

**TECHNICAL
BRIEF**

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Product Specification

Orion™ Steel Longitudinal Barrier

I. General

The Orion system is a Longitudinal Barrier in accordance with the definitions in the National Cooperative Highway Research Program Report 350 (NCHRP Report 350). The system has been tested and performs in an acceptable manner in accordance with the guidelines of NCHRP Report 350 at Test Level 3 (100 km/h).

II. Performance

The Orion system is designed to redirect an errant vehicle in accordance with NCHRP Report 350 guidelines for Longitudinal Barriers. The system is designed to provide positive work zone barrier protection to temporary construction sites and other miscellaneous roadside activities. When installed in accordance with the manufacturers' instructions, the Orion system is capable of redirecting a 4,400 lb (2000 kg) pickup truck impacting the system at 100 km/h (62.3 mph), 25 degrees and an 1800 lb (820 kg) compact vehicle impacting the system at 100 km/h (62.3 mph), 20 degrees.

- A. When properly installed according to the manufacturer's recommendations, the Orion system shall be able to meet the recommended structural adequacy, occupant risk, and vehicle trajectory criteria set forth in the NCHRP Report 350 for Test Level 3 (100 km/h) Longitudinal Barriers. The NCHRP Report 350 TL-3 Test Matrix includes the following conditions:
1. A 820 kg vehicle impacting at 20 degrees on a 230ft (70m) installation. The CIP was 142ft (43.3m) from the downstream end and each end unit was pinned to the ground only. (Test 3-10)
 2. A 2000 kg vehicle impacting at 25 degrees on a 230ft (70m) installation. The CIP was 141ft (43m) from the downstream end and each end unit was pinned to the ground only. (Test 3-11)

3. A 2000 kg vehicle impacting at 25 degrees on a 161ft (49.2m) installation. The CIP was 40ft (12m) from the downstream end and each end unit was pinned to the ground only. (Test 3-21)
 4. A 2000 kg vehicle impacting at 25 degrees on a 154ft (47m) installation. The CIP was 77ft (23.5m) from the downstream end and each end unit was pinned as well as 1 pin on the impact face side of the barrier every 12.5ft (3.81m) for the entire length of the installation. (Test 3-11)
- B. The impact velocity of a hypothetical front seat passenger against the vehicle interior, as calculated from the longitudinal vehicle acceleration and 600 mm [23 5/8 in] forward displacement, and the lateral vehicle acceleration and 300 mm [12 in] lateral vehicle displacement, shall be less than 12 m/s (39.3 ft/s). The highest 10 ms average vehicle acceleration in the longitudinal and lateral directions subsequent to the instant of hypothetical occupant impact shall be less than 20 g's.

Detached debris shall not show potential for penetrating the vehicle occupant compartment or present a hazard to other traffic, pedestrians, or workers in a work zone. The vehicle shall remain upright during and after the collision although moderate roll, pitch, and yaw may occur.

III. Description of System

- A. The Orion shall be made up of the following components and each segment shall be fabricated from materials conforming to the following specifications:
1. An Orion segment consists of external guardrail panels connected to a series of internal frames and trays using typical guardrail fasteners.
 - a. All steel structural components shall be fabricated from mild steel in conformance with ASTM A-36 specifications or equivalent. These components shall be hot dipped galvanized per ASTM-123.
 - b. The W-Beam rail elements shall conform to AASHTO RWM02A Class B guardrail or equivalent.
 - c. The Thrie Beam rail elements shall conform to AASHTO M180, Type II or IV or equivalent. The Thrie Beam shall be an 8 space rail.
 - d. Fasteners shall be Class 5.8 (Grade 2) or greater and hotdipped or mechanically galvanized in accordance with ASTM 123 or ASTM-153.
- B. An 11.7 m (38.5 ft.) Orion segment is approximately 450 mm (18 in) wide and 865 mm (34 in) tall and weighs approximately 900 kg (1985 lbs.)

- C. The Orion system shall be assembled and installed in accordance with the manufacturers' instructions.

IV. Application of Safety Appurtenances

Highway safety appurtenances should be applied to hazardous sites in accordance with the guidelines and recommendations in the American Association of State Highway Transportation Officials (AASHTO), "Roadside Design Guide", and other Federal Highway Administration and State Department of Transportation requirements. Placement of the Orion system must comply with these specifications and guidelines as well as those of the manufacturer.