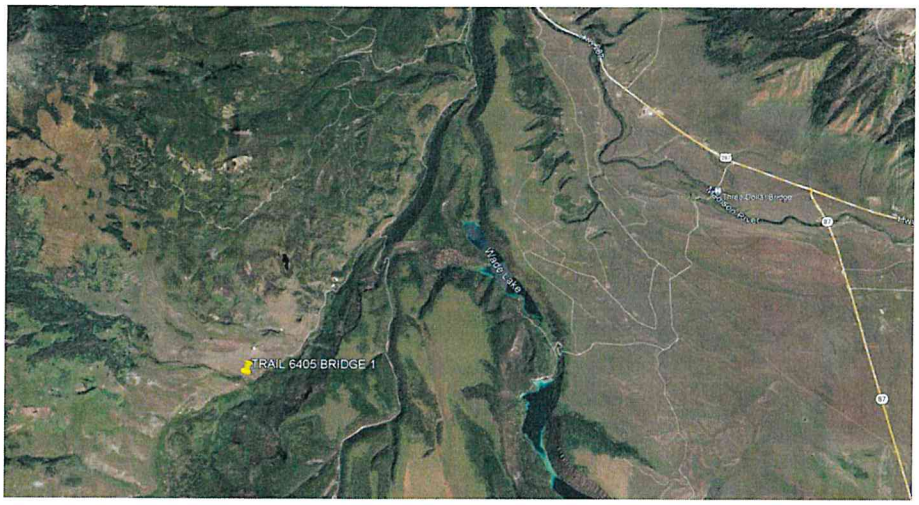
CONSTRUCTION DRAWINGS FOR TRAIL 6405 BRIDGE 1

MADISON RANGER DISTRICT

BEAVERHEAD-DEERLODGE NATIONAL FOREST



LOCATION REFERENCE

SUBMITTED:

CLAIRE BAER Digitally signed by CLAIRE BAER Date: 2023.01.19 08:34:46 -07'00'

DESIGNER

MORGAN SANDALL Digitally signed by MORGAN SANDALL Date: 2023.01.18 16:12:10 -07'00'

FOREST ENGINEER

Dale Olson 1/19/2023

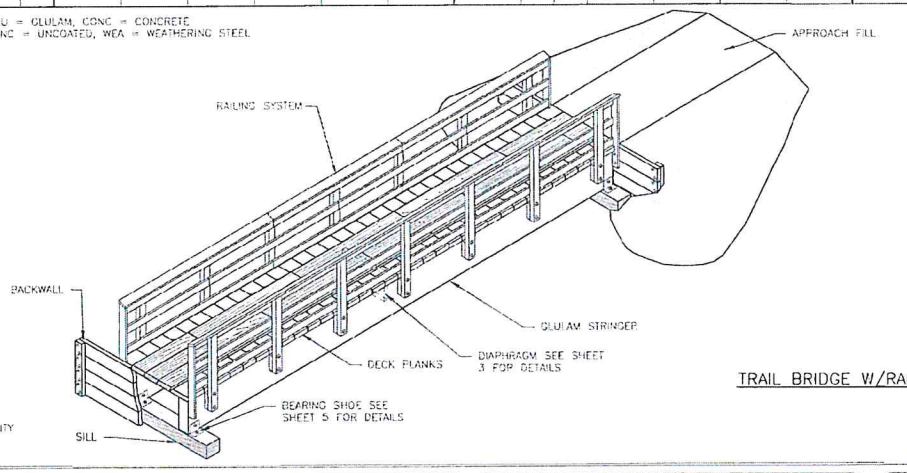
DISRICT RANGER

								STRINGERS				DECK			BACKWALL					
STRUCTURE NUMBER	TRAIL NO.	BRIDGE LOCATION	BRIDGE LENGTH OUT-TO-OUT	STRINGER SPAN C-C BRNG	BRIDGE CLEAR WIDTH	PEDESTRIAN LOAD	GROUND SNOW LOAD	COMBINATION SYMBOL	SPECIES	MATERIAL SIZE	TREATMENT	SPECIES	SIZE	TREATMENT	TYPE	SPECIES	SIZE	WIDTH	HEIGHT	TREATMENT
	6405	Miller Flats	56'-6"	55'	72"	90 psf	137.30	24F – V4	DF/DF	5.125 x 31.5	YES	DF	3x12x8	YES	PLANK	DF	3x12	14' MIN	3'-0"	YES

NA = NOT APPLICABLE

	RAILING SYSTEM/CURB					RUNNING PLANK				SILL			APPROACHES						HARDWARE	
STRUCTURE NUMBER	SPECIES	TYPE	HEIGHT	TREATMENT YES	TREATMENT NO	SPECIES	SIZE	WIDTH	TREATMENT	MATERIAL TYPE	SIZE	TREATMENT	LENGTH NEAR	LENGTH FAR	WIDTH	MATERIAL TYPE	MATERIAL DEPTH	GEO SYNTHETIC TYPE	COATING	COMMENTS
	DF	CURB ONLY	15"	X		DF	2" x 8" MIN	50" MIN	YES	DF	12 X 12	YES	TBD	TBD	72"	NAT SURF			SEE 3A	SEE PLANS & DETLS SEE GENERAL NOTES

ABUTMENT MATERIAL TYPE: SS = SOLID SAWN, GLU = GLULAM, CONC = CONCRETE
HARDWARE COATING TYPE: GALV = GALVANIZED, UNC = UNCOATED, WEA = WEATHERING STEEL



TRAIL BRIDGE W/RAILING SYSTEM

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
Lobo Mesa Trail #6405 Bridge 1
Miller Flats Trailhead

DRAWING NAME
GLULAM STRINGER TRAIL BRIDGE

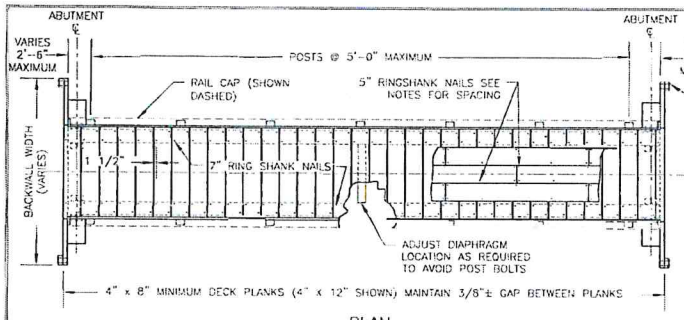
SECTION
963 - GLULAM TRAIL BRIDGE

TYPICAL ID
GSB

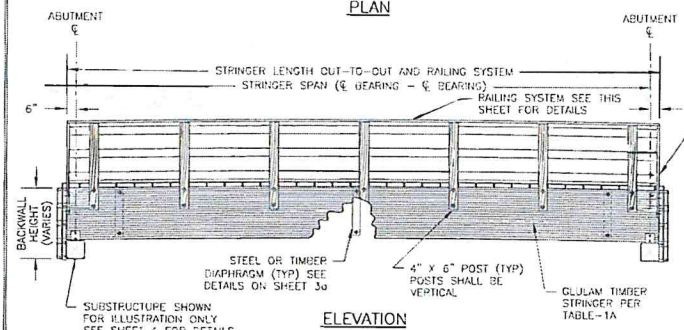
REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_963-10-01

SHEET
1 OF 5



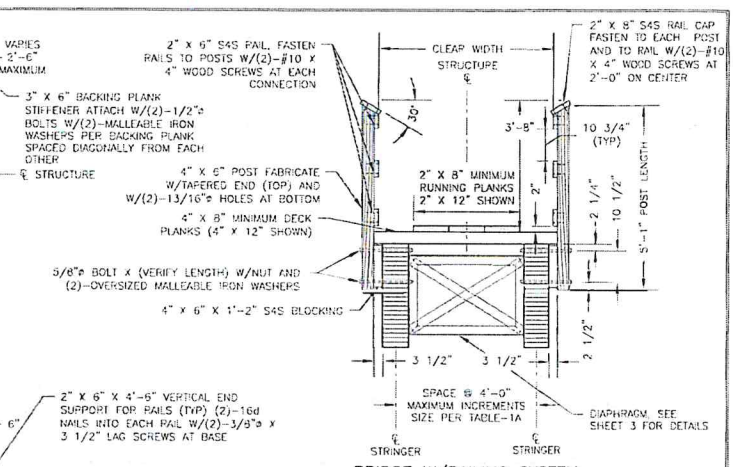
PLAN



ELEVATION

GRADE SHOWN = 0.0%

- FABRICATE GLULAM STRINGERS WITH CAMBER BASED ON A 900 FOOT RADIUS.
- RUNNING PLANKS NOT SHOWN FOR CLARITY.



BRIDGE W/RAILING SYSTEM

2" X 6" X 4'-6" VERTICAL END SUPPORT FOR RAILS (TYP) (2)-16d NAILS INTO EACH RAIL W/(2)-3/8"ø X 3 1/2" LAG SCREWS AT BASE

DECK SECTION W/STRINGERS @ 4'-0" O.C. MAX.

NOTES:

1. FASTEN DECK PLANKS TO STRINGERS WITH TWO ROWS 5/16-INCH DIAMETER X 7-INCH RING SHANK NAILS PER PLANK AT EACH STRINGER. ALTERNATE SIDES.
2. FASTEN RUNNING PLANKS TO DECK WITH 40d (5-INCH RING SHANK) NAILS AT 24-INCH SPACING. ALTERNATE SIDES WITH TWO AT EACH END.
3. SPLICE RAILS AT POSTS. RAILS SHALL BE CONTINUOUS FOR TWO POST SPACES. DO NOT LOCATE MORE THAN ONE RAIL SPLICE AT ANY ONE POST.

*TABLE-1A: GLULAM STRINGER SIZE REQUIREMENTS - LRFD

**STRINGER SPAN (FEET)	SPECIES - DF/DF, COMBINATION SYMBOL 24F - V4				
	DESIGN LOADING IN POUNDS PER SQUARE FOOT				
	PEDESTRIAN LIVE LOAD		GROUND SNOW LOAD		
	***65	90	120	150	200
● 25	5 1/8" x 15"	5 1/8" x 15"	5 1/8" x 15"	5 1/8" x 15 1/2"	5 1/8" x 18"
● 30	5 1/8" x 16 1/2"	5 1/8" x 18"	5 1/8" x 18"	5 1/8" x 19 1/2"	5 1/8" x 21"
▲ 35	5 1/8" x 19 1/2"	5 1/8" x 21"	5 1/8" x 21"	5 1/8" x 22 1/2"	5 1/8" x 24"
▲ 40	5 1/8" x 22 1/2"	5 1/8" x 24"	5 1/8" x 24"	5 1/8" x 25 1/2"	5 1/8" x 28 1/2"
▲ 45	5 1/8" x 25 1/2"	5 1/8" x 27"	5 1/8" x 27"	5 1/8" x 30"	6 3/4" x 28 1/2"
■ 50	6 3/4" x 27"	6 3/4" x 28 1/2"	6 3/4" x 27"	6 3/4" x 28 1/2"	6 3/4" x 31 1/2"
■ 55	6 3/4" x 30"	6 3/4" x 31 1/2"	6 3/4" x 30"	6 3/4" x 31 1/2"	6 3/4" x 34 1/2"
■ 60	6 3/4" x 31 1/2"	6 3/4" x 34 1/2"	6 3/4" x 33"	6 3/4" x 34 1/2"	6 3/4" x 39"

●INSTALL DIAPHRAGMS AT MID-SPAN AND WITHIN A DISTANCE OF THE DEPTH FROM THE ABUTMENTS
▲INSTALL DIAPHRAGMS AT THIRD POINTS OF SPAN AND WITHIN A DISTANCE OF THE DEPTH FROM THE ABUTMENTS
■INSTALL DIAPHRAGMS AT QUARTER POINTS OF SPAN AND WITHIN A DISTANCE OF THE DEPTH FROM THE ABUTMENTS

* STRINGER SIZE SHALL BE THE LARGER OF THE PEDESTRIAN OR GROUND SNOW LOAD SIZE REQUIRED FOR THE SITE CONDITIONS
** STRINGER LENGTH EQUAL TO STRINGER SPAN PLUS ONE FOOT
*** REQUIRES REGIONAL BRIDGE ENGINEER APPROVAL

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
Lobo Mesa Trail #6405 Bridge 1
Miller Flats Trailhead

DRAWING NAME
GLULAM STRINGER TRAIL BRIDGE

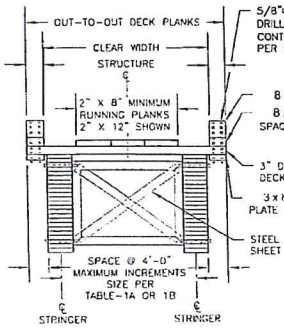
SECTION
963 - GLULAM TRAIL BRIDGE

TYPICAL ID
GSB

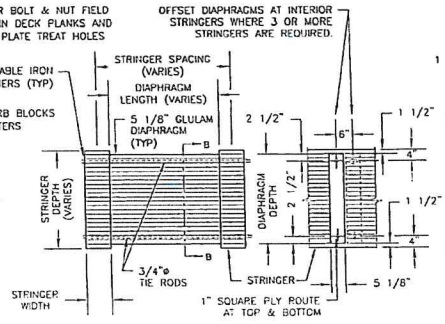
REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_963-10-02a

SHEET
2 OF **5**

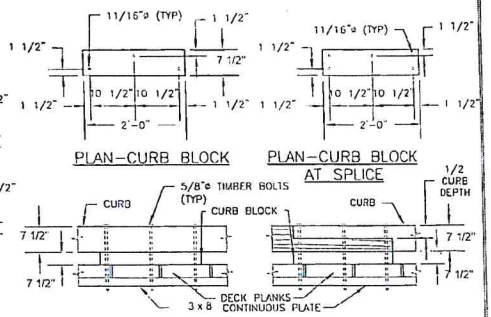


BRIDGE W/CURBS ONLY DECK
SECTION W/STRINGERS @ 4'-0" O.C.



ELEVATION-SECTION B-B GLULAM DIAPHRAGM ALTERNATE

GLULAM DIAPHRAGM ALTERNATE IS APPLICABLE FOR ALL STRINGER DEPTHS.



ELEVATION- TYPICAL CONNECTION SOLID SAWN CURB CONNECTION DETAILS

ELEVATION- CONNECTION AT SPLICE

GENERAL NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS.

TIMBER & LUMBER: SOLID SAWN TIMBER MEMBERS SHALL CONFORM TO THE REQUIREMENTS OF THE GRADING RULES AGENCY FOR THE SPECIES, TYPE, AND GRADE SPECIFIED BELOW. GLULAM MEMBERS SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD, STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER OF SOFTWOOD SPECIES (ANSI 117) FOR THE COMBINATION, SPECIES, USE, AND APPEARANCE SPECIFIED BELOW.

GLULAM STRINGERS
- COMBINATION SYMBOL 24F-V4, SPECIES - DF/DF DRY CONDITION USE AND INDUSTRIAL APPEARANCE

CURB MEMBERS, SILLS, AND BACKING PLANKS
- COASTAL REGION DOUGLAS FIR - LARCH ROUGH SAWN NO.1 GRADE, GRADING RULES AGENCY - WWPA, WCLIB

RUNNING PLANKS
- COASTAL REGION DOUGLAS FIR - LARCH ROUGH SAWN NO.2 GRADE, GRADING RULES AGENCY - WWPA, WCLIB

RAILS & POSTS (SEE PROJECT CRITERIA)

UNTREATED
- REDWOOD, S4S, NO.1 GRADE GRADING RULES AGENCY - RIS
- WESTERN RED CEDAR, S4S, SELECT STRUCTURAL GRADE GRADING RULES AGENCY - WWPA, WCLIB

TREATED
- HEM - FIR/DOUGLAS FIR, S4S, NO.1 GRADE GRADING RULES AGENCY - WWPA, WCLIB

TREATMENT: SEE PROJECT CRITERIA FOR MEMBERS IDENTIFIED TO BE TREATED AND FOR TREATMENT TYPE. PRESERVATIVE TREATMENT SHALL BE IN ACCORDANCE WITH THE CURRENT AMERICAN WOOD PROTECTION ASSOCIATION (AWPA) SPECIFICATIONS USING THE TREATMENT MATERIALS LISTED BELOW. TREATMENT WILL COMPLY WITH THE REQUIREMENTS OF THE CURRENT EDITION OF WESTERN WOOD PRESERVERS INSTITUTE (WWPI) "BEST MANAGEMENT PRACTICES FOR THE USE OF TREATED WOOD IN AQUATIC ENVIRONMENTS".

GLULAM STRINGER
- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 3B ABOVE GROUND - EXPOSED (UC3B)
- PENTACHLOROPHENOL IN LIGHT OIL (TYPE C SOLVENT)
- COPPER NAPHTHENATE (CuN) IN LIGHT OIL (TYPE C SOLVENT)

DECKING, RUNNING PLANKS, & RAILING SYSTEM, IF TREATED
- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 3B ABOVE GROUND - EXPOSED (UC3B)
- PENTACHLOROPHENOL IN LIGHT OIL (TYPE C SOLVENT)
- COPPER NAPHTHENATE (CuN) IN LIGHT OIL (TYPE C SOLVENT)

SILLS, BACKING PLANKS, CRIBS, TIMBER WALLS, IF TREATED
- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 4B GROUND CONTACT - HEAVY DUTY (UC4B)
- PENTACHLOROPHENOL IN HEAVY OIL (TYPE A SOLVENT)
- COPPER NAPHTHENATE (CuN) IN HEAVY OIL (TYPE A SOLVENT)

FIELD TREATMENT: COPPER NAPHTHENATE (2% SOLUTION) SHALL BE FURNISHED FOR FIELD TREATING OD WOOD. ALL ABRASIONS AND FIELD CUTS -APPROVED BY THE C.O.R.- SHALL BE CAREFULLY TRIMMED AND GIVEN THREE BRUSH COATS OF THE FIELD TREATMENT SOLUTION. WHERE APPROVED FIELD DRILLING OF BOLT OR NAIL HOLES IS REQUIRED, THE HOLES SHALL BE FILLED WITH PRESERVATIVE PRIOR TO INSERTING THE FASTENERS.

HARDWARE AND STRUCTURAL STEEL: SEE PROJECT DESIGN CRITERIA FOR STEEL HARDWARE FINISH. GALVANIZED OR UNFINISHED HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 36, WITH NUTS AND BOLTS CONFORMING TO ASTM A307, GRADE A. WEATHERING STEEL AND HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 50W, WITH BOLTS AND NUTS CONFORMING TO ASTM A325, TYPE 3. USE MALLEABLE IRON WASHERS AGAINST WOOD UNLESS OTHERWISE NOTED.

WHEN STRUCTURAL STEEL IS TO BE WELDED, THE WELDING PROCEDURE SHALL BE IN ACCORDANCE WITH AWS D1.1 AND SHALL BE SUITABLE FOR THE GRADE OF STEEL AND INTENDED USE OR SERVICE.

FABRICATION: SUBMIT SHOP DRAWINGS FOR ALL BRIDGE COMPONENTS (EXCEPT TIMBER RUNNING PLANKS). SHOW ALL DIMENSIONS AND FABRICATION DETAILS FOR ALL CUT OR BORED TIMBER. FIELD DRILLING OF HOLES SHALL NOT BE ALLOWED UNLESS OTHERWISE NOTED ON THE PLANS.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
Lobo Mesa Trail #6405 Bridge 1
Miller Flats Trailhead

DRAWING NAME
GLULAM STRINGER TRAIL BRIDGE

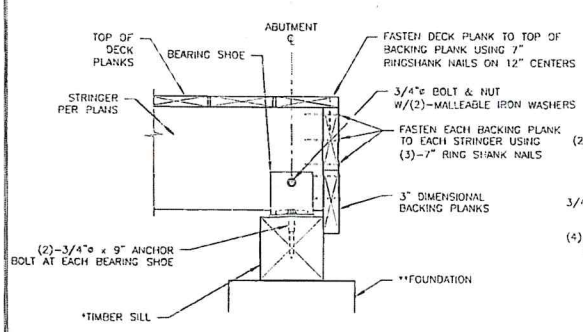
SECTION
963 - GLULAM TRAIL BRIDGE

TYPICAL ID
GSB

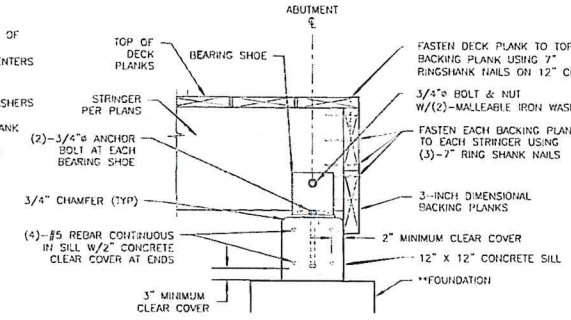
REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_963-10-03a

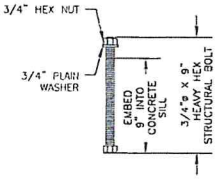
SHEET
3 OF 5



TIMBER SILL
CONNECTION DETAIL



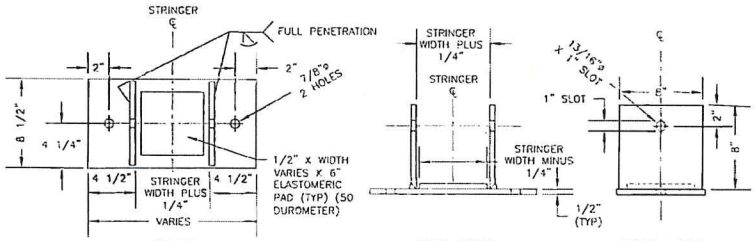
CONCRETE SILL
CONNECTION DETAIL



CONCRETE SILL
ANCHOR BOLT DETAIL

* TIMBER SILL CAN BE EITHER 12" X 12" SOLID SAWN 10 3/4" X 12" GLUE-LAMINATED, BUILT-UP 3" X 12", 4" X 12", & 6" X 12" TREATED MEMBERS.

** SEE STANDARD DRAWINGS 965-10, 965-20, 965-30, & 965-40 FOR FOUNDATION ALTERNATIVES



PLAN

END VIEW

SIDE VIEW

BEARING SHOE DETAIL

MATERIAL = 1/2" STEEL PLATE A36

NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS.

CONCRETE: USE STRUCTURAL CONCRETE WITH 7 SACK MINIMUM MIX APPROVED BY THE C.O.. CONCRETE SHALL RECEIVE A TOWELED SURFACE FINISH. CONCRETE SHALL HAVE 4%-6% ENTRAINED AIR. MAXIMUM SIZE AGGREGATE SHALL BE 3/4-INCH AND CONCRETE SLUMP SHALL NOT EXCEED 4-INCHES.

REINFORCING STEEL: PROVIDE REINFORCING STEEL THAT CONFORMS TO ASTM A615 (AASHTO M31), GRADE 40 OR 60. PROVIDE 2-INCH CLEAR CONCRETE COVER FOR ALL REBAR, UNLESS NOTED OTHERWISE ON THE PLANS.

HARDWARE AND STRUCTURAL STEEL: SEE SUPERSTRUCTURE DRAWINGS FOR PROJECT DESIGN CRITERIA AND GENERAL NOTES.

TREATED TIMBER & LUMBER: REFER TO THE GENERAL NOTES ON THE SUBSTRUCTURE DRAWINGS FOR TREATED TIMBER & LUMBER SPECIFICATIONS AND FIELD TREATING OF WOOD

LAG SCREW INSTALLATION: PRE-BORE LAG SCREW HOLES USING TWO DIAMETERS, ONE FOR THE SHANK AND ONE FOR THE THREADS. THE LEAD HOLE FOR THE SHANK IS TO BE 1/16-INCH LARGER THAN THE SHANK DIAMETER AND IS TO BE BORED TO THE DEPTH OF PENETRATION OF THE SHANK. THE LEAD HOLE FOR THE THREADED PORTION IS TO BE 70 PERCENT OF THE BOLT DIAMETER AS SHOWN ON THE PLANS AND IS TO BE BORED AT LEAST TO THE LENGTH OF THE THREADS. DO NOT DRIVE LAG SCREWS WITH A HAMMER.

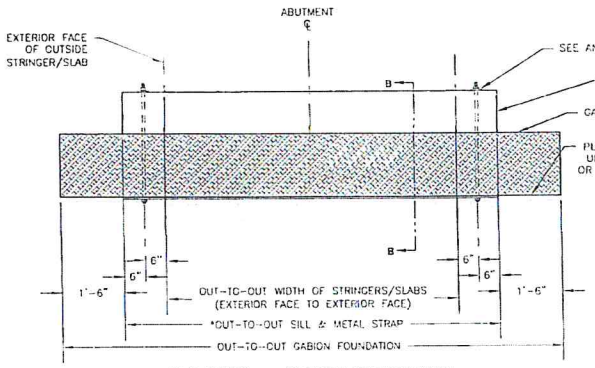
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
Lobo Mesa Trail #6405 Bridge 1
Miller Flats Trailhead

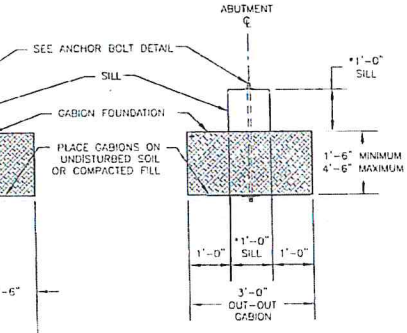
DRAWING NAME
GLULAM STRINGER TRAIL BRIDGE
SECTION: **963 - GLULAM TRAIL BRIDGE** TYPICAL ID: **GSB**

REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_963-10-04
SHEET **4** OF **5**



ELEVATION – GABION FOUNDATION



SECTION B-B

*SILL MATERIAL AND DIMENSIONS WILL VARY. REFER TO SUPERSTRUCTURE SHEETS FOR ACTUAL SILL DIMENSIONS AND ADJUST GABION AS NEEDED.

FOUNDATION NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS.

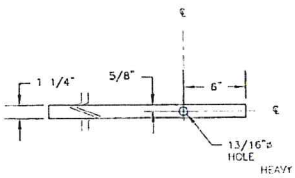
HARDWARE AND STRUCTURAL STEEL: SEE SUPERSTRUCTURE DRAWINGS FOR PROJECT DESIGN CRITERIA AND GENERAL NOTES.

GABION ABUTMENT STABILIZATION: REFER TO THE SPECIAL PROJECT SPECIFICATIONS FOR A DESCRIPTION OF THE WORK, MATERIALS, AND INSTALLATION PROCEDURES.

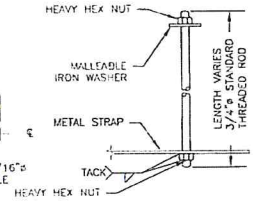
GABION FOUNDATIONS: REFER TO GABION FOUNDATION NOTES.

GABION FOUNDATION NOTES:

1. GABION BASKETS SHALL BE CONSTRUCTED USING WIRE MESH (U.S. STANDARD GAGE 9). BASKETS CONSTRUCTED USING TWISTED WIRE MESH WILL NOT BE ALLOWED. WELDED WIRE MESH SHALL BE POLYVINYL CHLORIDE COATED (PVC) WHERE BASKETS ARE EXPOSED TO CORROSIVE SOILS.
2. MATERIAL USED TO FILL THE GABION SHALL BE 4-INCH TO 8-INCH HARD, DURABLE, ANGULAR ROCK.
3. ROCK MAY BE PLACED MECHANICALLY PROVIDED CARE IS TAKEN TO ENSURE THAT IT IS TIGHTLY PACKED WITH A MINIMUM OF VOIDS. FOR EXPOSED FACES, HAND LABOR SHALL BE USED TO KEEP THE MESH VERTICAL, PREVENT BULGING, AND TO PRODUCE AN ATTRACTIVE APPEARANCE.
4. ALL GABIONS SHALL BE PLACED ON UNDISTURBED SOIL OR A FOUNDATION OF SUITABLE MATERIAL. REMOVE AND REPLACE UNSUITABLE SOILS WITH A MINIMUM OF 12-INCHES OF COARSE GRANULAR BACKFILL. COMPACT BACKFILL MATERIAL AT AN OPTIMUM MOISTURE CONTENT WITH A VIBRATING COMPACTOR. OPERATE COMPACTION EQUIPMENT OVER THE FULL WIDTH OF THE FOUNDATION AREA UNTIL VISIBLE DEFORMATION OF THE BACKFILL CEASES.
5. BACKFILL WITH SUITABLE MATERIAL BEHIND GABIONS CONCURRENTLY WITH THE CELL FILLING OPERATION. BACKFILL THE AREA BEHIND GABIONS WITH A COARSE GRANULAR MATERIAL. COMPACT BACKFILL MATERIAL AT AN OPTIMUM MOISTURE CONTENT WITH A VIBRATOR COMPACTOR. OPERATE COMPACTION EQUIPMENT OVER THE FULL WIDTH OF THE IN-FILL AREA UNTIL VISIBLE DEFORMATION OF THE BACKFILL CEASES.



1 1/4" X 1/4" METAL STRAP



ELEVATION–ANCHOR BOLT DETAIL

TABLE-1: STANDARD GABION BASKET SIZES

SIZE			NO. OF DIAPHRAGMS	CAPACITY CUBIC YARDS
LENGTH	WIDTH	HEIGHT		
6 FT	3 FT	3 FT	1	2
9 FT	3 FT	3 FT	2	3
12 FT	3 FT	3 FT	3	4
6 FT	3 FT	1.5 FT	1	1
9 FT	3 FT	1.5 FT	2	1.5
12 FT	3 FT	1.5 FT	3	2
6 FT	3 FT	1 FT	1	0.67
9 FT	3 FT	1 FT	2	1
12 FT	3 FT	1 FT	3	1.33

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
Lobo Mesa Trail #6405 Bridge 1
Miller Flats Trailhead

DRAWING NAME
TIMBER SILL ON GABION BASKET

SECTION
965 - TRAIL BRIDGE SUBSTRUCTURES

TYPICAL ID
GAB

REVISION DATE

NOT TO SCALE

DRAWING NO.
STD_965-20-01

SHEET
5 OF 5