(Use with rehab modifications of B-606-10MASH A&B, A-S, C&D, or C-S&D)

NOTES:

½" Chamfer

1//2

∽@ Post

¾"Ø Hole

tab mount

Tube $5\frac{1}{4}$ " x $5\frac{1}{4}$ "

Tubes and 1/8"0;

71/2" A325 bolts,

hex nuts, washers,

and lock washers

x .3125''' x 3'-0''

fabricated from

%₁" A572

1"Ø Holes in steelplate

Q 1/8"Ø holes in concrete

_between tubes for reflector

 $1'' \times 1^{1/2}$ " Horizontal

slots in post at Q

base plate

tubes

<u> 1</u>\$

31/2"

POST DETAIL PLAN

- by welding shall be ASTM572 Grade 50. All other steel shall be Grade 36 unless
- 2. The above material and all anchor bolts and miscellaneous bolts, nuts, and washers shall be galvanized after fabrication in accordance with AASHTO M111.
- 4. Tubes shall be continuous over not less than two posts, preferably 4 posts except at approach slab end joint. No welded butt splices will be allowed in the tube sections.
- 6. All bolts that have lock washers shall be tightened to snug tight only.
- 7. Posts shall be perpendicular to the longitudinal roadway grade.
- 8. One or more 10'-0" post spaces may be reduced (6'-8" Min) in order to transition.
- 9. Payment will be made under item 606, Bridge Rail Type 10R MASH, for all posts, base plates, anchor bolts, miscellaneous bolts, nuts, washers, tubes, tube expansion devices, tube splices, end plates and reflector tabs.

Design: AASHTO MASH 2016 TL-4 (a) for overlay thickness over 1" (by calculation), with assumed existing curb stirrup of #4 @ 18" (fy=60ksi). AASHTO MASH 2016 TL-3 for overlay thickness over 1" (by calculation), with assumed

Structural Steel:

- 1. All tubes shall be ASTM A1085. All posts, base plates, and splice tubes fabricated otherwise noted.
- Structural steel elements shall conform to the requirements of Section 509.
- 3. The tubes shall be shop bent or fabricated to fit horizontal curve when radius is less than 1,800 feet.
- 5. The centerline of the tube splice shall be 1'-8" minimum and 2'-6" maximum from the centerline of the posts.

- maintain dimensions from the end of the rail and expansion joints or concrete
- 10. Prior to fabrication of this item, an electronic PDF which complies with the requirements of Section 105, shall be submitted to the Engineer for information only (Working Drawing).

DESIGN DATA

existing curb stirrup of #4 @ 12" (fy=40ksi).

AASHTO M270 Gr 36 (ASTM A709 Gr 36) fv = 36 ksify = 50 ksi fy = 50 ksiAASHTO M270 Gr 50 (ASTM A992/A572 Gr 50) ASTM A1085

PLAN - TUBE SPLICE

at tube splice, and 1" x 4" slots at bridge expansion device. Slot both inner and outer tubes. Stagger top and bottom splices into different post spacings/spans, except at expansion joint place at opposite ends of same post space/span except as shown in transitions. (Range of motion = 1'-0" at bridge expansion

3'-0"

C Splice

C2 C1

Curb/Headwall and bottom projection is unavailable, holes BRIDGE/CBC shall be 2'-0" deep. The coring of holes and TYPICAL SECTION Item No 606 Bridge Rail Type 10R MASH.

Grade 105 galvanized rods with hex nuts and lock washers. Rods to be set in 1/8"Ø cored holes with an approved epoxy grout. Project rod $2\frac{3}{4}$ " at top and no more than 2" beyond nut at bottom. If hole can't be drilled through, epoxy grout to be included in the bid price for

. .

 \bigcirc 2- $\frac{7}{8}$ "Ø fully threaded A-449 or ASTM F1554

Asphalt overlay terproofing mer

. E

Designer/Detailer: Use references dialog box

in Microstation to

show appropriate

ı transition. Adjust

I transitions for final

l bridge rail heights _ _ ı

See BXX for

Designer/Detailer:

box in Microstation

to select appropriate

ı curb width. Set tubes

1 1/4" behind top point

I of curb face, except

device.)

HSS 6x6-

 $(15/16'' \times 11/8'' \text{ slots})$

with 12" Curb.

Use reference dialoa

Transition Details

C3 Structure No.

Staff Bridge Branch

1'-6"

PL $1\frac{1}{4} \times 10\frac{1}{2} \times 1\frac{1}{11}$

All sides

except as noted 5/16

1/4(1/4)

W6 x 20

All seals for this set of drawings are applied to the cover page(s)

Print Date: \$DATE\$					Sheet Revisions	
File Name: sheet_B-60	06-10R MASH.dgn			Date:	Comments	Init
Horiz. Scale: NTS	Vert. Scale: As No	ted 🗲	\supset			
Unit Information	Unit Leader Ini	ials 🗲				
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Limits of pay length for Bridge Rail Type 10R MASH

3'-6" Min to Joint (Typ)-

BRIDGE RAIL ELEVATION

 $1'' \times 1^{1/2}$

1" x 4" Slotted

holes at bridge-

HSS $6x6x^{1}/_{4}$ (Typ)

Reflector

each post

See M-606-1

For Details

-tab at

Exp device

Slotted

-holes in

at tubes

each post

(For post spacing, see BXX)

Typical post spacing

10'-0" Max, 6'-8" Min

15/16" x 11/8" Slotted holes at splices

Post-

© 2 - 1" x 1½" horiz slots & 2 - ¾"Ø x 2"

threadéd anchor

(automatically

end welded to

tube) with hex

nuts, hardened

washers, and lock washers

studs

Optional 1/2"Ø

for galvanizing

drain hole in post-

Utility as shown

centered hole (Typ)

Bar 3x3/8x3" with 15/16"Ø

in plan

W6-

X=73/41

C1=1'-0''

¾"Ø hole

reflector

at each

for

post

Designer/

Detailer:

ı dimensions

I to match

| curb/deck

dimensions

location_

and anchor

Adjust

boxed

Colorado Department of Transportation

2829 West Howard Place, Denver, CD 80204 Phone: 303-512-4079 FAX: 303-757-9197

Cacion	AS
3rd Floor	No Rev
	Revised
Initials	Void:

	As Constructed	Constructed BRIDGE RAIL TYPE 10R MASH					
	No Revisions:	12"	Project Number				
	Revised:		XXXXXX			Code	
		Detailer: XX	XXXXXXX	Numbers	X-XX-XX		
S	Void:	Sheet Subset:	BRIDGE	Subset Sh	eets: BXX of XXX	Sheet Number	

FOR INFORMATION ONLY

DESCRIPTION

Structural Steel (Galvanized)

For 26" Anchor Bolt and 10'-0" Post Spacing

PER LF

57.4

UNIT

LB

(Use with rehab modifications of B-606-10MASH A&B, A-S, C&D, or C-S&D)

- by welding shall be ASTM572 Grade 50. All other steel shall be Grade 36 unless otherwise noted.
- 2. The above material and all anchor bolts and miscellaneous bolts, nuts, and washers shall be galvanized after fabrication in accordance with AASHTO M111.
- less than 1,800 feet.
- 4. Tubes shall be continuous over not less than two posts, preferably 4 posts tube sections.
- 5. The centerline of the tube splice shall be 1'-8" minimum and 2'-6" maximum from the centerline of the posts.
- 6. All bolts that have lock washers shall be tightened to snug tight only.
- 7. Posts shall be perpendicular to the longitudinal roadway grade.
- 8. One or more 10'-0" post spaces may be reduced (6'-8" Min) in order to transition.
- 9. Payment will be made under item 606, Bridge Rail Type 10R MASH, for all posts, base plates, anchor bolts, miscellaneous bolts, nuts, washers, tubes, tube expansion devices, tube splices, end plates and reflector tabs.
- requirements of Section 105, shall be submitted to the Engineer for information only (Working Drawing).

DESIGN DATA

Design: AASHTO MASH 2016 TL-4 (a) for overlay thickness over 1" (by calculation), with assumed existing curb stirrup of #4 @ 18" (fy=60ksi). AASHTO MASH 2016 TL-3 for overlay thickness over 1" (by calculation), with assumed

Structural Steel:

NOTES:

_[|]/₂'' Chamfer base plate

1//2

∽@ Post

¾"Ø Hole

tab mount

Tube $5\frac{1}{4}$ " x $5\frac{1}{4}$ "

Tubes and 1/8"Ø:

71/2" A325 bolts,

hex nuts, washers,

and lock washers

x .3125''' x 3'-0''

fabricated from

%₁" A572

1"Ø Holes in steelplate

Q 1/8"Ø holes in concrete

_between tubes for reflector

tubes

 $1'' \times 1^{1/2}$ " Horizontal

slots in post at Q

-lф-

31/2"

POST DETAIL PLAN

- 1. All tubes shall be ASTM A1085. All posts, base plates, and splice tubes fabricated
- Structural steel elements shall conform to the requirements of Section 509.
- 3. The tubes shall be shop bent or fabricated to fit horizontal curve when radius is
- except at approach slab end joint. No welded butt splices will be allowed in the

- maintain dimensions from the end of the rail and expansion joints or concrete
- 10. Prior to fabrication of this item, an electronic PDF which complies with the

existing curb stirrup of #4 @ 12" (fy=40ksi).

AASHTO M270 Gr 36 (ASTM A709 Gr 36) fv = 36 ksify = 50 ksi fy = 50 ksiAASHTO M270 Gr 50 (ASTM A992/A572 Gr 50) ASTM A1085

FOR INFORMATION ONLY

DESCRIPTION

Structural Steel (Galvanized)

For 26" Anchor Bolt and 10'-0" Post Spacing

PER LF

57.4

UNIT

LB

PLAN - TUBE SPLICE

at tube splice, and 1" x 4" slots at bridge expansion device. Slot both inner and

outer tubes. Stagger top and bottom splices into different post spacings/spans,

except at expansion joint place at opposite ends of same post space/span

except as shown in transitions. (Range of motion = 1'-0" at bridge expansion

3'-0"

1'-6"

C Splice

© 2-1/8"∅ fully threaded A-449 or ASTM F1554
Grade 105 galvanized rods with hex nuts and
lock washers. Rods to be set in 11/8"Ø cored
holes with an approved epoxy grout. Project
_rod 2 $\frac{1}{4}$ " at top and no more than 2" beyond
nut at bottom. If hole can't be drilled through,
and bottom projection is unavailable, hole shall
be 2'-0" deep. The coring of holes and epoxy
grout to be included in the bid price for Item
No 606 Bridge Rail Type 10R MASH.
3 71

Designer/Detailer: Use references dialog box

PL $1\frac{1}{4}$ × $10\frac{1}{2}$ × $1^{1}-11^{1}$

All sides

except as noted 5/16

1/4(1/4)

W6 x 20

in Microstation to

show appropriate

ı transition. Adjust

I transitions for final

bridge rail heights ____i

See BXX for

Designer/Detailer:

box in Microstation

to select appropriate

ı curb width. Set tubes

1 1/4" behind top point

I of curb face, except

device.)

HSS 6x6-

 $(15/16'' \times 11/8'' \text{ slots})$

with 12" Curb.

Use reference dialoa

Transition Details

C2 C1 C3 Structure No.

BRIDGE TYPICAL SECTION

Limits of pay length for Bridge Rail Type 10R MASH

3'-6" Min to Joint (Typ)-

BRIDGE RAIL ELEVATION

 $1'' \times 1^{1/2}$

1" x 4" Slotted

holes at bridge-

HSS $6x6x^{1}/_{4}$ (Typ)

Reflector

each post

See M-606-1

 $\bar{\mathbb{C}} \, \bar{2} = \bar{1}^{1} / 2^{11}$

For Details

-tab at

Exp device

Slotted

-holes in

at tubes

each post

(For post spacing, see BXX)

Typical post spacing

10'-0" Max, 6'-8" Min

15/16" x 11/8" Slotted holes at splices

Post-

© 2 - 1" x 1½" horiz slots & 2 - ¾"Ø x 2"

threadéd anchor

(automatically

end welded to

tube) with hex

nuts, hardened

washers, and lock washers

studs

Optional 1/2"Ø

for aalvanizina

drain hole in post-

Utility as

shown in plan

Bar $3x\frac{3}{8}x3''$ with $\frac{15}{16}''\emptyset$ centered hole (Typ)

W6-

¾"Ø hole

reflector

at each

for

post

Designer/

Detailer:

ı dimensions

I to match

| curb/deck

dimensions

location _

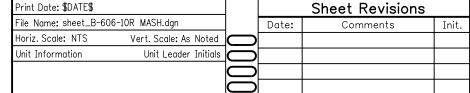
and anchor

Adjust

boxed

All seals for this set of drawings are applied to

the cover page(s)



Colorado Department of Transportation

C CDOT	2829 West Howard Place, 30 Denver, CD 80204 Phone: 303-512-4079 FAX: 303-757-9197	rd Floor
Staff Bridge Br	anch	Initials

	As Constructed	BRIDGI	E RAIL 1	Project No./Code		
	No Revisions:		Project Number			
	Revised:	Designer:	XXXXXXX	o ti do tai o		Code
		Detailer:	XXXXXXX	Numbers	X-XX-XX	
3	Void:	Sheet Subset:	BRIDGE	Subset Sh	eets: BXX of XXX	Sheet Number

(Use with rehab modifications of B-606-10MASH A&B, A-S, C&D, or C-S&D)

- by welding shall be ASTM572 Grade 50. All other steel shall be Grade 36 unless otherwise noted.
- washers shall be galvanized after fabrication in accordance with AASHTO M111. Structural steel elements shall conform to the requirements of Section 509.
- 4. Tubes shall be continuous over not less than two posts, preferably 4 posts tube sections.
- 5. The centerline of the tube splice shall be 1'-8" minimum and 2'-6" maximum from the centerline of the posts.
- 6. All bolts that have lock washers shall be tightened to snug tight only.
- 7. Posts shall be perpendicular to the longitudinal roadway grade.
- 8. One or more 10'-0" post spaces may be reduced (6'-8" Min) in order to transition.
- 9. Payment will be made under item 606, Bridge Rail Type 10R MASH, for all posts, base plates, anchor bolts, miscellaneous bolts, nuts, washers, tubes, tube expansion devices, tube splices, end plates and reflector tabs.
- requirements of Section 105, shall be submitted to the Engineer for information only (Working Drawing).

Design: AASHTO MASH 2016 TL-4 (a) for overlay thickness over 1" (by calculation), with assumed existing curb stirrup of #4 @ 18" (fy=60ksi). AASHTO MASH 2016 TL-3 for overlay thickness over 1" (by calculation), with assumed

Structural Steel:

NOTES:

_¹/₂" Chamfer

1//2

∽@ Post

¾"Ø Hole

tab mount

Tube $5\frac{1}{4}$ " x $5\frac{1}{4}$ "

Tubes and 1/8"0;

71/2" A325 bolts,

hex nuts, washers,

and lock washers

x .3125''' x 3'-0''

fabricated from

%₁" A572

1"Ø Holes in steel plate

© 1/8"Ø holes in concrete

_between tubes for reflector

 $1'' \times 1^{1/2}$ " Horizontal

slots in post at Q

base plate

tubes

<u> 1</u>\$

31/2"

POST DETAIL PLAN

- 1. All tubes shall be ASTM A1085. All posts, base plates, and splice tubes fabricated
- 2. The above material and all anchor bolts and miscellaneous bolts, nuts, and
- 3. The tubes shall be shop bent or fabricated to fit horizontal curve when radius is less than 1,800 feet.
- except at approach slab end joint. No welded butt splices will be allowed in the

- maintain dimensions from the end of the rail and expansion joints or concrete
- 10. Prior to fabrication of this item, an electronic PDF which complies with the

DESIGN DATA

existing curb stirrup of #4 @ 12" (fy=40ksi).

AASHTO M270 Gr 36 (ASTM A709 Gr 36) fv = 36 ksify = 50 ksi fy = 50 ksiAASHTO M270 Gr 50 (ASTM A992/A572 Gr 50) ASTM A1085

FOR INFORMATION ONLY

DESCRIPTION

Structural Steel (Galvanized)

PLAN - TUBE SPLICE

at tube splice, and 1" x 4" slots at bridge expansion device. Slot both inner and outer tubes. Stagger top and bottom splices into different post spacings/spans, except at expansion joint place at opposite ends of same post space/span except as shown in transitions. (Range of motion = 1'-0" at bridge expansion

3'-0"

1'-6"

C Splice

Structure No.

© 2-%"∅ fullv threaded A-449 or ASTM F1554

Init.

Designer/Detailer: Use references dialog box

PL $1\frac{1}{4} \times 10\frac{1}{2} \times 1\frac{1}{11}$

All sides

except as noted 5/16

1/4(1/4)

W6 x 20

in Microstation to

show appropriate

ı transition. Adjust

I transitions for final

l bridge rail heights _ _ ı

See BXX for

Designer/Detailer:

box in Microstation

to select appropriate

ı curb width. Set tubes

1 1/4" behind top point

I of curb face, except

HSS 6x6-

 $(15/16'' \times 11/8'' \text{ slots})$

device.)

with 12" Curb.

Asphalt overlay with aterproofing membra

Comments

Use reference dialoa

Transition Details

C1=1-11" Curb BRIDGE TYPICAL SECTION grout to be included in the bid price for Item No 606 Bridge Rail Type 10R MASH.

Grade 105 galvanized rods with hex nuts and lock washers. Rods to be set in 11/8" ocred holes with an approved epoxy grout. Project rod 21/4" at top and no moré than 2" béyond nut at bottom. If hole can't be drilled through, and bottom projection is unavailable, hole shall be 2'-0" deep. The coring of holes and epoxy

Print Date: \$DATE\$ Sheet Revisions ile Name: sheet_B-606-10R MASH.dgn Date: All seals for this set of Horiz, Scale: NTS Vert. Scale: As Noted drawings are applied to Jnit Information Unit Leader Initials the cover page(s)

[X_11]

Ш

Limits of pay length for Bridge Rail Type 10R MASH

3'-6" Min to Joint (Typ)-

BRIDGE RAIL ELEVATION

 $1'' \times 1^{1/2}$

1" x 4" Slotted

holes at bridge-

HSS $6x6x^{1}/_{4}$ (Typ)

Reflector

each post

See M-606-1

102 = 11/2

For Details

-tab at

Exp device

Slotted

-holes in

at tubes

each post

(For post spacing, see BXX)

Typical post spacing

10'-0" Max, 6'-8" Min

15/16" x 11/8" Slotted holes at splices

Post-

© 2 - 1" x 1½" horiz slots & 2 - ¾"Ø x 2"

threadéd anchor

(automatically

end welded to

tube) with hex

nuts, hardened

washers, and lock washers

studs

Optional 1/2"Ø

for aalvanizina

drain hale in post

핃

Utility as shown

in plans

Bar $3x\frac{3}{8}x3''$ with $\frac{15}{16}''\emptyset$

centered hole (Typ)

W6-

¾"Ø hole

reflector

at each

for

post

Designer/

Detailer:

ı dimensions

I to match

| curb/deck

dimensions

and anchor

location_

Adjust

boxed

C1

C2

C3

Н



	As Constructed	nstructed BRIDGE RAIL TYPE 10R MASH					
	No Revisions:	18'	Project Number				
	Revised:		X Structure		Code		
		Detailer: XXXXXX	χ Numbers	X-XX-XX			
3	Void:	Sheet Subset: BRID	E Subset S	neets: BXX of XXX	Sheet Number		

For 26" Anchor Bolt and 10'-0" Post Spacing

PER LF

57.4

UNIT

LB