

Comments and responses for proposed precision milling amendments to OPSS 510. Some similar comments have been combined.

C1: 510.07.06.04.02 Operational Constraints

- The second paragraph we believe is intended to describe the crossfall at each station and not the smooth transition between stations that will be often required. Some clarification can be achieved with the following wording.

-The surface remaining after removal shall have a constant and continuous crossfall at each station with a smooth transition where crossfall transitions are required between stations.

R1: Agree with proposed wording, document updated.

C2: 510.07.06.04.05 Automated Machine Guidance

This specification is new and when fully implemented after beta testing on several projects, contractors will be able to replace their millings fleets with equipment that can fully achieve the objectives and goals of this specification. In the mean time the specification should allow milling machines that use only local ground referencing systems.

High quality but older milling machines cannot be equipped with automatic milling depth control. For example, for accurate milling according to the 3D model, manual input is sufficient based on the milling depth information displayed on the tablet display depending on the GPS position (stationing). manual input can have the same accuracy as automatic input and should not disqualify such a system.

Suggested change: "... shall permit accurate compliance with the depths and slopes of milling in accordance with the DDM.

R2: Prefer to keep current wording as the NSSPs will be used only on trial basis in the short term. Equipment requirements will be revisited as experience is gained and the specification is more broadly used.

C3: Similarly, some manual intervention will be required on some milling machines that can still use the 3D model to achieve the precision milling. Until existing fleets can be replaced, the specification should just rely on the stipulated requirement to achieve a milling tolerance of +/- 5mm from the DDM.

The "3D Guidance" of the machine language needs revisited. The guidance for the machine should not be dictated by method but by accuracy. Machine control systems today provide "variable depth and slope", but don't steer the machine. If the intention of the spec is to say that the machine is controlled both vertically and horizontally, we think this is unachievable.

As a point of clarity, the depth and slope are controlled automatically, the horizontal position of the mill is still up to the operator and the design will reflect the mill position accordingly.

We suggest stating the expected accuracy of the system in both the horizontal and vertical and allow the contractor to select the guidance that will meet or exceed that specification.

R3: Further prescribing the capabilities of the milling machine would not be of great benefit as ultimately the contractor needs to be able to meet the 5mm tolerance on the milled surface.

C4: This section stipulates that "The Contract Administrator will carry out total station measurements of the milled surface to verify that the +/- 5mm tolerance from the DDM tolerance is met".

The location and number of measurements to be take are not specified. We recommend that the number of either individual shots or total cross sections be stipulated per kilometre. We also suggest that the location be selected on a random basis to eliminate any bias in the selection of the locations. This approach should reduce, if not eliminate any disputes between the CA and the contractor.

R4: Section updated to require a minimum of 12 locations on a contract to be surveyed, similar to QC requirements.

C5: The NSSP is a step in the right direction because it will reduce emissions due to construction ion by reducing milling time and hauling away cuttings from the milling.

It will also lead to better rehabilitated highways.

The specification requires the contractor to perform surveying and design prior to undertaking milling. These activities require time during the contract. The amount of time is a function of the highway complexity, 2 lane rural hwy, 4 lane divided highway urban or rural freeway with interchanges etc.

Designers and the Ministry must recognize that the survey and design requirements will inherently add time to the duration of the contract. The additional time must be considered when determining contract working days or completion dated as well as the actual advertising and award dates. The notes to designers should include this comment.

R5: Comment noted.

C6: 510.07.06.04.05 The final definition for checking the correct milling depths (510.07.06.04.05) according to the DDM, which must meet +/-5mm, should be better described and should include checking the milled slope to match the design slope according to the DDM at that location. The DDM check of cross slopes is very important

because it involves not only checking the AMG function and milling machine calibration, but also checking that the DRSM has been well measured and that the slope correction has been correctly designed in DDM.

R6: Wording added to address comment

C7: 510.07.06.04.02: "After partial depth removal, the gap between the top of milled surface and the bottom of a 3 m straightedge placed anywhere in any direction on the milled surface shall not exceed 6 mm."

Top of milled groove, correct? What about the distance between the bottom and top of milled groove?

R7: Wording clarified, should be top of milled groove

C8: "The surface remaining after removal shall have a constant and continuous crossfall matching the design milled surface crossfall. The milled surface shall have an even texture and be free of significantly different grooves and ridges in all directions."

To what tolerance?

R8: Tolerance is not required to be specified. Any visible inconsistencies would likely indicate that the 5mm surface tolerance is not being met.

C9: Will the MTO be performing preliminary design prior to tender to ensure the final design is achievable?

R9: Yes, projects will be screened for suitability of use of this special provision

C10: How will MTO determine whether the contract will be a contractor-provided survey or MTO provided survey?

R10: On Design Bid Build contracts survey info will be provided by MTO. On Design Build contracts obtaining survey information will be responsibility of the contractor.

C11: What type of contracts will MTO be utilizing this specification on? I.e. freeway, 2 lane rural, etc. Will line of sight to geodetic benchmarks be consistently available?

R11: Locations will be evaluated for suitability of the use of this special provision.

C12: Finally, re. "INSTRUCTIONS TO DESIGNERS"

Warrant: "Sufficient pavement depth to limit risk of "punch-through" to granular base by variable depth / optimized milling"

This is very critical! There have been many historical contracts where the existing HMA thickness was not sufficient to accommodate the specified milling depth.

R12: Noted