

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: 120 pcf

Internal Friction Angle: 34°

Cohesion = 0 psf

Retained Backfill:

Unit Weight: 120 pcf

Internal Friction Angle: 34°

Foundation Soils:

Unit Weight: 125 pcf

Friction Angle for Sliding: 34°

Cohesion = 0 psf

Traffic Surcharge (LL) = 250 psf
Worst Case Applied Bearing Pressure by MSE Wall - @ 19.5' Height - 2805 psf.

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.

Drainage control shall be as specified in the project plans and specifications or as directed by the engineer.

5. Design Procedure:

Mechanically Stabilized Earth walls and Reinforced Soil Slopes, FHWA report No. FHWA-NHI-00-043.

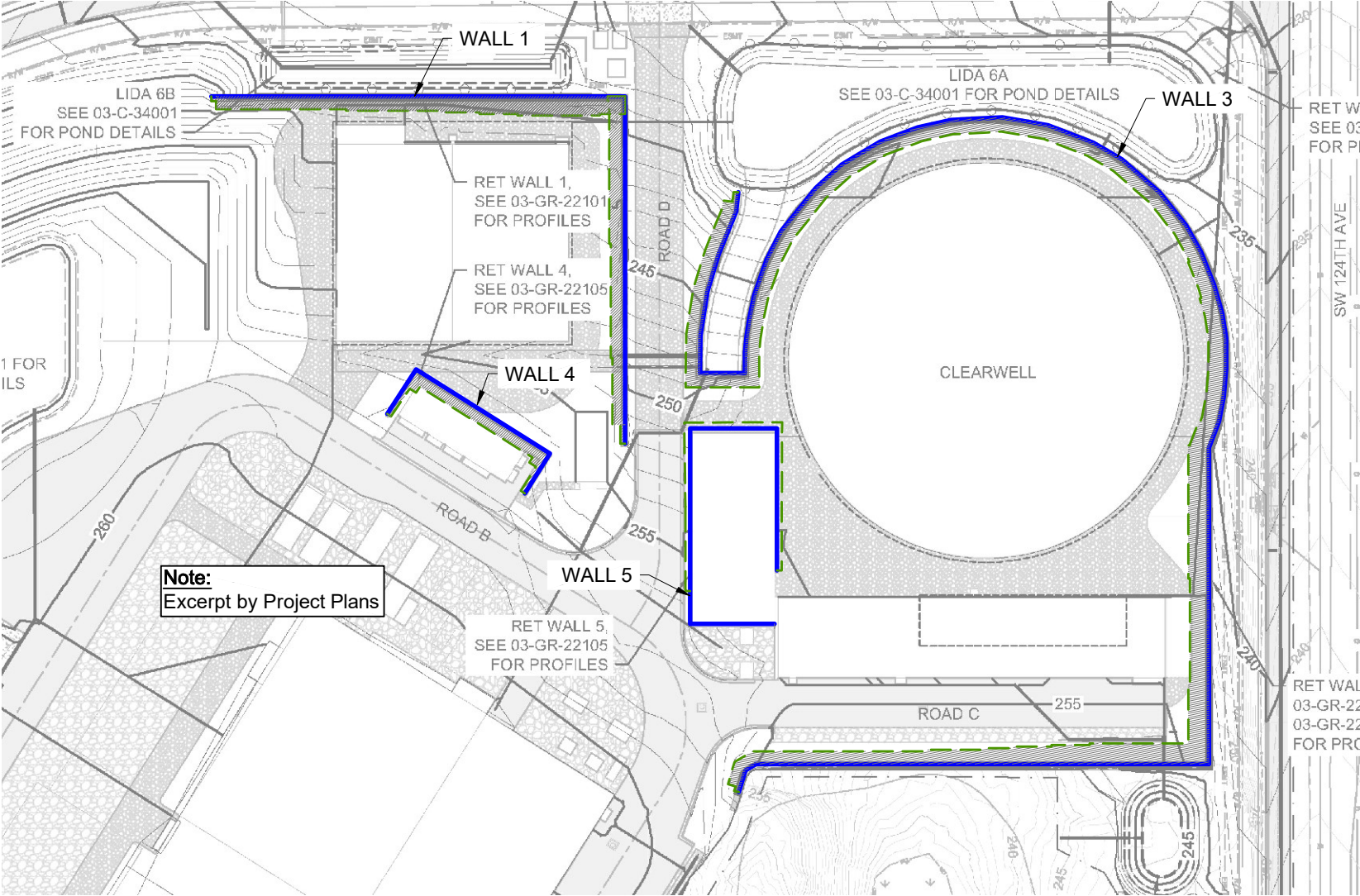
6. All information hereon is derived from the reference drawings, and is subject to geometric and geotechnical confirmation. Field verification of existing ground elevations and bottom of wall elevations should be completed prior to preparation. The applicable Hilfiker construction guide and specifications are an integral part of this submittal.

This design is intended to be responsible for the internal stability of the retaining wall only, and not for global stability or foundation bearing capacity. CES & Hilfiker Retaining Walls are not responsible for job site drainage, safety and fall protection provisions including compliance with OSHA regulations, nor the Competent Person designated for daily inspection.

TOTAL SUPPLIED QUANTITIES

GABION FACED - MSE WALL 1 5,130 SQ. FT.	GABION FACED - MSE WALL 5 900 SQ. FT.
3x3x3: 2	6x3x3: 41
6x3x3: 274	6x3x1.5: 13
6x3x1.5: 20	3x3x3: 5
GABION FACED - MSE WALL 3 17,874 SQ. FT.	GABION FACED - MSE WALL 6 5,508 SQ. FT.
3x3x3: 13	6x3x3: 277
6x3x3: 908	6x3x1.5: 58
6x3x1.5: 157	
GABION FACED - MSE WALL 4 657 SQ. FT.	GABION FACED - MSE WALL 7 3,672 SQ. FT.
3x3x3: 1	3x3x3: 1
6x3x3: 26	6x3x3: 190
6x3x1.5: 20	6x3x1.5: 27

TOTAL WALL AREA: 32,184 SQ. FT.



PLAN VIEW - WALLS 1, 3, 4 & 5

SCALE: 1" = 100'

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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only
	10-25-22	KLC	Revised Wall 3 per Client CAD file
	11-08-22	KLC	Revised Wall 7 per Client CAD file
	11-10-22	KLC	Revised Wall 5 per Client CAD file
	11-30-22	KLC	Revised Walls' Basket and Area Count

7-31-23 KLC Revised per new Profiles
10-23-23 KLC Revised Wall 3 per New Profile

HILFIKER RETAINING WALLS

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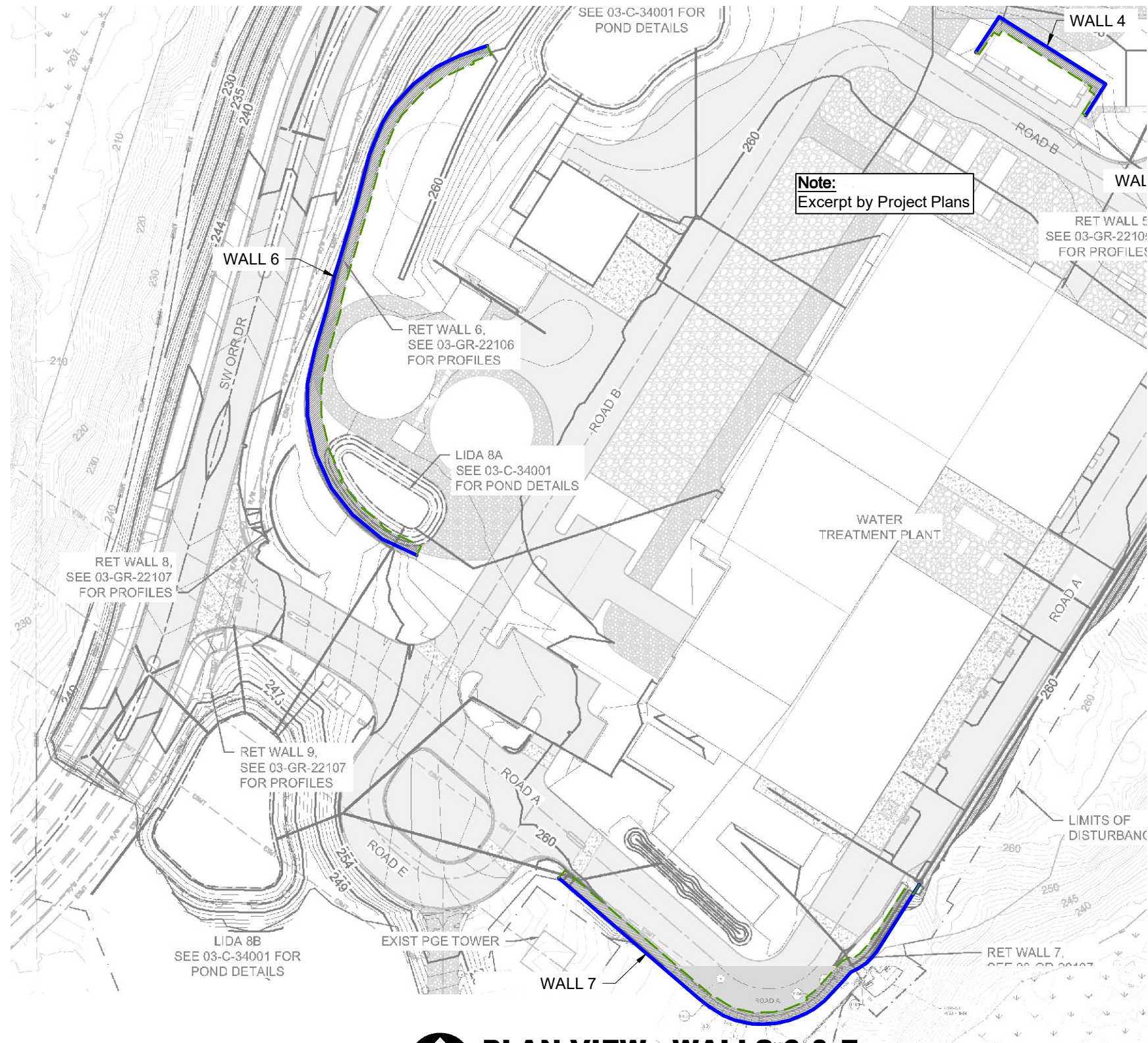
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Gabion Faced MSE Wall

WALLS 1, 3, 4 & 5 PLAN VIEW &
GENERAL NOTES

HW 211027AG

PROJECT	22-037
DATE	6-24-22
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SHT 1 OF 20



PLAN VIEW - WALLS 6 & 7

SCALE: 1" = 100'

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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	8-05-22	KLC	Revised Wall 7 Plan View
	11-08-22	KLC	Revised Wall 7 per Client New CAD

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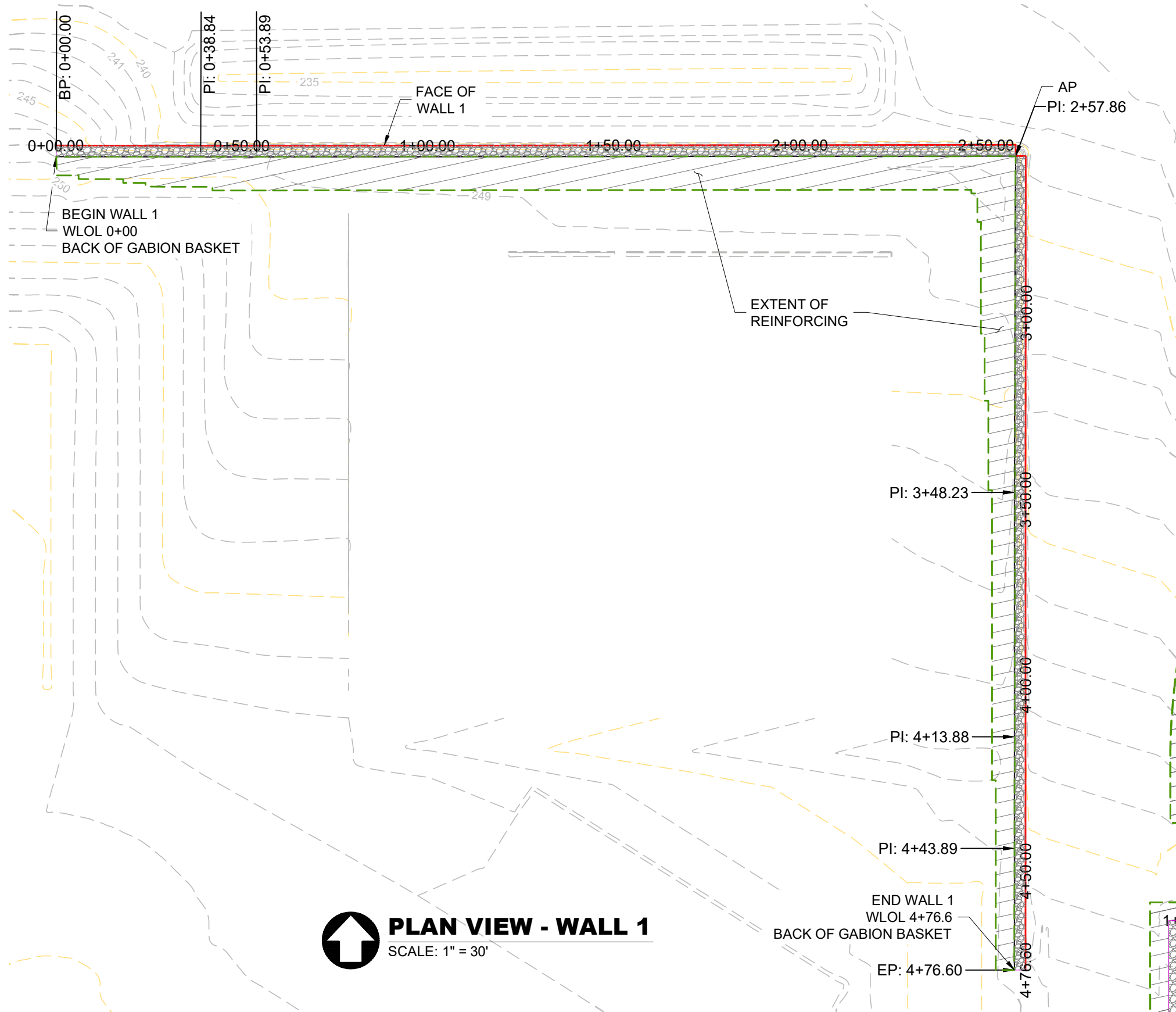
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WALLS 6 & 7 PLAN VIEW

HW 211027AG

PROJECT	22-037
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PLAN VIEW - WALL 1
SCALE: 1" = 30'

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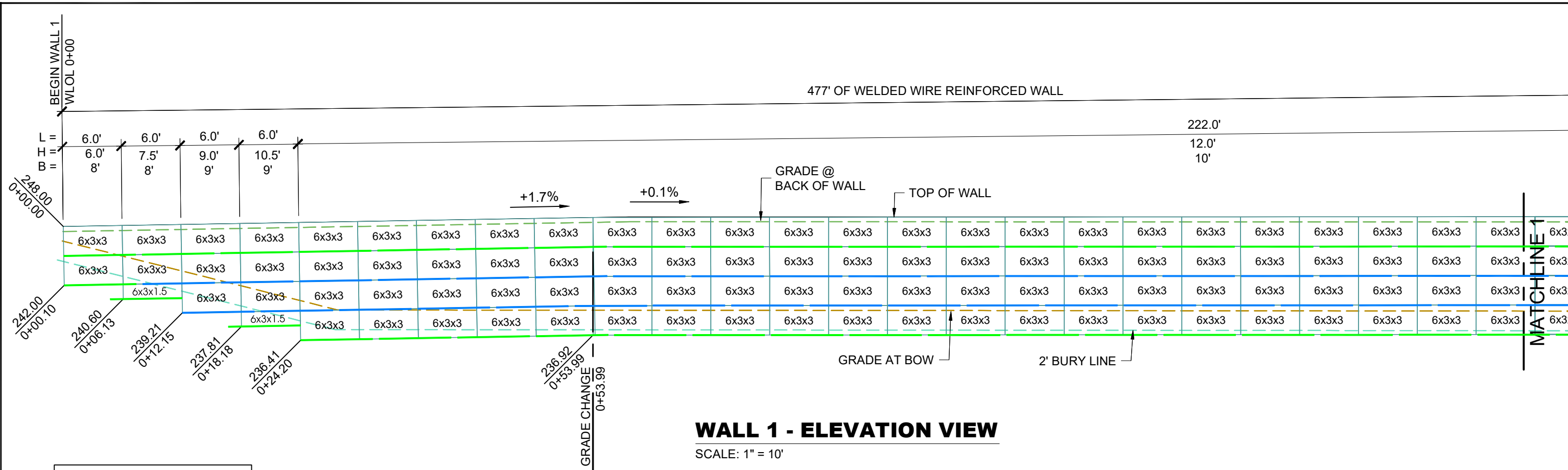
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WALL 1 PLAN VIEW

HW 211027AG

PROJECT 22-037
DATE 6-24-22
DESIGN KLC
DRAWN KLC

SHT **3** OF 20

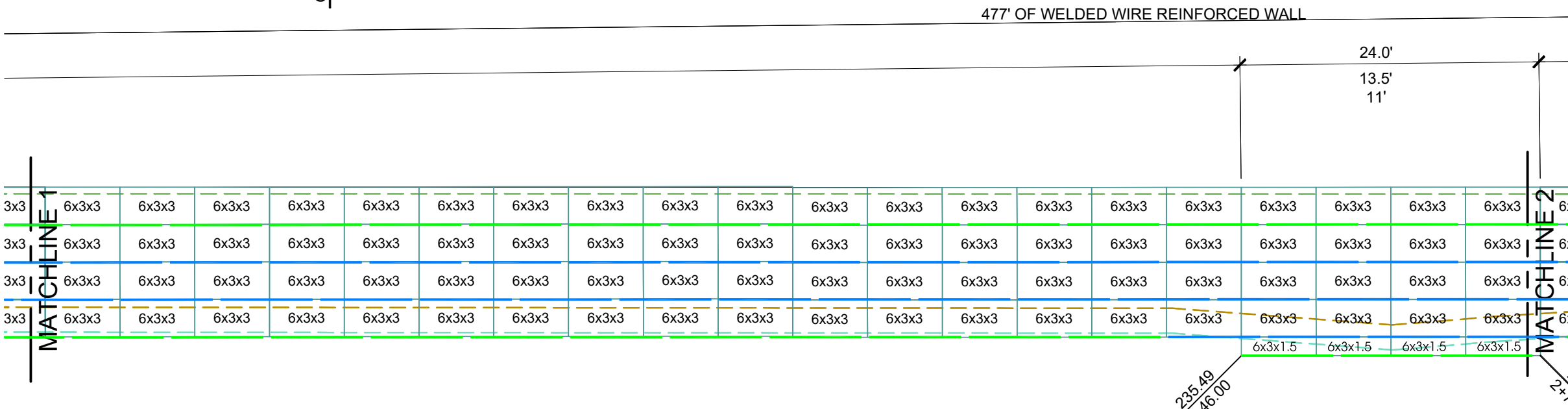


WALL 1 - ELEVATION VIEW

SCALE: 1" = 10'

WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'

Reinforcement Mats:
TYPE 1- 8x12 W4.5x3.5 WWR
TYPE 2- 8x12 W7.0x3.5 WWR
TYPE 3- 8x12 W9.5x4.0 WWR
Finish: Hot Dip Galvanized
- 75 Year Service Life



WALL 1 - ELEVATION VIEW (CONT'D)

SCALE: 1" = 10'

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WALL WIRE TYPE LEGEND

FINISH: HOT DIP GALVANIZED
SERVICE LIFE: 75 YEARS

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- TYPE 2 - 8X12 W7.0x3.5 MATS
- TYPE 3 - 8X12 W9.5x4.0 MATS

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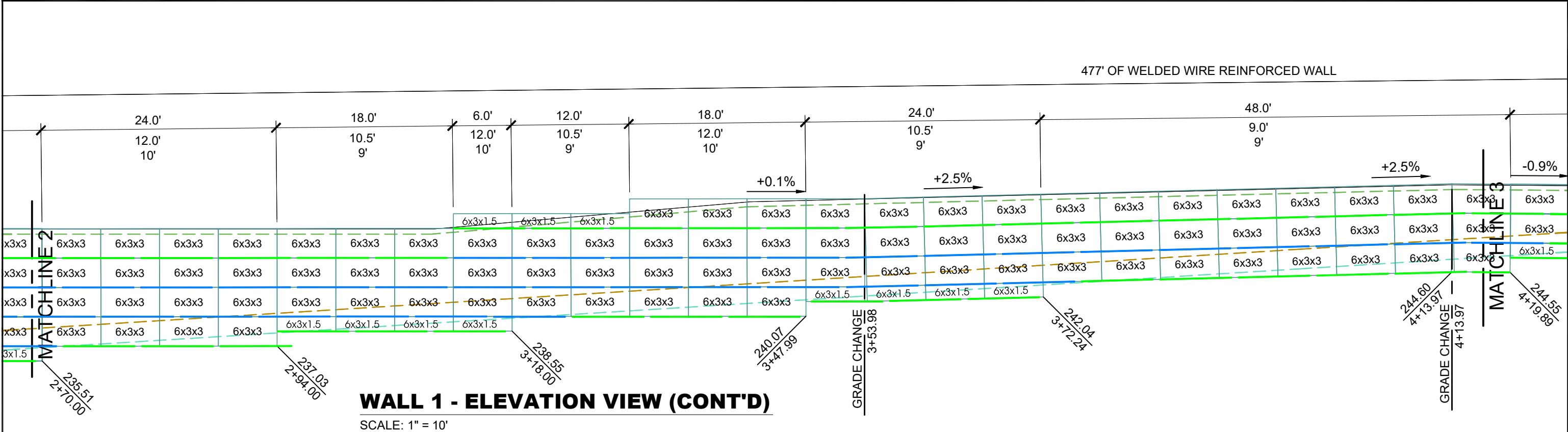
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WALL 1 - ELEVATION VIEW

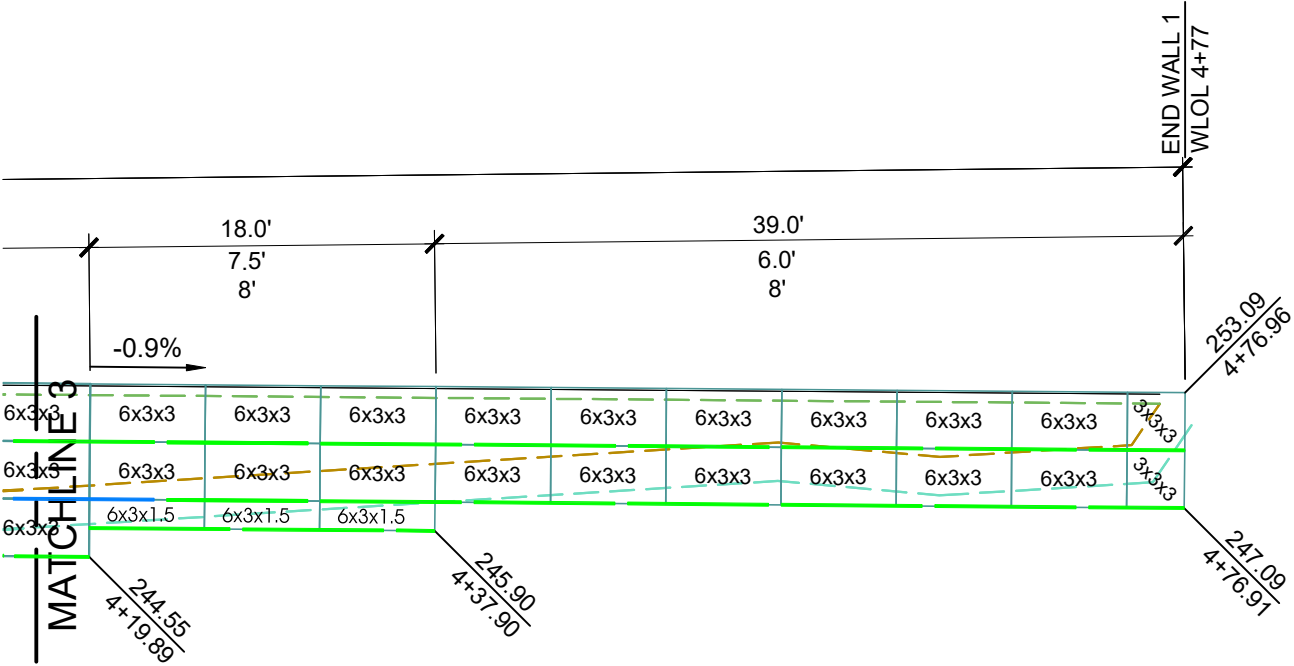
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DATE 6-24-22
DESIGN KLC
DRAWN KLC
SHT 4 OF 20



WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'

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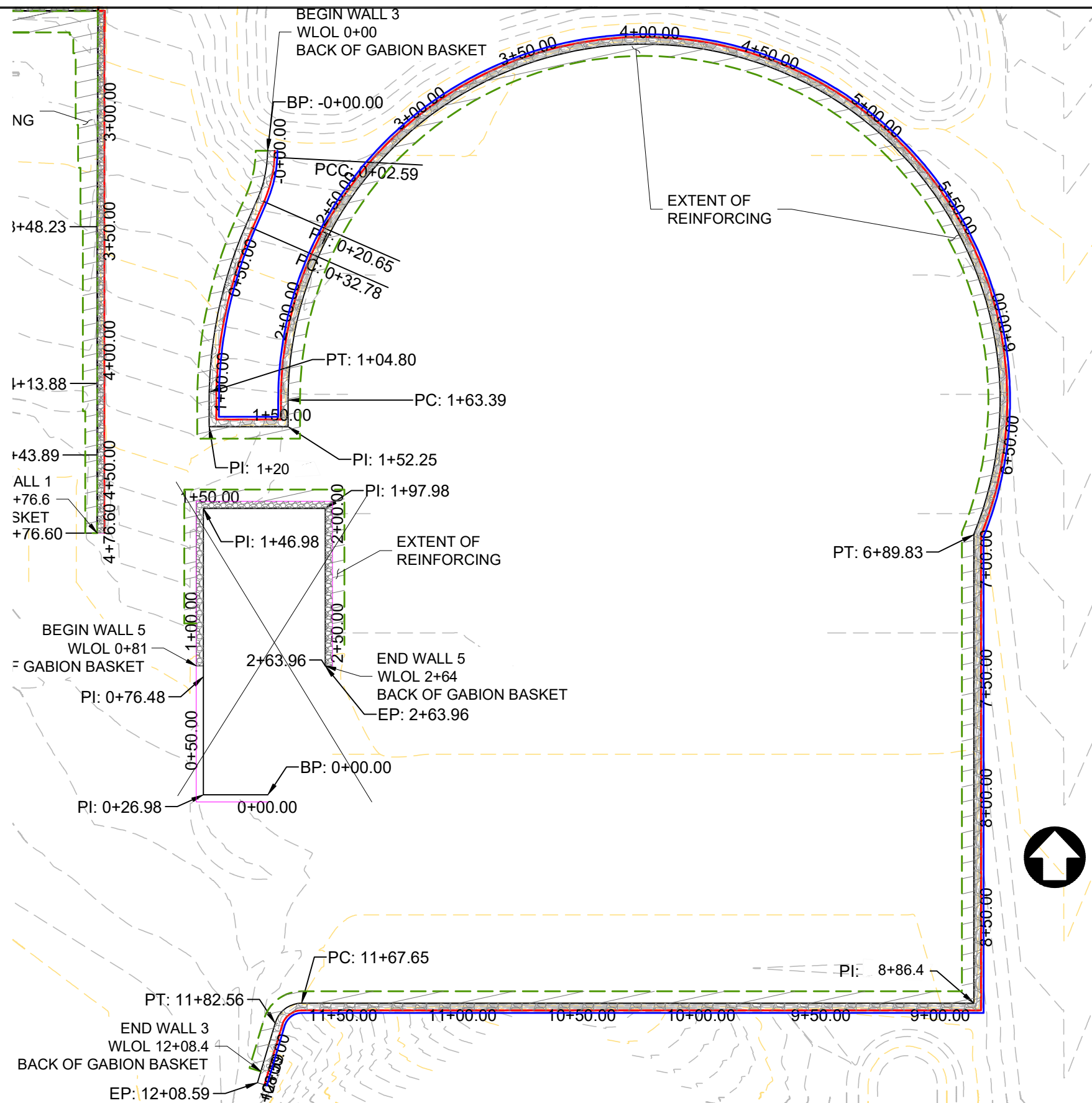
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WALL 1 - ELEVATION VIEW (CONT'D)

PROJECT	22-037
DATE	6-24-22
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SHT	5 OF 20



PLAN VIEW - WALL 3 & 5

SCALE: 1" = 50'

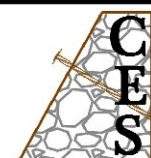
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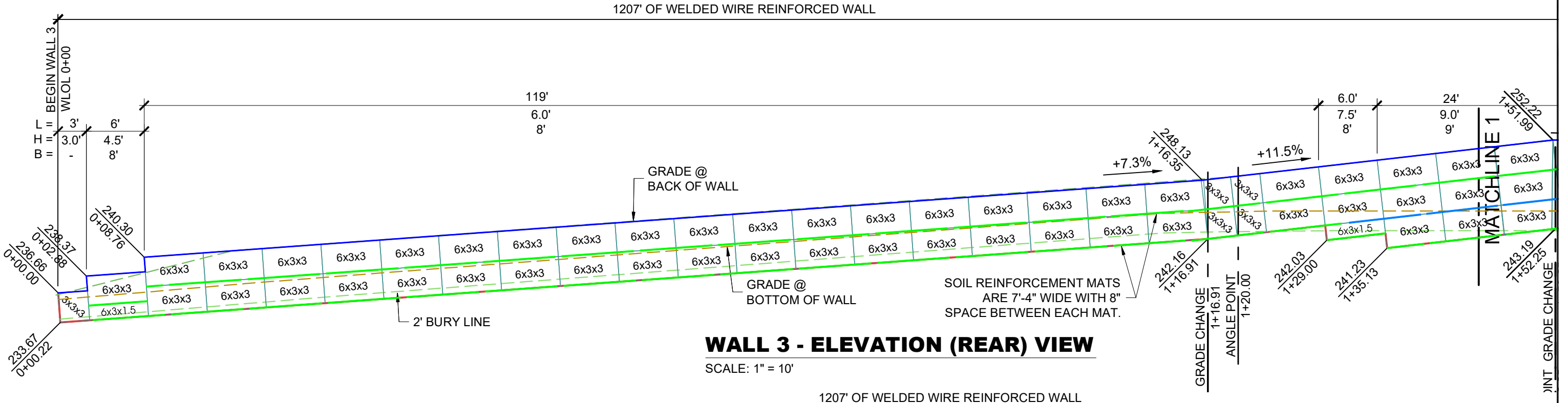
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WALL 3 & 5 PLAN VIEW

HW 211027AG

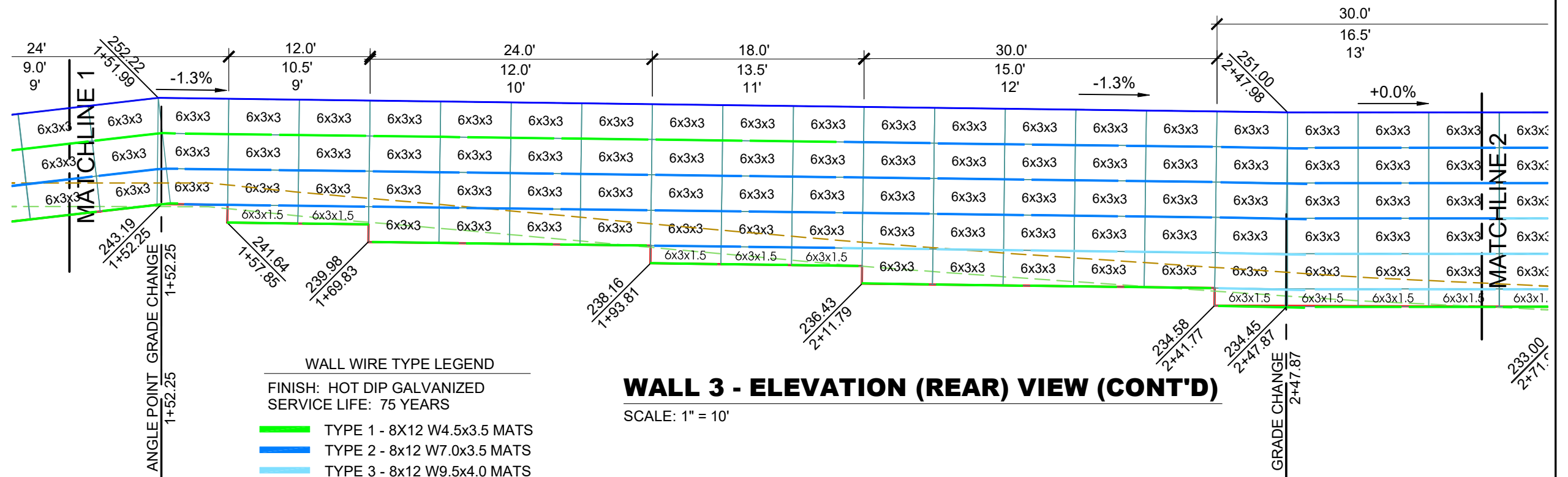
PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

SHT **6** OF 20



WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'

Reinforcement Mats:
 TYPE 1- 8x12 W4.5x3.5 WWR
 TYPE 2- 8x12 W7.0x3.5 WWR
 TYPE 3- 8x12 W9.5x4.0 WWR
Finish: Hot Dip Galvanized
 - 75 Year Service Life



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	9-29-23	KLC	Revised Wall 3 per Clients new Geometry

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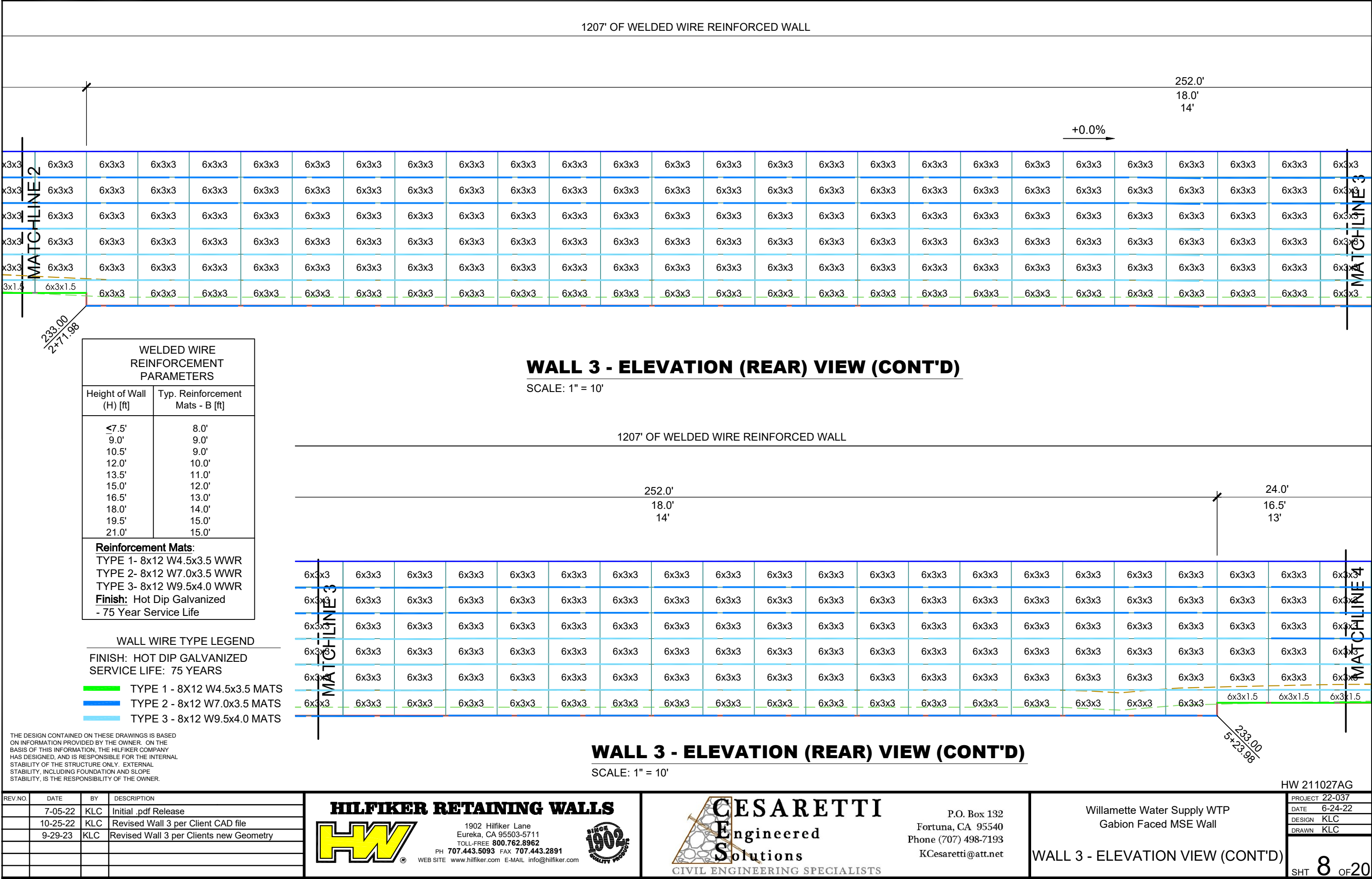
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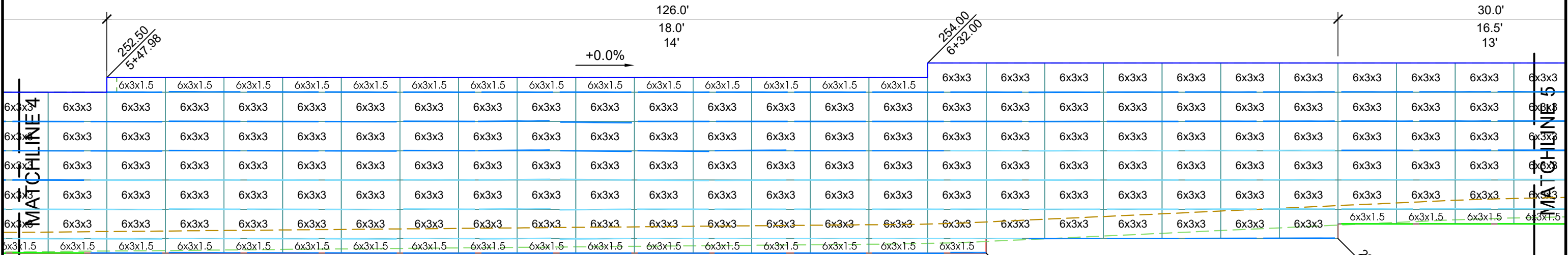
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WALL 3 - ELEVATION VIEW

PROJECT 22-037
DATE 6-24-22
DESIGN KLC
DRAWN KLC
SHT 7 OF 20

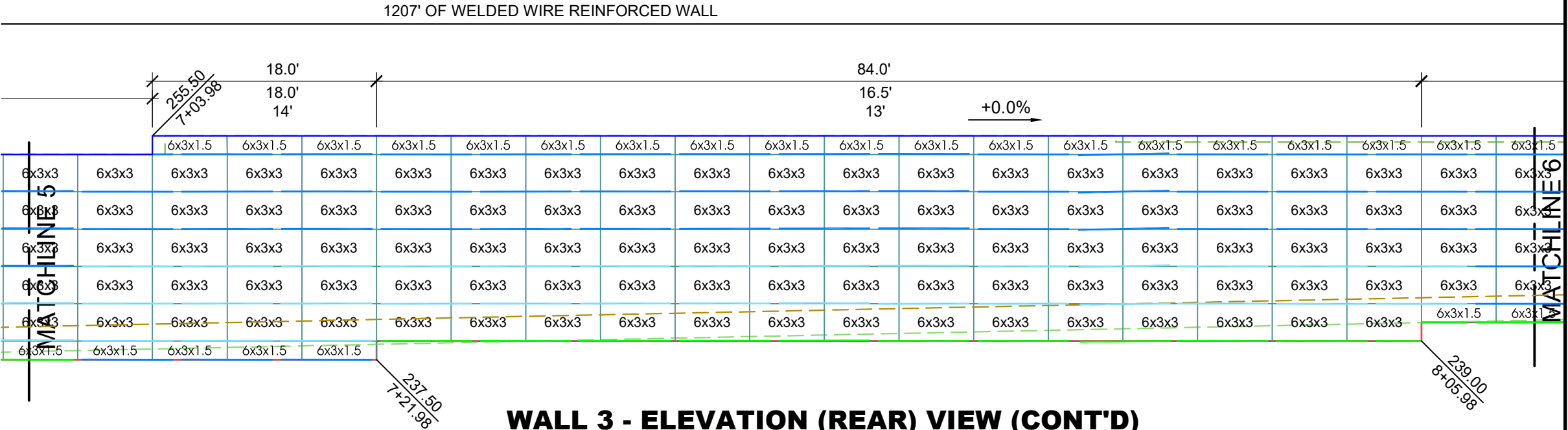


1207' OF WELDED WIRE REINFORCED WALL



WALL 3 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'



WALL 3 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'

WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
<7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'

Reinforcement Mats:
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TYPE 2- 8x12 W7.0x3.5 WWR
TYPE 3- 8x12 W9.5x4.0 WWR
Finish: Hot Dip Galvanized
- 75 Year Service Life

WALL WIRE TYPE LEGEND	
FINISH: HOT DIP GALVANIZED SERVICE LIFE: 75 YEARS	
—	TYPE 1 - 8X12 W4.5x3.5 MATS
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	10-25-22	KLC	Revised Wall 3 per Client CAD file
	9-29-23	KLC	Revised Wall 3 per Clients new Geometry

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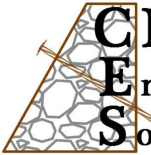
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WALL 3 - ELEVATION VIEW

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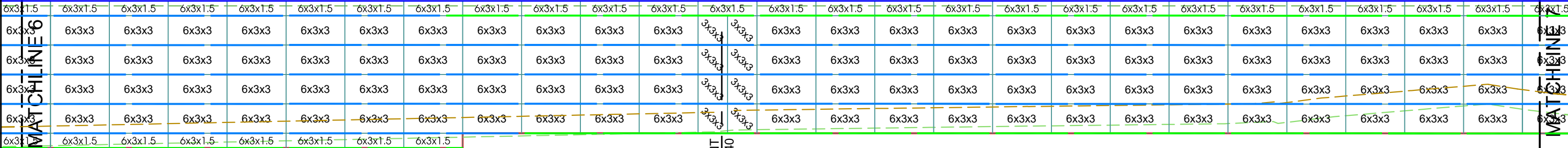
PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

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1207' OF WELDED WIRE REINFORCED WALL

54.0'
15.0'
12'

126.0'
13.5'
11'



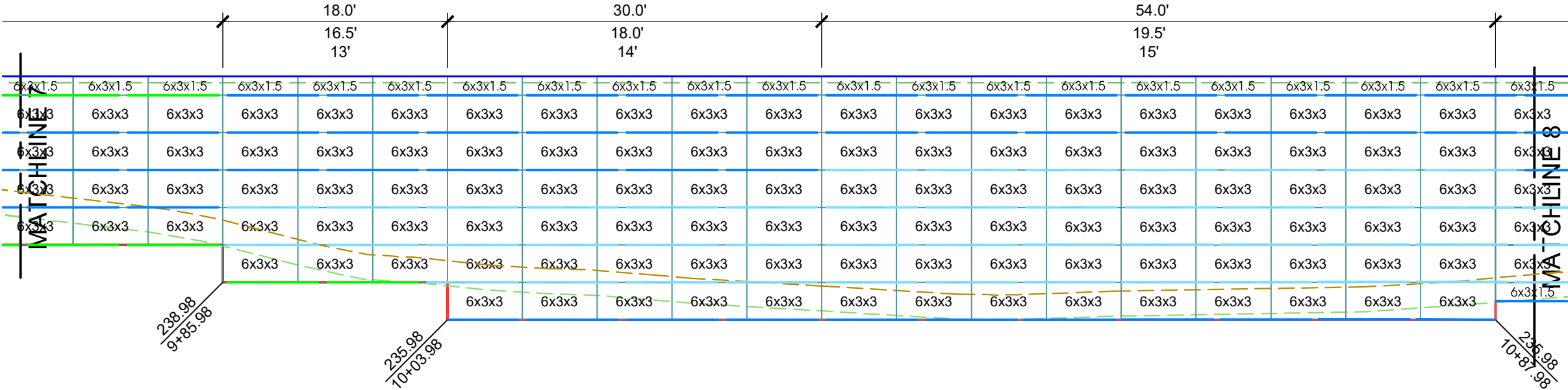
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TYPE 3- 8x12 W9.5x4.0 WWR
Finish: Hot Dip Galvanized
- 75 Year Service Life

WALL 3 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'

1207' OF WELDED WIRE REINFORCED WALL



WALL 3 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'

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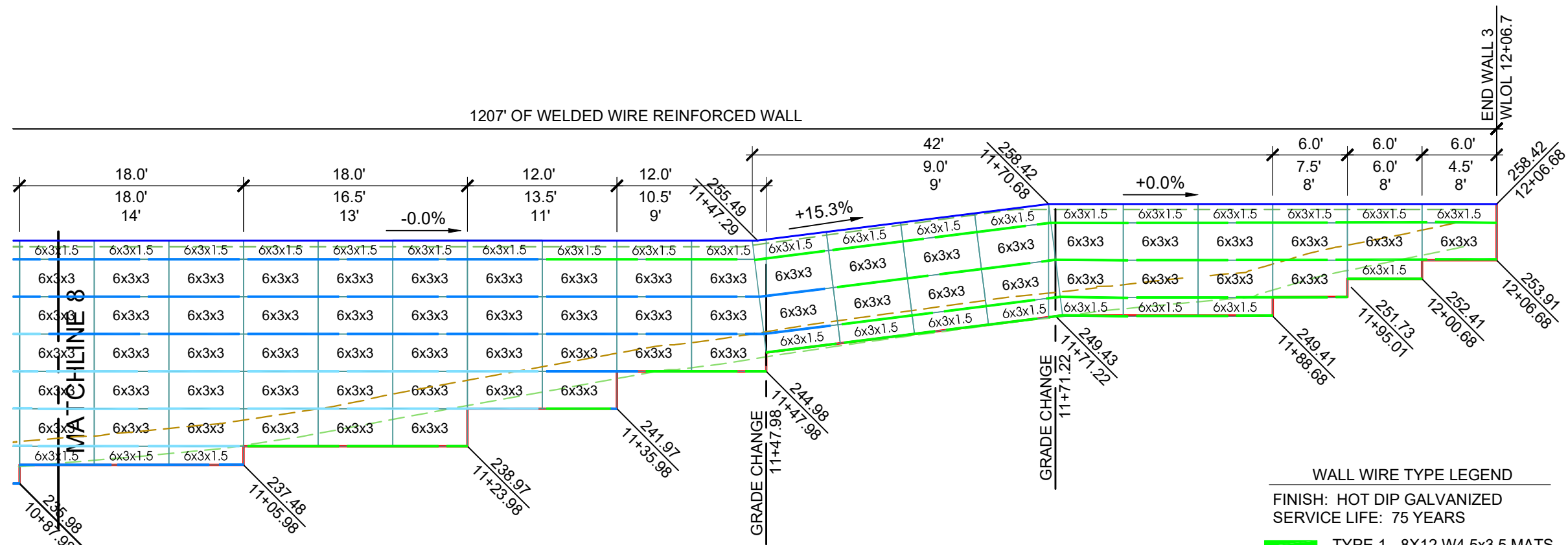
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WALL 3 - ELEVATION VIEW (CONT'D)

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC
SHT	10 OF 20



WALL 3 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'

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Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
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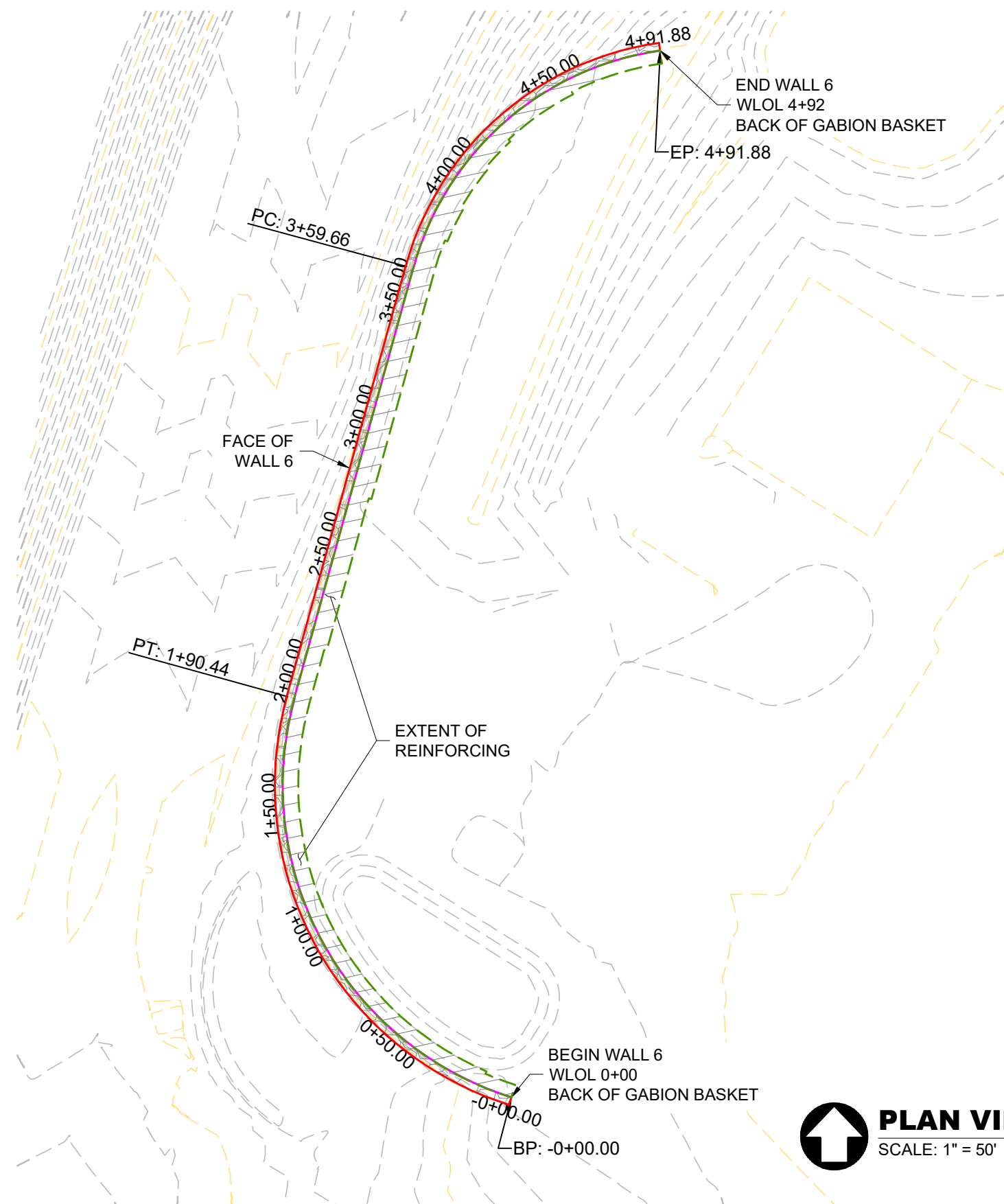
Willamette Water Supply WTP
Gabion Faced MSE Wall

WALL 3 - ELEVATION VIEW (CONT'D)

HW 211027AG

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

SHT 11 OF 20



PLAN VIEW - WALL 6

SCALE: 1" = 50'

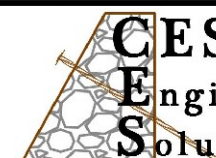
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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only
	08-08-22	KLC	Reversed Wall 6 Plan View

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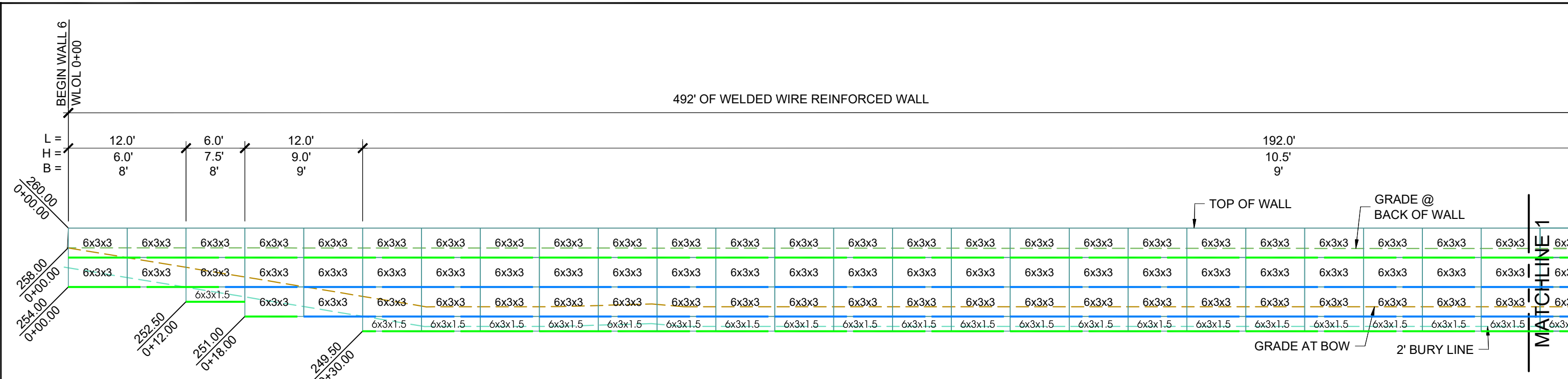
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WALL 6 PLAN VIEW

HW 211027AG

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

SHT 13 OF 20



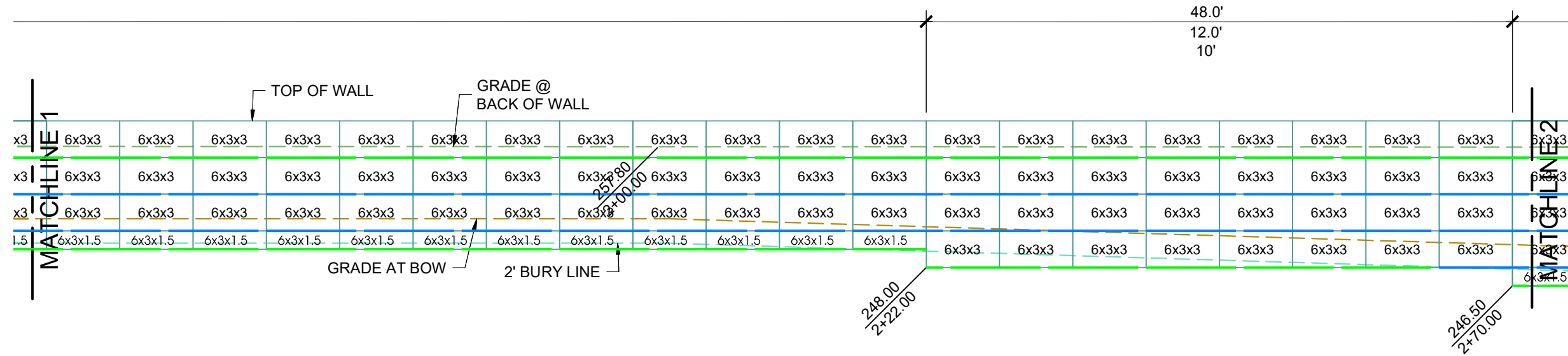
WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'

Reinforcement Mats:
TYPE 1- 8x12 W4.5x3.5 WWR
TYPE 2- 8x12 W7.0x3.5 WWR
TYPE 3- 8x12 W9.5x4.0 WWR
Finish: Hot Dip Galvanized

WALL 6 - ELEVATION (REAR) VIEW
SCALE: 1" = 10'
492' OF WELDED WIRE REINFORCED WALL

WALL WIRE TYPE LEGEND	
FINISH: HOT DIP GALVANIZED SERVICE LIFE: 75 YEARS	
■	TYPE 1 - 8X12 W4.5x3.5 MATS
■	TYPE 2 - 8x12 W7.0x3.5 MATS
■	TYPE 3 - 8x12 W9.5x4.0 MATS

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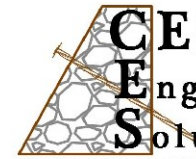
WALL 6 - ELEVATION (REAR) VIEW (CONT'D)
SCALE: 1" = 10'

REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only
	7-31-23	KLC	Revised per new Profiles

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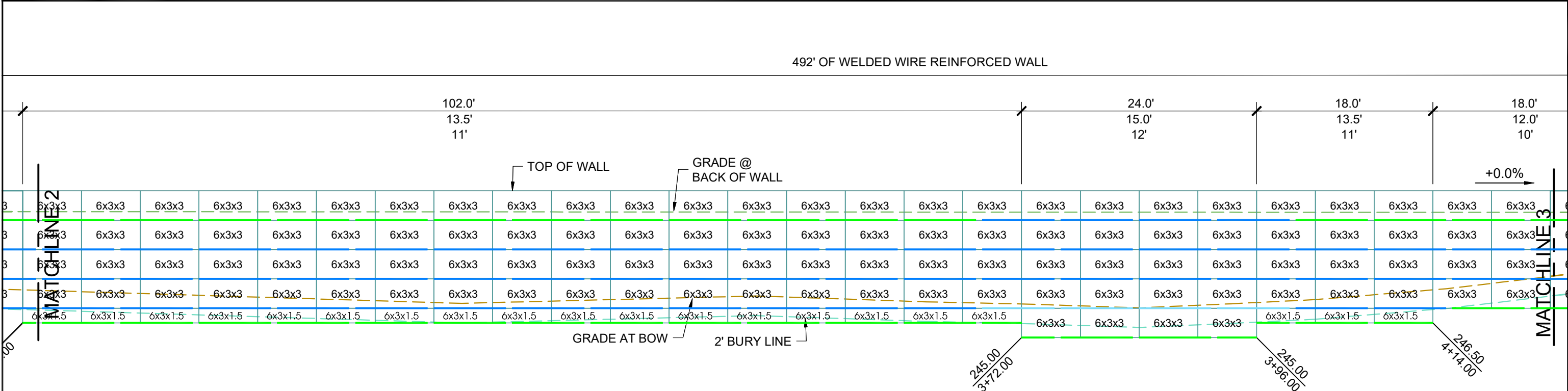
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WALL 6 - ELEVATION VIEW

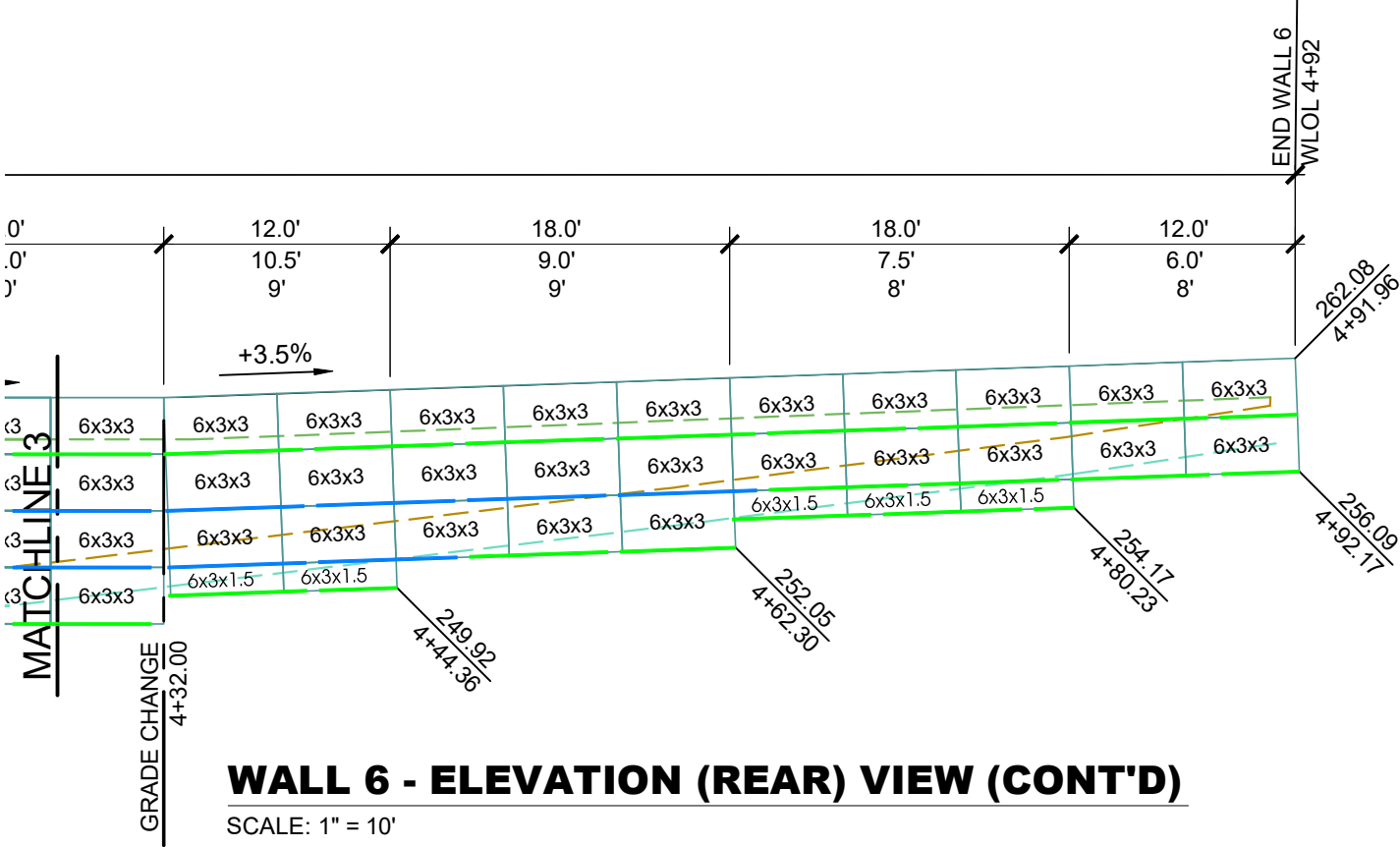
HW 211027AG
PROJECT 22-037
DATE 6-24-22
DESIGN KLC
DRAWN KLC
SHT 14 OF 20



WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'
Reinforcement Mats: TYPE 1- 8x12 W4.5x3.5 WWR TYPE 2- 8x12 W7.0x3.5 WWR TYPE 3- 8x12 W9.5x4.0 WWR Finish: Hot Dip Galvanized - 75 Year Service Life	

- WALL WIRE TYPE LEGEND
FINISH: HOT DIP GALVANIZED
SERVICE LIFE: 75 YEARS
- TYPE 1 - 8X12 W4.5x3.5 MATS
 - TYPE 2 - 8x12 W7.0x3.5 MATS
 - TYPE 3 - 8x12 W9.5x4.0 MATS

WALL 6 - ELEVATION (REAR) VIEW (CONT'D)
SCALE: 1" = 10'



WALL 6 - ELEVATION (REAR) VIEW (CONT'D)
SCALE: 1" = 10'

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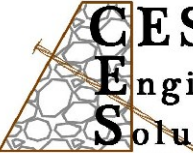
REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only
	7-31-23	KLC	Revised per new Profiles

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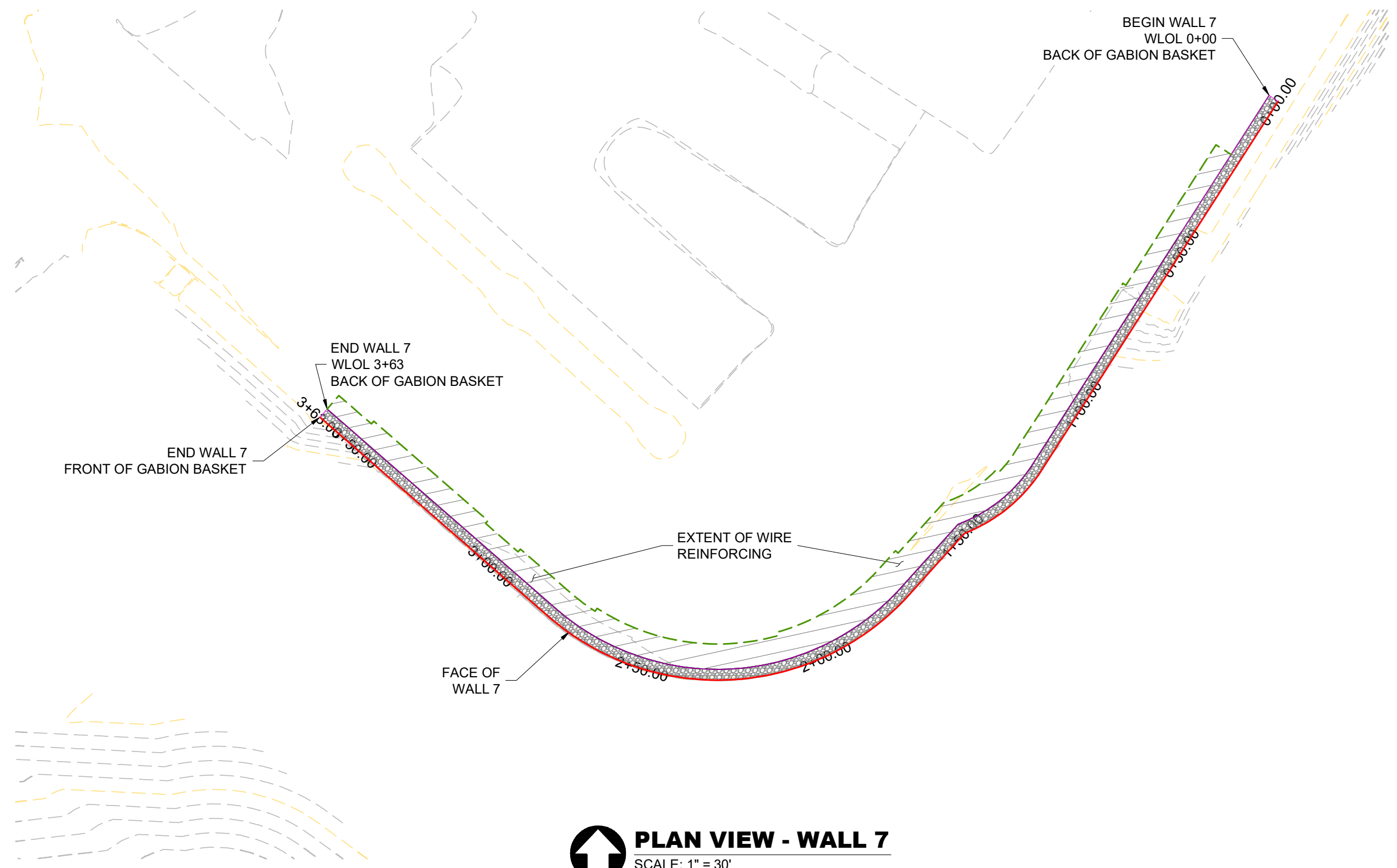
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WALL 6 - ELEVATION VIEW (CONT'D)

PROJECT 22-037
DATE 6-24-22
DESIGN KLC
DRAWN KLC
SHT 15 OF 20



PLAN VIEW - WALL 7
SCALE: 1" = 30'

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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only
	11-08-22	KLC	Revised Wall 7 per Client CAD file
	08-08-22	KLC	Reversed Wall 7 Plan View

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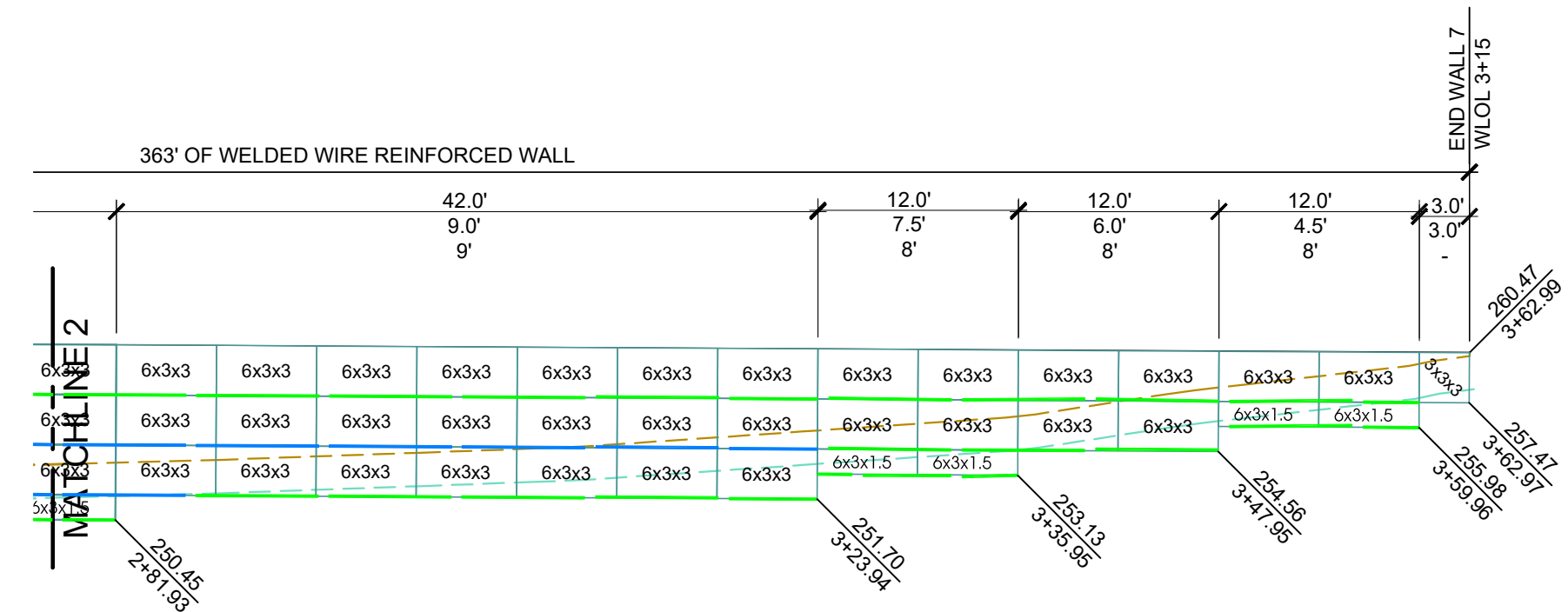
WALL 7 PLAN VIEW

HW 211027AG

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

SHT **16** OF 20

WELDED WIRE REINFORCEMENT PARAMETERS	
Height of Wall (H) [ft]	Typ. Reinforcement Mats - B [ft]
≤7.5'	8.0'
9.0'	9.0'
10.5'	9.0'
12.0'	10.0'
13.5'	11.0'
15.0'	12.0'
16.5'	13.0'
18.0'	14.0'
19.5'	15.0'
21.0'	15.0'
Reinforcement Mats: TYPE 1- 8x12 W4.5x3.5 WWR TYPE 2- 8x12 W7.0x3.5 WWR TYPE 3- 8x12 W9.5x4.0 WWR Finish: Hot Dip Galvanized - 75 Year Service Life	



WALL 7 - ELEVATION (REAR) VIEW (CONT'D)

SCALE: 1" = 10'

WALL WIRE TYPE LEGEND

FINISH: HOT DIP GALVANIZED
SERVICE LIFE: 75 YEARS

- TYPE 1 - 8X12 W4.5x3.5 MATS
- TYPE 2 - 8x12 W7.0x3.5 MATS
- TYPE 3 - 8x12 W9.5x4.0 MATS

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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	11-08-22	KLC	Revised Wall 7 per Client CAD file
	7-31-23	KLC	Revised per new Profiles

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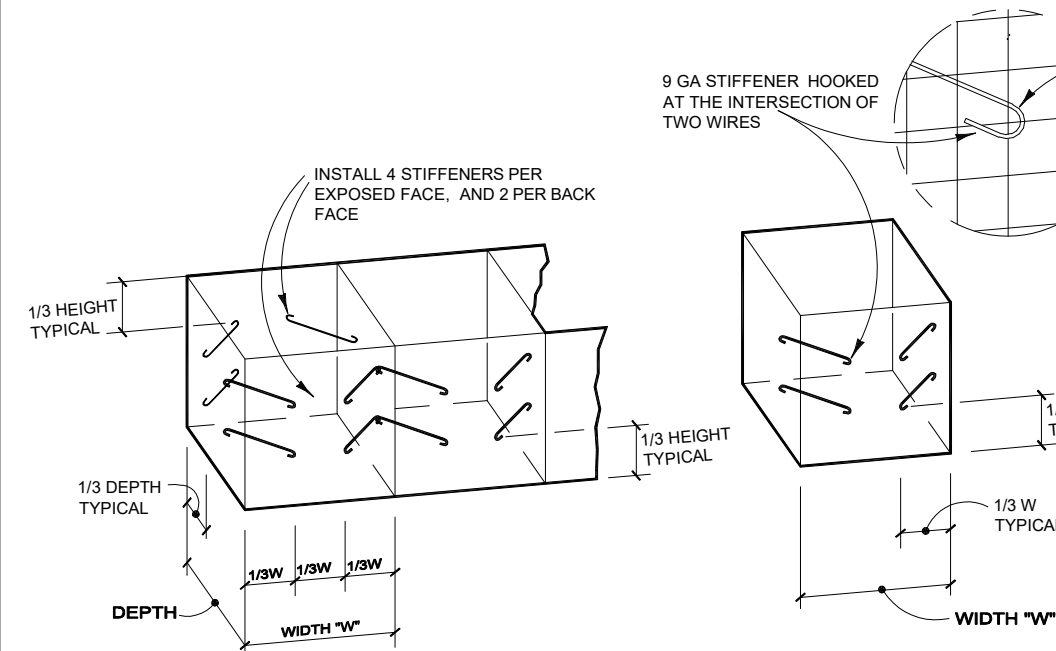
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WALL 7 - ELEVATION VIEW (CONT'D)

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC
SHT	18 OF 20

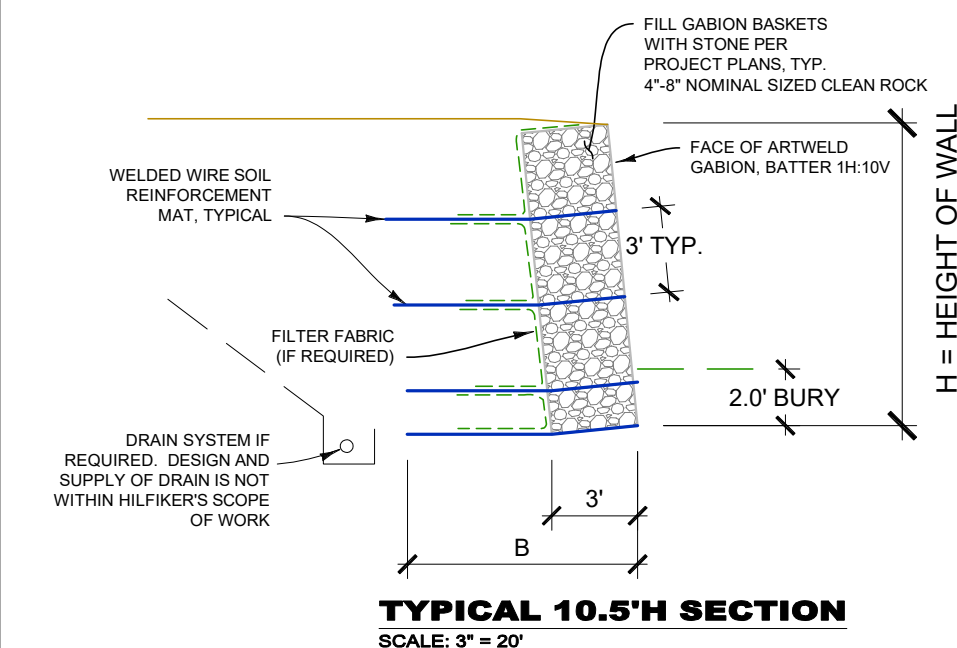


WHERE HEIGHT OF GABION IS 18" OR LESS, INSTALL 2 STIFFENERS PER FACE WHERE HEIGHT IS 12", NO STIFFENERS REQUIRED

END CELLS

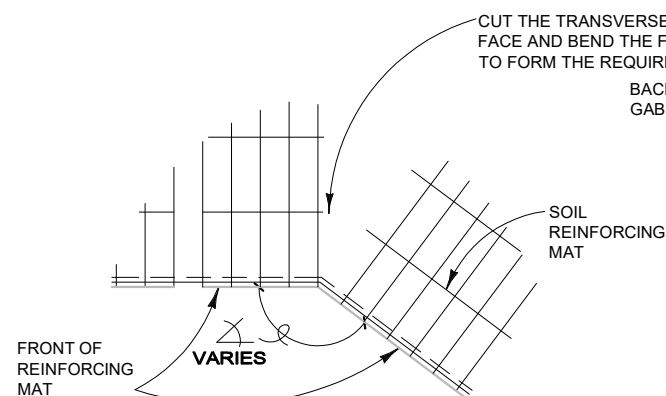
STIFFENER DETAILS

NOT TO SCALE

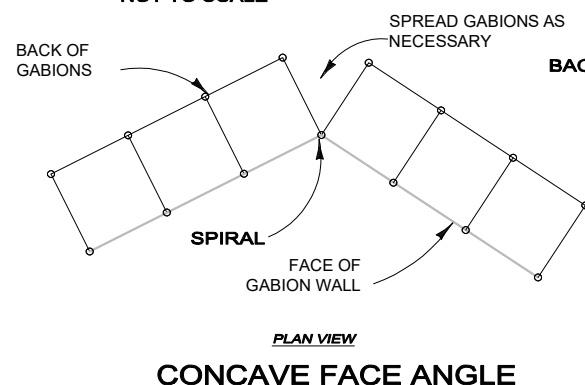


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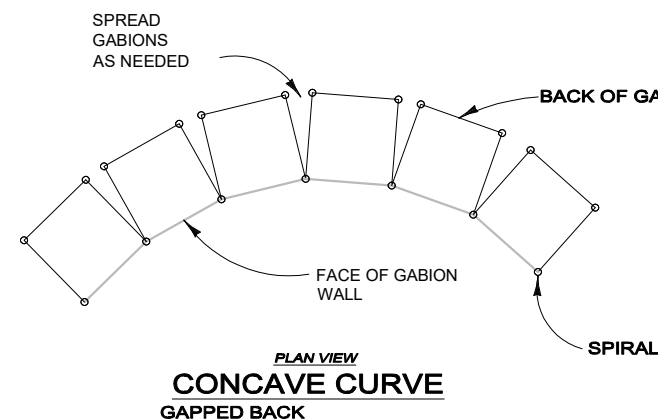
EXPOSED FACES



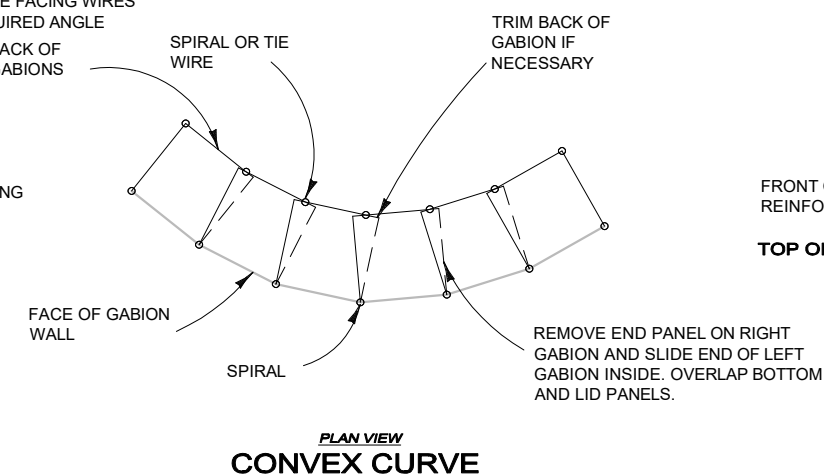
PLAN VIEW CONCAVE ANGLE DETAIL NOT TO SCALE



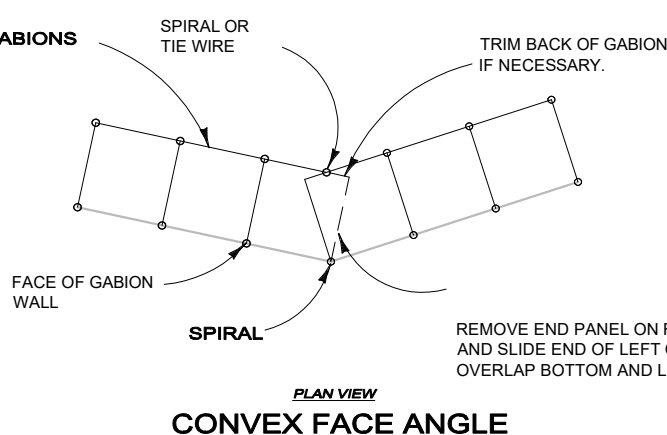
CONCAVE FACE ANGLE



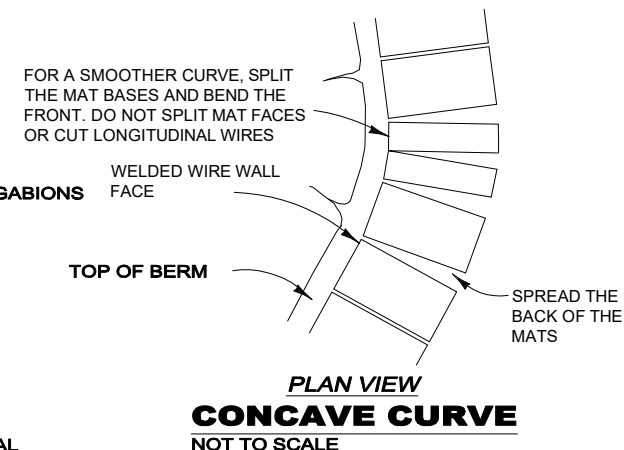
PLAN VIEW CONCAVE CURVE GAPPED BACK



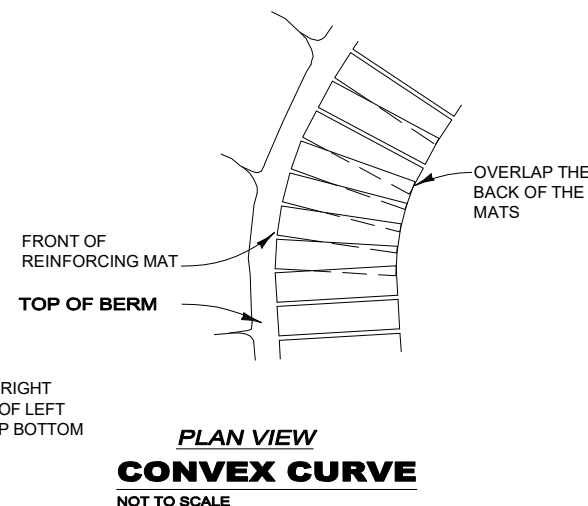
PLAN VIEW CONVEX CURVE



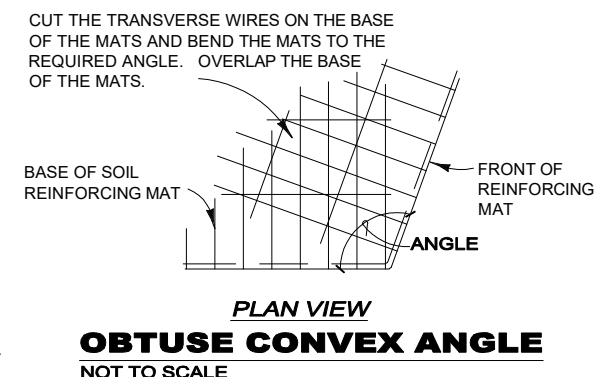
PLAN VIEW CONVEX FACE ANGLE



PLAN VIEW CONCAVE CURVE NOT TO SCALE



PLAN VIEW CONVEX CURVE NOT TO SCALE



PLAN VIEW OBTUSE CONVEX ANGLE NOT TO SCALE

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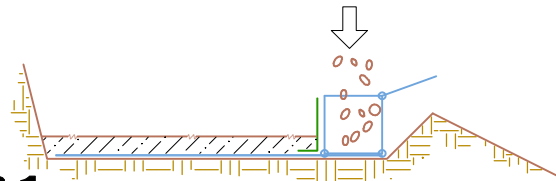
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CROSS SECTION & DETAILS

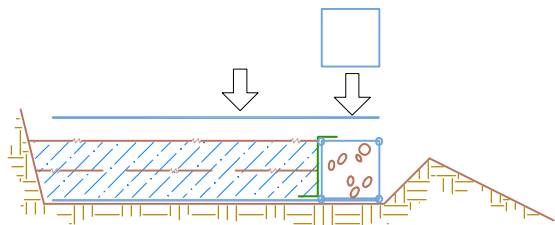
HW 211027AG

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC

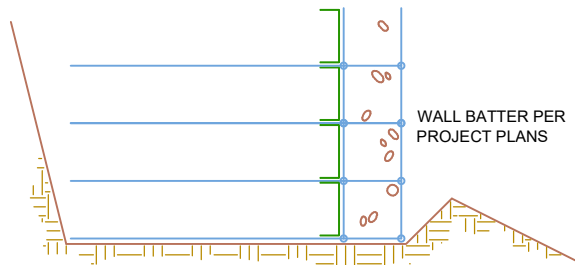
SHT 19 OF 20



- STEP 1**
- 1. PLACE SOIL REINFORCEMENT MATS ON PREPARED FOUNDATION.
 - 2. PLACE THE FIRST LIFT OF GABIONS AND PERMANENTLY CONNECT THE FRONT EDGES TO THE SOIL REINFORCEMENT MATS WITH SPIRAL BINDERS.
 - 3. INSTALL FILTER FABRIC, IF REQUIRED.
 - 4. PLACE AND COMPACT THE FIRST COURSE OF BACKFILL ON THE SOIL REINFORCEMENT MATS. BACKFILL TO BE OF SUFFICIENT DEPTH TO PROTECT SOIL REINFORCEMENT MATS FROM DAMAGE OR MOVEMENT BY EQUIPMENT DURING DELIVERY OF ROCK TO THE GABIONS.
 - 5. FILL THE GABIONS WITH SUITABLE ROCK.
 - 6. CLOSE LID AND SECURE WITH SPIRAL BINDERS.

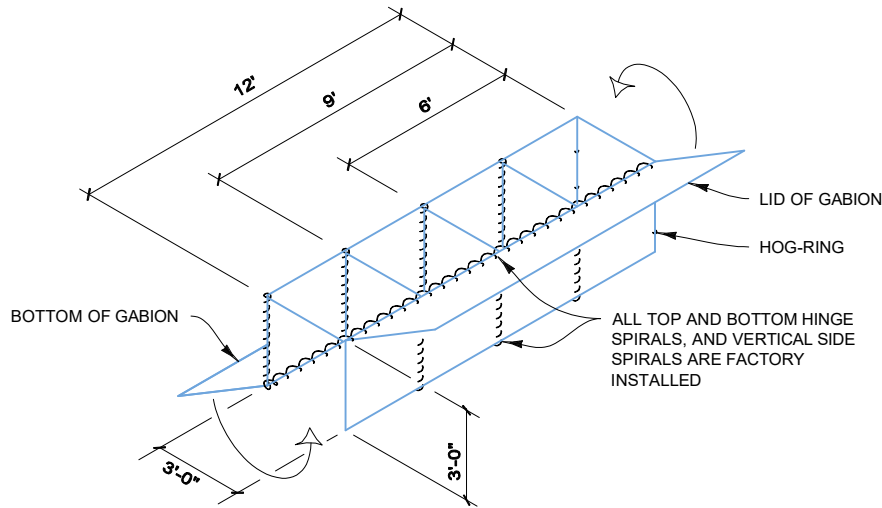


- STEP 2**
- 1. PLACE AND COMPACT THE REMAINING BACKFILL IN UNIFORM LIFTS OVER THE SOIL REINFORCING MAT.
 - 2. PLACE SOIL REINFORCEMENT MATS ON THE BACKFILL AND THE TOP OF THE GABION.
 - 3. PLACE THE SECOND LIFT OF GABIONS OVER THE FIRST LIFT AND CONNECT THE GABIONS AND THE SOIL REINFORCEMENT MATS TOGETHER PERMANENTLY WITH SPIRAL BINDERS.
 - 4. PLACE AND COMPACT BACKFILL AT THE TOE OF THE WALL PER YOUR PROJECT PLANS.

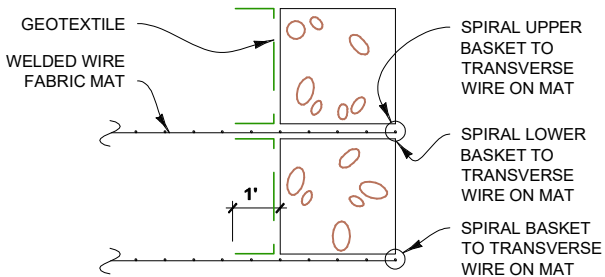


- STEP 3**
- 1. REPEAT STEP 2 TO THE TOP LIFT OF GABIONS.
 - 2. PLACE THE FINAL LIFT OF BACKFILL PER PROJECT PLANS.

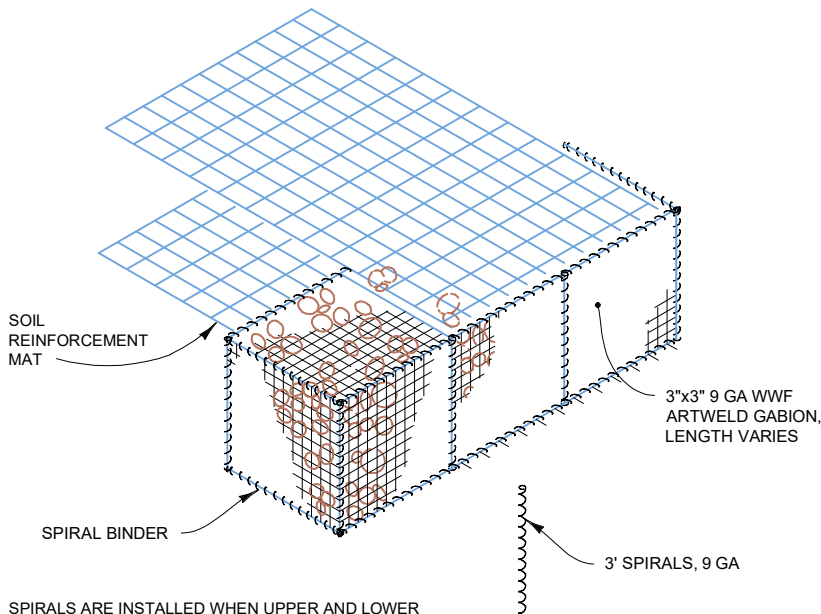
CONSTRUCTION SEQUENCE
NOT TO SCALE



TYPICAL GABION
NOT TO SCALE

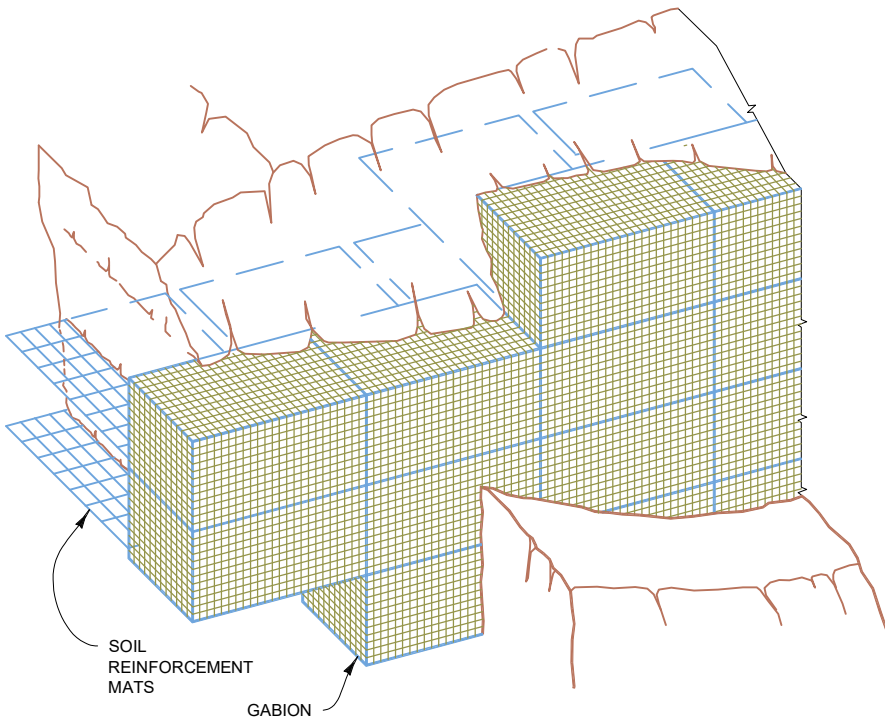


CONNECTION DETAIL
NOT TO SCALE



SPIRALS ARE INSTALLED WHEN UPPER AND LOWER GABIONS ARE JOINED TOGETHER. ONE SPIRAL WILL JOIN THE MATS AND THE GABIONS TOGETHER AT ONE TIME.

ISOMETRIC OF WALL COMPONENTS
NOT TO SCALE



PICTORIAL ELEVATION
NOT TO SCALE

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REV. NO.	DATE	BY	DESCRIPTION
	7-05-22	KLC	Initial .pdf Release
	7-16-22	KLC	Corrected Face of Wall Batter in Cross Section
	9-21-22	KLC	Wall 1 & Wall 6 layout revised only

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CONSTRUCTION SEQUENCE & DETAILS

PROJECT	22-037
DATE	6-24-22
DESIGN	KLC
DRAWN	KLC
SHT	20 OF 20