

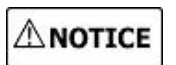


MONTANA FLUME INSTALLATION INSTRUCTIONS

1. Follow all instructions provided by the project engineers in the form of specifications, blue prints, etc.
2. There should be no drops, bends, flow junctions, etc. immediately upstream of the flume location. The flume should be located in a straight section of the open channel.
3. The approaching flow should be uniformly distributed across the channel, tranquil, and subcritical.
4. The approaching flow should not be turbulent, surging, unbalanced, or possessing a poorly distributed velocity pattern.
5. As a general guideline, a straight upstream approach length of 10-20 times the throat width will meet these entrance conditions
 - a. 10 throat widths may be used where the throat width of the flume is larger than half the width of the approach channel
 - b. 20 throat widths should be used where the throat width of the flume is less than half the width of the approach channel
6. If baffles are used to correct or smooth the flow, they should be placed upstream of the flume at a distance of at least 10 times the maximum head. Baffles are not recommended for sanitary or solids laden flows.
7. If the crest of the flume (the converging section's floor) is set above the floor of the channel, the channel should rise at a 1:4 slope just before the flume.
8. For channels wider than the entrance of the flume, radius or flat 45° wingwalls should be used to smoothly direct the flow into the flume. Refer to the U.S. Department of the Interior, Bureau of Reclamation's [Water Measurement Manual](#) for wingwall radii.
9. 1" and 2" throat width flumes should not be used on sanitary flows.
10. Due to the absence of the extended throat section and discharge sections found on the Parshall flume from which the Montana flume was derived from, the discharge from the flume be free spilling.
11. In earthen channels, rip rap may be necessary to minimize or prevent scouring downstream of the flume.



DO NOT USE CABLES OR CHAINS TO UNLOAD FLUMES. UNLOAD FLUMES WITH FABRIC SLINGS IN CONJUNCTION WITH A SPREADER BAR OR BY LIFTING EYES (IF PROVIDED), SPREADING THE LOAD.



THE THROAT OF THE FLUME (THE NARROW SECTION) MUST BE SET DOWNSTREAM AND MUST BE LEVEL FROM FRONT TO BACK AND FROM SIDE TO SIDE. A LEVEL INSTALLATION IS CRITICAL TO THE PROPER OPERATION OF THE FLUME.

12. Set the flume in place and at the elevation indicated on the engineer's drawings.



- 13. For larger flumes, concrete piers may be poured perpendicular to the direction of flow for the flume to sit on. Pre-cast concrete blocks may also be used. When piers or blocks are used, the floor of the flume should rest on them and not on the stiffening ribs or flanges.
- 14. The flume must be secured from flotation. One of the following methods may be used:
 - a. Wire should be run from the anchor clips to rebar, or
 - b. Rebar should be run through the anchor clips.

WARNING	<i>LINE THE INTERIOR OF THE FLUME WITH PLYWOOD AND BRACE THE FLUME INTERNALLY WITH 2 X 4'S TO ENSURE THAT THE DISTORTION DOES NOT OCCUR. THIS IS ESPECIALLY TRUE OF FLUMES 12 INCHES AND LARGER.</i>
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- 15. Sandbags may be placed inside the flume to prevent it from floating in wet concrete.
- 16. Grout the flume in place. The first pour should just cover the bottom of the flume and should be allowed to cure before the sidewalls are grouted. Once the first pour has set, grout the sidewalls in 6" (15,24 cm) lifts, letting each lift cure before proceeding.
- 17. With large flumes, grout one section between the piers (or blocks) at a time. Due to the distances involved, a grout hose may be required. Flow grout from only one side of the flume.
- 18. The use of a vibrator should be minimized as excessive use may bulge or distort the flume sidewalls and bottom. Chaining is recommended in lieu of vibrator sticks.

WARNING	<i>NO VOIDS OR AIR POCKETS SHOULD REMAIN IN ANY GROUT POUR. FAILURE TO ELIMINATE VOIDS OR POCKETS WILL RESULT IN SETTELING OR BULGING OF THE FLUME AND IS NOT WARRANTABLE.</i>
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