7010000, Audible and Vibratory Pavement Markings
Response to Comments from Industry Review

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Mike Sprayberry
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Comment:

1. Specs are supposed to be written as "action commands" to the contractor. This style is called "active voice-imperative mood". This is explained in section 1-1 of the Spec Book. This spec sometimes uses the correct voice and sometimes does not. For example, "The individual profiles shall be located transversely across the full width of the traffic stripe at approximately 1.0 inch on center, with a bottom width between 0.090-0.310 inches" (found in Section 701-4.2) is written in the old passive voice and not as an active command. Yet one of the edits of this spec corrects the voice in another sentence (found in Section 701-4.2) "…remove and reapply the striping at no cost to the Department." It appears the only reason for the change was to correct the voice. So my comment is to rewrite all sentences to active voice-imperative mood for intraspec consistency and consistency with other specs.

Response:

The sentence you mentioned should be in passive since it an option the Contractor may chose. The requirements are written in active voice.

Comment:

2. In Section 701-5, why is "LOT" all caps and what does it mean? It should be defined or if it is an acronym it should be spelled out (plain language).

Response:

LOT is a term used in the materials portion of the specifications, see section 971-1.1 for packaging and labeling.

Comment:

3. Overall, I am frightened by the phrase "at no cost to the Department" or "at no additional cost to the Department". Why do we feel the need to express this within the context of requiring the contractor to re-perform substandard work? When this phrase is used, it works ok for that spec, but what scares me are other specs that may not use the phrase. I don't think we want to say this after every command the specs give to the contractor.

Could a contractor claim since we did not say it (elsewhere) that the Department must pay for it? Bottom line is if used properly and carefully, this phrase works fine, but if misused/omitted anywhere (which would be very easy to do), it could work against the Department. I suggest we don't use this phrase at all for simplicity.

Response:

This is consistent with all the other pavement marking specifications. The Specifications Office did not think we should change the specifications at his time.

Comment:

4. In Section 701-7 why do we restrict ourselves from checking the color and retroreflectivity toward end of the observation period: "The Department reserves the right to check the color and retroreflectivity within 30 days prior to the end of the observation period." I am interpreting this to mean we can check anytime except last 30 days. Why not last 30 days?

Response:

We can check it anytime within the 180 day period. We are suggesting that if we think we have a problem, check it before the end of the 180 days so the Contractor can be put on notice prior to the end of the 180 days.

Comment:

5. I dislike Section 701-8 hard-coding a set limit of rework: "Correct all deficiencies by removal and reapplication of a 1.0 mile LOT centered around the deficiency at no cost to the Department." So if a car runs over a "wet" stripe while crossing the stripe, why not allow to fix 20 feet either side? An entire mile of removing and reapplying perfectly good striping seems like a waste of money for everyone and is bad for the roadway, the taxpayers, and the economy. You are still going to have two new-stripe-meets-old-stripe junctions either way.

Response:

Construction is working on a modification to the Florida Test Method that would do away with the current acceptance of markings in one mile sections. Section 701-5 will be revised when the revised method is approved.

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Gregory Jones, Esq.
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Comment:

I agree with the comments in paragraph 3. Re-work and repair work is not paid by the Department so I agree we should not use the phrase “at no cost to the Department”. The contract specifies what we pay for, we should not specify what we don’t pay for.

Response:

This is consistent with all the other pavement marking specifications. The Specifications Office did not think we should change the specifications at his time.

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Stefanie D. Maxwell
FDOT State Construction Office
605 Suwannee Street, MS 31
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Comments

- All references to “Audible and Vibratory” should be “Audible-Vibratory”.
- Remove reference to FM 5-579 in Article 701-4.1. (if FM is combined)
- Remove references to LOT in Articles 701-5 and 701-8.
- Why did you remove the last sentence of the first paragraph of Article 701-11?

Responses:

I am not sure I understand the differences between the two.

I am not sure we should revise the specification when we don’t know when the FM’s will be approved. The construction memo should handle this issue to the FM’s are completed and the specification changes are made accordingly.

The language in 701.5 is consistent with all the other specifications. This revision to some of this language will be made at one time for all the specifications.

The last sentence was added back in the specification.

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Horace D Autry

Comment:

This is a new specification. It appears incomplete at the end where it addresses Final Payment. Also, the proposed change eliminates the wording, “Final payment will be withheld until all deficiencies are corrected” (it is struck through). What will take the place of this action?

Response:

The last sentence was added back in the specification.

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Alan L. Lafferty
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Comments

Mr. Powell; thank you for the opportunity to comment on the subject specification revision. This revision appears to be a result of **Roadway Design Bulletin 08-07** **Estimates Bulletin 08-05**. This bulletin states "crash data for lane departure crashes indicates the serious injury and fatality rate on Rural (Urban 1) and Urban 2 & # flush shoulder roadways is twice the rate of those on limited access facilities. Rumble strips are a proven cost-effective countermeasure to lane departure crashes brought on by driver drowsiness, distraction, and/or inattention."

"Effective with the January 2009 letting, audible and vibratory pavement markings shall be installed on all rural construction projects excluding limited access facilities."

Current requirements for section **971-5 Thermoplastic Materials for Traffic Stripes** requires white and yellow pavement markings meet an initial retroreflectance of not less than 450 mcd/lx·m^2 and not less than 350 mcd/lx·m^2 , respectively. Proposed requirements for section **971-10 Thermoplastic Material for Audible and Vibratory Traffic Stripes** would require white and yellow pavement markings meet an initial retroreflectance of not less than 300 mcd/lx·m^2 and not less than 250 mcd/lx·m^2 , respectively.

Reflectivity (sight) should not be of less importance than audibility (noise).
Question: Why is the retroreflectivity for an audible and vibratory traffic stripe less than a thermoplastic or other durable traffic stripe?
The same comment and question applies to section 7010000.

Audible wet weather pavement marking systems have been documented by FDOT to provide an initial retroreflectance of not less than 450 mcd/lx·m^2 and not less than 350 mcd/lx·m^2 , respectively dry and an initial wet retroreflectance of not less than 150 mcd/lx·m^2. This may well reduce the injury fatality rate on rural and urban roadways since limited access facilities have rumble strips incorporated with higher performance pavement marking systems.

Comment: Utilize data obtained from the FDOT "Rain Stripe Test" conducted by third parties, and incorporate in a standard specification for audible wet weather systems where Districts conclude audible and vibratory pavement markings alone are not adequate.

Response:

The viscosity of the thermo used to hold a 0.50 inch bump is much higher than that of our normal thermo. It was determined during field evaluation that it is almost impossible to get a large bead embedded in the material deep enough to hold the bead. To obtain higher reflectivity values would require either a larger bead or a high index bead. We evaluated the cost of using a high index bead and determined that it would increase the cost between $450 and $500 per mile. The decision was made to accept the lower reflectivity, rather than add additional cost to the pavement markings at this time. I might add that neither the RainLine nor the Gulf Industries yellow material on the wet weather test deck met the 350 mcd you suggest. The reflectivity values of 300 mcd and 250 mcd for white and yellow respectively are good reflectivity values.

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Paul Vinik
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Comments:

This spec states that the department reserves the right to test these markings within 3 days or receipt of certification. Then, we go on and say that there is a 180 day observation period. Is this not a QPL product and should have already been observed? Also, why do we have a 180 day observation period when this product is suppose to be a 3 year product.

Response:

The 180 observation period is used to determine if the markings are installed properly. There are a lot of ways the Contractor can meet the initial requirements immediately upon installation which will not last the 180 days. The intent with the 180 days is prevent these measures. The 180 day observation has nothing to do with the service life except that if the marking meets the 180 days requirements it is much more likely to be consistent with performance of the QPL product.

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Marshall H. Dougherty, Jr.
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Comments:

The length (LOT) of correction for any deficiency appears to be too extreme. A small length of non-compliant thickness should not require a one-mile reapplication. A shorter distance, based on the actual deficiency, could certianly assure proper correction while not creating adversarial conditions at the outset.

Response:

Construction is working on a modification to the Florida Test Method that would do away with the current acceptance of markings in one mile sections. Section 701-5 will be revised when the revised method is approved.

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Christopher Wood
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Comment:
Section 701-7. Most common signs of failure should be listed under this section.

Response:

They are listed in section 701-7.

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Mark Bjorklund
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Comments:
In numerous places throughout the document: "**protrusion**" instead of **"transverse bar"** would be more generic and describes products currently being evaluated accurately.

Section 701-3 **"Use equipment which ~~has a screed extrusion die~~ is capable of producing….."** would allow for broader application equipment use without changing product performance requirements.

Section 701-4.3 **"…~~on shoulder markings~~ shall have a height of ~~0.6 to 0.7 inches, and a height of~~ 0.45 to 0.55 inches ~~on centerline markings~~, including the baseline."** This is more representative of the products currently being evaluated, and would allow for more reasonable dry times, while producing acceptable audible/vibratory results.

"…shall have a~~n approximate~~ minimum length of 2.5 inches." This would be more specific.

Responses:

I believe more people would be confused by the term protrusion. The use of the term transverse bar will remain.

The sentence on equipment has been modified.

The audible bar heights were revised to indicate only one height. The word approximate would allow for something slightly less than 2.5", where minimum does not.

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Matthew Schindler
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Comment:

I believe that the decision to use profiled baseline (audible inverted profile markings) should be left to the designers, not the contractors. I am aware that many districts see the additional benefits of wet weather reflectivity of the audible inverted profile markings over the flat baseline audible markings. Hence why many districts have only been letting projects using the inverted profile method, rather than flat baseline audible markings. If the main purpose of these audible markings is to provide an audible and sensory cue to the driver that he is leaving the travel lane, it makes no sense to me why the visual cue of "seeing the line" should be taken away from the driver when it rains (as is the case with the flat baseline audible line which appears as a confusing "skip" line during wet night conditions).

Response:

At the request of RainLine, the original developmental specification was modified to allow use of the inverted rib profile as a base material for the audible and vibratory pavement marking so that you could use your product if you wished to compete. This allowance was carried over into the permanent specification (Section 701-4.2) to allow RainLine to compete under this specification. Analysis of crash data indicated that only 4% of the lane departure crashes occurred during wet weather conditions and the primary need for the marking is audibility and vibration. For this reason the specification addresses the audible and vibratory warnings to motorists and disregards the wet weather characteristics of these markings. The department still allows the districts to utilize wet weather markings, where it is appropriate, under a developmental specification.
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Jennifer Marcato
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Comments

After reviewing, we would like to offer the following for the Florida Department of Transportation to review before finalizing the specification. 701-4.2 Thickness Although the language is very unclear, we are concerned that the option of what type of base line to be used is being left up to the contractor, rather than being decided by the designer. At a recent meeting of the ATSSA/FDOT Pavement Marking Committee, Chester Henson declared that it is, in fact, left up to the contractor's discretion. While both types of line will offer both audibility and vibration to the motorists, the profiled base line will provide superior visibility in all weather conditions. Surely the decision as to whether to use the flat base line or the profiled base line between transverse audible bars should be left to the districts and their designers to decide. It appears to be unprecedented to delegate a lifesaving decision to contractors rather than designers. The simplest way to do this would be to reword the first sentence of the second paragraph to read something like: "When required in the plans, a profiled baseline meeting the following dimensions should be applied." As a side note, we noticed that only a drawing of a flat base line is included in the 2008 Interim Design Standards. For the convenience of the designer, a drawing of an inverted rib profile base line should be added. 701-4.3 Dimensions of Transverse Audible Bars Rather than using two separate height requirements, one of which will be extremely difficult to achieve and maintain, we suggest the Department consider having all audible bars at a height of 0.4 to 0.5 inches above the road surface. We appreciate your consideration, and would be happy to discuss any of these issues further.

Response:

At the request of RainLine, the original developmental specification was modified to allow use of the inverted rib profile as a base material for the audible and vibratory pavement marking so that you could use your product if you wished to compete. This allowance was carried over into the permanent specification (Section 701-4.2) to allow RainLine to compete under this specification. Analysis of crash data indicated that only 4% of the lane departure crashes occurred during wet weather conditions and the primary need for the marking is audibility and vibration. For this reason the specification addresses the audible and vibratory warnings to motorists and disregards the wet weather characteristics of these markings. The department still allows the districts to utilize wet weather markings, where it is appropriate, under a developmental specification.

The line style used in the Design Standards does not depict any particular type of marking.

The audible bar heights were revised to indicate only one height.

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