

April 24, 1997

Refer to: HNG-14

Mr.J. M. Essex
Vice President, Sales
Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601

Dear Mr. Essex:

In your February 21 letter to Mr. Gerald L. Eller, you requested the Federal Highway Administration's (FHWA) acceptance of a truck-mounted attenuator (TMA) called the Alpha 100K TMA as an NCHRP Report 350 test level 3 (TL-3) TMA. Included with your letter were copies of a report from E-TECH Testing Services, Inc., dated February 1997 and entitled "NCHRP Report 350 Crash Test Results for the ALPHA 100K TMA" and videotapes of the compliance tests that were run. On March 3 you sent us additional information which we had requested, including detailed drawings of the tested design.

The ALPHA 100K TMA is attached to under-ride brackets connected to the frame of a support vehicle, details of which were provided to us with your April 22 correspondence and have been retained for our files. The Alpha 100K TMA incorporates an ALPHA 350DX cartridge containing energy absorbing cells made from lightweight aluminum sheet metal of various thicknesses. This cartridge has a molded plastic "Durashell" nose attached to it which is designed to minimize damage to the main cartridge in low speed impacts. In addition, there are an auxiliary (350 AUX-1) energy absorbing cartridge and four 350 AUX-2 cartridges (two on each side of the 350 AUX-1 cartridge) in a collapsible support frame located between the support vehicle and the 350DX cartridge. This design and its dimensions are shown on the enclosed drawings (drawing number 75-02-53B, sheet 3 of 6). Total weight of the TMA was reported as approximately 750 kg.

Three NCHRP Report 350 compliance tests were reported: Test 2-50, Test 3-50 and Test 3-51. The support vehicle for both tests was a 8,550-kg dump truck. In tests 3-50 and 3-51, the truck

was in second gear with its brakes locked. It rolled ahead 1.5 meters in test 3-50 and 4.0 meters in test 3-51.

Current FHWA policy permits use of an unblocked truck for test 3-50 if a TMA has satisfactorily met the NCHRP Report 350 evaluation criteria at TL-2 (Test 2-50) with the support vehicle blocked. For test 2-50 (contained in a January 1996 E-TECH Report entitled "ALPHA 70K TMA Crash Test Report"), the truck was blocked to prevent movement. Although the ALPHA 100K used for test 3-50 differed from that used for test 2-50, we concur that the changes were such that the earlier results can be considered applicable to the new design. Specifically, the addition of the collapsible frame and auxiliary cartridges soften the system, as well as adding stroke distance to the unit. The results of these tests are summarized in Enclosure 2. We have noted that the occupant impact velocity in Test 3-50 was 12.1 m/s. However, the FHWA has previously accepted a maximum limit of 12.2 m/s and considers this result to be acceptable.

Based on our review of the information you submitted, we consider the ALPHA 100K TMA as shown on the enclosed drawings to be acceptable for use on the National Highway System (NHS) as a TL-3 device when such use is requested by a highway agency. As a proprietary product, its use on Federal-aid highway projects, except exempt, non-NHS projects, is subject to the conditions stated in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is Enclosure 3.

Sincerely yours,

(original signed by Seppo I. Sillan)

for Dwight A. Horne, Chief
Federal-Aid and Design Division

3 Enclosures
Acceptance Letter CC-39

REV	DATE	BY	CHKD	APP

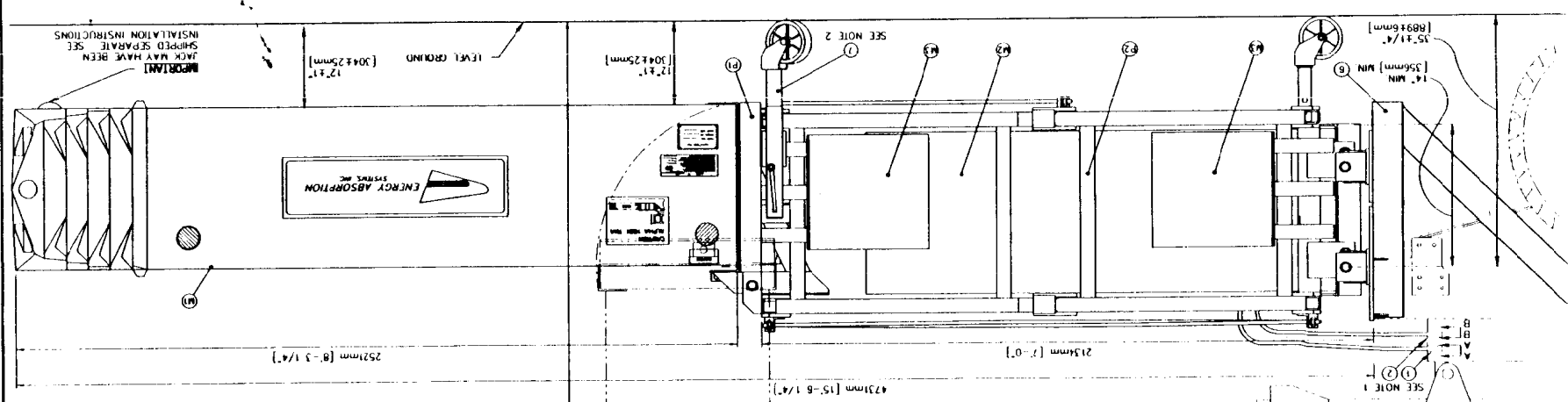
LOCATE FEMALE CONNECTORS IN A CONVENIENT LOCATION ON TRUCK SO THAT LIFTING OR LOWERING TMA WILL NOT DAMAGE ELECTRICAL CABLE AND/OR ROTATED TO TRAVEL POSITIONS WHENEVER TMA IS ATTACHED TO TRUCK JACK SHOWN IN REAR POSITION FOR ILLUSTRATIVE PURPOSES. JACK SHOULD BE RAISED TO SHOW TMA IN REAR POSITION.

DATE	BY	CHKD	APP
2/26/97	D. June		

REFERENCES

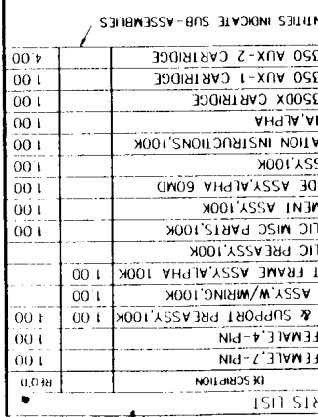
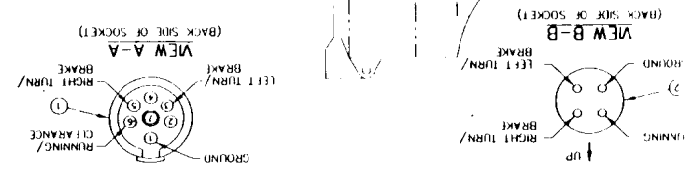
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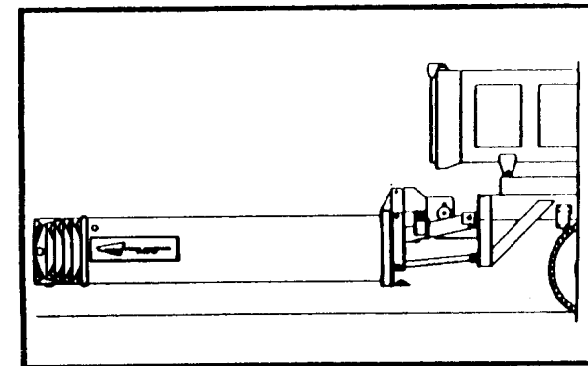
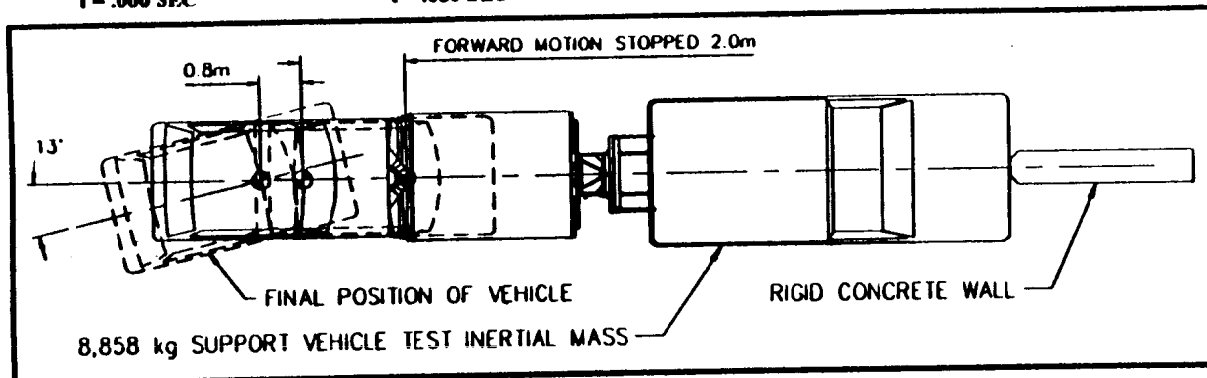
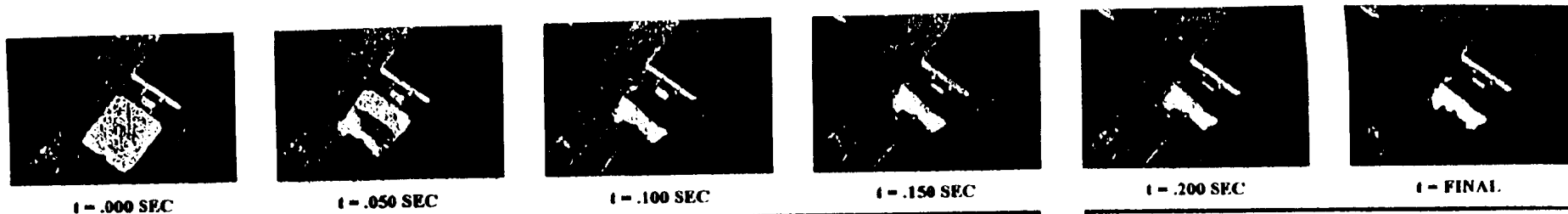
1 = 14	75-02-53B	3 of 6
E-TECH TEST 01-7617-002		
TMA, ALPHA 100K, 90 TILT, MECH LOCK		
ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT		



INDENTED QUANTITIES INDICATE SUB-ASSEMBLIES

ITEM	STOCK NO	DESCRIPTION	QTY
1	272451-0000	SOCKET FEMALE, 7-PIN	1.00
2	2724901-0000	SOCKET FEMALE, 4-PIN	1.00
3		BACKUP & SUPPORT PRE ASSY, 100K	1.00
P1		BACKUP ASSY, W/WRING, 100K	1.00
P2	352601A-0000	SUPPORT FRAME ASSY, ALPHA 100K	1.00
P3		HYDRAULIC PRE ASSY, 100K	
4		HYDRAULIC MISC PARTS, 100K	
5		ATTACHMENT ASSY, 100K	
6	3524120-0000	UNDERIDE ASSY, ALPHA 60MD	1.00
7		JACK ASSY, 100K	
8		INSTALLATION INSTRUCTIONS, 100K	
9	2735831-1000	MSDS, TMA ALPHA	1.00
M1	3524804-0000	ALPHA 3500X CARTRIDGE	1.00
M2	3524803-0000	ALPHA 350 AUX-1 CARTRIDGE	1.00
M3	3524805-0000	ALPHA 350 AUX-2 CARTRIDGE	4.00





General Information

Test No. 183-005
 Date Dec. 19, 1995

Test Article

Type ALPHA 70K TMA
 Installation Length, m (ft) NA
 Size and/or dimension and material
 of key elements N/A

Soil Type and Condition NA

Test Vehicle

Type Production Model
 Designation 820C
 Model Ford Festiva
 Mass, kg (lb)
 Curb 818 (1800)
 Test inertial 845 (1863)
 Dummy(s) 75 (165)
 Gross Static 920 (2028)

Impact conditions

Speed, km/h (mph) 71.2 (44.2)
 Angle (deg) 0
 Impact Severity, kJ (ft-kips) 165.3 (121.9)

Exit conditions

Speed, km/h (mph) NA
 Angle, deg NA

Occupant Risk Values

Impact Velocity, m/s (fps)
 x-direction 11.54 (37.86)
 y-direction 0.31 (1.02)
 Ridedown Acceleration, g's
 x-direction -13.66
 y-direction -2.67

Acceleration Severity Index 1.09

Test Article Deflection, m (ft)

Dynamic N/A
 Permanent N/A

Vehicle Damage

Exterior
 VDS FD-4
 CDC 12FDEW3
 Interior
 OCDI AS0000000

Post-Impact Vehicular Behavior

Maximum Roll Angle, deg 2.49
 Maximum Pitch Angle, deg 1.76
 Maximum Yaw Angle, deg -13.36

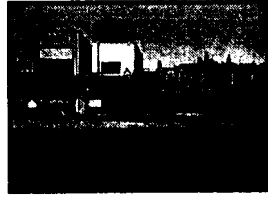
Figure 1. Summary of Results - ALPHA 70K TMA Test 183-005



t = 0.000 sec



t = 0.048 sec



t = 0.096 sec



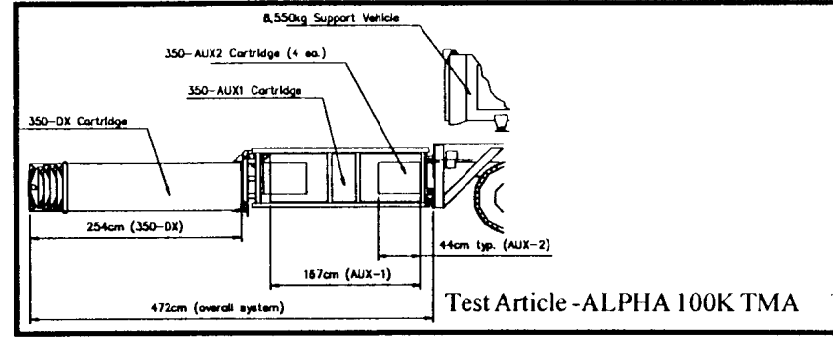
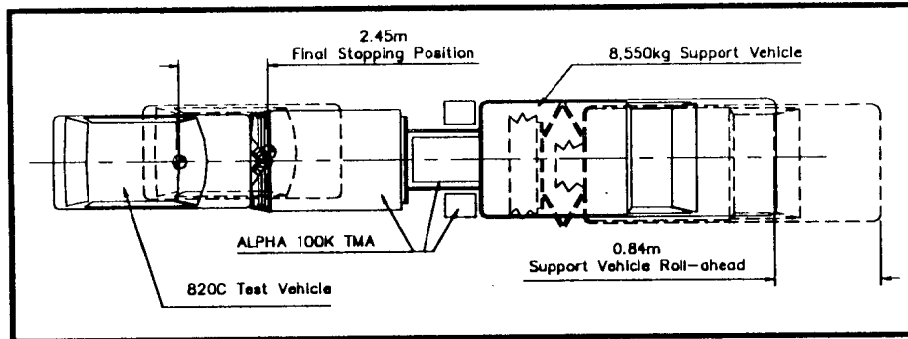
t = 0.144 sec



t = 0.192 sec



t = final



E-TECH Testing Services, Inc.

ALPHA 100K TMA Crash Test Results

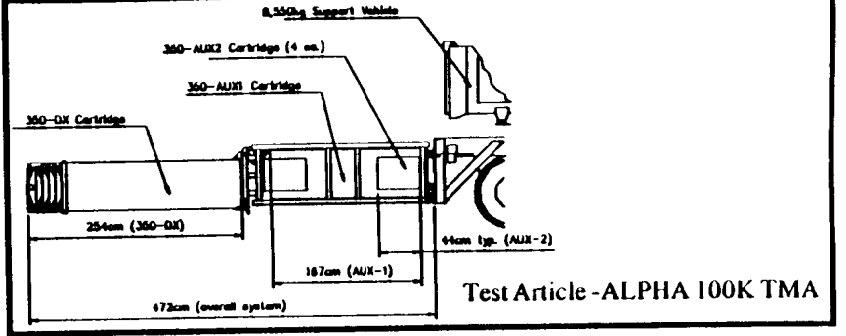
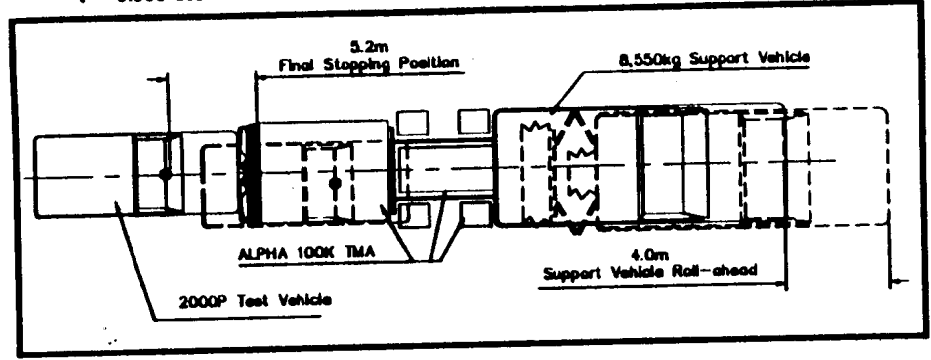
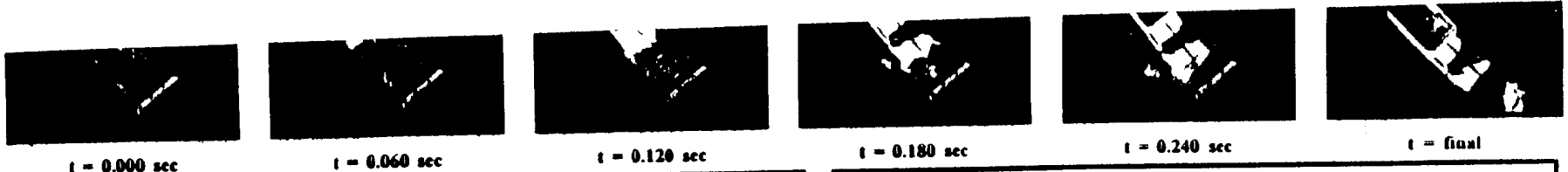
General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-50
Test No.	01-7617-003
Date	2/13/97
Test Article	
Type	Energy Absorption Systems, Inc.
.....	ALPHA 100K TMA
.....	
Installation Length (cm)	472 (overall system)
Size and/or dimension and material	
of key elements (cm)	254 ALPHA 350DX Cartridge
.....	167 ALPHA 350-AUX1 Cartridge
.....	44 ALPHA 350-AUX2 Cartridge
(4 ea.)	
Test Vehicle	
Type	Production Model
Designation	820C
Model	1988 Ford Festiva
.....	Hatchback
Mass (kg)	
Curb	773
Test inertial	844
Dummy(s)	75
Gross Static	919
Impact Conditions	
Speed (km/h)	96.97
Angle (deg)	0.0
Impact Severity (kJ)	306.18

Exit conditions

Speed (km/h)	N/A
Angle (deg)	N/A
Occupant Risk Values	
Impact Velocity (m/s)	
x-direction	12.11
y-direction	0.02
Ridedown Acceleration (g's)	
x-direction	-17.97
y-direction	-2.83
THIV (m/s)	12.13
PHD (g's)	16.97
ASI	1.40
Support Vehicle Acceleration (max. 10ms g's)	N/A
Test Article Deflections (m)	
Dynamic	3.3
Permanent	N/A
Vehicle Damage	
Exterior	
VDS	FD-3
CDC	12FDEW3
Interior	
OCDI	AS0000000
Post-Impact Vehicular Behavior (deg - gyro @ c.g.)	
Maximum Roll Angle	-0.99
Maximum Pitch Angle	1.49
Maximum Yaw Angle	1.18

Summary of Results - ALPHA 100K TMA Test 01-7617-003



ALPHA 100K TMA Crash Test Results -11 of 19

General Information	
Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-51
Test No.	01-7617-002
Date	2/10/97
Test Article	
Type	Energy Absorption Systems, Inc.
.....	ALPHA 100K TMA
.....	
Installation Length (cm)	472 (overall system)
Size and/or dimension and material of key elements (cm)	254 ALPHA 350DX Cartridge
.....	167ALPHA350-AUX1 Cartridge
.....	44 ALPHA 350-AUX2 Cartridge
.....	
(4 ea.) Test Vehicle	
Type	Production Model
Designation	2000P
Model	1992 Chevrolet C2500
.....	3/4 Ton Pickup
.....	
Mass (kg)	1982
Curb	1999
Test Inertial	N/A
Dummy(s)	1999
Gross Static	
Impact Conditions	
Speed (km/h)	96.63
Angle (deg)	0
Impact Severity (kJ)	720.03

Exit conditions	
Speed (km/h)	N/A
Angle (deg)	N/A
Occupant Risk Values	
Impact Velocity (m/s)	
x-direction	10.28
y-direction	0.28
Ridedown Acceleration (g's)	
x-direction	-17.18
y-direction	11.37
THIV (m/s)	10.30
PHD (g's)	16.77
ASI	1.41
Support Vehicle Acceleration (max. 10ms g's)	4.93
Test Article Deflections (m)	
Dynamic	3.6
Permanent	3.5
Vehicle Damage	
Exterior	
VDS	FD-4
CDC	12FCEW3
Interior	
OCDI	AS0000000
Post-Impact Vehicular Behavior (deg - gyro @ c.g.)	
Maximum Roll Angle	7.42
Maximum Pitch Angle	3.69
Maximum Yaw Angle	5.27

Figure 6. Summary of Results - ALPHA 100K TMA Test 01-7617-002

E-TECH Testing Services, Inc.

processes including application of a coating, for use materials must occur in the United States. Coating includes all processes which protect or enhance the value of the material to which the coating is applied.

(2) The State has standard contract provisions that require the use of domestic materials and products, including steel and iron materials, to the same or greater extent as the provisions set forth in this section.

(3) The State elects to include alternate bid provisions for foreign and domestic steel and iron materials which comply with the following requirements. Any procedure for obtaining alternate bids based on furnishing foreign steel and iron materials which is acceptable to the Division Administrator may be used. The contract provisions must (1) require all bidders to submit a bid based on furnishing domestic steel and iron materials, and (11) clearly state that the contract will be awarded to the bidder who submits the lowest total bid based on furnishing domestic steel and iron materials unless such total bid exceeds the lowest total bid based on furnishing foreign steel and iron materials by more than 25 percent.

(4) When steel and iron materials are used in a project, the requirements of this section do not prevent a minimal use of foreign steel and iron materials, if the cost of such materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or \$2,500, whichever is greater. For purposes of this paragraph, the cost is that shown to be the value of the steel and iron products as they are delivered to the project.

(c)(1) A State may request a waiver of the provisions of this section if:

(i) The application of those provisions would be inconsistent with the public interest; or

(11) Steel and iron materials/products are not produced in the United States in sufficient and reasonably available quantities which are of a satisfactory quality.

(2) A request for waiver, accompanied by supporting information, must be submitted in writing to the Regional Federal Highway Administrator (RFHWA) through the FHWA Division

Administrator. A request must be submitted sufficiently in advance of the need for the waiver in order to allow time for proper review and action on the request. The RFHWA will have approval authority on the request.

(3) Requests for waivers may be made for specific projects, or for certain materials or products in specific geographic areas, or for combinations of both, depending on the circumstances.

(4) The denial of the request by the RFHWA may be appealed by the State to the Federal Highway Administrator (Administrator), whose action on the request shall be considered administratively final.

(5) A request for a waiver which involves nationwide public interest or availability issues or more than one FHWA region may be submitted by the RFHWA to the Administrator for action.

(6) A request for waiver and an appeal from a denial of a request must include facts and justification to support the granting of the waiver. The FHWA response to a request or appeal will be in writing and made available to the public upon request. Any request for a nationwide waiver and FHWA's action on such a request may be published in the FEDERAL REGISTER for public comment.

(7) In determining whether the waivers described in paragraph (c)(1) of this section will be granted, the FHWA will consider all appropriate factors including, but not limited to, cost, administrative burden, and delay that would be imposed if the provision were not waived.

(d) Standard State and Federal-aid contract procedures may be used to assure compliance with the requirements of this section.

[48 FR 53104, Nov. 25, 1983, as amended at 49 FR 18821, May 3, 1984; 58 FR 38975, July 21, 1993]

EDITORIAL NOTE: For a waiver document affecting §635.410 see 60 FR 15478, Mar. 24, 1995.

§635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set

§635.413

forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert

pipes, and (2) the number and types such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and plans to single trade name material will not be approved on Federal contracts.

§635.413 Warranty clauses.

The SHA may include warranty provisions in National Highway System (NHS) construction contracts in accordance with the following:

(a) Warranty provisions shall be for specific construction product or structure. Items of maintenance not eligible for Federal participation shall not be covered.

(b) All warranty requirements subsequent revisions shall be submitted to the Division Administrator advance approval.

(c) No warranty requirement shall be approved which, in the judgment of the Division Administrator, may place undue obligation on the contractor items over which the contractor has control.

(d) A SHA may follow its own procedures regarding the inclusion of warranty provisions in non-NHS Federal contracts.

[60 FR 44274, Aug. 25, 1995]

§635.417 Convict produced material

(a) Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if such materials have been:

(1) Produced by convicts who are on parole, supervised release, or probation from a prison or

(2) Produced in a qualified prison facility and the cumulative annual production amount of such material used in Federal-aid highway construction does not exceed the amount of such materials produced in such facility for use in Federal-aid highway construction during the 12-month period ending July 1, 1987.

(b) Qualified prison facility means a prison facility in which convicts are used for Federal-aid highway construction during the 12-month period ending July 1, 1987.