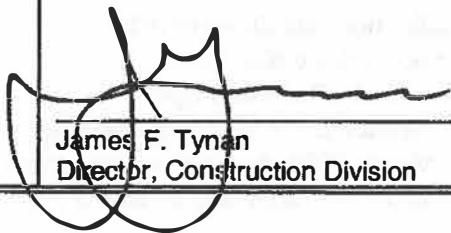


To: SUPERSEDED BY <u>EB 06-004</u> EFFECTIVE <u>9/7/06</u>	New York State Department of Transportation ENGINEERING INSTRUCTION	EI 03-039
Title: TEMPORARY RUMBLE STRIPS FOR CONSTRUCTION WORK ZONES		
Distribution: ☐ Manufacturers (18) ☐ Surveyors (33) ☒ Main Office (30) ☒ Consultants (34) ☒ Local Govt. (31) ☒ Contractors (39) ☒ Regions/Agencies (32) ☐ _____ ()	Approved:  _____ James F. Tynan Director, Construction Division <u>11-6-03</u> Date	

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction is effective for projects submitted for the letting of May 6, 2004.
- This EI supersedes the Special Specifications issued by EI 96-001.
- The Standard Specifications revisions issued by this EI will be incorporated into the next update of the Standard Specifications.
- The design guidance in EI 96-001 is not superseded and will be incorporated into the next revision of Chapter 16 of the Highway Design Manual.

PURPOSE:

The purpose of this EI is to issue a standard specification for temporary rumble strips for use in construction work zones.

TECHNICAL INFORMATION:

The revised specification for temporary rumble strips for construction work zones incorporates this item into the Standard Specifications. The specification allows the use of preformed plastic strips in addition to raised asphalt strips, recessed, saw-cut or milled-in strips, and strips formed from layers of pavement-marking tape.

Experience with temporary rumble strips on Department projects confirms the effectiveness of the suggested layout pattern in EI 96-001 and thickness requirements in the specification. Some other observations follow.

1. Proper pavement surface preparation is essential for good performance of tape and preformed rumble strips. Pavement must be in good condition and clean, and rumble strips must be applied according to the manufacturer's instructions (proper air and pavement temperatures, absence of moisture, appropriate adhesive) for best results. Strips do not adhere well to pitted, deteriorated pavement and will pull away from the pavement if not properly applied.
2. Rumble strips formed from pavement-marking tape provide optimal performance when multiple layers of tape, preferably four, are placed directly on top of one another. These strips create the right level of noise and can be felt within a vehicle without causing a jarring effect.
3. Because preformed strips rely upon ridges and depressions in the strip to enhance their audible and tactile effect, they can have a slightly lower profile than strips formed of tape and still provide good warning to drivers. Therefore, a lower minimum thickness is specified. Strips higher than 13 mm are considered to be too aggressive and may not be used. The maximum thickness for preformed strips (13 mm) is the same as for tape strips and raised asphalt strips.

4. Potential locations for temporary rumble strips should be evaluated on a project-to-project basis. Generally, rumble strips are not effective in urban settings and are not appropriate for residential areas because of the noise. Some suggested locations are: when the work zone occurs on an open stretch of highway; at a detour or diversion; where the traffic pattern has been changed; where there is alternating one-way traffic with a temporary traffic signal.

IMPLEMENTATION:

The following special specifications are disapproved:

18619.6460 Temporary Rumble Strips

08619.646001 Temporary Rumble Strips

Main Office Design Quality Assurance Bureau will insert the standard specification shelf note beginning with projects submitted for the letting of May 6, 2004. Regions may use this item in contracts let before this date, and should include the specification in the proposal. This item may be added to projects under construction by order-on-contract.

BACKGROUND:

EI 96-001 provided specifications and design guidance for use of temporary rumble strips in work zones. These rumble strips had minimal use on Department projects for several years, even though they performed well in the few instances they were used. Engineering Directive ED 99-002, Work Zone Intrusion Countermeasures, listed temporary rumble strips as one of seven countermeasures to be used on selected projects to reduce the incidence of traffic intrusions into highway work areas where workers are exposed to traffic. Temporary rumble strips were included as a countermeasure because they are a low-cost, easy-to-install/remove feature that is effective in providing audible and tactile warning to drivers that they are approaching a highway work zone. While they are not generally effective in reducing speed, they can raise a driver's level of awareness and reduce risk to the traveling public as well as workers.

In 1999, the first season of the work zone intrusion initiative, temporary rumble strips were used on over fifty construction projects. Since then, temporary rumble strips have become one of the most frequently used intrusion countermeasures.

Most temporary rumble strips have been constructed of several layers of removable, preformed, black pavement-marking tape. Several products have become available that use a polymer or polycarbonate product in preformed strips manufactured specifically as temporary removable rumble strips. The Department has used preformed strips on a number of projects on an experimental basis for several years and has found that their performance is comparable to rumble strips formed from pavement-marking tape. These strips are available from several manufacturers and may now be used as raised, removable rumble strips.

CONTACT

Direct questions to the Regional Traffic Group or Chuck Riedel criedel@dot.state.ny.us, of the Traffic Engineering & Highway Safety Division at (518) 457-2185

TEMPORARY RUMBLE STRIPS FOR CONSTRUCTION WORK ZONES

Make the following changes to Volume 2 of 3 of the Standard Specifications of January 2, 2002:

Page 6-81, after line 38 insert the following:

619-1.16 (Vacant)

619-1.17 Temporary Rumble Strips. Work shall consist of installing, maintaining, and removing temporary rumble strips in construction work zones at the locations shown in the contract documents or as directed by the Engineer.

Page 6-86, after line 31 insert the following:

619-2.11 (Vacant)

619-2.12 (Vacant)

619-2.13 (Vacant)

619-2.14 (Vacant)

619-2.15 (Vacant)

619-2.16 (Vacant)

619-2.17 Temporary Rumble Strips.

A. Raised Asphalt Rumble Strips. Raised asphalt rumble strips shall be formed from Type 5 (Shim Course) or Type 7 (Top Course) hot mix asphalt (HMA) meeting the requirements of Section 403, *Hot Mix Asphalt (HMA) Pavements for Municipalities* or a 9.5 mm hot mix asphalt meeting the requirements of Section 402, *Hot Mix Asphalt (HMA) Pavements*. Asphalt Emulsion Tack Coat shall be used to adhere the rumble strip to the existing pavement. Raised asphalt rumble strips shall have a width measured in the direction of traffic of between 150 mm and 225 mm and have a final compacted thickness of 10 mm $\pm$ 3 mm.

B. Raised, Removable-Tape Rumble Strips. Removable-tape rumble strips shall be formed from black, nonreflectorized, removable pavement-marking tape. Raised, removable-tape rumble strips shall have a minimum width measured in the direction of traffic of 150 mm, with sufficient layers of tape such that each finished rumble strip has a thickness of 10 mm $\pm$ 3 mm.

C. Raised, Preformed Rumble Strips. Raised, preformed rumble strips shall be manufactured specifically as temporary rumble strips. Raised, preformed rumble strips shall have a minimum width measured in the direction of traffic of 100 mm, with a thickness of between 6 mm and 13 mm.

D. Saw-cut Rumble Strips. Saw-cut rumble strips shall have a width measured in the direction of traffic of 100 mm $\pm$ 13 mm. The depressions shall have a rectangular cross section with a depth of 10 mm $\pm$ 3 mm.

E. Milled-in Rumble Strips. Milled-in rumble strips shall have a nominal width measured in the direction of traffic of 150 mm. The depressions shall have a semicircular, concave cross section with a depth of 10 mm $\pm$ 3 mm.

F. Removing Temporary Rumble Strips. Rumble strip depressions shall be filled in with Type 5 (Shim Course) or Type 7 (Top Course) hot mix asphalt (HMA) meeting the requirements of Section 403, *Hot Mix Asphalt (HMA) Pavements for Municipalities* or a 9.5 mm hot mix asphalt meeting the requirements of Section 402, *Hot Mix Asphalt (HMA) Pavements*.

TEMPORARY RUMBLE STRIPS FOR CONSTRUCTION WORK ZONES

Page 6-103, after line 23 insert the following:

619-3.14 (Vacant)

619-3.15 (Vacant)

619-3.16 (Vacant)

619-3.17 Temporary Rumble Strips. Due to difficulties in patching shallow voids in hot mix asphalt pavement surfaces, saw-cut and milled-in rumble strips shall only be installed in locations where hot mix asphalt pavement will subsequently be overlaid or reconstructed.

A. Raised Asphalt Rumble Strips. The roadway surface on which the rumble strips are to be attached shall be dry, free of surface contaminants such as dust or oil, and thoroughly swept with a stiff broom. The surface temperature of the pavement shall be 8°C or greater unless otherwise authorized by the Engineer. The pavement surface shall be cleaned with compressed air just prior to tack coating and subsequent installation of the rumble strips. The strips shall be formed using a rumble strip paver (drag box) pulled transversely across the pavement, or by hand placement between forms fixed to the pavement. If forms are used, they shall be removed prior to compaction of the asphalt mixture. Compaction shall be accomplished using a plate tamper or a static roller.

B. Raised, Removable-Tape Rumble Strips. Raised removable tape rumble strips shall be formed by applying one or more layers of removable preformed pavement-marking tape. The tape shall be applied to a clean, dry pavement surface in accordance with the Manufacturer's recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the tape.

C. Raised, Preformed Rumble Strips. Raised preformed rumble strips shall be applied to a clean, dry pavement surface in accordance with the Manufacturer's recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the tape.

D. Saw-cut Rumble Strips. Saw-cut rumble strips shall be saw cut into existing pavement using wet cutting methods. The blade or blades shall be of such configuration that the desired dimensions of the saw cut can be made with one pass. No spacers between blades will be allowed.

Before a work area is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air. Sawing slurry from the wet-sawing process shall be flushed from the pavement surface immediately.

E. Milled-In Rumble Strips. Milled-in rumble strips shall be milled into existing pavement using a rotary-type cutting head with a maximum nominal outside diameter of 600 mm. The cutting head shall be on its own suspension system, independent from that of the power unit, to allow the head to align itself with the slope of the pavement and/or any irregularities in the pavement surface. The pattern of cutting tips on the head shall be arranged to produce a relatively smooth cut with no more than 2 mm between peaks and valleys. Prior to beginning work, the Contractor shall demonstrate to the Engineer the ability to achieve the desired surface without tearing or snagging the pavement.

Before a work area is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air.

F. Removing Temporary Rumble Strips. The Contractor shall either completely remove raised rumble strips from the pavement or fill in the depressions from saw-cut or milled-in rumble strips prior to the start of the winter plowing season, prior to the placement of successive pavement courses, or as directed by the Engineer. Any damage to the pavement surface that results from the removal of raised rumble strips shall be repaired at no additional cost to the State.

Rumble strip depressions shall be filled in with hot mix asphalt. Before they are filled, the depressions shall be cleaned by sweeping, flushing, or with a stream of compressed air, and coated with Asphalt Emulsion Tack Coat. The rumble strips shall be overfilled slightly and compacted using a plate tamper or static roller so that the final compacted surface is flush with the existing pavement.

TEMPORARY RUMBLE STRIPS FOR CONSTRUCTION WORK ZONES

Page 6-105, after line 13 insert the following:

619-4.15 (Vacant)

619-4.16 (Vacant)

619-4.17 Temporary Rumble Strips. The work will be measured for payment as the number of meters of individual rumble strip, measured transverse to the direction of traffic flow, satisfactorily installed.

Page 6-109, after line 20 insert the following:

619-5.17 Temporary Rumble Strips. The unit price bid for temporary rumble strips shall include the cost of all labor, materials and equipment necessary to complete the work. Payment will include the cost of pavement cleaning, hot mix asphalt, or other materials used to form or fill in the rumble strips, and tack coat. Progress payments will be made at the unit price bid for 75 percent of the quantity after installation. The remaining 25 percent will be paid upon removal.

Page 6-109, after line 49 add the following:

619.22 M	Temporary Rumble Strips	Meter
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