

DRAFT

MASH BARRIER DESIGN AIDS

BARRIER LENGTHS:

Reference Chapter 300 of the ADOT Roadway Design Guide to determine End of Barrier Need (LON points)
See C-10.00 and referenced drawings for barrier feature measurements and begin/end Station locations

To determine barrier lengths:

- Determine where hazard begins and ends from mapping or field measurements

- Apply length of need formula on each end to determine begin / end LON points

- Measure distance between LON points along face of barrier and

- subtract end treatments to determine barrier quantities

- Subtract 47' for each end terminal

- Subtract 3' for each end anchor

- Subtract 50' for each transition

- Round barrier quantity

- For concrete barrier quantity, round up to next foot

- For guardrail quantity, round up to next 12.5' increment

- Adjust LON points to match rounded barrier quantities

- Determine Begin/ End Stations and record on Barrier Summary sheet

- For end terminals, Begin/ End Station = LON points

- For transitions and anchors, match Standard Drawing Station location

GUARDRAIL:

Both C-10.03 and C-10.04 should be options for new runs

Always anchor both ends of guardrail with end terminal, end anchor or transition to concrete barrier

Minimum overall run length is 75'

Approach surface should be 10:1 or flatter (8:1 minimum) and typically paved to face of guardrail

Paving should not extend past front face of post without leaveouts

Fixed objects should be located 59" inches behind face of rail (50" for steel posts)

CONCRETE BARRIER:

32" barrier meets MASH TL3 and 42" barrier meets TL5

Median barrier may be used on outside edge as shown in C-10.40 and C-10.41

Upstream end, determine best option between crash cushion or guardrail transition + end terminal

Downstream end, determine best option between extending barrier or guardrail transition + end anchor

Consider "zone of influence" per AASHTO RDG where applicable

Minimize placement of fixtures on top of barrier - place behind barrier where practical

Evaluate glare potential and consider a taller barrier or a MASH approved proprietary glare screen

END ANCHOR:

Use only where end is located outside recovery width of approaching traffic

Verify field conditions will allow the end anchor to extend ~36' beyond the LON point

END TERMINALS:

Tangent terminals should be used whenever practical

List standard drawing numbers of all viable tangent terminal options on summary sheet

Verify field conditions will allow the end terminal to extend up to 16.5' beyond the Begin/End Station

Preferably offset the terminal at least 5' from edge of travel lane

For narrower shoulders, flare guardrail at 30:1 to attain a 5' offset ahead of the end terminal if practical

Otherwise, place tangent terminal at less than 5' offset, or consider using flared terminal

When using flared terminals, insert details and reference details on summary sheet

Use alternative grading for tangent pads per AASHTO Roadside Design Guide if site restrictions require

TRANSITIONS:

Use for roadway and bridge transitions to concrete barrier

Allow wood and steel post options whenever practical

Allow only steel post option if curb is used

For a sag within the transition, consider using a C-15.30 type 4 catch basin with C-4.20 or C-4.50 outlet

TAPERS:

Use R-10 for connecting MASH guardrail to in-place G4 system

Include taper length in guardrail pay item

RECONSTRUCT GUARDRAIL:

Use this item only for in-place, single operation reconstruction

If construction phasing requires storing or hauling, use remove & salvage + construct from salvage instead

Do not re-use 64" wood posts

Do not re-use Cor-ten steel rail or hardware

72" steel posts can be re-used

Only rail with factory-punched bolt holes spaced 3'-1 1/2" apart can be re-used

8" blockouts can be re-used in conjunction with 4" blockouts and longer bolts

GUARDRAIL WITH CURB

In low speed conditions with vertical curb, guardrail may be added where roadside hazards warrant

In high speed conditions with freeway curb, guardrail may be added where roadside hazards warrant

In high speed conditions with embankment curb, guardrail should always be present

Aprons similar to C-10.77 should be used for end terminals and crash cushions with curb

TURNOUT CONFLICTS:

Move or eliminate turnout whenever practical

Add runs before and after turnout to meet LON

Use MASH approved short radius system where practical

Consider Yuma type short radius system where applicable

Consider shop curved radius if necessary

DOWNDRAIN & SPILLWAY INLETS:

Direct buried posts with leaveouts should be placed in downdrain and spillway inlets

NARROW SECTION:

New guardrail should be configured per C-10.01 as nearly as practical

Changes to standard 2' offset should be noted in Summary Sheet Remarks or detail

Other deviations should be noted in a plan sheet detail referenced on Barrier Summary sheet

Methods to avoid barrier encroaching on existing shoulder width by order of preference:

- 1) Flatten slopes or remove hazard to eliminate need for barrier
- 2) Widen slopes to allow standard C-10.01 placement
- 3) Narrow or eliminate the 2' shelf behind posts

Standard 72" posts can be set at a 2:1 slope break point provided you:

- Keep 10:1 or flatter cross slope up to face of guardrail
- Do not use within 12.5' of transitions or end terminals
- Do not omit any posts
- Do not use with curbs

- 4) Narrow or eliminate blockouts

8" blockouts, or no blockouts with backup plates may be used provided you:

- Use only with steel posts
- Keep 10:1 or flatter cross slope up to face of guardrail
- Use 12" blockouts and 2' shelf behind CRT posts in longspan
- One post may be omitted with 8" blockouts without requiring CRTs
- Do not omit 1 post with no blockouts unless using CRTs per above
- Do not use with curb
- Do not use within 25' of transition
- Do not use with reduced post spacing

ELIMINATING POSTS:

Use C-10.06 long span system when culverts or other shallow underground utilities interfere with full depth placement of standard guardrail posts

Long span constraints:

- Do not use without blockouts
- Do not use at 2:1 slope break
- Do not use on approach slopes steeper than 10:1
- Avoid using in conjunction with curb
- Omitted posts cannot be located within:
 - 37.5' of downstream anchor
 - 31.25' of end terminals with offsets of 1' or more
 - 12.5' of end terminals with 0' offset
 - 18.75' of transition to concrete barrier
 - 43.75' of long span system

Long spans are not a separate pay item

- include as part of guardrail length quantities
- and tally on Barrier Summary sheet

SHALLOW BOX POSTS:

Use C-10.07 attached posts for shallow box culverts when long span is not a viable option

Shallow box culvert posts are paid as an each item

and included as part of guardrail length quantities

Coordinate with bridge for special barrier on boxes when neither long span or shallow box posts will work

ENCOUNTERING ROCK:

Use R-10.09 when in-situ rock interferes with post placement