

SCOPE

SCOPE INCLUDES STRUCTURAL DESIGN AND DETAILING OF GRAVITY AND REINFORCED SEGMENTED CONCRETE BLOCK RETAINING WALLS. THE WALLS DEPICTED IN THIS DOCUMENT ARE TO BE INSTALLED IN RESIDENTIAL AND LIGHT COMMERCIAL APPLICATIONS. EACH SPECIFIC WALL INSTALLATION IS TO MEET THE CONDITIONS AND ASSUMPTIONS OF OUR DESIGN AND SPECIFICATIONS. ALL OTHER SITE CONDITIONS REQUIRE SITE SPECIFIC DESIGNS. ALL CONSTRUCTION IS TO BE DONE IN ACCORDANCE WITH THIS DOCUMENT, STANDARD INDUSTRY PRACTICE, AND THE REQUIREMENTS OF ALL APPLICABLE CODES. SPECIFIC SITE PLANS ARE OUTSIDE THE SCOPE OF THIS DOCUMENT. THE AFFIXED SEAL HERE IS FOR THE FULL DOCUMENT SET SPECIFIED IN THE INDEX.

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of South Dakota.

Print Name: Neil A. Groon

Signed: Neil A. Dron

Date: 6/22/07 SD License Number: 8609



Monster Blocks

Index & Certification

Midwest Ready Mix

1405 East Highway 50

Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____

Street Address:

City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
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- B. DRAINAGE PIPE IS TO BE MANUFACTURED IN ACCORDANCE WITH ASTM D 3034 AND/OR ASTM D 1248.

2.6 BACKFILL

- A. BACKFILL MATERIAL IS TO BE AS SHOWN ON THE STRUCTURAL DRAWINGS. THE ASSUMED PROPERTIES OF EACH SOIL TYPE ARE AS FOLLOWS:
1. SAND
 - A. SOIL CLASSES GW, GP, SW, & SP.
 - B. EFFECTIVE INTERNAL SOIL FRICTION ANGLE OF 34 DEGREES USED IN DESIGN.
 - C. SOIL UNIT WEIGHT APPROXIMATELY 120 PCF.
 2. SANDY CLAY/SILTY SAND
 - A. SOIL CLASSES GM, GC, SM, SM-SC, & ML.
 - B. EFFECTIVE INTERNAL SOIL FRICTION ANGLE OF 30 DEGREES USED IN DESIGN.
 - C. SOIL UNIT WEIGHT APPROXIMATELY 120 PCF.
 3. LEAN CLAY
 - A. SOIL CLASSES SC, ML-CL, & INORGANIC CL.
 - B. SOIL INTERNAL SOIL FRICTION ANGLE APPROXIMATELY 26 DEGREES.
 - C. SOIL UNIT WEIGHT APPROXIMATELY 115 PCF.
- B. MAXIMUM ALLOWABLE PARTICLE SIZE OF BACKFILL MATERIAL IS 2 INCHES.
- C. FAT OR SWELLING CLAYS ARE NOT TO BE PLACED BEHIND RETAINING WALL OR WITHIN A 1 TO 1 PROJECTION OF THE INFLUENCE ZONE.

2.7 EMBEDDED SOIL ANCHORS

- A. ANCHORS ARE TO BE INSTALLED TO A MINIMUM TENSILE CAPACITY IN ACCORDANCE WITH THIS DOCUMENT.
- B. THE ANCHORS ARE TO BE OF APPROPRIATE MATERIAL OR COATED WITH APPROPRIATE MATERIAL FOR SUSTAINED BELOW GRADE USE.

PART 3: EXECUTION

4.1 EXCAVATION

- A. CONTRACTOR IS TO VERIFY LOCATION OF EXISTING STRUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR IS TO ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF WALL EXCAVATION. EXCAVATION SUPPORT, IF REQUIRED, IS THE RESPONSIBILITY OF THE CONTRACTOR.

4.2 FOUNDATION PREPARATION

- A. LEVELING PAD IS TO BE PLACED ON NATIVE SOIL WITH AN ALLOWABLE BEARING CAPACITY OF AT LEAST 2,000 PSF, OR AN ENGINEERED FILL CAPABLE OF ACHIEVING THE REQUIRED CAPACITY AND COMPACTED TO 95% OF STANDARD PROCTOR DENSITY.

4.3 LEVELING PAD CONSTRUCTION

- A. LEVELING PAD IS TO BE PLACED AS SHOWN ON THE STRUCTURAL DRAWINGS IN TERMS OF WIDTH AND DEPTH.
- B. LEVELING PAD IS TO BE COMPACTED TO 95% OF STANDARD PROCTOR OR 90% OF MODIFIED PROCTOR TO ENSURE A LEVEL, HARD SURFACE ON WHICH TO PLACE THE FIRST COURSE BLOCKS. PAD IS TO BE PLACED AT THE PROPER ELEVATION TO ENSURE THE FINAL ELEVATION SHOWN ON THE STRUCTURAL DRAWINGS. WELL-GRADED SAND MAY BE USED TO SMOOTH THE TOP 1/2 INCH ON THE LEVELING PAD (WHEN USING GRAVEL PAD).

4.4 BLOCK UNIT INSTALLATION

- A. FIRST COURSE OF BLOCK UNITS IS TO BE PLACED ON THE LEVELING PAD. THE UNITS ARE TO BE LEVELED SIDE-TO-SIDE, FRONT-TO-REAR AND WITH ADJACENT UNITS, AND ALIGNED TO ENSURE CONTACT WITH THE LEVELING PAD. NO SIGNIFICANT GAPS ARE TO BE LEFT BETWEEN THE FRONTS OF ADJACENT UNITS.

Monster Blocks
Specifications

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- B. THE BACKFILL IN FRONT AND BACK OF ENTIRE BASE ROW IS TO BE PLACED AND COMPACTED TO FIRMLY ANCHOR THE BLOCK UNITS IN PLACE. CHECK ALL UNITS AGAIN FOR LEVEL AND ALIGNMENT.
- C. ALL EXCESS DEBRIS IS TO BE CLEANED FROM TOP OF UNITS AND THE NEXT COURSE OF UNITS INSTALLED ON TOP OF THE UNITS BELOW.
- D. POSITION BLOCK UNITS IN A STAGGERED PATTERN WITH THE SEAMS OF BLOCKS BELOW. BLOCK UNITS ARE TO BE PLACED FULLY FORWARD SO KNOB AND GROOVE ARE ENGAGED. CHECK EACH BLOCK FOR PROPER ALIGNMENT AND LEVEL.
- E. PLACE DRAINAGE MEDIA AND BACKFILL BEHIND WALL AS SHOWN ON THE STRUCTURAL DRAWINGS. ENSURE PROPER PLACEMENT OF FILTER FABRIC AND GEOSYNTHETIC REINFORCEMENT, IF REQUIRED.

4.5 GEOSYNTHETIC REINFORCEMENT PLACEMENT

- A. PLACE GEOSYNTHETIC REINFORCEMENT AT THE ELEVATIONS AND TO THE EXTENT SHOWN ON THE STRUCTURAL DRAWINGS.
- B. LAY GEOSYNTHETIC REINFORCEMENT HORIZONTALLY ON COMPACTED BACKFILL AND ATTACHED TO THE WALL UNITS. PULL REINFORCEMENT TAUT AND ANCHOR PRIOR TO BACKFILL PLACEMENT ON THE REINFORCEMENT.
- C. ORIENT GEOSYNTHETIC REINFORCEMENT WITH THE HIGHEST STRENGTH AXIS PERPENDICULAR TO THE WALL ALIGNMENT. REINFORCEMENT IS TO BE CONTINUOUS BEHIND WALL FOR FULL EMBEDMENT LENGTH WITH NO SPLICE POINTS.
- D. TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOSYNTHETIC REINFORCEMENT. A MINIMUM OF 6 INCHES OF BACKFILL IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOSYNTHETIC.

4.6 DRAINAGE MATERIALS

- A. DRAINAGE AGGREGATE SHALL BE PLACED IN ACCORDANCE WITH THE STRUCTURAL DRAWINGS.
- B. DRAINAGE COLLECTION PIPES SHALL BE INSTALLED TO ENSURE GRAVITY FLOW OF WATER AWAY FROM BASE OF RETAINING WALL. PROVIDE OUTLETS TO DAYLIGHT OR STORM SEWER IF PERMITTED, AS REQUIRED.

4.7 BACKFILL PLACEMENT

- A. PLACE, SPREAD, AND COMPACT BACKFILL IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF SLACK IN THE GEOSYNTHETIC REINFORCEMENT AND OTHER DAMAGE.
- B. PLACE AND COMPACT REINFORCED BACKFILL IN LIFTS NOT TO EXCEED 6 INCHES WHEN HAND COMPACTION IS USED, OR 8 TO 10 INCHES WHEN HEAVY COMPACTION EQUIPMENT IS USED. DECREASE LIFT THICKNESS WHERE NECESSARY TO ACHIEVE REQUIRED DENSITY.
- C. COMPACT REINFORCED BACKFILL TO 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D 698.
- D. ALLOW ONLY LIGHTWEIGHT HAND-OPERATED EQUIPMENT WITHIN 3 FEET FROM THE REAR OF THE MODULAR CONCRETE UNIT.
- E. DO NOT OPERATE TRACKED CONSTRUCTION EQUIPMENT DIRECTLY UPON THE GEOSYNTHETIC REINFORCEMENT. A MINIMUM FILL THICKNESS OF 6 INCHES IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOSYNTHETIC. TRACKED VEHICLE TURNING SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOSYNTHETIC.

4.8 EMBEDDED EARTH ANCHOR PLACEMENT

- A. CONTACT ULTEIG FOR SITE SPECIFIC ANCHOR LOCATION MAP. ANCHOR PLACEMENT WILL VARY WITH BLOCK SIZE AND SITE SPECIFIC VARIABLES.

4.9 CONSTRUCTION TOLERANCES

- A. VERTICAL ALIGNMENT - WITHIN 1 ½ INCHES OF LEVEL OVER A 10 FOOT DISTANCE
- B. WALL BATTER - WITHIN 2 DEGREES OF SHOWN ON STRUCTURAL DRAWINGS
- C. HORIZONTAL ORIENTATION - GAPS BETWEEN ADJACENT UNITS LESS THAN ½ INCH

END OF SECTION

Monster Blocks
Specifications

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069



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Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
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Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____

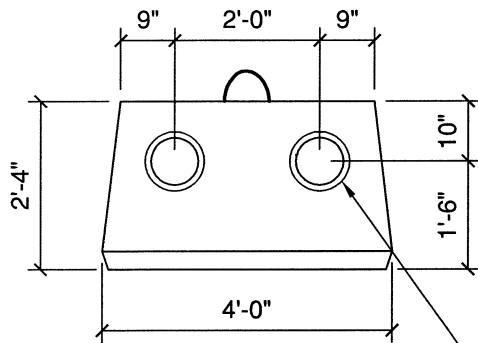
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
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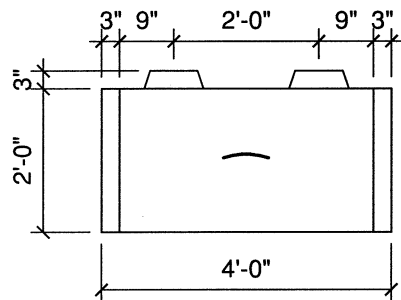
MONSTER BLOCK



TOP VIEW

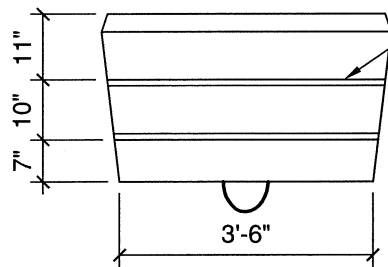
TAPERED CONCRETE
TAB TYP. 9 7/8" Ø AT BASE

INDICATES #4 x 3'-0"
BENT BARS (REFER TO
S26 FOR MORE INFO.)



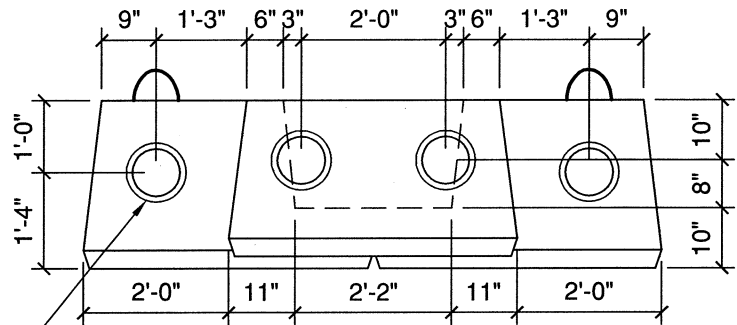
REAR VIEW

TAPERED CONCRETE GROOVE TYP.
10" WIDTH @ BOTTOM OF BLOCK



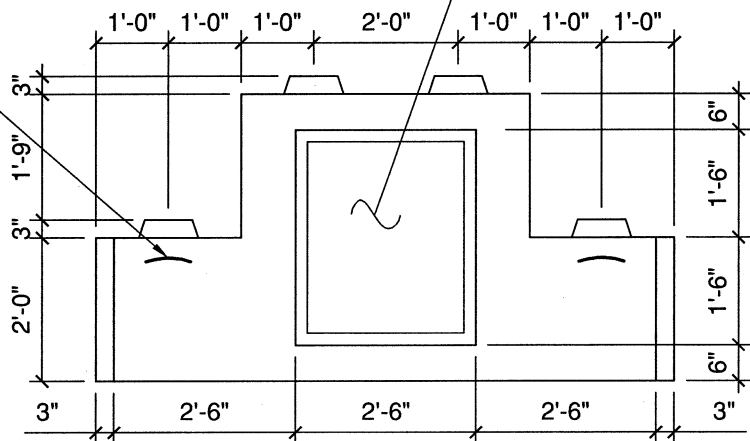
BOTTOM VIEW

MIGHTY MONSTER BLOCK



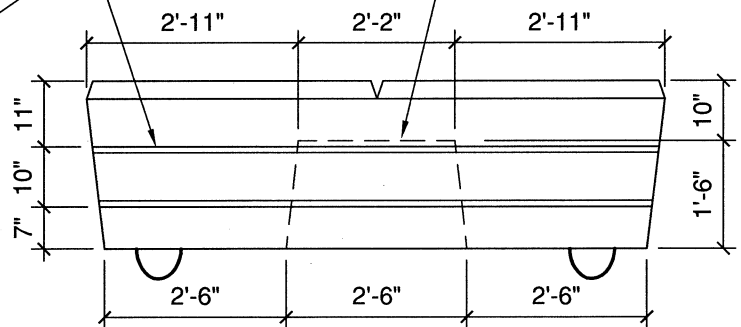
TOP VIEW

CONCRETE VOID AREA



REAR VIEW

DEPICTS EDGE OF
VOID AREA TYP.



BOTTOM VIEW

Monster Blocks

Block Unit Dimensions



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Midwest Ready Mix

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Vermillion, SD 57069

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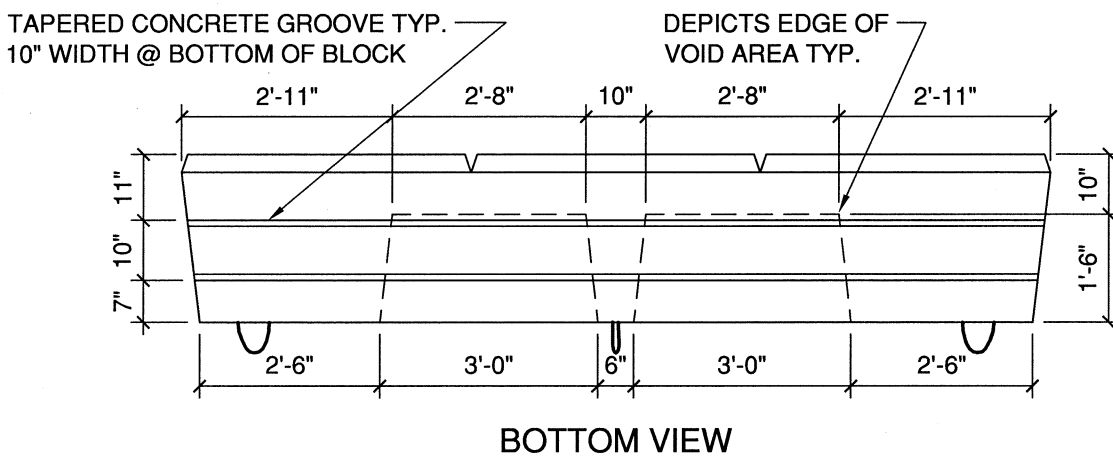
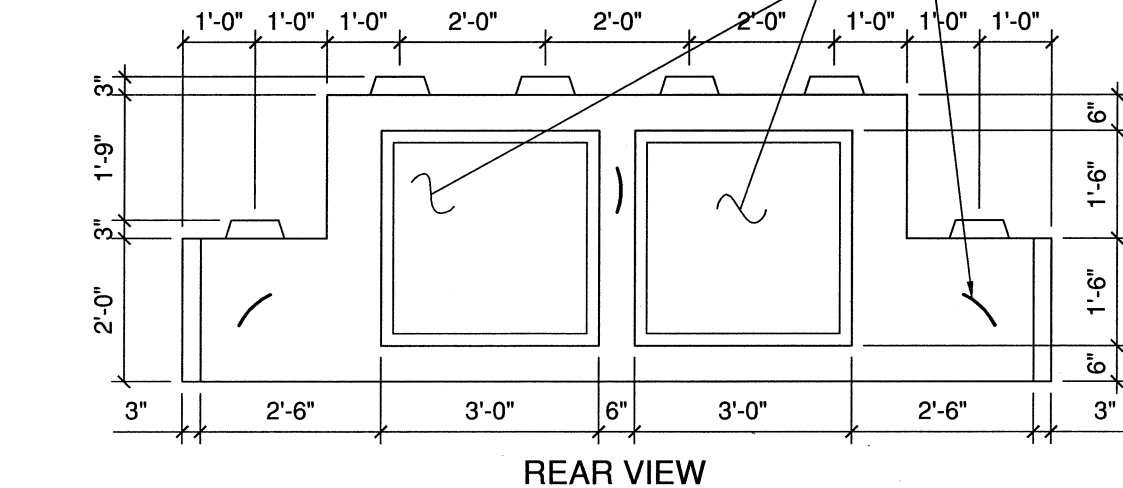
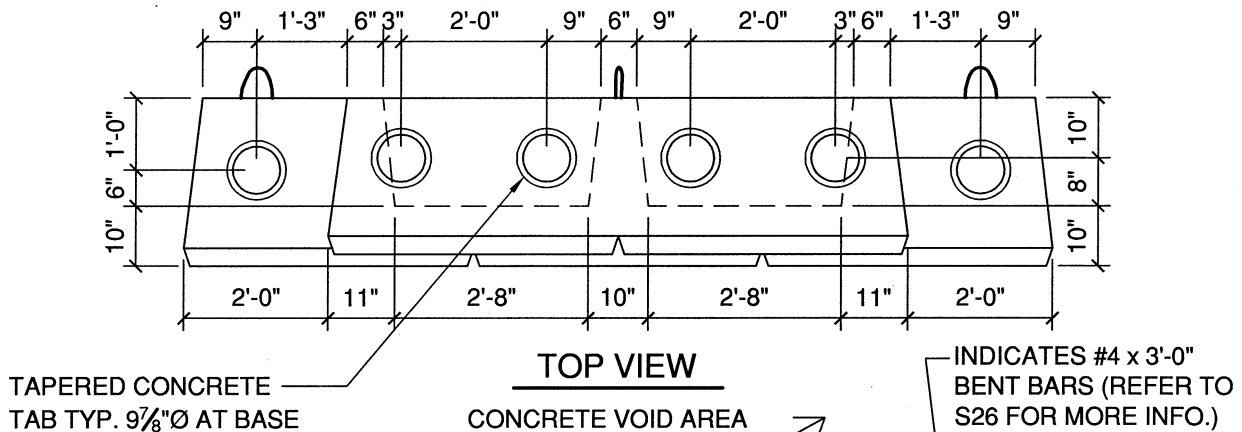
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MEGA MONSTER BLOCK



Monster Blocks
Block Unit Dimensions

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069



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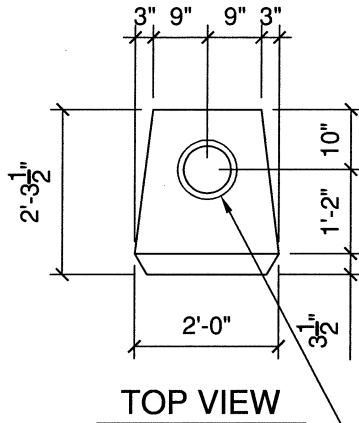
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Street Address: _____
City: _____ State: SD Zip Code: _____

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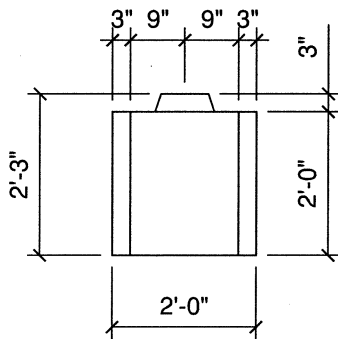
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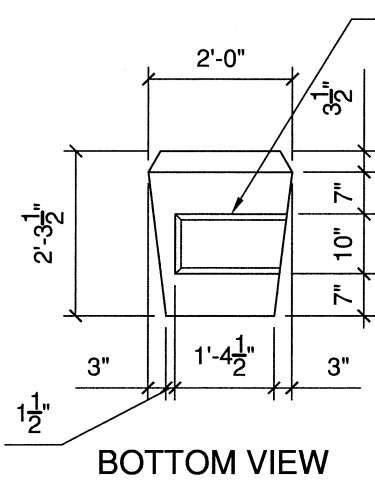
HALF BLOCK



TOP VIEW



REAR VIEW

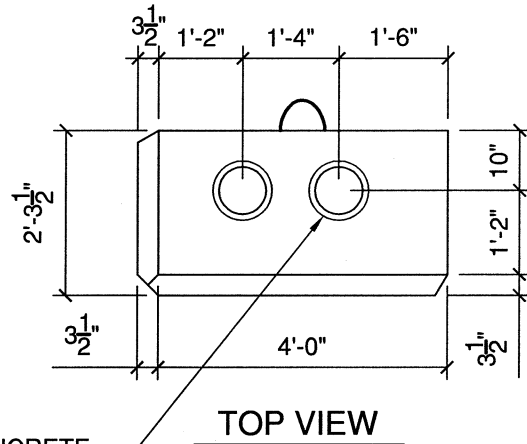


BOTTOM VIEW

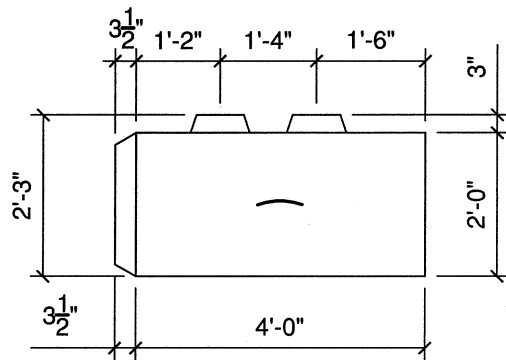
TAPERED CONCRETE
TAB TYP. 9 7/8" Ø AT BASE

TAPERED
CONCRETE
GROOVE TYP.
10" WIDTH @
BOTTOM OF
BLOCK

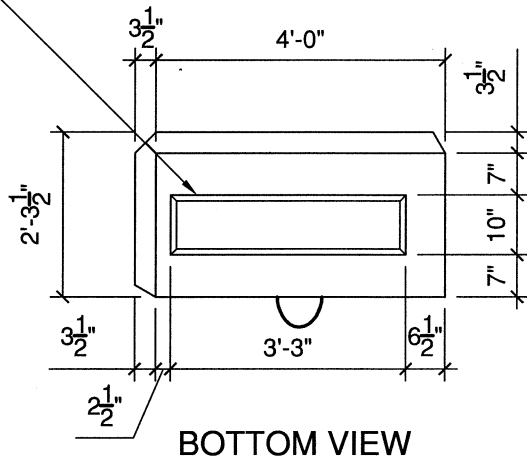
FULL CORNER BLOCK



TOP VIEW



REAR VIEW



BOTTOM VIEW

Monster Blocks

Block Unit Dimensions



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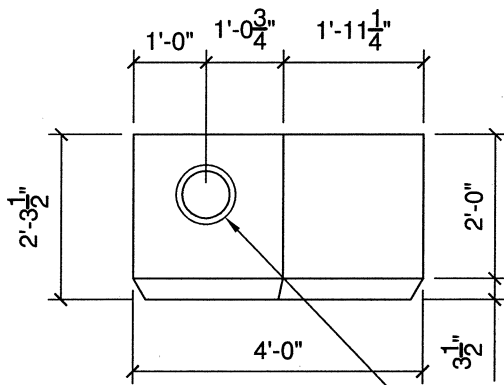
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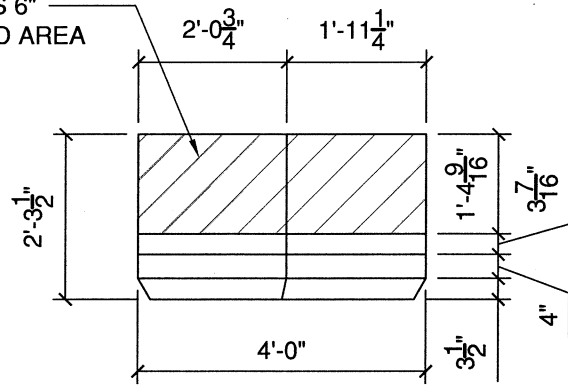
FULL ANGLE BLOCK



TOP VIEW

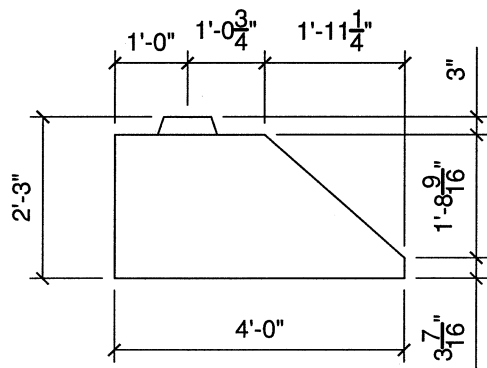
INDICATES 6" RECESSED AREA

TOP ANGLE BLOCK

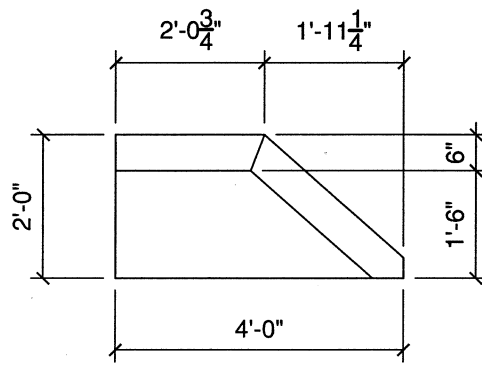


TOP VIEW

TAPERED CONCRETE TAB TYP. 9 7/8" Ø AT BASE

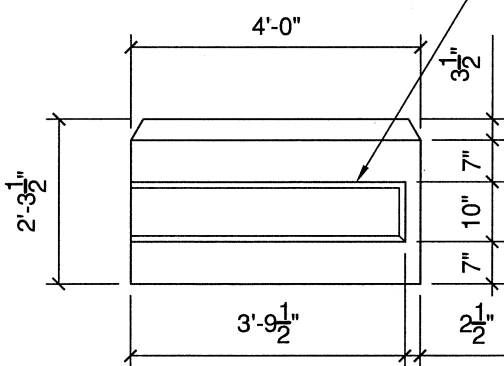


REAR VIEW

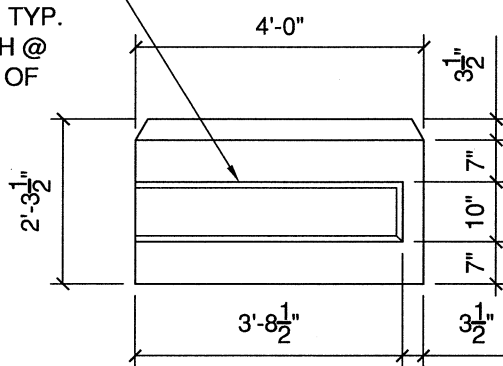


REAR VIEW

TAPERED CONCRETE GROOVE TYP. 10" WIDTH @ BOTTOM OF BLOCK



BOTTOM VIEW



BOTTOM VIEW

Monster Blocks

Block Unit Dimensions

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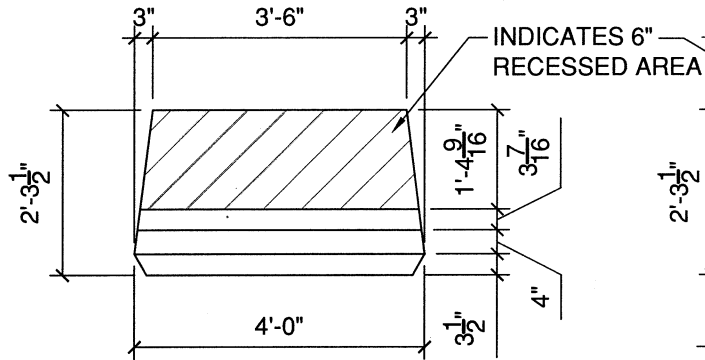
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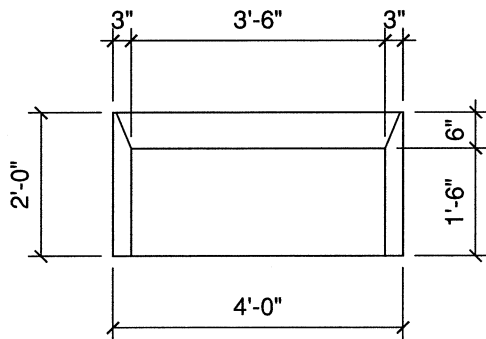
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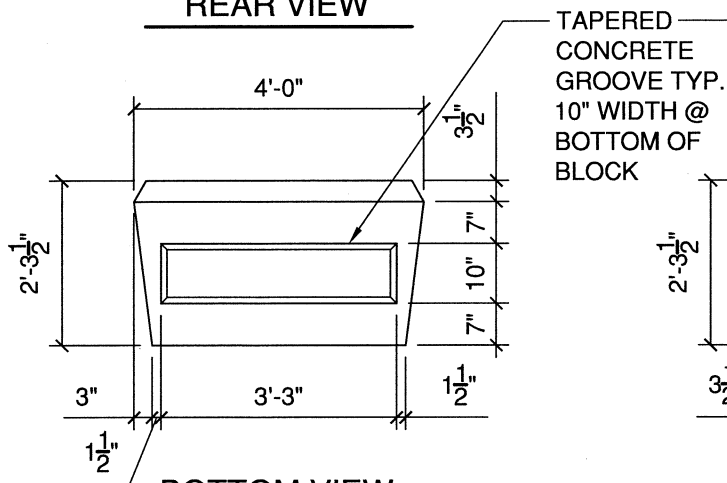
FULL TOP CAP BLOCK



TOP VIEW

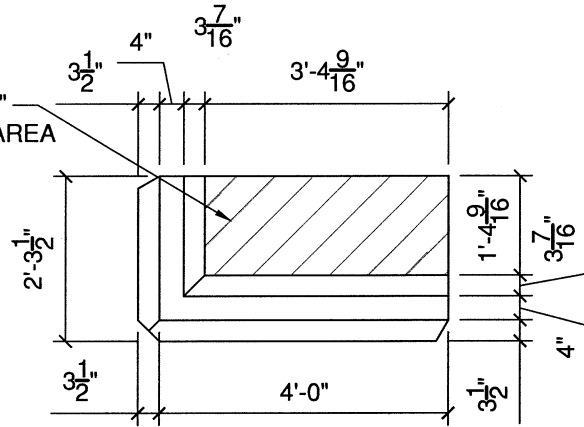


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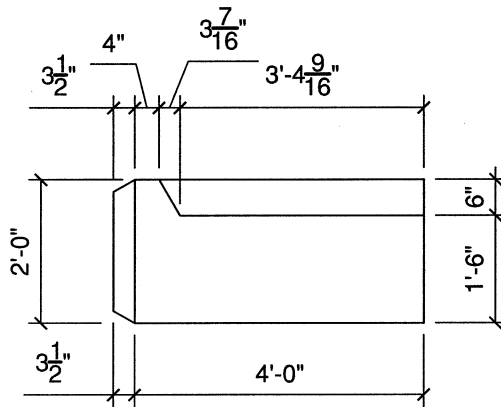


BOTTOM VIEW

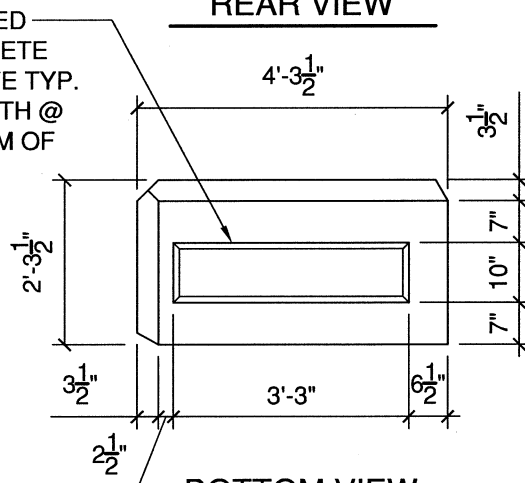
FULL TOP CAP CORNER BLOCK



TOP VIEW



REAR VIEW



BOTTOM VIEW

Monster Blocks

Block Unit Dimensions



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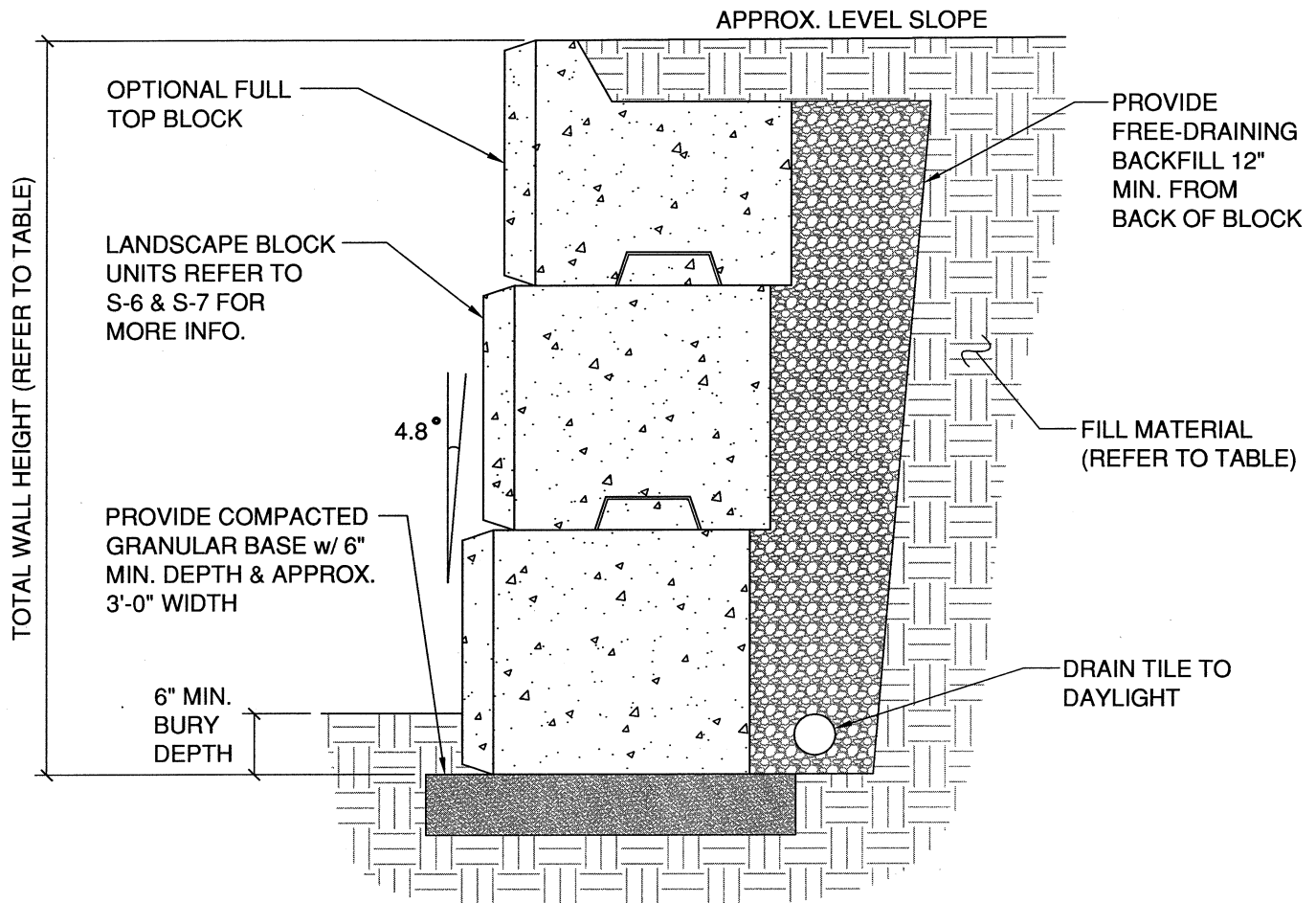
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SECTION

GRAVITY WALL - LEVEL BACKFILL

GRAVITY RETAINING WALLS

| SOIL TYPE | CLASSIFICATIONS | MAX. WALL HEIGHT |
|--|-------------------------|------------------|
| SAND | GW, GP, SW, & SP | 8'-0" |
| SANDY CLAY | GM, GC, SM, SM-CL, & ML | 6'-0" |
| LEAN CLAY | SC, ML-CL, & CL | 6'-0" |
| FAT & ORGANIC SWELLING CLAYS MUST BE REPLACED w/ ABOVE | | |

Monster Blocks

Gravity Wall - Level Backfill

Midwest Ready Mix

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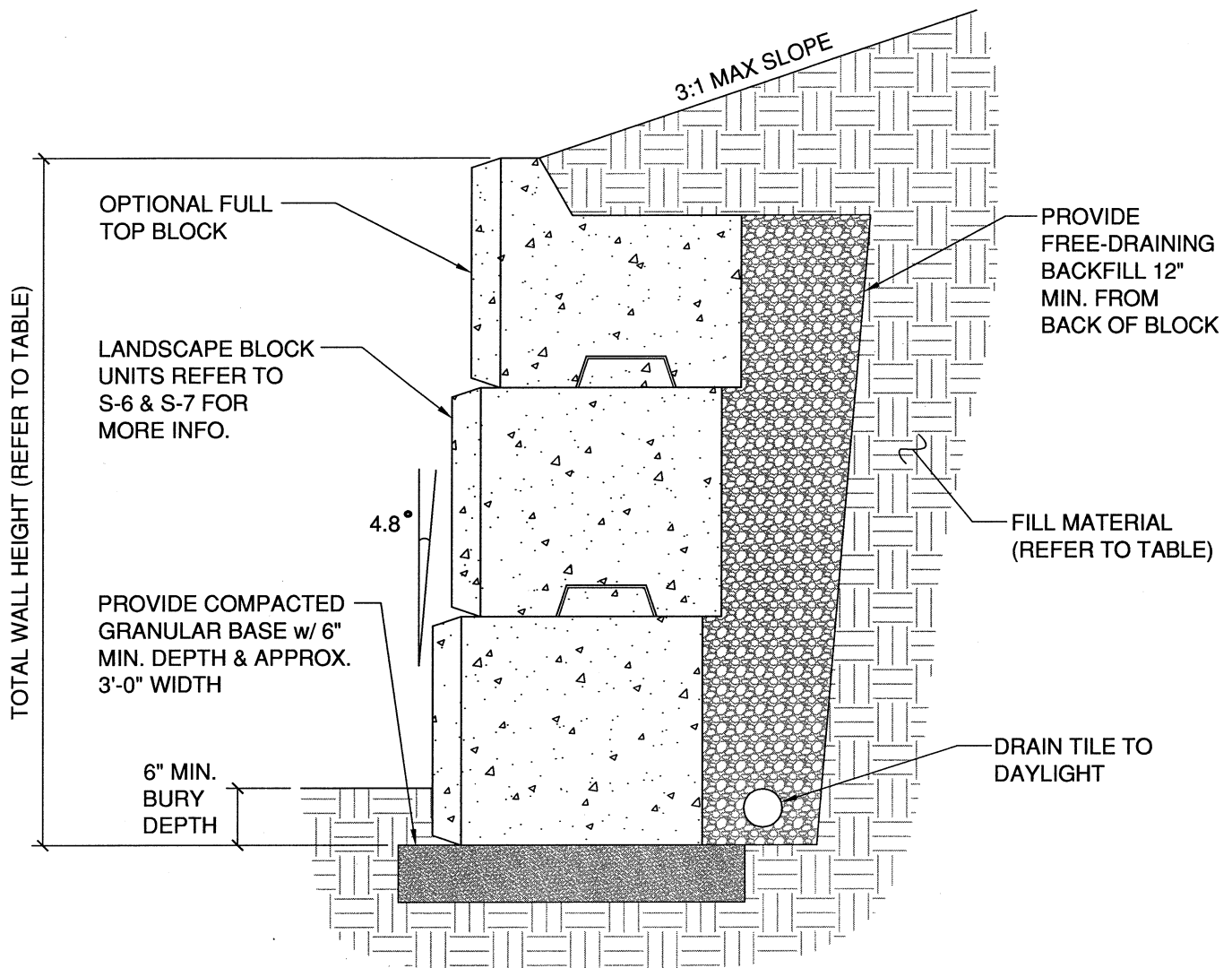
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SECTION

GRAVITY WALL - SLOPING BACKFILL

GRAVITY RETAINING WALLS

| SOIL TYPE | CLASSIFICATIONS | MAX. WALL HEIGHT |
|--|-------------------------|------------------|
| SAND | GW, GP, SW, & SP | 6'-0" |
| SANDY CLAY | GM, GC, SM, SM-CL, & ML | 6'-0" |
| LEAN CLAY | SC, ML-CL, CL | 4'-0" |
| FAT & ORGANIC SWELLING CLAYS MUST BE REPLACED w/ ABOVE | | |

Monster Blocks

Gravity Wall - Sloping Backfill

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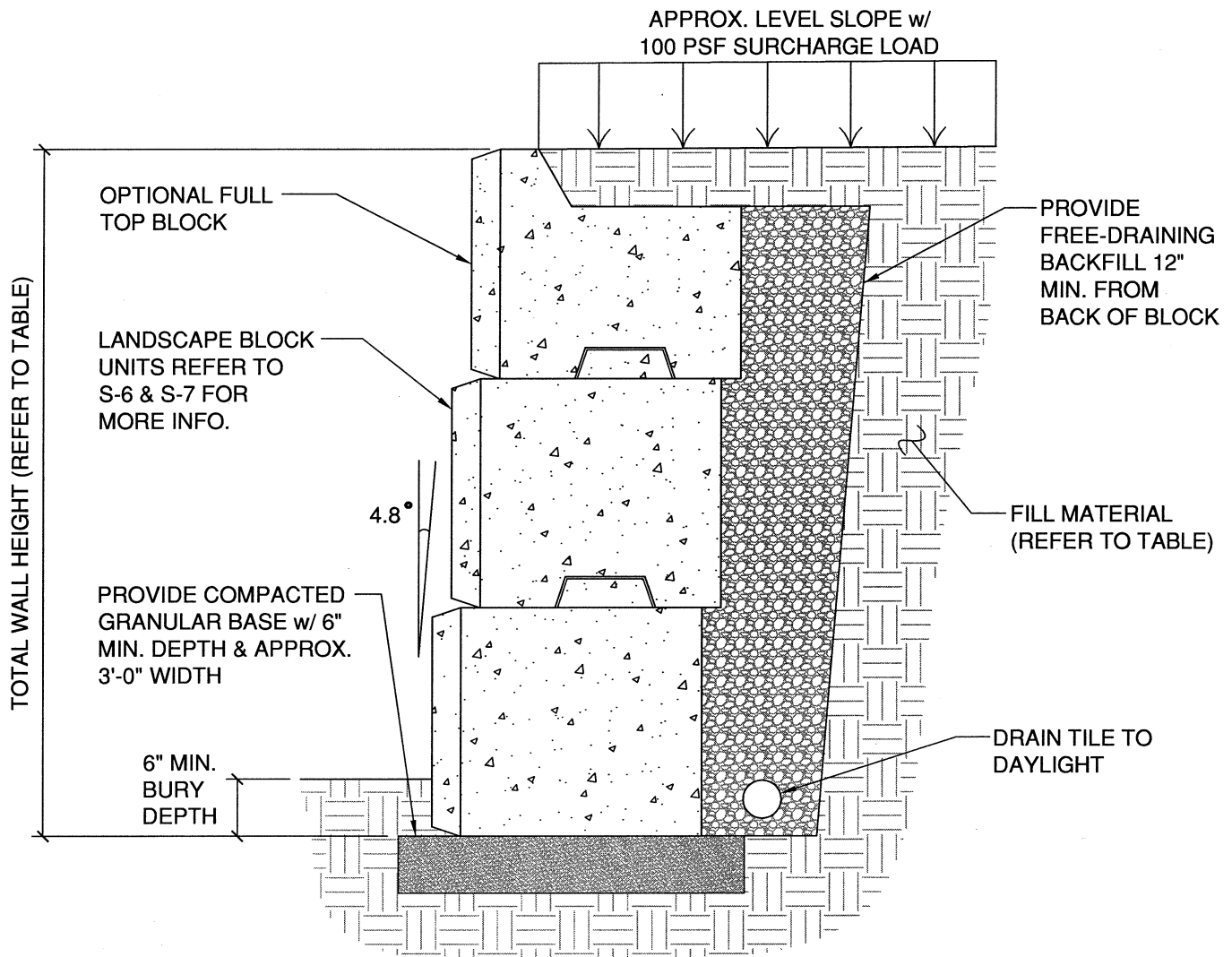
Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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| Project Number: <u>406.083</u> | S12 |
| Date: <u>June 22, 2007</u> | |
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SECTION

GRAVITY WALL - SURCHARGE LOAD

GRAVITY RETAINING WALLS

| SOIL TYPE | CLASSIFICATIONS | MAX. WALL HEIGHT |
|--|-------------------------|------------------|
| SAND | GW, GP, SW, & SP | 8'-0" |
| SANDY CLAY | GM, GC, SM, SM-CL, & ML | 6'-0" |
| LEAN CLAY | SC, ML-CL, & CL | 6'-0" |
| FAT & ORGANIC SWELLING CLAYS MUST BE REPLACED w/ ABOVE | | |

Monster Blocks

Gravity Wall - Surcharge Load

Midwest Ready Mix

1405 East Highway 50
Vermillion, SD 57069

Ulteigengineers

5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ultieg.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

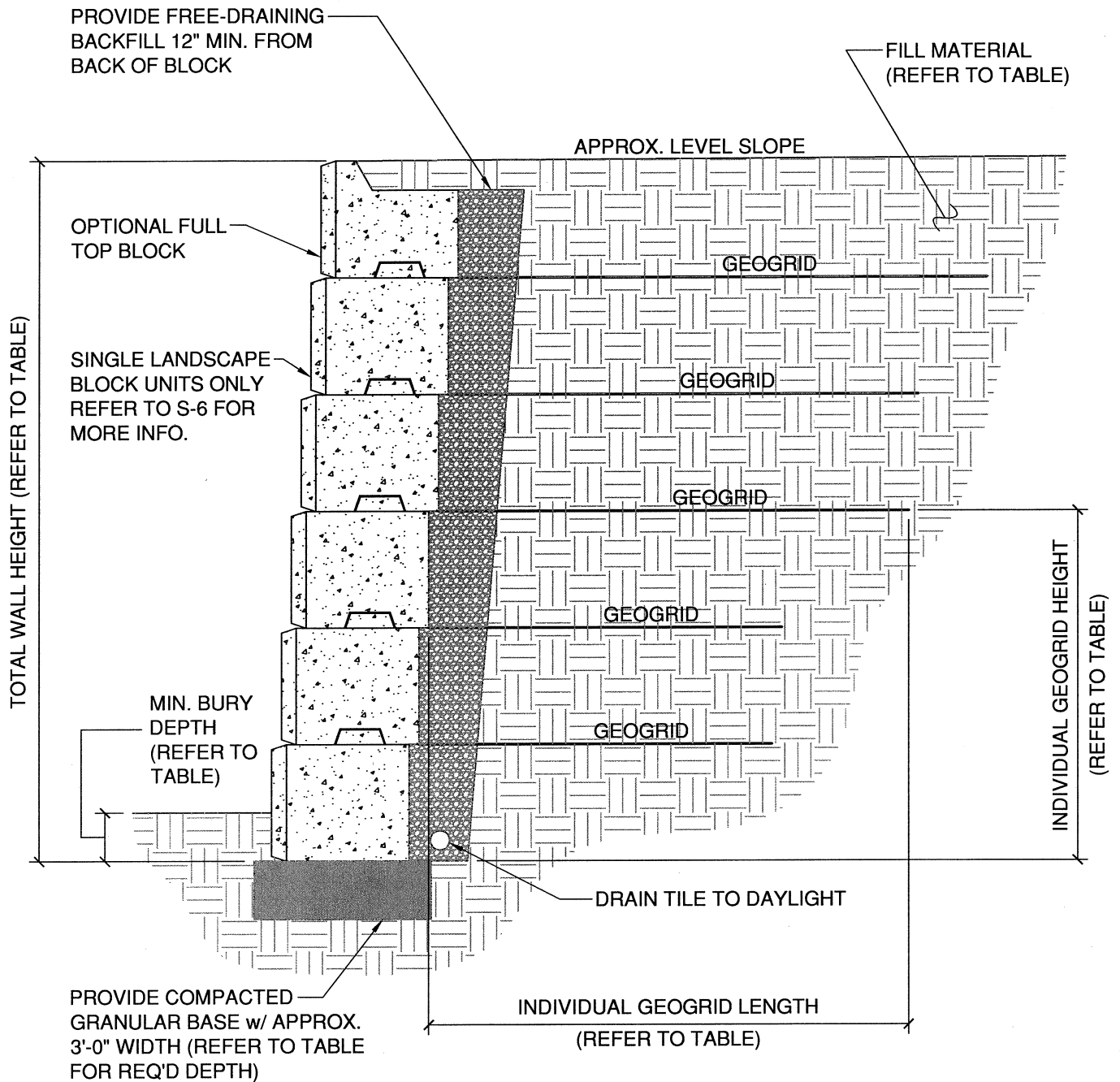
Owner: _____
Street Address: _____

City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
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Project Number: 406.083
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SECTION

REINFORCED WALL - LEVEL BACKFILL
(REFER TO TABLE NEXT PAGE)

Monster Blocks

Reinforced Wall - Level Backfill

Midwest Ready Mix

1405 East Highway 50
Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
| | | |
| | | |
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Project Number: 406.083
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NOTES

1. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
2. GEOGRID MUST BE EMBEDDED A MINIMUM OF 1'-6" INTO BLOCK TO BLOCK INTERFACE ZONE TYPICAL.

| REINFORCED RETAINING WALLS - LEVEL BACKFILL | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{\text{DESIGN}} = 34^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 10'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 4'-0" | 5'-0" | 7'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 4'-0" | 4'-0" | 5'-0" | 6'-0" | 8'-0" | |
| 14'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 5'-0" | 5'-0" | 5'-0" | 6'-0" | 8'-0" | 9'-0" |

| REINFORCED RETAINING WALLS - LEVEL BACKFILL | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{\text{DESIGN}} = 30^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 4'-0" | 4'-0" | 6'-0" | | | |
| 10'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 4'-0" | 6'-0" | 7'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 5'-0" | 5'-0" | 6'-0" | 7'-0" | 9'-0" | |
| 14'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 6'-0" | 6'-0" | 6'-0" | 7'-0" | 9'-0" | 10'-0" |

| REINFORCED RETAINING WALLS - LEVEL BACKFILL | | | | | | | | |
|--|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{\text{DESIGN}} = 26^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 4'-0" | 5'-0" | 7'-0" | | | |
| 10'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 5'-0" | 7'-0" | 8'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 5'-0" | 5'-0" | 7'-0" | 8'-0" | 10'-0" | |
| 14'-0" | 10" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 7'-0" | 7'-0" | 7'-0" | 8'-0" | 10'-0" | 11'-0" |

Monster Blocks
Reinforced Wall - Level Backfill

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069

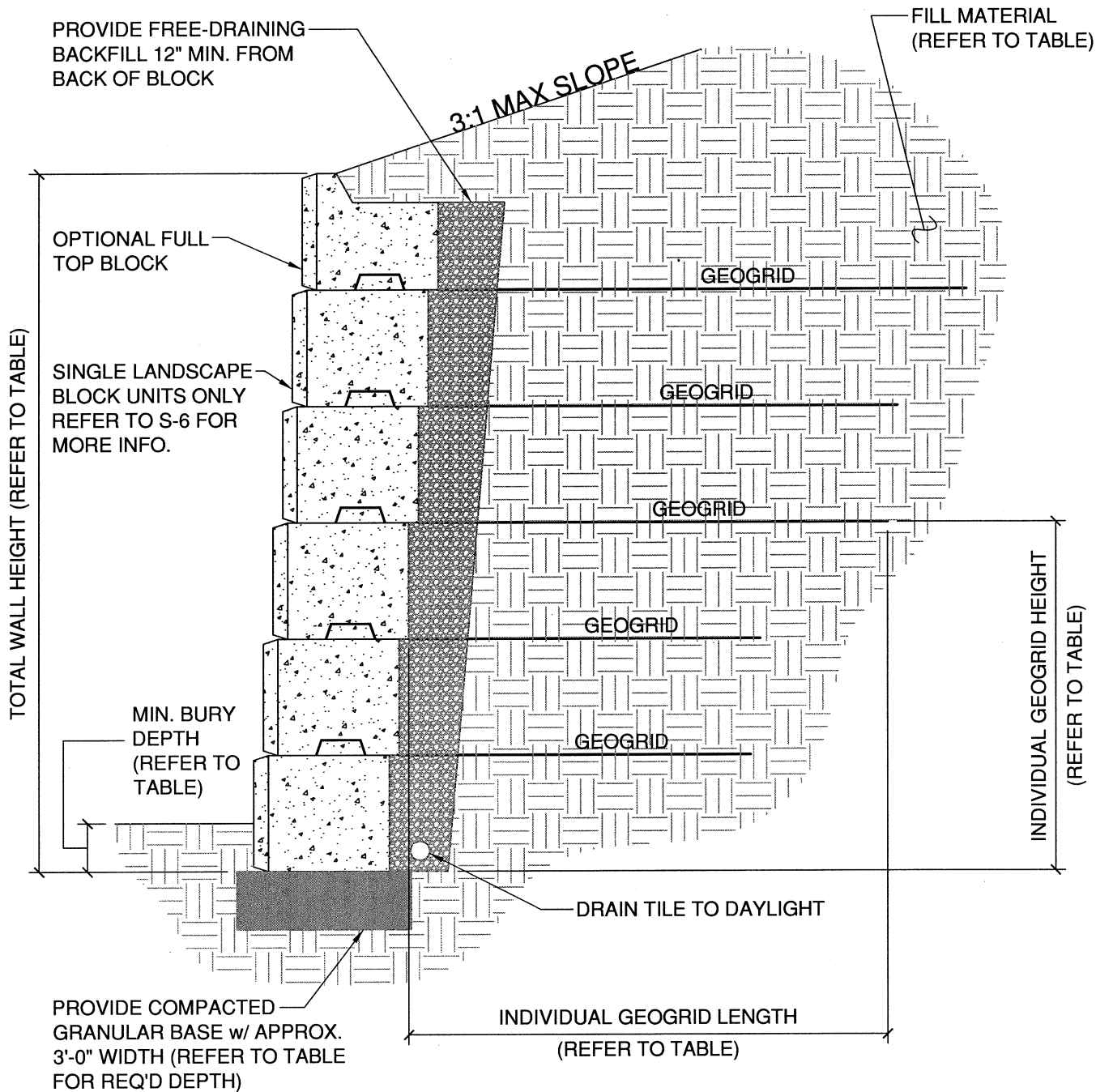


5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
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Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|--------------------------------|------|-------------|
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| Project Number: <u>406.083</u> | | S15 |
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| Sheets: <u>15</u> of <u>26</u> | | |



SECTION

REINFORCED WALL - SLOPING BACKFILL
(REFER TO TABLE NEXT PAGE)

Monster Blocks
Reinforced Wall - Sloping Backfill

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
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Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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Project Number: 406.083
Date: June 22, 2007
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NOTES

1. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
2. GEOGRID MUST BE EMBEDDED A MINIMUM OF 1'-6" INTO BLOCK TO BLOCK INTERFACE ZONE TYPICAL.

| REINFORCED RETAINING WALLS - 3:1 SLOPING BACKFILL | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{\text{DESIGN}} = 34^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 4'-0" | 4'-0" | 6'-0" | | | |
| 10'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 4'-0" | 6'-0" | 7'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 5'-0" | 5'-0" | 6'-0" | 7'-0" | 9'-0" | |
| 14'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 6'-0" | 6'-0" | 6'-0" | 7'-0" | 9'-0" | 10'-0" |

| REINFORCED RETAINING WALLS - 3:1 SLOPING BACKFILL | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{\text{DESIGN}} = 30^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 4'-0" | 5'-0" | 7'-0" | | | |
| 10'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 5'-0" | 7'-0" | 8'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 5'-0" | 5'-0" | 7'-0" | 8'-0" | 10'-0" | |
| 14'-0" | 10" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 7'-0" | 7'-0" | 7'-0" | 9'-0" | 10'-0" | 12'-0" |

| REINFORCED RETAINING WALLS - 3:1 SLOPING BACKFILL | | | | | | | | |
|--|-----------------|-----------------|-------------------|-------|-------|--------|--------|--------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{\text{DESIGN}} = 26^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 6'-0" | 6" | 6" | 2'-0" | 4'-0" | | | | |
| | | | 5'-0" | 6'-0" | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 5'-0" | 6'-0" | 8'-0" | | | |
| 10'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 5'-0" | 6'-0" | 8'-0" | 10'-0" | | |
| 12'-0" | 10" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 6'-0" | 7'-0" | 8'-0" | 10'-0" | 12'-0" | |
| 14'-0" | 12" | 10" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 8'-0" | 8'-0" | 8'-0" | 10'-0" | 12'-0" | 14'-0" |

Monster Blocks

Reinforced Wall - Sloping Backfill

Midwest Ready Mix

1405 East Highway 50
Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

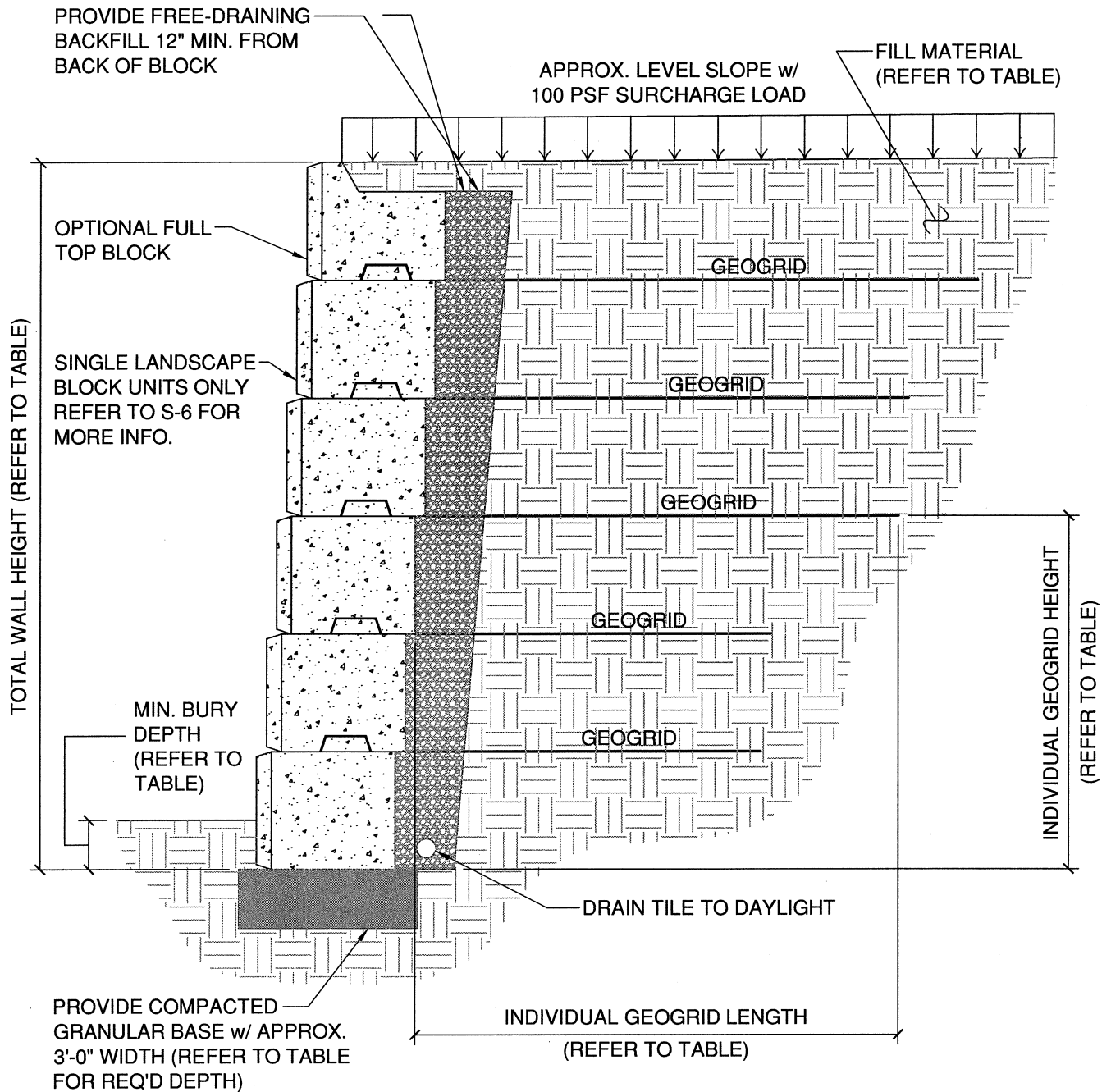
JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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SECTION

REINFORCED WALL - LEVEL BACKFILL (REFER TO TABLE NEXT PAGE)

Monster Blocks
Reinforced Wall - Surcharge Load

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069



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Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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Project Number: 406.083
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NOTES

1. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
2. GEOGRID MUST BE EMBEDDED A MINIMUM OF 1'-6" INTO BLOCK TO BLOCK INTERFACE ZONE TYPICAL.

| REINFORCED RETAINING WALLS - SURCHARGE LOAD | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{\text{DESIGN}} = 34^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 10'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 4'-0" | 5'-0" | 7'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 4'-0" | 5'-0" | 5'-0" | 7'-0" | 8'-0" | |
| 14'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 6'-0" | 6'-0" | 6'-0" | 7'-0" | 8'-0" | 10'-0" |

| REINFORCED RETAINING WALLS - SURCHARGE LOAD | | | | | | | | |
|---|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{\text{DESIGN}} = 30^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 6" | 6" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 4'-0" | 5'-0" | 7'-0" | | | |
| 10'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 4'-0" | 5'-0" | 6'-0" | 8'-0" | | |
| 12'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 5'-0" | 6'-0" | 6'-0" | 7'-0" | 9'-0" | |
| 14'-0" | 10" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 7'-0" | 7'-0" | 7'-0" | 7'-0" | 9'-0" | 11'-0" |

| REINFORCED RETAINING WALLS - SURCHARGE LOAD | | | | | | | | |
|--|-----------------|-----------------|-------------------|-------|-------|-------|--------|--------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{\text{DESIGN}} = 26^\circ$) | | | | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF GEOGRID | | | | | |
| | | | LENGTH OF GEOGRID | | | | | |
| 8'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | | | |
| | | | 5'-0" | 5'-0" | 8'-0" | | | |
| 10'-0" | 8" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | | |
| | | | 5'-0" | 5'-0" | 7'-0" | 9'-0" | | |
| 12'-0" | 10" | 8" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | |
| | | | 6'-0" | 6'-0" | 7'-0" | 9'-0" | 11'-0" | |
| 14'-0" | 12" | 10" | 2'-0" | 4'-0" | 6'-0" | 8'-0" | 10'-0" | 12'-0" |
| | | | 8'-0" | 8'-0" | 8'-0" | 8'-0" | 10'-0" | 12'-0" |

Monster Blocks
Reinforced Wall - Surcharge Load

Midwest Ready Mix
1405 East Highway 50
Vermillion, SD 57069



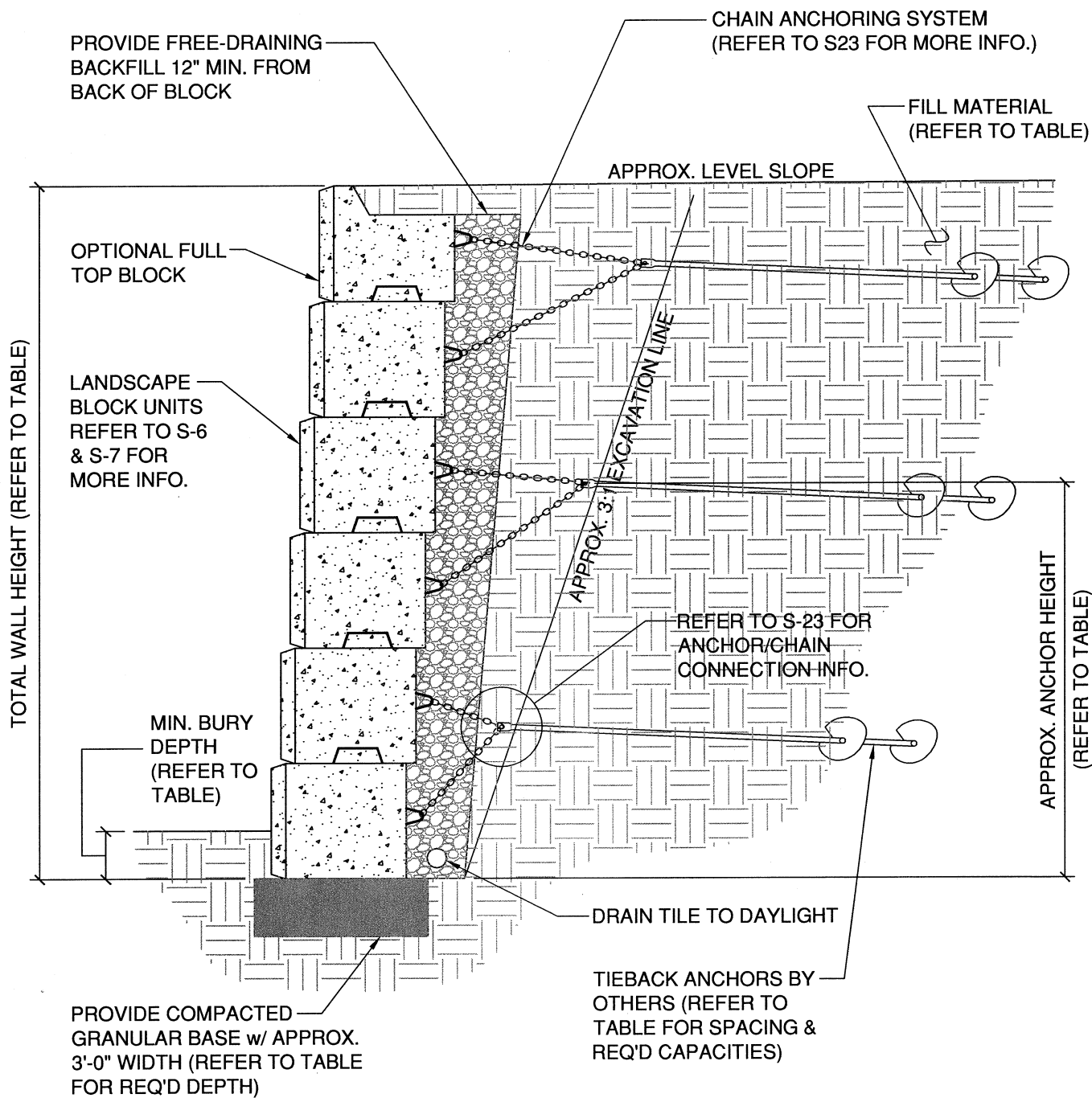
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Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|--------------------------------|------|-------------|
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| | | |
| Project Number: <u>406.083</u> | | S19 |
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SECTION

TIEBACK WALL - LEVEL BACKFILL
(REFER TO TABLE NEXT PAGE)

Monster Blocks

Tieback Wall - Level Backfill

Midwest Ready Mix

1405 East Highway 50
Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
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Project Number: 406.083
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NOTES

1. TABLES BELOW ARE FOR BIDDING PURPOSES ONLY. EXACT ANCHOR SPACING AND PLACEMENT IS SITE DEPENDENT. CONTACT ULTEIG FOR MORE INFORMATION.
2. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
3. REFER TO S-23 FOR REQUIREMENTS OF ANCHOR SYSTEMS A AND B LISTED IN THE TABLES..

| TIEBACK RETAINING WALL - LEVEL BACKFILL | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{DESIGN} = 34^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 12' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 8' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 8' O.C. | A - 12' O.C. | B - 12' O.C. |

| TIEBACK RETAINING WALL - LEVEL BACKFILL | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{DESIGN} = 30^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 12' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 10' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |

| TIEBACK RETAINING WALL - LEVEL BACKFILL | | | | | |
|---|-----------------|-----------------|-------------------------|----------------|------------------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{DESIGN} = 26^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 10' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 8' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 5' O.C. | A - 10' O.C. | B - 12' O.C. |

Monster Blocks

Tieback Wall - Level Backfill

Midwest Ready Mix

1405 East Highway 50
Vermillion, SD 57069



5201 East River Road Suite 308
Minneapolis, Minnesota 55421
Phone: 763.571.2500 Fax: 763.571.1168
Web: www.ulteig.com
Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____

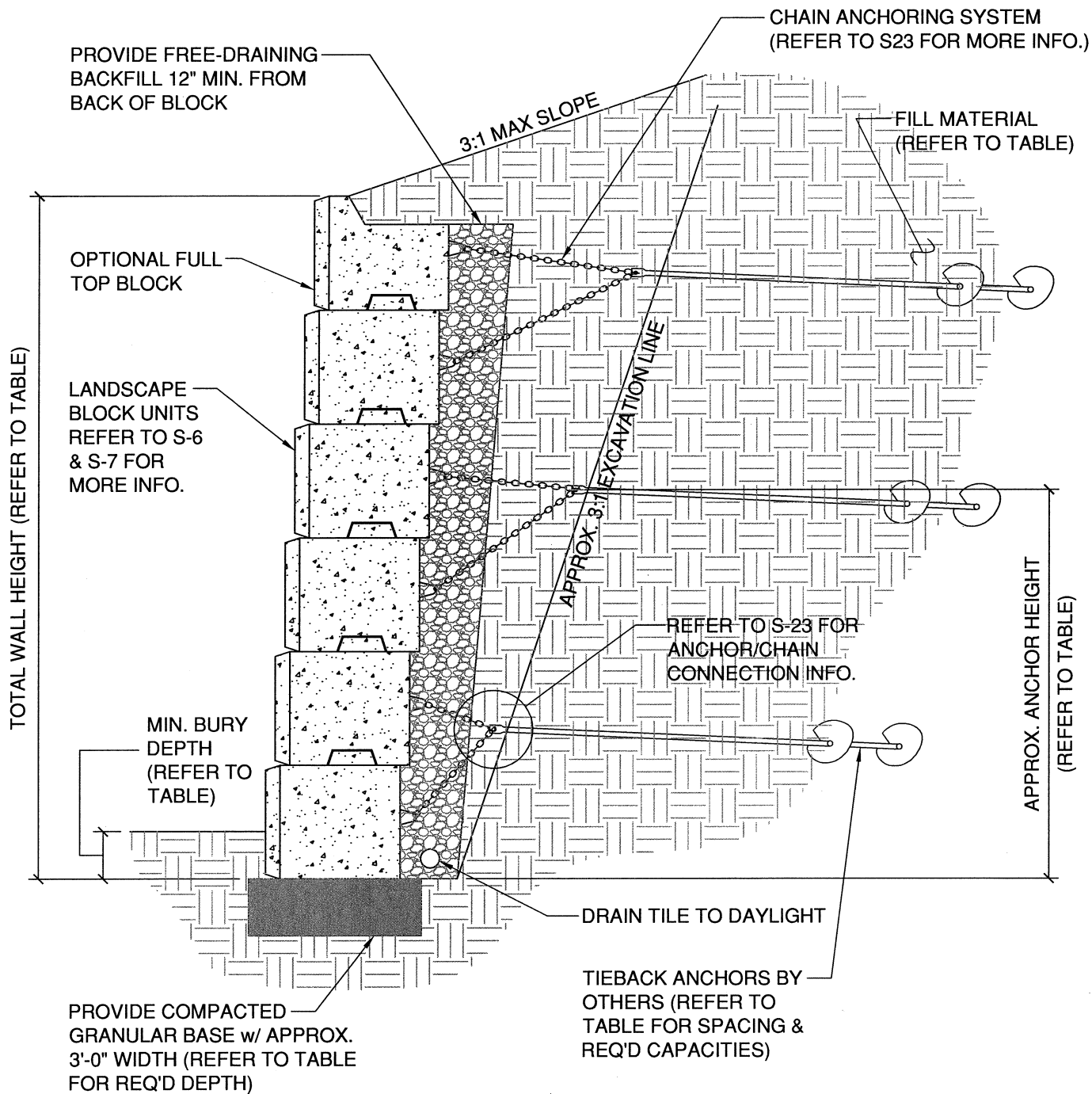
Street Address: _____

City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
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| | | |

Project Number: 406.083
Date: June 22, 2007
Sheets: 21 of 26

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SECTION

TIEBACK WALL - SLOPING BACKFILL
(REFER TO TABLE NEXT PAGE)

Monster Blocks

Tieback Wall - Sloping Backfill

Midwest Ready Mix

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(to be filled out by the contractor)

Owner: _____

Street Address: _____

City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
| | | |
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Project Number: 406.083
Date: June 22, 2007
Sheets: 22 of 26

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NOTES

1. TABLES BELOW ARE FOR BIDDING PURPOSES ONLY. EXACT ANCHOR SPACING AND PLACEMENT IS SITE DEPENDENT. CONTACT ULTEIG FOR MORE INFORMATION.
2. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
3. REFER TO S-23 FOR REQUIREMENTS OF ANCHOR SYSTEMS A AND B LISTED IN THE TABLES..

| TIEBACK RETAINING WALL - 3:1 SLOPING BACKFILL | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{DESIGN} = 34^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 12' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 8' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 5' O.C. | A - 10' O.C. | B - 12' O.C. |

| TIEBACK RETAINING WALL - 3:1 SLOPING BACKFILL | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{DESIGN} = 30^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 10' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 6' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 5' O.C. | A - 10' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 4' O.C. | A - 8' O.C. | A - 12' O.C. |

| TIEBACK RETAINING WALL - 3:1 SLOPING BACKFILL | | | | | |
|---|-----------------|-----------------|-------------------------|----------------|------------------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{DESIGN} = 26^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 6'-0" | 6" | 6" | 2'-0" TO 4'-0" | | |
| | | | A - 8' O.C. | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 6' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 5' O.C. | A - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 4' O.C. | A - 10' O.C. | A - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 4' O.C. | A - 6' O.C. | A - 12' O.C. |

Monster Blocks

Tieback Wall - Sloping Backfill

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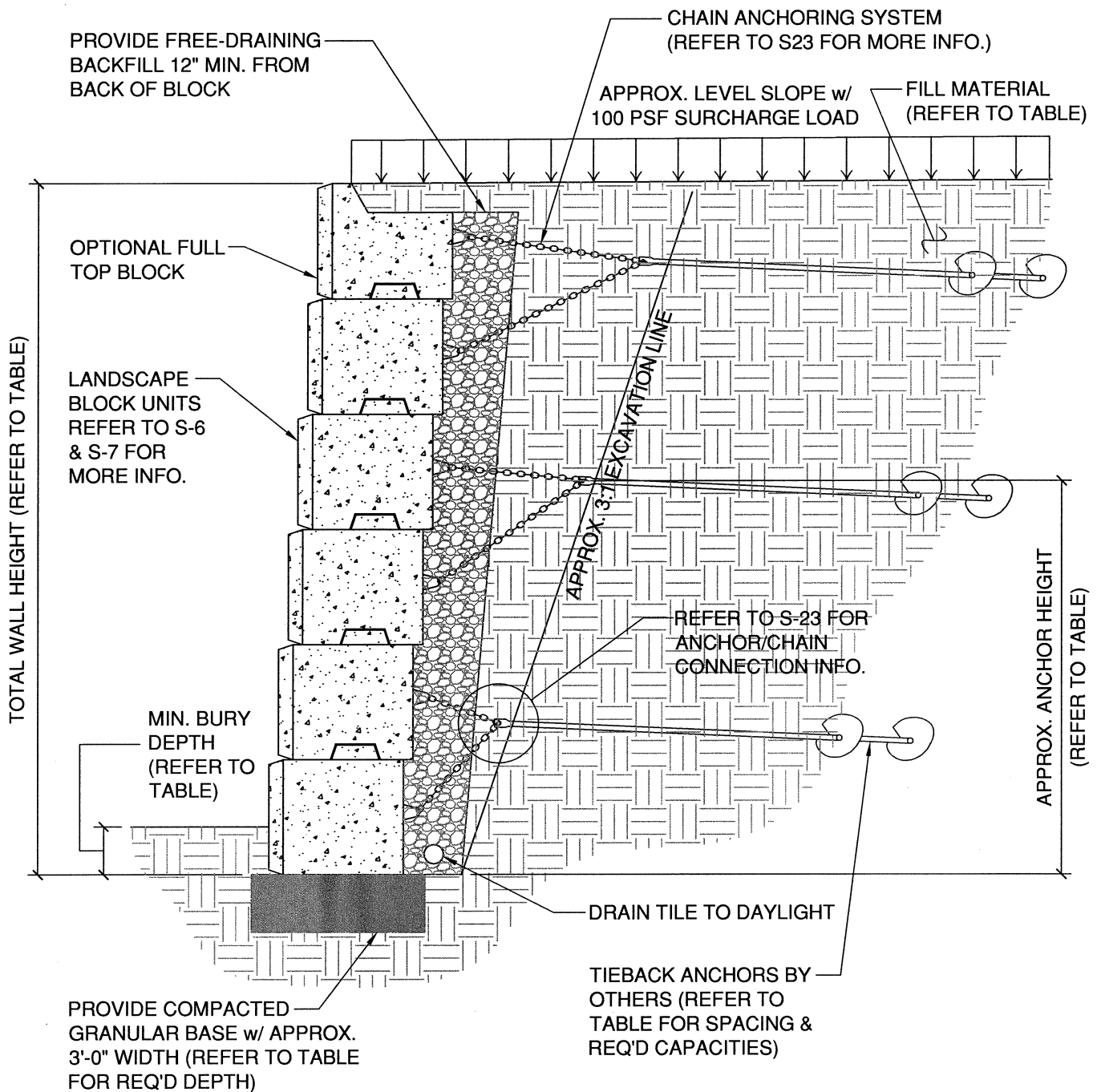
JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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Project Number: 406,083
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SECTION

TIEBACK WALL - SURCHARGE LOAD
(REFER TO TABLE NEXT PAGE)

Monster Blocks

Tieback Wall - Surcharge Load

Midwest Ready Mix

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Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls

Drawn By: RPM
Checked By: DGS
Approved By: NAG

JOB SITE INFORMATION
(to be filled out by the contractor)

Owner: _____
Street Address: _____
City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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Project Number: 406.083
Date: June 22, 2007
Sheets: 24 of 26

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NOTES

1. TABLES BELOW ARE FOR BIDDING PURPOSES ONLY. EXACT ANCHOR SPACING AND PLACEMENT IS SITE DEPENDENT. CONTACT ULTEIG FOR MORE INFORMATION.
2. TABLES BELOW ARE DIVIDED INTO SAND, SANDY CLAY, AND LEAN CLAY SOIL TYPES. FAT OR ORGANIC SWELLING CLAYS MUST BE REPLACED WITH ONE OF THE PREVIOUS TYPES.
3. REFER TO S-23 FOR REQUIREMENTS OF ANCHOR SYSTEMS A AND B LISTED IN THE TABLES..

| TIEBACK RETAINING WALL - SURCHARGE LOAD | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SAND SOIL (GW, GP, SW, & SP - $\phi_{DESIGN} = 34^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 10' O.C. | B - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 8' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |

| TIEBACK RETAINING WALL - SURCHARGE LOAD | | | | | |
|--|-----------------|-----------------|-------------------------|----------------|------------------|
| SANDY CLAY (GM, GC, SM, SM-SC, & ML - $\phi_{DESIGN} = 30^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 10' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 8' O.C. | A - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 6' O.C. | A - 12' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 5' O.C. | A - 10' O.C. | B - 12' O.C. |

| TIEBACK RETAINING WALL - SURCHARGE LOAD | | | | | |
|---|-----------------|-----------------|-------------------------|----------------|------------------|
| LEAN CLAY (SC, ML-SC, & CL - $\phi_{DESIGN} = 26^\circ$) | | | | | |
| MAX. WALL HEIGHT | MIN. BURY DEPTH | MIN. BASE DEPTH | HEIGHT OF ANCHOR | | |
| | | | ANCHOR SYSTEM - SPACING | | |
| 8'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 8' O.C. | B - 12' O.C. | |
| 10'-0" | 6" | 6" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | |
| | | | A - 6' O.C. | A - 12' O.C. | |
| 12'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 5' O.C. | A - 10' O.C. | B - 12' O.C. |
| 14'-0" | 8" | 8" | 2'-0" TO 4'-0" | 6'-0" TO 8'-0" | 10'-0" TO 12'-0" |
| | | | A - 4' O.C. | A - 8' O.C. | A - 12' O.C. |

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Tieback Wall - Surcharge Load

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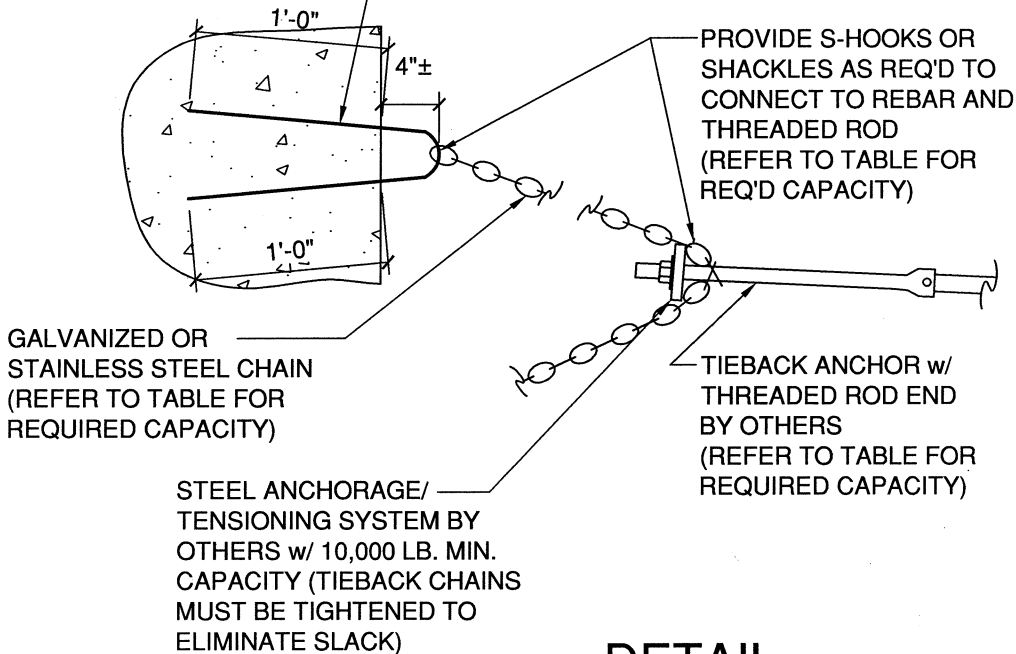
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City: _____ State: SD Zip Code: _____

| Revision | Date | Description |
|----------|------|-------------|
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Project Number: 406.083
Date: June 22, 2007
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#4 x 3'-0" BENT BARS CAST
IN CONCRETE BLOCKS
(REFER TO S6 & S7 FOR
APPROX. LOCATIONS)



DETAIL

CHAIN/ANCHOR TIEBACK SYSTEM (REFER TO TABLE BELOW)

TIEBACK SYSTEM COMPONENTS

| MARK | REQUIRED CHAIN/S-HOOK CAPACITY | REQUIRED ANCHOR CAPACITY |
|---|--------------------------------|--------------------------|
| SYSTEM A | 10,000 LBS. | 20,000 LBS. |
| SYSTEM B | 6,000 LBS. | 12,000 LBS. |
| CHAIN/S-HOOK CAPACITIES ARE LISTED AS ALLOWABLE WORKING LOADS. ANCHOR CAPACITIES ARE LISTED AS ULTIMATE INSTALLED VALUES AND INCLUDE A FACTOR OF SAFETY OF 2. | | |

Monster Blocks

Tieback Detail & Required Capacities

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Project Number: 406.083
Date: June 22, 2007
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