



U.S. Department
of Transportation
**Federal Highway
Administration**

1200 New Jersey Ave., SE
Washington, D.C. 20590

March 10, 2011

In Reply Refer To:
HSST/B- 216

Mr. Gary D. Miracle, President
Cumberland Barrier, Inc.
7685 Old Woods Court
Springboro, OH 45066

Dear Mr. Miracle:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system:	Cumberland Barrier, Inc. Emergency Median Access Barrier System (EMA)
Type of system:	Permanent Barrier
Test Level:	AASHTO Manual for Assessing Safety Hardware (MASH) Test Level 3 (TL-3)
Testing conducted by:	Transportation Research Center (TRC)
Date of request:	December 21, 2010
Date initially acknowledged:	December 22, 2010
Task Force 13	
Drawing Designator:	SGM31

You requested that we find this system acceptable for use on the NHS under the provisions of the American Association of State Highway and Transportation Officials (AASHTO) "Manual for Assessing Safety Hardware" (MASH).

Requirements

Roadside safety devices should meet the guidelines contained in the MASH.

Decision

The following device was found acceptable, with details provided below:

- EMA

Description

The Cumberland Barrier, Inc. EMA allows access through a 50-inch concrete median barrier. The gate is an 18 feet long continuous steel fabrication with no splices except at the extreme



ends where the gate's horizontal members slide up and down between the flanges of the W12 x 40 end posts. The gate has an embedded concrete foundation roughly 26 feet long and 9 feet deep.

The EMA units for concrete barrier walls will include a concrete transition wall. The transition wall has the same profile as the median barrier and runs 10 feet past Cumberland's median access gate. The last 6 feet of transition wall are constructed to the state's median barrier specifications. For this test, the wall constructed was a Kentucky standard 50-inch wall, a Type C new flexible pavement barrier which is 12 inches at the top, with a Kentucky Foundation, which has an 8-inch thick aggregate base with a minimum 3-inch thick asphalt cap. The aggregate base and asphalt cap were 5 feet wide on either side of the wall. To meet the MASH minimum wall length for testing, an additional 7 feet of Kentucky standard 50-inch wall was installed downstream of the 10 feet transition wall.

TRC's vehicle tow cable has a sub-surface pit for cable turn-around sheaves that prohibits upstream wall construction. This was further discussed with Mr. Nick Artimovich, FHWA Office of Safety on January 10, 2010. After this discussion it was decided that due to this physical limitation of available space upstream of the median gate, the upstream end of the gate was to be securely braced with lateral and longitudinal supports as though it were attached to a concrete wall.

Details of the Cumberland Barrier, Inc. EMA are provided as enclosure to this correspondence.

Crash Testing

Physical crash test for TL-3 as per MASH requires that longitudinal barrier systems be subjected to the following two full-scale vehicle crash tests:

1. Test Designation 3-20. An 1,100-kg (2,425-lb) passenger car impacting at a nominal speed and angle of 100.0 km/h (62.1 mph) and 25 degrees, respectively.
2. Test Designation 3-21. A 2,270-kg (5,004-lb) pickup truck impacting at a nominal speed and angle of 100.0 km/h (62.1 mph) and 25 degrees, respectively.

A single test was requested and discussed with Mr. Artimovich on January 4, 2010. After this discussion it was decided that this situation is the same as that described in the first sentences of MASH 2.3.2 were the splice is coincident with the hard point and a single test is recommended to evaluate both Critical Impact Points (CIP's). Therefore, only test designation 3-21 was conducted for the free-standing temporary barrier system described within the description section of this correspondence.

The EMA was positioned such that the right front corner of the impacting 2270P vehicle struck the gate at the CIP of 4.3 feet upstream from the inside edge of the downstream steel end post.

Findings

The analysis of the MASH Test Designation 3-21 showed there were no detached elements from the impacting vehicle or gate system that penetrated the occupant compartment of the impacting vehicle or presented hazards to others in the area. There was no significant deformation of the

roof, windshield or occupant compartment. The occupant impact velocities and ridedown accelerations were within the recommended limits for the impacting vehicle. The maximum occupant impact velocities were 4.76 m/s longitudinally and 9.28 m/s laterally. The maximum ridedown accelerations were 6.43 g longitudinally and 10.64 g laterally.

Therefore, the system described in the request above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

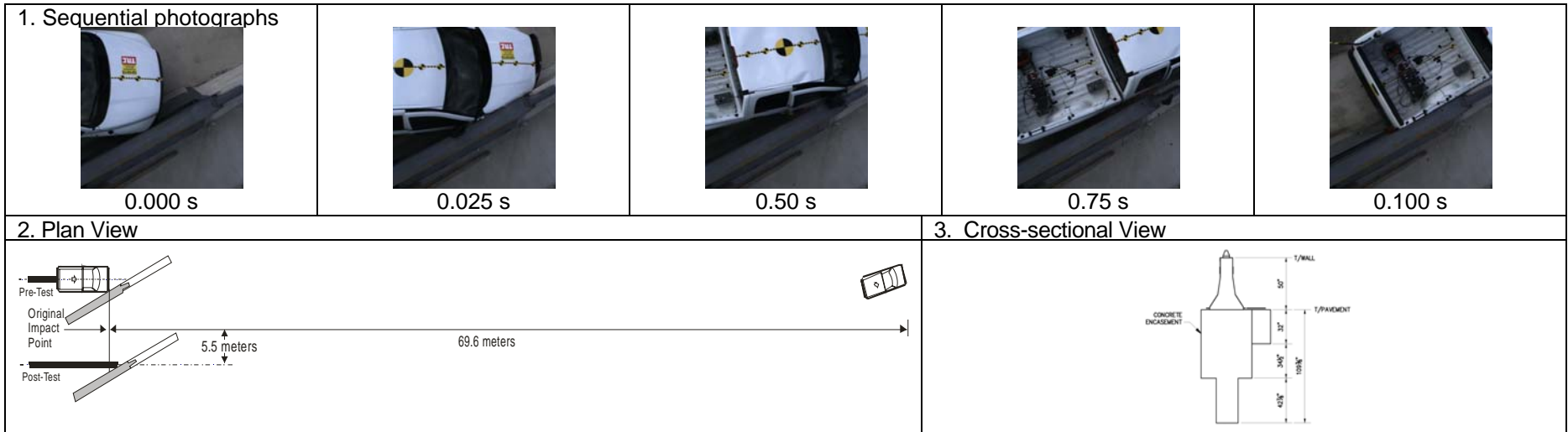
- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the AASHTO MASH.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B- 216 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely,



Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures



4. General Information:

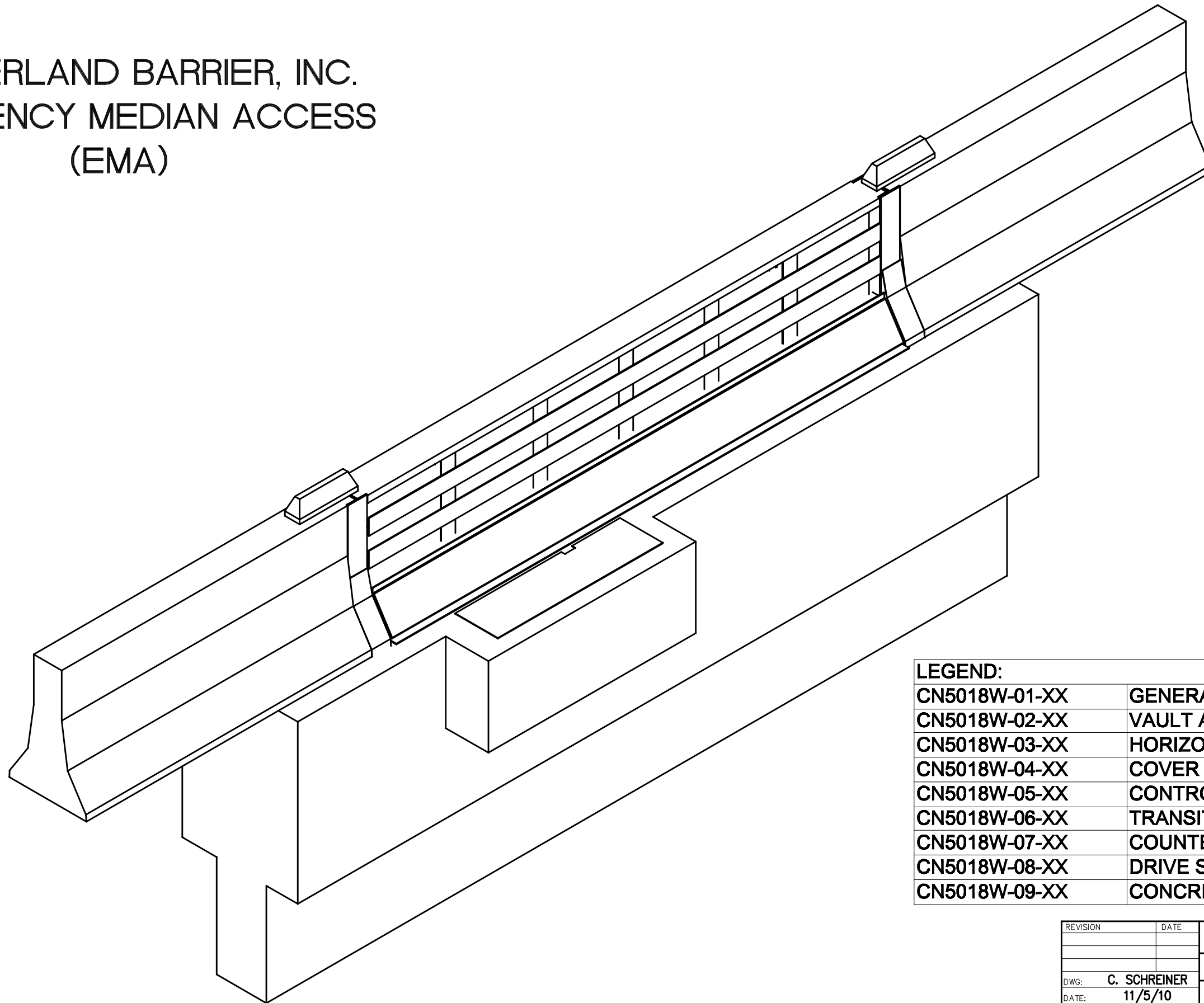
- Test Agency: Transportation Research Center Inc.
 - Test Number: 101015
 - Date: October 15, 2010
5. Test Article:
- Type: Emergency Median Access
 - Installation Length: Longitudinal Barrier Gate
 - Key Elements: 18 feet
 - Key Elements: Steel Barrier Gate, concrete foundation
6. Soil Conditions:
- Type of Soil: Not applicable
 - Soil Strength: Not applicable
7. Test Vehicle:
- Type/Designation: Production Model 2270P
 - Make and Model: 2004 Dodge Ram 1500
 - Test Inertial: 2294.2 kg
 - Gross Static: 2294.2 kg
8. Impact Conditions:
- Speed: 100.1 km/h
 - Angle: 25 degrees
 - Location/Orientation: 1.3 m upstream from the inside edge of the gate's steel end post

9. Exit Conditions:

- Speed: 100.1 km/h (estimated)
 - Angle: 5 degrees (estimated)
 - Exit Box Criterion: Met
10. Post-Impact Trajectory:
- Vehicle Stability: Satisfactory
 - Stopping Distance: 69.6 m downstream; 5.5 m laterally left
11. Occupant Risk:
- Longitudinal OIV: 6.43 g
 - Lateral OIV: 10.64 g
 - Longitudinal RA: 4.76 m/s
 - Lateral RA: 9.28 m/s
12. Test Article Damage: Slight
13. Test Article Deflections:
- Permanent Set: 0.0 mm
 - Dynamic: 0.0 mm
 - Working Width: 762 mm
14. Vehicle Damage: Moderate
- VDS: N/A
 - CDC: 01FZEW2
 - Maximum Deformation: 329 mm

Figure 35. Summary of results for test 101015

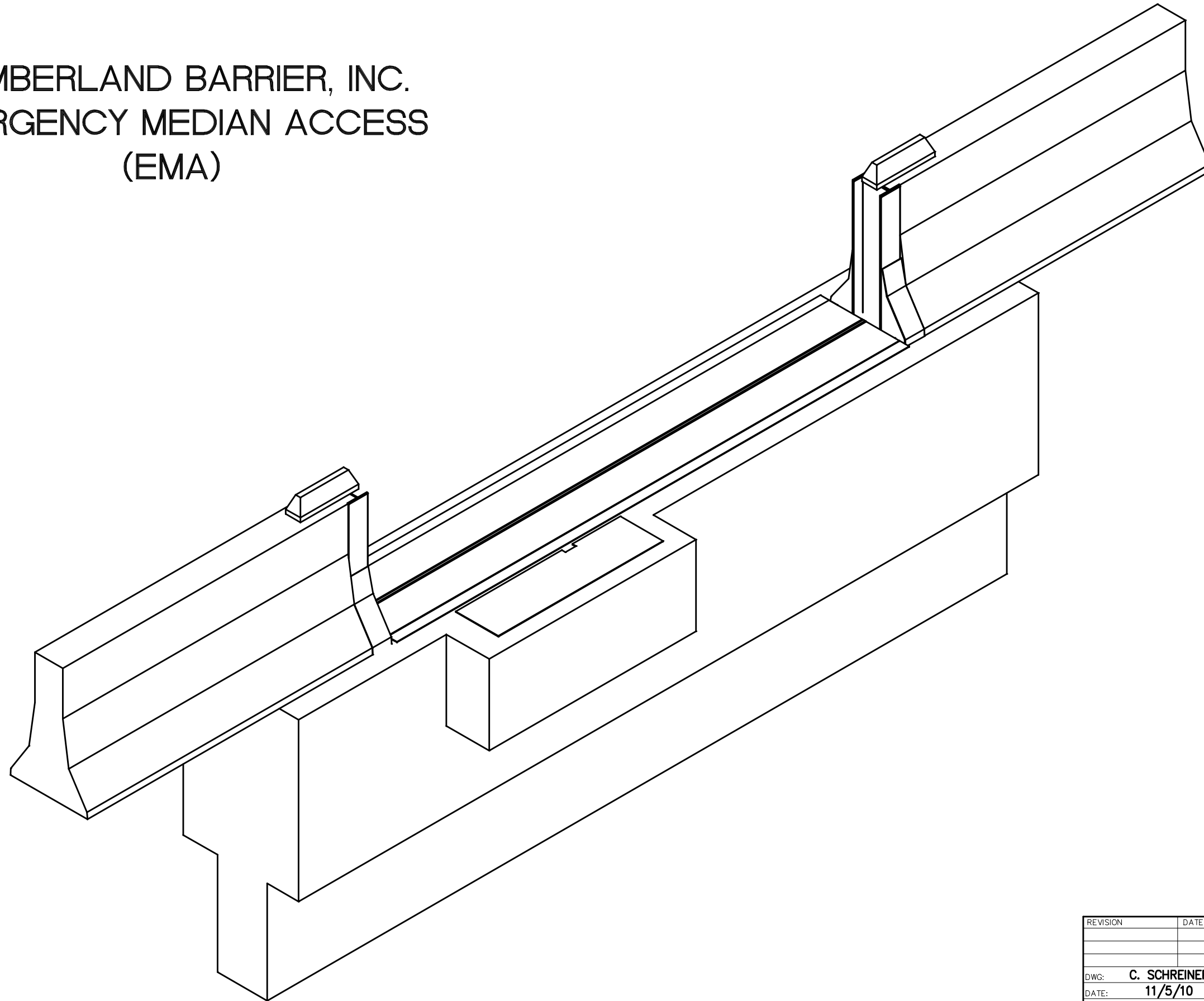
CUMBERLAND BARRIER, INC.
EMERGENCY MEDIAN ACCESS
(EMA)



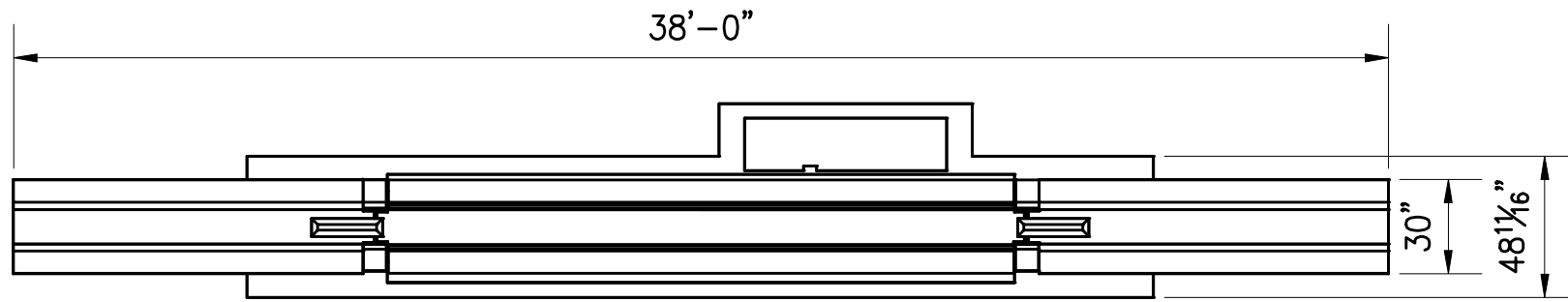
LEGEND:	
CN5018W-01-XX	GENERAL ARRANGEMENT
CN5018W-02-XX	VAULT ASSEMBLY
CN5018W-03-XX	HORIZONTAL MEMBERS
CN5018W-04-XX	COVER PLATE & HINGES
CN5018W-05-XX	CONTROL BOX
CN5018W-06-XX	TRANSITION PLATES
CN5018W-07-XX	COUNTERWEIGHT SYSTEM
CN5018W-08-XX	DRIVE SYSTEM
CN5018W-09-XX	CONCRETE / REBAR

REVISION	DATE	CUMBERLAND BARRIER, INC.
DWG:	C. SCHREINER	DEPLOYED BARRIER
DATE:	11/5/10	CN5018W-01-01
CKD:		
SCALE:	N.T.S.	

CUMBERLAND BARRIER, INC.
EMERGENCY MEDIAN ACCESS
(EMA)

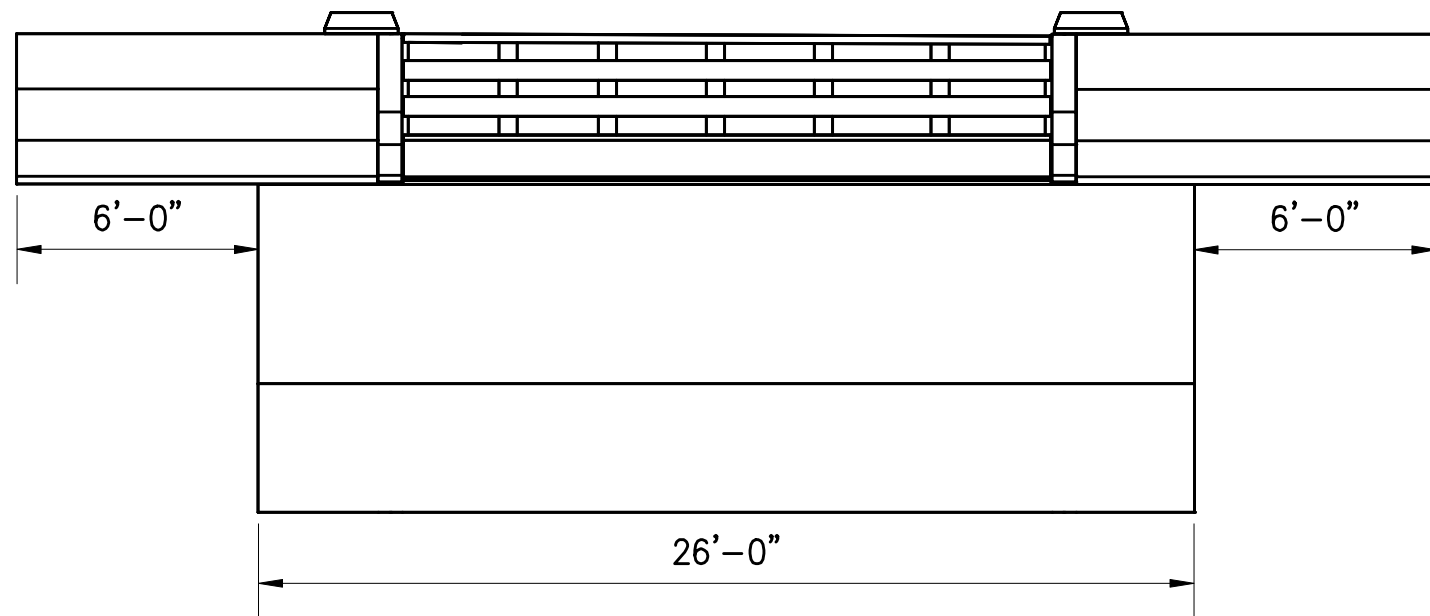


REVISION	DATE	CUMBERLAND BARRIER, INC. <i>EMERGENCY MEDIAN ACCESS</i> CLOSED BARRIER CN5018W-01-02
DWG: C. SCHREINER		
DATE: 11/5/10		
CKD:		
SCALE: N.T.S.		



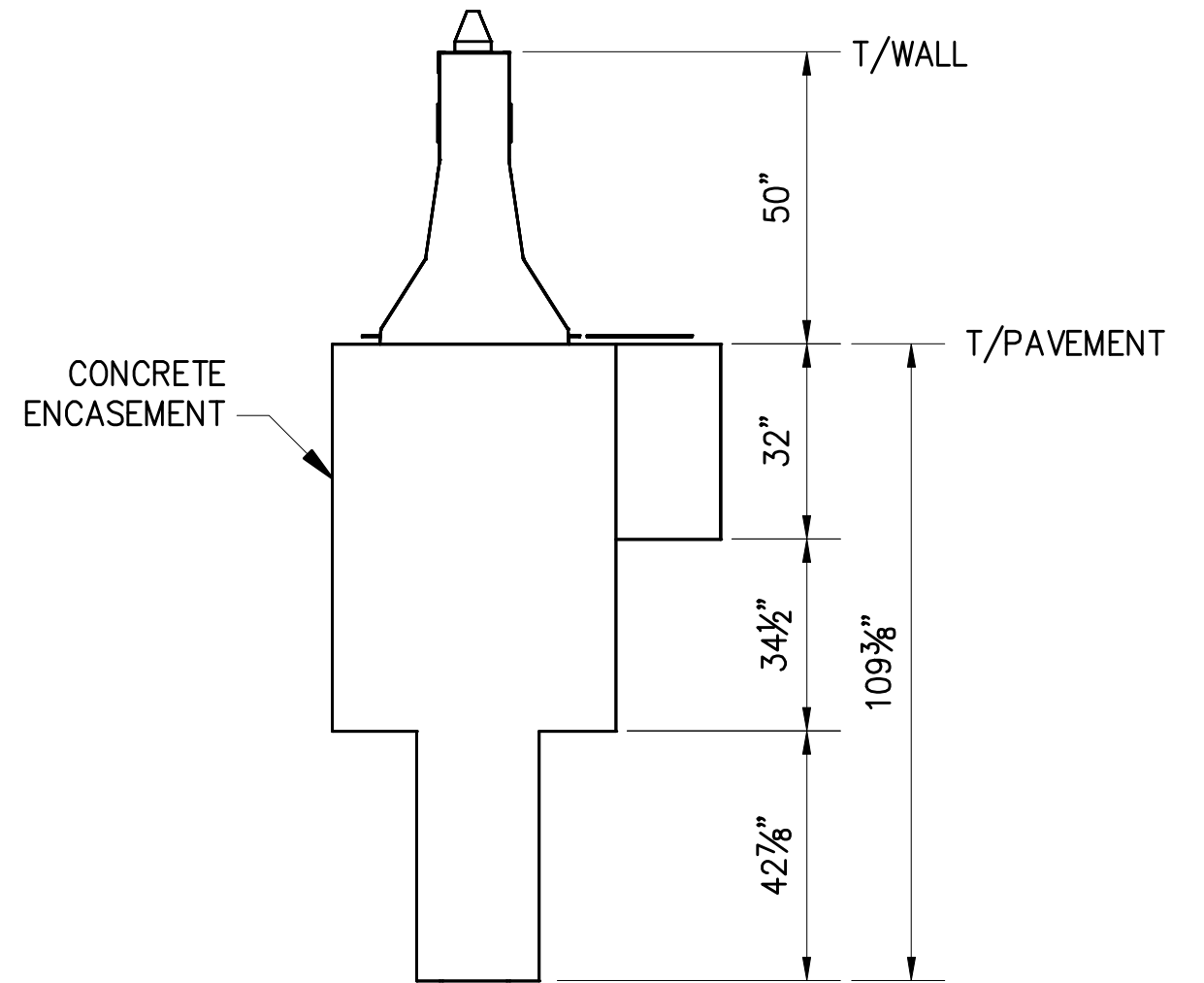
PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3-16" = 1'-0"



SIDE

SCALE: 3/8" = 1'-0"

REVISION	DATE	CUMBERLAND BARRIER, INC.
DWG:	C. SCHREINER	EMERGENCY MEDIAN ACCESS
DATE:	11/5/10	DEPLOYED BARRIER
CKD:		CN5018W-01-03
SCALE:	VARIES	