

DESIGN NOTES

1. 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.
2. Assumed Soil Characteristics:

Wall Backfill:

Unit Weight: 130 pcf

Internal Friction Angle: 36°

Cohesion = 0 psf

Retained Backfill:

Unit Weight: 125 pcf

Internal Friction Angle: 34°

Cohesion = 0 psf

Foundation Soils:

Unit Weight: 130 pcf

Friction Angle for Sliding: 36°

Cohesion = 0 psf

Applied Bearing Pressure - applied at 37' Height -
Factor Bearing Load - 9,736 psf.

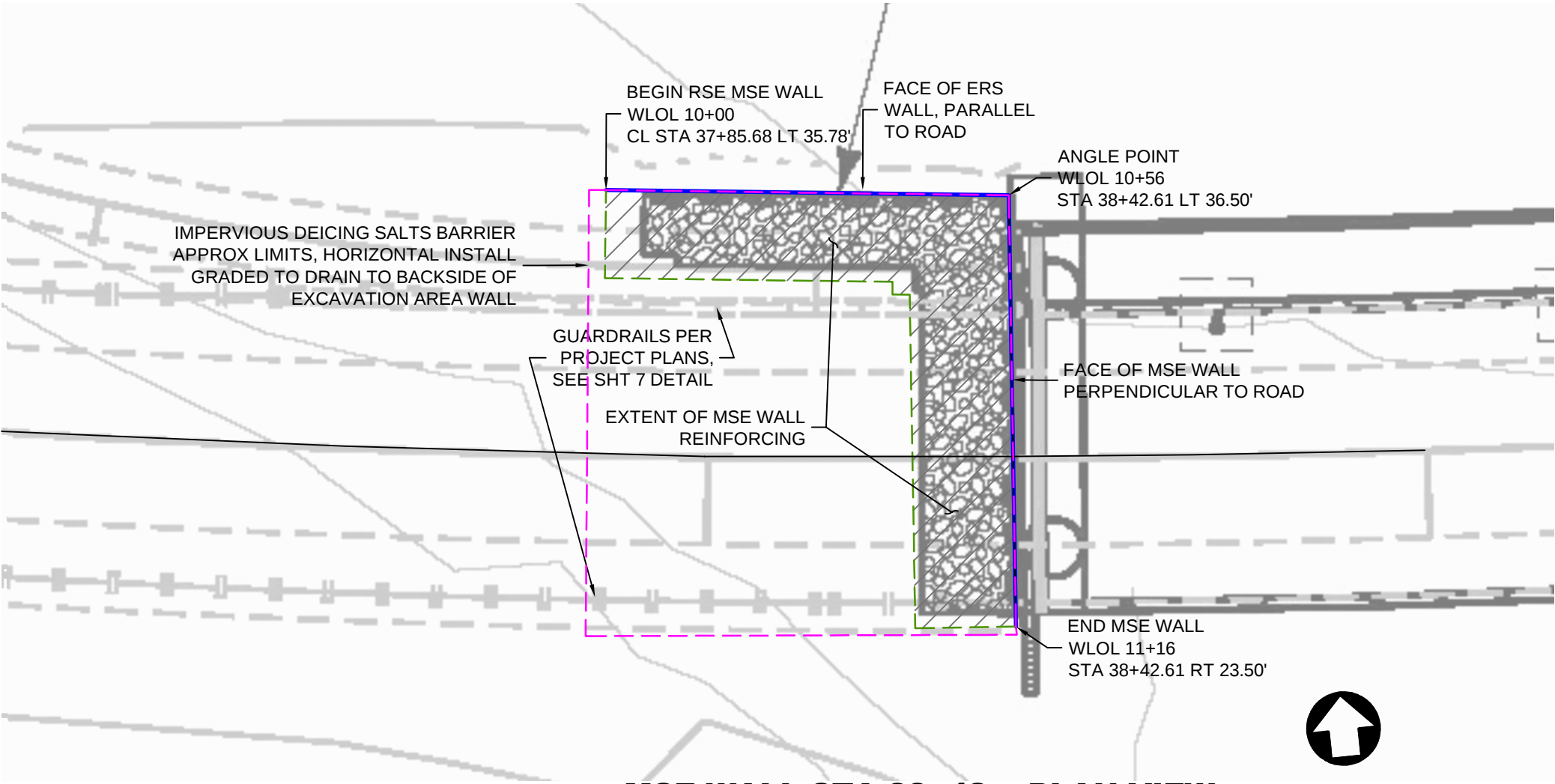
3. If actual characteristics, grades or dimensions of soil materials differ from those listed above or shown on the plans, Hilfiker Retaining walls shall be notified to evaluate the need to redesign.
3. If during construction, the wall location, structure location or loads are different than that proposed in this plan set and calculation package, HRW shall be notified to evaluate the need for a redesign.
4. 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.
5. Design Procedure:

Mechanically Stabilized Earth walls and Reinforced Soil Slopes, FHWA report No. FHWA-NHI-00-044.
6. All information hereon is derived from the reference drawings, and is subject to geometric and geotechnical confirmation. The applicable Hilfiker construction guide and specifications are an integral part of this submittal.
7. Internal stability of the retaining wall as well as global stability and foundation bearing capacity was evaluated. The Contractor is responsible for all job site drainage, safety and fall protection provisions for workers in compliance with OSHA and any other applicable requirements.

Note: If Foundation Soils are soft and/or yielding, removal of this material and replacing with acceptable engineered fill is required.

PROPOSED QUANTITIES:

MSE WALL AREA:	
MSE WALL STA 37+90	2,012 FT ²
MSE WALL STA 46+93	3,768 FT ²
TOTAL WALL AREA:	5,780 FT ²



MSE WALL STA 38+42 - PLAN VIEW
SCALE: 1"= 20'

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	06/16/ 17	KLC	Initial Soft .pdf Release
	07/26/17	KLC	Revised Per Plan Check Comments 7/ 7/ 17
	01/17/18	KLC	Revised Per Plan Check Comments 10/30/17
	04/30/18	KLC	Revised Deicing Membrane Geometry Per Plan Check Comments 10/30/17

HILFIKER RETAINING WALLS



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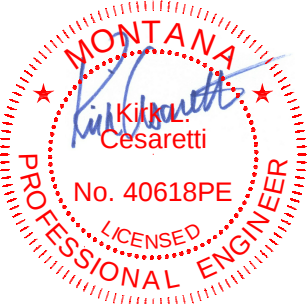


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S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE & RSE MSE WALLS

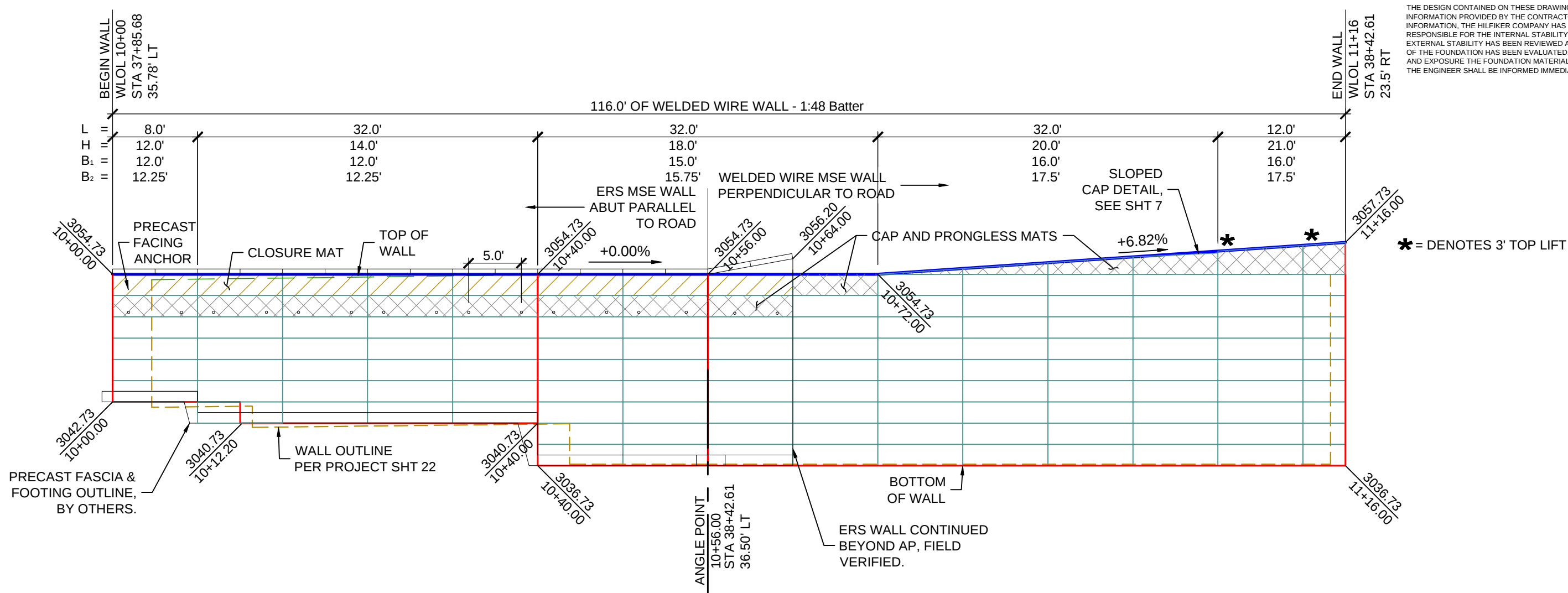
MSE WALL BENT 1 PLAN VIEW &
GENERAL NOTES



HW 170330EW	
PROJECT	17-022
DATE	06-16-17
DESIGN	KLC
DRAWN	KLC
SHT 1 OF 9	

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MSE WALL STA 38+42 - ELEVATION VIEW - REAR VIEW

SCALE: 1" = 10'

WALL WIRE TYPE LEGEND

FINISH: HOT DIP GALVANIZED
SERVICE LIFE: 75 YEARS

- TYPE 1 - 8x12 W7.0x3.5 MATS
- TYPE 1 CLOSURE MAT- 8x12 W7.0x3.5 MATS
- TYPE 2 - 8x21 W7.0x4.0 MATS
- TYPE 3 - 8x21 W9.5x4.0 MATS

WELDED WIRE WALL PARAMETERS

Height of Wall (H)	Length of Cap & Prongless Mats (B1)	Length of Standard Mats (B)
12'-14'	12.0'	12.25'
16'	13.0'	14.0'
18'	15.0'	15.75'
20'-21'	16.0'	17.5'
24'	20.0'	19.25'
34'	28.0'	28.0'
36'	29.0'	29.75'

Cap & Prongless Mats are: 8x12 W7.0x3.5 WWR (Type 1)
Standard Mats are: 8x21 W7.0x4.0 WWR (Type 2)
8x21 W9.5x4.0 WWR (Type 3)
Finish: HOT DIP Galvanized - 75 Year Service Life



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S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE MSE WALLS

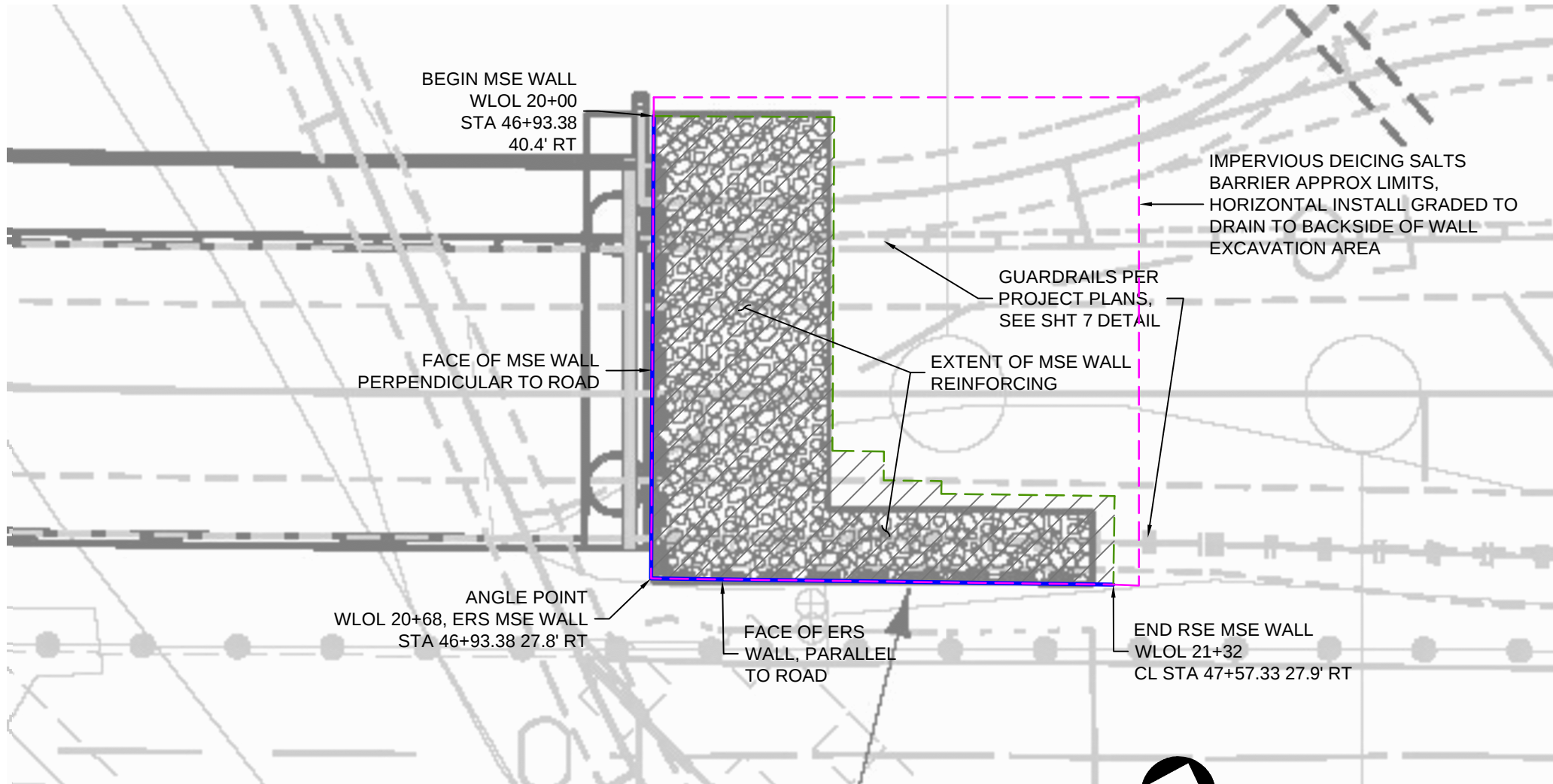
BENT 1 ELEVATION VIEW

HW 170330EW

PROJECT	17-022
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DESIGN	KLC
DRAWN	KLC

SHT 2 OF 9

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MSE WALL STA 46+93 - PLAN VIEW

SCALE: 1"= 20'

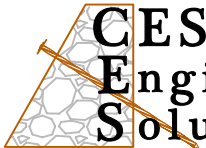
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S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE MSE WALLS

MSE WALL BENT 5 PLAN VIEW

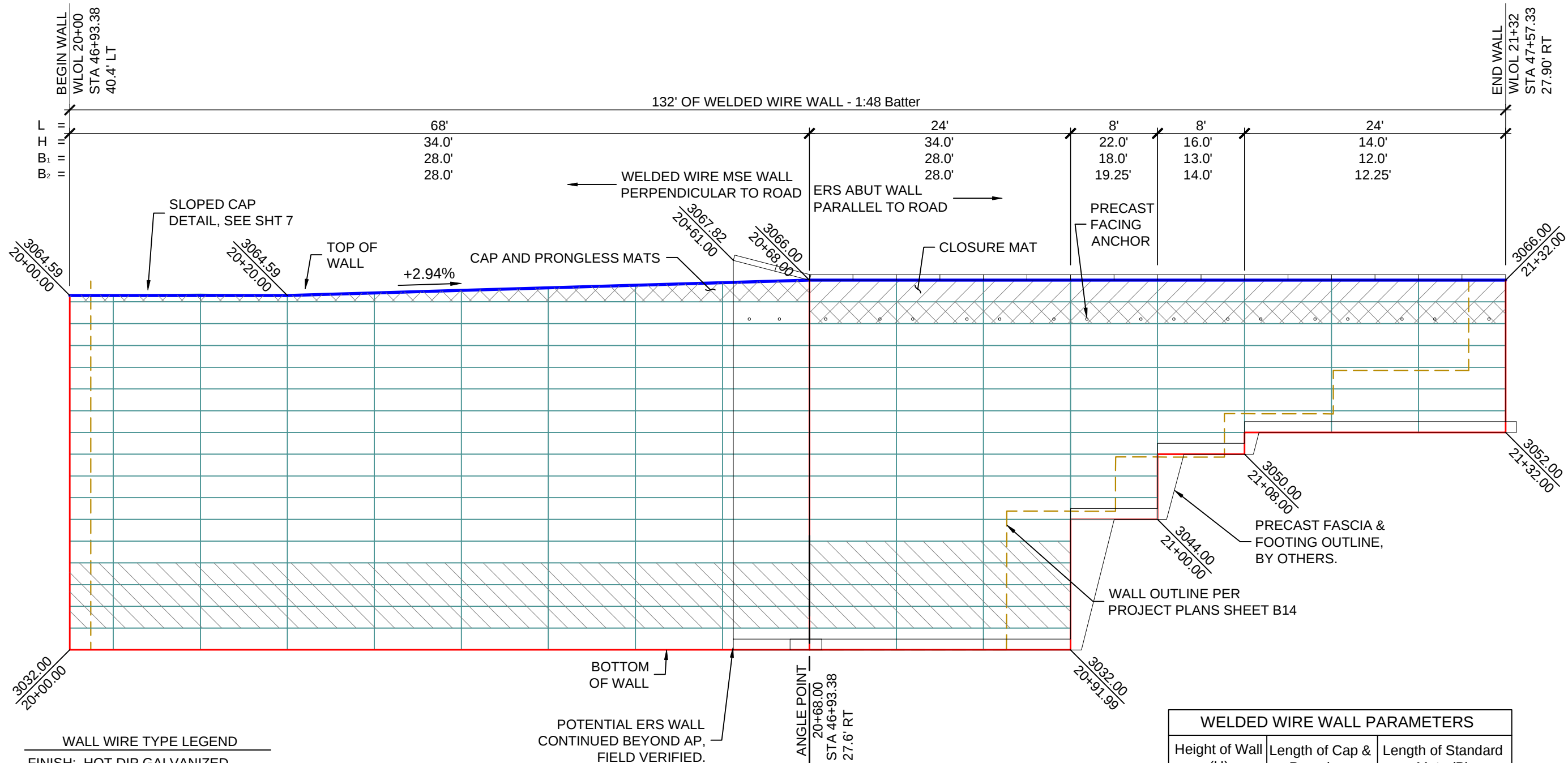


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SHT **3** OF 9

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MSE WALL STA 46+93 - ELEVATION VIEW - FRONT VIEW

SCALE: 1" = 10'

WELDED WIRE WALL PARAMETERS		
Height of Wall (H)	Length of Cap & Prongless Mats (B1)	Length of Standard Mats (B)
12'-14'	12.0'	12.25'
16'	13.0'	14.0'
18'	15.0'	15.75'
20'-21'	16.0'	17.5'
24'	20.0'	19.25'
34'	28.0'	28.0'
36'	29.0'	29.75'
Cap & Prongless Mats are: 8x12 W7.0x3.5 WWR (Type 1)		
Standard Mats are: 8x21 W7.0x4.0 WWR (Type 2)		
8x21 W9.5x4.0 WWR (Type 3)		
Finish: HOT DIP Galvanized - 75 Year Service Life		



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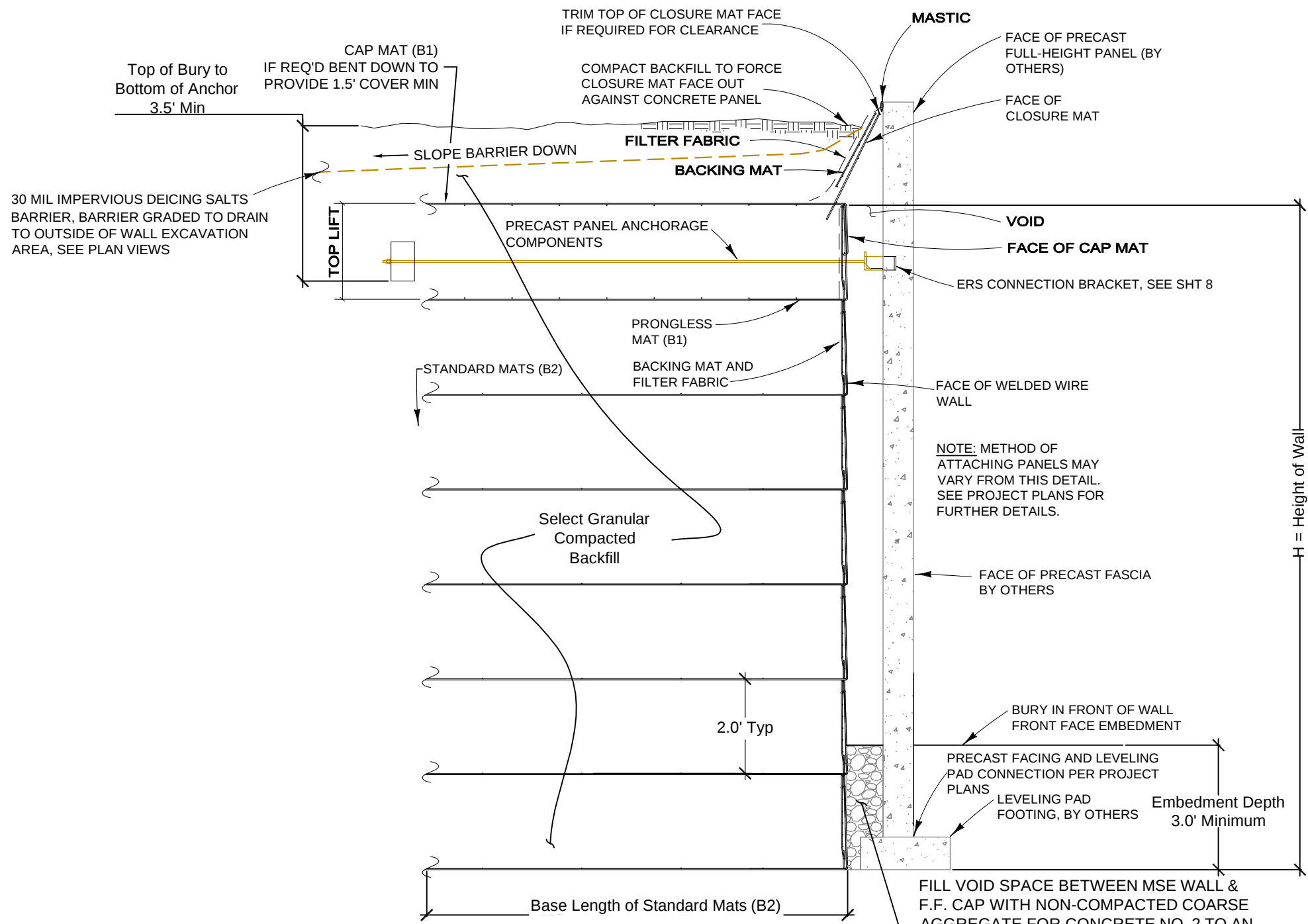
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S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE MSE WALLS

MSE WALL BENT 5
ELEVATION VIEW

PROJECT	17-022
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DESIGN	KLC
DRAWN	KLC
SHT	4 OF 9

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TYPICAL ERS WALL CROSS SECTION
SCALE: 1" = 5'

NOTE:
Many Department of Transportations use de-icing salts in the winter months to provide safer roadways. Metallic reinforcing if exposed to these salts are at risk to higher corrosion rates and loss of service life. To protect the Steel reinforcing in MSE walls it is an acceptable practice to use an impervious barrier around the reinforcing and a drainage system design that diverts the salts and protects the reinforcing.

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HILFIKER RETAINING WALLS

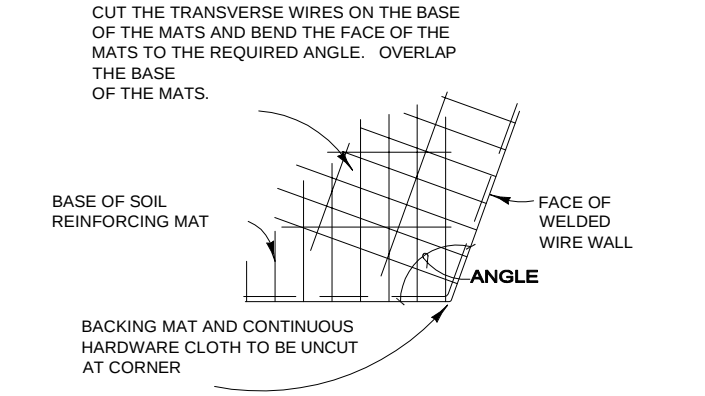


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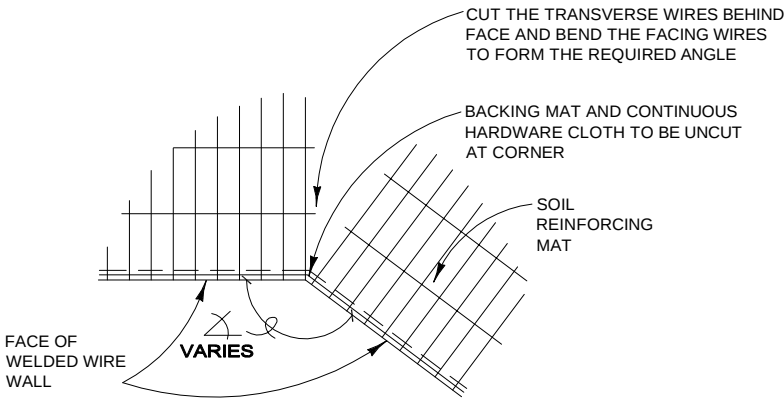


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PLAN VIEW
OBTUSE CONVEX ANGLE
NOT TO SCALE



PLAN VIEW
CONCAVE ANGLE DETAIL
NOT TO SCALE



S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE MSE WALLS

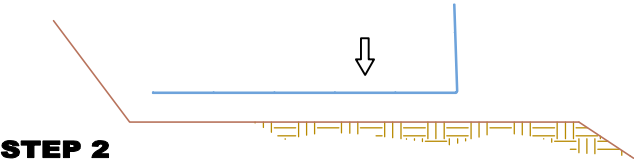
ERS CROSS SECTION VIEW & AP
DETAIL

PROJECT	17-022
DATE	06-16-17
DESIGN	KLC
DRAWN	KLC
SHT	5 OF 9

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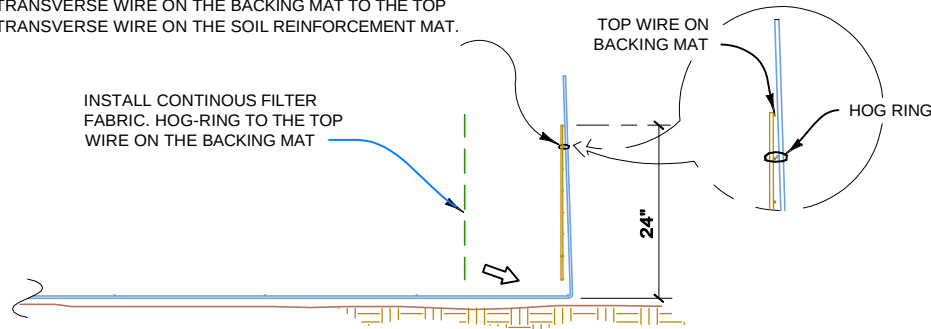
STEP 1

PLACE THE FIRST COURSE OF SOIL REINFORCEMENT MATS ON PREPARED FOUNDATION



STEP 2

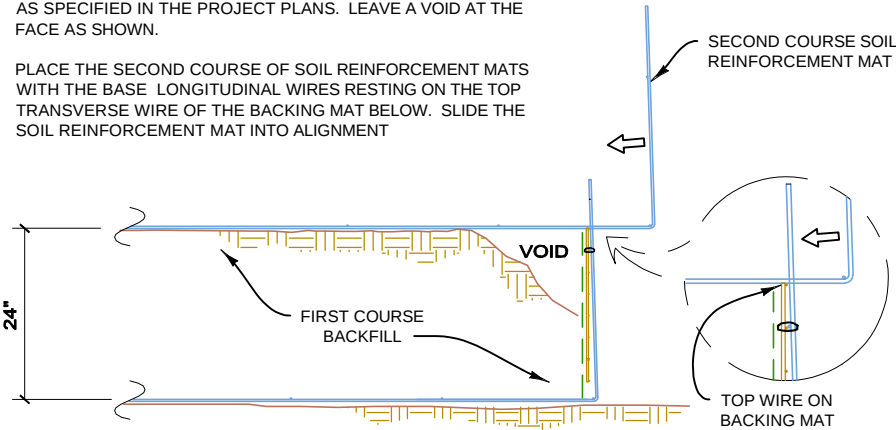
PLACE THE BACKING MAT AGAINST THE INSIDE FACE OF THE SOIL REINFORCEMENT MAT. CLIP THE SECOND-TO-TOP TRANSVERSE WIRE ON THE BACKING MAT TO THE TOP TRANSVERSE WIRE ON THE SOIL REINFORCEMENT MAT.



STEP 3

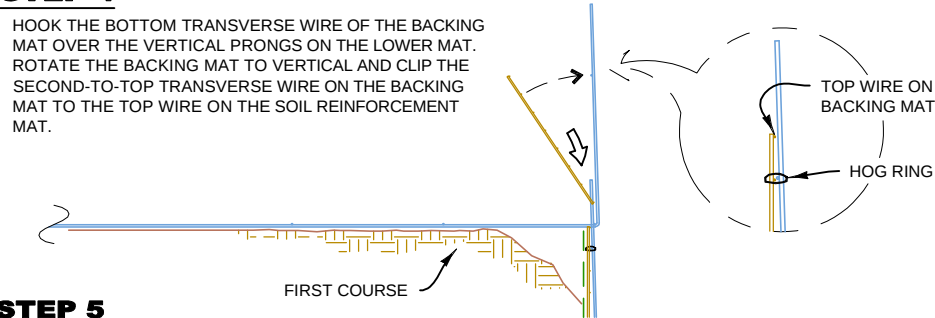
PLACE AND COMPACT THE BACKFILL IN LAYERS AND DENSITIES AS SPECIFIED IN THE PROJECT PLANS. LEAVE A VOID AT THE FACE AS SHOWN.

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.

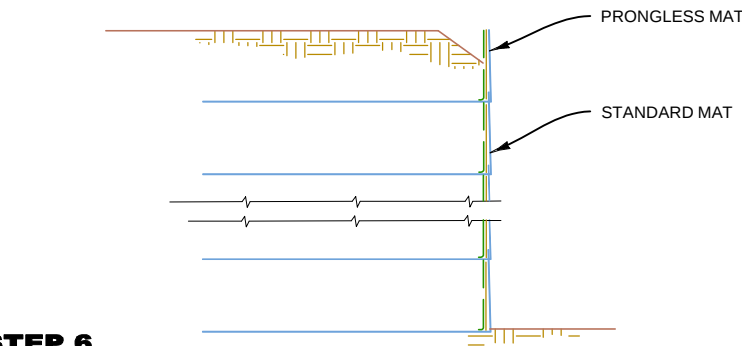
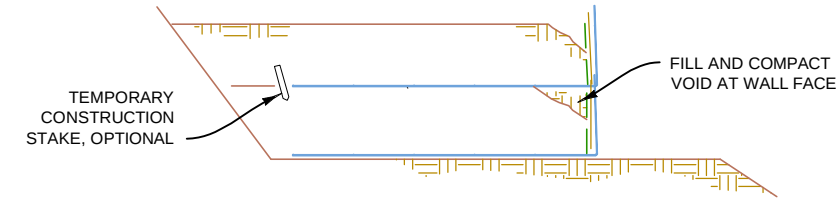


STEP 5

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.

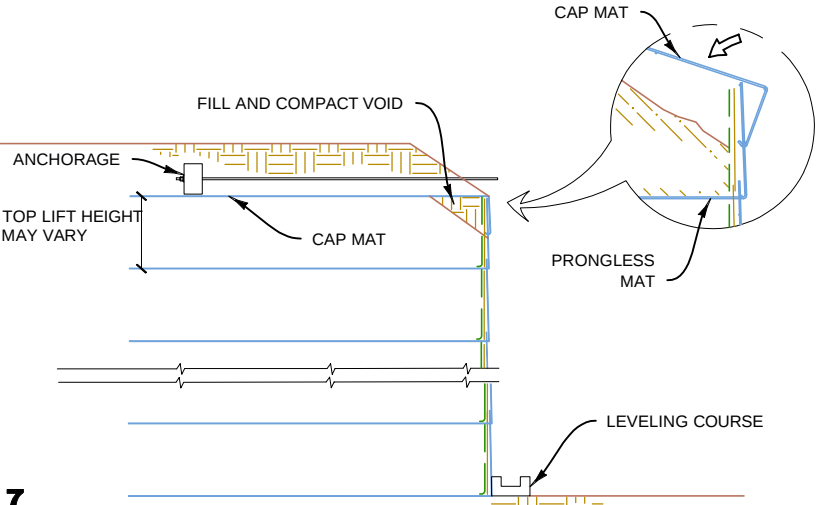


STEP 6

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.

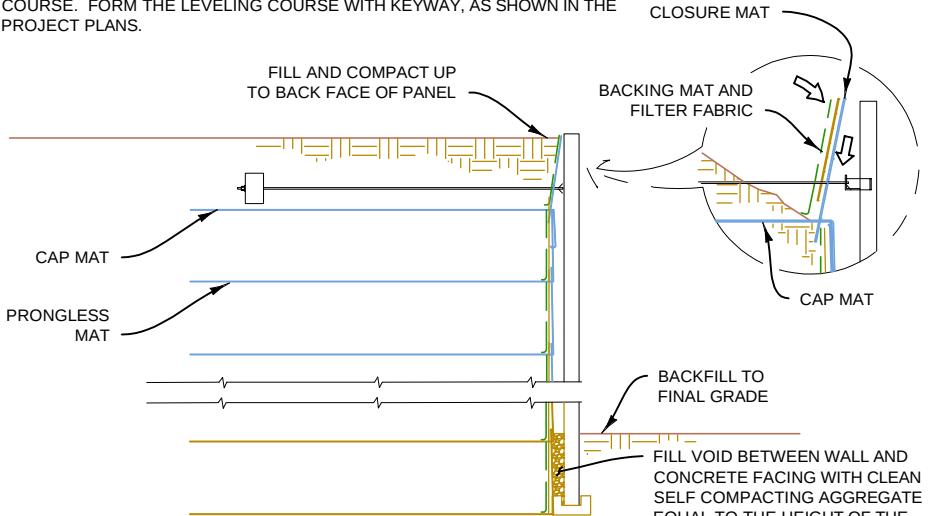
PLACE AND COMPACT THE BACKFILL IN THE PRONGLESS MAT LIFT.



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 MSE WALL CONSTRUCTION SEQUENCE
NOT TO SCALE

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HILFIKER RETAINING WALLS



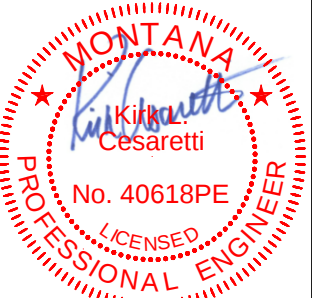
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S FORK FLATHEAD - HUNGRY HORSE
WELDED WIRE MSE WALLS
ERS CONSTRUCTION SEQUENCE & DETAILS



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SHT	6 OF 9

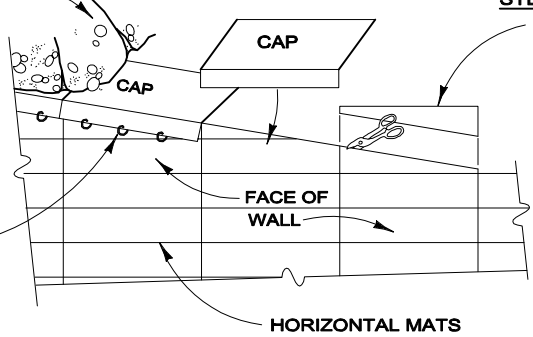
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STEP 4
PLACE AND COMPACT BACKFILL OVER THE SLOPED CAPS TO FINAL GRADE

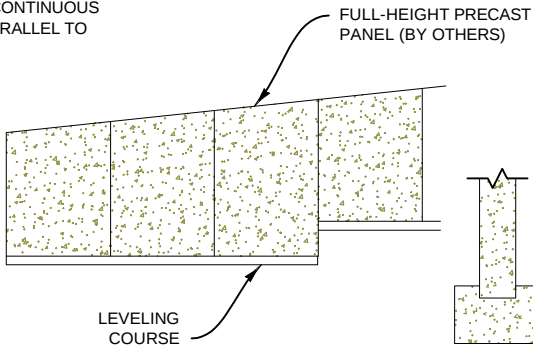
STEP 2
PLACE CAPS ON SLOPE

STEP 1
CUT OFF TOP OF THE MAT FACES, BACKING MATS, AND CONTINUOUS HARDWARE CLOTH PARALLEL TO FINAL GRADE

STEP 3
CLIP CAPS TO MAT FACES WITH HOG RINGS



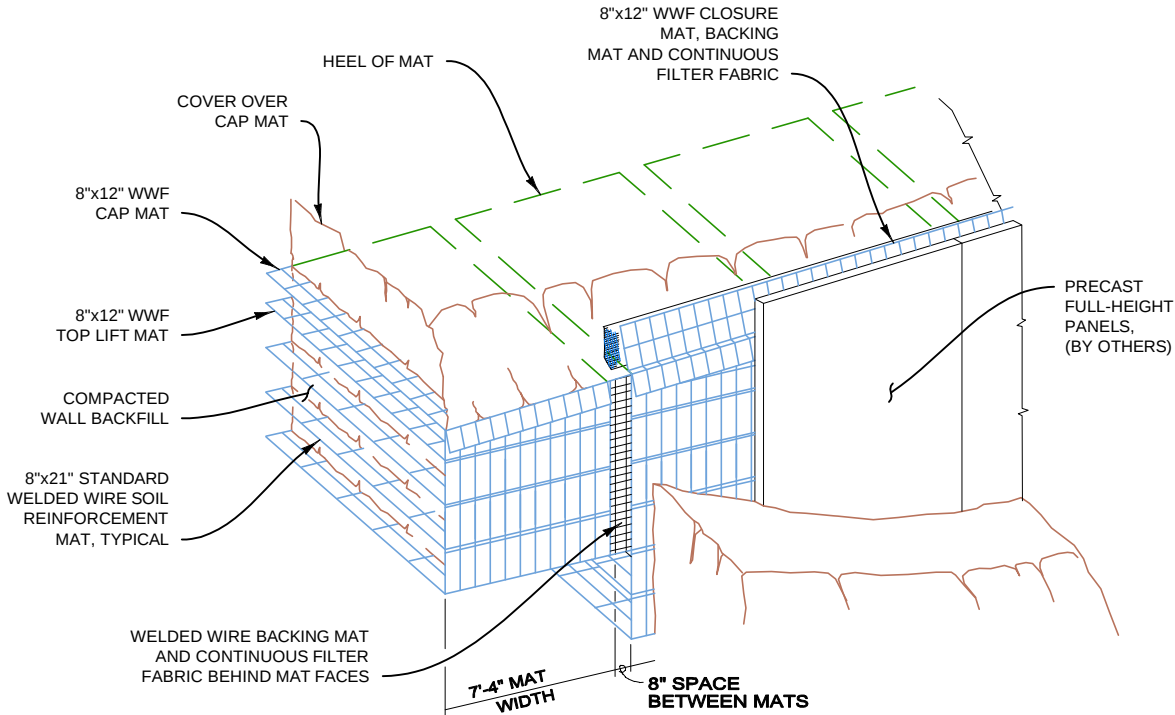
PICTORIAL ELEVATION
SLOPED CAP MAT DETAIL
NOT TO SCALE



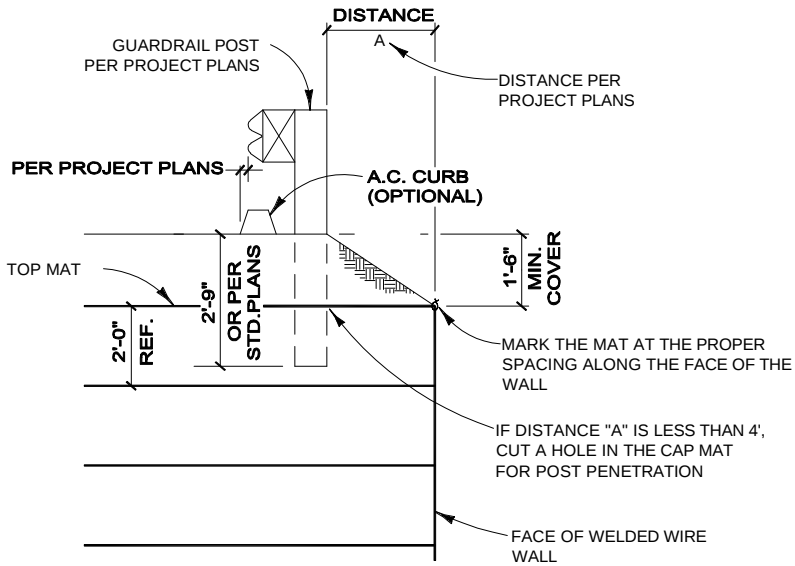
ELEVATION

SECTION

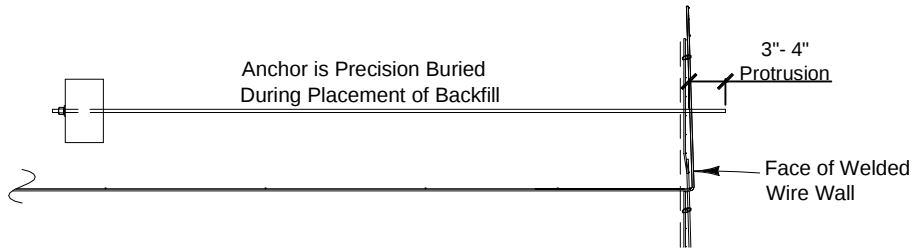
BOTTOM OF WALL DETAIL
NOT TO SCALE



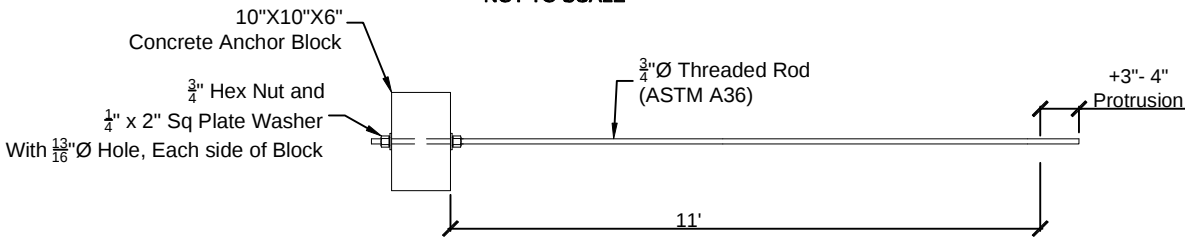
ERS PICTORIAL ELEVATION
NOT TO SCALE



SECTION
GUARDRAIL DETAIL
NOT TO SCALE
(FENCE DETAIL SIMILAR)



WALL ANCHOR/BRACING DETAILS
NOT TO SCALE



ANCHOR COMPONENTS
NOT TO SCALE

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HILFIKER RETAINING WALLS

HW

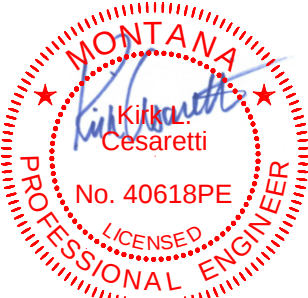
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1902
QUALITY PRODUCTS

CESARETTI
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CIVIL ENGINEERING SPECIALISTS

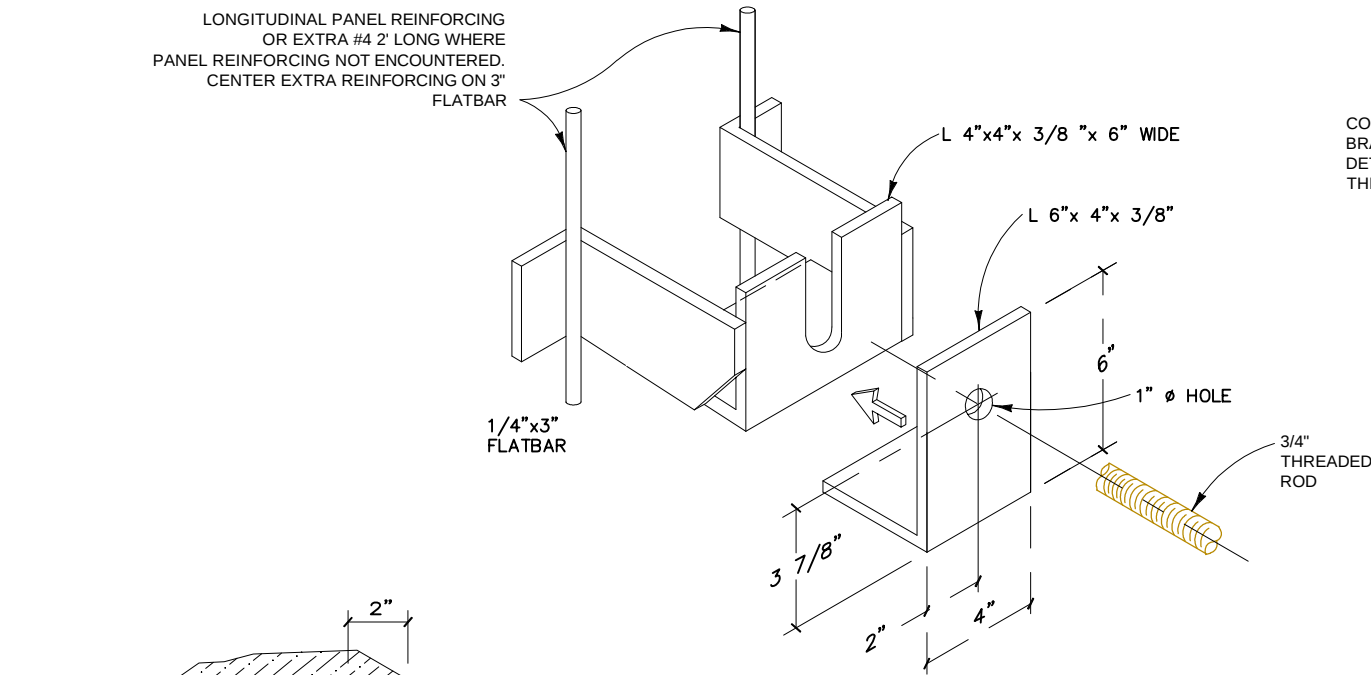
P.O. Box 132
Fortuna, CA 95540
Phone (707) 725-CESR
(707) 498-7193
CesarettiEngineered.com
KCesaretti@att.net

S FORK FLATHEAD - HUNGRY HORSE
ERS & WELDED WIRE WALL
DETAILS



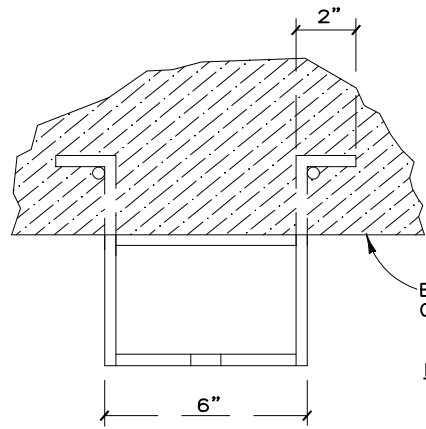
PROJECT	17-022
DATE	06-16-17
DESIGN	KLC
DRAWN	KLC
SHT	7 OF 9

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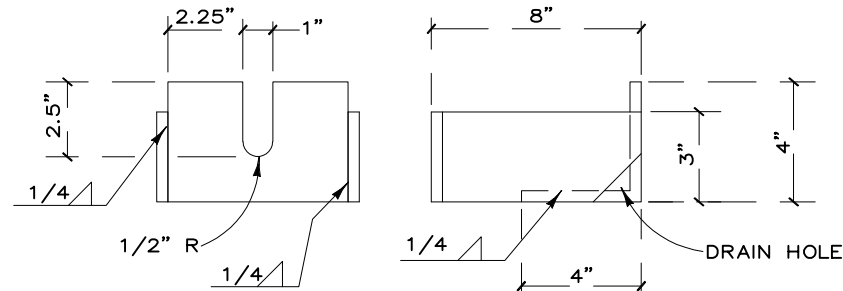


ISOMETRIC VIEW

PRECAST PANEL CONNECTION BRACKET
NOT TO SCALE



TOP VIEW



FRONT VIEW

SIDE VIEW

PRECAST PANEL CONNECTION BRACKET
NOT TO SCALE

THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE CONTRACTOR. ON THE BASIS OF THIS INFORMATION, THE HILFIKER COMPANY HAS DESIGNED, AND IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE. EXTERNAL STABILITY HAS BEEN REVIEWED AND THE BEARING CAPACITY OF THE FOUNDATION HAS BEEN EVALUATED. IF DURING CONSTRUCTION AND EXPOSURE THE FOUNDATION MATERIAL IS FOUND TO BE SUSPECT, THE ENGINEER SHALL BE INFORMED IMMEDIATELY FOR CONSULTATION.

REV.NO.	DATE	BY	DESCRIPTION
	06/16/ 17	KLC	Intial Soft .pdf Release
	07/26/17	KLC	Revised Per Plan Check Comments 7/ 7/ 17
	01/17/18	KLC	Revised Per Plan Check Comments 10/30/17

HILFIKER RETAINING WALLS

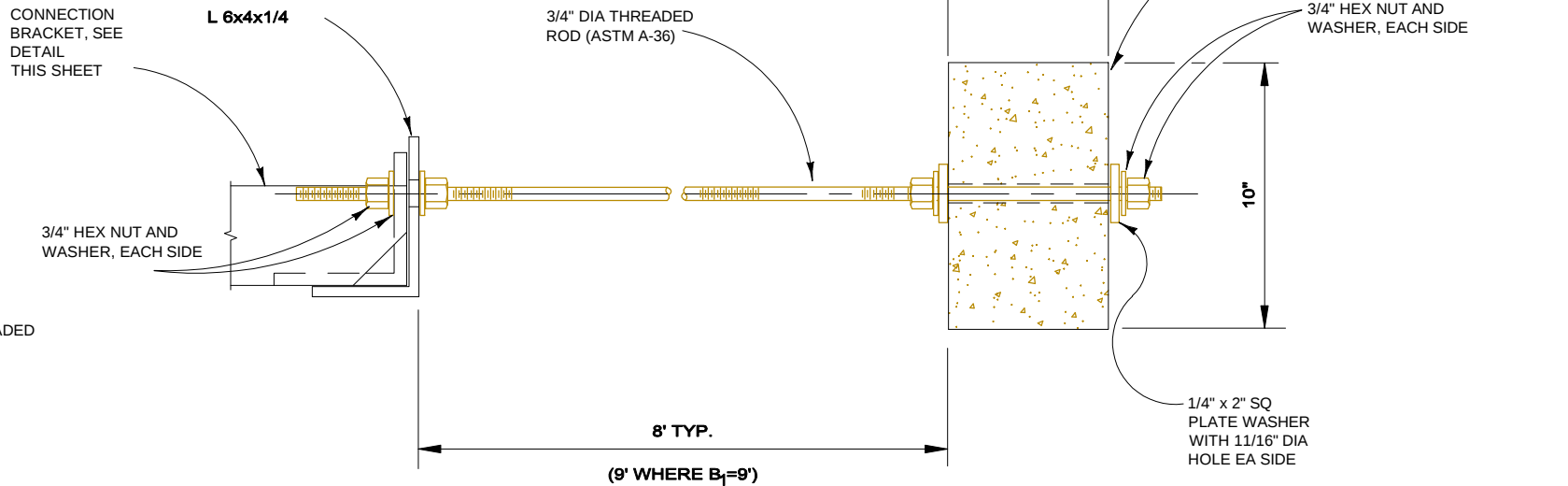


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PANEL ANCHORAGE COMPONENTS

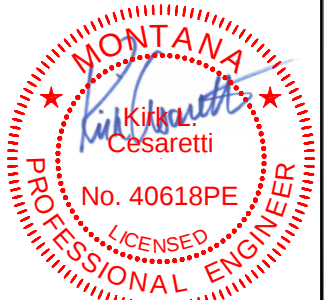


PANEL ANCHORAGE ASSEMBLY
NOT TO SCALE

PARTS LIST:

PART NO.	DESCRIPTION	PER ASSEMBLY	TOTAL AMOUNT
1	3/4" CUT WASHER	4	--
2	10"x10"x8" CONCRETE ANCHOR BLOCK	1	--
3	3/4" HEX NUT	4	--
4	1/4"x2"x2" PLATE WASHER WITH 11/16" CENTER HOLE	2	--
5	3/4" DIA THREADED ROD	1	--
6	ERS CONNECTION BRACKET	1	--

THREADED RODS, PLATES, NUTS AND WASHERS MAY BE HOT-DIP GALVANIZED AFTER FABRICATION (2 OZ/SQ FT MIN)



HW 170330EW

PROJECT	17-022
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DRAWN	KLC

SHT 8 OF 9

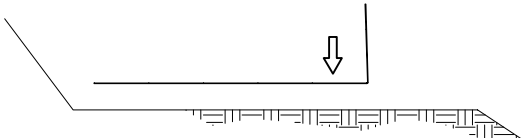
S FORK FLATHEAD - HUNGRY HORSE
PANEL ANCHOR
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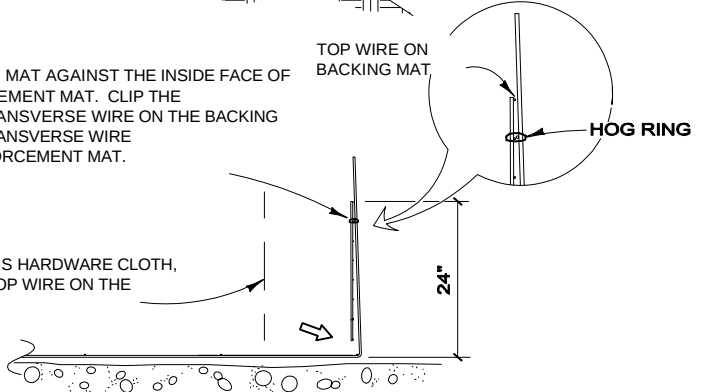
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STEP 1
PLACE THE FIRST COURSE OF SOIL REINFORCEMENT MATS ON PREPARED FOUNDATION



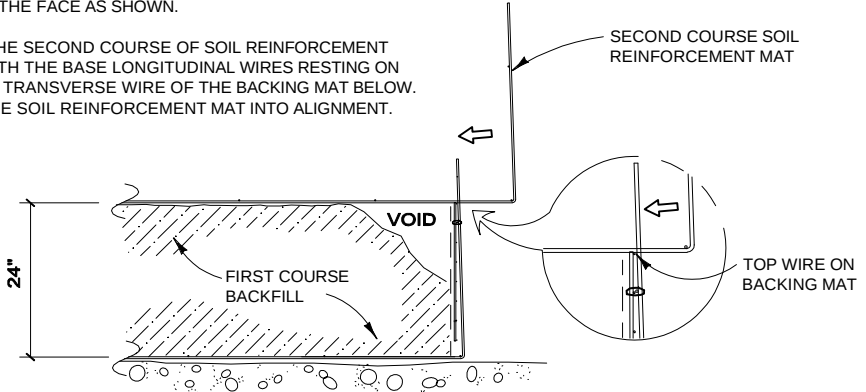
STEP 2
PLACE THE BACKING MAT AGAINST THE INSIDE FACE OF THE SOIL REINFORCEMENT MAT. CLIP THE SECOND-TO-TOP TRANSVERSE WIRE ON THE BACKING MAT TO THE TOP TRANSVERSE WIRE ON THE SOIL REINFORCEMENT MAT.

INSTALL CONTINUOUS HARDWARE CLOTH, HOG-RING TO THE TOP WIRE ON THE BACKING MAT.

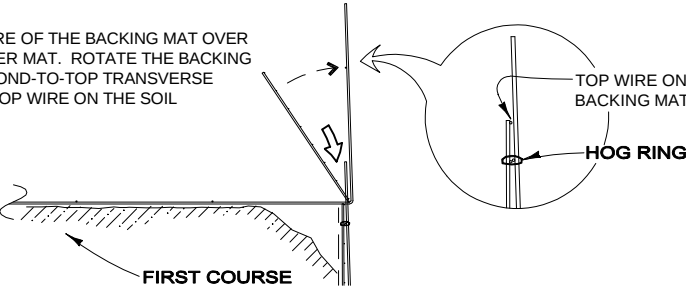


STEP 3
PLACE AND COMPACT THE BACKFILL IN LAYERS AND DENSITIES AS SPECIFIED IN THE PROJECT PLANS. LEAVE A VOID AT THE FACE AS SHOWN.

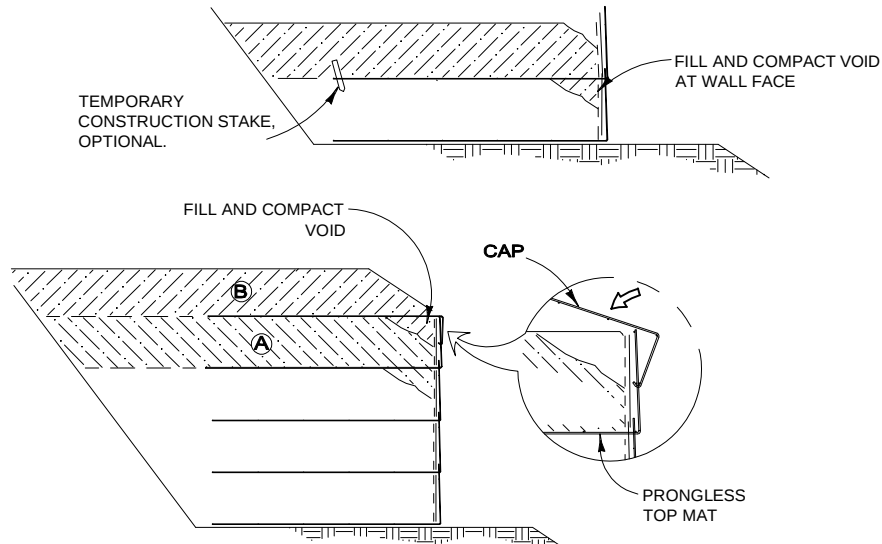
PLACE THE SECOND COURSE OF SOIL REINFORCEMENT MATS WITH THE BASE LONGITUDINAL WIRES RESTING ON THE TOP TRANSVERSE WIRE OF THE BACKING MAT BELOW. SLIDE THE SOIL REINFORCEMENT MAT INTO ALIGNMENT.



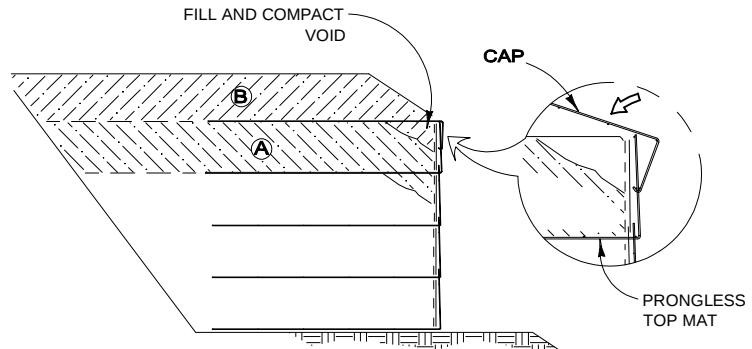
STEP 4
HOOK THE BOTTOM TRANSVERSE WIRE OF THE BACKING MAT OVER THE VERTICAL PRONGS ON THE LOWER MAT. ROTATE THE BACKING MAT TO VERTICAL AND CLIP THE SECOND-TO-TOP TRANSVERSE WIRE ON THE BACKING MAT TO THE TOP WIRE ON THE SOIL REINFORCEMENT MAT.



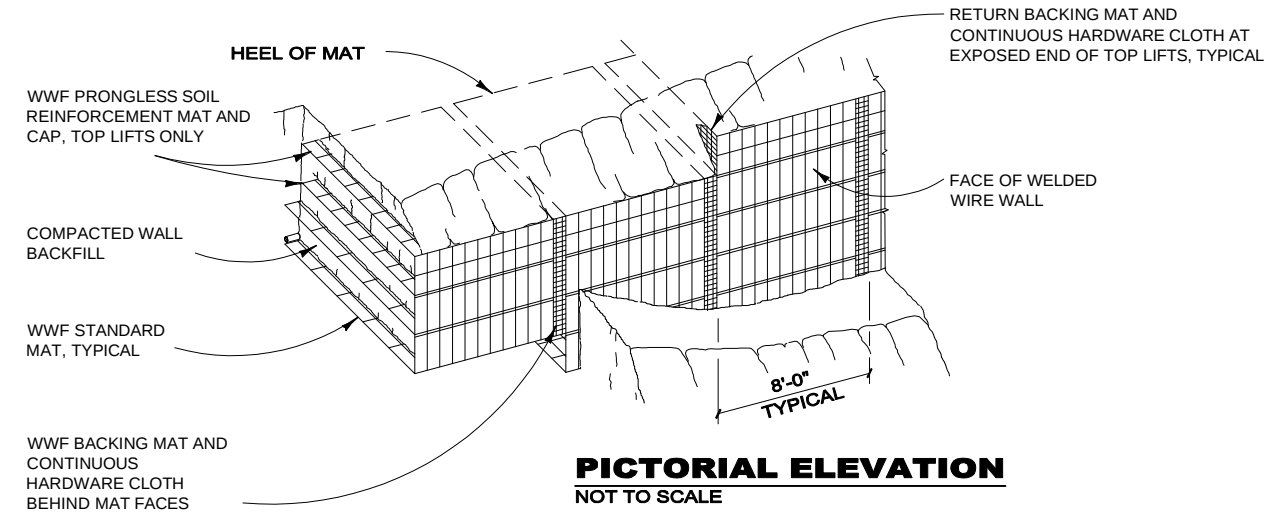
STEP 5
INSTALL THE CONTINUOUS HARDWARE CLOTH. PLACE AND COMPACT THE BACKFILL TO THE BASE ELEVATION OF THE NEXT MAT. REPEAT STEPS 3 THROUGH 5 TO THE TOP LIFT.



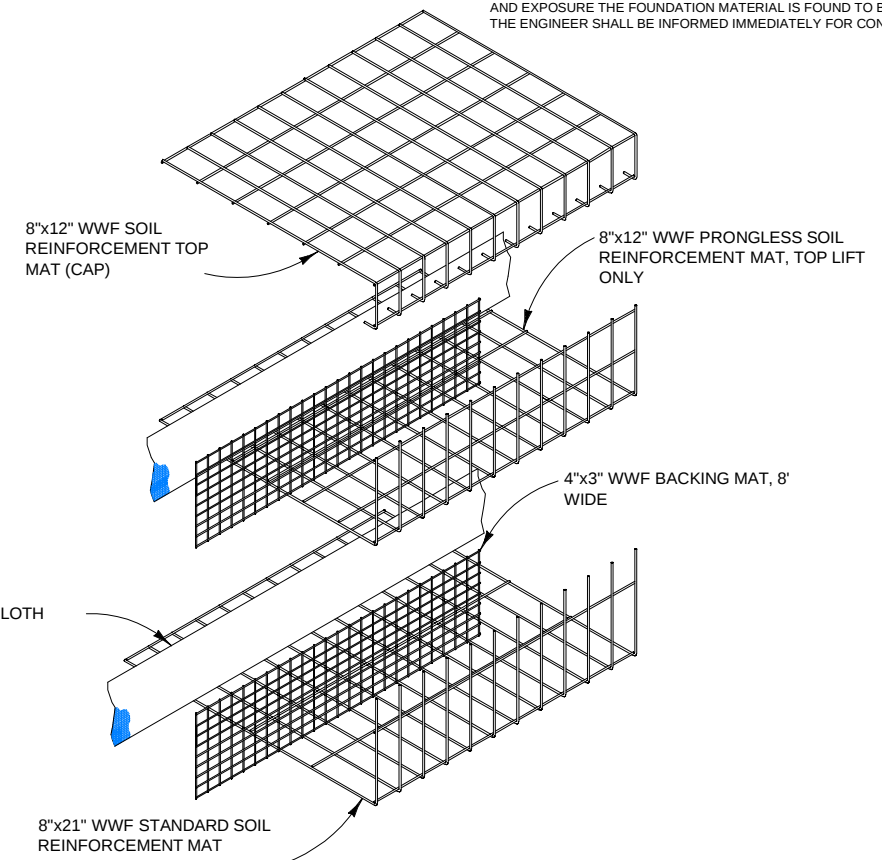
STEP 6: TOP LIFT
PLACE THE TOP LIFT PRONGLESS MAT, BACKING MAT AND CONTINUOUS HARDWARE CLOTH. PLACE AND COMPACT BACKFILL IN AREA "A". HOOK THE CAP OVER THE MIDDLE TRANSVERSE WIRE ON THE PRONGLESS MAT, AND ROTATE INTO PLACE. BACKFILL "B" TO 1'-6" MIN. COVER OVER THE CAP.



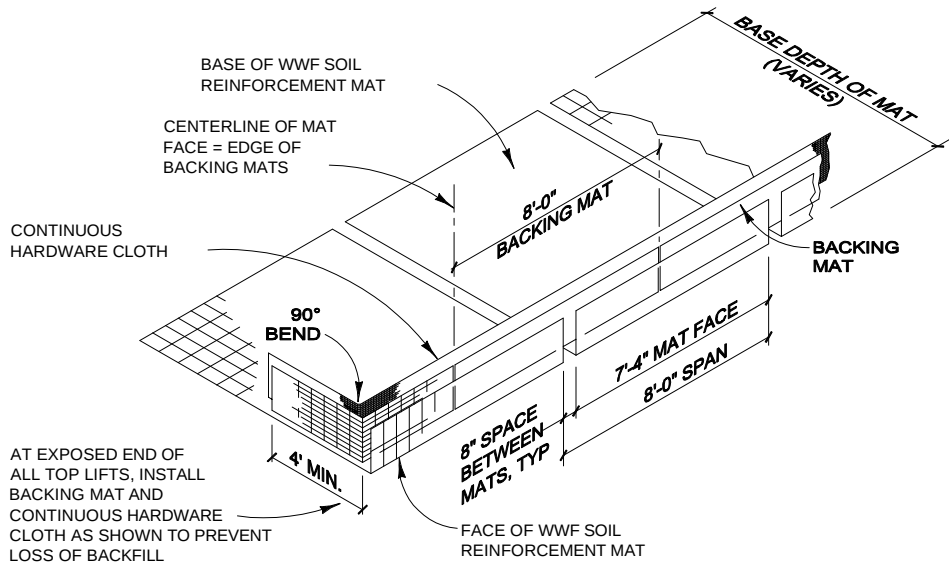
CONSTRUCTION SEQUENCE
NOT TO SCALE



PICTORIAL ELEVATION
NOT TO SCALE



WALL COMPONENTS
NOT TO SCALE



WELDED WIRE WALL COMPONENTS WITH RETURN MAT
NOT TO SCALE



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WELDED WIRE MSE WALLS

WELDED WIRE WALL CONSTRUCTION
SEQUENCE & DETAILS

PROJECT	17-022
DATE	06-16-17
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SHT	9 OF 9