



Foundation Depth Reference: Shallow vs. Standard Mount

In a vehicle impact, the foundation is half the barrier. This note explains what the foundation does during a crash, how shallow-mount systems differ from standard embedment, and the questions to resolve before a foundation depth is written into a specification.

1 What the foundation does in a crash

A crash-rated bollard or barrier does not stop a truck by itself — it transfers the impact energy into the ground. The foundation resists overturning and translation while the barrier element yields and the vehicle crushes. Change the foundation and the load path changes: **the crash rating certifies the barrier-plus-foundation system exactly as tested**, including embedment depth, concrete dimensions, reinforcement, unit spacing, and the soil or slab condition around it. This is why ASTM F2656 test reports document the foundation in detail, and why a rating quoted without its foundation is an incomplete claim.

2 Standard vs. shallow mount

	STANDARD EMBEDMENT	SHALLOW MOUNT
Typical depth	Roughly 36–60 in. of embedment and footing, per the tested design	Roughly 8–18 in. total system depth, per the tested design
How it resists	Deep passive soil/concrete engagement below grade	Wide spread footing or engineered tray; resists by geometry and mass rather than depth
Where it wins	Open sites with clear ground; generally the least costly certified capacity	Over utilities, on structural slabs, bridges, plazas, and urban streets where digging is limited
Watch for	Utility conflicts, high water table, frost depth, adjacent structures	Larger footprint, drainage detailing, slab capacity, edge distance to vaults and joints

Neither is "better." A third-party certified shallow system with its tested tray is a legitimate M-rated barrier; an improvised shortened foundation under a deep-mount product is an uncertified guess. The depths above are typical ranges for orientation only — **the controlling number is always the depth on the product's own crash test report.**

3 Questions to resolve before writing the depth

- **What does the lab report show?** Foundation depth, width, reinforcement, and spacing from the test article govern. Obtain the report before design development, not at submittal.

- **What is actually under the line?** Utility locates and a geotech report come before the barrier line is fixed. Discovering a duct bank at 24 in. after specifying a 48 in. foundation is a change order, not a detail.
- **Is the soil the tested soil?** Reports state the test-site condition. Weak or saturated soils may need an engineered redesign — by the manufacturer's engineer of record, kept within the certified configuration's limits.
- **Slab or grade?** On structure, the deck takes the impact reaction: involve the structural engineer, and prefer systems certified in a slab-mounted configuration.
- **Drainage and corrosion:** foundations collect water; detail drainage and coating/galvanizing so the certified steel section is still there in year fifteen.

The one-sentence rule: if the installed foundation does not match the tested foundation, the installation does not carry the rating — no matter what the bollard on top is certified to.

4 Specification language

Tie the foundation to the certification rather than restating a depth that may drift:

- "Barrier foundation shall match the foundation configuration documented in the manufacturer's ASTM F2656 crash test report, including embedment depth, dimensions, reinforcement, and unit spacing."
- "Deviations from the tested foundation shall be designed and sealed by the manufacturer's engineer of record and submitted with justification referencing the tested configuration."

Status of this note: Draft for review. Depth figures are typical industry ranges for orientation, not certified values; the tested configuration on the product's lab report always governs. Verify before release. NPSI sells no products and lists no manufacturers in this note.