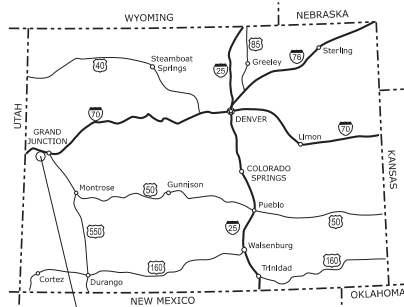


PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	A1



COLORADO KEY MAP

Project Location

U. S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE COLORADO NATIONAL MONUMENT



PLANS FOR PROPOSED PROJECT

CO NP COLM 10(5)

GUARDRAIL IMPROVEMENT

MESA COUNTY
LENGTH 0.27 MILES
VARIOUS SITES

TYPE OF CONSTRUCTION:

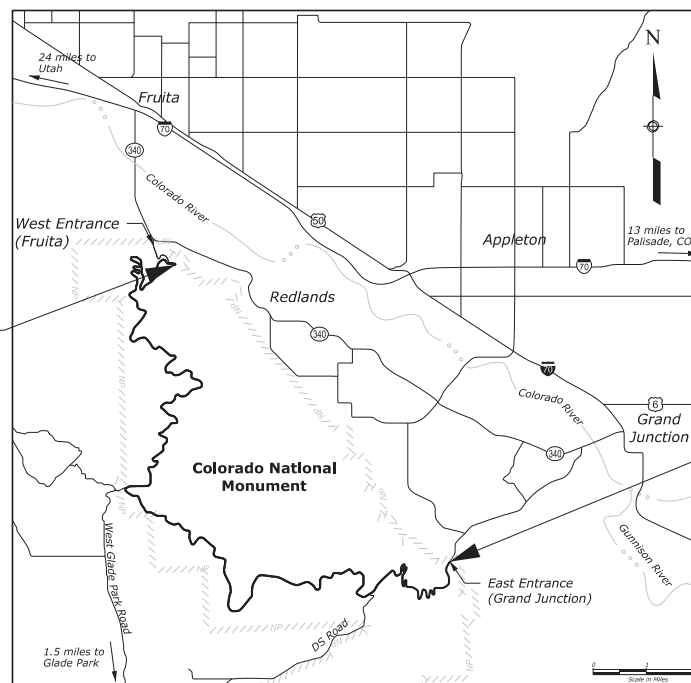
Guardrail Replacement and Installation

SPECIFICATIONS:

"STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS, FP-24"

INDEX TO SHEETS	
SHEET	DESCRIPTION
A1	TITLE SHEET
A2-A3	CONVENTIONAL PLAN SYMBOLS AND ABBREVIATIONS
A4	SITE MAP
B1	SUMMARY OF QUANTITIES
C1-C6	GUARDRAIL IMPROVEMENT DETAILS
D1	STAGING AREA EAST OVERFLOW PARKING
T1	617-13 MGS AND G4 W-BEAM GUARDRAIL INSTALLATION IN ROCK
T2	617-20 MGS AND G4 W-BEAM GUARDRAIL TYPE TANGENT TERMINAL AND GRADING
T3	617-A G4 W-BEAM GUARDRAIL WOOD POSTS
T4	617-B MGS W-BEAM GUARDRAIL WOOD POSTS
T5	E633-01 SIGN STRUCTURES
T6	E633-03 BREAKAWAY SIGN SUPPORT WOOD AND STEEL POSTS
W1	TEMPORARY TRAFFIC CONTROL SINGLE LANE CLOSURE LAYOUT (WITH FLAGGERS)

**BEGIN PROJECT
MM 0.8**



**END PROJECT
MM 22.3**



PLANS PREPARED BY
**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**
CENTRAL FEDERAL LANDS HIGHWAY DIVISION
DENVER, CO



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PROJECT MANAGER	HIGHWAY DESIGN MANAGER	LEAD DESIGNER
T. EGGERS	E. JESSEE	C. ARROYO

APPROVED:

CURTIS R SCOTT Digitally signed by CURTIS R SCOTT
Date: 2026.04.15 08:42:54 -06'00'

Chief of Engineering,
Central Federal Lands Highway Division

See Approval Letter of PS&E dated 03.18.2026
Park Superintendent
Colorado National Monument

DATE

ABBREVIATIONS

ϵ	centerline	H hdl.	headwall
Δ	curve delta	HES	homestead entry survey
$\emptyset$	diameter	hex.	hexagon
A abut.	abutment	horiz.	horizontal
ADT	average daily traffic	HW	high water
aggr.	aggregate	hwy.	highway
AH	ahead	I ID	inside diameter
alt.	alternate	incl.	inclusive, including
appr.	approach	int.	interior
asph.	asphalt	J jt.	joint
B b.f.	both faces	L L	length of curve
beg.	beginning, begin	lam.	lamination
BK	back	lat.	latitude
BM	bench mark	long.	longitude
BP	balance point	LPSM	lump sum
br.	bridge	Lt. or LT	left
brg.	bearing	LW	low water
C CBC	concrete box culvert	M mag.	magnetic
c-c	center to center	maint.	maintenance
clr.	clear	matl.	material
CMP	corrugated metal pipe	max.	maximum
Co.	county	MGs	Midwest Guardrail System
col.	column	min.	minimum
conc.	concrete	mon.	monument
constr.	construction	mtn(s).	mountain(s)
constr. jt.	construction joint	N N	north
cont.	continuous	NC	normal crown
corr.	corrugated	neg.	negative
cr.	creek	no. or #	number
CS	point of curve to spiral	O o.c.	on centers
ctrs.	centers	o.f.	other face
CTSM	contingent sum	OD	outside diameter
culv.	culvert	P PC	point of curve
D decr.	decrement	PCC	point of compound curve
DHV	design hour volume	perf.	perforate
DI	drop inlet	PI	point of intersection
dia. or D	diameter	pl.	plate
diag.	diagonal	POC	point on curve
diaph.	diaphragm	POS	point on spiral
dist.	distance	POT	point on tangent
Dist.	district	proj.	project
DLC	donation land claim	psi	pounds per square inch
dwg(s).	drawing(s)	PT	point of tangent
E E	east	pvm.	pavement
e	superelevation rate	Q quant., Qty	quantities
El. 94.066	elevation with number	R R	radius
elev.	elevation	R.	range
emb.	embankment	R/W	right-of-way
engr(s).	Engineer(s)	rd.	road
EOP	edge of pavement	rdwy.	roadway
EQ or eq.	equation	reconst.	reconstruction
ER	edge of road	reinf.	reinforcement
et al	and others	reqd.	required
et ux	and wife	res.	reservoir
EW	edge of water	Res.	Reservation
exc.	excavation	ret. wall	retaining wall
exp. jt.	expansion joint	RH	reference hub
ext.	exterior	Rt. or RT	right
F f.f.	fill face	rte.	route
Fed.	federal		
FES	flared end section		
fin.	finish		
ftg.	footing		
G ga.	gage (gauge)		
galv.	galvanized		
gdr.	girder		

S S	south
SADT	seasonal average daily traffic
SC	point of spiral to curve
sec.	section
shldr.	shoulder
spa.	spacing, spaces or spaced
spec.	specification
st.	street
ST	point of spiral to tangent
sta.	station
std.	standard
stiff.	stiffener
str.	straight
struc.	structural
sym.	symmetrical
T T	tangent length
T.	township
tan.	tangent
TBM	temporary bench mark
TCE	temporary construction easement
transv.	transverse
TS	point of tangent to spiral
typ.	typical
V V	design speed
vert.	vertical
vph	vehicles per hour
VPI	vertical point of intersection
W W	West

DRAINAGE SYMBOLS

Ditch (existing, proposed)

Flow Arrow

Drainage or Small Creek

Lake, Pond or Reservoir

Large Creek

Wetland

River

Spring

Bridge (existing, proposed)

Box culvert (existing, proposed)

Pipe culvert (existing, proposed)

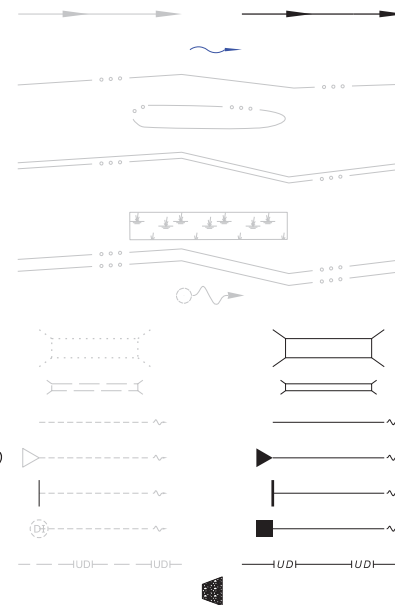
With end sections (existing, proposed)

With headwalls (existing, proposed)

With drop inlet (existing, proposed)

Underdrain (existing, proposed)

Riprap apron (proposed)

CONVENTIONAL PLAN SYMBOLS
AND ABBREVIATIONS

Sheet 1 of 2

c:\new\work\offices\1139\SP4\sp4.dwg (Symbols Sheet 2) 3 March 2016 1:10 PM

FENCE & CATTLE GUARD SYMBOLS

Fence (existing, proposed)



Fence with gate (existing, proposed)



Cattle guard (existing, proposed)



GEOLOGIC SYMBOLS

Boring location



Material source



LANDSCAPING & VEGETATION SYMBOLS

Tree



Tree line



MAPPING SYMBOLS

Building (existing, proposed)



Coordinate Grid Tick



North arrow



Railroad

Single Track



Double Track



Spot elevation



Trail



Survey control point



GUARDRAIL, BARRIER & WALL SYMBOLS

Guardrail (existing, proposed)



Guardwall (proposed)



Median & Side Barrier (existing, proposed)

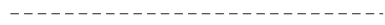


Retaining Wall (existing, proposed)



ROADWAY SYMBOLS

Clearing/construction limits

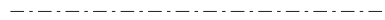


Slope stake limits

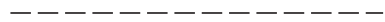
Top of Cut



Transition



Toe of fill



Edge of roadway (existing, proposed)



Roadway centerline (with station ticks)



Roadway obliteration



RIGHT-OF-WAY SYMBOLS

Boundaries

National



State



County



City



Township or Range line



Section



1/4 Section



1/16 Section



Bureau of Indian Affairs



Bureau of Land Management



National Forest



National Park



National Wildlife Refuge



Easements

Permanent (existing)



Permanent (proposed)



Temporary (proposed)



Monument (as described)



Parcel number



Property line



Right-of-way line (existing)



Right-of-way line (proposed)



Section corner (found, projected)



1/4 Section corner (found, projected)



1/16 Section corner (found, projected)



SIGN SYMBOLS

Signs

Commercial (existing, proposed)



Delineator (existing, proposed)



Portable (proposed)



Post mounted (existing, proposed)



UTILITY SYMBOLS

Irrigation ditch



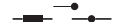
Underground (existing, proposed)



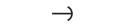
Surface (existing, proposed)



Support pole (existing, proposed)



Support pole anchor (existing, proposed)



Street light (existing, proposed)



Telephone pedestal (existing, proposed)



Underground utility

CATV (existing, proposed)



Fiber optic (existing, proposed)



Gas (existing, proposed)



Oil (existing, proposed)



Power (existing, proposed)



Sanitary sewer (existing, proposed)



Telephone (existing, proposed)



Water (existing, proposed)



Overhead utility

CATV (existing, proposed)



Fiber optic (existing, proposed)



Power (existing, proposed)



Telephone (existing, proposed)

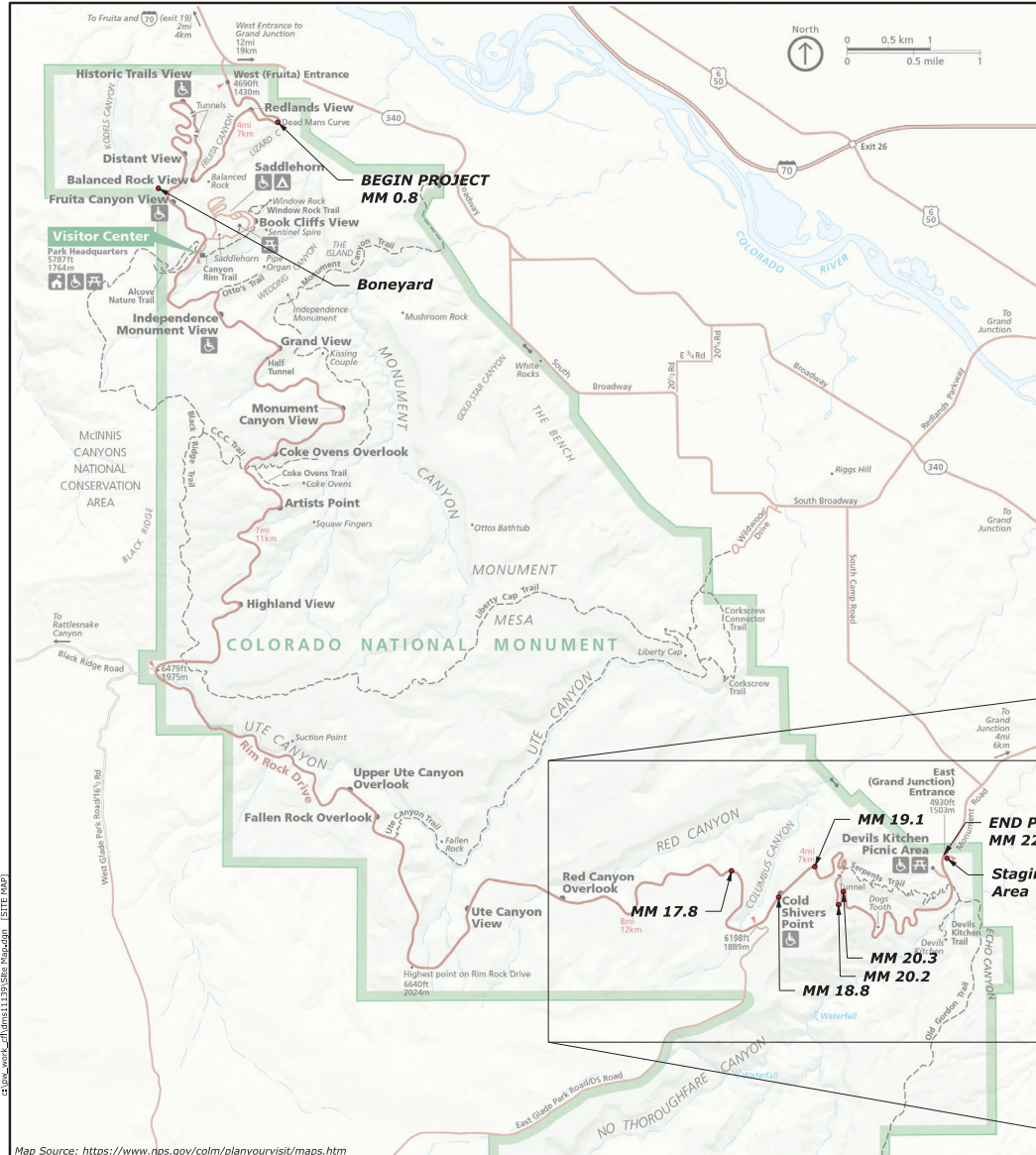


PROJECT SPECIFIC SYMBOLS

CONVENTIONAL PLAN SYMBOLS AND ABBREVIATIONS

Sheet 2 of 2

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	A4

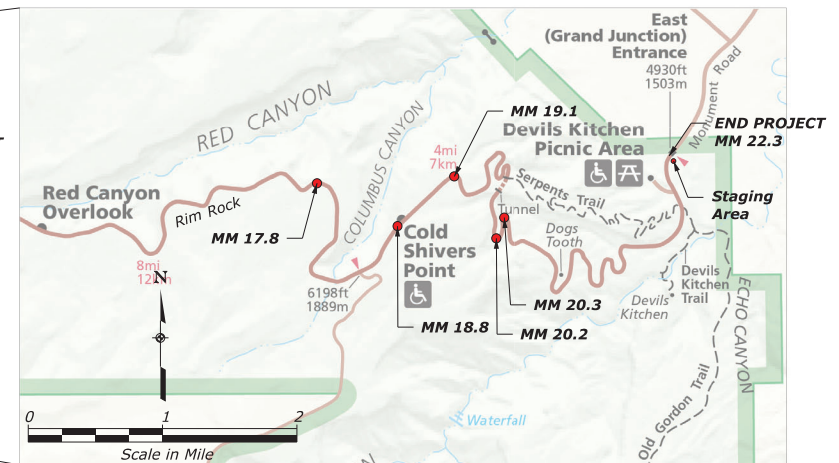
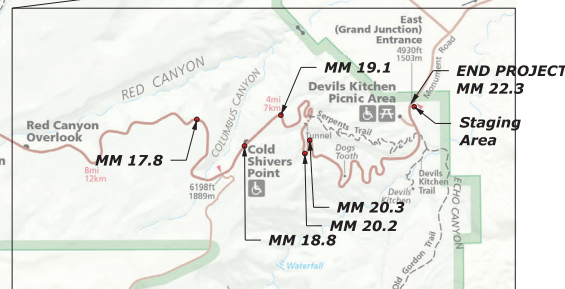


NOTE:

1. Guardrail improvement sites are located along Rim Rock Drive. The locations shown are approximate and will be verified during construction. Limits of repair to be determined in the field by the CO, based on existing conditions.

Site Location Coordinates				
Site Mile Marker (MM)	Side	Latitude	Longitude	Description
0.8	LT	39°06'52.2"N	108°43'28.7"W	
Boneyard		39° 6'28.68"N	108°44'26.55"W	COLM Materials Yard: signs, posts and concrete barriers drop-off
17.8	LT	39°01'59.4"N	108°39'41.5"W	
18.8	LT	39°01'49.4"N	108°39'17.4"W	
19.1	RT/LT	39°02'00.5"N	108°38'59.9"W	
20.2	RT	39°01'45.9"N	108°38'46.0"W	
20.3	LT	39°01'51.1"N	108°38'44.6"W	
Staging Area	RT	39°02'03.4"N	108°37'51.4"W	East Entrance Parking Area

Note: Coordinates are based on Google Earth pin locations.



Map Source: <https://www.nps.gov/colm/planyourvisit/maps.htm>

SITE MAP

SUMMARY OF QUANTITIES

PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	B1

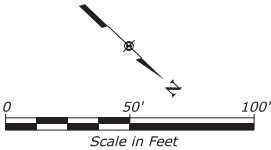
A M E N D	LINE ITEM NO.	PAY ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT	Repair Sites	ALLOWANCE	Estimated Quantities	Remarks and/or Determination of Estimated Quantity
					C1-C6, D1			
					Quantities		BID SCHEDULE	
	A0020	15101-0000	MOBILIZATION	LPSM			ALL	
	A0040	15301-0000	CONTRACTOR QUALITY CONTROL	LPSM			ALL	
	A0060	15401-0000	CONTRACTOR TESTING	LPSM			ALL	
	A0080	15501-0000	CONSTRUCTION SCHEDULE	LPSM			ALL	
	A0100	15701-0000	SOIL EROSION CONTROL	LPSM			ALL	
	A0120	20102-0000	CLEARING AND GRUBBING	LPSM			ALL	
	A0140	20301-3700	REMOVAL OF TERMINAL SYSTEM	EACH	4		4	
	A0160	20302-1200	REMOVAL OF GUARDRAIL	LNFT	25		25	
	A0180	30202-2000	ROADWAY AGGREGATE, METHOD 2	TON	110	10	120	
	A0200	61701-4550	GUARDRAIL SYSTEM MGS, TYPE 2, CLASS A, WOOD POSTS,(COATED)	LNFT	325		325	
	A0220	61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT,(COATED)	EACH	6		6	
	A0240	61704-2000	REPLACEMENT POST, WOOD	EACH	13		13	As directed by CO.
	A0260	61704-4000	REPLACEMENT BLOCKOUT	EACH	29	6	35	As directed by CO.
	A0280	61705-0600	REPLACEMENT GUARDRAIL W-BEAM RAIL ELEMENT, TYPE 4, CLASS B,(COATED)	LNFT	25		25	
	A0300	61805-1000	REMOVE AND RESET BARRIER,(DELIVER TO COLM)	LNFT	120		120	
	A0320	61805-1000	REMOVE AND RESET BARRIER,(DELIVER TO CURE)	LNFT	200		200	
	A0340	62201-0200	DUMP TRUCK, 8 CUBIC YARD MINIMUM CAPACITY	HOURL			10	
	A0360	62201-0550	BACKHOE LOADER, 6 CUBIC FOOT MINIMUM RATED CAPACITY BUCKET, 24-INCH WIDTH	HOURL			10	
	A0380	62201-0950	WHEEL LOADER, 3 CUBIC YARD MINIMUM RATED CAPACITY	HOURL			10	
	A0400	62301-0000	GENERAL LABOR	HOURL			10	
	A0420	63301-0000	SIGN SYSTEM,(WOOD POST)	EACH	5		5	
	A0440	63316-1000	REMOVE AND RESET SIGN SYSTEM	EACH	7		7	
	A0460	63501-0000	TEMPORARY TRAFFIC CONTROL	LPSM			ALL	
	A0480	63503-1000	TEMPORARY TRAFFIC CONTROL, PLASTIC FENCE,(STAGING AREA)	LNFT	320	30	350	

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C1



NOTE:

- 1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions.
- 2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements.
- 3. Locations of guardrail post replacements as directed by CO.
- 4. Minimize vegetation removal per 107.10(e).



TABULATION OF QUANTITIES (MM 0.8)			
ITEM NUMBER	ITEM	QUANTITY	UNIT
20301-3700	REMOVAL OF TERMINAL SYSTEM	1	EACH
61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT (COATED)	1	EACH
61704-2000	REPLACEMENT POST, WOOD	1	EACH



Existing Terminal Section Conditions



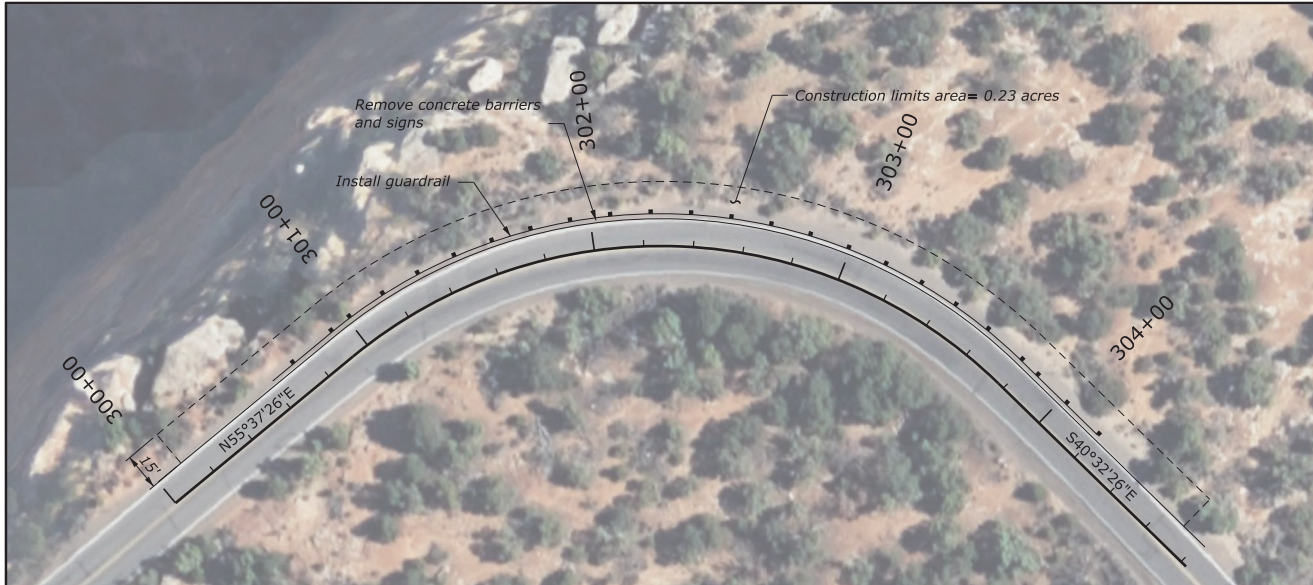
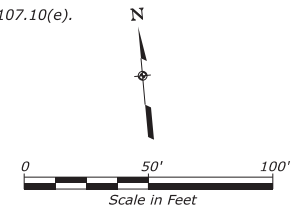
Proposed Terminal Section Example

GUARDRAIL REPAIR
SITE MM 0.8

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C2

NOTE:

1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions.
2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements.
3. Salvage and transport 32 existing concrete barriers. Deliver as follows:
 -Twelve (12) barriers: Deliver to Colorado National Monument (COLM) Boneyard.
 -Twenty (20) barriers: Deliver to Curecanti National Recreation Area (CURE) Boneyard at Elk Creek (38.461434, -107.168880).
4. Minimize vegetation removal per 107.10(e).

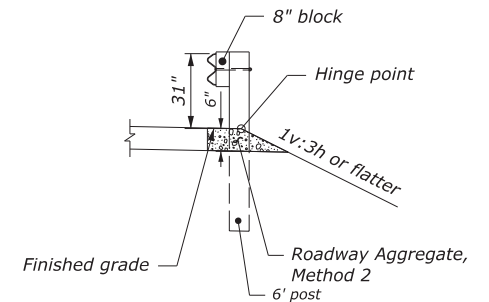


TABULATION OF QUANTITIES (MM 17.8)

ITEM NUMBER	ITEM	QUANTITY	UNIT
30202-2000	ROADWAY AGGREGATE, METHOD 2	110	TON
61701-4550	GUARDRAIL SYSTEM MGS, TYPE 2, CLASS A, WOOD POSTS (COATED)	325	LNFT
61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT (COATED)	2	EACH
61805-1000	REMOVE AND RESET BARRIER (DELIVER TO COLM)	120	LNFT
61805-1000	REMOVE AND RESET BARRIER (DELIVER TO CURE)	200	LNFT
63316-1000	REMOVE AND RESET SIGN SYSTEM	7	EACH

NOTE:

1. Adjust final guardrail layout to fit field conditions as directed by CO.
2. Aggregate base application rate 139 lb/ton.
3. See FLH Special 617-B for MGS Guardrail details.



**MGS GUARDRAIL
TYPICAL SECTION**

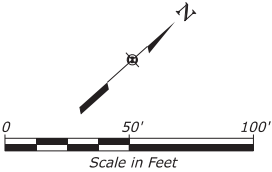
**GUARDRAIL INSTALLATION
SITE MM 17.8**

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C3



NOTE:

1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions.
2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements.
3. Locations of guardrail post replacements as directed by CO.
4. Minimize vegetation removal per 107.10(e).



TABULATION OF QUANTITIES (MM 18.8)			
ITEM NUMBER	ITEM	QUANTITY	UNIT
20301-3700	REMOVAL OF TERMINAL SYSTEM	1	EACH
61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT (COATED)	1	EACH
61704-2000	REPLACEMENT POST, WOOD	5	EACH
61704-4000	REPLACEMENT BLOCKOUT	3	EACH



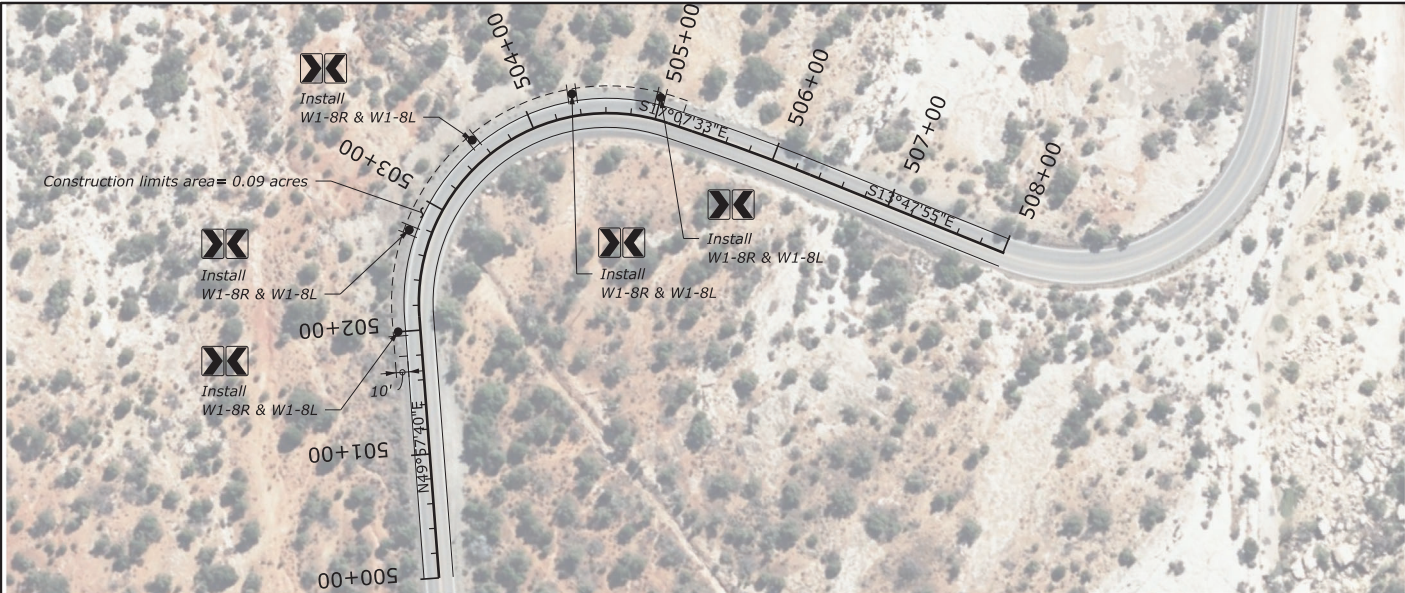
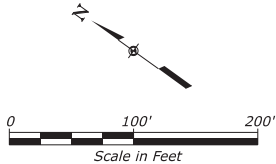
Existing Terminal Section Conditions

GUARDRAIL REPAIR
SITE MM 18.8

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C4

NOTE:

- 1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions.
- 2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements.
- 3. Minimize vegetation removal per 107.10(e).



TABULATION OF QUANTITIES (MM 19.1)			
ITEM NUMBER	ITEM	QUANTITY	UNIT
63301-0000	SIGN SYSTEM (WOOD POST)	5	EACH

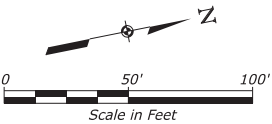
SIGN SYSTEM INSTALLATION
SITE MM 19.1

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C5



NOTE:

1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions
2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements
3. Locations of guardrail post replacements as directed by CO.
4. Minimize vegetation removal per 107.10(e).



TABULATION OF QUANTITIES (MM 20.2)			
ITEM NUMBER	ITEM	QUANTITY	UNIT
20301-3700	REMOVAL OF TERMINAL SYSTEM	1	EACH
61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT (COATED)	1	EACH
61704-4000	REPLACEMENT BLOCKOUT	25	EACH



Existing Terminal Section Conditions

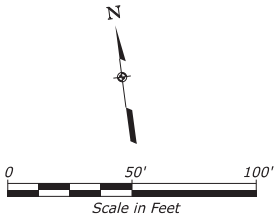


Example of Damaged Blockouts

GUARDRAIL REPAIR
SITE MM 20.2

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	C6

- NOTE:
1. The horizontal alignment and the location of the existing and proposed features are not based on precise survey data. Adjust as necessary to fit field conditions
 2. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements
 3. Locations of guardrail post and blockout replacements as directed by CO.
 4. Minimize vegetation removal per 107.10(e).



TABULATION OF QUANTITIES (MM 20.3)			
ITEM NUMBER	ITEM	QUANTITY	UNIT
20301-3700	REMOVAL OF TERMINAL SYSTEM	1	EACH
20302-1200	REMOVAL OF GUARDRAIL	25	LNFT
61702-1500	TERMINAL SYSTEM, TYPE MGS TANGENT (COATED)	1	EACH
61704-2000	REPLACEMENT POST, WOOD	7	EACH
61704-4000	REPLACEMENT BLOCKOUT	1	EACH
61705-0600	REPLACEMENT GUARDRAIL W-BEAM RAIL ELEMENT, TYPE 4, CLASS B (COATED)	25	LNFT



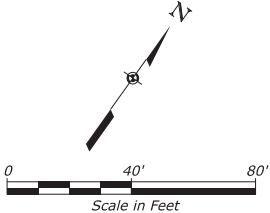
Existing Guardrail Conditions

GUARDRAIL REPAIR
SITE MM 20.3

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	D1

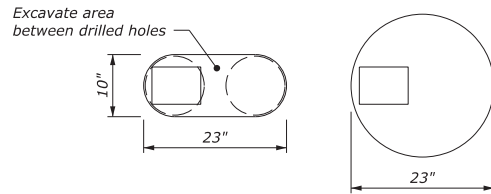
NOTE:

1. Some features in the drawing are not drawn to scale and identify the approximate location of the feature. Final quantities will be determined from field measurements.

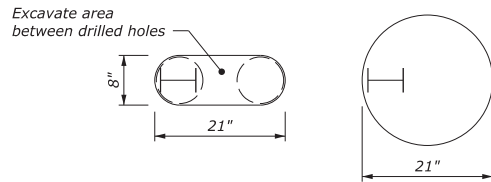


**STAGING AREA
EAST OVERFLOW PARKING**

PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	T1

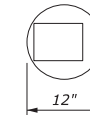


Wood Post



Steel Post

PLAN VIEW



Wood Post

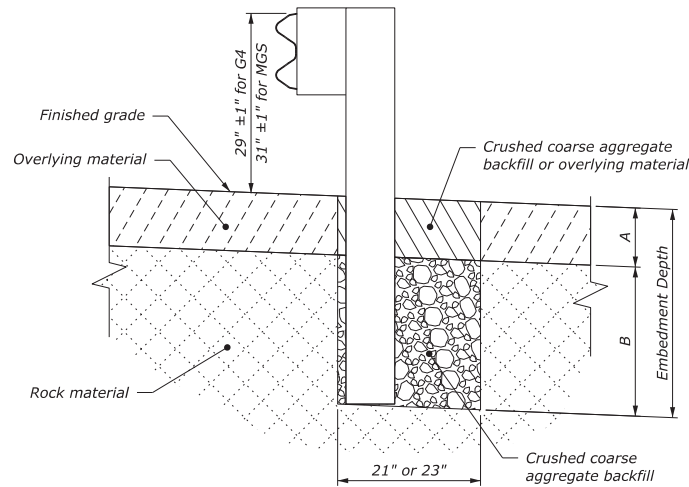


Steel Post

PLAN VIEW

NOTE:

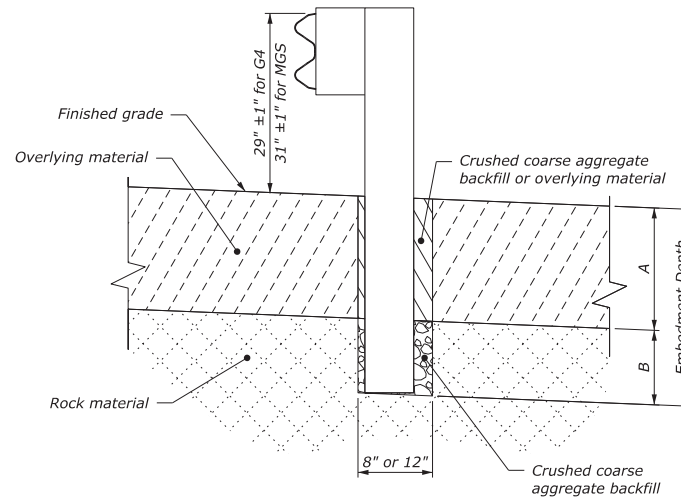
1. Use this standard when posts cannot be embedded to the minimum depth shown on Standard 617-10, 617-11, 617-31 or 617-32.
2. Unless otherwise specified, use either the circular or the oblong hole configuration for Case 1 conditions.
3. Use crushed coarse aggregate conforming to Section 703 "Coarse aggregate for concrete" or granular backfill for "Underdrain pipe with geotextile".
4. Place crushed coarse aggregate according to the post requirements in Section 617.
5. Treat field cut galvanized steel post surfaces that expose the base metal with two coats of zinc-oxide paint.



ELEVATION

Case 1: Overlying material depth (A) is 18" or less

POST EMBEDMENT DIMENSIONS			
HOLE TYPE	EMBEDMENT DEPTH	OVERLYING MATERIAL (A)	DRILLING DEPTH (B)
Case 1	24" to 42"	0 to 18"	24"
Case 2	30" to 42"	> 18" to 30"	12"
	42"	> 30"	42" - A



ELEVATION

Case 2: Overlying material depth (A) is greater than 18"

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 617-13
MGS AND G4 W-BEAM GUARDRAIL INSTALLATION IN ROCK	SPECIFICATION FP-24, FP-14 APPROVED FOR USE 1/2024



TEST LEVEL	L (FT)
2 (≤ 45 mph)	25
3 (> 45 mph)	37.5 or 50 (for G4)
	50 (for MGS)



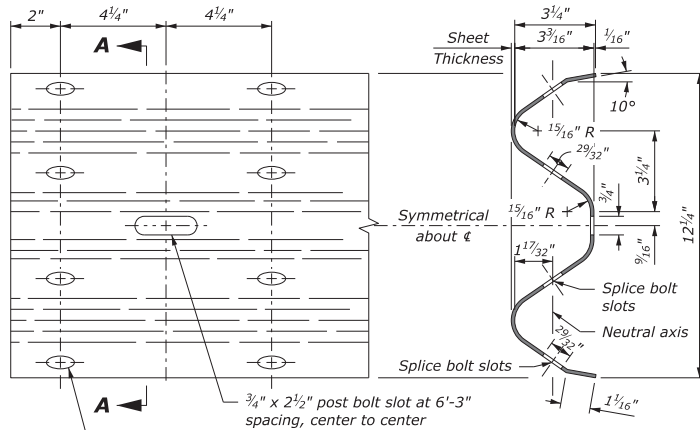
1. *Install tangent terminal according to the manufacturer's recommendations. See manufacturer's drawings for other details.*
2. *Construct the terminal grading layout as shown in the staking notes or model. If no staking notes or model are provided, use the preferred grading layout as much as practical within site constraints. If necessary because of site limitations, use the alternative grading layout.*
3. *For design purposes, the length of need is assumed to begin at post 3. Verify the length of need with the manufacturer for a specific product. Adjust grading as necessary to install the tangent terminal according to the manufacturer's recommendations.*
4. *Install terminal at a 1:25 taper or flatter to position the end farther from the edge of shoulder, or use a taper according to the manufacturer's recommendations.*
5. *Install a reflectorized object marker on the end of the terminal.*
6. *Construct a 1V:4H slope outside of the guardrail terminal grading extents where practical.*

U.S. DEPARTMENT OF TRANSPORTATION, FHWA
OFFICE OF FEDERAL LANDS HIGHWAY

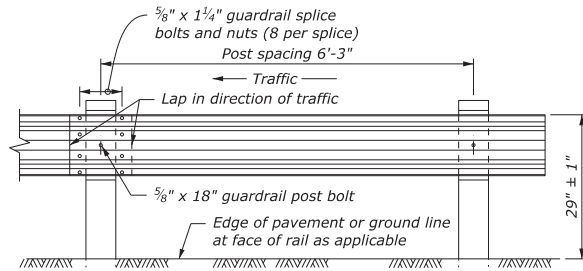
**MGS AND G4
W-BEAM GUARDRAIL
TYPE TANGENT TERMINAL
AND GRADING**

FLH STANDARD
617-20
SPECIFICATION
FP-24
APPROVED FOR USE
1/2024

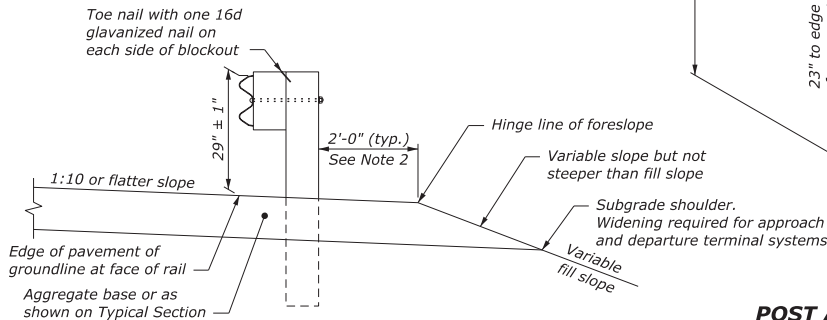
PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	T3



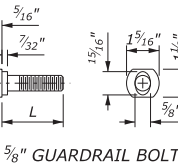
W BEAM RAIL



POST SPACING STANDARD POST SECTION

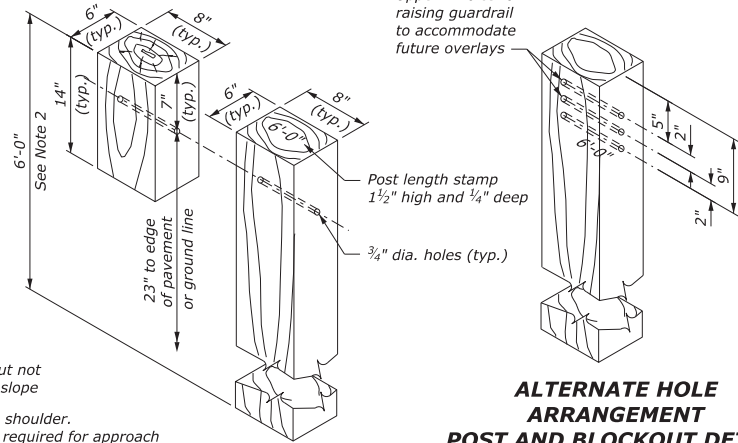
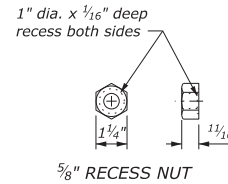


TYPICAL GUARDRAIL CROSS SECTION



GUARDRAIL BOLT AND RECESS NUT

L	Thread Length
1 1/4"	1 1/8" minimum
2"	1 3/4" minimum
10"	4" minimum
18"	4" minimum
25"	4" minimum

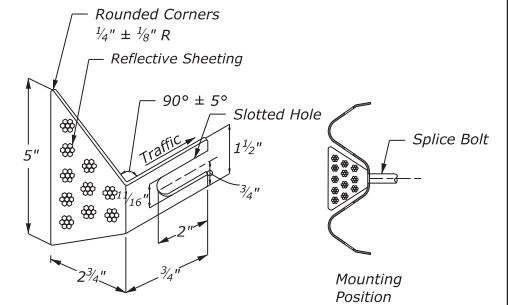


STANDARD HOLE ARRANGEMENT POST AND BLOCKOUT DETAIL

ALTERNATE HOLE ARRANGEMENT POST AND BLOCKOUT DETAIL

NOTE:

- When encountering impenetrable material, see Standard 617-13.
- See Special Contract Requirements when 7 foot or longer posts are specified.
- See Special Contract Requirements when the alternate hole arrangement is specified.
- Retroreflector tabs shall be manufactured from 12 to 14 gauge galvanized steel and shall be installed at 25 ft. intervals. Retroreflector tabs will not be paid for separately but shall be included in the work. The tabs shall be installed on splice bolts, not on the post bolts and shall be mounted so the bolt slot faces away from traffic, and the retroreflector surface faces the approaching traffic for one-way roads. For two-way roads, both sides of the tabs shall be retroreflective, so that delineation is provided for both directions of travel. The retroreflective sheeting shall match the color of the adjacent travel way edge line.
- Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.

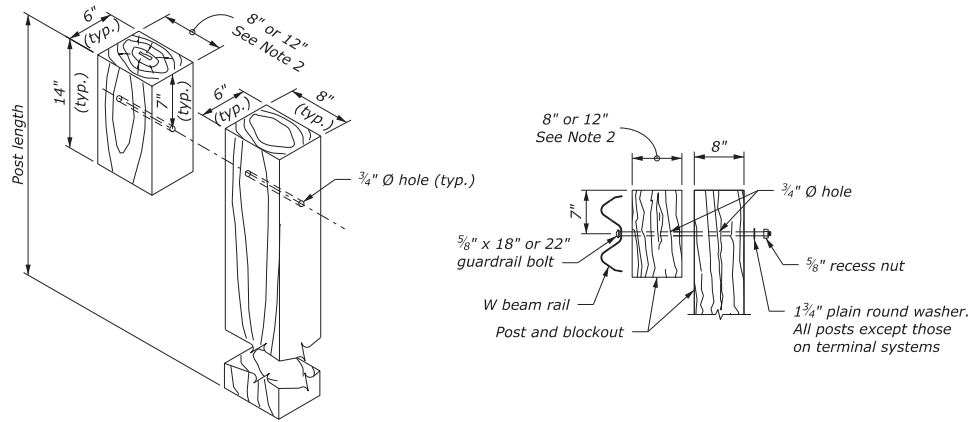


RETROREFLECTOR TAB

G4 W-BEAM GUARDRAIL WOOD POSTS

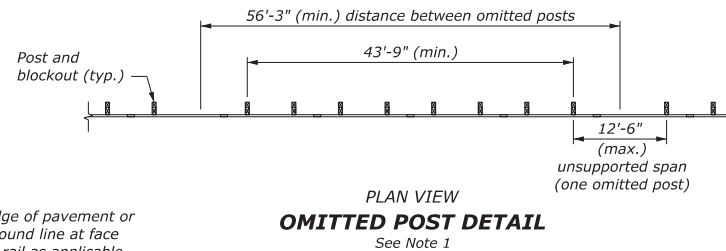
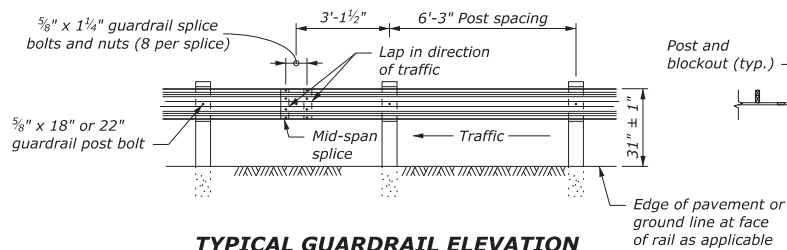
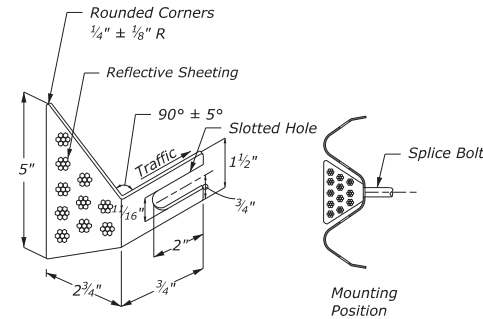
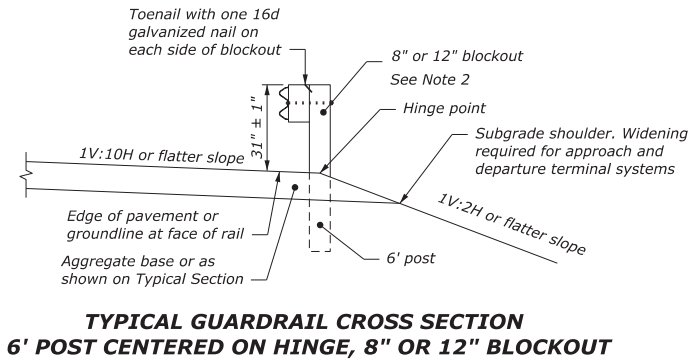
NO SCALE

PROJECT	SHEET NUMBER
CO NP COLM 10(S) GUARDRAIL IMPROVEMENT	T4



NOTE:

- When encountering impenetrable material, one post may be omitted in locations where the typical guardrail cross section includes 2 feet (min.) between the back of the guardrail post and the hinge point. For all other locations, see Section 617 and Standard 617-13 or 617-37.
- Size of blockout shown elsewhere in the plans. Use a single blockout or combination of blockouts (no more than two) to achieve the actual 8 or 12 inch offset. Secure wood blockouts to the posts with anti-rotation nails. If combination blockouts are used, toenail the adjacent blockouts with two 16d galvanized nails to prevent blockout rotation.
- Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
- Retroreflector tabs shall be manufactured from 12 to 14 gauge galvanized steel and shall be installed at 25 ft. intervals. Retroreflector tabs will not be paid for separately but shall be included in the work. The tabs shall be installed on splice bolts, not on the post bolts and shall be mounted so the bolt slot faces away from traffic, and the retroreflector surface faces the approaching traffic for one-way roads. For two-way roads, both sides of the tabs shall be retroreflective, so that delineation is provided for both directions of travel. The retroreflective sheeting shall match the color of the adjacent travel way edge line.

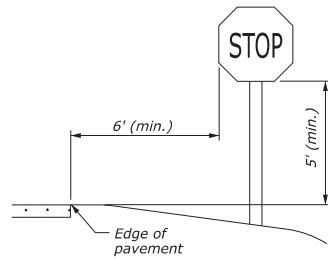


NO SCALE

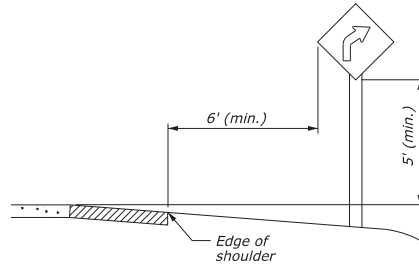
MGS W-BEAM GUARDRAIL WOOD POSTS

SPECIAL
617-B

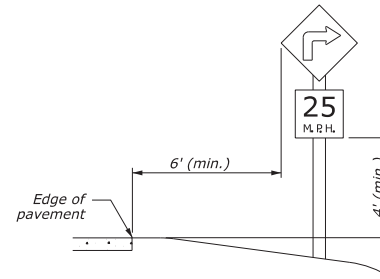
PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	T5



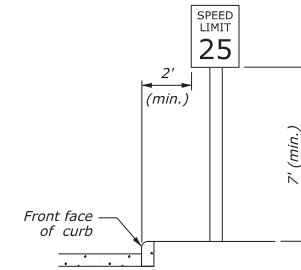
WITHOUT SHOULDER



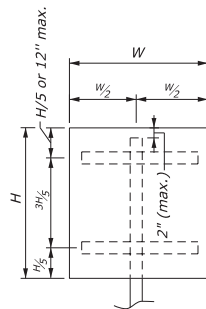
WITH SHOULDER



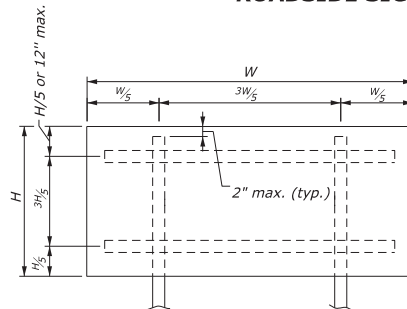
WITH ADVISORY SPEED PLAQUE

ROADSIDE SIGN IN BUSINESS
OR RESIDENTIAL DISTRICT

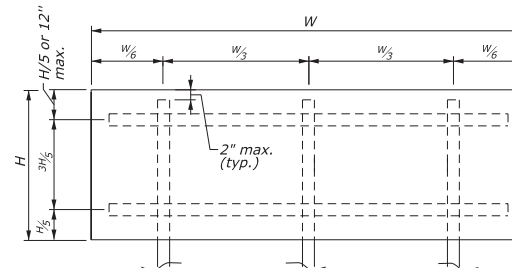
ROADSIDE SIGN IN RURAL DISTRICT



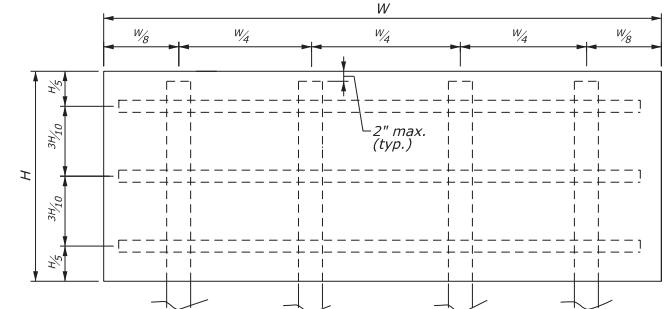
SINGLE POST



DOUBLE POST



TRIPLE POST



QUADRUPLE POST

NOTES:

1. Locate and set sign height according to the "Manual on Uniform Traffic Control Devices" (MUTCD), latest edition.
2. For U-channel, square tubular, and corrosion resistant steel posts for which the sign panel area is 10 square feet or less but W is over 4 feet, use double posts.
3. For square tubular steel double posts for which the sign panel area is equal to 24 square feet, use slip base according to manufacturer's recommendations.
4. Refer to Detail E633-02 for breakaway support details for corrosion resistant steel posts.
5. Refer to Detail E633-03 for breakaway support details for wood, U-channel steel and square tubular steel posts.
6. Refer to Detail E633-04 for bracing details for wood, U-channel steel and square tubular steel posts.
7. Refer to Section 2A.18 of the MUTCD, latest edition, for additional information.

POST SIZE TABLE					
POST TYPE	POST SIZE	MAXIMUM SIGN AREA (SQFT)			
		SINGLE POST	DOUBLE POST	TRIPLE POST	QUADRUPLE POST
Wood	4" x 4"	10	20		
	4" x 6"	15	35	45	60
	6" x 6"	20	50	75	100
U-Channel Steel		10*	24	30	
Square Tubular Steel	2" 12 ga.	10*	16		
	2" 12 ga.	10*	24**		
Corrosion Resistant Steel	2" x 2" 10 ga. Class B	10*	24		

* See Note 2
** See Note 3

NO SCALE

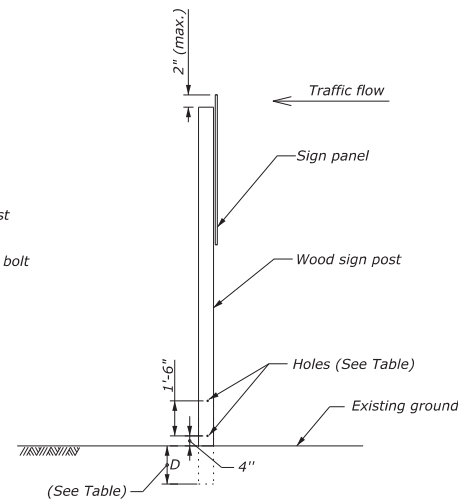
U.S. DEPARTMENT OF TRANSPORTATION, FHWA
OFFICE OF FEDERAL LANDS HIGHWAY

SIGN STRUCTURES

EFLHD DETAIL
E633-01SPECIFICATION
FP-24, FP-14APPROVED FOR USE
06/2024

POST SIZE	HOLE DIAMETER	(D) (MIN.)
4" x 4"	Not Required	3'
4" x 6"	1.5"	4'
6" x 6"	2"	4'

1. Breakaway sign support is not required for signs placed behind protective barriers.
2. Signs requiring 6- by 6-inch wood posts are considered to be non-breakaway if multiple posts are required and posts cannot be spaced a minimum of 7 feet apart.
3. Place non-breakaway signs outside the clear zone or shield with approved barrier. Do not place holes in posts of non-breakaway signs.
4. Position splice overlap on U-channel steel posts entirely between the ground line and 18 inches above the ground line. Do not place more than one splice per post.
5. Attach the square tubular steel post to the anchor with a corner bolt according to the manufacturer's recommendations. Size the anchor according to the manufacturer's recommendations to accept the post size specified.
6. Maintain the post assembly in a plumb position.
7. For sign punching details, see the blank standards in the "Standard Highway Signs and Markings" as specified in the latest edition of the MUTCD.
8. Refer to Detail E633-01 for sign mounting details.
9. Refer to Detail E633-04 for sign bracing details.
10. Refer to Section 2A.18 of the MUTCD, latest edition, for additional information.



WOOD POST

BREAKAWAY SIGN SUPPORT

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	EFLHD DETAIL E633-03
	SPECIFICATION FP-24, FP-14 APPROVED FOR USE 06/2024

BREAKAWAY SIGN SUPPORT

WOOD AND STEEL POSTS

PROJECT	SHEET NUMBER
CO NP COLM 10(5) GUARDRAIL IMPROVEMENT	W1

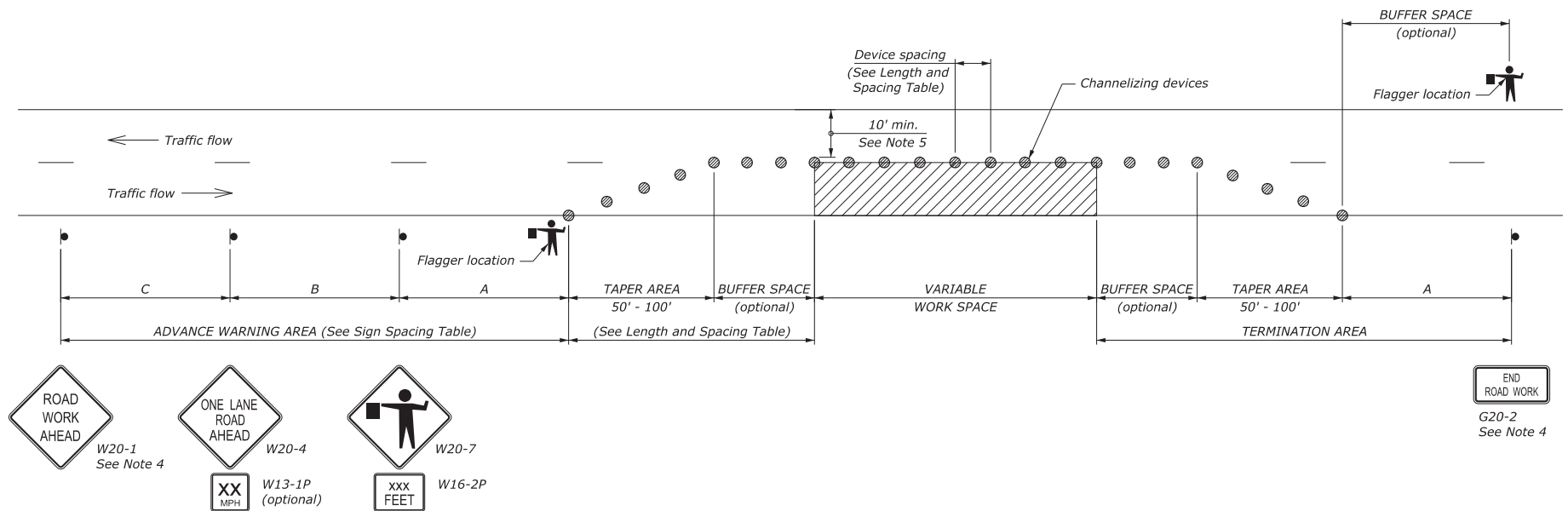
LENGTH AND SPACING TABLE				
APPROACH SPEED* MPH	BUFFER SPACE LENGTH FEET	CHANNELIZING DEVICE SPACING IN FEET		
		TAPER AREA	BUFFER SPACE	WORK SPACE
20	115	20	40	40
25	155	20	50	50
30	200	20	60	60
35	250	20	70	70
40	305	20	80	80
45	360	20	90	90
50	425	20	100	100
55	495	20	110	110
60	570	20	120	120
65	645	20	130	130
70	730	20	140	140

* Approach speed based on the regulatory posted speed, not the advisory speed.

SIGN SPACING TABLE			
ROAD TYPE	DISTANCE BETWEEN SIGNS IN FEET		
	A	B	C
Urban and Rural 30 mph and less	100	100	100
Urban and Rural 35 mph to 50 mph	350	350	350
Rural greater than 50 mph	500	500	500
Expressway / Freeway	1000	1500	2640

NOTE:

1. Signs are shown for one direction of travel only. Place signs similar to those depicted for the opposite direction of travel.
2. Final location and spacing of devices may be changed to fit field conditions as approved.
3. For pilot car operation, mount the PILOT CAR FOLLOW ME (G20-4) sign at a conspicuous location on the rear of vehicle. Prominently display the name of the Contractor on the pilot car.
4. If closure is completely within the project limits, eliminate the ROAD WORK AHEAD (W20-1) and END ROAD WORK (G20-2) signs.
5. For project specific minimum width, refer to the Special Contract Requirements, Section 156.
6. Do not allow equipment, materials, or vehicles to be parked or stored in the buffer space.



NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 635-6
TEMPORARY TRAFFIC CONTROL SINGLE LANE CLOSURE LAYOUT (WITH FLAGGERS)	SPECIFICATION FP-24, FP-14 APPROVED FOR USE 2/2024