March 26, 1999

Refer to: HMHS-B52

Mr. John Dallain
Vice-President
EASI-SET INDUSTRIES
Post Office Box 300
Midland, Virginia 22728

Dear Mr. Dallain:

In your March 12 letter to Mr. Richard Powers of my staff, you requested the Federal Highway Administration's (FHWA) acceptance of your J-J Hooks temporary barrier connection when used with either a New Jersey or F-shape concrete barrier. To support your request, you sent copies of a Texas Transportation Institute report dated March 1999 entitled "NCHRP Report 350 Test 3-11 of the J-J Hooks Jersey Shape Portable Concrete Barrier", by Menges, Booth, Williams, and Schoeneman. You also sent us video tapes of the test that was run.

The barrier tested was a standard height (813 mm) New Jersey shape portable concrete barrier. Each segment was 3658-mm long and connected together by steel J-J hooks cast into each segment. These "hooks" were formed from 10-mm thick steel plates which were connected through the barrier by three No.16 ASTM A706 Grade 60 reinforcing bars. Additional reinforcement in the barrier consisted of welded wire fabric throughout its length. Design details are shown in Enclosure 1 for the New Jersey shape and in Enclosure 2 for the F-shape.

NCHRP Report 350 test 3-11 was run on a free-standing installation comprised of 16 connected segments totaling 58.56 m in length. The impact point was approximately 21.2 m from the upstream end or 1.2 m upstream from the joint between segment 7 and segment 8. Maximum deflection under this test set-up was reported as 1.3 m. The test vehicle was contained and redirected upright and all appropriate Report 350 evaluation criteria were met. Summary data from this test are shown in Enclosure 3.

Based on our review of the information you submitted, we find the J-J hook design to meet the requirements for an NCHRP Report 350 test level 3 (TL-3) barrier when used with 3658-mm long portable New Jersey shape concrete barriers or with an F-shape concrete barrier having the same base width (600 mm) as the tested New Jersey design. Since the J-J Hook design is

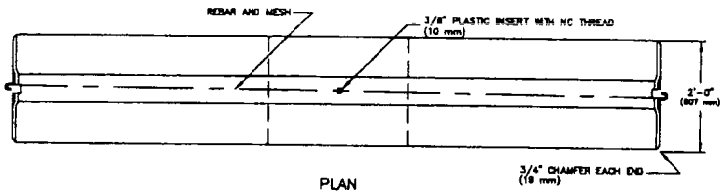
proprietary, its use on Federal-aid projects, except exempt projects not on the National Highway System, remains subject to the conditions listed in Title 23, Code of Federal Regulations, Section 635.411 when its use is specified by the contracting authority. Please do not hesitate to call Mr. Powers at (202) 366-1320 should you have any questions regarding this letter.

Sincerely yours,

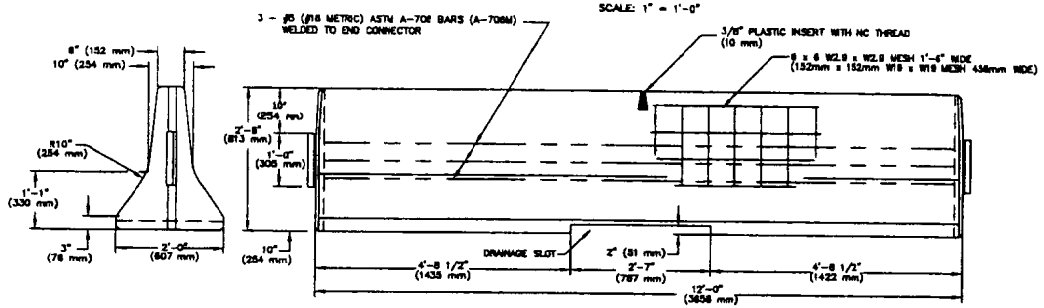
(original signed by Dwight A. Horne)

Dwight A. Horne
Director, Office of Highway Safety Infrastructure

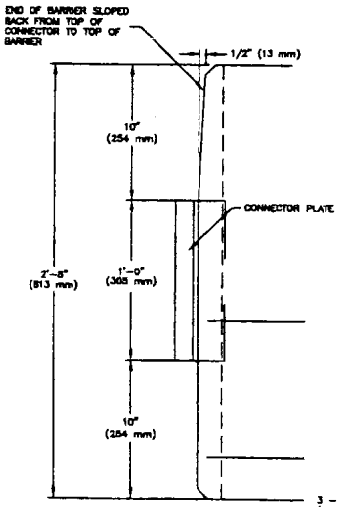
3 Enclosures



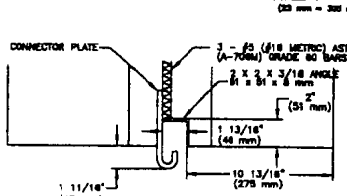
PLAN
SCALE: 1" = 1'-0"



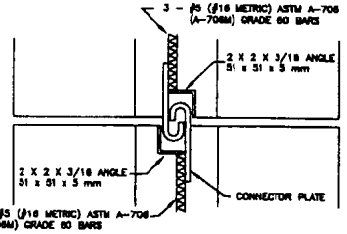
ELEVATION
SCALE: 1" = 1'-0"
(25 mm = 305 mm)



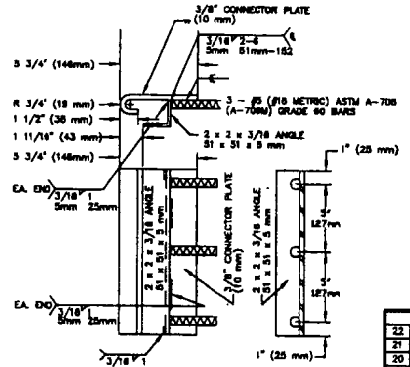
ELEVATION AT END
SCALE: 3" = 1'-0"



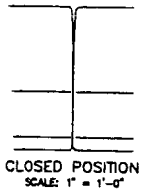
PLAN OF END
SCALE: 3" = 1'-0"



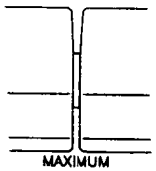
POSITIVE CONNECTOR
SCALE: 3" = 1'-0"



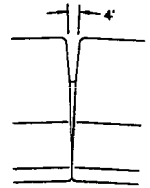
CONNECTOR PLATE DETAIL
SCALE: 3" = 1'-0"



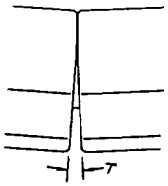
CLOSED POSITION
SCALE: 1" = 1'-0"



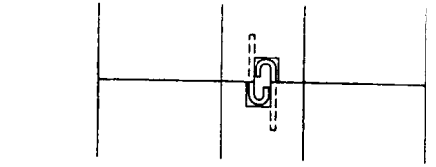
MAXIMUM SEPARATION
SCALE: 1" = 1'-0"



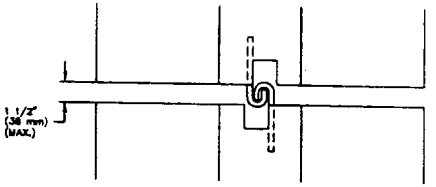
VERTICAL ROTATION
MINIMUM VERTICAL CURVE RADIUS = 175' (53.3 m)
SCALE: 1" = 1'-0"



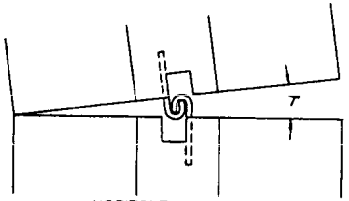
VERTICAL ROTATION
MINIMUM VERTICAL CURVE RADIUS = 100' (30.5 m)
SCALE: 1" = 1'-0"



CLOSED POSITION
SCALE: 3" = 1'-0"



MAXIMUM SEPARATION
SCALE: 3" = 1'-0"



HORIZONTAL ROTATION
MINIMUM HORIZONTAL RADIUS = 100' (30.5 m)
SCALE: 3" = 1'-0"

GENERAL NOTES AND SPECIFICATIONS:

MATERIALS: (MUST CONFORM WITH STATE MATERIAL SPECIFICATIONS.)
- CONCRETE: CLASS AA CONCRETE 5000 PSI (34 MPa) MINIMUM COMPRESSIVE STRENGTH IN 28 DAYS.
- REINFORCING: ASTM A-706 (A-706M) GRADE 60. REBARS WELDED TO STEEL CONNECTOR PLATES. ASTM A-185 (A-185M) WELDED WIRE FABRIC
- STEEL: ASTM A-36 (A-36M) (PLAIN).

TOLERANCE:
- CONNECTOR LOCATION +/- 1/16" (1.6mm)
- WIDTH OF CONNECTOR @ B + 1/32" (0.8mm)
- CONNECTOR PLATE SIZE + 1/8" (3.2mm)
- BARRIER LENGTH + 1/4" (6.4mm)

WELDING:
ALL WELDING TO BE IN ACCORDANCE WITH AMERICAN WELDING SOCIETY (AWS) STRUCTURAL WELDING CODES

DESIGN:
FHWA APPROVED SHAPE. J-J HOOKS IS ACCEPTED BY FHWA AS A CRASH TESTED AND OPERATIONAL DESIGN FOR USE ON ALL FEDERAL-AID HIGHWAY PROJECTS.

INSTALLATION:
BARRIERS ARE TO BE INSTALLED AT MAXIMUM SEPARATION IN ORDER TO MINIMIZE BARRIER DEFLECTION UPON IMPACT.

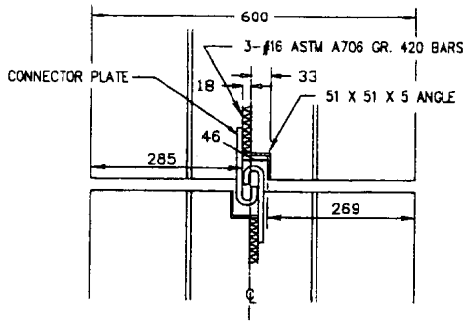
F.H.W.A. APPROVED FOR USE ON ALL FEDERAL-AID HIGHWAY PROJECTS 11/8/90.

REVISIONS					
22			11	WELD SYMBOLS (6-21-94)	
21			10	U.S. PATENT APPROVED (8-2-94)	
20			9	MESH SIZE CORRECTED (8-2-93)	
19			8	ADD METRIC DIM. (7-2-92)	
18			7	ADD SCALE TO DWG. (6-30-92)	
17			6	MODIFY "J" HOOK (4-22-92)	
16			5	REM. MORTAR GROOVE (4-22-92)	
15	03/15/96	CHANGED "MATERIALS" GENERAL NOTE	4	DEL. REV. 1 AND 2 (3-11-92)	
14	12/11/95	ADD #5 (#16 METRIC) REBAR	3	TEXT REV. (2-10-92)	
13	12/11/95	REVISED METRIC REFERENCES	2	REV. MIN. HORIZONTAL ROTATION	
12	12/11/95	MADE MISC. METRIC CONVERSIONS	1	ADD TAPER TO BOTTOM OF BARRIER	

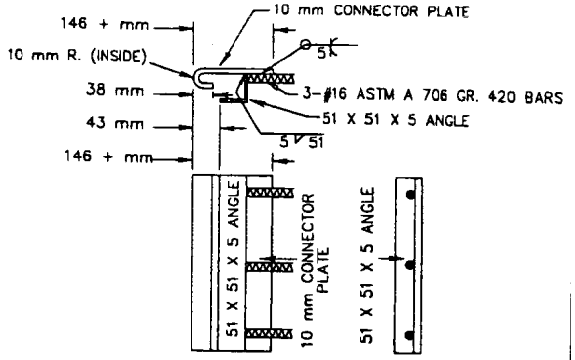
SMITH-MIDLAND COMPANY
[illegible]

POSITIVE CONNECTING BARRIER
J-J HOOK DESIGN
6" JERSEY SHAPE

DRAWN BY: MD, DDPE, PE	DATE: 10-15-90	SHEET
CHECKED BY: S.L.O.	DATE: 2-13-91	1/1
APPROVED BY: R. SMITH	DATE: 2-28-91	

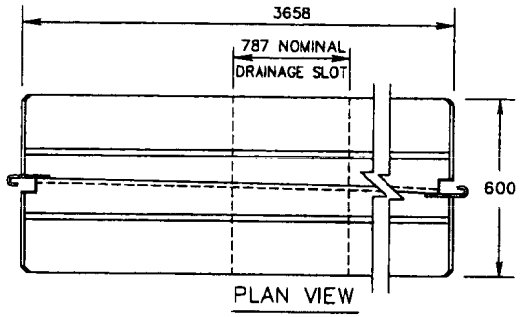


J-J HOOK DETAIL

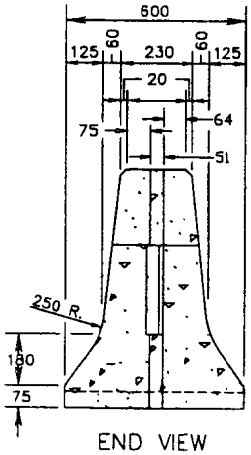


CONNECTOR PLATE DETAIL

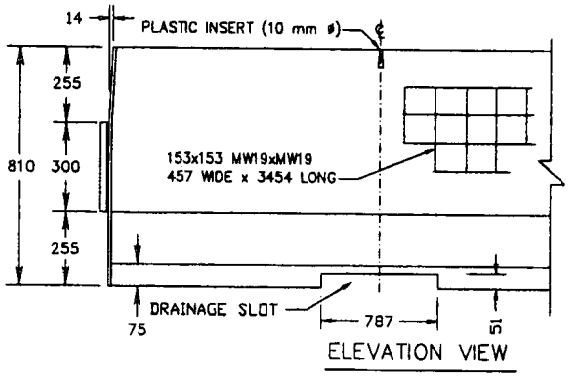
J - J HOOK



PLAN VIEW



END VIEW



ELEVATION VIEW

NOTES:

1. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS DRAWING ARE IN MILLIMETERS.
2. CONCRETE STRENGTH = 5000 PSI (34 MPa) MIN.
3. ASTM A36 STEEL PLATE.
4. ASTM A185 W.W.F. FOR CONCRETE.
5. ASTM A706 GRADE 420 REBARS.
6. J-J HOOKS PATENTED DESIGN AS MANUFACTURED BY SMC, MIDLAND VA. OR OTHER AUTHORIZED EASI-SET MANUFACTURERS
7. J-J HOOKS TO BE NON-GALVANIZED FOR TEMPORARY LOCATIONS, J-J HOOKS TO BE GALVANIZED FOR PERMANENT LOCATION
8. BARRIER SHOWN IS NOT TO BE USED ON BRIDGE DECK.

DATE	REVISION	INT.

CONTRACTOR:

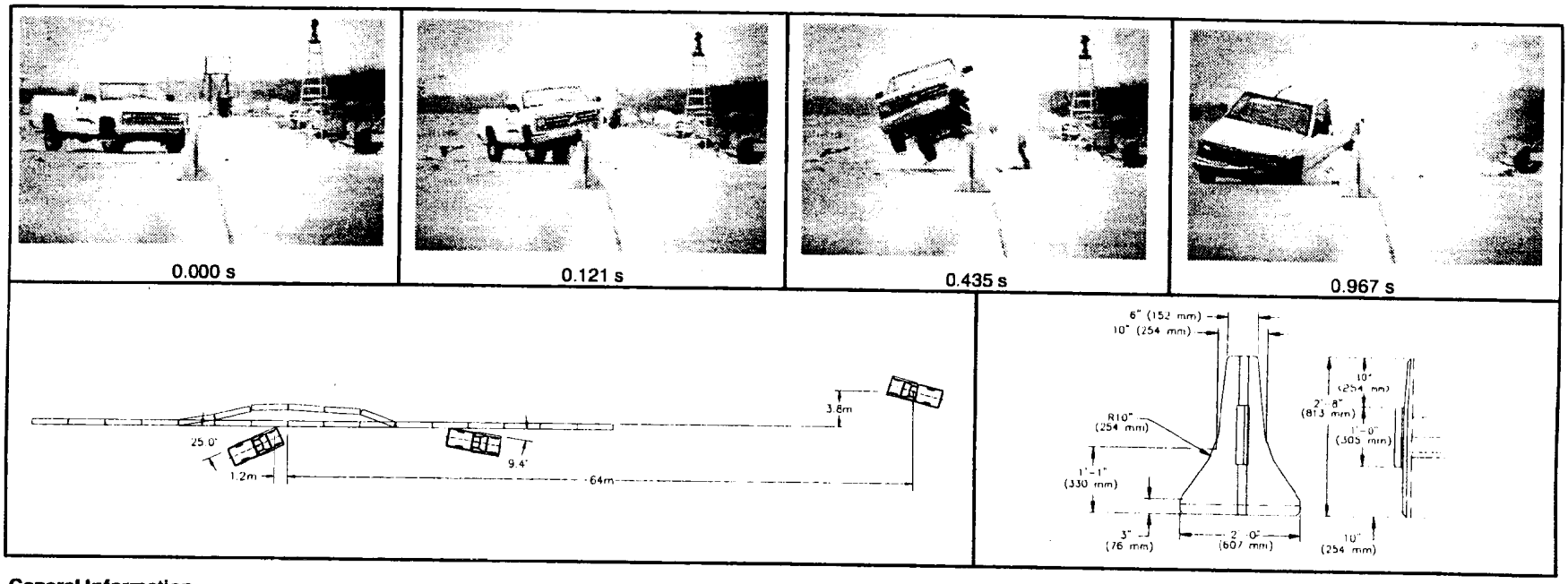
PROJECT NO.:

J-J HOOKS™ POSITIVE CONNECTION
F-SHAPE DESIGN
PORTABLE CONCRETE BARRIER

EASI-SET INDUSTRIES

DATE: 2-11-99

P.O. Box 300, Midland, VA 22728
(800) 347-4045 FAX (540) 439-1232



General Information
- Test Agency ..... Texas Transportation Institute
- Test No. 400001-ESI1
- Date 02/05/99

Test Article
- Type ..... Portable Concrete Barrier
- Name ..... J-J Hooks™ Jersey Shape PCB System
- Installation Length (m) 58.6
- Material or Key Elements ... 16 Segments 3.66 m Long Reinforced Jersey Shape Concrete Barriers

Soil Type and Condition .... Concrete Pavement, Dry

Test Vehicle
- Type ..... Production
- Designation 2000P
- Model ..... 1993 Chevrolet 2500 pickup truck
- Mass (kg)
  - Curb 2052
  - Test Inertial 2000
  - Dummy ..... No Dummy
  - Gross Static 2000

Impact Conditions
- Speed (km/h) 101.0
- Angle (deg) 25.0

Exit Conditions
- Speed (km/h) 75.2
- Angle (deg) 9.4

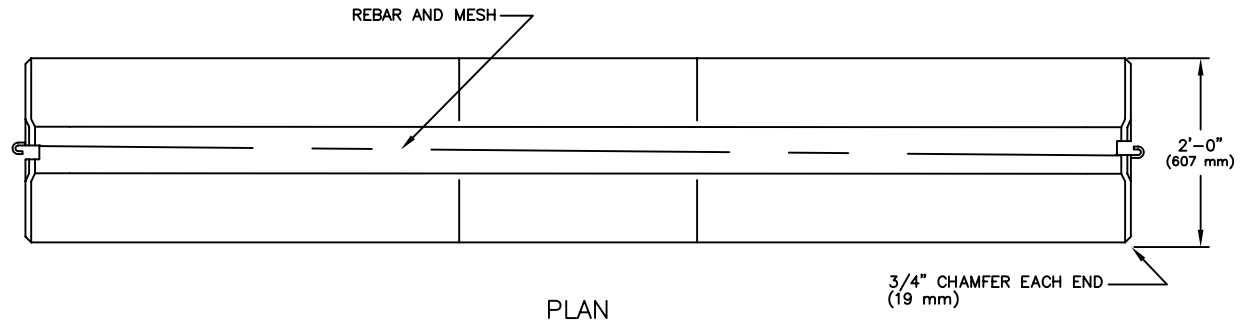
Occupant Risk Values
- Impact Velocity (m/s)
  - x-direction 5.9
  - y-direction 5.1
- THIV (km/h) 24.8
- Ridedown Accelerations (g's)
  - x-direction ..... -3.7
  - y-direction 5.7
- PHD (g's) 5.7
- ASI 0.99
- Max. 0.050-s Average (g's)
  - x-direction ..... -6.5
  - y-direction 7.8
  - z-direction ..... -3.0

Test Article Deflections (m)
- Dynamic 1.30
- Permanent 1.30

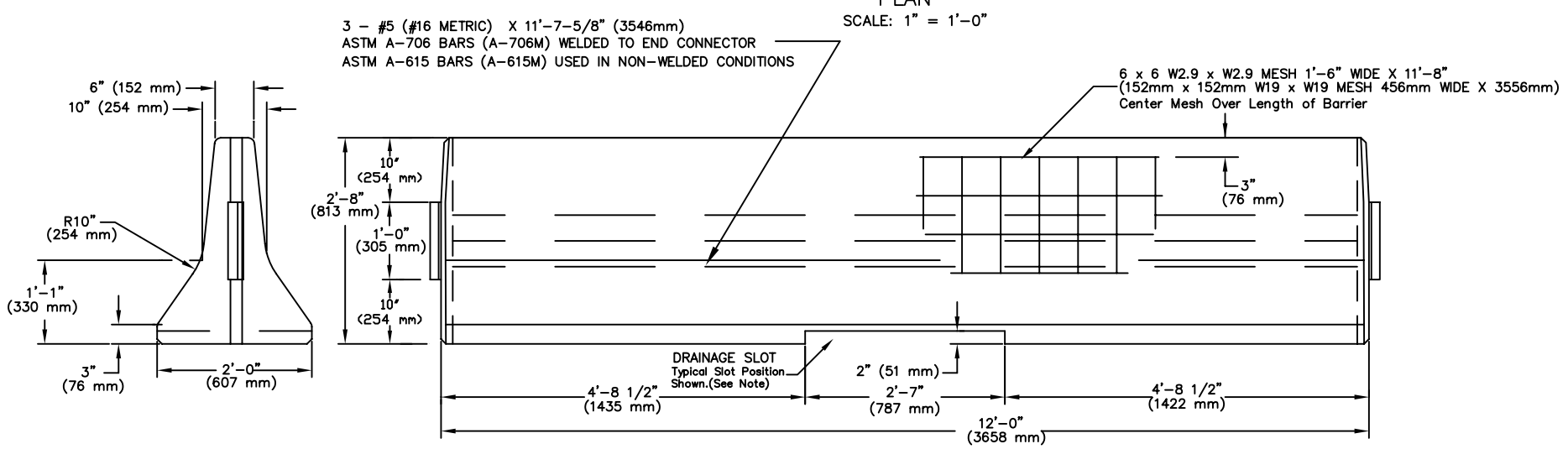
Vehicle Damage
- Exterior
  - VDS 11LFQ3
  - CDC ..... 11FLEK3 & 11LYEW3
- Maximum Exterior Vehicle Crush (mm) 340
- Interior
  - OCDI LF0001000
- Max. Occ. Compart. Deformation (mm) 32

Post-Impact Behavior (during 1.0 s after impact)
- Max. Yaw Angle (deg) 43
- Max. Pitch Angle (deg) ..... -13
- Max. Roll Angle (deg) 25

Figure 12. Summary of Results for test 400001-ESI1, *NCHRP Report 350* test 3-11.



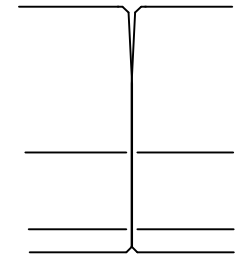
PLAN
SCALE: 1" = 1'-0"



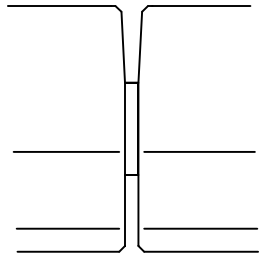
NOTE:
Drainage slot and position at discretion of State DOT
As are lifting devices and holes for lifting barrier.

NOTE:
J-J Hooks Barrier approved by FHWA NCHRP 350 Test
Level III for lengths 8 feet (2440mm) to 30 feet (9144mm).
See your specific state for reinforcing details and barrier shape.

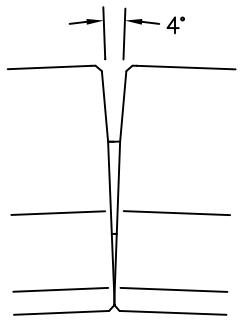
ELEVATION
SCALE: 1" = 1'-0"
(25 mm = 305 mm)



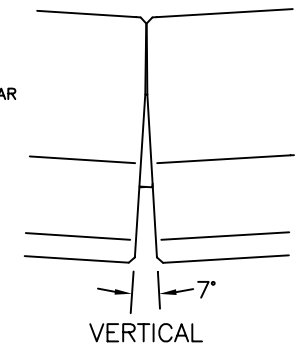
CLOSED POSITION
SCALE: 1" = 1'-0"



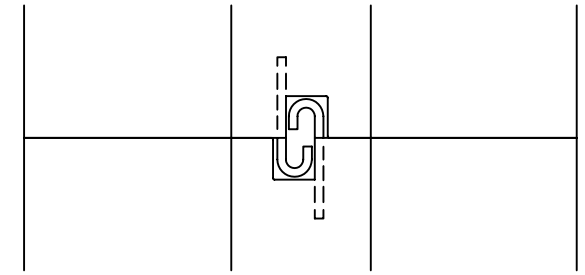
MAXIMUM SEPARATION
SCALE: 1" = 1'-0"



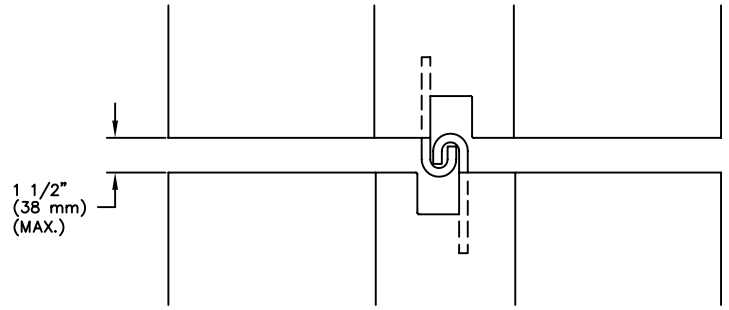
VERTICAL ROTATION
MINIMUM VERTICAL CURVE
RADIUS = 175' (53.3 m)
SCALE: 1" = 1'-0"



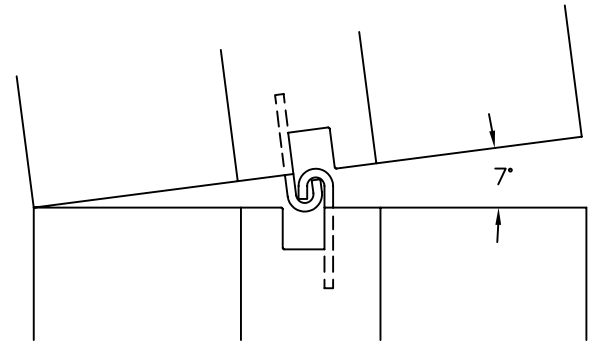
VERTICAL ROTATION
MINIMUM VERTICAL
CURVE RADIUS = 100' (30.5 m)
SCALE: 1" = 1'-0"



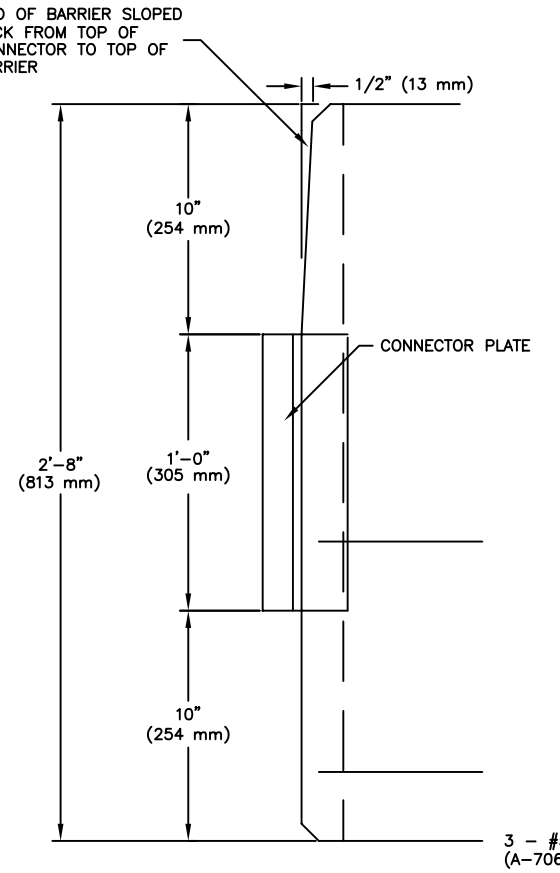
CLOSED POSITION
SCALE: 3" = 1'-0"



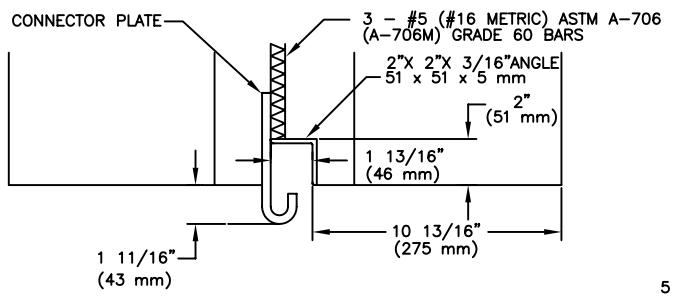
MAXIMUM SEPARATION
SCALE: 3" = 1'-0"



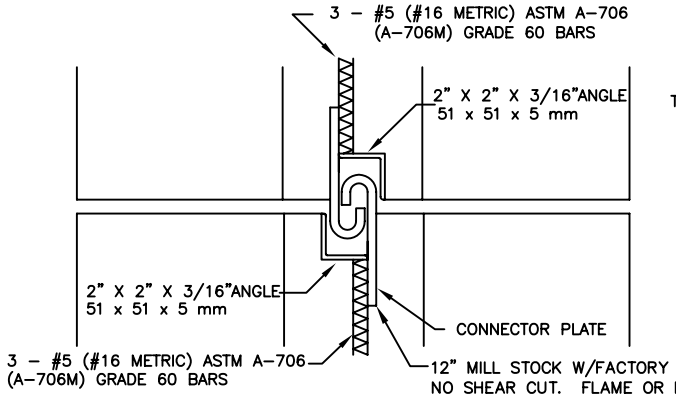
HORIZONTAL ROTATION
MINIMUM HORIZONTAL
RADIUS = 100' (30.5 m)
SCALE: 3" = 1'-0"



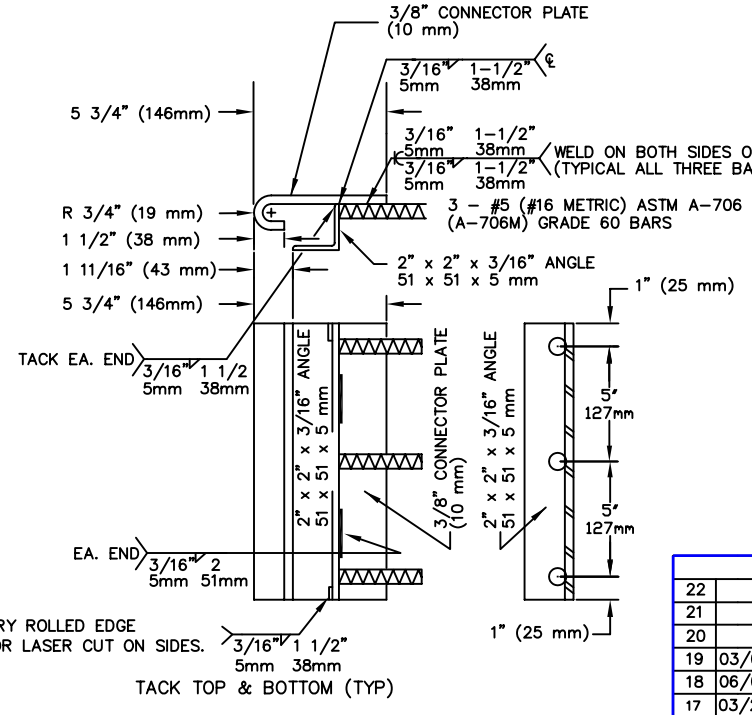
ELEVATION AT END
SCALE: 3" = 1'-0"



PLAN OF END
SCALE: 3" = 1'-0"



POSITIVE CONNECTOR
SCALE: 3" = 1'-0"



TACK TOP & BOTTOM (TYP)

CONNECTOR PLATE DETAIL
SCALE: 3" = 1'-0"

F.H.W.A. APPROVED FOR USE ON ALL FEDERAL-AID HIGHWAY PROJECTS.

GENERAL NOTES AND SPECIFICATIONS:

MATERIALS: (MUST CONFORM WITH STATE MATERIAL SPECIFICATIONS.)

CONCRETE: CLASS AA CONCRETE 3500 PSI 24MPa
MINIMUM COMPRESSIVE STRENGTH IN 28 DAYS.

REINFORCING: ASTM A-706 (A-706M) GRADE 60 REBARS WELDED TO STEEL CONNECTOR PLATES, ASTM 615 REBAR IN NON-WELDED CONDITIONS. ASTM A-185 (A-185M) WELDED WIRE FABRIC

COVER: CRSI STANDARD IF NOT LISTED

STEEL: ASTM A-36 (A-36M) (PLAIN).

TOLERANCE:

CONNECTOR LOCATION +/- 1/16" (1.6mm)
WIDTH OF CONNECTOR @ B + 1/32" (0.8mm)
CONNECTOR PLATE SIZE + 1/8" (3.2mm)
BARRIER LENGTH + 1/4" (6.4mm)

WELDING:

ALL WELDING TO BE IN ACCORDANCE WITH AMERICAN WELDING SOCIETY (AWS) STRUCTURAL WELDING CODES

DESIGN:

FHWA APPROVED SHAPE. J-J HOOKS IS ACCEPTED BY FHWA AS A CRASH TESTED AND OPERATIONAL DESIGN FOR USE ON ALL FEDERAL-AID HIGHWAY PROJECTS.

INSTALLATION:

BARRIERS ARE SELF-ALIGNING WITH NO LOOSE HARDWARE.

REVISIONS					
22			11	WELD SYMBOLS (6-21-94)
21			10	U.S. PATENT APPROVED (9-22-92)
20			9	MESH SIZE CORRECTED (8-27-93)
19	03/08/08	WELD SIZE MINIMUM ON A-706 REBAR	8	ADD METRIC DIM. (7-2-92)
18	06/08/01	ADD WELD NOTE/BOTH SIDES REBAR.	7	ADD SCALE TO DWG. (6-30-92)
17	03/22/00	CHANGED INSTALLATION NOTE	6	MODIFY "J" HOOK (4-22-92)
16	03/15/00	INCREASED CONNECTOR PL. WELD DIMS	5	REM. MORTAR GROOVE (4-22-92)
15	03/15/99	CHANGED "MATERIALS" GENERAL NOTE	4	DEL. REV. 1 AND 2 (3-11-92)
14	12/11/98	ADD #5 (#16 METRIC) REBAR	3	TEXT REV. (2-10-92)
13	12/11/98	REVISED METRIC REFERENCES	2	REV. MIN. HORIZONTAL ROTATION
12	12/11/98	MADE MISC. METRIC CONVERSIONS	1	ADD TAPER TO BOTTOM OF BARRIER

Easi-Set Industries
5119 Catlett Road
MIDLAND, VA 22728 Supplier
Contact: Rick Groves, Ext. 129
PHONE: 540-439-8911
FAX: 540-439-1232

SMITH-MIDLAND COMPANY
RTE. 28 BOX 300
MIDLAND, VA 22728 Manufacturer
PHONE: 540-439-3266
FAX: 540-439-1232

POSITIVE CONNECTING BARRIER
J-J HOOK DESIGN
6" JERSEY SHAPE

SWC02

Ref. No. MB7A-PC
Last Rev. R-19 3/08/08

DRAWN BY: MEL COPE, PE | DATE: 10-10-90
CHECKED BY: S.J.D. | DATE: 2-13-91
APPROVED BY: R. SMITH | DATE: 2-26-91

SHEET 1/1