

LN U99070996

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 Milton, Ontario L9T 4B4
 Canada

License Number: **U99070996**

Project Identification:

Project Name: **9 Ft Wall**
 Section: **9 ft**
 Data Sheet: **IAE07033_9**

Owner:
 Client: **Brown's Concrete**

Prepared by: **ASL**
 Date: **April 26 2007**
 Time: **09:38:04 AM**

Data file: **07033_9.dat**

Type of Structure: **Geosynthetic-Reinforced Segmental Retaining Wall**
Design Methodology: **NCMA Method A**

Seismic Analysis Details:

Peak Ground Acceleration (PGA) ratio **0.00**

Wall Geometry:

Design Wall Height (m)	2.85
Embedment Wall Height (m)	0.28
Exposed Design Wall Height (m)	2.57
Vertical Wall Height including Cap Unit (m)	2.93
Exposed Wall Height including Cap Unit (m)	2.65
Minimum Levelling Pad Thickness (m)	0.15

Number of Segmental Wall Units	19
Hinge Height (in plane of wall) (m)	N/A
Wall Inclination (degrees)	9.5

Slopes:

Front Slope (degrees)	horizontal
Back Slope (degrees)	18.6
Infinite Back Slope	

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Uniformly Distributed Surcharges:

Live Load Surcharge **none**
 Dead Load Surcharge **none**

<u>Soil Data:</u>	<u>Soil Description:</u>	<u>Cohesion</u> (kPa)	<u>Friction</u> <u>Angle</u> (degrees)	<u>Unit Weight</u> (kN/m3)
Reinforced Soil	Granular B	N/A	34.0	22.0
Retained Soil	Native	N/A	28.0	19.0
Levelling Pad Soil	Granular A	N/A	36.0	22.0
Foundation Soil	Native	0.0	28.0	19.0

Segmental Unit Name: **Parkwall**

Segmental Unit Data:

Cap Height (mm) **75.0**
 Unit Height (Hu)(mm) **150.0**
 Unit Width (Wu)(mm) **300.0**
 Unit Length (mm) **200.0**
 Setback (mm) **25.1**
 Weight (infilled) (kg) **19.5**
 Unit Weight (infilled) (kN/m3) **21.2**
 Center of Gravity (mm) **152.4**

Segmental Unit Interface Shear Data:

<u>Properties</u>	<u>Ultimate Strength Criteria</u>	<u>Service State Criteria</u>
Minimum (kN/m)	17.3	13.6
Friction Angle (degrees)	63.0	49.0
Maximum (kN/m)	96.8	69.0

Geosynthetic Reinforcement Types and Number:

<u>Type</u>	<u>Number</u>	<u>Name</u>
1	0	Miragrid 2XT
2	4	Miragrid 3XT
3	0	Miragrid 5XT

Geosynthetics Properties:

<u>Strength and Polymer Type:</u>	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>
Ultimate Strength (kN/m)	29.2	46.0	62.7
Polymer Type	polyester	polyester	polyester

<u>Reduction Factors:</u>	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>
Creep	1.60	1.60	1.60
Durability	1.10	1.10	1.10
Installation Damage	1.10	1.10	1.10
Overall Factor of Safety	1.50	1.50	1.50

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<u>Allowable Strength:</u>	Type 1	Type 2	Type 3
Ta (kN/m)	10.06	15.84	21.59

<u>Coefficient of Interaction:</u>	Type 1	Type 2	Type 3
Ci	0.8	0.8	0.8

<u>Coefficient of Direct Sliding:</u>	Type 1	Type 2	Type 3
Cds	0.8	0.8	0.8

<u>Connection Strength:</u>	Type 1	Type 2	Type 3
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Ultimate Strength Criterion:

Minimum (kN/m)	10.6	8.0	11.7
Friction Angle (degrees)	30.0	30.0	37.0
Maximum (kN/m)	28.8	24.7	45.1

Service State Criterion:

Minimum (kN/m)	9.5	6.9	9.5
Friction Angle (degrees)	21.0	28.0	35.0
Maximum (kN/m)	22.4	19.2	31.2

Geosynthetic-Segmental Retaining Wall Unit

<u>Interface Shear Strength:</u>	Type 1	Type 2	Type 3
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Ultimate Strength Criterion:

Minimum (kN/m)	9.0	9.0	9.0
Friction Angle (degrees)	79.0	79.0	79.0
Maximum (kN/m)	160.0	160.0	160.0

Service State Criterion:

Minimum (kN/m)	0.0	0.0	0.0
Friction Angle (degrees)	79.0	79.0	79.0
Maximum (kN/m)	70.0	70.0	70.0

Coefficients of Earth Pressure and Failure Plane Orientations:

Reinforced Soil (Ka)	0.244
Reinforced Soil (Ka horizontal component)	0.238
Orientation of failure plane from horizontal (degrees)	50.96
Retained Soil (Ka)	0.347
Retained Soil (Ka horizontal component)	0.329
Orientation of failure plane from horizontal (degrees)	43.92

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Results of External Stability Analyses:

	Calculated	Design Criteria
FOS Sliding	1.72	1.5 OK
FOS Overturning	3.41	2.0 OK
FOS Bearing Capacity	5.0	2.5 OK
Base Reinforcement Length (L) (m)	1.71	1.71 OK
Base Eccentricity (e)(m)	0.02	N/A
Base Eccentricity Ratio (e/L-2e)	0.01	N/A
Base Reinforcement Ratio (L/H)	0.6	0.6 OK

Note: calculated values MEET ALL design criteria

Detailed Results of External Stability Analyses: Calculated Values:

Total Horizontal Force (kN/m)	35.3
Total Vertical Force (kN/m)	114.5
Sliding Resistance (kN/m)	60.9
Driving Moment (kN-m/m)	39.6
Resisting Moment (kN-m/m)	135.1
Bearing Capacity (kPa)	343.3
Maximum Bearing Pressure (kPa)	68.6

Results of Internal Stability Analyses:

SRW Unit #	Geosyn Type	Elev (m)	Length (m)	Anchor Length (m)	FOS Over-stress	FOS Pullout	FOS Sliding	Layer Spacing (m)
				> 0.3	> 1.0	> 1.5	> 1.5	< 0.91
16	2	2.25	2.05	0.3	6.37	3.19	10.13	OK
11	2	1.5	1.71	0.44	3.42	3.83	5.64	OK
7	2	0.9	1.71	0.83	2.59	7.04	4.15	OK
3	2	0.3	1.71	1.22	1.98	9.72	3.28	OK

Note: calculated values MEET ALL design criteria

Detailed Results of Internal Stability Analyses:

SRW Unit #	Geosyn Type	Elev (m)	Allowable Strength (kN/m)	Tensile Load (kN/m)	Pullout Capacity (kN/m)	Sliding Force (kN/m)	Sliding Capacity (kN/m)
16	2	2.25	15.8	2.5	7.9	3.9	39.1
11	2	1.5	15.8	4.6	17.8	10.8	61.1
7	2	0.9	15.8	6.1	43.1	18.9	78.6
3	2	0.3	15.8	8.0	77.7	29.3	96.1

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Results of Facing Stability Analyses:

SRW Unit #	Heel Elev (m)	Geosynthetic Type	FOS Overturning > 1.5	FOS Shear (peak) > 1.5	Shear (deformation) < 0.02 x Hu	FOS Connection (peak) > 1.5	Connection (deformation) < 19 mm
19	2.7	none	49.52	>99	OK	-	-
18	2.55	none	13.4	89.48	OK	-	-
17	2.4	none	6.41	43.31	OK	-	-
16	2.25	2	3.86	26.35	OK	4.11	OK
15	2.1	none	6.8	-	-	-	-
14	1.95	none	6.76	-	-	-	-
13	1.8	none	6.06	76.64	OK	-	-
12	1.65	none	5.29	25.25	OK	-	-
11	1.5	2	4.58	15.0	OK	2.8	OK
10	1.35	none	4.65	-	-	-	-
9	1.2	none	4.48	-	-	-	-
8	1.05	none	4.21	29.42	OK	-	-
7	0.9	2	3.92	14.76	OK	2.48	OK
6	0.75	none	3.91	-	-	-	-
5	0.6	none	3.8	-	-	-	-
4	0.45	none	3.65	25.95	OK	-	-
3	0.3	2	3.48	13.07	OK	2.17	OK
2	0.15	none	3.44	-	-	-	-
1	0.0	none	3.36	>99	OK	-	-

Note: calculated values MEET ALL design criteria

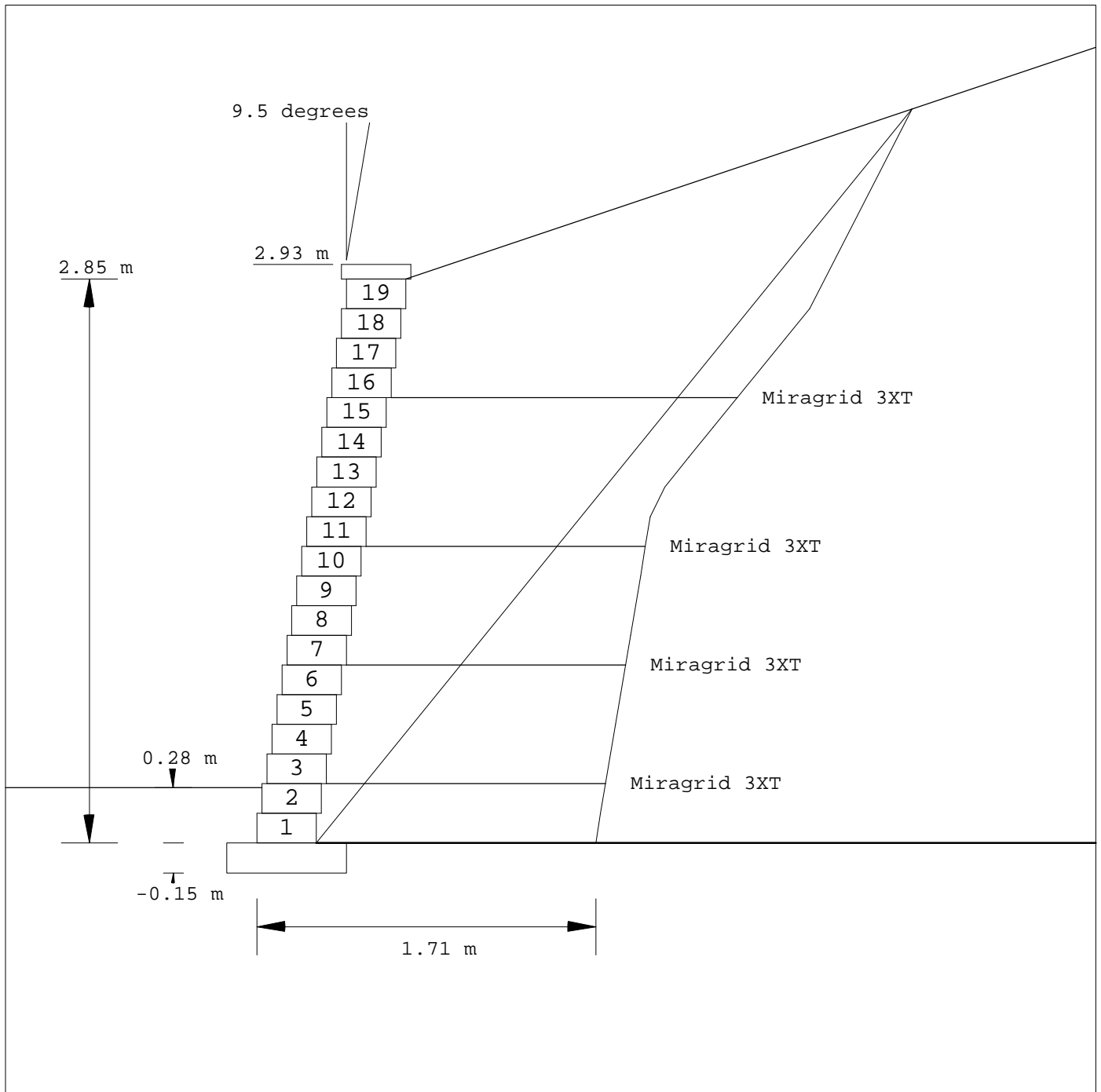
Detailed Results of Facing Stability Analyses (Moment and Shear):

SRW Unit #	Heel Elev (m)	Geo Type	Drive Moment (kN-m/m)	Resist Moment (kN-m/m)	Shear Load (kN/m) +out -in	Shear Capacity (kN/m) (peak)	Shear Capacity (kN/m) (deformation)
19	2.7	none	0.0	0.15	0.1	19.2	14.7
18	2.55	none	0.02	0.32	0.2	21.1	15.8
17	2.4	none	0.08	0.51	0.5	22.9	16.9
16	2.25	2	0.19	0.73	0.9	24.8	18.0
15	2.1	none	0.37	2.5	-1.0	26.7	19.1
14	1.95	none	0.64	4.3	-0.4	28.6	20.2
13	1.8	none	1.01	6.12	0.4	30.4	21.3
12	1.65	none	1.51	7.96	1.3	32.3	22.4
11	1.5	2	2.14	9.83	2.3	34.2	23.5
10	1.35	none	2.94	13.67	-1.2	36.1	24.6
9	1.2	none	3.91	17.53	0.0	37.9	25.7
8	1.05	none	5.08	21.41	1.4	39.8	26.8
7	0.9	2	6.46	25.32	2.8	41.7	27.9
6	0.75	none	8.07	31.53	-1.7	43.6	29.0
5	0.6	none	9.93	37.76	0.0	45.4	30.1
4	0.45	none	12.05	44.02	1.8	47.3	31.2
3	0.3	2	14.45	50.3	3.8	49.2	32.3
2	0.15	none	17.15	58.98	-2.2	51.1	33.4
1	0.0	none	20.17	67.69	0.0	52.9	34.5

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Detailed Results of Facing Stability Analyses (Connections):

SRW Unit #	Heel Elev (m)	Geo Type	Connection Load (kN/m)	Connection Capacity (peak) (kN/m)	Connection Capacity (deformation) (kN/m)
16	2.25	2	2.5	10.2	8.9
11	1.5	2	4.6	13.0	11.5
7	0.9	2	6.1	15.2	13.5
3	0.3	2	8.0	17.4	15.5



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