.00	15	5.00	6.00	1.000	75.0
6	20.00	15	5.00	6.00	1.000	75.0
7	15.00	15	5.00	6.00	1.000	75.0
8	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

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Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	2.50	45.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 70.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.28

Found at Search Point: 6

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 22.5 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf

1 Very Old Paralic 5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 22.5 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.10	2.30	82.99	16.95	89.48	25.24	1	30.9	Facing
							2	30.6	Facing
							3	30.5	Facing
							4	38.6	Facing
							5	38.5	Facing
							6	36.4	Facing
							7	34.3	Facing
							8	32.1	Facing
2	1.40	9.07	72.08	26.52	86.92	16.85	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	41.7	Bar Yield
							7	39.1	Facing
							8	31.9	Pullout
3	1.31	15.84	62.20	23.77	77.27	21.56	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	39.4	Pullout
							8	30.4	Pullout
4	1.29	22.61	57.18	25.03	66.73	22.89	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	37.1	Pullout
							8	29.6	Pullout
5	1.30	29.38	50.03	27.44	60.80	24.09	1	30.6	Pullout
							2	36.3	Pullout

							3	37.7	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	38.5	Pullout
							7	33.5	Pullout
							8	28.4	Pullout
** 6	1.28	36.15	42.95	24.69	54.39	31.04	1	19.7	Pullout
							2	25.9	Pullout
							3	29.0	Pullout
							4	37.2	Pullout
							5	34.2	Pullout
							6	31.8	Pullout
							7	29.5	Pullout
							8	27.1	Pullout
7	1.28	42.92	36.32	21.31	48.83	39.12	1	9.7	Pullout
							2	16.3	Pullout
							3	20.9	Pullout
							4	28.9	Pullout
							5	24.3	Pullout
							6	24.5	Pullout
							7	25.1	Pullout

							8	25.6	Pullout
8	1.31	49.69	34.11	30.01	45.45	35.41	1	0.0	Pullout
							2	5.4	Pullout
							3	11.0	Pullout
							4	18.5	Pullout
							5	20.2	Pullout
							6	21.8	Pullout
							7	23.4	Pullout
							8	25.1	Pullout
9	1.36	56.46	36.69	70.40	0.00	0.00	1	0.0	Pullout
							2	4.8	Pullout
							3	13.3	Pullout
							4	24.2	Pullout
							5	24.6	Pullout
							6	25.0	Pullout
							7	25.3	Pullout
							8	25.7	Pullout
10	1.42	63.23	33.63	75.94	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	6.8	Pullout
							4	17.4	Pullout

							5	19.3	Pullout
							6	21.2	Pullout
							7	23.1	Pullout
							8	25.0	Pullout
11	1.50	70.00	31.00	81.66	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	0.6	Pullout
							4	11.0	Pullout
							5	14.3	Pullout
							6	17.6	Pullout
							7	21.0	Pullout
							8	24.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: SCHEDULE 7 - 23 FT - 5 LEVELS (Building Surcharge).snz

Run Date: 05/22/18

Run Time: 14:40:58

==========

Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 23 FT WITH BUI

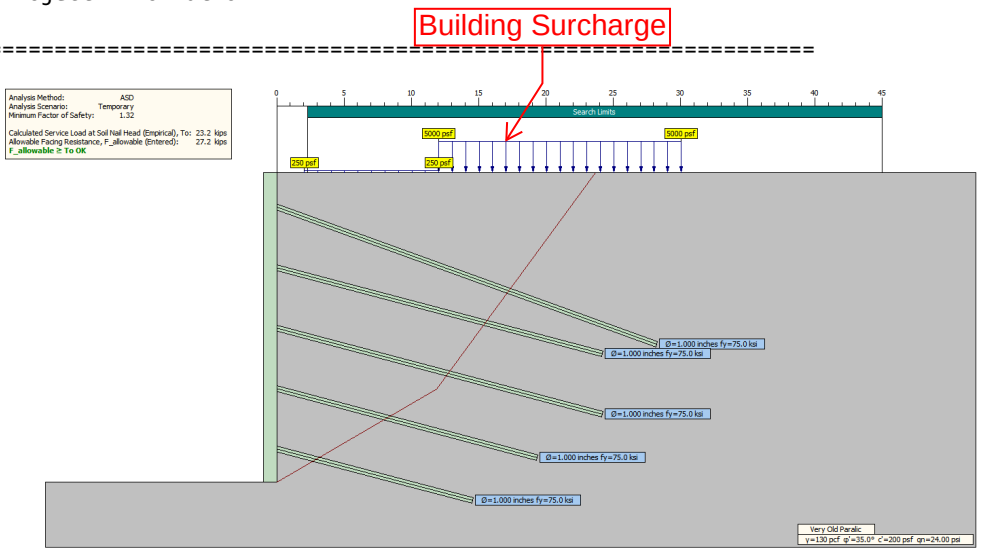
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 23.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	0.00
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing: 4.50 feet

Number of Soil Nail Rows: 5

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	30.00	20	2.50	5.00	1.000	75.0
2	25.00	15	4.50	5.00	1.000	75.0
3	25.00	15	4.50	5.00	1.000	75.0
4	20.00	15	4.50	5.00	1.000	75.0
5	15.00	15	4.50	5.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	27.2			kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	Distance from Top of Wall End feet	Load Begin psf	Load End psf
1	12.00	30.00	5000	5000
2	2.00	12.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 45.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.32

Found at Search Point: 6

Found at Grid Point: 28

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 23.2 kips

Allowable Facing Resistance, F_allowable (Entered): 27.2 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 23.2 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.62	2.30	77.32	9.43	89.05	13.80	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	39.9	Facing
							5	36.5	Facing
2	2.47	6.57	66.81	15.01	85.92	9.22	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	38.1	Facing
3	2.75	10.84	50.49	11.93	76.74	14.18	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield

								5	40.7	Facing
	4	1.60	15.11	43.57	16.68	75.28	11.89	1	41.7	Bar Yield
								2	41.7	Bar Yield
								3	41.7	Bar Yield
								4	41.7	Bar Yield
								5	41.7	Bar Yield
	5	1.37	19.38	30.69	13.52	64.29	17.87	1	41.7	Bar Yield
								2	35.7	Pullout
								3	41.7	Bar Yield
								4	40.0	Pullout
								5	41.5	Pullout
**	6	1.32	23.65	30.26	13.69	53.70	19.98	1	40.4	Pullout
								2	31.1	Pullout
								3	40.9	Pullout
								4	39.7	Pullout
								5	41.3	Pullout
	7	1.34	27.92	11.64	11.40	51.02	26.63	1	30.1	Pullout
								2	21.0	Pullout
								3	31.7	Pullout
								4	25.1	Pullout

							5	33.0	Pullout
8	1.44	32.19	10.13	13.08	46.98	28.31	1	21.7	Pullout
							2	13.0	Pullout
							3	25.0	Pullout
							4	19.7	Pullout
							5	31.8	Pullout
9	1.58	36.46	11.88	11.18	39.04	32.86	1	18.9	Pullout
							2	11.6	Pullout
							3	26.5	Pullout
							4	24.1	Pullout
							5	33.1	Pullout
10	1.70	40.73	10.66	12.43	35.98	35.23	1	12.3	Pullout
							2	5.2	Pullout
							3	21.4	Pullout
							4	20.3	Pullout
							5	32.2	Pullout
11	1.85	45.00	0.00	9.00	32.57	42.72	1	7.4	Pullout
							2	0.6	Pullout
							3	18.3	Pullout
							4	18.8	Pullout
							5	19.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: 89-92&96-120.snz

Run Date: 05/22/18

Run Time: 15:00:24

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Project Information

==========

Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 41 FT(89-92,96-120)

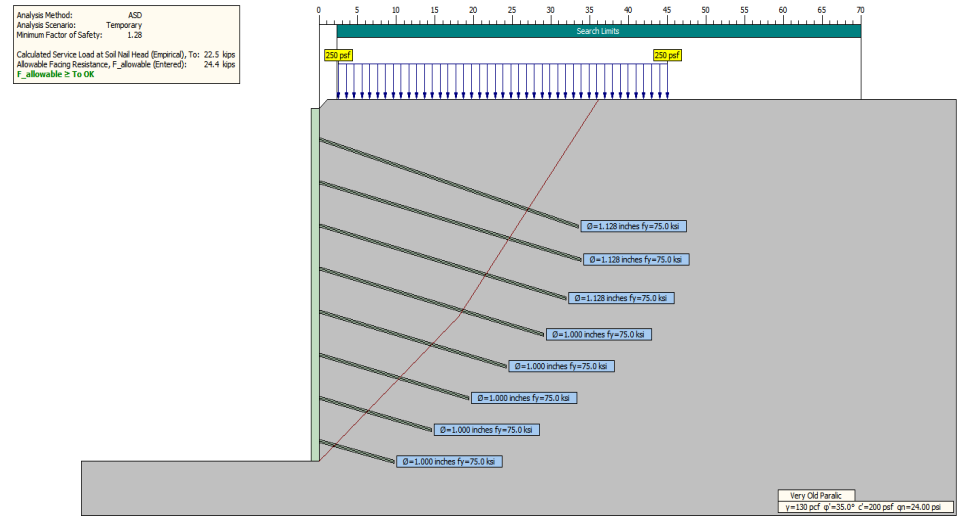
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 41.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 8

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	35.00	17	3.50	6.00	1.128	75.0
2	35.00	15	5.00	6.00	1.128	75.0
3	33.00	15	5.00	6.00	1.128	75.0
4	30.00	15	5.00	6.00	1.000	75.0
5	25.00	15	5.00	6.00	1.000	75.0
6	20.00	15	5.00	6.00	1.000	75.0
7	15.00	15	5.00	6.00	1.000	75.0
8	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

==========

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	End psf
1	2.50	45.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 70.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.28

Found at Search Point: 6

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 22.5 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf

1 Very Old Paralic 5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 22.5 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.14	2.30	82.99	16.95	89.48	25.24	1	30.8	Facing
							2	30.6	Facing
							3	30.5	Facing
							4	38.6	Facing
							5	38.5	Facing
							6	36.4	Facing
							7	34.3	Facing
							8	32.1	Facing
2	1.42	9.07	72.08	26.52	86.92	16.85	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	41.7	Bar Yield
							7	39.1	Facing
							8	31.9	Pullout
3	1.32	15.84	62.20	23.77	77.27	21.56	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	39.4	Pullout
							8	30.4	Pullout
4	1.30	22.61	57.18	25.03	66.73	22.89	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	37.1	Pullout
							8	29.6	Pullout
5	1.30	29.38	50.03	27.44	60.80	24.09	1	30.0	Pullout
							2	36.3	Pullout

							3	37.7	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	38.5	Pullout
							7	33.5	Pullout
							8	28.4	Pullout
** 6	1.28	36.15	42.95	24.69	54.39	31.04	1	18.4	Pullout
							2	25.9	Pullout
							3	29.0	Pullout
							4	37.2	Pullout
							5	34.2	Pullout
							6	31.8	Pullout
							7	29.5	Pullout
							8	27.1	Pullout
7	1.28	42.92	36.32	21.31	48.83	39.12	1	7.8	Pullout
							2	16.3	Pullout
							3	20.9	Pullout
							4	28.9	Pullout
							5	24.3	Pullout
							6	24.5	Pullout
							7	25.1	Pullout

							8	25.6	Pullout
8	1.31	49.69	34.11	30.01	45.45	35.41	1	0.0	Pullout
							2	5.4	Pullout
							3	11.0	Pullout
							4	18.5	Pullout
							5	20.2	Pullout
							6	21.8	Pullout
							7	23.4	Pullout
							8	25.1	Pullout
9	1.36	56.46	36.69	70.40	0.00	0.00	1	0.0	Pullout
							2	4.8	Pullout
							3	13.3	Pullout
							4	24.2	Pullout
							5	24.6	Pullout
							6	25.0	Pullout
							7	25.3	Pullout
							8	25.7	Pullout
10	1.42	63.23	33.63	75.94	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	6.8	Pullout
							4	17.4	Pullout

							5	19.3	Pullout
							6	21.2	Pullout
							7	23.1	Pullout
							8	25.0	Pullout
11	1.50	70.00	31.00	81.66	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	0.6	Pullout
							4	11.0	Pullout
							5	14.3	Pullout
							6	17.6	Pullout
							7	21.0	Pullout
							8	24.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

==========

File Name: 93-95.snz

Run Date: 05/22/18

Run Time: 14:51:48

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 41 FT (93-95)

Structure No.:

Station:

Engineer: BM

Designer

Comments:

==========

Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 41.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 8

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	35.00	23	3.50	6.00	1.128	75.0
2	35.00	15	5.00	6.00	1.128	75.0
3	33.00	15	5.00	6.00	1.128	75.0
4	30.00	15	5.00	6.00	1.000	75.0
5	25.00	15	5.00	6.00	1.000	75.0
6	20.00	15	5.00	6.00	1.000	75.0
7	15.00	15	5.00	6.00	1.000	75.0
8	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

==========

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	2.50	45.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 70.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.28

Found at Search Point: 6

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 22.5 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf

1 Very Old Paralic 5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 22.5 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.06	2.30	82.99	16.95	89.48	25.24	1	31.1	Facing
							2	30.6	Facing
							3	30.5	Facing
							4	38.6	Facing
							5	38.5	Facing
							6	36.4	Facing
							7	34.3	Facing
							8	32.1	Facing
2	1.38	9.07	72.08	26.52	86.92	16.85	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	41.7	Bar Yield
							7	39.1	Facing
							8	31.9	Pullout
3	1.30	15.84	62.20	23.77	77.27	21.56	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	39.4	Pullout
							8	30.4	Pullout
4	1.29	22.61	57.18	25.03	66.73	22.89	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	37.1	Pullout
							8	29.6	Pullout
5	1.29	29.38	50.03	27.44	60.80	24.09	1	31.1	Pullout
							2	36.3	Pullout

							3	37.7	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	38.5	Pullout
							7	33.5	Pullout
							8	28.4	Pullout
** 6	1.28	36.15	42.95	24.69	54.39	31.04	1	20.7	Pullout
							2	25.9	Pullout
							3	29.0	Pullout
							4	37.2	Pullout
							5	34.2	Pullout
							6	31.8	Pullout
							7	29.5	Pullout
							8	27.1	Pullout
7	1.28	42.92	36.32	21.31	48.83	39.12	1	11.3	Pullout
							2	16.3	Pullout
							3	20.9	Pullout
							4	28.9	Pullout
							5	24.3	Pullout
							6	24.5	Pullout
							7	25.1	Pullout

							8	25.6	Pullout
8	1.31	49.69	34.11	30.01	45.45	35.41	1	1.0	Pullout
							2	5.4	Pullout
							3	11.0	Pullout
							4	18.5	Pullout
							5	20.2	Pullout
							6	21.8	Pullout
							7	23.4	Pullout
							8	25.1	Pullout
9	1.36	56.46	36.69	70.40	0.00	0.00	1	0.4	Pullout
							2	4.8	Pullout
							3	13.3	Pullout
							4	24.2	Pullout
							5	24.6	Pullout
							6	25.0	Pullout
							7	25.3	Pullout
							8	25.7	Pullout
10	1.42	63.23	33.63	75.94	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	6.8	Pullout
							4	17.4	Pullout

							5	19.3	Pullout
							6	21.2	Pullout
							7	23.1	Pullout
							8	25.0	Pullout
11	1.50	70.00	31.00	81.66	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	0.6	Pullout
							4	11.0	Pullout
							5	14.3	Pullout
							6	17.6	Pullout
							7	21.0	Pullout
							8	24.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: 136-139.snz

Run Date: 05/22/18

Run Time: 15:13:43

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Project Information

==========

Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 41 FT(136-139)

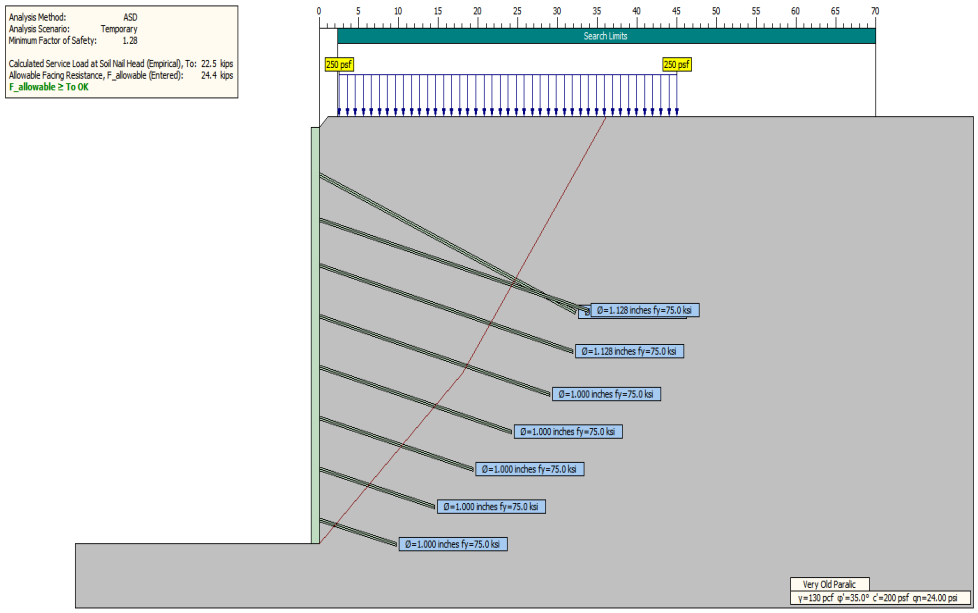
Structure No.:

Station:

Engineer: BM

Designer

Comments:



==========

Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 41.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 8

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	35.00	23	4.50	6.00	1.128	75.0
2	35.00	15	4.50	6.00	1.128	75.0
3	33.00	15	4.50	6.00	1.128	75.0
4	30.00	15	5.00	6.00	1.000	75.0
5	25.00	15	5.00	6.00	1.000	75.0
6	20.00	15	5.00	6.00	1.000	75.0
7	15.00	15	5.00	6.00	1.000	75.0
8	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

==========

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

	Distance from Top of Wall		Load	Load
	Begin	End	Begin	End
No.	feet	feet	psf	psf
1	2.50	45.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 70.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.28

Found at Search Point: 6

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 22.5 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf

1 Very Old Paralic 5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 22.5 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.06	2.30	82.99	16.95	89.48	25.24	1	31.0	Facing
							2	30.6	Facing
							3	30.5	Facing
							4	38.6	Facing
							5	38.5	Facing
							6	36.4	Facing
							7	34.3	Facing
							8	32.1	Facing
2	1.38	9.07	72.08	26.52	86.92	16.85	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	41.7	Bar Yield
							7	39.1	Facing
							8	31.9	Pullout
3	1.30	15.84	62.20	23.77	77.27	21.56	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	39.4	Pullout
							8	30.4	Pullout
4	1.29	22.61	57.18	25.03	66.73	22.89	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	37.1	Pullout
							8	29.6	Pullout
5	1.30	29.38	50.82	32.56	62.35	18.99	1	31.2	Pullout
							2	35.6	Pullout

							3	37.9	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	39.2	Pullout
							7	33.9	Pullout
							8	28.6	Pullout
** 6	1.28	36.15	42.95	24.69	54.39	31.04	1	22.3	Pullout
							2	26.8	Pullout
							3	29.0	Pullout
							4	37.2	Pullout
							5	34.2	Pullout
							6	31.8	Pullout
							7	29.5	Pullout
							8	27.1	Pullout
7	1.29	42.92	36.32	21.31	48.83	39.12	1	13.2	Pullout
							2	17.3	Pullout
							3	20.9	Pullout
							4	28.9	Pullout
							5	24.3	Pullout
							6	24.5	Pullout
							7	25.1	Pullout

							8	25.6	Pullout
8	1.32	49.69	35.20	36.48	46.62	28.94	1	1.5	Pullout
							2	4.9	Pullout
							3	10.2	Pullout
							4	21.0	Pullout
							5	22.1	Pullout
							6	23.2	Pullout
							7	24.3	Pullout
							8	25.4	Pullout
9	1.37	56.46	36.69	70.40	0.00	0.00	1	3.0	Pullout
							2	6.2	Pullout
							3	13.3	Pullout
							4	24.2	Pullout
							5	24.6	Pullout
							6	25.0	Pullout
							7	25.3	Pullout
							8	25.7	Pullout
10	1.42	63.23	33.63	75.94	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	6.8	Pullout
							4	17.4	Pullout

							5	19.3	Pullout
							6	21.2	Pullout
							7	23.1	Pullout
							8	25.0	Pullout
11	1.50	70.00	31.00	81.66	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	0.6	Pullout
							4	11.0	Pullout
							5	14.3	Pullout
							6	17.6	Pullout
							7	21.0	Pullout
							8	24.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: 140-148.snz

Run Date: 05/22/18

Run Time: 14:54:45

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 41 FT(140-148)

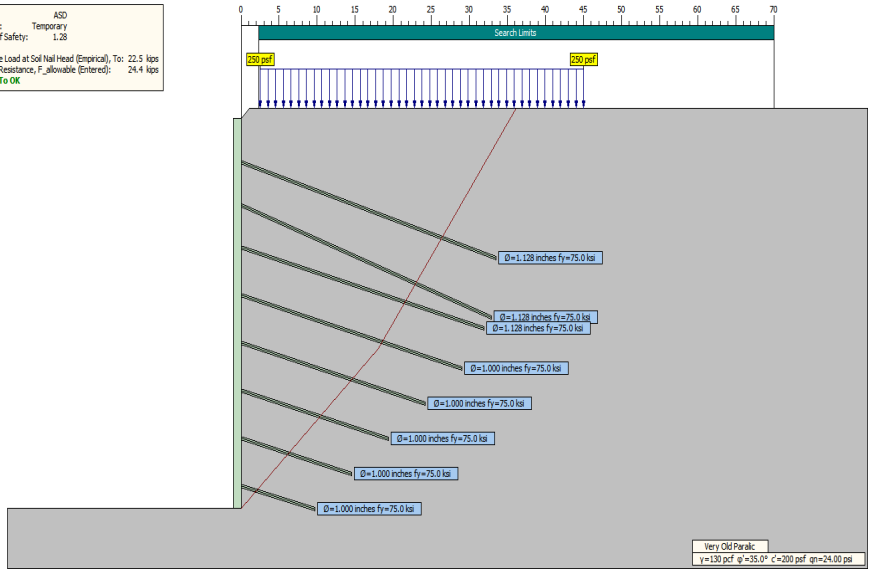
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 41.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 8

Soil Nail Design Parameters: Varying

Soil Nail No.	Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	35.00	17	4.50	6.00	1.128	75.0
2	35.00	20	4.50	6.00	1.128	75.0
3	33.00	15	4.50	6.00	1.128	75.0
4	30.00	15	5.00	6.00	1.000	75.0
5	25.00	15	5.00	6.00	1.000	75.0
6	20.00	15	5.00	6.00	1.000	75.0
7	15.00	15	5.00	6.00	1.000	75.0
8	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

==========

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	2.50	45.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 70.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.28

Found at Search Point: 6

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 22.5 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf

1 Very Old Paralic 5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 22.5 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
	Factor	From Toe							Controlling
Search Point	of Safety	of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Resistance Failure Mode
1	2.07	2.30	82.99	16.95	89.48	25.24	1	30.8	Facing
							2	30.8	Facing
							3	30.5	Facing
							4	38.6	Facing
							5	38.5	Facing
							6	36.4	Facing
							7	34.3	Facing
							8	32.1	Facing
2	1.39	9.07	72.08	26.52	86.92	16.85	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield

							6	41.7	Bar Yield
							7	39.1	Facing
							8	31.9	Pullout
3	1.30	15.84	62.20	23.77	77.27	21.56	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	39.4	Pullout
							8	30.4	Pullout
4	1.29	22.61	57.18	25.03	66.73	22.89	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	41.7	Bar Yield
							7	37.1	Pullout
							8	29.6	Pullout
5	1.30	29.38	50.03	27.44	60.80	24.09	1	31.3	Pullout
							2	38.0	Pullout

							3	37.7	Pullout
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	38.5	Pullout
							7	33.5	Pullout
							8	28.4	Pullout
** 6	1.28	36.15	42.95	24.69	54.39	31.04	1	20.1	Pullout
							2	28.7	Pullout
							3	29.0	Pullout
							4	37.2	Pullout
							5	34.2	Pullout
							6	31.8	Pullout
							7	29.5	Pullout
							8	27.1	Pullout
7	1.29	42.92	36.32	21.31	48.83	39.12	1	9.8	Pullout
							2	20.3	Pullout
							3	20.9	Pullout
							4	28.9	Pullout
							5	24.3	Pullout
							6	24.5	Pullout
							7	25.1	Pullout

							8	25.6	Pullout
8	1.32	49.69	34.11	30.01	45.45	35.41	1	0.0	Pullout
							2	10.4	Pullout
							3	11.0	Pullout
							4	18.5	Pullout
							5	20.2	Pullout
							6	21.8	Pullout
							7	23.4	Pullout
							8	25.1	Pullout
9	1.37	56.46	36.69	70.40	0.00	0.00	1	0.0	Pullout
							2	11.7	Pullout
							3	13.3	Pullout
							4	24.2	Pullout
							5	24.6	Pullout
							6	25.0	Pullout
							7	25.3	Pullout
							8	25.7	Pullout
10	1.43	63.23	33.63	75.94	0.00	0.00	1	0.0	Pullout
							2	5.2	Pullout
							3	6.8	Pullout
							4	17.4	Pullout

							5	19.3	Pullout
							6	21.2	Pullout
							7	23.1	Pullout
							8	25.0	Pullout
11	1.50	70.00	31.00	81.66	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	0.6	Pullout
							4	11.0	Pullout
							5	14.3	Pullout
							6	17.6	Pullout
							7	21.0	Pullout
							8	24.3	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: 149-152.snz

Run Date: 05/22/18

Run Time: 14:56:02

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 26 FT(149-152)

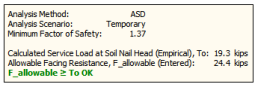
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

==========

Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 26.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	2.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 5

Soil Nail Design Parameters: Varying

No.	Soil Nail Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	25.00	17	4.50	6.00	0.875	75.0
2	20.00	20	4.50	6.00	0.875	75.0
3	15.00	15	4.50	6.00	0.875	75.0
4	15.00	15	5.00	6.00	0.875	75.0
5	10.00	15	5.00	6.00	0.875	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

==========

Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf
1	Very Old Paralic	130	35.0	200

==========

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	2.50	34.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 40.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

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Results

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Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.37

Found at Search Point: 4

Found at Grid Point: 40

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 19.3 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 19.3 kips (Clouterre)

			Failure Planes				Reinforcement		
	Minimum	Distance	Lower		Upper				
Search Point	Factor of Safety	From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.20	2.30	79.44	11.30	89.21	16.66	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
2	1.61	6.07	69.07	11.89	83.76	16.76	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.1	Pullout
3	1.42	9.84	66.11	12.15	73.55	17.37	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield

							5	40.5	Pullout
**	4	1.37	13.61	59.54	16.11	68.59	14.91	1	41.7	Bar Yield
								2	41.7	Bar Yield
								3	38.0	Pullout
								4	41.7	Bar Yield
								5	39.2	Pullout
	5	1.37	17.38	57.96	32.76	0.00	0.00	1	41.7	Bar Yield
								2	41.7	Bar Yield
								3	36.4	Pullout
								4	41.7	Bar Yield
								5	38.9	Pullout
	6	1.39	21.15	46.41	15.34	57.60	19.73	1	41.7	Bar Yield
								2	34.4	Pullout
								3	23.4	Pullout
								4	41.1	Pullout
								5	36.3	Pullout
	7	1.40	24.92	41.72	16.69	53.21	20.80	1	35.1	Pullout
								2	26.6	Pullout
								3	17.3	Pullout
								4	37.5	Pullout
								5	35.1	Pullout

8	1.41	28.69	37.75	18.14	49.27	21.99	1	25.8	Pullout
							2	19.3	Pullout
							3	11.7	Pullout
							4	34.1	Pullout
							5	33.9	Pullout
9	1.44	32.46	34.39	19.67	45.75	23.26	1	17.0	Pullout
							2	12.4	Pullout
							3	6.4	Pullout
							4	30.9	Pullout
							5	32.9	Pullout
10	1.49	36.23	31.51	21.25	42.61	24.61	1	8.6	Pullout
							2	6.7	Pullout
							3	1.4	Pullout
							4	27.9	Pullout
							5	31.9	Pullout
11	1.54	40.00	34.77	48.69	0.00	0.00	1	11.4	Pullout
							2	13.1	Pullout
							3	7.0	Pullout
							4	31.3	Pullout
							5	33.0	Pullout

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END OF REPORT

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Snail

Version: 2.0.3

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File Information

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File Name: 153-160.snz

Run Date: 05/22/18

Run Time: 15:15:27

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Project Information

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Description: TORREY PINES

Location: San Diego

EA:
Project ID: 180200

Wall No.: UP TO 36 FT(153-160)

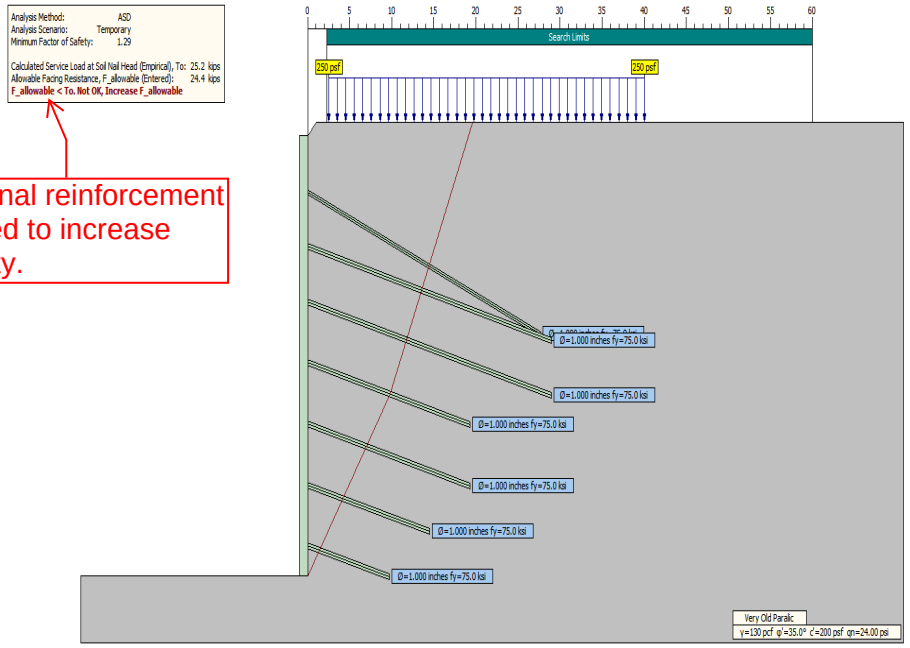
Structure No.:

Station:

Engineer: BM

Designer

Comments:



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Geometry

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Layout:

Reference Point:

At: Top of Wall

Distance From Origin: 0.00 feet

Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 36.00 feet

Facing Angle: 90.00 degrees

Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	45	1.50
2	0	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 1

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation

Ground Water:

Include Ground Water: No

==========

Soil Nails

==========

Dimensions and Properties:

Maximum Vertical Spacing: 5.00 feet

Number of Soil Nail Rows: 7

Soil Nail Design Parameters: Varying

No.	Soil Nail Length feet	Inclination From Horizontal degrees	Vertical Spacing feet	Horizontal Spacing feet	Nail Bar Diameter Ø inches	Nail Bar Yield Strength fy ksi
1	30.00	23	4.50	6.00	1.000	75.0
2	30.00	15	4.50	6.00	1.000	75.0
3	30.00	15	4.50	6.00	1.000	75.0
4	20.00	15	5.00	6.00	1.000	75.0
5	20.00	15	5.00	6.00	1.000	75.0
6	15.00	15	5.00	6.00	1.000	75.0
7	10.00	15	5.00	6.00	1.000	75.0

Facing Resistance:

	Temporary	Permanent	Seismic	
ASD Allowable Facing Resistance:	24.4			kips

==========

Soil Properties

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Layer	Description	Unit Weight γ pcf	Friction Angle ϕ' degrees	Cohesion c' psf

1	Very Old Paralic	130	35.0	200

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

	Distance from Top of Wall		Load	Load
	Begin	End	Begin	End
No.	feet	feet	psf	psf
1	2.50	40.00	250	250

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.30 feet

End: 60.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

==========

Results

==========

Analysis:

Method: ASD

Scenario: Temporary

Factor of Safety:

Minimum: 1.29

Found at Search Point: 4

Found at Grid Point: 34

Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 25.2 kips

Allowable Facing Resistance, F_allowable (Entered): 24.4 kips

F_allowable < To. Not OK, Increase F_allowable

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Very Old Paralic	5.429

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 25.2 kips (Clouterre)

			Failure Planes				Reinforcement		
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.12	2.30	79.45	11.31	89.49	25.94	1	39.5	Facing
							2	39.0	Facing
							3	38.8	Facing
							4	38.7	Facing
							5	38.5	Facing
							6	35.8	Facing
							7	32.7	Facing
2	1.49	8.07	70.79	19.62	85.02	18.60	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
							5	41.7	Bar Yield
							6	39.6	Facing

							7	31.7	Pullout
3	1.33	13.84	60.74	16.99	76.02	22.92	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	39.0	Pullout
							5	41.7	Bar Yield
							6	38.8	Pullout
							7	30.2	Pullout
** 4	1.29	19.61	56.52	17.77	66.21	24.30	1	41.7	Bar Yield
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	34.0	Pullout
							5	41.7	Bar Yield
							6	36.8	Pullout
							7	29.5	Pullout
5	1.30	25.38	49.44	19.51	60.29	25.60	1	36.6	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	25.5	Pullout
							5	38.0	Pullout
							6	33.2	Pullout

							7	28.3	Pullout
6	1.30	31.15	43.59	21.50	54.99	27.15	1	24.8	Pullout
							2	31.1	Pullout
							3	40.6	Pullout
							4	17.8	Pullout
							5	32.5	Pullout
							6	29.8	Pullout
							7	27.2	Pullout
7	1.30	36.92	38.77	23.68	50.30	28.90	1	14.0	Pullout
							2	20.1	Pullout
							3	31.0	Pullout
							4	10.7	Pullout
							5	27.4	Pullout
							6	26.8	Pullout
							7	26.2	Pullout
8	1.32	42.69	34.78	25.99	46.17	30.82	1	4.0	Pullout
							2	9.7	Pullout
							3	22.0	Pullout
							4	4.1	Pullout
							5	22.7	Pullout
							6	24.0	Pullout

							7	25.3	Pullout
9	1.37	48.46	37.41	61.01	0.00	0.00	1	4.2	Pullout
							2	10.1	Pullout
							3	25.7	Pullout
							4	8.5	Pullout
							5	25.8	Pullout
							6	25.9	Pullout
							7	25.9	Pullout
10	1.42	54.23	34.35	65.68	0.00	0.00	1	0.0	Pullout
							2	2.1	Pullout
							3	19.1	Pullout
							4	3.3	Pullout
							5	22.1	Pullout
							6	23.6	Pullout
							7	25.2	Pullout
11	1.50	60.00	31.70	70.52	0.00	0.00	1	0.0	Pullout
							2	0.0	Pullout
							3	12.8	Pullout
							4	0.0	Pullout
							5	18.6	Pullout
							6	21.5	Pullout

7	24.5	Pullout

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END OF REPORT

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