

**DESIGN NOTES**

- Design is based on the assumption that backfill within the reinforced soil mass, methods of construction and quality of materials conform to the requirements of Hilfiker Retaining Walls.
- Required Soil Characteristics:  
 Wall Backfill:  
 Unit Weight: 130 pcf  
 Internal Friction Angle: 46°  
 Cohesion = 0 psf  
 Retained Backfill:  
 Unit Weight: 130 pcf  
 Internal Friction Angle: 45°  
 Cohesion = 0 psf  
 Foundation Soils:  
 Unit Weight: 130 pcf  
 Friction Angle for Sliding: 40°  
 Cohesion = 0 psf

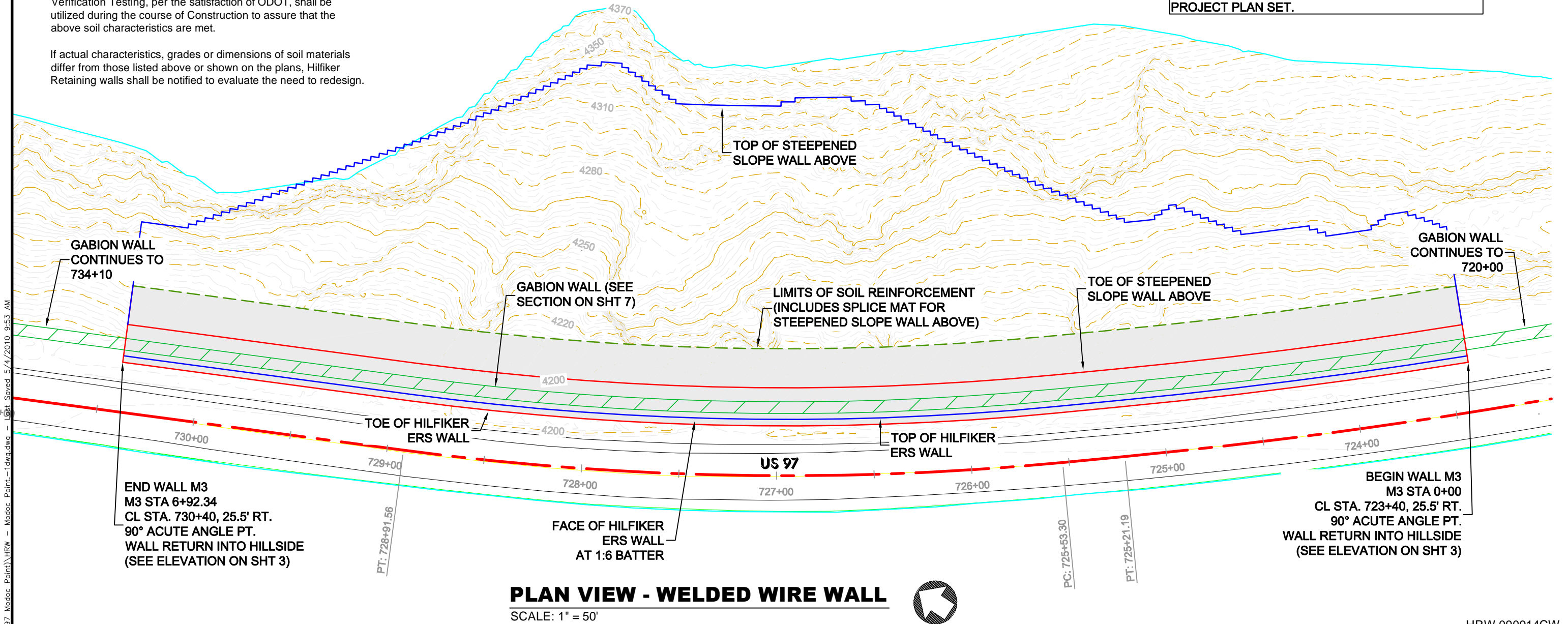
- If during construction, the wall location, structure location or loads are different than that proposed in this plan set and calculation package, HRW shall be notified to evaluate the need for a redesign.
- The design requires a non-saturated backfill. Surface and sub-surface drainage control may be required to prevent saturation of the backfill or relieve hydrostatic pressures.
- Design Procedure:  
 Mechanically Stabilized Earth walls and Reinforced Soil Slopes, FHWA report No. FHWA-NHI-00-043.
- Ref. Documents:  
 ODOT Project Plans - US97: Modoc Point To Hagelstein Park Sec.  
 CAD Cross Sections Provided by ODOT.

Verification Testing, per the satisfaction of ODOT, shall be utilized during the course of Construction to assure that the above soil characteristics are met.

If actual characteristics, grades or dimensions of soil materials differ from those listed above or shown on the plans, Hilfiker Retaining walls shall be notified to evaluate the need to redesign.

THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE HILFIKER COMPANY HAS DESIGNED, AND IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY, INCLUDING FOUNDATION AND SLOPE STABILITY, IS THE RESPONSIBILITY OF THE OWNER.

**NOTE:**  
 PLAN SHOWN IS A PORTION OF THE "M3 ROCKFALL MITIGATION PLAN" ON SHEET GC-23 OF THE ODOT PROJECT PLAN SET.



**PLAN VIEW - WELDED WIRE WALL**

SCALE: 1" = 50'

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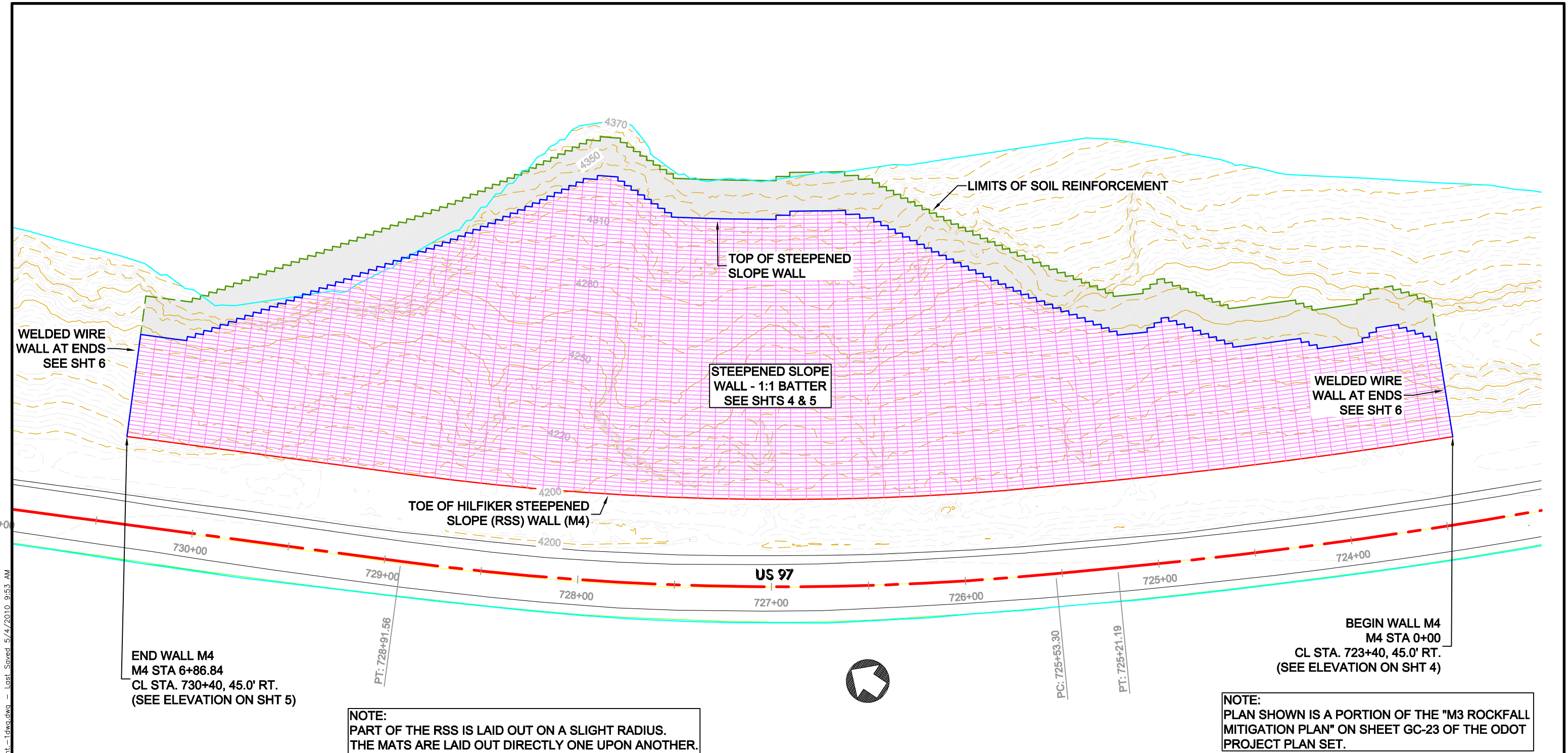
US 97:MODOC POINT TO HAGELSTEIN PARK SECTION

PLAN VIEW & DESIGN NOTES

HRW 090914CW

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| PROJECT | 09-054  |
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| DESIGN  | KLC     |
| DRAWN   | KLC     |

SHT 1 OF 13



**NOTE:**  
 PART OF THE RSS IS LAID OUT ON A SLIGHT RADIUS. THE MATS ARE LAID OUT DIRECTLY ONE UPON ANOTHER. THIS DESIGN REQUIRES THAT THE 8" SPACE BETWEEN MATS WILL INCREMENTALLY DECREASE AS THE WALL IS BUILT UPWARD. THE LOWER MATS ARE 8" APART WHILE THE UPPER MATS ARE CLOSE TO TOUCHING.

**NOTE:**  
 PLAN SHOWN IS A PORTION OF THE "M3 ROCKFALL MITIGATION PLAN" ON SHEET GC-23 OF THE ODOT PROJECT PLAN SET.

**PLAN VIEW - M4, STEEPENED SLOPE (RSS) WALL**

SCALE: 1" = 50'

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US 97:MODOC POINT TO HAGELSTEIN PARK SECTION

RSS PLAN VIEW

HRW 090914CW

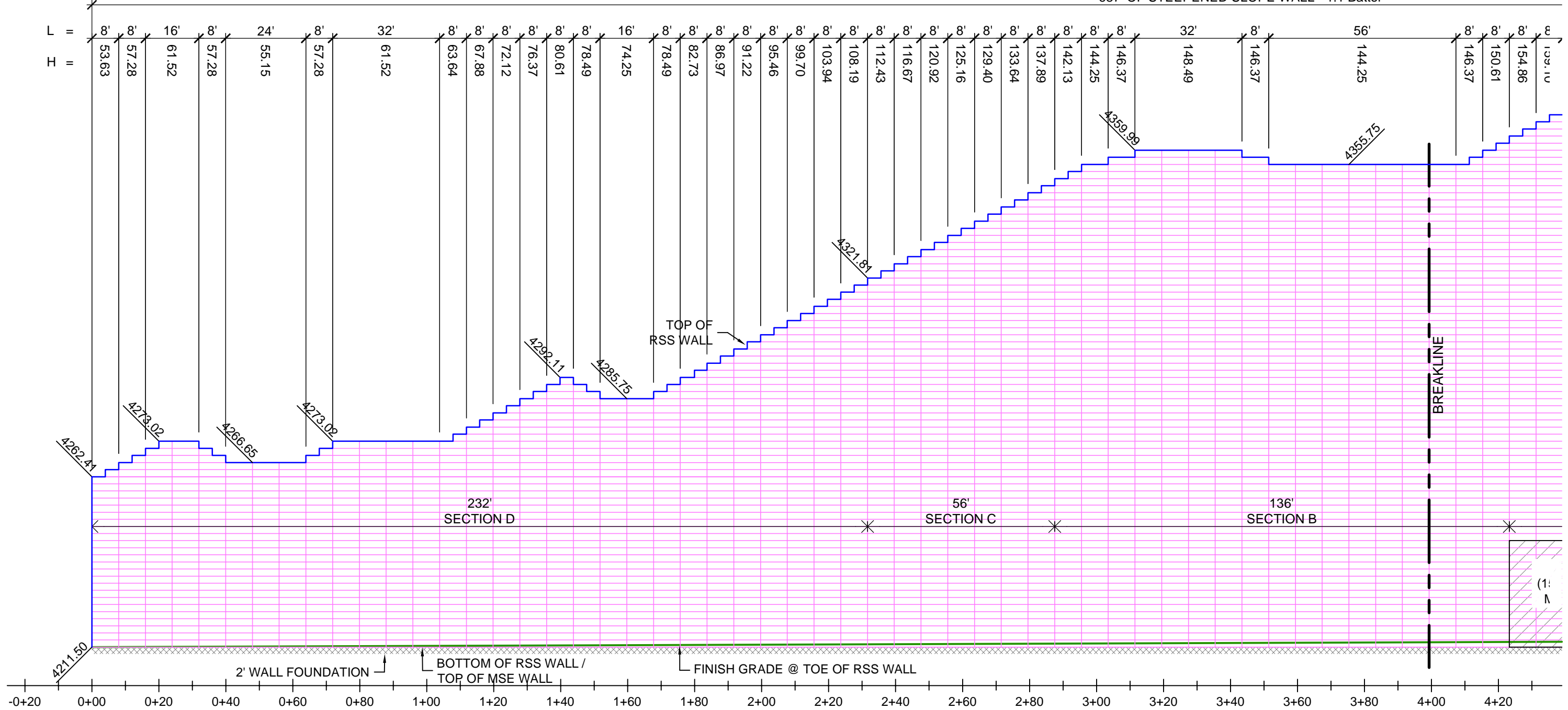
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| PROJECT | 09-054  |
| DATE    | 3-13-10 |
| DESIGN  | KLC     |
| DRAWN   | KLC     |

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BEGIN WALL  
M3 STA 0+00  
CL STA 723+40, RT 45.00

687' OF STEEPENED SLOPE WALL - 1:1 Batter



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**RSS (M4) DEVELOPED ELEVATION - BACK FACE OF WALL**

SCALE: 1" = 30'

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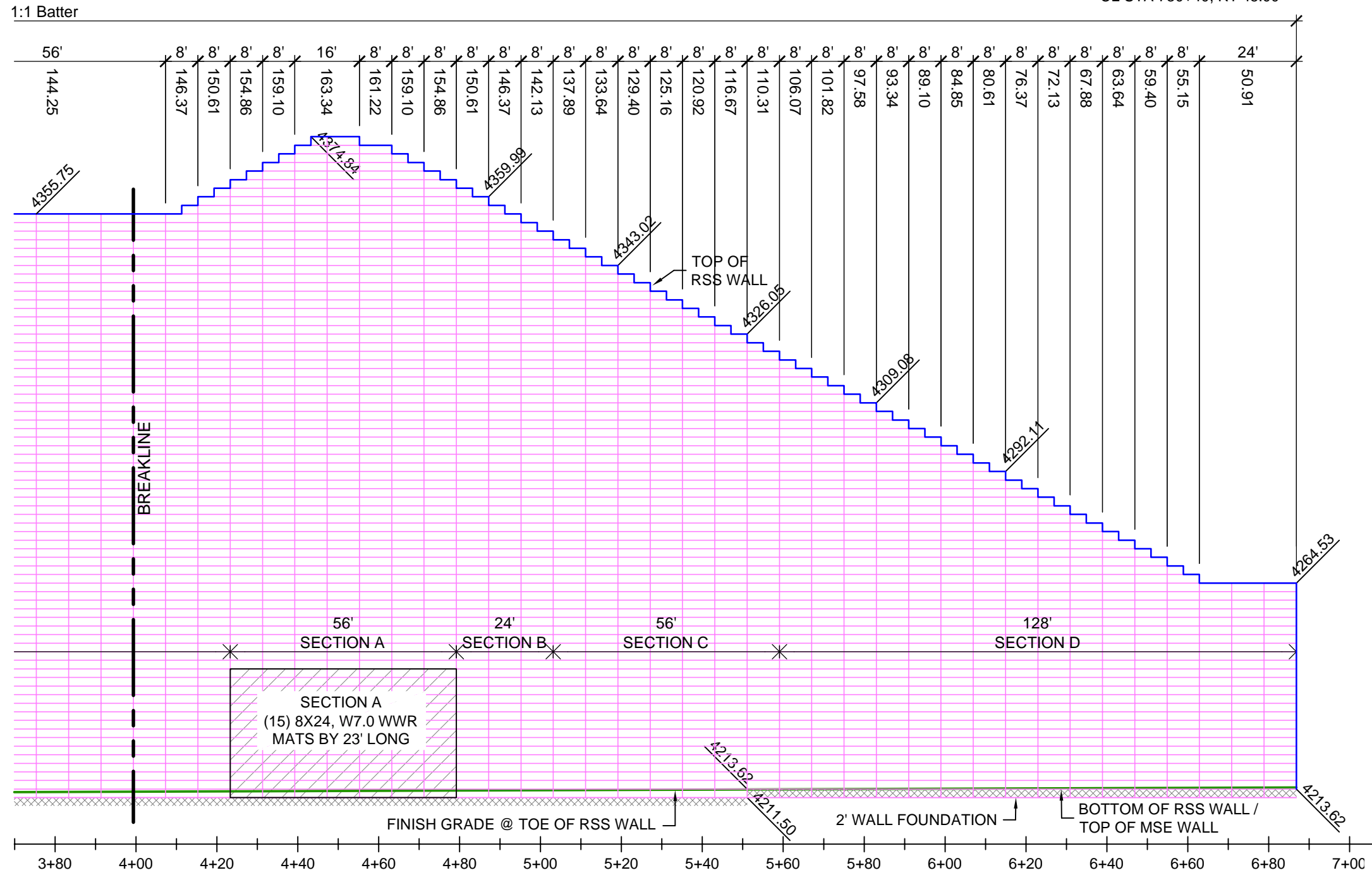
US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION  
RSS ELEVATION VIEW

HRW 090914CW

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| PROJECT | 09-054  |
| DATE    | 3-13-10 |
| DESIGN  | KLC     |
| DRAWN   | KLC     |

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END WALL  
M3 STA 6+86.84  
CL STA 730+40, RT 45.00



**RSS (M4) DEVELOPED ELEVATION - BACK FACE OF WALL**

SCALE: 1" = 30'

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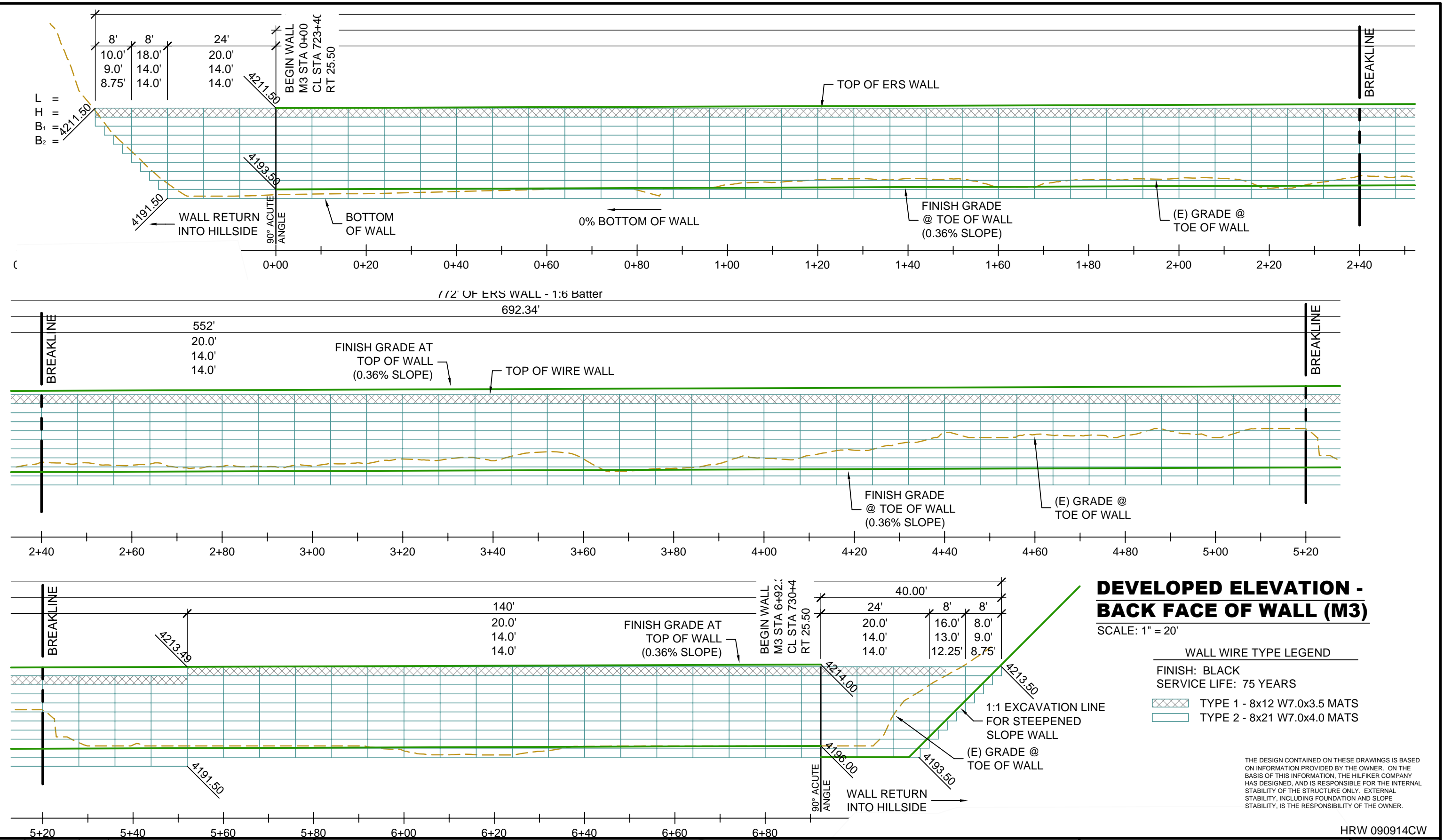
US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION  
RSS ELEVATION VIEW

HRW 090914CW

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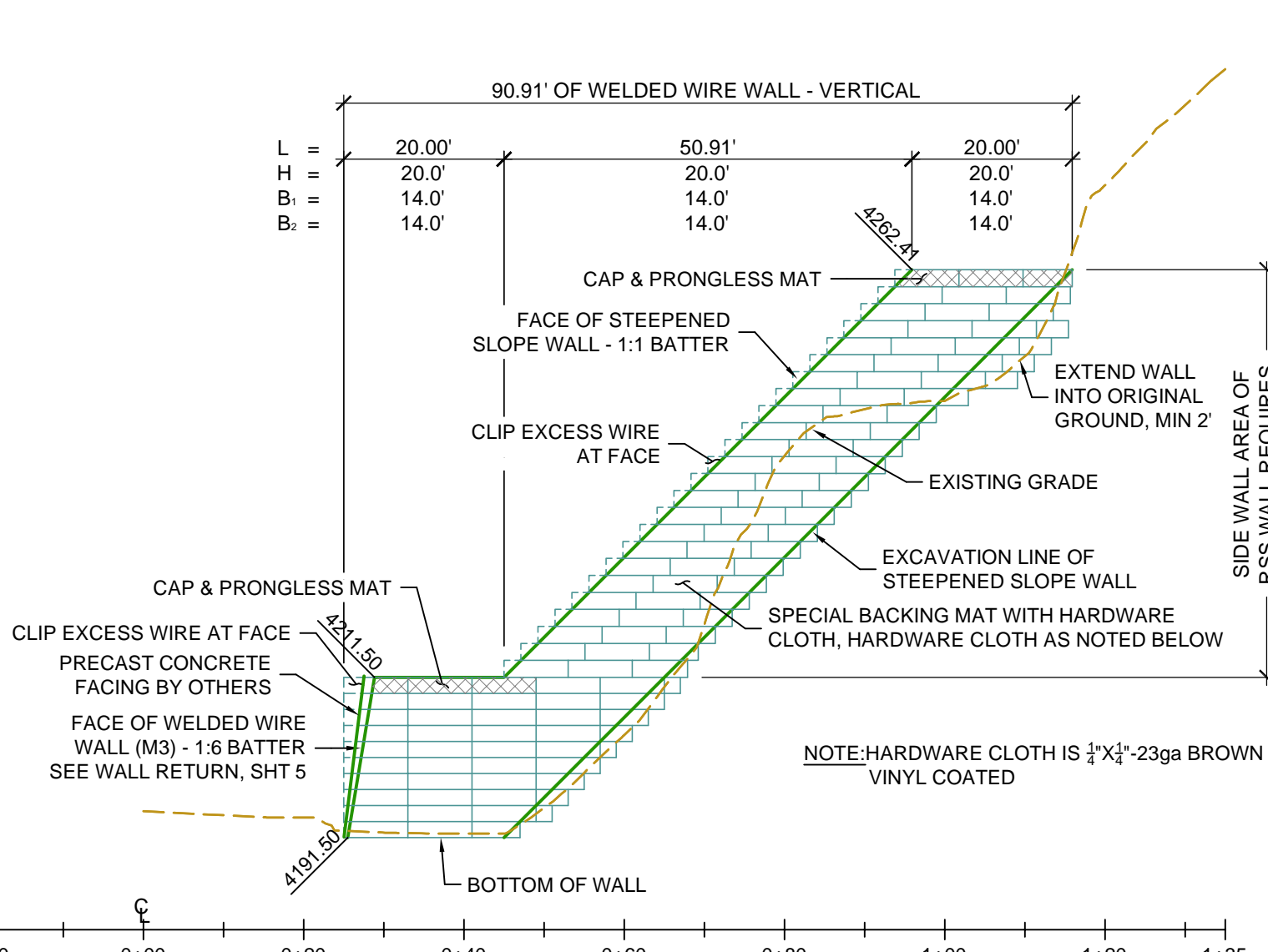
US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION  
MSE ELEVATION VIEW

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| DESIGN  | KLC     |
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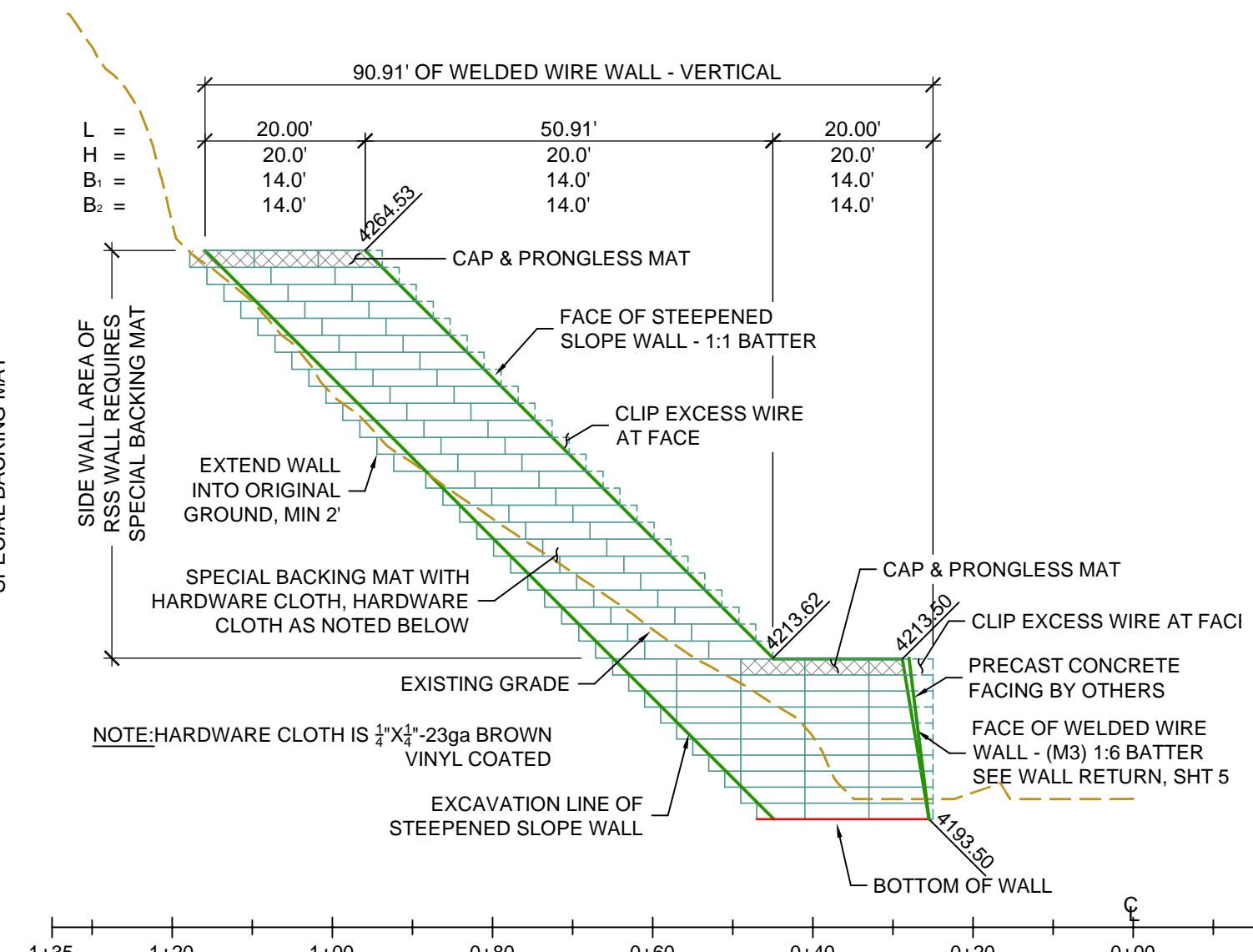
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**STA 723+40**

NOTE:  
THE SIDES OF THE MSE AND RSS WALLS RETURN INTO THE HILLSIDE. THE WALL RETURNS ENCAPSULATE/CONTAIN THE FILL MATERIAL.



**STA 730+40**

NOTE: HARDWARE CLOTH IS 1/4" X 1/4" - 23ga BROWN VINYL COATED

WALL WIRE TYPE LEGEND  
 FINISH: BLACK  
 SERVICE LIFE: 75 YEARS  
 TYPE 1 - 8x12 W7.0x3.5 MATS  
 TYPE 2 - 8x21 W7.0x4.0 MATS

**DEVELOPED ELEVATIONS - SIDES OF WALL (M3 & M4)**  
 SCALE: 1" = 20'

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US 97:MODOC POINT TO HAGELSTEIN PARK  
 SECTION  
 ELEVATION & TYPICAL WALL  
 SECTION

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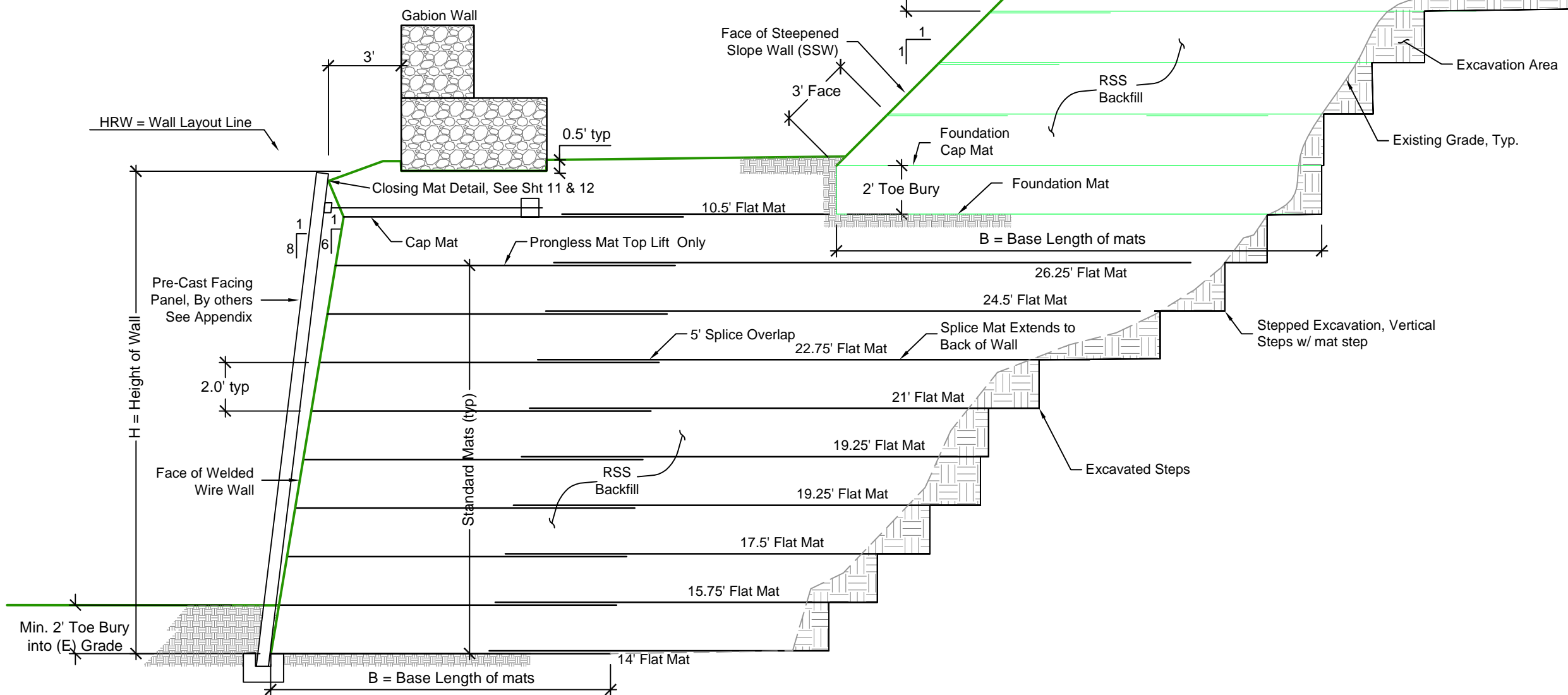
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**SUPPLIED QUANTITIES:**

|                                  |                 |
|----------------------------------|-----------------|
| RSS WALL:                        | 101,352 SQ. FT. |
| MSE WALL:                        | 15,128 SQ. FT.  |
| GABION WALL (TOTAL):             | 1401 CY         |
| MSE WALL FOR RSS SIDES:          | 2,368 SF        |
| WIRE SIZE AS CALLED OUT ON PLANS |                 |
| WIRE FINISH: BLACK               |                 |

**TYPICAL MSE (M3) /RSS (M4) SECTION**

SCALE: 1" = 5'



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US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION

TYPICAL CROSS SECTION

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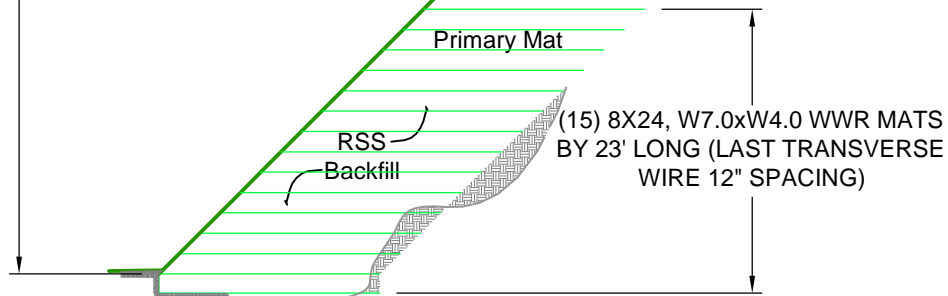
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SLOPE HEIGHT "H"

NOTE:  
FOR SLOPE HEIGHTS LESS THAN THE  
MAXIMUM HEIGHT SHOWN DELETE  
LOWER/BOTTOM MATS AS REQUIRED.

AS 'H' DECREASES THE LOWER MATS  
ARE ELIMINATED BUT THE BOTTOM 15  
MATS ARE TO REMAIN 23' IN LENGTH  
THESE INDICATED MATS WILL BE LONGER  
AS REQUIRED

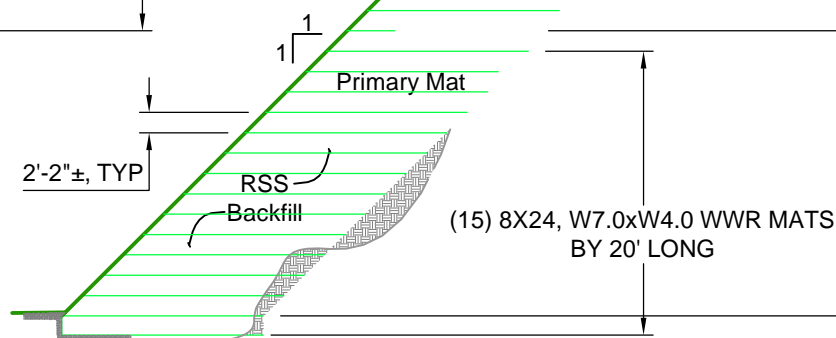


**SECTION A: 154.86' < H < 163.34'**

SCALE: 1" = 20'

2'-2"±, TYP

(31) 8X24, W7.0xW4.0 WWR MATS  
20' LONG PRIMARY MATS  
ALTERNATING WITH  
5' FACING MATS



**SECTION B: 140' < H < 152.74'**

SCALE: 1" = 20'

(33) 8X24, W4.5xW4.0 WWR MATS  
20' LONG PRIMARY MATS  
ALTERNATING WITH  
5' FACING MATS

(33) 8X24, W4.5xW4.0 WWR MATS  
20' LONG PRIMARY MATS  
ALTERNATING WITH  
5' FACING MATS

AS 'H' DECREASES THE LOWER MATS  
ARE ELIMINATED BUT THE BOTTOM 15  
MATS ARE TO REMAIN 20' IN LENGTH  
THESE INDICATED MATS WILL BE LONGER  
AS REQUIRED

(26) 8X24, W7.0xW4.0 WWR MATS  
20' LONG PRIMARY MATS  
ALTERNATING WITH  
5' FACING MATS

SLOPE HEIGHT "H"

NOTE:  
FOR SLOPE HEIGHTS LESS THAN THE  
MAXIMUM HEIGHT SHOWN DELETE  
LOWER/BOTTOM MATS AS REQUIRED.

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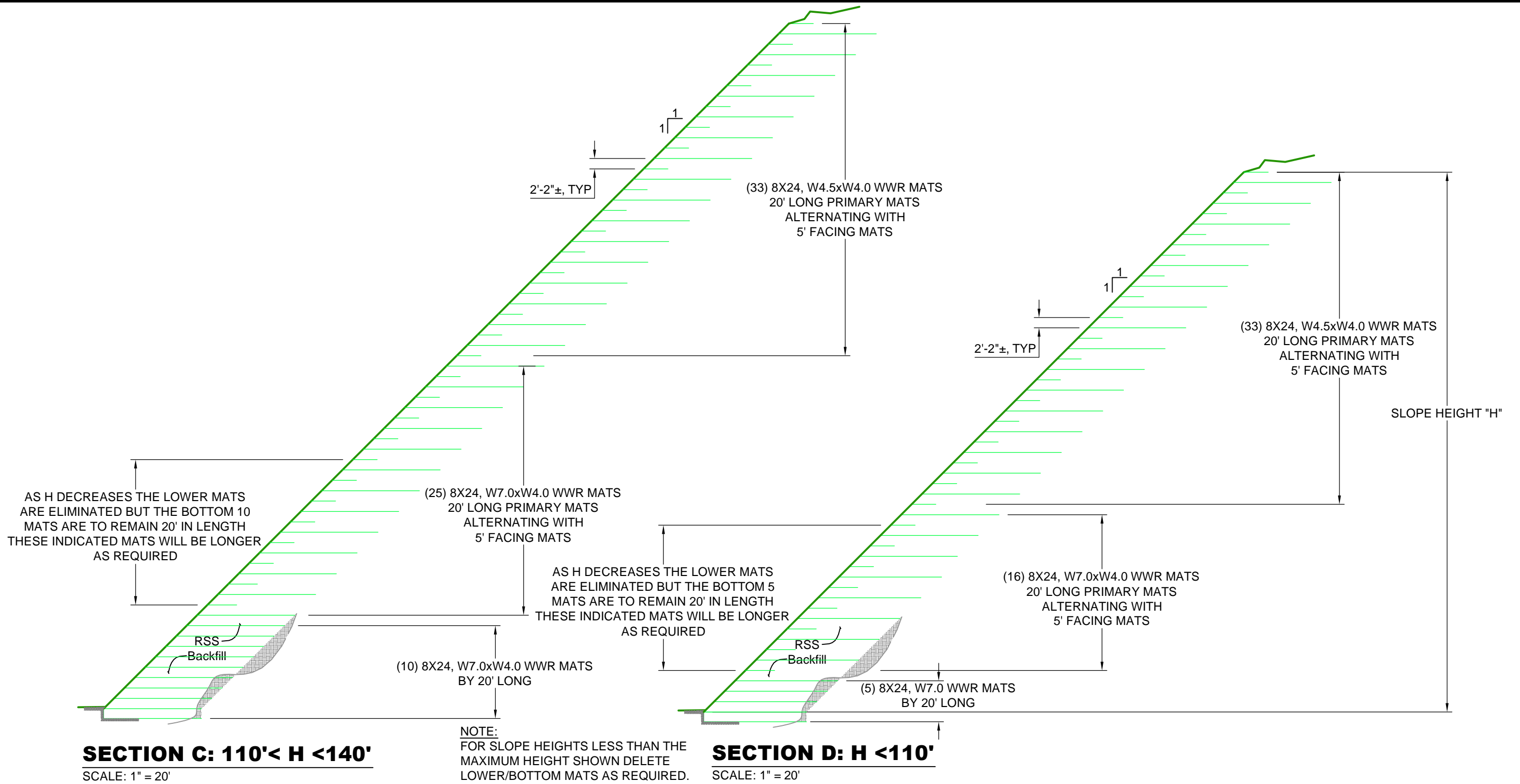
US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION

**STEEPENED SLOPE (RSS),  
SECTIONS (M4)**

|                    |         |
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| PROJECT            | 09-054  |
| DATE               | 3-17-10 |
| DESIGN             | KLC     |
| DRAWN              | KLC     |
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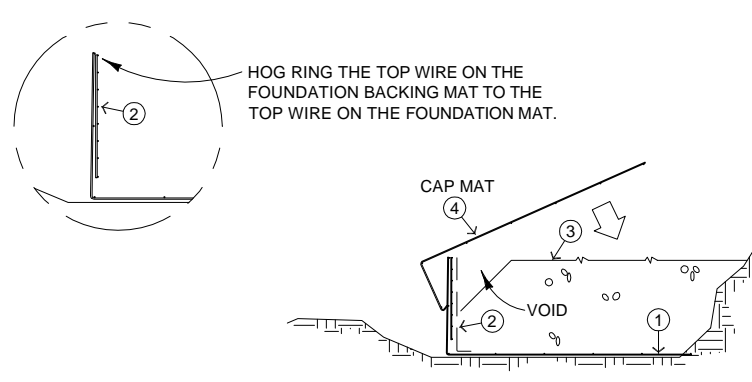
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SECTION

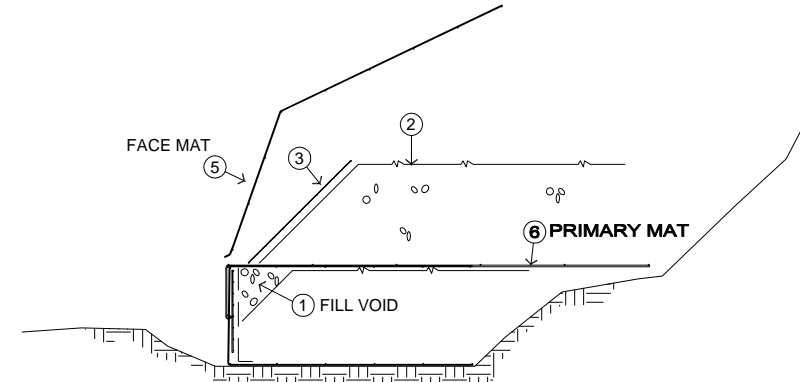
RSS (M4) SECTIONS

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| DESIGN  | KLC     |
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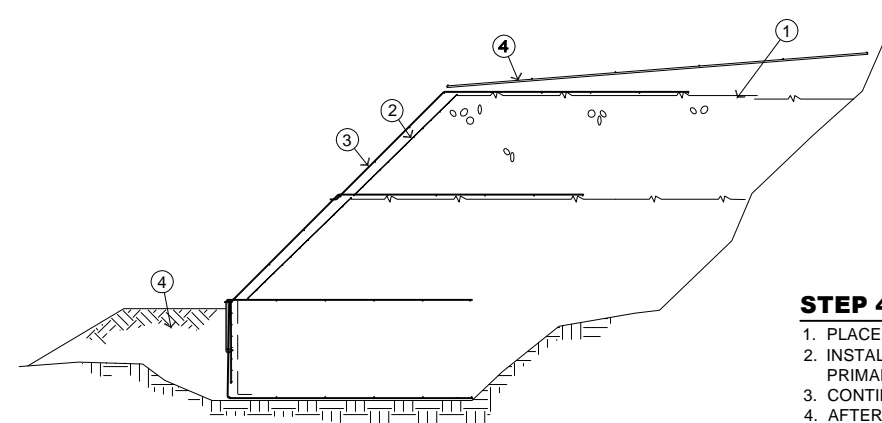


HOG RING THE TOP WIRE ON THE FOUNDATION BACKING MAT TO THE TOP WIRE ON THE FOUNDATION MAT.

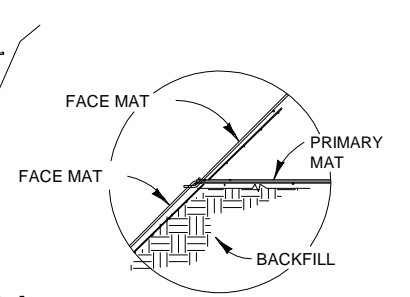
- STEP 1**
1. PREPARE THE FOUNDATION AND PLACE THE FOUNDATION MATS.
  2. INSTALL THE FOUNDATION BACKING MAT AND FILTER FABRIC.
  3. PLACE AND COMPACT BACKFILL TO 24" DEPTH AS SHOWN.
  4. HOOK CAP MAT ON TRANSVERSE WIRE OF FOUNDATION MAT AND LAY IT DOWN ONTO THE BACKFILL.



- STEP 2**
1. FILL THE VOID BELOW THE FRONT OF THE CAP AND ROD TO FULLY COMPACT.
  2. PLACE BACKFILL.
  3. PLACE BACKING MAT WITH HARDWARE CLOTH.
  4. HOOK FACE MAT ON TRANSVERSE WIRES OF THE FOUNDATION MAT AND LAY IT DOWN ONTO THE BACKFILL.
  5. HOOK FACE MAT ON TRANSVERSE WIRES OF PRIMARY MAT AND THE FOUNDATION MAT AND LAY IT DOWN ONTO THE BACKFILL.

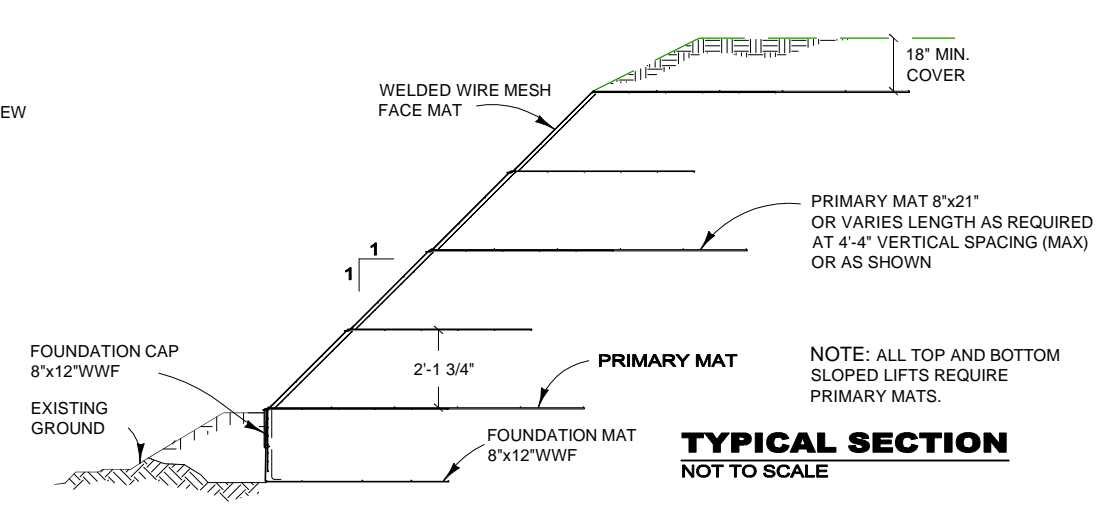


- STEP 3**
1. PLACE AND COMPACT SECOND 25.75" LIFT OF BACKFILL.
  2. PLACE BACKING MAT WITH HARDWARE CLOTH.
  3. INSTALL THE FACE MAT SO IT ENGAGES THE LOWER FACE MAT. SEE DETAIL.
  4. PLACE PRIMARY MAT WITH TRANSVERSE WIRE ALIGNED WITH THE TRANSVERSE WIRE OF THE LOWER FACE MAT THAT WILL BE HOOKED WITH THE NEXT FACE MAT.
  5. BACKFILL AND COMPACT SOIL AT TOE OF WALL.

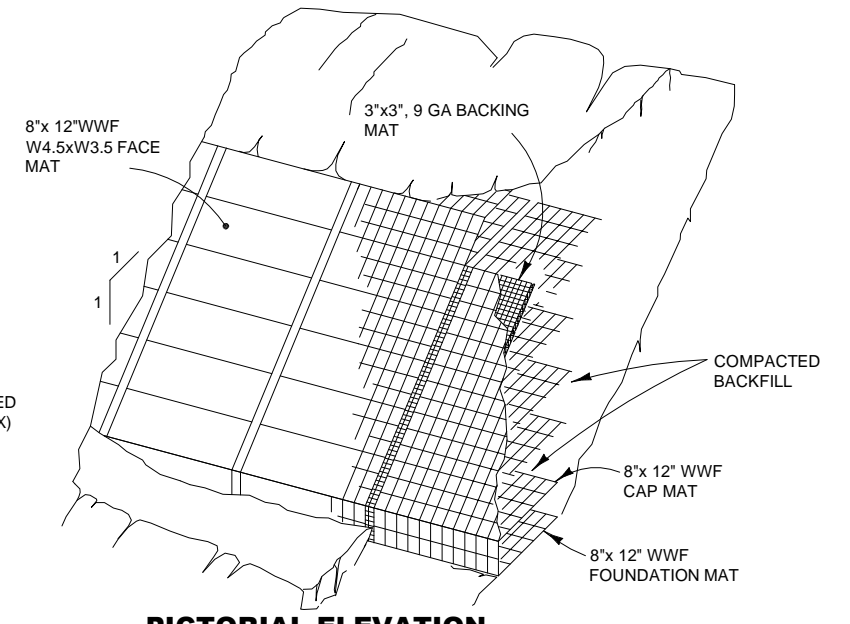


- STEP 4**
1. PLACE THE NEXT LIFT OF BACKFILL & BACKING MAT.
  2. INSTALL THE FACE MAT SO IT ENGAGES BOTH THE PRIMARY MAT AND THE LOWER FACE MAT.
  3. CONTINUE LIFTS TO THE TOP OF THE WALL.
  4. AFTER PLACING THE TOP LIFT OF BACKFILL AND FACE MAT AND BACKING MAT, BACKFILL AND COMPACT THE REQUIRED COVER OVER THE PRIMARY MAT.

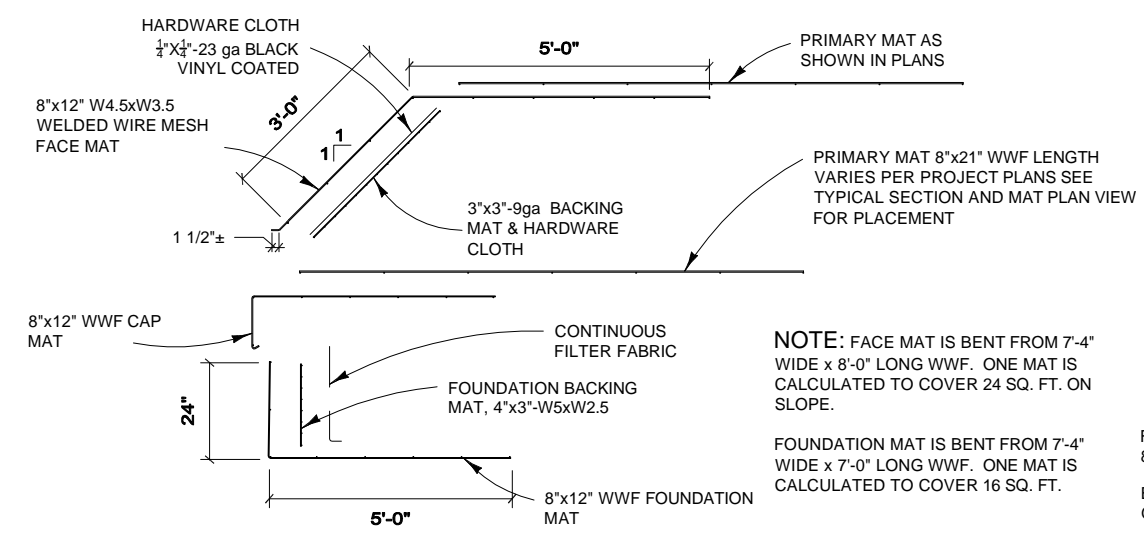
**CONSTRUCTION SEQUENCE**  
NOT TO SCALE



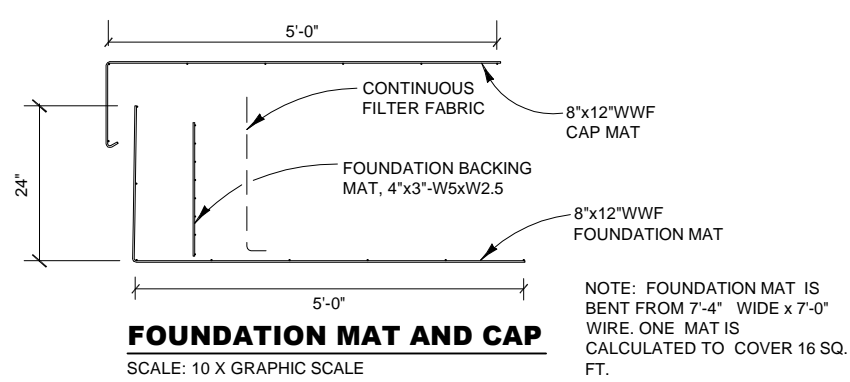
**TYPICAL SECTION**  
NOT TO SCALE



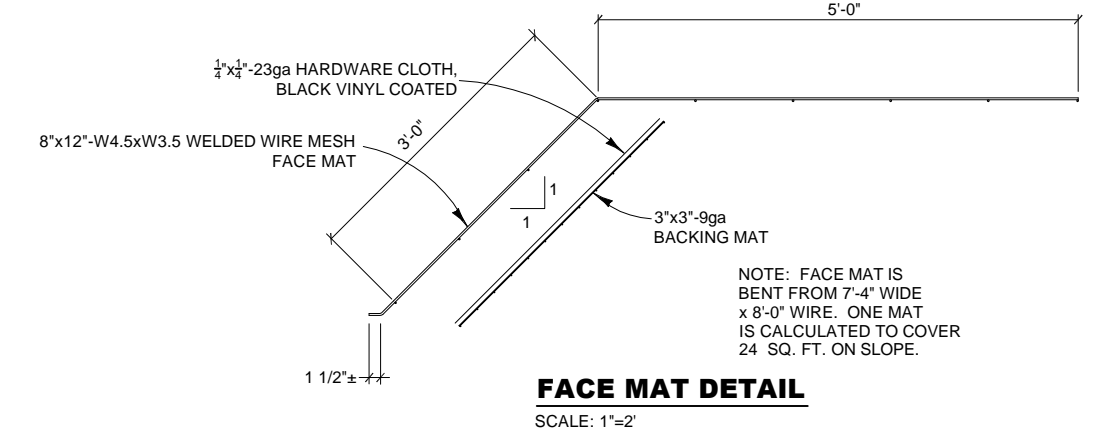
**PICTORIAL ELEVATION**  
NOT TO SCALE



**WALL COMPONENTS**  
NOT TO SCALE



**FOUNDATION MAT AND CAP**  
SCALE: 10 X GRAPHIC SCALE



**FACE MAT DETAIL**  
SCALE: 1"=2'

P:\09-054 - (HRW - Modoc Point) - Modoc Point-kc-2.dwg - Last Saved 5/4/2010 11:49 AM

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US 97:MODOC POINT TO HAGELSTEIN PARK SECTION

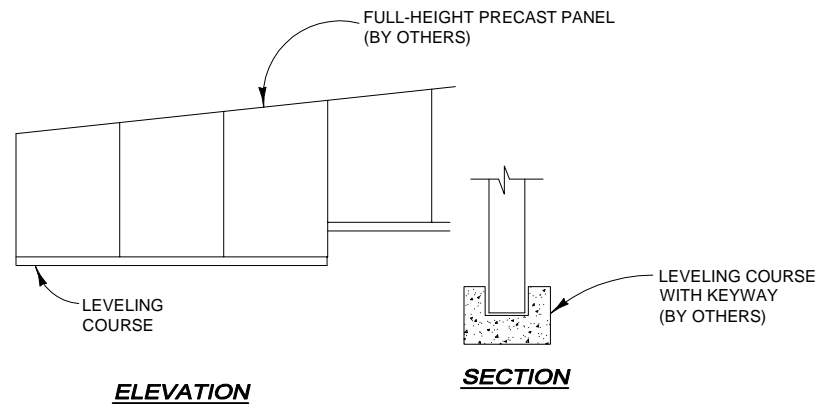
RSS (M4) DETAILS

HRW 090914CW

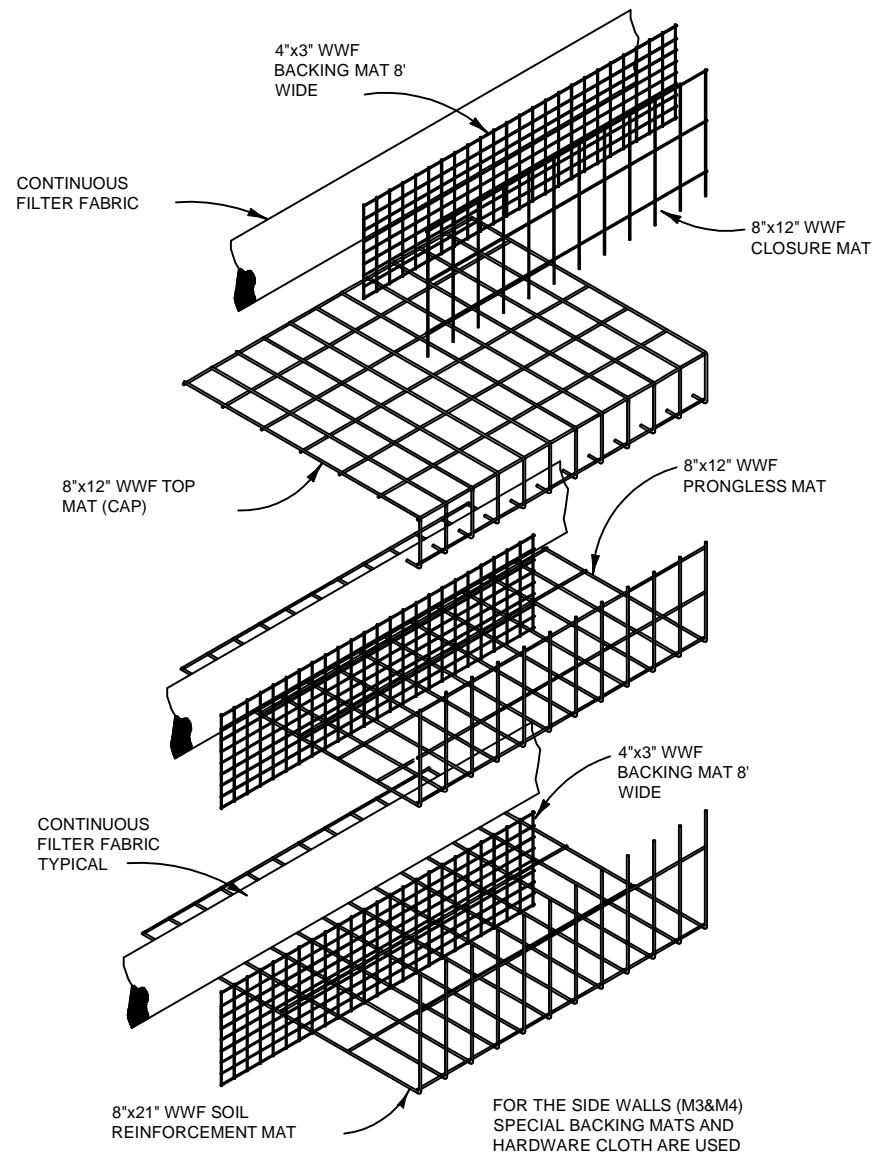
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| PROJECT | 09-054  |
| DATE    | 3-12-10 |
| DESIGN  | KLC     |
| DRAWN   | KLC     |

**10** OF 13  
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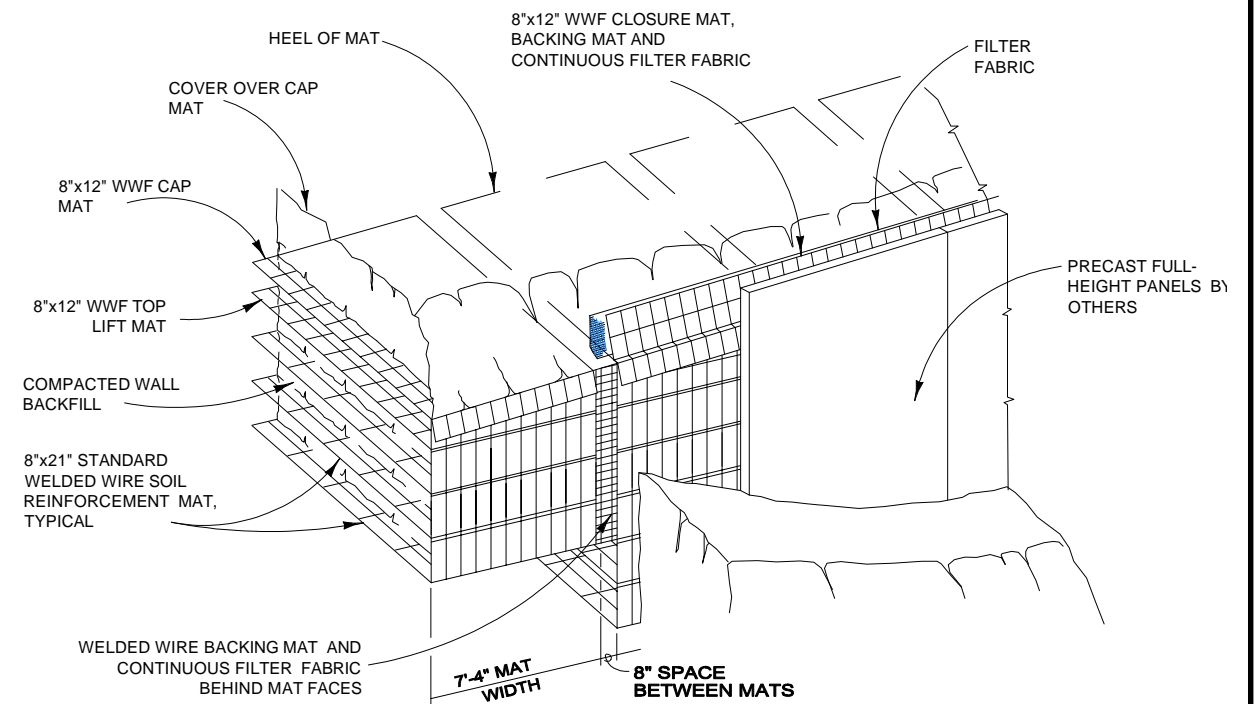
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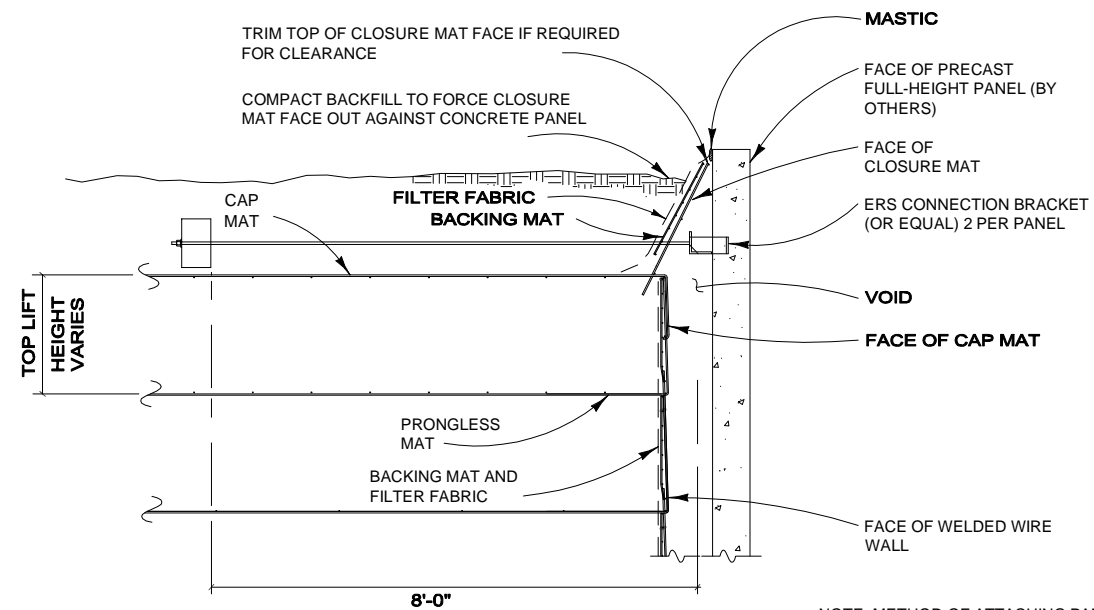
**BOTTOM OF WALL DETAIL**  
NOT TO SCALE



**WALL COMPONENTS**  
NOT TO SCALE



**PICTORIAL ELEVATION**  
NOT TO SCALE



**TOP OF WALL AND PANEL CONNECTION DETAILS**  
NOT TO SCALE

NOTE: METHOD OF ATTACHING PANELS MAY VARY FROM THIS DETAIL. SEE PROJECT PLANS FOR FURTHER DETAILS.

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US 97:MODOC POINT TO HAGELSTEIN PARK SECTION

ERS - DETAILS

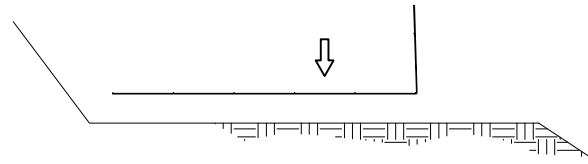
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**STEP 1**

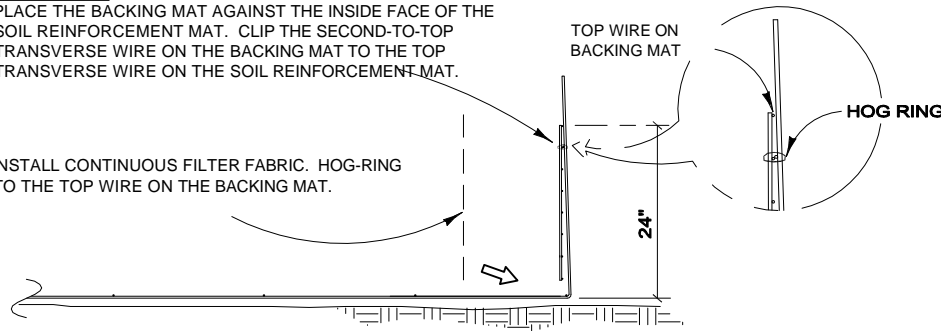
PLACE THE FIRST COURSE OF SOIL REINFORCEMENT MATS ON PREPARED FOUNDATION



**STEP 2**

PLACE THE BACKING MAT AGAINST THE INSIDE FACE OF THE SOIL REINFORCEMENT MAT. CLIP THE SECOND-TO-TOP TRANSVERSE WIRE ON THE BACKING MAT TO THE TOP TRANSVERSE WIRE ON THE SOIL REINFORCEMENT MAT.

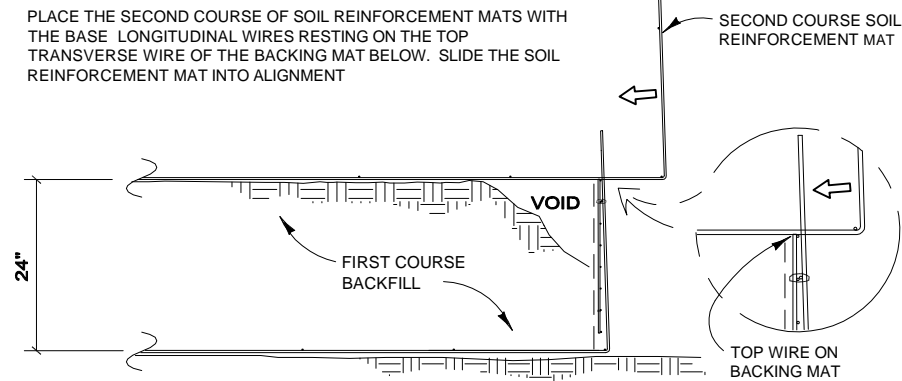
INSTALL CONTINUOUS FILTER FABRIC. HOG-RING TO THE TOP WIRE ON THE BACKING MAT.



**STEP 3**

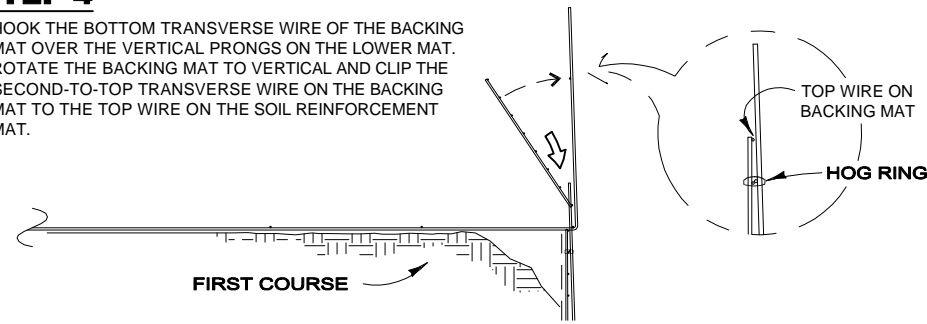
PLACE AND COMPACT THE BACKFILL IN LAYERS AND DENSITIES AS SPECIFIED IN THE PROJECT PLANS. LEAVE A VOID AT THE FACE AS SHOWN.

PLACE THE SECOND COURSE OF SOIL REINFORCEMENT MATS WITH THE BASE LONGITUDINAL WIRES RESTING ON THE TOP TRANSVERSE WIRE OF THE BACKING MAT BELOW. SLIDE THE SOIL REINFORCEMENT MAT INTO ALIGNMENT



**STEP 4**

HOOK THE BOTTOM TRANSVERSE WIRE OF THE BACKING MAT OVER THE VERTICAL PRONGS ON THE LOWER MAT. ROTATE THE BACKING MAT TO VERTICAL AND CLIP THE SECOND-TO-TOP TRANSVERSE WIRE ON THE BACKING MAT TO THE TOP WIRE ON THE SOIL REINFORCEMENT MAT.

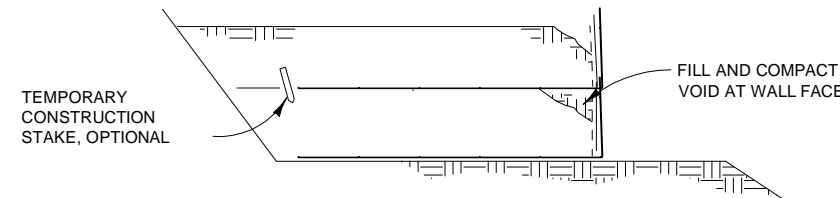


**STEP 5**

INSTALL FILTER FABRIC BEHIND THE BACKING MATS.

PLACE AND COMPACT THE BACKFILL TO THE BASE ELEVATION OF THE NEXT MAT.

REPEAT STEPS 3 THRU 5 TO THE TOP LIFT.

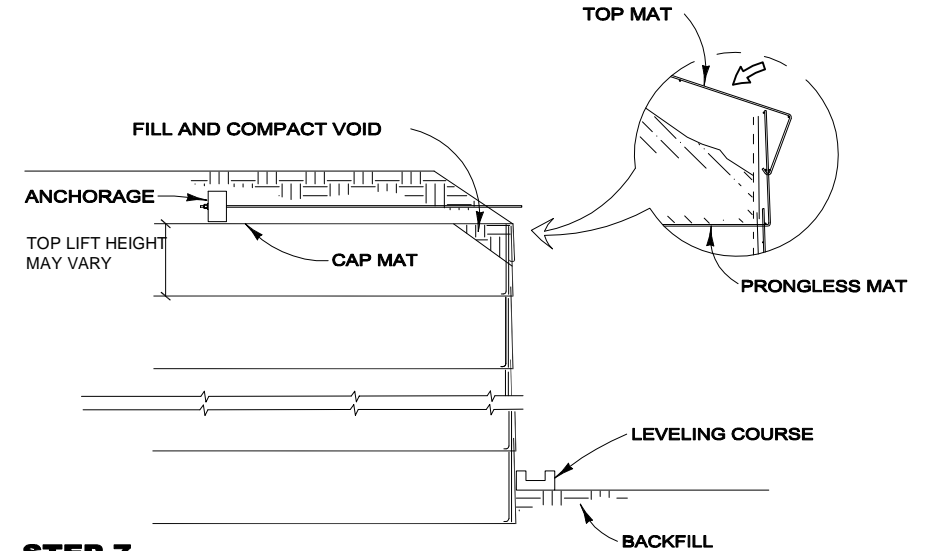
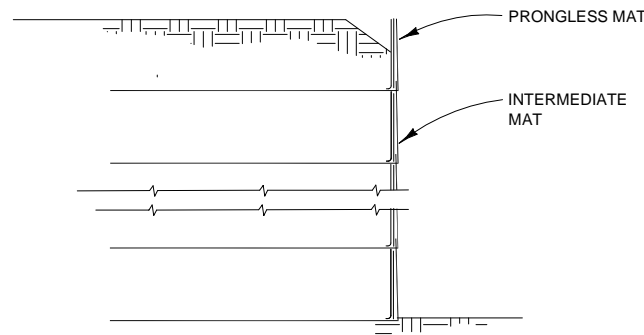


**STEP 6**

PLACE THE TOP LIFT PRONGLESS MAT, BACKING MAT AND FILTER FABRIC.

CUT OFF HEIGHT OF PRONGLESS MAT FACE AND FILTER FABRIC, IF REQUIRED, TO PARALLEL FINISHED GRADE.

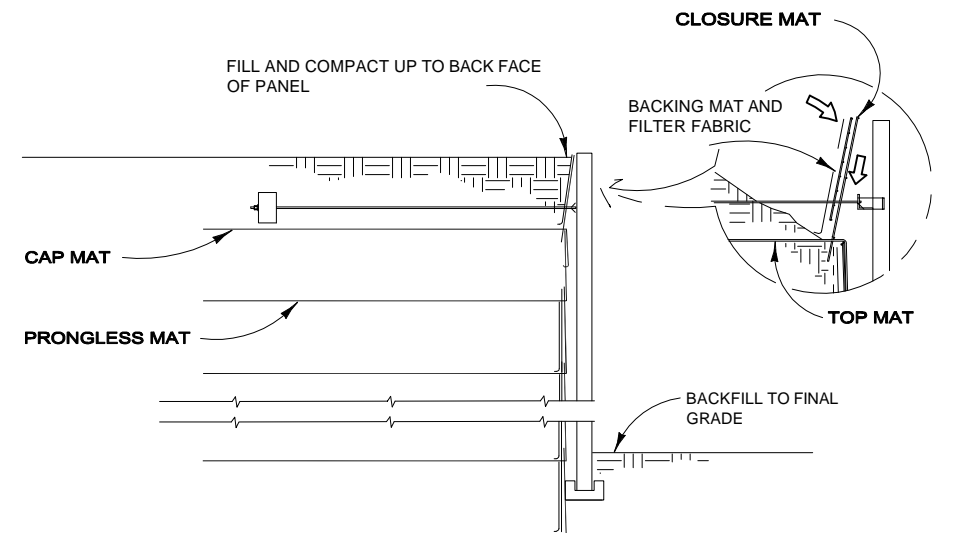
PLACE AND COMPACT THE BACKFILL IN THE PRONGLESS MAT LIFT.



**STEP 7**

INSTALL THE CAP MAT OVER THE COMPACTED BACKFILL. INSTALL THE PANEL ANCHORAGES TO THE SPACING SHOWN IN THE PROJECT PLANS. BACKFILL TO 1'-6" MINIMUM COVER OVER THE TOP MAT.

BACKFILL AT THE TOE TO THE ELEVATION OF THE BOTTOM OF THE LEVELING COURSE. FORM THE LEVELING COURSE WITH KEYWAY, AS SHOWN IN THE PROJECT PLANS.



**STEP 8**

PLACE THE BOTTOM OF THE PRECAST FULL-HEIGHT PANEL INTO THE KEYWAY ON THE LEVELING COURSE. RAISE THE PANEL TO VERTICAL AND ATTACH TO THE PANEL ANCHORAGE.

PUSH PRONGS OF THE CLOSURE MAT INTO SOIL BEHIND THE BEND IN THE TOP MAT AND ROTATE TOP OF THE CLOSURE MAT FORWARD UNTIL IT CONTACTS THE BACK OF THE PANEL. PLACE BACKING MATS AND FILTER FABRIC BEHIND CLOSURE MATS AND BACKFILL.

BACKFILL AT TOE TO FINAL GRADE. FINISH THE TOP OF THE WALL PER PROJECT PLANS.

**ERS RETAINING WALL CONSTRUCTION SEQUENCE**  
NOT TO SCALE

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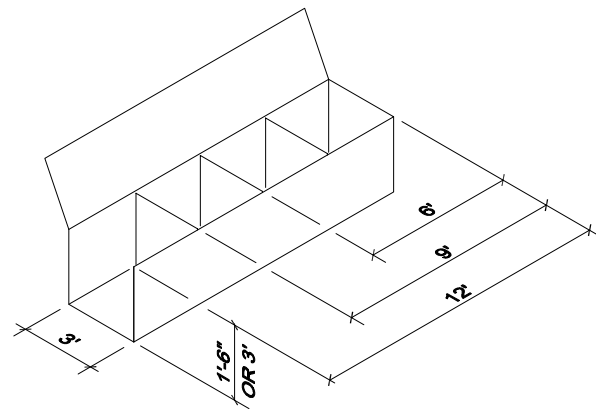
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US 97:MODOC POINT TO HAGELSTEIN PARK  
SECTION  
ERS DETAILS

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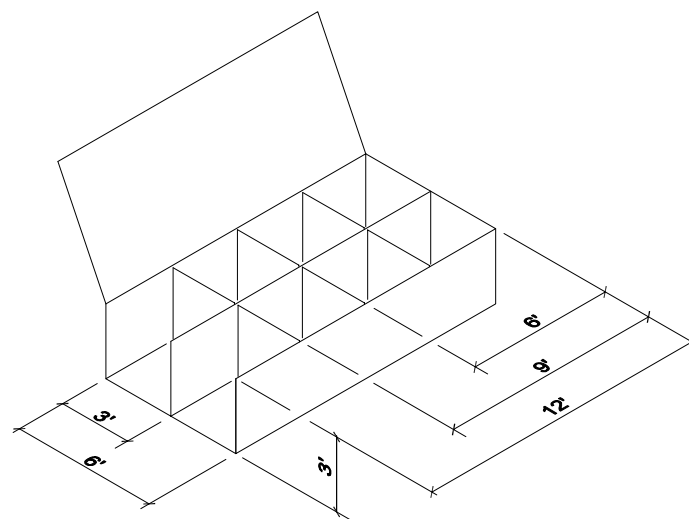
12 OF 13  
SHT



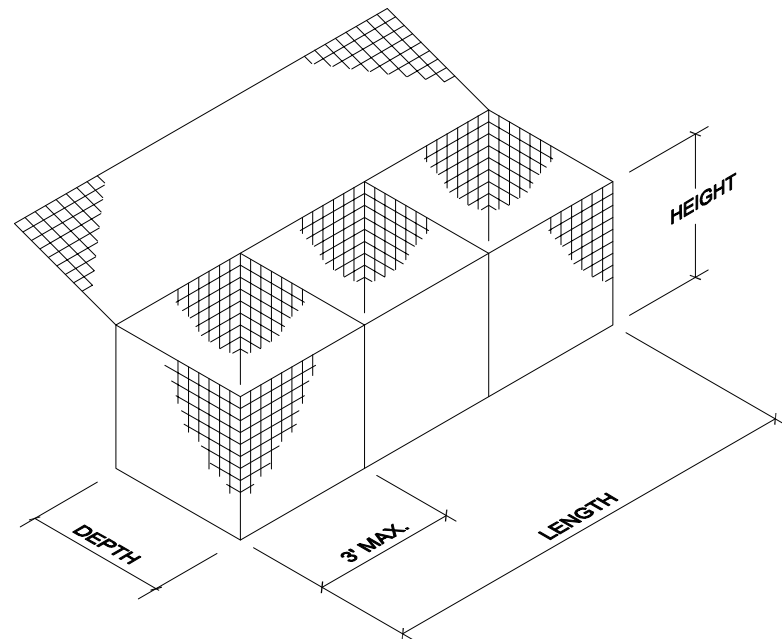
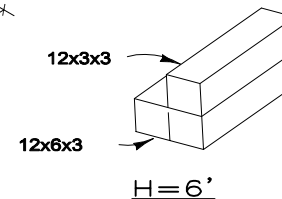
TYPICAL OPEN-END GABION

| SIZE LxWxH | CU.YD. |
|------------|--------|
| 12 x 6 x 3 | 8      |
| 12 x 3 x 3 | 4      |

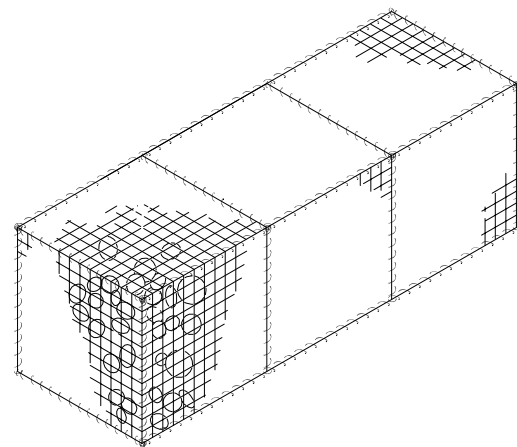
**GABION SIZES AND FILL REQMTS**



TYPICAL 12'x6' GABION

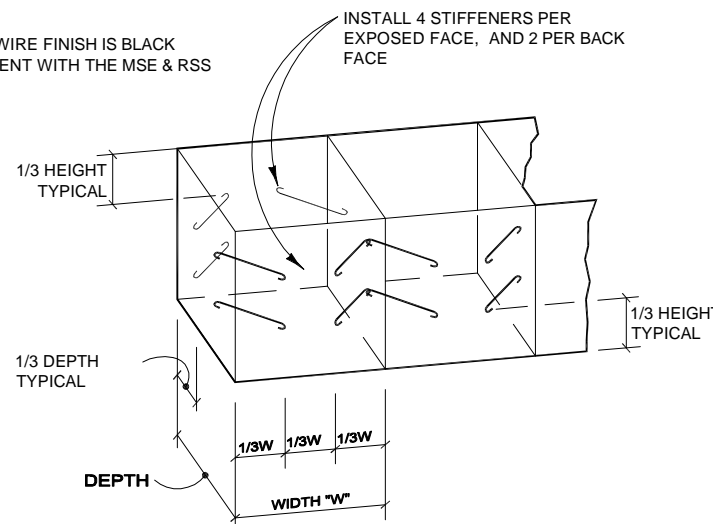


TYPICAL GABION  
NOT TO SCALE



TYPICAL ASSEMBLED GABION  
NOT TO SCALE

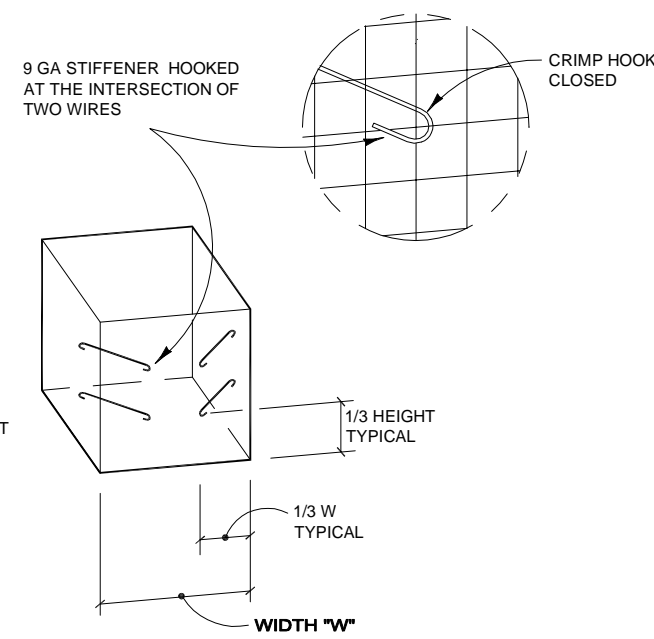
GABION WIRE FINISH IS BLACK CONSISTENT WITH THE MSE & RSS WALL



END CELLS

WHERE HEIGHT OF GABION IS 18" OR LESS, INSTALL 2 STIFFENERS PER FACE WHERE HEIGHT IS 12", NO STIFFENERS REQUIRED

STIFFENER DETAILS  
NOT TO SCALE



EXPOSED FACES

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US 97:MODOC POINT TO HAGELSTEIN PARK SECTION

GABION BARRIER DETAILS

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