

Sam Page  
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Saint Louis  
**COUNTY**  
TRANSPORTATION  
PUBLIC WORKS

Daniel W. Dreisewerd, P.E., PTOE  
Acting Director

Stephanie Leon Streeter, P.E.  
Deputy Director

June 27, 2019

Mr. Gregory Linneman, PE  
Crockett Engineering  
1000 W Nifong Blvd.  
Columbia, MO 65203

Re: Permit Application #19BLD-02677: **Residential Master Plans** for  
MidWest Block & Brick, using the **MagnumStone 24"**  
**Block Retaining Wall System**

Dear Mr. Linneman:

I am pleased to inform you that the plans submitted for review of the **MagnumStone 24"**  
Retaining Walls are **approved** and the new master plan numbers are as follows:

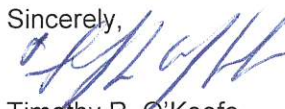
|  |           |
|--|-----------|
| Single Tier, 6' high max, Horizontal Slope, Soil Backfill, NO Surcharge          | 730-19-01 |
| Single Tier, 6' high max, Horizontal Slope, Gravel Backfill, NO Surcharge        | 730-19-02 |
| Single Tier, 6' high max, 3H:1V, Soil Backfill, NO Surcharge                     | 730-19-03 |
| Single Tier, 6' high max, 3H:1V, Gravel Backfill, NO Surcharge                   | 730-19-04 |
| Single Tier, 6' high max, Horizontal Slope, Soil Backfill, 100psf LL Surcharge   | 730-19-05 |
| Single Tier, 6' high max, Horizontal Slope, Gravel Backfill, 100psf LL Surcharge | 730-19-06 |
| Single Tier, 6' high max, Tiered Wall, Soil Backfill, NO Surcharge               | 730-19-07 |

Please inform your customers of the following **procedures they need to follow** when applying  
for a residential retaining wall permit with Saint Louis County:

1. Submit a **completed permit application** form that includes the **selected master plan number**.
2. Submit **four (4) site plans** showing the location and length of the wall, drawn to scale, with the top-of-wall and bottom-of-wall elevations noted at the ends and midpoint of each wall, at a minimum. Dimension the wall(s) distance from any structures, parking lots, easements and property lines. Show with arrows the existing and proposed direction of site drainage at and around the proposed wall area.
3. Submit **four (4) copy sets** of the approved master plan (16 pages total).
4. Your customers should be made aware that a **Saint Louis County Pre-grading Inspection may be required** to assess any potential major changes on the site grading and drainage when a retaining wall is proposed closer than 10-feet to a property line. Conditions on the site plans submitted may also indicate a Saint Louis County Pre-grading Inspection is needed.

Please call me at 314-615-7821 or e-mail at [t.keefe@stlouisco.com](mailto:t.keefe@stlouisco.com) if you have any questions.

Sincerely,



Timothy R. O'Keefe  
Building Code Review Section  
Division of Code Enforcement

# MagnumStone Wall System

## St. Louis County Master Plans

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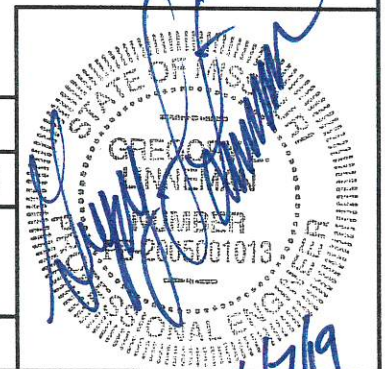
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DESIGNED: GLL

DATE: 06-07-2019

TITLE AND INDEX

SHEET: 1 OF 16





APPLICATION AND DESIGN PROCEDURE:

APPLICATION

MAGNUMSTONE IS A LARGE WET-CAST RETAINING WALL SYSTEM, CLEVERLY ENGINEERED WITH A HOLLOW CORE. THE DESIGNS PRESENTED IN THIS MASTER PLAN ARE BASED ON THE ASSUMPTIONS DETAILED IN THE FOUR DESIGN CASES. SHOULD YOU WISH TO BUILD A WALL THAT DOES NOT MEET ONE OF THESE DESIGN CASES, WE RECOMMEND THAT YOU CONTACT A REGISTERED PROFESSIONAL ENGINEER EXPERIENCED WITH THE DESIGN OF SEGMENTAL BLOCK RETAINING WALLS TO PROVIDE CUSTOM PLANS FOR YOUR UNIQUE SITE.

CONTACT MIDWEST BLOCK & BRICK FOR ADDITIONAL DETAILS REGARDING MAGNUMSTONE BLOCK PRODUCTS. (OFFICE: 314-291-3200; [WWW.MIDWESTBLOCK.COM](http://WWW.MIDWESTBLOCK.COM))

CONTACT CROCKETT ENGINEERING REGARDING DESIGN AND CONSTRUCTION ISSUES. (CONTACT INFORMATION BELOW.)

DESIGN PROCEDURE

SOIL PROPERTIES ARE PRESENTED BELOW THAT WILL APPLY TO MOST SITES IN ST. LOUIS COUNTY, MISSOURI. IF THE SITE AND SUBSURFACE CONDITIONS DO NOT MEET THE DESIGN PARAMETERS USED HEREIN, THE RETAINING WALLS MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER EXPERIENCED WITH THE DESIGN OF THE MAGNUMSTONE WALL SYSTEMS. THE PARAMETERS PRESENTED BELOW ARE "DRAINED" SOIL PARAMETERS USED TO MODEL LONG TERM EFFECTIVE STRENGTH CONDITIONS. HIGH PLASTICITY CLAY SHOULD BE AVOIDED UNLESS SITE SPECIFIC DESIGN RECOMMENDATIONS ARE OBTAINED FROM LOCAL GEOTECHNICAL ENGINEERS, EXPERIENCED IN THE DESIGN OF SEGMENTAL BLOCK RETAINING WALL SYSTEMS. THE DESIGNS PRESENTED HEREIN ASSUME THAT GROUNDWATER, PONDED WATER, OR RUNNING SURFACE WATER ARE NOT PRESENT. SHOULD GROUNDWATER, PONDED WATER, OR RUNNING WATER OR BE PRESENT, A SITE-SPECIFIC EVALUATION AND DESIGN IS NEEDED AND THE PLANS PRESENTED HEREIN ARE NOT VALID. WALLS WITH A SLOPE AT, BELOW AND/OR NEAR THE TOE OF THE WALL SHOULD BE AVOIDED UNLESS SITE SPECIFIC DESIGN RECOMMENDATIONS ARE OBTAINED FROM LOCAL GEOTECHNICAL ENGINEERS EXPERIENCED IN THE DESIGN OF MAGNUMSTONE RETAINING WALL SYSTEMS. THIS MASTER PLAN IS NOT VALID FOR THE DESIGN OF ANY RETAINING WALL WITH A SLOPE AT OR NEAR THE TOE OF THE WALL.

FOUR WALL CONFIGURATIONS ARE PRESENTED IN THE MASTER PLAN. ONE CONFIGURATION IS A WALL WITH A HORIZONTAL TOE SLOPE, A HORIZONTAL BACKSLOPE, AND NO SURCHARGE. THE SECOND CONFIGURATION IS A HORIZONTAL TOE SLOPE, A HORIZONTAL BACKSLOPE AND A 100 POUND PER SQUARE FOOT SURCHARGE. THE SURCHARGE IS A LOAD MEANT TO REPRESENT A MODERATE LOAD, SUCH AS A RESIDENTIAL DRIVEWAY. THE THIRD CONFIGURATION IS A SINGLE WALL WITH A HORIZONTAL TOE SLOPE, A BACKSLOPE INCLINED NO STEEPER THAN 3-HORIZONTAL TO 1-VERTICAL. THE FOURTH CONFIGURATION IS A TIERED WALL WITH TWO WALLS, A LEVEL TOE SLOPE, A LEVEL TERRACE, A LEVEL BACK SLOPE ABOVE THE UPPER WALL, AND NO SURCHARGE.

A RETAINING WALL SYSTEM CONSISTS OF SEVERAL ELEMENTS: THE BLOCK FACING; RETAINED EARTH (THE SOIL BEHIND THE RETAINING WALL SYSTEM); THE LEVELING PAD (THE HORIZONTAL FOUNDATION THAT THE FIRST COURSE OF BLOCK IS PLACED ON); AND THE FOUNDATION SOIL (THE SOIL THAT THE WALL SYSTEM SITS ON).

THE FOLLOWING IS A SUMMARY OF THE DESIGN PARAMETERS AND MINIMUM FACTORS OF SAFETY USED FOR THESE WALL CONFIGURATIONS:

|                  | <u>FRICTION ANGLE (DEGREES)</u> | <u>UNIT WEIGHT (PCF)</u> | <u>COHESION (PSF)</u> |
|------------------|---------------------------------|--------------------------|-----------------------|
| LEVELING PAD     | 40                              | 135                      | 0                     |
| RETAINED SOILS   | 28 SOIL/34 GRAVEL               | 120                      | 0                     |
| FOUNDATION SOILS | 28                              | 120                      | 0                     |

NET ALLOWABLE BEARING CAPACITY=1,500 PSF

PCF=POUNDS PER CUBIC FOOT

PSF=POUNDS PER SQUARE FOOT

MINIMUM FACTORS OF SAFETY (STATIC)

|                  |     |
|------------------|-----|
| EXTERNAL SLIDING | 1.5 |
| OVERTURNING      | 1.5 |

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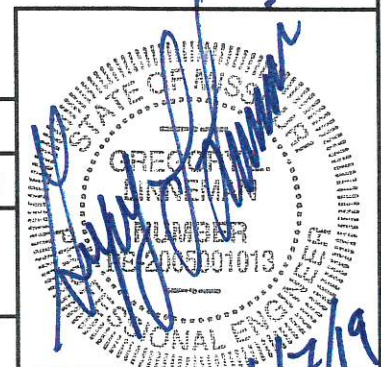
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DATE: 06-07-2019

APPLICATION AND  
DESIGN PROCEDURE

SHEET: 2 OF 16





SPECIFICATIONS:

MATERIALS

RETAINING WALL UNITS SHALL BE MAGNUMSTONE AS MANUFACTURED BY MIDWEST BLOCK & BRICK. THE UNITS ARE 48 INCH WIDE, 24 INCH TALL AND 24 INCHES DEEP. CONCRETE WALL UNITS SHALL MEET THE REQUIREMENTS OF ASTM C94 EXCEPT COMPRESSIVE STRENGTH SHALL BE A MINIMUM 4,000 PSI.

REINFORCED BACKFILL AND RETAINED SOIL/FILL MATERIALS SHALL BE FREE OF EXCESS MOISTURE, ROOTS, MUCK, SOD, SNOW, FROZEN LUMPS, ORGANIC MATTER OR OTHER DELETERIOUS MATERIALS. ALL ROCK PARTICLES AND HARD EARTH CLODS SHALL BE LESS THAN THREE INCHES IN THE LONGEST DIMENSION. REINFORCED BACKFILL MATERIALS WHICH DO NOT MEET THIS CRITERION SHALL BE CONSIDERED UNSUITABLE AND SHALL BE REMOVED.

THE INFILL MATERIAL PLACED INSIDE OF THE BLOCK SHALL BE 0.5 TO 1.5 INCH CLEAN CRUSHED LIMESTONE, THE DRAINAGE ROCK SHALL BE FREE DRAINING AGGREGATE SUCH AS 0.75 INCH CLEAN CRUSHED LIMESTONE.

THE LEVELING PAD SHALL BE CONSTRUCTED OF WELL GRADED, CRUSHED LIMESTONE SIMILAR TO 1 INCH MINUS.

FILTER FABRIC TO BE MIRAFI 140NL OR APPROVED EQUAL.

THE PERFORATED PIPE SHALL BE 4 INCH DIAMETER HDPE COIL PIPE.

WALL FOUNDATION

FOUNDATION SOIL SHALL BE EXCAVATED AS NEEDED TO CONSTRUCT THE LEVELING PAD AND FILL ZONES TO THE DEPTHS AND LOCATIONS SHOWN ON THE PLAN SHEETS. THE EXPOSED FOUNDATION SOIL SHALL BE OBSERVED PRIOR TO CONSTRUCTION TO VERIFY THAT THE EXPOSED MATERIAL IS SUITABLE FOR A NET DESIGN BEARING PRESSURE OF 1,500 PSF AND THAT THE BASE OF THE EXCAVATION IS FREE OF LOOSE SOIL, UNCOMPACTED FILL, HIGH PLASTIC SOIL, WATER, OR FROZEN MATERIAL. CONSULT A SOILS ENGINEER IF IN DOUBT. REMOVE ANY UNSUITABLE SOIL. UNDERCUT AREAS SHALL BE FILLED WITH CRUSTED LIMESTONE (1 INCH MINUS) AND COMPACTED TO AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY.

CONSTRUCT THE CRUSHED ROCK LEVELING PAD TO LINES AND GRADES SHOWN ON THE PLANS. CONSTRUCT THE HORIZONTAL DRAINAGE LAYER AT THE LINES AND GRADES SHOWN ON THE PLANS. THE DRAINAGE ROCK SHALL BE SEPARATED FROM THE SURROUNDING FILL WITH A FILTER FABRIC.

INSTALL A 4 INCH DIAMETER PERFORATED DRAIN PIPE IN THE LOWEST PORTION OF THE WALL. DAYLIGHT THE DRAIN PIPE AT END AND/OR THROUGH FACE OF WALL TO ALLOW FOR DRAINAGE.

WALL CONSTRUCTION

INSTALL THE FIRST COURSE OF UNITS ON THE LEVELING PAD, TAKE CARE TO LEVEL THE UNITS BOTH PARALLEL AND PERPENDICULAR TO THE WALL. PLACE THE NEXT UNITS ON TOP OF THE FIRST. COURSE IN A RUNNING BOND PATTERN. BACKFILL UNITS LIFT BY LIFT AND CONTINUE CONSTRUCTION.

DRAINAGE ROCK SHALL BE PLACED IN A HORIZONTAL LAYER AT THE BASE OF THE WALL SO THE BASE OF THE DISCHARGE PIPE WILL BE LEVEL WITH THE GRADE AT THE TOE OF THE WALL. THE DRAINAGE ROCK SHALL BE SEPARATED FROM THE SOIL WITH A FILTER FABRIC.

WALL BACKFILL

WALL BACKFILL MATERIAL SHALL BE PLACED IN MAXIMUM 6 INCH LOOSE LIFTS AND COMPACTED TO AT LEAST 95% OF THE MATERIAL'S MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR METHOD. BACKFILL SHALL BE PLACED, SPREAD, AND COMPACTED IN SUCH A MANNER THAT MINIMIZES MOVEMENT OF THE WALL.

DURING BACKFILL PLACEMENT, THE 3 FOOT ZONE DIRECTLY BEHIND THE WALL SHALL BE LIMITED TO THE USE OF HAND OPERATED COMPACTION EQUIPMENT ONLY.

THE SOIL FOR THE WALLS SHALL BE PROTECTED FROM FUTURE EROSION.

PROTECTION OF WORK

THE SURFACE OF THE WALL BACKFILL SHALL BE GRADED AT THE END OF EACH DAY OF WORK TO PROVIDE POSITIVE SURFACE DRAINAGE AWAY FROM THE WALL. GRADING SHALL INCLUDE PROPER CONTOURING OF FILLS IN ADJACENT AREAS TO PREVENT THE FLOW OF SURFACE WATER INTO THE RETAINING WALL CONSTRUCTION ZONE.

THE DESIGN OF THE WALLS ARE BASED ON CONDITIONS AND LOADS IMPOSED ON THE WALL AT COMPLETION OF THE PROJECT. PRIOR TO PROJECT COMPLETION, THE WALL IS VULNERABLE TO DAMAGES CAUSED BY CONSTRUCTION ACTIVITY ADJACENT TO THE WALL. OF PARTICULAR CONCERN IS OPERATION OF GRADING AND PAVEMENT CONSTRUCTION EQUIPMENT ON THE BACKFILL AT THE TOP OF THE WALL. ONLY EQUIPMENT WITH A WEIGHT NOT EXCEEDING ONE TON CAN BE USED IN THE THREE FOOT ZONE DIRECTLY BEHIND THE BACK OF THE BLOCK.

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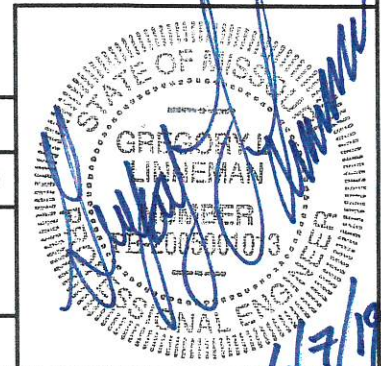
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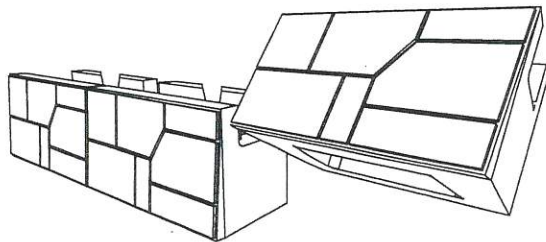
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SPECIFICATIONS

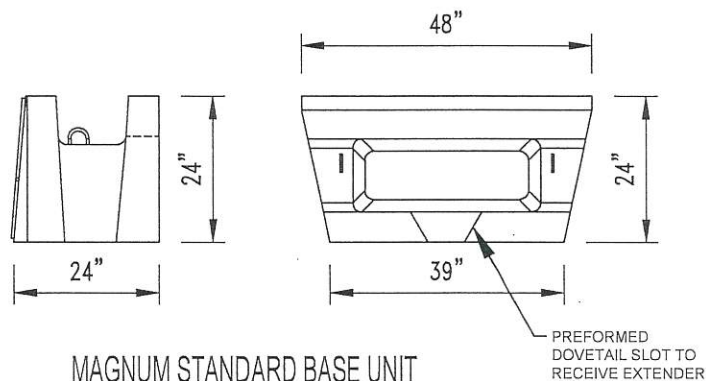
SHEET: 3 OF 16





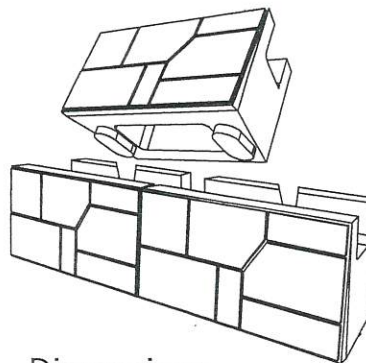
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|            |         |
|------------|---------|
| Face Width | 48"     |
| Back Width | 39"     |
| Depth      | 24"     |
| Height     | 24"     |
| Face Area  | 8 sq ft |
| Setback    | 4.5°    |
| Weight     | 1375lbs |



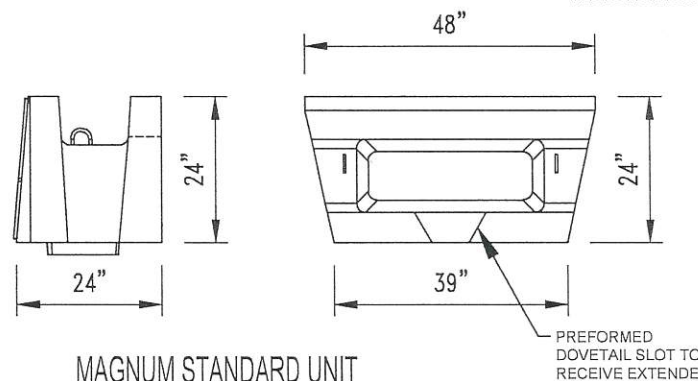
**MAGNUM STANDARD BASE UNIT**

SCALE: NONE



### Dimensions

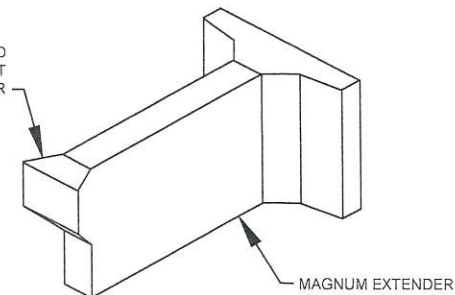
|            |         |
|------------|---------|
| Face Width | 48"     |
| Back Width | 39"     |
| Depth      | 24"     |
| Height     | 24"     |
| Face Area  | 8 sq ft |
| Setback    | 4.5°    |
| Weight     | 1400lbs |



**MAGNUM STANDARD UNIT**

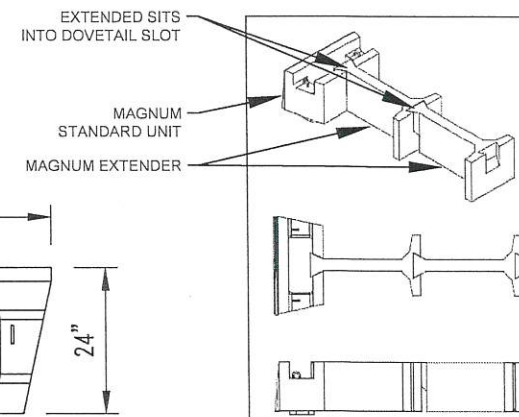
SCALE: NONE

CONCRETE FORMED  
w/ PRECAST  
DOVETAIL RECEIVER



**MAGNUM STANDARD EXTENDER**

SCALE: NONE



**MAGNUM STONE EXTENDER**

SCALE: NONE

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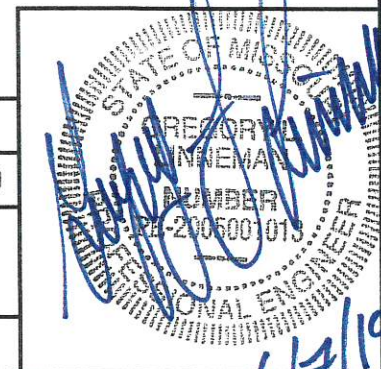
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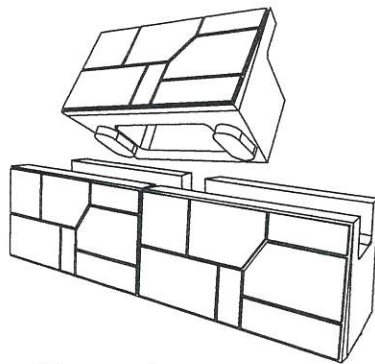
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MAGNUM STANDARD  
BLOCK DETAILS

SHEET: 4 OF 16

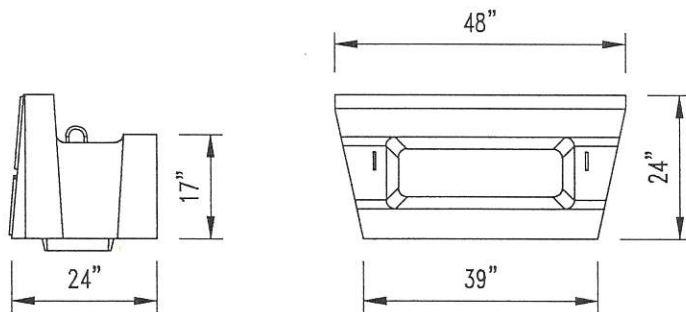






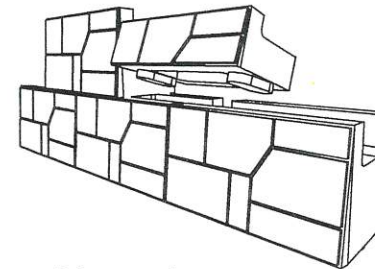
#### Dimensions

Face Width 48"  
Back Width 39"  
Depth 24"  
Height 24"  
Face Area 8 sq ft  
Setback 4.5°  
Weight 1240lbs



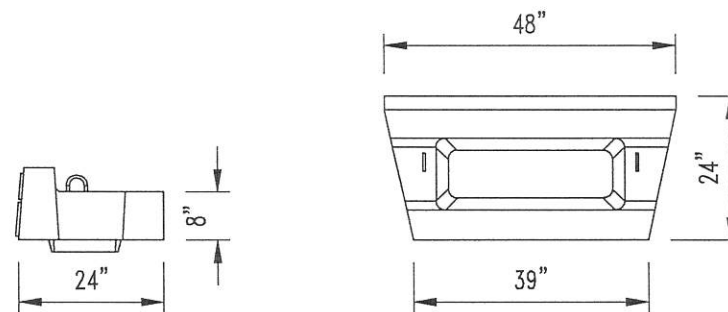
MAGNUM STANDARD TOP UNIT

SCALE: NONE



#### Dimensions

Face Width 48"  
Back Width 39"  
Depth 12"  
Height 12"  
Face Area 4 sq ft  
Setback 4.5°  
Weight 670lbs



MAGNUM HALF HIGH TOP UNIT

SCALE: NONE

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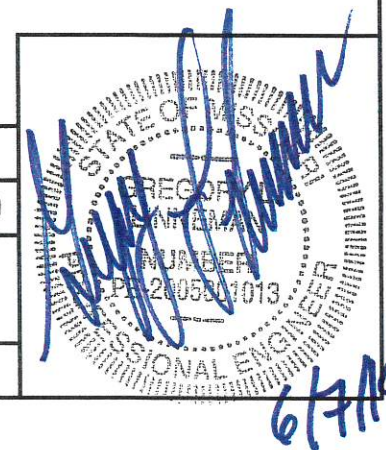
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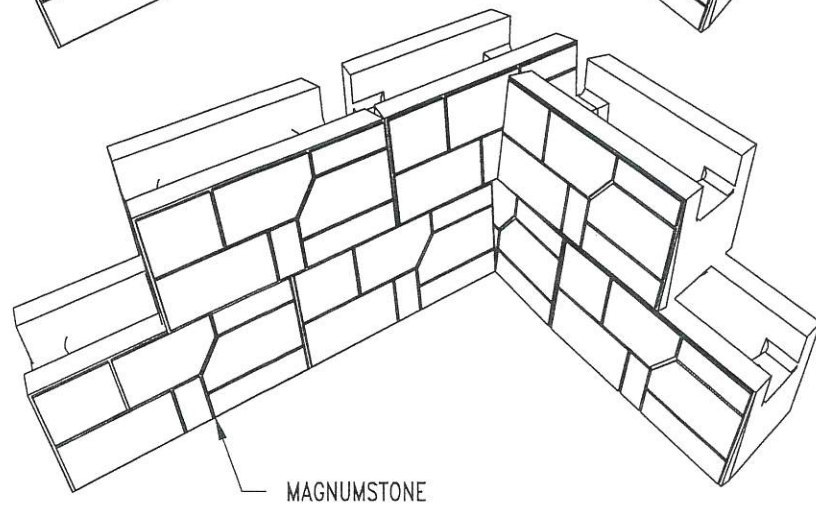
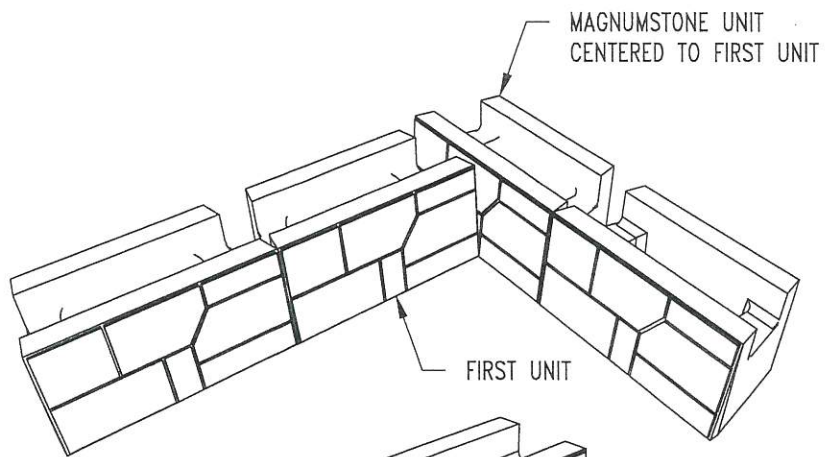
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DATE: 06-07-2019

MAGNUM STANDARD  
BLOCK DETAILS

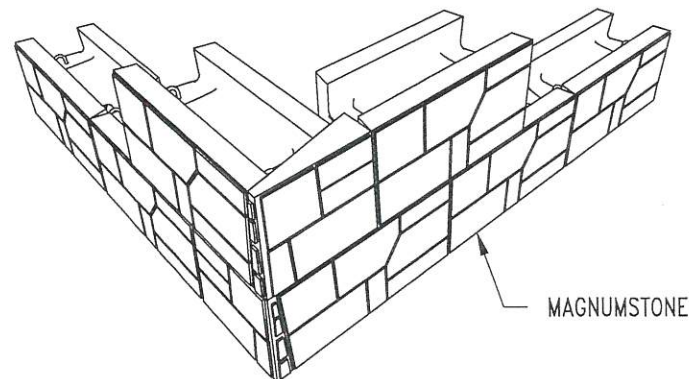
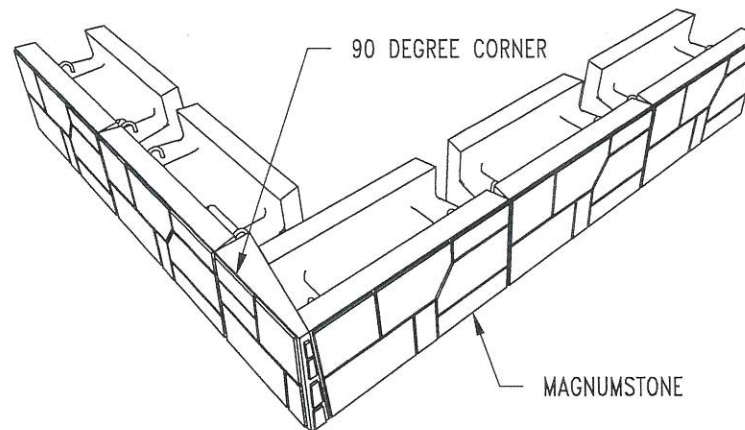
SHEET: 5 OF 16





MAGNUM INSIDE CORNER DETAIL

SCALE: NONE



MAGNUM OUTSIDE CORNER DETAIL

SCALE: NONE

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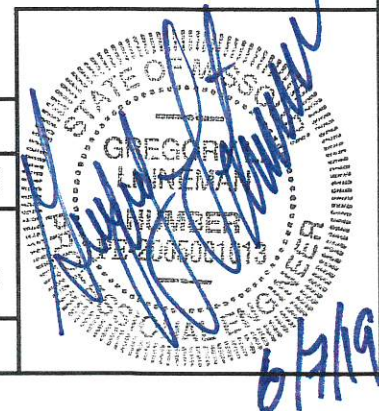
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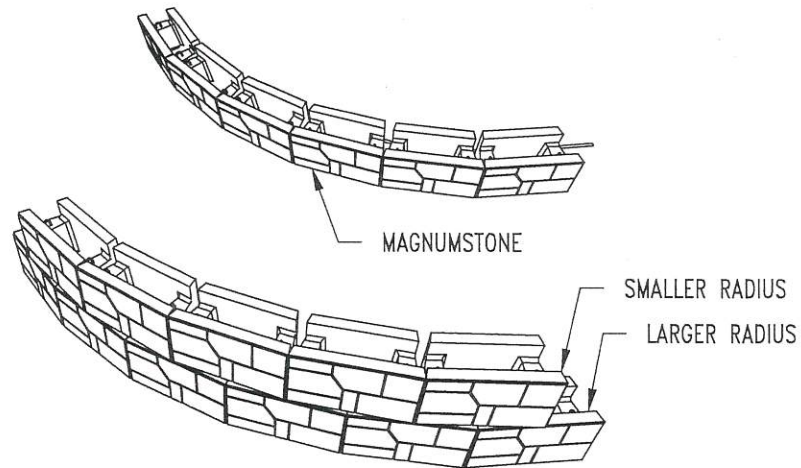
DATE: 06-07-2019

MAGNUM STANDARD  
BLOCK CORNER DETAILS

SHEET: 6 OF 16

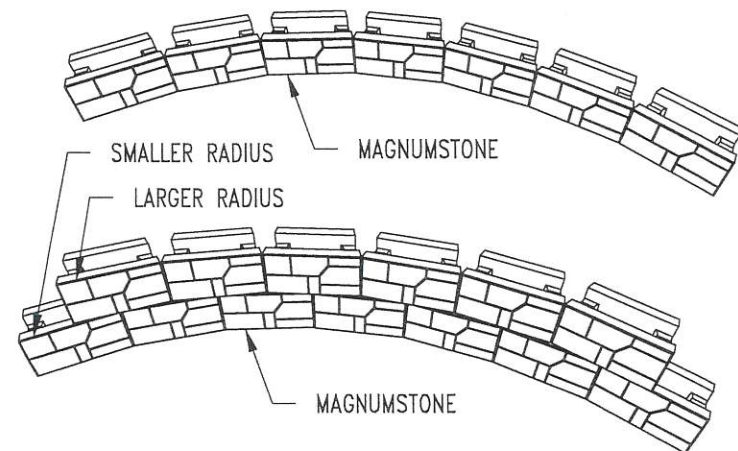






MAGNUM OUTSIDE CURVE DETAIL

SCALE: NONE



MAGNUM INSIDE CURVE DETAIL

SCALE: NONE

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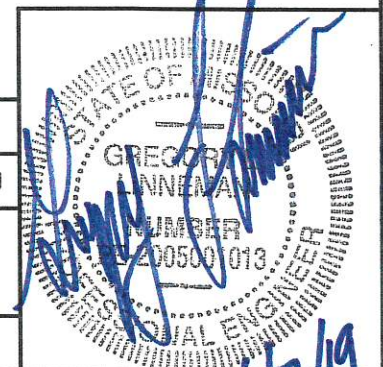
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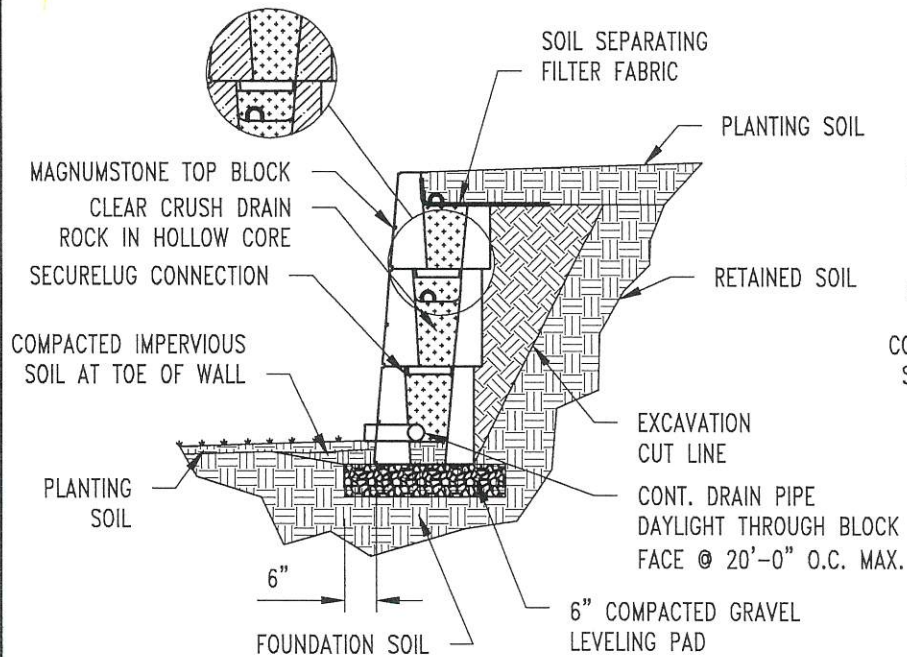
MAGNUM STANDARD  
BLOCK CURVE DETAILS

SHEET: 7 OF 16



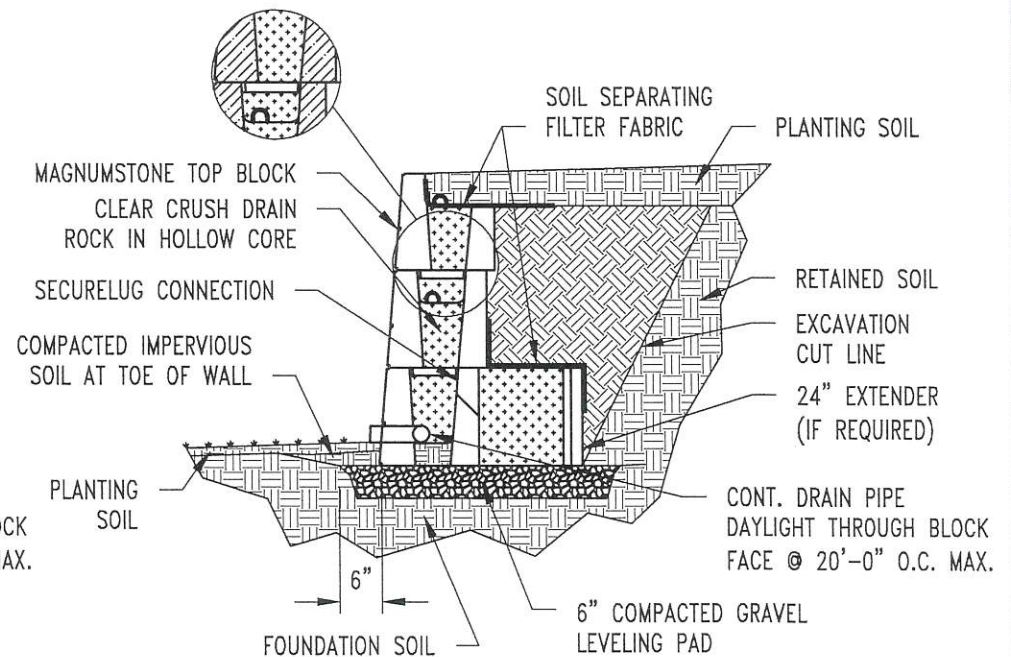
6/7/19





GRAVITY WALL SECTION

SCALE: NONE



GRAVITY WALL SECTION WITH EXTENDER

SCALE: NONE

## WALL SECTIONS WITH SOIL BACKFILL

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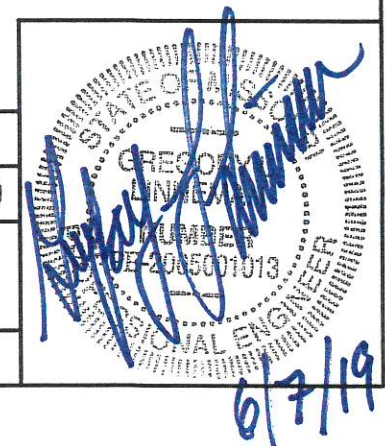
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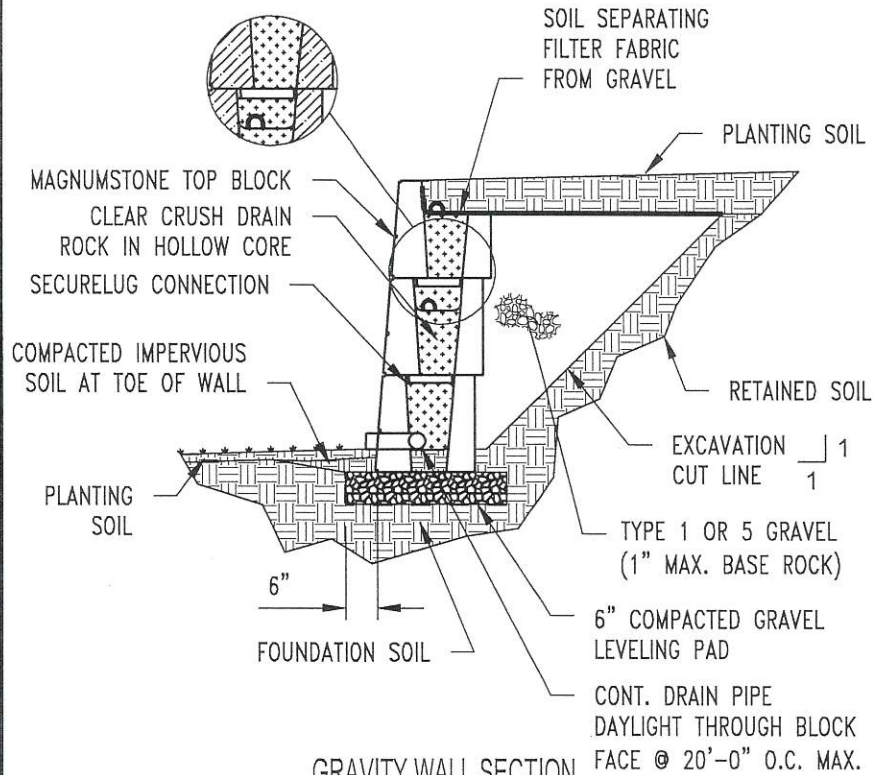
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DATE: 06-07-2019

MAGNUM TYPICAL  
WALL SECTIONS

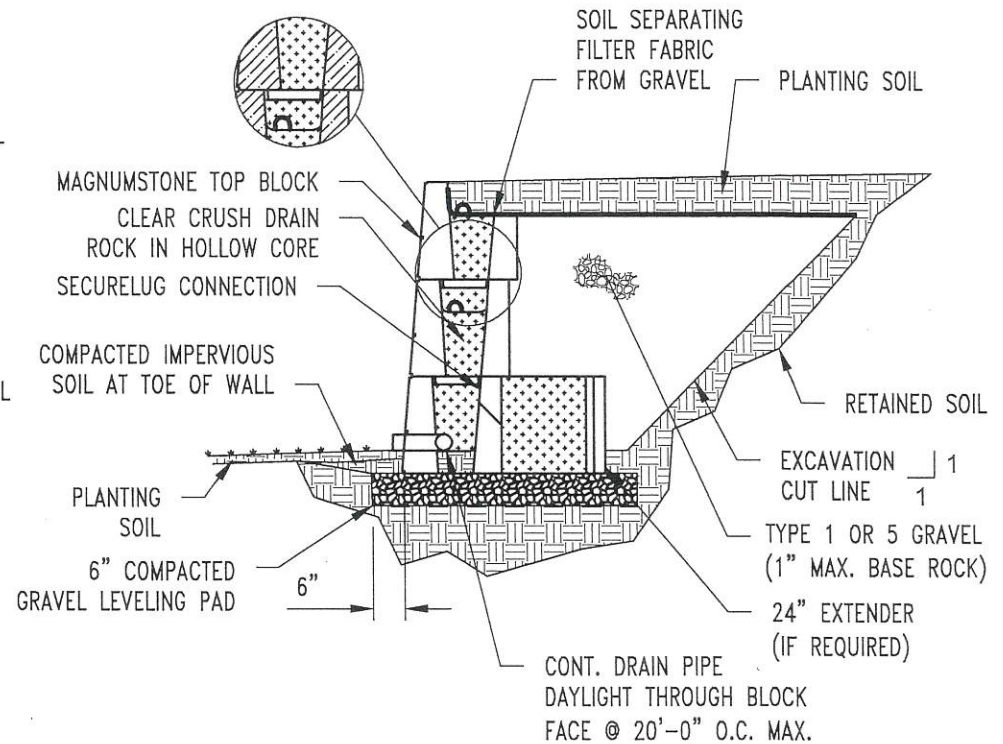
SHEET: 8 OF 16





GRAVITY WALL SECTION

SCALE: NONE



GRAVITY WALL SECTION WITH EXTENDER

SCALE: NONE

## WALL SECTIONS WITH GRAVEL BACKFILL

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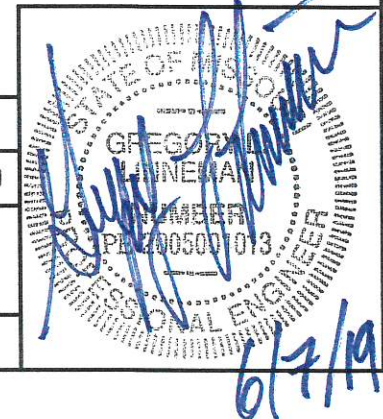
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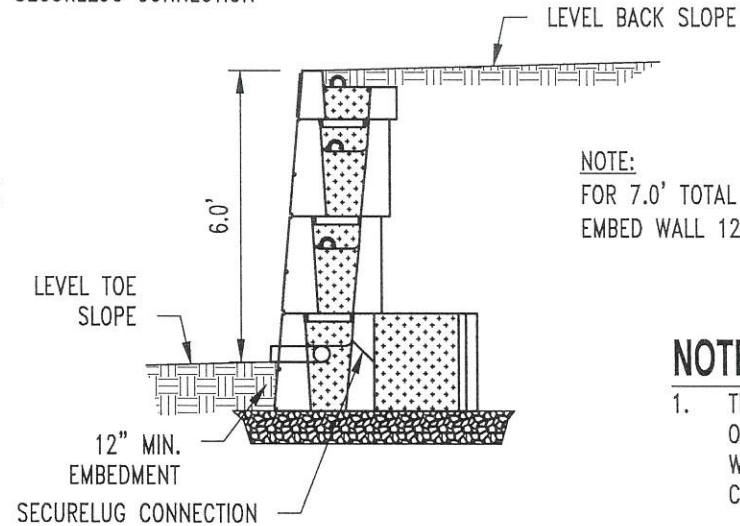
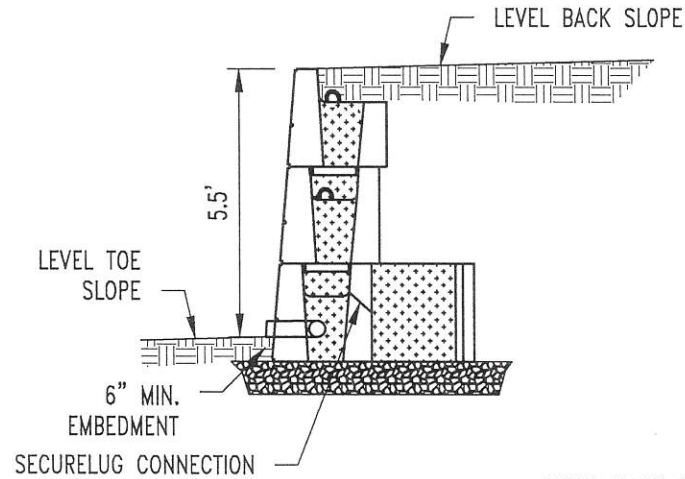
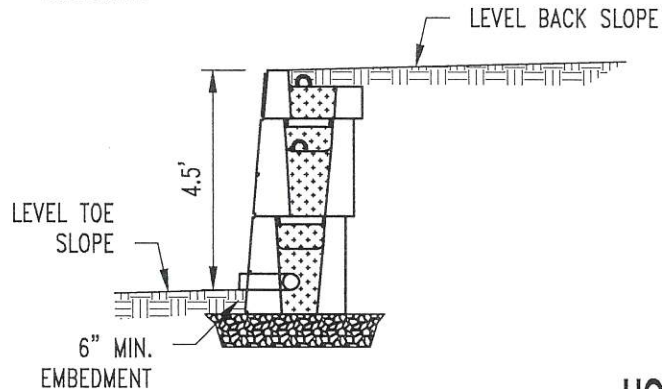
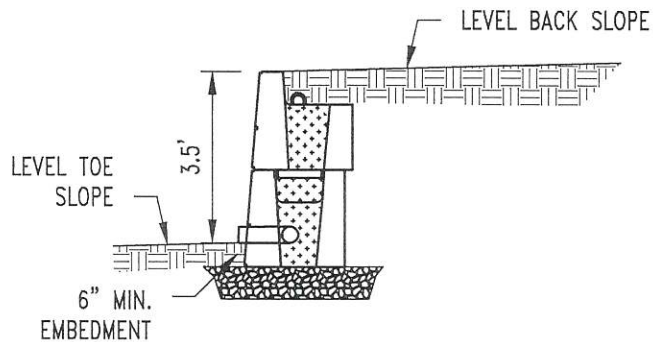
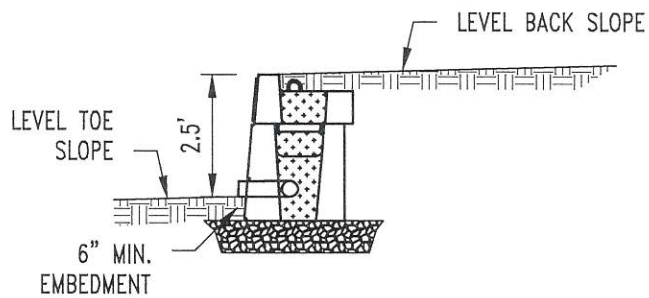
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MAGNUM TYPICAL  
WALL SECTIONS

SHEET: 9 OF 16







**NOTE:**  
FOR 7.0' TOTAL HEIGHT,  
EMBED WALL 12"

**NOTE:**

1. THIS PAGE IS A GUIDE FOR THE PLACEMENT OF MAGNUMSTONE BLOCKS AT DIFFERENT WALL HEIGHTS. SEE TYPICAL SECTIONS FOR CONSTRUCTION NOTES.

## HORIZONTAL SLOPE WITH SOIL BACKFILL

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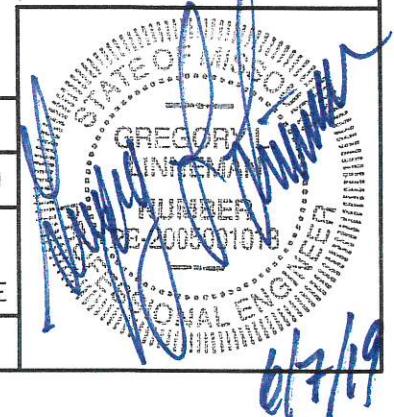
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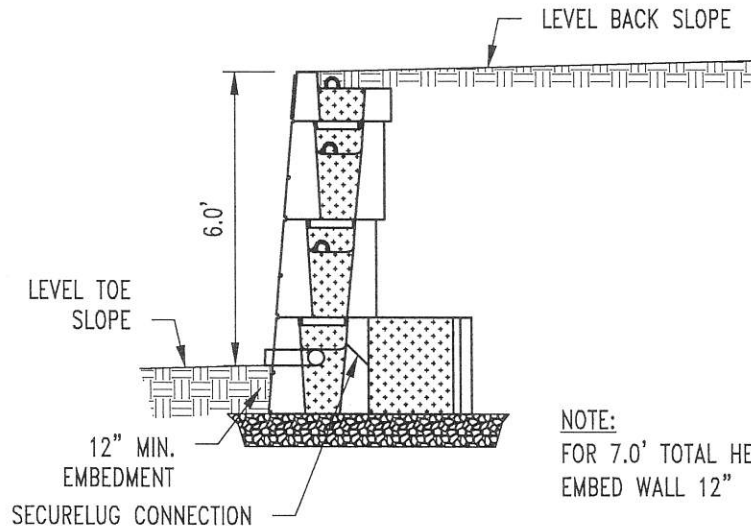
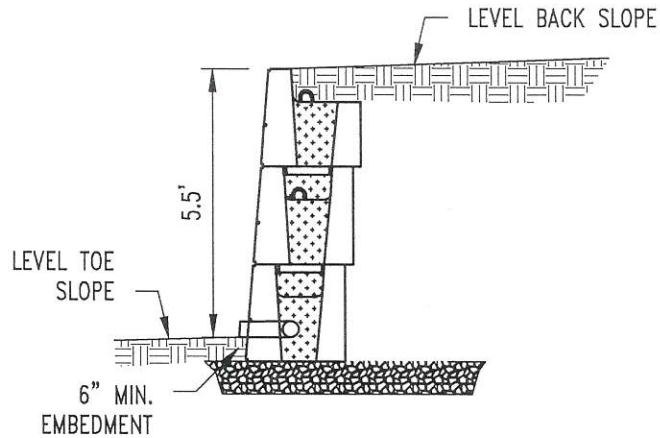
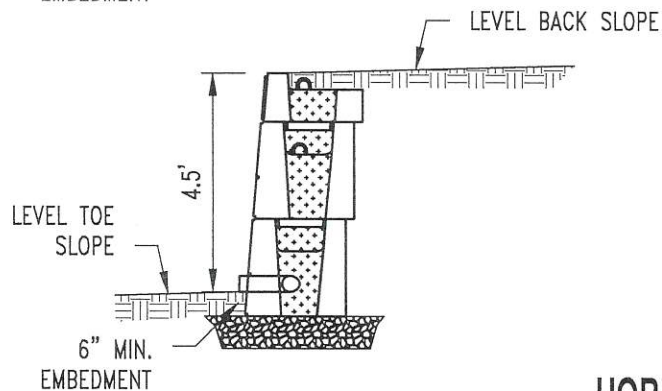
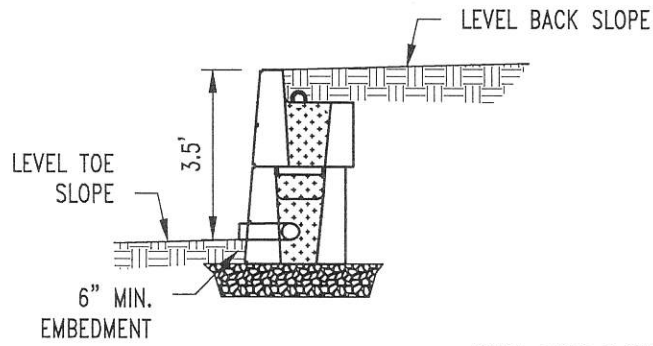
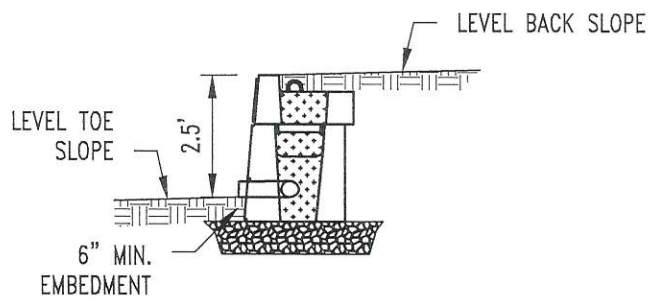
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
HORIZONTAL BACK SLOPE

SHEET: 10 OF 16





### NOTE:

1. THIS PAGE IS A GUIDE FOR THE PLACEMENT OF MAGNUMSTONE BLOCKS AT DIFFERENT WALL HEIGHTS. SEE TYPICAL SECTIONS FOR CONSTRUCTION NOTES.

NOTE:  
FOR 7.0' TOTAL HEIGHT,  
EMBED WALL 12"

## HORIZONTAL SLOPE WITH GRAVEL BACKFILL

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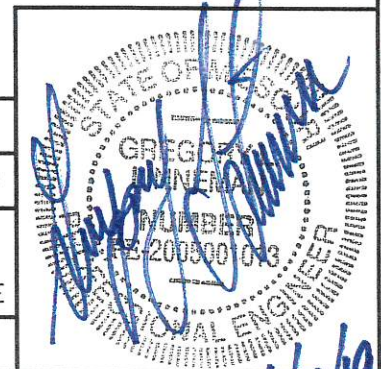
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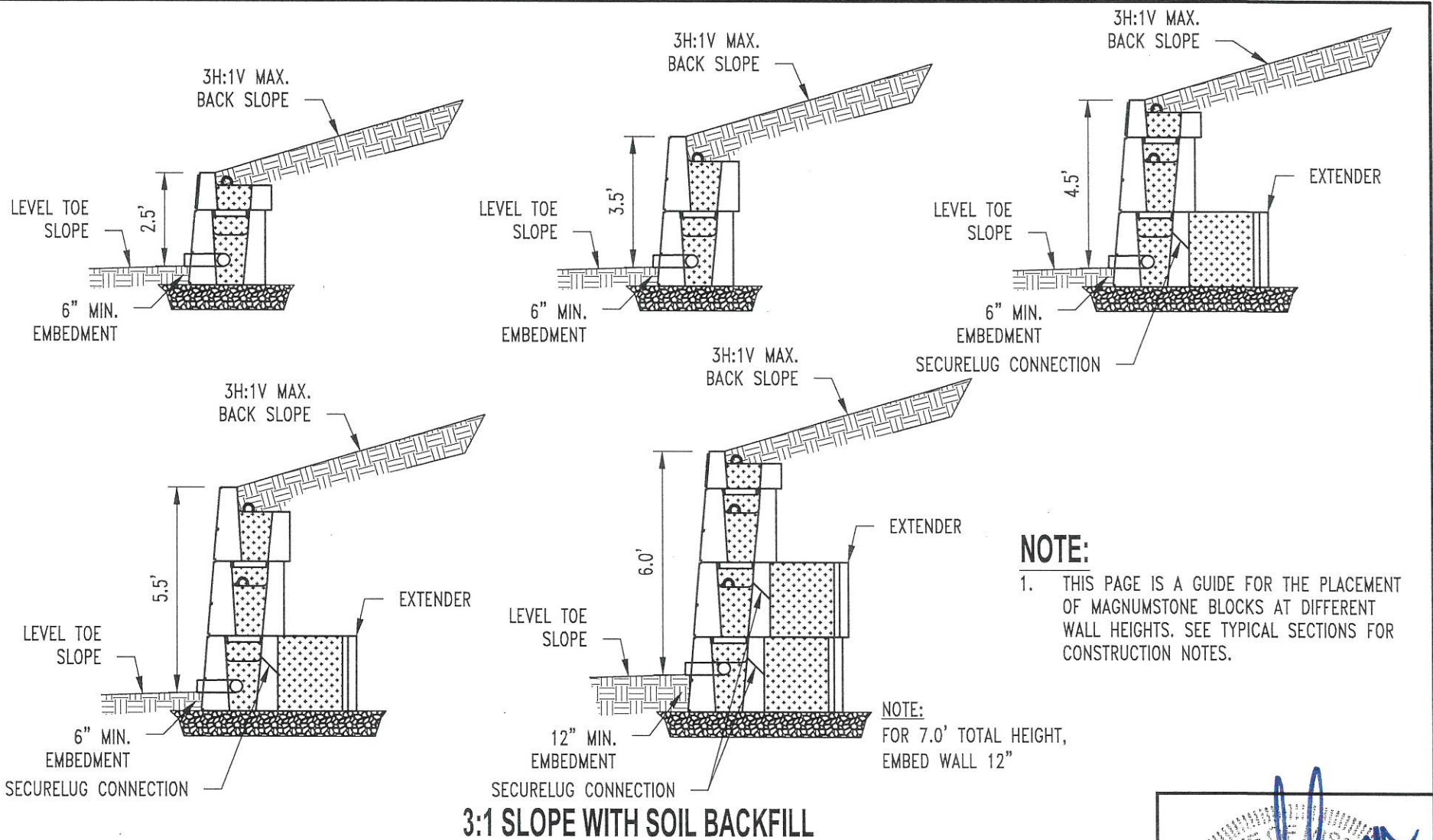
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
HORIZONTAL BACK SLOPE

SHEET: 11 OF 16







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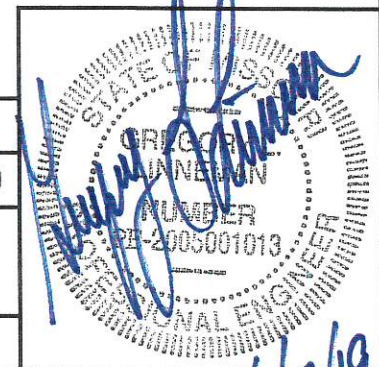
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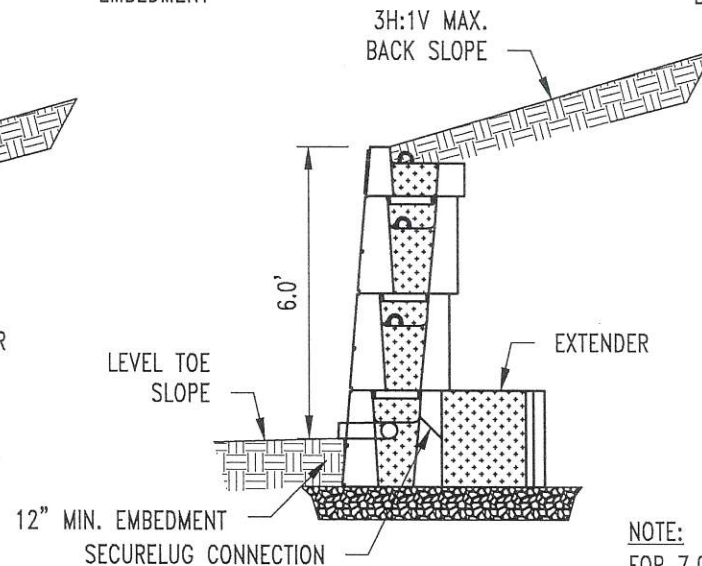
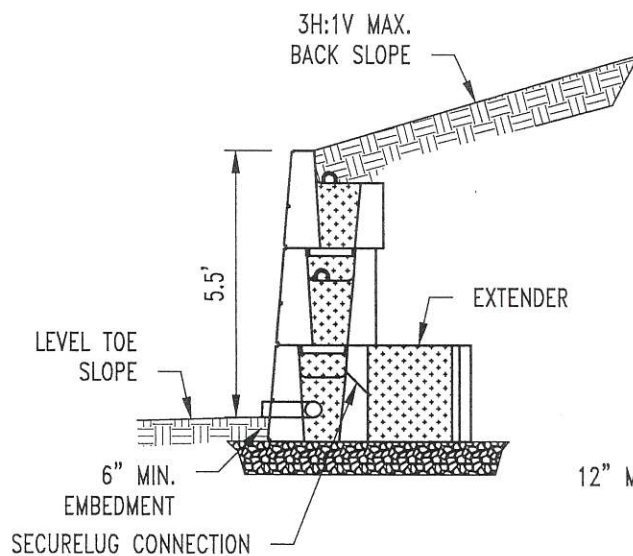
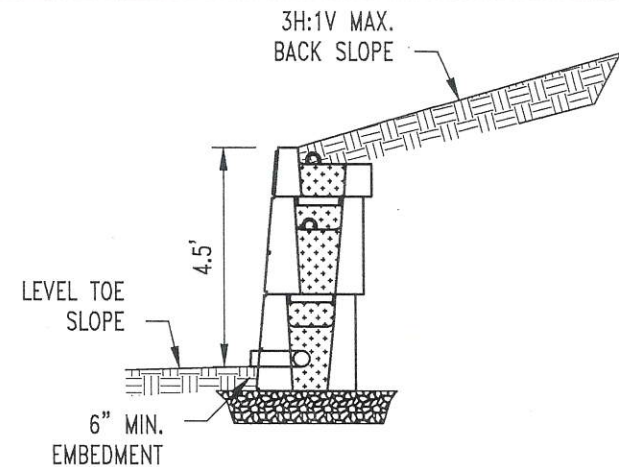
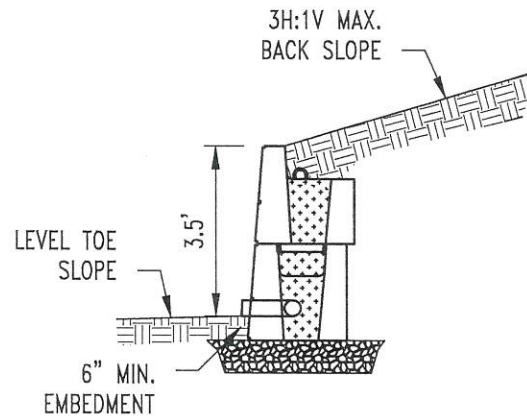
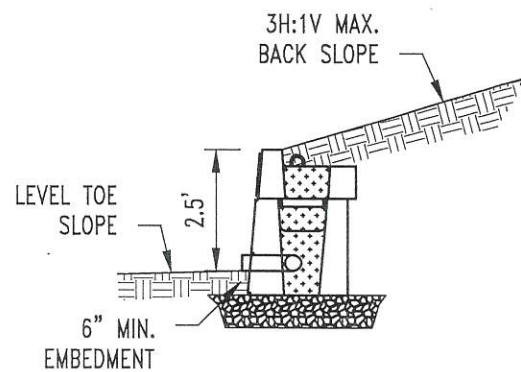
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
SLOPING BACK SLOPE

SHEET: 12 OF 16





### 3:1 SLOPE WITH GRAVEL BACKFILL

#### NOTE:

1. THIS PAGE IS A GUIDE FOR THE PLACEMENT OF MAGNUMSTONE BLOCKS AT DIFFERENT WALL HEIGHTS. SEE TYPICAL SECTIONS FOR CONSTRUCTION NOTES.

#### NOTE:

FOR 7.0' TOTAL HEIGHT,  
EMBED WALL 12"

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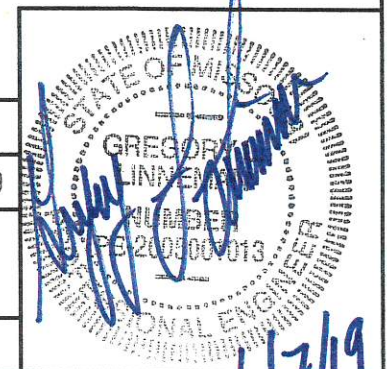
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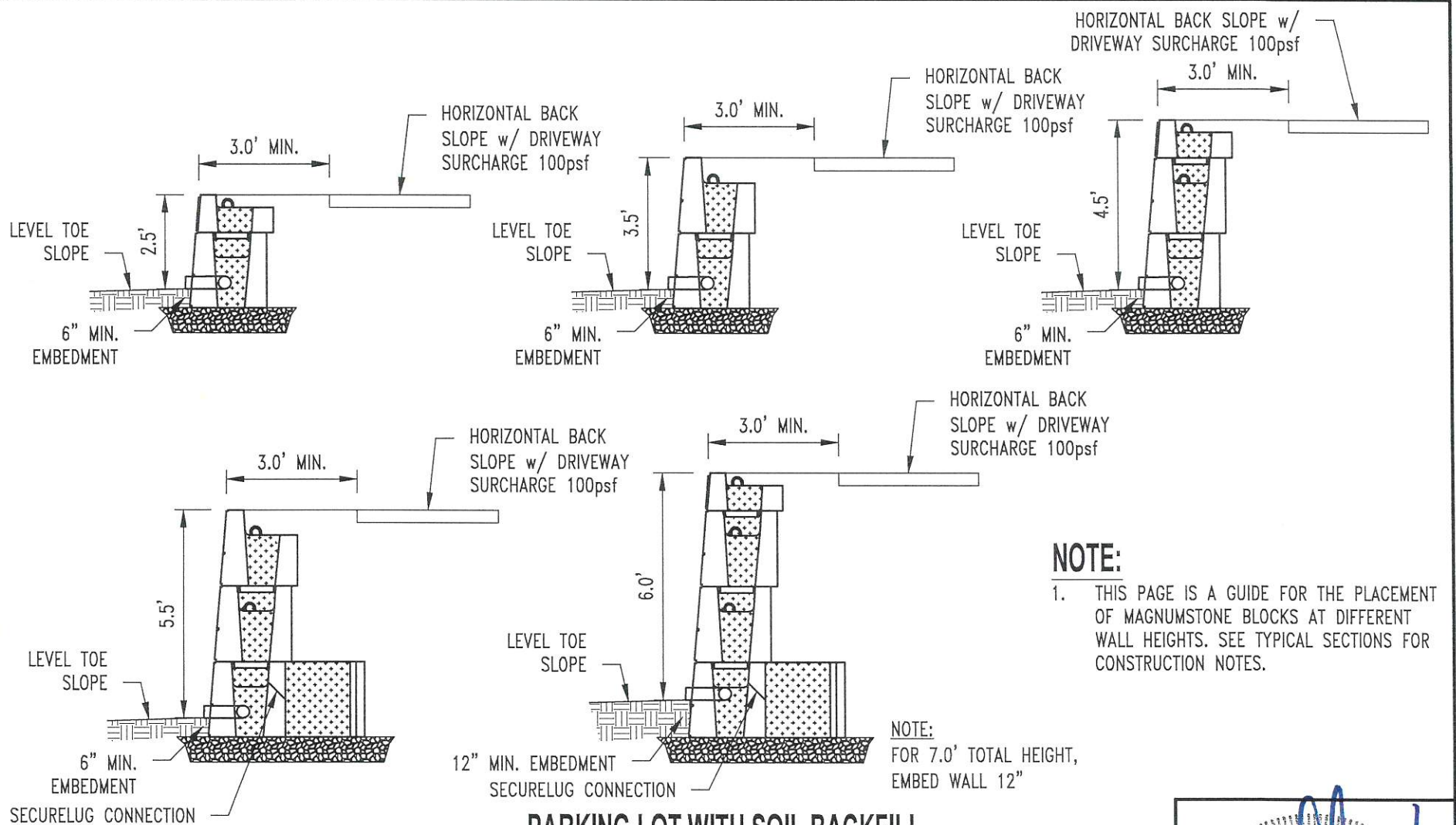
WALL HEIGHT GUIDES  
STANDARD DESIGN  
SLOPING BACK SLOPE

SHEET: 13 OF 16



6/7/19





## PARKING LOT WITH SOIL BACKFILL

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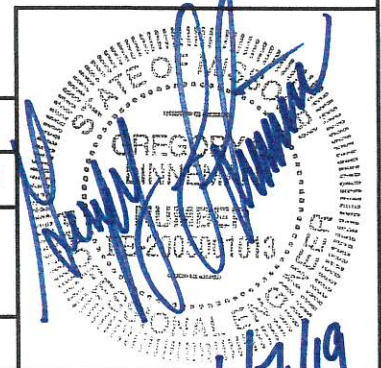
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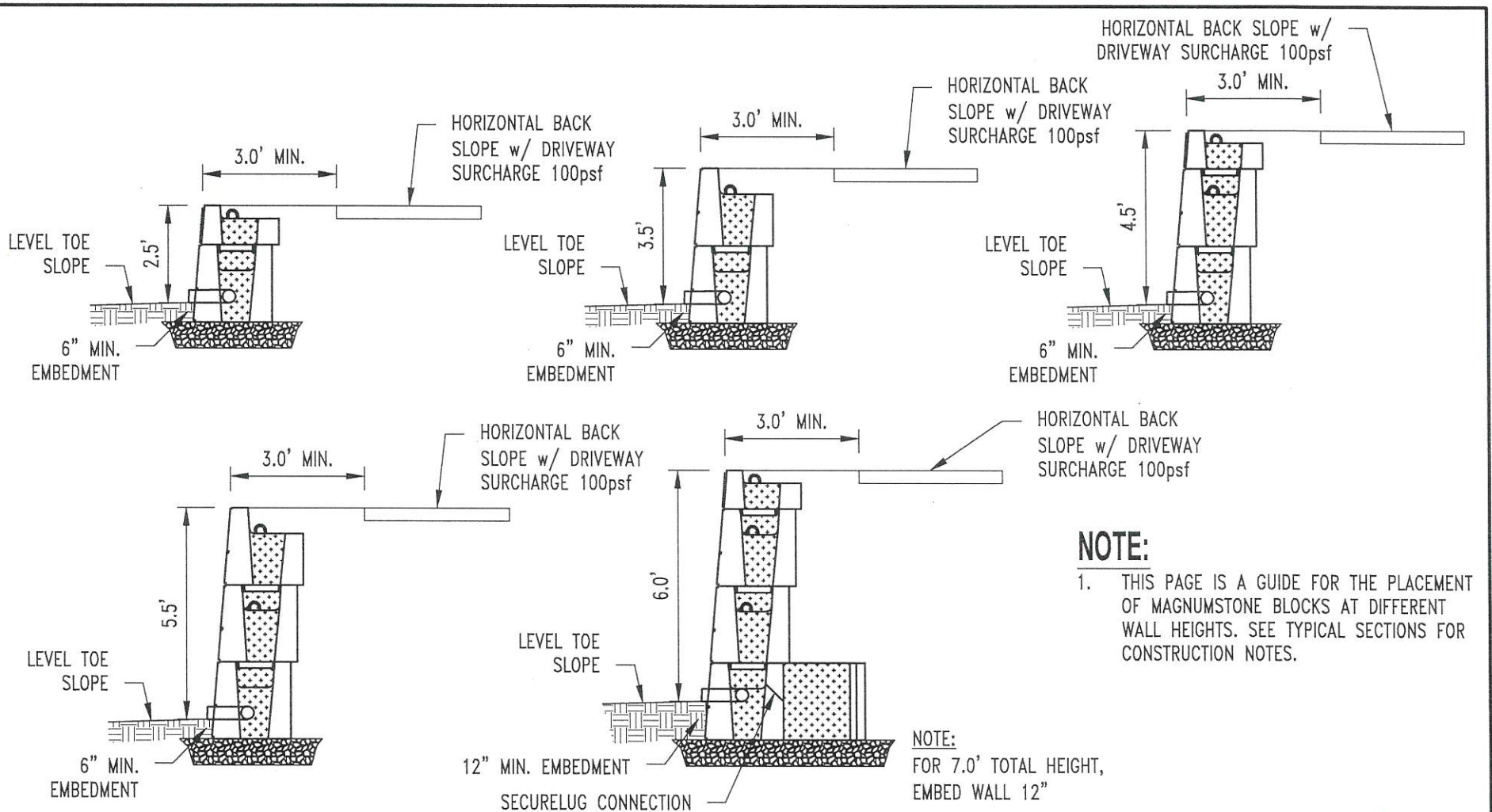
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
PARKING SURCHARGE 100psf

SHEET: 14 OF 16





## PARKING LOT WITH GRAVEL BACKFILL

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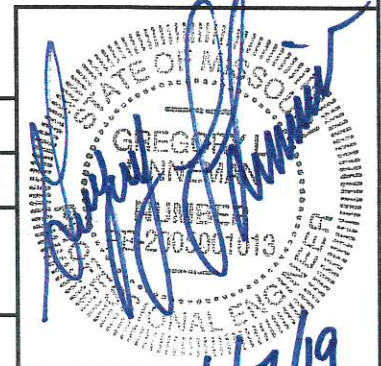
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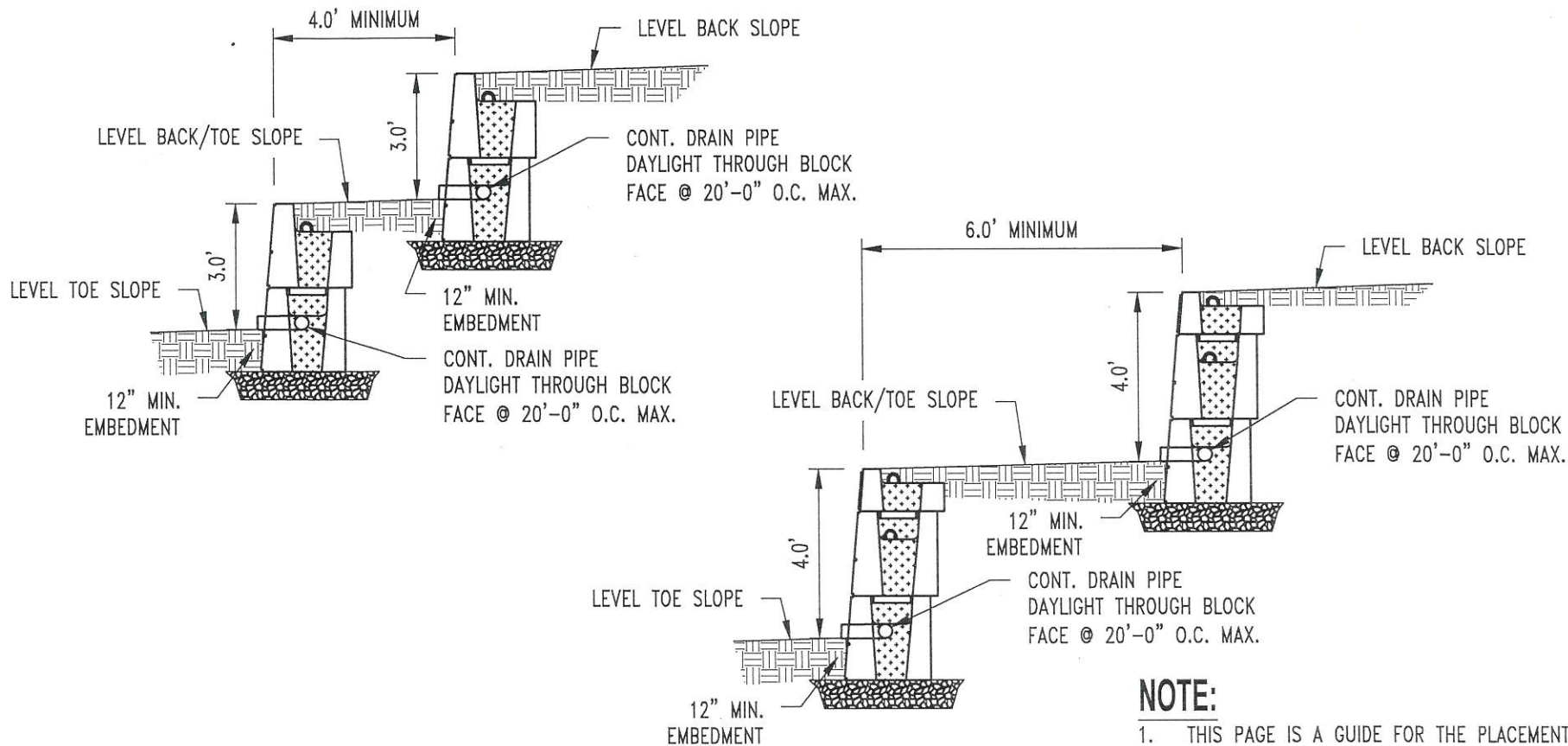
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
PARKING SURCHARGE 100psf

SHEET: 15 OF 16







### NOTE:

1. THIS PAGE IS A GUIDE FOR THE PLACEMENT OF MAGNUMSTONE BLOCKS AT DIFFERENT WALL HEIGHTS. SEE TYPICAL SECTIONS FOR CONSTRUCTION NOTES.

## TIERED WALLS WITH SOIL BACKFILL

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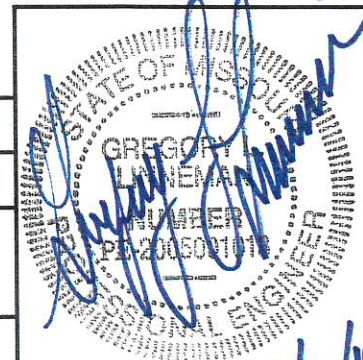
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WALL HEIGHT GUIDES  
STANDARD DESIGN  
TIERED WALLS

SHEET: 16 OF 16



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