

ANHYDROUS AMMONIA

Storage Facility Traffic Protection Guidelines

Physical/Traffic Storage System Protection

Minnesota Rules (Parts 1513.0160 and 1513.0370) requires that storage systems (storage tanks, piping, appurtenances and nurse tank riser areas) be located or protected by suitable barriers so as to avoid physical damage that might result from impact by moving machinery, automobiles, trucks, or any other equipment at the facility.

Protection Model Design Considerations

In developing adequate protection models, a “typical” situation was considered. Barriers utilized in providing protection must deflect/repel/withstand a vehicle impact equivalent to a standard size pickup truck towing a full 1000-1500 gallon NH₃ nurse tank at a speed of 5-10 mph. Another consideration is the cost effectiveness associated with materials used to provide suitable protection models. For this reason, specified protection models (curb barrier and post protection models) were developed. Higher levels of protection may be necessary whenever larger equipment, vehicles, etc. routinely travels in a storage system area.

Curb Barrier Protection Model

1. **Minimum Dimensions:** Consist of a curb barrier sixteen (16) inches high and eight (8) inches wide;
2. **Materials:** Construct of a durable material (i.e. concrete, etc.) able to deflect/repel/withstand impact of a vehicle, etc.;
3. **Stabilize:** With metal stakes going to a depth of two (2) feet below ground level. Curb barriers of sufficient height/size may be recessed 8-10 inches below ground level or 8-10 inches of Class 2 aggregate packed behind barriers;
4. **Warning Markers:** For curb barriers less than three (3) feet in height: Install warning markers (i.e. light duty posts/rebar, etc. painted with a contrasting color), positioned every five (5) feet, and at a minimum height of three (3) feet from ground level. Warning markers serve to alert those operating vehicle or equipment in the area of the storage system where curb barriers/tank/appurtenances are located. Guards over the top of pointed/rigid anchoring rods/warning markers for impalement protection are recommended, especially around nurse tank riser areas;
5. **Spacing:** Allow adequate spacing [maximum spacing of three (3) feet] between each curb barrier to ensure accessibility to and from storage system; and
6. **Setback Distances:** Position curb barriers no closer than three (3) feet from storage system. Position curb barriers no closer than one (1) foot from the fixed portion of riser platforms/steps.

Figures 1 and 2 (see page 2) illustrate the curb barrier protection model.

Post Protection Model

1. **Minimum Post Size:** Four (4) inch steel piping with a wall thickness of .237 inches filled with concrete.
2. **Position** posts three (3) feet above ground level;
3. **Bury** posts to a depth of four (4) feet below ground level with twelve (12) inch diameter concrete foundation;
4. **Space** posts at four (4) foot intervals (between single posts) or ten (10) foot intervals when posts are connected together (post/barrier) by means of a highway rated barrier (i.e. guardrail). If post/barrier protection is installed allow adequate spacing [maximum of three (3) feet] between each post/barrier structure to ensure accessibility to and from storage system.
5. **Position** post or post/barrier protection no closer that three (3) feet from storage system. Position post or post/barriers protection no closer that one (1) foot from the fixed portion of riser platforms/steps.

Figures 3, 4, and 5 (see page 2) illustrate the post protection model.

Figure 1. Overhead view of curb barrier protection model. Warning markers (solid circles = ●) must be installed if curb barriers are less than 36 inches above the ground level. Illustrating curb barriers (CB) with space = (s) between CBs. Spacing between CBs must be no more than three (3) feet.

CB●	s	CB●	s	CB●	s	CB●	s	CB●	s	CB●	s	CB●
CB●	Area of:										CB●	
s	Storage Tank(s)/System Piping/Appurtenances										s	
CB●	<ul style="list-style-type: none"> ▶ CBs no closer than 3 feet from tank/piping/etc. ▶ Spacing between CBs no greater than 3 feet ▶ Stabilize CBs as noted in the fact sheet ▶ CB protection must not impede operation of pull-away protection. 										CB●	
s											s	
CB●	Nurse Tank Riser Areas										CB●	
s	<ul style="list-style-type: none"> ▶ Fixed portion of riser platform/steps must be protected. ▶ CBs no closer than 1 foot from fixed portion of riser platform and steps. ▶ CBs no closer than 3 feet from riser piping. ▶ Spacing between CBs no greater than 3 feet. ▶ Stabilize CBs as noted in the fact sheet. ▶ Fold down portion of platform may fold down over CBs. ▶ Allow access to safety water from steps. ▶ CB protection must not impede operation of pull-away protection. 										CB●	
CB●											CB●	
s											s	
CB●	s	CB●	s	CB●	s	CB●	s	CB●	s	CB●	s	CB●

Figure 2. View of a 16 inch high by 8 inch wide protective curb barrier. Note the use of anchoring rods as warning markers.

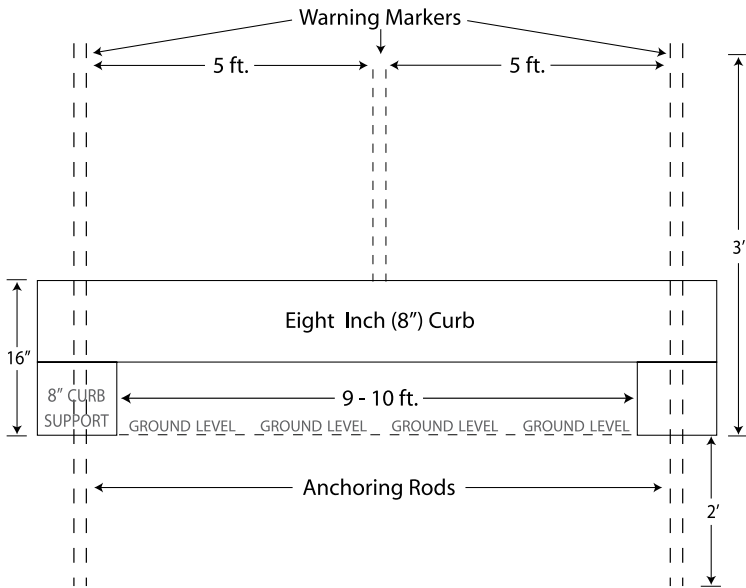


Figure 3. Overhead view of nurse tank riser area post protection model – Post (●) and space = (s) between posts.

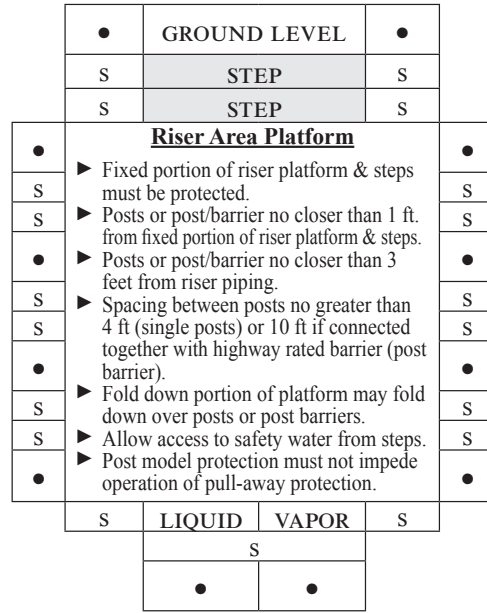


Figure 4. Overhead view of post protection model around storage tank. Post model protection must not impede operation of pull-away protection.

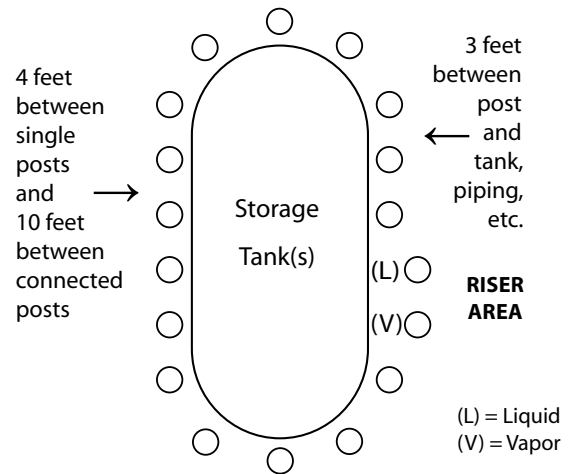
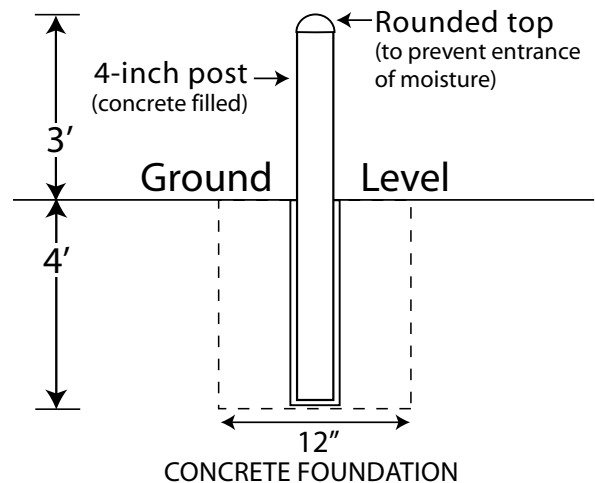


Figure 5. View of post specifications:



Combination or Other Models of Physical/Traffic Protection

A combination of curb barrier and post protection, as specified for each model, may be used to provide adequate storage system protection. Other equivalent protection may be used.

Accessibility

Regardless of the 'model' of protection used it is important to allow access to and from a storage system for authorized personnel and emergency responders. For example, curb barrier or post/barrier structures used for protecting a storage system must accommodate adequate accessibility (*i.e. spacing between curb barriers or post/barriers structures*)

Physical/Traffic Protection Is Not Required When:

1. Areas of a storage system are inaccessible to moving machinery, vehicles, etc.
 2. Barriers are installed to prevent the entrance to areas of a storage system by moving machinery, vehicles, etc.; and
 3. Other equivalent barriers (reinforced elevated walkway/platform, dike, etc.) are present, protecting the storage system and/or the preventing entrance by moving machinery, vehicles, etc.
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Questions or Requesting Guidance

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