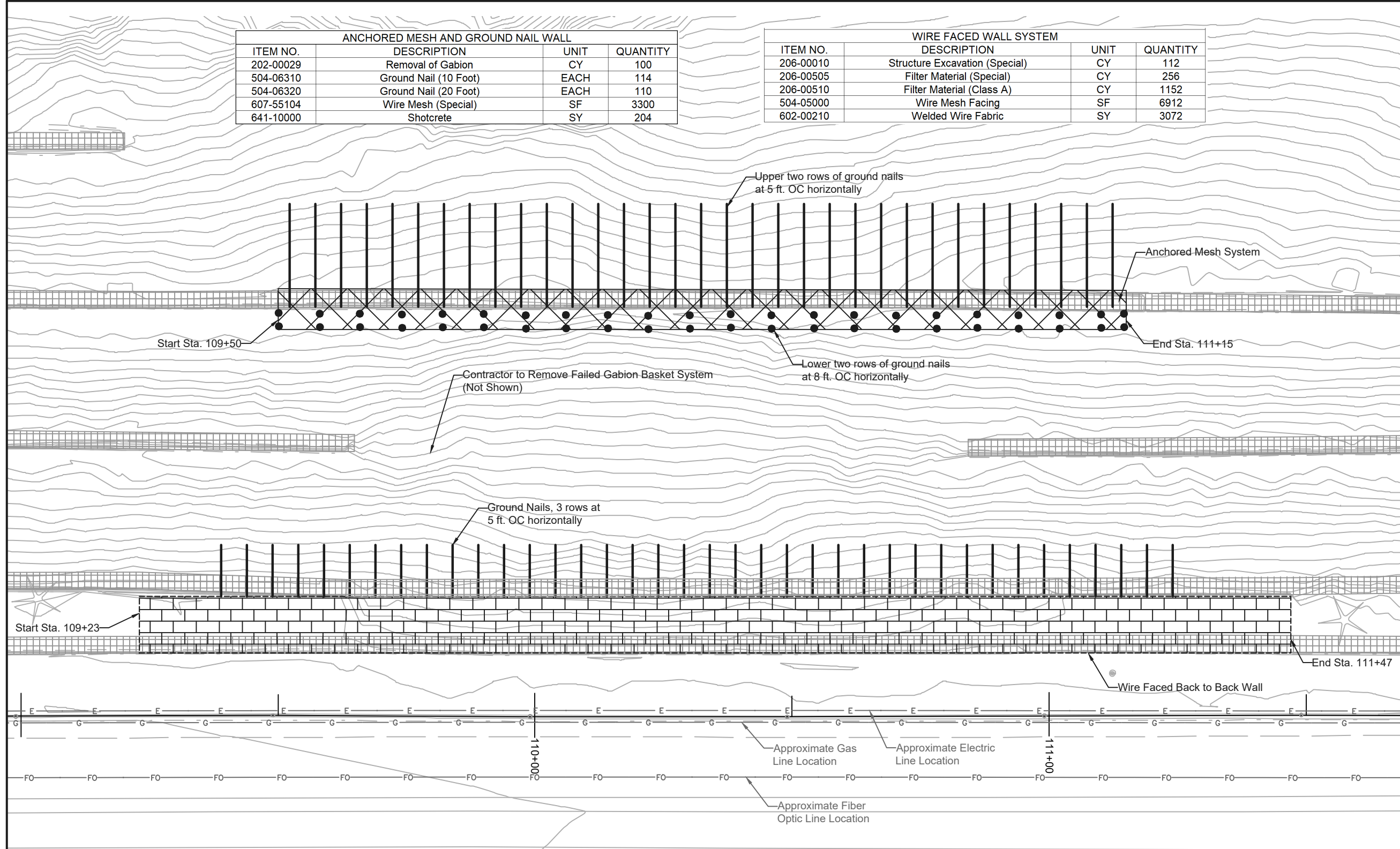
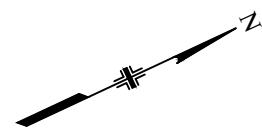


ANCHORED MESH AND GROUND NAIL WALL			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
202-00029	Removal of Gabion	CY	100
504-06310	Ground Nail (10 Foot)	EACH	114
504-06320	Ground Nail (20 Foot)	EACH	110
607-55104	Wire Mesh (Special)	SF	3300
641-10000	Shotcrete	SY	204

WIRE FACED WALL SYSTEM			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
206-00010	Structure Excavation (Special)	CY	112
206-00505	Filter Material (Special)	CY	256
206-00510	Filter Material (Class A)	CY	1152
504-05000	Wire Mesh Facing	SF	6912
602-00210	Welded Wire Fabric	SY	3072



- Existing Gabion
- Anchored Mesh
- Wire Faced Wall

Notes:  
 1. Base plan from David Evans.  
 2. Utility locations are approximate and were provided by CDOT. RJ does not assume responsibility for utility locations. Contractor should call 811 or other appropriate utility locating entities.

Print Date: 10/07/2020  
 File Name: 20-004,1 MSE Locations  
 Horiz. Scale: 1:240 Vert. Scale: 1:240  
 Unit Information Unit Leader Initials

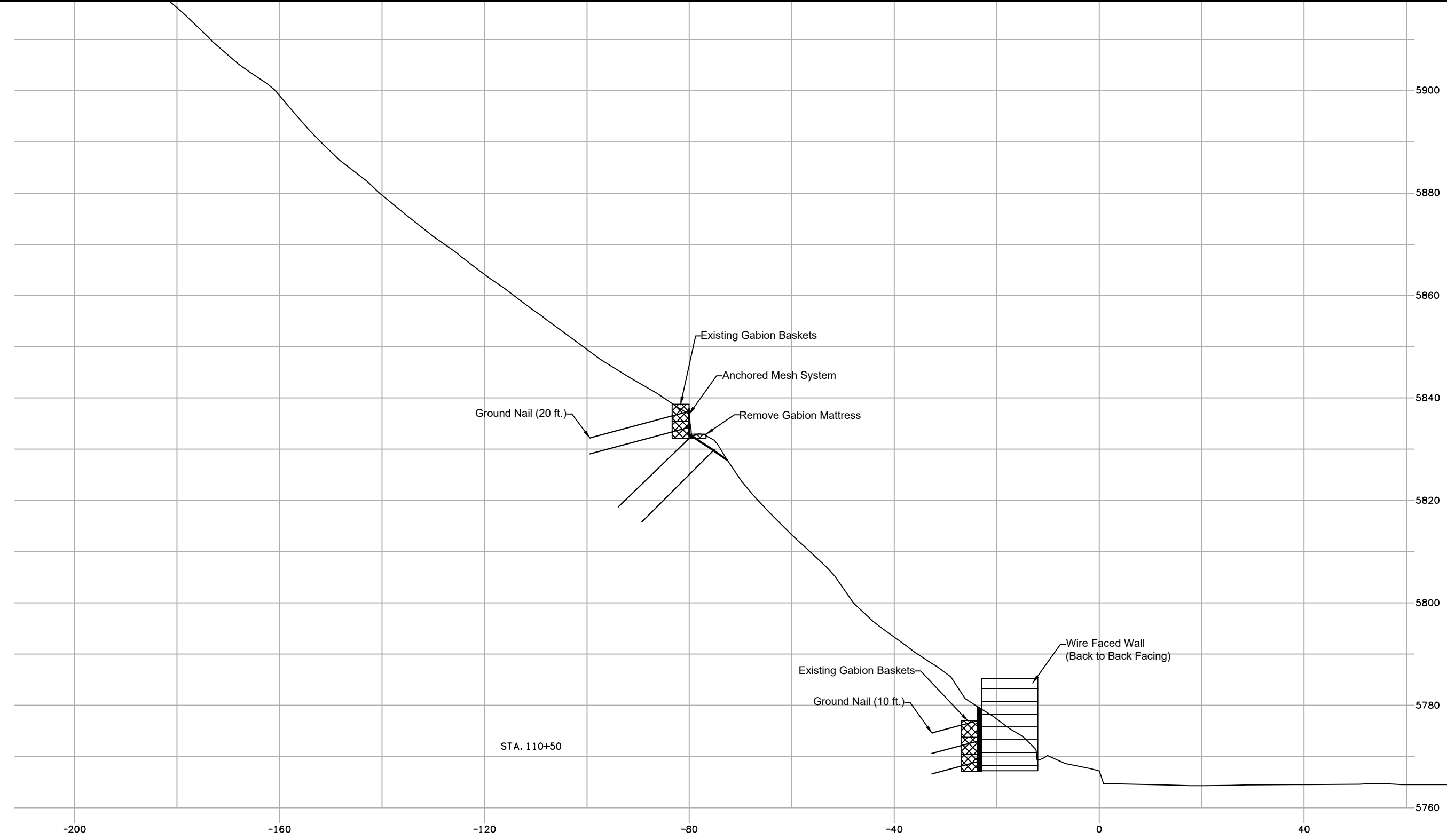
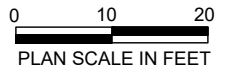
Sheet Revisions		
Date:	Comments	Init.

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MP 117 GABION WALL STABILIZATION LOCATION			
Designer:	B. Arndt	Structure Numbers	
Detailer:	R. Johnson		
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Notes:  
1. Section from David Evans.

Print Date: 08/26/2020  
 File Name: 20-004.2 MSE Xsec  
 Horiz. Scale: 1:240    Vert. Scale: 1:240  
 Unit Information                      Unit Leader Initials

Sheet Revisions		
Date:	Comments	Init.

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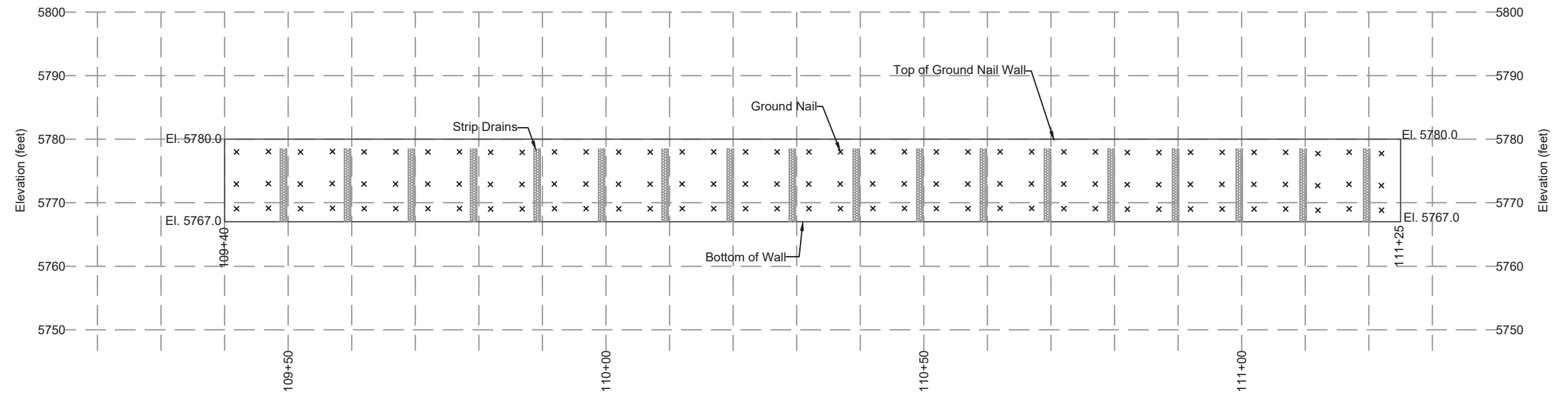
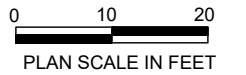
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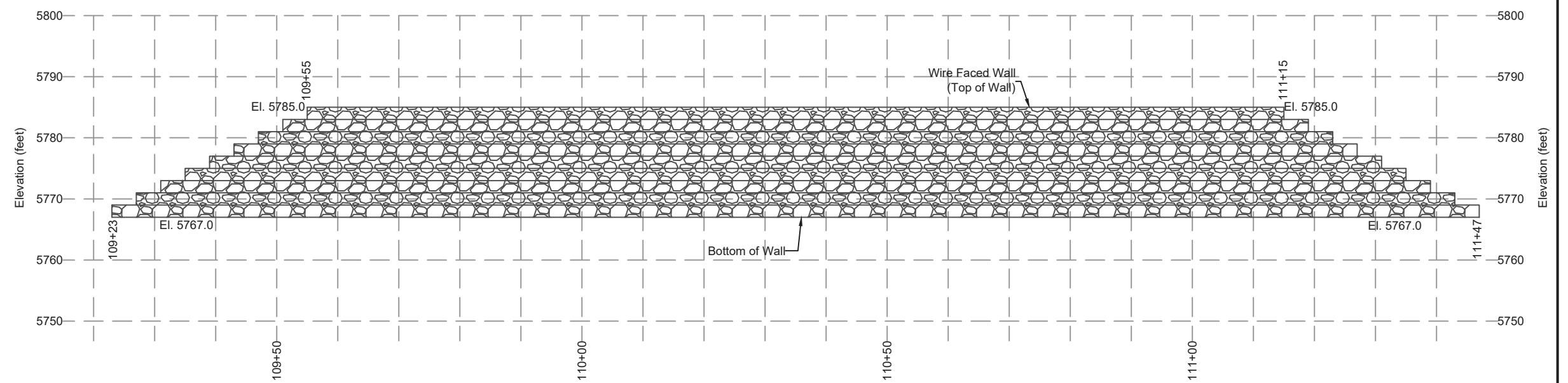
<b>As Constructed</b>
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Revised:
Void:

<b>MP 117 GABION WALL STABILIZATION SECTION</b>			
Designer:	B. Arndt	Structure Numbers	
Detailer:	R. Johnson		
Sheet Subset:		Subset Sheets:	2 of 9

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NAIL LENGTH SCHEDULE  
x 10 feet



Print Date: 08/25/2020  
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 Horiz. Scale: 1:240 Vert. Scale: 1:240  
 Unit Information Unit Leader Initials

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MP 117 GABION WALL STABILIZATION PROFILE			
Designer:	B. Arndt	Structure Numbers	
Detailer:	R. Johnson		
Sheet Subset:		Subset Sheets:	3 of 9

Project No./Code	C 0702-398
	23420
Sheet Number	9

**GROUND NAIL WALL GENERAL NOTES**

- 1.0 GROUND NAIL WALL MATERIALS
  - 1.1 GROUND NAILS – HOLLOW INJECTION BARS IN ACCORDANCE WITH ASTM A519.  
F<sub>y</sub> = 85,000 PSI
  - 1.2 GROUT – GROUT MAY BE NON-SHRINK, NEAT-CEMENT OR WITH SAND IN ACCORDANCE WITH ASTM C1107 WITH TYPE II CEMENT IN ACCORDANCE WITH ASTM C150. WATER-CEMENT RATIO SHOULD BE BETWEEN 0.4 AND 0.6.  
f'c=1,500 PSI MINIMUM 3-DAY  
f'c=3,000 PSI MINIMUM 28-DAY
  - 1.3 END HARDWARE – NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH GROUND NAIL MANUFACTURER'S RECOMMENDATIONS. BEARING PLATE SHALL BE IN ACCORDANCE WITH ASTM A36, GRADE 36.
  - 1.4 SHOTCRETE – SHOTCRETE MIX SHALL CONSIST OF TYPE II CEMENT IN ACCORDANCE WITH ASTM C150, POTABLE WATER AND NORMAL WEIGHT AGGREGATE IN ACCORDANCE WITH ASTM C33. ADMIXTURES, IF USED, SHOULD BE NON-CORROSIVE TO STEEL.  
f'c=4,000 psi (28-DAY STRENGTH)
  - 1.5 WELDED WIRE MESH SHALL BE IN ACCORDANCE WITH ASTM A185.
  - 1.6 WALERS AND VERTICAL BEARING BARS SHALL BE IN ACCORDANCE WITH ASTM A615.  
f<sub>y</sub>=60,000 psi
  - 1.8 STRIP DRAINS SHALL CONSIST OF 12-INCH WIDE DIMPLED CORES WRAPPED IN GEOTEXTILE. THE COMPRESSIVE STRENGTH OF THE CORE SHALL BE AT LEAST 20 PSI WHEN TESTED IN ACCORDANCE WITH ASTM D1621, AND THE IN-PLANE FLOW CAPACITY SHOULD BE AT LEAST 10 GPM PER FOOT WHEN TESTING IN ACCORDANCE WITH ASTM D4716.
- 2.0 GROUND NAIL CONSTRUCTION SEQUENCE
  - 2.1 EXCAVATE TO A MAXIMUM DEPTH OF FOUR (4) FEET.
  - 2.2 INSTALL GROUND NAILS AT THE LOCATIONS AND TO THE LENGTHS SHOWN ON THE PLANS. GROUND NAIL LOCATION MAY VARY BY UP TO 6 INCHES. NO DRY OR AIR DRILLING ALLOWED. GROUT MUST BE USED TO CONSTANTLY FLUSH DRILL HOLE. BARS SHALL BE INSTALLED USING GROUT TO FLUSH DRILL HOLE WITH CONSTANT GROUT RETURN DURING INSTALLATION.
  - 2.3 INSTALL STRIP DRAINS, WELDED WIRE MESH, WALERS AND BEARING BARS AS SHOWN ON THE DRAWINGS. USE CHAIRS TO HOLD WELDED WIRE MESH AWAY FROM THE SOIL AS NECESSARY.
  - 2.4 INSTALL SHOTCRETE TO THE MINIMUM THICKNESS SHOWN ON THE DRAWINGS AND TO ATTAIN MINIMUM COVERAGES SPECIFIED HEREIN. GIVE SPECIAL ATTENTION TO FILLING THE VOID IN THE BOREHOLE ABOVE THE GROUT LINE. COLD WEATHER PROTECTION MEASURES MAY BE NECESSARY.
  - 2.5 INSTALL THE GROUND NAIL END HARDWARE AFTER THE MINIMUM INSIDE COVERAGE SPECIFIED HEREIN HAS BEEN ATTAINED. WHILE THE SHOTCRETE IS STILL WET, EMBED THE PLATE INTO THE SHOTCRETE SURFACE UNTIL THERE IS NO VOID BEHIND THE PLATE. HAND-TIGHTEN THE NUT. INSTALL REMAINDER OF SHOTCRETE OVER END HARDWARE TO MINIMUM SPECIFIED THICKNESS AND MINIMUM OUTSIDE COVERAGE AS SPECIFIED HEREIN.
  - 2.6 ONCE THE GROUT AND SHOTCRETE HAVE ATTAINED 80% OF THEIR SPECIFIED STRENGTHS, REPEAT 2.1-2.5 TO THE BOTTOM OF THE WALL.
- 3.0 GROUND NAIL WALL DESIGN PARAMETERS
  - 3.1 THE GROUND NAIL WALL HAS BEEN DESIGNED IN GENERAL ACCORDANCE WITH PROCEDURES CONTAINED IN THE FHWA "SOIL NAIL WALLS REFERENCE MANUAL", REPORT NO. FHWA-NHI-14-007, 2015.
  - 3.2 THE FOLLOWING STRENGTH PARAMETERS WERE ASSUMED FOR DESIGN:
 

	Φ	C	γ	Q <sub>ult</sub>	
	(deg)	(psf)	(pcf)	(psi)	Φ ANGLE OF INTERNAL FRICTION
NATIVE GRAVEL AND COBBLES	38	10	135	20	C COHESION
					γ UNIT WEIGHT
  - 3.3 GROUNDWATER LEVEL WAS ASSUMED TO BE BELOW THE BASE OF THE WALL.

- 3.4 RESISTANCE FACTORS
  - GLOBAL – FS ≥ 1.3
  - NAIL TENSILE RESISTANCE = 0.65
  - NAIL PULLOUT RESISTANCE = 0.65
  - NAIL FLEXURAL RESISTANCE = 0.90
  - PUNCHING SHEAR RESISTANCE = 0.90
- 3.5 SURCHARGE LOADING ASSUMED IN THE DESIGN – NO SURCHARGE LOADING WAS ASSUMED.
- 3.6 CORROSION WAS ASSUMED TO BE LOW.
- 3.7 DESIGN LIFE = 75 YEARS
- 4.0 GROUND NAIL WALL SPECIAL NOTES
  - 4.1 WALL GEOMETRY USED IN DESIGN WAS BASED ON INFORMATION PROVIDED BY DAVID EVANS AND ASSOCIATES.
  - 4.2 GROUND NAIL VERIFICATION AND PROOF TESTING SHALL BE PERFORMED IN ACCORDANCE WITH FHWA-NHI-14-007, 2015.
  - 4.3 THE GROUND NAIL WALL MAY BE REDESIGNED AT THE DISCRETION OF RJ ENGINEERING BASED ON TEST RESULTS.

**ANCHORED MESH GENERAL NOTES**

- 1.0 ANCHORED MESH
  - 1.1 ANCHORS PER GROUND NAIL DETAILS.
  - 1.2 GROUT PER GROUND NAIL DETAILS.
  - 1.3 MESH (SEE SPECIAL PROVISIONS), GALVANIZED.
- 2.0 ANCHORED MESH CONSTRUCTION SEQUENCE
  - 2.1 INSTALL GROUND NAIL AT LOCATIONS AND LENGTHS SHOWN IN THE PLANS.
  - 2.2 NAIL LOCATIONS MAY VARY UP TO 12 INCHES.
  - 2.3 ADD EROSION MAT UNDER MESH BELOW GABION BASKET AS SHOWN ON PLANS.
  - 2.4 ATTACH MESH TO TOP ROW OF GROUND NAILS. DRAPE MESH OVER UPPER GABION SYSTEM.
  - 2.5 ATTACH MESH TO LOWER GROUND NAILS. ATTACH PLATES AND TENSION MESH BETWEEN ALL GROUND NAILS. SPLICE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - 2.6 PLATES SHALL BEAR AGAINST AT LEAST TWO (2) MAJOR MESH ELEMENTS OF PANEL.
  - 2.7 FINAL MESH SHALL BE TIGHT UP AGAINST GABION SYSTEM AT TOP AND BOTTOM. NO SIGNIFICANT BULGING OR NON-TIGHT SYSTEMS WILL BE ALLOWED.

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<b>As Constructed</b>	<b>MP 117 GABION WALL STABILIZATION NOTES</b>		
No Revisions:			
Revised:	Designer: B. Arndt	Structure Numbers	
	Detailer: R. Johnson		
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WIRE MESH WALL GENERAL NOTES

1.0 WIRE MESH WALL MATERIALS

- 1.1 BACKFILL SOIL (REINFORCED FILL) SHALL MEET THE REQUIREMENTS FOR STRUCTURE BACKFILL (SPECIAL) PER REVISION OF SECTION 206 STRUCTURE BACKFILL (SPECIAL).
- 1.2 WIRE MESH FACING AND WELDED WIRE FABRIC MATERIALS SHALL BE GALVANIZED AND SHALL BE IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

2.0 WIRE MESH WALL CONSTRUCTION SEQUENCE

- 2.1 STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM A RECENT FIELD SURVEY. THE CONTRACTOR SHALL VERIFY DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.
- 2.2 GROUND NAIL WALL TO BE INSTALLED PRIOR TO WIRE MESH WALL CONSTRUCTION WHERE REQUIRED.
- 2.3 EXCAVATION SHALL BE MADE TO THE LINES AND GRADES INDICATED ON THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER. THE EXTENTS OF THE WIRE MESH WALL MAY BE INCREASED OR REDUCED BASED ON THE ENGINEER'S INSPECTION OF THE EXISTING SITE CONDITIONS.
- 2.4 UNSUITABLE FOUNDATION MATERIALS BELOW THE PROPOSED WIRE MESH WALL SHALL BE REMOVED IN ACCORDANCE WITH SECTION 206.03 PRIOR TO CONSTRUCTION OF THE WALL.
- 2.5 THE WIRE FACING AND COMPONENTS SHALL BE INSTALLED AS INDICATED ON THE PLANS AND IN ACCORDANCE WITH THE MANUFACTURE'S RECOMMENDATIONS.
- 2.6 ALL WELDED WIRE FABRIC (WWF) LAYERS SHALL BE INSTALLED WITH 100% COVERAGE.
- 2.7 STRUCTURE BACKFILL (SPECIAL) SHALL BE PLACED WORKING FROM THE FACE OF THE WALL TOWARDS THE END OF THE REINFORCEMENT IN A MANNER THAT AIDS IN TENSIONING THE WWF.
- 2.8 A MINIMUM OF 6 INCHES OF STRUCTURE BACKFILL (SPECIAL) SHALL BE PLACED OVER THE WWF BEFORE THE OPERATION OF TRACKED VEHICLES IN THE REINFORCED ZONE WILL BE PERMITTED. TURNING SHALL BE MINIMIZED TO AVOID DISPLACING THE WWF LAYERS. RUBBER TIRED VEHICLES MAY OPERATE AT SLOW SPEEDS (<5 MPH) ON THE EXPOSED WWF IF NECESSARY.
- 2.9 TEMPORARY GROUNDWATER AND SURFACE WATER DIVERSION IS THE RESPONSIBILITY OF THE CONTRACTOR.

3.0 WIRE MESH WALL DESIGN PARAMETERS

3.1 THE WIRE MESH WALL HAS BEEN DESIGNED IN GENERAL ACCORDANCE WITH PROCEDURES CONTAINED IN THE FHWA "DESIGN AND CONSTRUCTION OF MSE WALLS AND RSS", REPORT NO. FHWA-NHI-10-024, 2009 AND AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

3.2 THE FOLLOWING STRENGTH PARAMETERS WERE ASSUMED FOR DESIGN:

	$\Phi$ (deg)	C (psf)	$\gamma$ (pcf)	
FILTER (CLASS A)	38	0	135	$\Phi$ ANGLE OF INTERNAL FRICTION C COHESION
NATIVE GRAVEL AND COBBLES	38	10	135	$\gamma$ UNIT WEIGHT

3.3 THE ROCKFALL WIRE FACED WALL SYSTEM IS ALSO DESIGNED TO MITIGATE COMBINED TRANSLATIONAL AND ROTATIONAL ENERGY LESS THAN 500 KJ FOR ROCKS THAT IMPACT THE SYSTEM BASED ON PREVIOUS FIELD TESTING AND OBSERVATION OF SIMILAR SYSTEMS (TRANSPORTATION RESEARCH CIRCULAR E-C141, 2009 AND ASCE GEOTECHNICAL PRACTICE PUBLICATION NO. 9, 2014, PP. 148-180). THE DESIGNED ROCKFALL CONTAINMENT BEHIND THE SYSTEM IS EQUAL TO OR GREATER THAN 90%.

3.4 ROCKFALL EVENTS ARE SPORADIC AND UNPREDICTABLE. THE WIRE FACED WALL IS DESIGNED FOR THE ROCKFALL ENERGIES STATED BUT DOES NOT ATTEMPT TO PREDICT THE AVERAGE RECURRENCE INTERVAL, MAGNITUDE, OR EXACT LOCATION OF ROCKFALL EVENTS. THESE FACTORS CANNOT BE ACCURATELY PREDICTED. CONSEQUENTLY, NEITHER THE ROCKFALL HAZARD IN TERMS OF PROBABILITY OF A ROCKFALL AT ANY SPECIFIC LOCATION, NOR THE RISK TO PEOPLE OR FACILITIES FROM SUCH EVENTS IS ADDRESSED BY THE WIRE FACED WALL.

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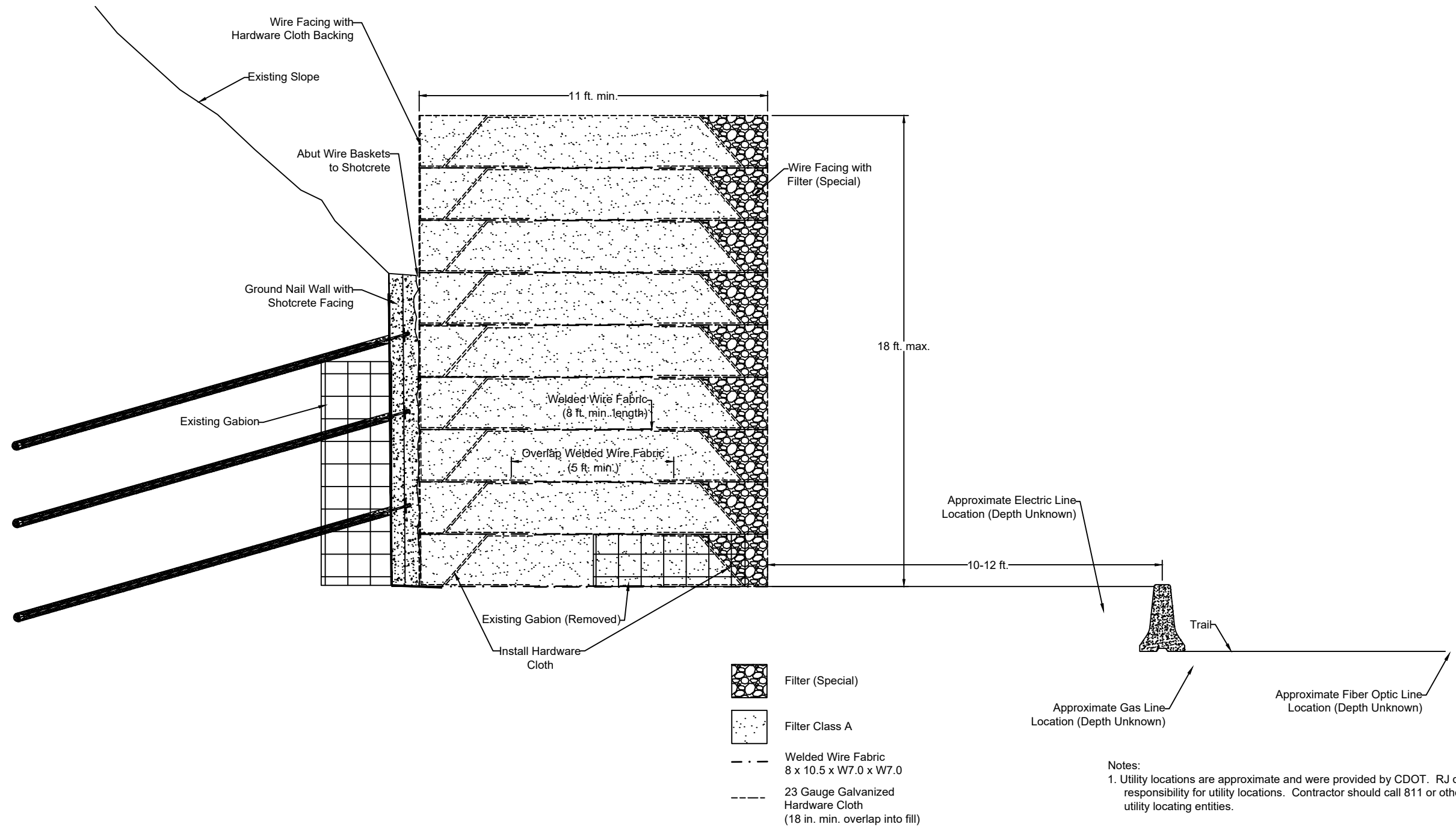
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Detailer:	R. Johnson		
Sheet Subset:		Subset Sheets:	5 of 9

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Sheet Number      11



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MP 117 GABION WALL STABILIZATION  
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 Detailer: R. Johnson  
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