

3531100 CONCRETE PAVEMENT SLAB REPLACEMENT
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

Jeff O'Leary
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Comments: (1-9-13)

Is there a chance that the slab removed is thinner than what the department requires to be put back? If so, then payment should be based on the thicker of the two. Also, I assume that measurement of average thickness of the removed slab is clearly spelled out, provides sufficient precision and is essentially incontestable. Otherwise, that would certainly be a source of dispute. With these issues addressed, I think the standard will be fair to all parties - the department shouldn't pay for more than what is being installed and the contractor should get paid for what is being installed.

I just realized my comment about the "thicker of the two" isn't quite correct either - as that might penalize the department. However, I think you get my point.

Response:

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Comments: (1-9-13)

The Department may want to consider elaborating on the procedure to measure the thickness of the removed slabs. I recommend specifying that an average thickness be calculated, maybe from at least one thickness measurement obtained from each side of the slab.

Response:

Cloyce Darnell, P.E.
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Comments: (1-10-13)

Why have the last sentence? Redundant. Index 308 covers this. If must keep the last sentence, why not follow it with "See Note 4 of Index 308."

Response:

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Comments: (1-29-13)

Thank you for the opportunity to comment.

I have had recent experience in D-2 working on concrete pavement rehab projects in Jacksonville on both I-95 and I-10. The proposed change is essentially going back to the way the measurement and payment was dealt with in the past. I concur with the wording. It has been impossible to know the thickness of every slab of pavement that required replacement and for the Contractor to assume over-thickness than what was indicated in the plans during the bid process. We found out quickly that although measurement for thickness was not required, the removed slabs often exceeded the design by an average of 1/2 inch for a - 9" assumed in place thickness. The additional material cost for replacement then became a contention and led to disputes. Also not considered was the additional cost for removal. These issues quickly spiraled into a heated disputes and additional costs not expected by both the Department and the Contractor.

I welcome this change and have observed that this thickness measurement, provided it is done jointly by both CEI and Contractor forces, will ultimately benefit our industry as well as insuring fairness.

As an aside, Design may want to consider a factor that takes into account this unknown extra depth that is typically encountered and include this in quantities. This inclusion may prevent cost overruns during construction.

In some rare cases it was discovered that as-built plans that were not available to the designer indicated thickness that so exceeded what was expected that a changed site condition was allowed and SA were written to account for that fact.

Again, thanks for this opportunity to comment.

Response:

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Comments: (1-31-13)

As a result of inaccurate "existing" and "replacement" thickness shown in many contract plans, triggering the disputes referenced, this specification revision changes the method replacement concrete volume for pay is calculated. The Department should also correct its method calculating quantities for slab removals also, to include a proportionate increase or decrease to the square yards based on the all-too-frequent differing actual thicknesses.

Response:

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Comments: (1-31-13)

Cemex- Ryan Chandley Proposed concerns and changes to 353 Specification

1. 353-3.1 Mixture Proportions (1st paragraph): Is the 2200-psi necessary to support the intended traffic load when the paving is reopened? A review of several other states slab replacement specifications, indicates a requirement of 2000-psi prior to opening to traffic. A lower required compressive strength would allow for lower cement factors, which would reduce shrinkage potential.

353-3.1 Mixture Proportions: Designate the actual proportions to be used to produce a concrete with a minimum 6-hour compressive strength of 2200 psi and a minimum 24-hour compressive strength of 3,000 psi.

Response:

2. 353-5 Test Requirements. The challenge with this section is the difficulty in assuring that the protection cylinders are match cured with the replacement slab to properly represent the in-place paving. These protection cylinders are rarely, if ever allowed to cure undisturbed for the specified 6-hours. For these reasons, the Maturity Method should be required as mandatory as it will demonstrate the actual in-place concrete performance.

Perform concrete sampling and testing in accordance with Section 346-5. Perform the plastic property tests in accordance with 346-8, except when the mix design contains an accelerator; perform the plastic property tests prior to the addition of the accelerator. The requirements of 346-9 apply to this Section with the following modification: 28-day requirements will be replaced with 24-hours and if the design mix includes an accelerator, then the compressive strength cylinders will be fabricated after all ingredients, including the accelerator, are added.

Make a minimum of four test cylinders from the last slab for each day of placement to assess strength for protection and opening to traffic (protection set). Cure the protection set of cylinders by methods identical to those used in curing the concrete replacement slabs. Cure the acceptance set of cylinders identical to the protection set of cylinders for the first 6-hours, then by laboratory cured conditions thereafter until the 24-hour strength test. Provide a location and curing facility for initial curing of verification cylinders.

Test two cylinders from the protection set within 6-hours of sampling and consider the average compressive strength of these two tests to be the 6-hour compressive strength. If the compressive strength is below 2,200 psi, test the remaining 2 cylinders from the protection set no longer than 6-hours from sampling. The Maturity Method specified in 353-10.2 may be used as an alternate to the protection set of concrete cylinders.

Test the acceptance and verification cylinders at 24-hours from the time of sampling.

Response:

3. 353-6 Concrete Slab Acceptance:

Comment 1 (1st & 2nd paragraph): Concerns with slab acceptance based on protection cylinders is that if not properly match cured (same condition as paving), they may not represent the actual in-place compressive strength. Further, there is no recourse for in-place evaluation of the concrete paving. In effect, the Department, Contractor, and Concrete Producer are at the mercy of the testing laboratory. If Maturity Method was properly implemented, all concerned parties have the results of the actual in-place concrete strength gain curve, eliminating the concern with improper match curing, transport and testing the cylinders.

Reject any Concrete not meeting the plastic property requirements of 353-5. Acceptance will be based on plastic properties, achieving the 2,200 psi compressive strength prior to opening the slabs to traffic and the 24-hour compressive strength.

If the compressive strength of any set of test cylinders fails to meet the strength requirements, take immediate corrective measures to ensure that concrete placed in the future meets the specified strength requirements. The Engineer will evaluate the particular circumstances in each instance where a strength deficiency occurs. If the Engineer determines that there will be a significant effect on the service life of the replacement slab, replace the concrete at no expense to the Department.

Response:

Comment 2 (3rd paragraph): For sake of this comment, assume the contractor has placed an approved mix in accordance with the contract documents, meeting the required compressive strength prior to opening to traffic.

How is it that the contractor is responsible for replacing slabs that crack during the life of the contract? Why are there no provisions for crack repair as opposed to slab replacement? If the cracked slabs must be replaced, it should be a shared between the Department and Contractor.

If any uncontrolled cracks appear during the life of the contract, remove and replace the cracked slab at no expense to the Department. Repair by removing and replacing the pavement across the full width of all affected lanes or shoulders and to the nearest transverse joint in each direction. Investigate and implement immediate effective solutions to eliminate further cracks, in consultation with, and subject to the approval of, the Engineer.

Response:

4. 353-8 Curing. Under current specifications, mix designs are approved based on achieving the required 6-hour compressive strength. The contractor then requires the producer to supply concrete meeting the required strength in less than the specified 6 hours to allow increased production. If the 353 specification required a minimum curing period, i.e: (4-hours) all involved parties would have a clear understanding of the requirements.

353-8 Curing.

Cure the slab as specified in 350-11, except for time and temperature restrictions. Use curing compounds as specified in 350-11.2 after completing the

finishing operations. After the curing compound has been applied, cover the surface and exposed edges with two layers of white burlap-polyethylene curing blanket conforming to Section 925 or insulating blankets approved by the Engineer. Cover the slab with the curing materials as soon as the slab hardens enough to resist marring the concrete surface. Continue curing the slab until the concrete achieves the required 6-hour strength.

Response:

5. 353-9 Joints. The current specification only allows for a liquid bond breaker however when fresh concrete is being placed against existing cracked concrete a liquid bond breaker won't be sufficient to prevent cracking to migrate to fresh concrete. The contractor should have the ability to choose between a physical bond breaker or a liquid bond breaker. Additionally all joints in new concrete should match existing joints in adjacent concrete there is no reference to that in section 353 where it is specified in section 350-12.3.3.

353-9.1 General: Construct transverse joints as specified in 350-12 and as shown on the Design Standards, except that dowels bars are installed per 353-9.2. Tie bars will not be placed along the longitudinal joints unless shown in the Contract Documents. Apply a liquid bond breaker recommended by the manufacturer for the intended application to all vertical faces of the adjacent slabs.

Response:

6. 353-10 Protection and Opening to Traffic. What is the magic to 6 hours, as long as the paving has the required strength prior to opening to traffic. Additional thoughts/ Concerns: The correlation between 353-3.1 and 353-6. The mix design is prepared with different parameters than the acceptance criteria, i.e. the mix design states a "...minimum 6 hour 2,200 psi..." and 353-6 states "...2,200 psi prior to opening traffic..." One or the other would be preferable, 2200 in 6 Hours, or 2200 before opening to traffic, or stating Cannot be opened to traffic until 2200 in 6 hrs is reached.

353-10.1 General: The requirements of 350-6 apply to this Section. Keep the slab closed to traffic until the compressive strength requirement of 2,200 psi is achieved. Verify the achievement of the required strength by cylinder testing as specified in 353-5 or the use of the maturity method test as described in 353-10.2. Provide documentation that 6-hour strength was achieved prior to opening to traffic, by either a cylinder test report or a printed maturity meter monitoring record.

Protect the pavement from all traffic, including construction vehicles, until the specified 2,200 psi strength has been obtained. Include in the Quality Control Plan (QCP) what actions will be used to protect the pavement. The protective measures shall be arranged so as not to interfere with traffic lanes being utilized for required maintenance of traffic.

Response:

7. 353-11: Method of Measurement: Pay should be for actual depth of concrete placed, unless they have actual/job specific depth checks to back up the design depth. Recommend Maturity Meter the only form of acceptance testing in the 353 specification. Recommended slabs be tested throughout the pour for acceptance, not just the final slab placed during any single pour.

The quantity to be paid for will be the volume, in cubic yards, of concrete placed and accepted. The quantity will be calculated on the basis of field-measured horizontal dimensions and pavement design thickness. No additional compensation will be allowed for additional concrete required to bring the proposed concrete slab up to finished grade.

Response:

District 4 Construction

Comments: (2-5-13)

I don't think the new text is going to solve any problems. First, we don't know that a contractor will remove a slab as a unit or use a pavement breaker and remove in pieces. How do we determine the "thickness of the slab"? Even if they removed as a unit the bottom of slab could be undulating and have variable thickness depending on where it was measured. Suggest looking at ways to non-destructively (no coring) check the thickness of the existing slab via gpr or some other technology and use this to establish a plan/final thickness.

Response:

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Comments: (2-5-13)

District 5 has reviewed the subject industry review and would like to submit the following comment:

I received a number of comments on specification direction for determination of thickness. The concern is many times the removed slab will not have a uniform thickness for the entire concrete slab. Suggest the following revision highlighted in yellow below:

The *pay* quantity will be the volume, in cubic yards, of concrete placed and accepted *determined by calculation*. The quantity will be calculated *using* field-measured horizontal dimensions and **the average** thickness *of the removed slab*.

Response: