# PROJECT 230484 PID: 84625
# ASHTABULA COUNTY SR-11
# ODOT RESPONSE TO STEP 3 CLAIM
# DISPUTE 04-230484-01

## Overview

This project resurfaced SR-11 from SLM 22.16 to SLM 29.04 in Ashtabula County. The project also included minor work to eighteen structures and one culvert on SR-11 and one structure on SR-531.

The Project's contract included version 2019 of the ODOT C&MS with Supplemental Specification 800 dated 4/21/2023. The Proposal included PN 420 dated 1/20/2023.

## Project Milestones

- Letting 10/12/2023
- Award 10/19/2023
- Project Execution 10/31/2023
- Notice to Proceed 10/31/2023
- Work began 1/10/2024
- Original Completion 11/1/2024
- Adjusted Completion 4/30/2025
- Substantial Work Complete 4/30/2025

## Items included in this Dispute

- PN 420 Dated 1/20/2023
- 2019 ODOT C&MS with Supplemental Specification 800 dated 4/21/2023

**Relevant Timeline (Selected emails provided in Appendix A)**

**April 15th, 2024,** On-Site: Milling operation begins.

**May 3rd, 2024,** On-Site: Repair operation begins.

**May 14th, 2024,** On-Site: Mainline paving begins.

**May 22nd, 2024,** Email: Karvo provides rideability reports for SR-11 northbound passing lane and requests that PN 420 be waived due to deteriorated subgrade.

**May 22nd, 2024,** Email: ODOT acknowledges Karvo's email and will provide a response once reviewed.

**June 3rd, 2024,** Meeting: On-site discussion between ODOT and Karvo about PN 420.

**June 4th, 2024,** On-Site: ODOT PE reviewed layout of smoothness grinding locations and waived areas as part of potential mitigation efforts.

**June 7th, 2024,** Email: Karvo states achieving requirements of PN 420 commercially impractical. Requests immediate Step 2 if ODOT not willing to waive PN 420. Provides possible mitigation of one diamond grinding shift northbound, and one diamond grinding shift southbound.

**June 7th, 2024,** Email: ODOT states that the issue cannot be currently elevated to Step 2 per 108.02.G, since mitigation efforts were being pursued. The Department did not recognize that a Step 1 meeting had been held at this point.

**June 7th, 2024,** Email: Karvo disagrees of where in the Claims process the project is at and requests the Step 1 meeting before costs are incurred.

**June 10th, 2024,** On-Site: ODOT and Karvo meet to discuss PN 420, considers the meeting to be Step 1 meeting

**June 10th, 2024,** Email: ODOT states that the Department's Step 1 decision is that PN 420 applies as bid. ODOT references Karvo's 6/7/2024 email to elevate to Step 2 and formally requests elevation to Step 2.

**June 11th, 2024,** Email: ODOT states that Karvo has not been damaged and that PN 420 still applies. Costs can be determined at the conclusion of project.

**June 19th, 2024,** Email: Karvo states that the project will be completed and all data will be gathered for PN 420. Also states that a meeting will be held between ODOT and Karvo to determine possible mitigation efforts. Mentions that deterioration is reflecting through the newly constructed pavement.

**July 24th, 2024,** Email: Karvo expresses further concern for PN 420 in the paving SR-11 northbound driving lane and shoulder (22' section).

**July 26th, 2024,** Email: ODOT states that the email has been received and that the issue is being tracked via the Dispute Resolution Process.

**July 27th, 2024,** On-Site: Mainline paving completes.

**July 29th, 2024,** On-Site: Ramp paving begins.

**August 12th, 2024,** On-Site: Ramp paving completes. All pavement complete.

**August 13th, 2024,** Email: ODOT provides update to PN 420 pending Dispute. States that discussion was paused as no definitive costs could be attributed. Will resume discussion once all PN 420 information is received.

**August 14th, 2024,** Email: Karvo states that all PN 420 data will be provided once received.

**August 22nd, 2024,** Email: Karvo provides partial PN 420 profiler data.

**August 22nd, 2024,** Email: ODOT states that all data has been collected from the project and requests the full scope of costs incurred.

**August 23rd, 2024,** Email: ODOT requests profiler data files.

**September 4th, 2024,** Email: ODOT again requests profiler data files.

**September 9th, 2024,** Email: ODOT includes all parties in one email. Again requests profiler data.

**September 9th, 2024,** Email: ODOT acknowledges that profiler data was received and provided to District for review.

**September 18th, 2024,** Email: ODOT provides review of PN 420 with multiple comments that must be resolved by Karvo.

**September 18th, 2024,** Email: Karvo subcontractor collecting data suggests recollection of all profiler data.

**September 19th, 2024,** Email: ODOT requests data for the ramps located within the project.

**September 20th, 2024,** Email: ODOT states that the PN 420 submittal package is incomplete and is required for determination of a dollar cost. Concerns about the amount of time that it is taking, and that the project completion date is November 1st, 2024. No contract requirements have been waived and directs Karvo to proceed with all PN 420 related work per 108.02.

**September 26th, 2024,** Email: ODOT states that it does not believe that the entire job needs profiler data recollected, force account records will be kept due to issue in the DRP, provided bridge lengths, and states that comments from 9/17/2024 and 9/18/2024 emails still need addressed.

**October 10th, 2024,** Email: Karvo provides NB and SB Corrective Action Plan and log sheet. Karvo subcontractor provided profiler .pvp files (raw data).

**October 25th, 2024,** Email: ODOT provides review of mainline pavement with multiple comments to be resolved.

**October 25th, 2024,** Email: ODOT provides review of ramp pavement with multiple comments to be resolved.

**November 19th, 2024,** Email: ODOT states PN 420 correction part of remaining work, and that some comments have not been resolved from latest submittal. Karvo states that grinding is set up for 11/11/2024 pending ODOT's review.

**November 22th, 2024,** Email: ODOT provides ACM with areas where the typical section varied from the plans. These areas would be analyzed for localized roughness with an IRI in excess of 250 inches per mile in 25 feet. This exception area included SR-11 northbound from SLM 23.22 to 23.97 and SR-11 northbound / southbound from SLM 28.23 to the northern paving limit at SR-531.

**December 17th, 2024,** Email: ODOT provides C-85 Final Inspection with Punchlist. States that PN 420 work must be done by revised completion date of April 30th, 2025.

**February 27th, 2025,** Email: ODOT reminder about the revised completion date and that work not completed by this time would be considered for liquidated damages.

**February 27th, 2025,** Email: ODOT requests one complete PN 420 package since multiple items have been revised.

**March 13th, 2025,** Email: ODOT stated that a complete submittal has yet to be received. Reminded Karvo about the revised completion date.

**March 24th, 2025,** Email: ODOT notes receiving PN 420 files via USB stick.

**April 11th, 2025,** Email: ODOT provided multiple review comments. Directs Karvo to proceed with smoothness grinding scheduled for 4/14/2025.

**April 11th, 2025,** Email: Karvo states that it will proceed with work, and that the PN 420 requirement was requested to be waived. States that all costs will be tracked.

**April 14th, 2025,** On-Site: Subcontractors begin PN 420 corrective grinding.

**April 17th, 2025,** Email: ODOT states that Karvo's subcontractor should collect post-grind data as soon as possible so that it is representative of the work performed.

**April 24th, 2025,** On-Site: Subcontractors finish PN 420 corrective grinding.

**May 7th, 2025,** Data: ODOT receives complete post-grind PN 420 data.

**May 21st, 2025,** Email: ODOT provides comments and requests a response. *Resolution of comments never received.*

**June 4th, 2025,** Email: ODOT provided review of the post-grind data and calculated a disincentive of -$435,731.46.

**June 4th, 2025,** Email: Karvo disagreed with disincentive.

**June 17th, 2025,** Email: Karvo provided force account documentation for PN 420 grinding in the amount of $87,406.04. Karvo requests what step is next in the DRP.

**June 18th, 2025,** Email: ODOT explains the requirements to escalate to Step 2.

**June 18th, 2025,** Email: Karvo requests formal escalation to Step 2.

**June 23rd, 2025,** Email: ODOT assigns Dispute number 04-230484-01.

**August 22nd, 2025,** Meeting: Step 2 meeting held at District 4.

**September 26th, 2025,** Email: ODOT provides Step 2 Decision.

**October 2nd, 2025,** Email: Karvo requests elevation to Step 3.

**ODOT's Position**

On May 1st, 2024 Karvo made the Department aware of their belief that the Percent Within Limits (PWL) density specification was erroneously applied to the project, due to the differences in subgrade in the northbound and southbound directions. Subsequently, Karvo requested that the requirement be waived. The Department stated that the PWL requirements were known at the time of bid and would not be waived. Additionally, the Department stated that deteriorated base pavement joints are not representative of the overall roadway. At the conclusion of the paving operation, Karvo received a bonus of $223,801.55 for PWL mat and joint density and the claim was rescinded. The Federal Highway Association has noted in technical brief FHWA-HIF-21-022 (Appendix D) that "In some cases, it has been reported that excessive rolling of the asphalt mat creates issues with smoothness". It also states that weak subgrade and/or base can make it difficult to obtain higher density numbers.

The project began the milling, pavement repair, and paving operations with the SR-11 northbound and southbound passing lanes first. The contractor would mill and clean the roadway, and then the Department would evaluate the milled surface and mark areas of distressed pavement for either transverse partial depth, longitudinal partial depth, or full depth repairs. These types of repairs are highly subjective, and all pavement repair notes on plan page 4 state that it is not the intention to repair every deteriorated area, but ultimately the following quantities were used for the repairs based on the Project Engineer's authority granted per 105.01.B:

- PLI 0005 - 203E10000-EXCAVATION
    - 0.00 CY of 250.00 CY Provided (0%)
- PLI 0025 - 251E01000-PRTL DEPTH PVMT REPAIR (441) (Longitudinal)
    - 5796.15 CY of 2,000 CY Provided (289.81%)
- PLI 0028 - 255E10010-FULL DTPH RMVL & REPL, CL QC1
    - 751.04 CY of 1,500 CY Provided (50.07%)
- PLI 0256 - 251E01000-PRTL DEPTH PVMT REPAIR (441) (Transverse)
    - 649.00 CY of 2,000 CY Provided (32.45%)

These quantities were not disputed at the time of the work being performed, during estimates, or with agreement of final quantities. Based on the original bid total dollar amount between all above items of $527,500, the project performed $509,794 of repair items, or 96.64% of the allocated funds.

On May 22nd, 2024 an email was sent from Karvo which contained the rideability report for SR-11 northbound passing lane after completion of the mainline pavement. This is the first correlation between deteriorated subgrade and impacts on PN 420 in email, though the subject did come up in field discussions between ODOT and Karvo earlier. A field meeting was held on June 3rd, 2024 to discuss the potential issue. As an act of mitigation, the areas identified in the rideability report were laid out by Karvo's subcontractor (ACM Construction Management) to be

evaluated individually by ODOT's Project Engineer for possible exclusion based on the severity of the defect. Areas identified were small bumps and dips that were estimated to be borderline cases where the IRI limit was minimally exceeded and were few and not representative of the overall project. The Department did not exclude areas where the defect was caused by a construction joint, transition to a structure, or over a pavement repair performed previously by the contractor. This mitigation was ultimately not used; instead Karvo stated that the requirements of PN 420 were commercially impractical and offered their own mitigation efforts of one diamond grinding operation-day northbound, and one operation-day southbound. If their mitigation was not accepted, Karvo wanted to immediately proceed to Step 2. Since the full scope of costs would not be known until all the corrective work was done, the Department denied this request per 108.02.G.

A Step 1 meeting was held between the Department and Karvo on site on June 10th, 2024. A follow-up email was provided, where the Department stated that PN 420 applied as bid, since it was a known bid condition. During this time, it was discussed that 108.02.G required project work in dispute to continue. The Department stated that all PN 420 pre-grind and post-grind work must be performed for the full cost of the potential issue to be realized.

During the data acquisition portion of the work, the Department notified the contractor multiple times about the requirements of PN 420, and the submittal process. With the completion of the mainline paving on July 27th, 2024 a partial submittal was received on August 22nd, 2024. The Department made multiple attempts to collect a complete submittal via email, which was ultimately provided for mainline pavement on September 9th, 2024. After District review, an email was provided on September 18th, 2024 with a large amount of comments that required resolution from Karvo and ACM. A follow-up email was provided on September 19th, 2024 that requested the requirements of ramp rideability. Finally on September 20th, 2024, the Department notified Karvo that the PN 420 submittal was still incomplete and stated that the requirements of 108.02 still apply with work having to complete by the original completion date of November 1st, 2024. Ultimately the work was not performed before the original completion date due to the lack of a complete submittal for review. On December 17th, 2024 a final inspection C-85 was provided to Karvo which included PN 420 in the punch list to be complete by the revised completion date of April 30th, 2025.

Various back and forth efforts were made to try and use the submittal provided to the best of the Department's ability so that grinding could be performed in the spring of 2025. Once the griding operation was completed in mid-April, the Department received the complete post-grind submittal on May 7th, 2025. This was reviewed by District and returned to Karvo with comments for resolution. These comments were never resolved. The Department reviewed the submittal "as-is", which included calculating remove and replace areas at maximum disincentive as previously stated via email by the Department. It is possible that if the contractor had removed and replaced these areas, the disincentive would be smaller. At the conclusion of the review, it was determined that a disincentive of -$435,731.46 was due, to which Karvo disagreed. Karvo submitted their own costs of $87,406.04 derived from force account records taken during the PN 420 grinding operation. At this time, the issue was elevated to Step 2.

In summary, it is the Department's opinion that Karvo should be assessed the total disincentive amount for the following:

- PN 420 was present at the time of bid and is contractually part of the project, and has been used over 1,000 times since 2015 including the following projects on SR-11 within the vicinity of project 230484
  - 150426 ATB83037 (2 lifts of asphalt)
    - ATB-SR 11-08.04
  - 180192 ATB88933 (1 lift of asphalt)
    - ATB-SR 11/SR 45-13.94/24.07
  - 200579 TRU83046 (1 lift of asphalt)
    - TRU-SR 11-19.02
    - Prime Contractor was Karvo
  - 210293 ATB91877 (1 lift of asphalt)
    - ATB-SR 11-00.00
- Per 102.05, the Contractor is required to perform a site investigation before submitting a bid. None of the contractors provided any pre-bid questions (Appendix B) about surface pavement condition because of deteriorated subgrade or that alleged deteriorated subgrade would affect PN 420
- Karvo did not bring the issue of pavement condition to attention at the preconstruction meeting held on December 18th, 2023
- Karvo is a paving contractor who is familiar with PN 420 and its requirements
- Pavement repairs were performed per plan notes and specifications at the direction of the Project Engineer
- Multiple attempts were made by the Department to receive the required information so that the smoothness grinding could be performed in construction year 2024 as this would potentially yield better results for the contractor, but was not completed until mid-April 2025
- Change Order 002 compensated the contractor in the amount of $223,801.55 for Item 447 Density Requirements, with additional stricter requirements of Percent Within Limits (PWL) and Joint Density Requirements. FHWA-HIF-21-022 states that weak subgrade and/or bases negatively affect achieving higher densities in asphalt pavement

Respectfully,

Brian Dell, Jr., P.E.
Project Engineer, ODOT District 4 Construction

# Appendix A

# Select Emails

## Dell, Brian

**From:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Sent:** Wednesday, May 22, 2024 12:47 PM
**To:** Dell, Brian
**Cc:** Yianni Karvounides
**Subject:** Rt 11 ODOT 230484
**Attachments:** Copy of 230484 - ATB-SR-11-22.16.xlsm; SR-11 NB.pvp; SR11 Northbound Pavement Graphs.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Brian,

We received the attached rideability reports. As predicted, there are issues with achieving the specified targets due to the undisclosed deteriorated nature of the subgrade, in addition to the design-related issues that were raised as part of our Step 1 process. We are requesting that you waive remediation for any alleged "deficiencies" reflected in this report. If not, we will be separately track and cost-code our costs associated with this remediation if directed to proceed with them and seek them as part of on-going dispute resolution proceedings. We raised this issue with you at the outset of the Project upon discovering the degraded subgrade condition and were directed to nevertheless proceed. As you already know, we have achieved excellent compaction results and this rideability analysis is further indication that this is not a Karvo performance issue, but the result of the subgrade and design problems that we had previously warned about.

Please let us know your decision as soon as possible, and I am writing without waiver and a full reservation of rights.

I appreciate your prompt attention to this request before further costs are incurred.

Thank you,

KARVO COMPANIES
An Equal Opportunity Employer

Joshua Fenstermaker
**Superintendent**
Karvo Companies, Inc.
4524 Hudson Drive
Stow, Ohio 44224
Phone: 330.929.9616 ext. 117
Cell: 330-360-4646
www.karvocompanies.com

## Dell, Brian

**From:** Dell, Brian
**Sent:** Monday, June 10, 2024 12:40 PM
**To:** Yianni Karvounides
**Cc:** Joshua Fenstermaker; Dudt, Jonathan
**Subject:** RE: PN 420

Yianni,

Following today's on-site meeting, the Department's written Step 1 decision is that PN 420 applies as bid, with some mitigation efforts after further field review.

You mentioned in your June 7th, 2024, email that if PN 420 was not waived, then Karvo Companies would like the dispute elevated to Step 2.

Jonathan – please consider this email notification of Karvo Companies' request for a Step 2 meeting.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

**From:** Yianni Karvounides
**Sent:** Friday, June 7, 2024 2:38 PM
**To:** Dudt, Jonathan
**Cc:** Joshua Fenstermaker ; Dell, Brian
**Subject:** Re: PN 420

Jonathan,

While we disagree with your analysis of where we are in the claims process, and are not waiving any rights, for the reasons stated in my previous email, please consider this our request for a Step 1 meeting before we incur the costs.

Respectfully,
Yianni Karvounides

**From:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>
**Sent:** Friday, June 7, 2024 12:08 PM
**To:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>

**Cc:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>; Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Subject:** RE: PN 420

Yianni,

Unfortunately pursuant of 108.02.G we cannot elevate with to a step 2 until we have exhausted the previous steps of the dispute resolution process.

We met on-site on Monday 6/3/24 and discussed your concerns and agreed to investigate some mitigation efforts. From my records it appears that areas in question from the initial analysis of the passing lanes was laid out on Tuesday 6/4/24 for review and that Brian reviewed them and made some adjustments in the field. If you are not accepting this mitigation effort as acceptable, the Department will accept this as written early notice of a dispute.

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**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Friday, June 7, 2024 10:59 AM
**To:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Cc:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>; Dell, Brian <Brian.Dell@dot.ohio.gov>
**Subject:** PN 420

Jonathan,

Consistent with our previous notices, Karvo had requested that PN420 requirements be waived due to the undisclosed and unforeseen condition of the subgrade. Those conditions make achieving PN420 requirements commercially impracticable. We have delivered to you an outstanding project. Should ODOT not waive the PN420 requirements, we are requesting that our Step 2 proceeding be scheduled immediately. In the meantime, we will perform any directed work in this regard with full expectation and entitlement to reimbursement and will therefore be separately tracking those costs.

In an effort to partner and resolve this issue, Karvo is willing to provide 1 diamond grinding shift heading north and 1 diamond grinding shift heading south. Should this not be acceptable, however, we need to promptly proceed with the dispute resolution protocol, which we are not waiving any rights.

KARVO COMPANIES
An Equal Opportunity Employer

Yianni Karvounides

Karvo Companies, Inc.

4524 Hudson Drive

Stow, Ohio 44224

Phone: 330.929.9616 ext. 150

www.karvocompanies.com

## Dell, Brian

**From:** Dell, Brian
**Sent:** Monday, September 9, 2024 10:18 AM
**To:** Joshua Fenstermaker
**Cc:** yianni.karvounides@karvocompanies.com; Dudt, Jonathan; Todd Moyer
**Subject:** RE: ODOT 230484

Josh,

The data was received Friday afternoon, and I have provided it to District. I will let you know if we have any questions.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

**From:** Dell, Brian
**Sent:** Friday, September 6, 2024 11:12 AM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Cc:** yianni.karvounides@karvocompanies.com; Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>; Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Subject:** RE: ODOT 230484

Josh,

To keep all parties up to date, I have copied Yianni, Jonathan, and Todd. The attachments in this email are what was received on 8/22/24, which did not include the profiler data.

Please provide this information so we can keep the process moving.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** Dell, Brian
**Sent:** Wednesday, September 4, 2024 11:22 AM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** RE: ODOT 230484

Josh,

Double checking on this – could you please have ACM provide the profiler data files? The last email only contained the spreadsheet information.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** Dell, Brian <Brian.Dell@dot.ohio.gov>
**Sent:** Friday, August 23, 2024 1:59 PM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** Re: ODOT 230484

Josh,

Also, please have ACM provide the profiler data files.

Respectfully,
**Brian M. Dell, Jr., P.E.**
*Project Engineer*
ODOT District 4, Construction
2088 S. Arlington Rd., Akron, OH 44306
330.786.6935
transportation.ohio.gov

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**From:** Dell, Brian <Brian.Dell@dot.ohio.gov>
**Sent:** Thursday, August 22, 2024 2:44 PM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** FW: ODOT 230484

Josh,

As we discussed, the PN420 results are still in in the Dispute Resolution Process in conjunction with the 447 with PWL requirements. Now that all the data has been collected, please provide the Department the full scope of the costs incurred between these two items.

Respectfully,

**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

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**From:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Sent:** Thursday, August 22, 2024 12:39 PM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>
**Subject:** ODOT 230484

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Joshua Fenstermaker
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## Dell, Brian

**From:** Dudt, Jonathan
**Sent:** Friday, September 20, 2024 12:07 PM
**To:** Yianni Karvounides (yianni.karvounides@karvocompanies.com)
**Cc:** Dell, Brian; Josh Fenstermaker; Simpkins, Michael
**Subject:** FW: 23-0484 84625 ATB-11-22.16 Disputes

Yianni,

From speaking with Brian this week I understand that the 420 submittal package that he received is insufficient and has been returned for revisions prior to completing the review. The full data requirements of PN420 are needed to determine a dollar cost, so we can consider the potential impacts and begin the dispute process.

We have some concerns with the amount of time it is taking to get through this process and it should be noted that the completion date for this project is 11/01/2024. While we have a potentially ongoing dispute, no Contract requirements have been waived at this time. It is imperative that the project proceeds with all Contract work including PN 420 submittals, potentially grinding or remove and replace if necessary, and especially the installation of all safety items including striping and RPM's prior to the completion date.

Per 108.02 for all work potentially under dispute:

The Engineer and Contractor shall maintain records of labor, equipment, and materials used on the disputed work or made necessary by the circumstance. Such records will begin when early notice is received by the Engineer. Tracking such information is not an acknowledgement that the Department accepts responsibility for payment for this disputed work.

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**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Wednesday, August 14, 2024 3:18 PM
**To:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Cc:** Dell, Brian <Brian.Dell@dot.ohio.gov>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>; Simpkins, Michael <Michael.Simpkins@dot.ohio.gov>
**Subject:** Re: 23-0484 84625 ATB-11-22.16 Disputes

Jonathan-

When all the PN 420 smoothness results are in, we will provide them to you. I suggest we get those results to fully understand the scope of our remaining dispute. If we continue to disagree, our recommendation is to reinstitute the CMS dispute-resolution protocol:

An on-site meeting (Step 1) to discuss our differences, if any, as a result of the recent test results;
If necessary, a Step 2 proceeding following a report from ODOT as a result of our Step 1 meeting;
If necessary, a Step 3; and
Court of Claims filing if we can not resolve it per the above.

I remain hopeful we can work this all out. You know our position about the suitability of these standards to this Project. We have delivered an outstanding Project to ODOT, especially under the circumstances, and we are only looking for a partnering approach to resolving this issue.

Respectfully,
Yianni Karvounides

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**From:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>
**Sent:** Tuesday, August 13, 2024 1:18 PM
**To:** Yianni Karvounides <yianni.karvounides@karvocompanies.com>
**Cc:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>; Michael.Simpkins@dot.ohio.gov <Michael.Simpkins@dot.ohio.gov>
**Subject:** 23-0484 84625 ATB-11-22.16 Disputes

Yianni,

As discussed earlier, we have a dispute pending on this project in regards to the PWL requirements and the 420 smoothness. This discussion was paused as the project progressed as no definitive cost could be attributed to these items. As paving has completed, the Department should have the final PWL results this week. When you are able to get the PN420 smoothness results, please let us know how you would like to proceed.

**Jonathan M. Dudt, PE**
**Area Engineer**
**District 4 Construction Administration**
2088 South Arlington Rd.
Akron, Ohio 44306
D: 330.786.3181 C: 330.612.5000

## Dell, Brian

**From:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Sent:** Thursday, October 10, 2024 10:16 AM
**To:** Dell, Brian
**Subject:** RE: 230484 PN 420 Files - Review
**Attachments:** ATB-11-22.16_230484 Northbound Lanes.pvp; ATB-11-22.16_230484 Southbound Lanes.pvp

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**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Thursday, September 26, 2024 9:45 AM
**To:** yianni.karvounides@karvocompanies.com
**Cc:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>; John Jacobs <john.jacobs@karvocompanies.com>; Jonathan.Dudt@dot.ohio.gov; Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Subject:** RE: 230484 PN 420 Files - Review

Yianni,

Providing an update to this email string and bringing everyone into the conversation.

- The Department does not believe that the entire job needs profiler data rerun. We have the baseline information from which the corrective action plan can be developed. Bumps which have shown up after the initial runs will be shown in the post grind profiler runs
- Force account records will be kept during the smoothness grinding as backup documentation for the Dispute Resolution Process
    - This is for record keeping only, and not to be construed as the Department agreeing that the work is considered additional to the original contract requirements
- We field measured the mainline bridge lengths
    - ATB-11-2344L/R = 415 ft
        - SR-11 over I-90
    - ATB-11-2515L/R = 1,191 ft
        - SR-11 over Ashtabula river
    - ATB-11-2749L & ATB-11-2750R = 252 ft
        - SR-11 over State Rd.
    - ATB-11-2782L & ATB-11-2783R = 258 ft
        - SR-11 over CSX railroad
- The remaining comments from my 9/17/2024 and 9/18/2024 emails still need addressed

Please let me know if you have any questions or updates on when this work will take place.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Sent:** Wednesday, September 18, 2024 3:36 PM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Cc:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Subject:** RE: 230484 PN 420 Files - Review

We should rerun everything at this point since it's been 5 months since the 1st lanes were paved and 2 months since the 2nd lanes have been paved. Given what I saw in profiles from Amy to July there is no way the current data we have is reflection of what is there today.

**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Wednesday, September 18, 2024 11:03 AM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Cc:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Subject:** RE: 230484 PN 420 Files - Review

> You don't often get email from brian.dell@dot.ohio.gov. Learn why this is important

Josh,

In addition to the comments below, District is requesting the data for the ramps within the project.

Please let me know if you have any questions.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** Dell, Brian
**Sent:** Tuesday, September 17, 2024 1:01 PM
**To:** Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Cc:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Subject:** 230484 PN 420 Files - Review

Josh,

Here are some comments regarding the PN 420 data. Please review and let me know.

- Please check these lengths for overall lane length and the bridge crop outs which should be the length of the bridge plus approaches.
  Why are the bridge lengths different for highlighted? Why are the NB/SB Lanes not similar lengths?

| | Lengths | | | |
|---|---|---|---|---|
| | NB LN1 | NB LN2 | SB LN 1 | SB LN2 |
| IR90 | 415 | 416 | 453.55 | 441.35 |
| ATB River | 1187 | 1187 | 1187 | 1201 |
| State Rd | 257.79 | 255 | 276 | 302 |
| RR | 291.01 | 263 | 253 | 260 |
| Overall | 35,974.57 | 36,909.00 | 35,662.73 | 35,904.03 |

- Log sheet is incomplete. Log sheet should identify all 4 lanes' start/stop and which is LN 1, LN 2? PL or DL?
- The data has been analyzed correctly and populated to the Pay Adjustment sheets for Lot and Local Roughness. SB Ln 1 Pre Correction Local Roughness Pay Adjustment sheet should say SB, it says "NB".
- Roughness remaining after grinding, as shown on the "ProVal Grinding Simulation Report," at transition to the structures shows no after grind result. This roughness does not show any grinding for improvement
- There were 3 grind depths provided for NB LN1, but all other grind depths on the CAP are blank. These should be shown so that it can be verified they are <0.5" max depth.
- SB LN2 After Grinding columns are not highlighted to signify they go with State Rd. Overpass and ATB River Overpass.
- Heading for NB LANE 2 of ProVal Grinding Simulation Locations says "LANE 1". Correct to "NB LANE2."
- Please change the title at the bottom of all ProVal Grinding Simulation Report and ProVal Grinding Location pages from CUY 271 6.13 230560 to ATB 90 230484.

Respectfully,

**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

## Dell, Brian

**From:** Dell, Brian
**Sent:** Tuesday, December 17, 2024 10:38 AM
**To:** John Jacobs
**Cc:** yianni.karvounides@karvocompanies.com; Dudt, Jonathan
**Subject:** 230484 Final Inspection - Punchlist Work
**Attachments:** C-85 Final with Punchlist 230484.pdf

John,

Please see attached. The following work has a completion date of April 30th, 2025, please let me know if you have any questions.

1. Barrier reflectors
2. Structure ID signs
3. PN 420 smoothness grinding

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

## Dell, Brian

**From:** Dell, Brian
**Sent:** Monday, March 24, 2025 1:21 PM
**To:** John Jacobs
**Cc:** Dudt, Jonathan
**Subject:** Re: 230484 Final Inspection - Punchlist Work

John,

I have received the USB stick will the files, and I will pass them along to District for review.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

---

**From:** Dell, Brian
**Sent:** Thursday, March 20, 2025 8:51 AM
**To:** John Jacobs
**Cc:** Dudt, Jonathan
**Subject:** Re: 230484 Final Inspection - Punchlist Work

John,

I am unable to access DropBox because our IT security policy blocks the website.

I was able to download the .pvp files you sent me previously. I believe they were on Karvo's SharePoint site. Could you upload these files there and send the link?

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** John Jacobs <John.Jacobs@karvocompanies.com>
**Sent:** Wednesday, March 19, 2025 4:39 PM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Subject:** Fw: 230484 Final Inspection - Punchlist Work

Brian,

I believe this is everything you need is in the link below.

Thanks,


**John Jacobs**
**Sr. Project Superintendent, Karvo Companies, Inc.**

330-929-9616 | 330-801-3877

john.jacobs@karvocompanies.com

www.karvocompanies.com

4524 Hudson Dr, Stow, OH 44224


**Karvo Companies is actively recruiting for several job positions.**

**From:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Sent:** Wednesday, March 19, 2025 2:13 PM

**To:** John Jacobs <John.Jacobs@karvocompanies.com>
**Subject:** RE: 230484 Final Inspection - Punchlist Work

Files are in the dropbox as one...

https://www.dropbox.com/scl/fo/v6nchkd8b1dwztil94z6g/ADqNKSfxAb8MNzMPopmbAPY?rlkey=c6m38ci764271ujknfiwjntoa&st=orpegdxa&dl=0

---

**From:** John Jacobs <John.Jacobs@karvocompanies.com>
**Sent:** Tuesday, March 18, 2025 7:16 PM
**To:** Todd Moyer <tmoyer@acmconstructionmanagement.com>
**Cc:** Michael Katz <mkatz@allega.com>
**Subject:** Re: 230484 Final Inspection - Punchlist Work

Todd,

I wanted to follow up on the below email.

Could you please let me know when you can get this over.

ODOT has given us a completion date for April 30th

Thanks!
Sent from my iPhone

> On Mar 13, 2025, at 1:55 PM, John Jacobs <John.Jacobs@karvocompanies.com> wrote:
>
> Todd,
>
> ODOT has requested that all the documents pertaining to PN 420 be put into 1 file because this is part of a dispute.
>
> Could you please get this put together and sent over?
>
> Thank you

**John Jacobs**
**Sr. Project Superintendent,**
**Karvo Companies, Inc.**

330-929-9616 | 330-801-3877

john.jacobs@karvoccompanies.com

www.karvocompanies.com

4524 Hudson Dr, Stow, OH 44224

**Karvo Companies is actively recruiting for several job positions.**

---

**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Thursday, March 13, 2025 10:42 AM
**To:** John Jacobs <john.jacobs@karvocompanies.com>
**Cc:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Subject:** Re: 230484 Final Inspection - Punchlist Work

John,

As of today, I have not received a complete submittal as required per Supplement 1110 (attached) . The requirements for the submittal are detailed in 1110.06. Since this information is part of a dispute, it is important that we have one complete submittal for review.

This work is also included on the C-85 Final Inspection, with a required completion date of April 30th, 2025. If this work is not completed by the revised completion date, liquidated damages will be assessed per 108.07.

Please let me know if you have any questions.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306

330.786.6935

<Outlook-A picture .png>

---

**From:** Dell, Brian
**Sent:** Thursday, February 27, 2025 1:37 PM
**To:** John Jacobs <John.Jacobs@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Subject:** RE: 230484 Final Inspection - Punchlist Work

John,

To eliminate confusion, since this information has been revised, please provide one complete submittal as required per PN 420 with all the latest data. If the files are too large to fit in an email, please provide them on a USB drive and we will make arrangements to come and get them.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

<image001.png>

---

**From:** Dell, Brian
**Sent:** Thursday, February 27, 2025 1:03 PM
**To:** John Jacobs <John.Jacobs@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Subject:** RE: 230484 Final Inspection - Punchlist Work

John,

Received – thank you. I will pass these along for review.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

<image001.png>

**From:** John Jacobs <John.Jacobs@karvocompanies.com>
**Sent:** Thursday, February 27, 2025 9:51 AM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Subject:** Re: 230484 Final Inspection - Punchlist Work

Brian ,

Please see the attached files.

Todd just sent these over.

Thanks,


**John Jacobs**
**Sr. Project Superintendent, Karvo Companies, Inc.**

330-929-9616 | 330-801-3877

john.jacobs@karvocompanies.com

www.karvocompanies.com

4524 Hudson Dr, Stow, OH 44224




**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Thursday, February 27, 2025 9:26 AM
**To:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>; John Jacobs <john.jacobs@karvocompanies.com>
**Cc:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>
**Subject:** RE: 230484 Final Inspection - Punchlist Work

Yianni / John,

Since we are getting closer to the construction season, I wanted to send a reminder that this project has a revised completion date of April 30th, 2025. If not complete by this date, liquidated damages will be considered.

I have been copied on the emails (last sent 2/25/2025) from John to Todd Moyer requesting an update on the PN 420 data. To date, I have not seen a response from Todd.

Barrier reflectors and ID signs are waiting for the weather to break – please let me know once the work is scheduled.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

<image001.png>

---

**From:** Dell, Brian
**Sent:** Tuesday, December 17, 2024 10:38 AM
**To:** John Jacobs <john.jacobs@karvocompanies.com>
**Cc:** yianni.karvounides@karvocompanies.com; Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Subject:** 230484 Final Inspection - Punchlist Work

John,

Please see attached. The following work has a completion date of April 30th, 2025, please let me know if you have any questions.

1. Barrier reflectors
2. Structure ID signs
3. PN 420 smoothness grinding

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

<image001.png>

## Dell, Brian

**From:** Dell, Brian
**Sent:** Thursday, April 17, 2025 2:02 PM
**To:** 'John Jacobs'
**Cc:** Dudt, Jonathan; 'Yianni Karvounides'
**Subject:** RE: 230484 PN 420 Submittal Review

John,

Following up with our conversation earlier – please let ACM know to collect post-grind profile data as soon as possible. By doing this, it is the best representation of the roadway following the corrective work.

Let me know if you have any questions.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

---

**From:** Dell, Brian
**Sent:** Friday, April 11, 2025 9:47 AM
**To:** John Jacobs <John.Jacobs@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Subject:** RE: 230484 PN 420 Submittal Review

John,

All locations identified on the submittal should be marked in the field with the intent to grind. Once marked, they can be evaluated on a case-by-case basis.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

**From:** John Jacobs <John.Jacobs@karvocompanies.com>
**Sent:** Friday, April 11, 2025 9:35 AM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>; Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Subject:** Re: 230484 PN 420 Submittal Review

Brian-

After ACM reviewing ODOT's comments what locations are we grinding?


**John Jacobs**
**Sr. Project Superintendent, Karvo Companies, Inc.**

330-929-9616 | 330-801-3877

john.jacobs@karvocompanies.com

www.karvocompanies.com

4524 Hudson Dr, Stow, OH 44224




---

**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Friday, April 11, 2025 8:46 AM
**To:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Cc:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>; John Jacobs <John.Jacobs@karvocompanies.com>
**Subject:** RE: 230484 PN 420 Submittal Review

Yianni,

Understood – who will be keeping records for this work? We are keeping track as well, and I would like to have everyone on the same page to make sure our records match.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

---

**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Friday, April 11, 2025 8:29 AM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>; John Jacobs <John.Jacobs@karvocompanies.com>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Subject:** Re: 230484 PN 420 Submittal Review

Brian,

As mentioned before, Karvo will proceed with the as directed that ODOT is requesting. We are scheduled to start next week on the 14th. As previously discussed and consistent with our previous notices regarding PN420, Karvo requested this requirement to be waived due to the underlying pavement/undisclosed and unforeseen condition of the subgrade. We are tracking all costs associated with this work and will seek full reimbursement.

Without waiver and full reservation of our rights.

Respectfully,
Yianni Karvounides

---

**From:** Brian.Dell@dot.ohio.gov
**Sent:** Friday, April 11, 2025 8:26 AM
**To:** John Jacobs
**Cc:** Yianni Karvounides; Jonathan.Dudt@dot.ohio.gov
**Subject:** 230484 PN 420 Submittal Review

John,

The Department has reviewed the provided PN 420 submittal and has the following comments. Please proceed with the smoothness grinding scheduled for Monday, April 14th.

1. The “After Grinding” column data exactly matches the “Before Grinding” data on the ProVal Grinding Simulation Reports
2. There are no depths of grinds specified. Limit the depth to 1/3 the thickness of the surface course
3. The Pay Adjustment Sheets appears to be populated correctly for Local Roughness. These and the Pay Adjustment Sheets for Lots will need to be revised and resubmitted for review with after grind data
4. Lots that are still above 95 IRI (the maximum allowed) after grinding will be evaluated case by case. Assuming the ride is satisfactory with no further action being required, the Department will consider changing remove and replace areas to 95 IRI so the spreadsheet calculates the maximum disincentive. The contractor may choose remove and replace over maximum disincentive.
5. Localized roughness that remains over 250 IRI (exception areas) or 160 IRI will be evaluated case by case. Assuming the ride is satisfactory with no further action being required, the Department will consider changing remove and replace areas to the maximum IRI so the spreadsheet calculates the maximum disincentive. The contractor may choose remove and replace over maximum disincentive.
6. The contractor should evaluate comments 4 and 5 carefully before grinding, as these disincentives can become very costly
7. Butt Joints and bridge transitions will be evaluated case by case and may require grinding, even if not called out
8. Grinds are to be feathered out, especially in transverse direction
9. Any striping or RPMs obliterated shall be replaced prior to final project approval

Please let me know if you have any questions.

Respectfully,

**Brian Dell, Jr., P.E.**

**Project Engineer**

ODOT District 4, Construction

2088 S. Arlington Rd.

Akron, OH 44306

330.786.6935

Department of Transportation

## Dell, Brian

**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Wednesday, June 4, 2025 10:29 AM
**To:** Dell, Brian
**Cc:** Dudt, Jonathan; John Jacobs; Joshua Fenstermaker
**Subject:** Re: 230484 PN 420 Post Grind Analysis

Will do.

---

**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Wednesday, June 4, 2025 10:28 AM
**To:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Cc:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>; John Jacobs <John.Jacobs@karvocompanies.com>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** RE: 230484 PN 420 Post Grind Analysis

Yianni,

Please provide Karvo's total cost, including supporting documentation, associated with the dispute so that it can be reviewed. After review, we can determine if the project will progress to Step 2.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

Department of Transportation

---

**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Wednesday, June 4, 2025 10:11 AM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>
**Cc:** Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>; John Jacobs <John.Jacobs@karvocompanies.com>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** Re: 230484 PN 420 Post Grind Analysis

Brian,

Pursuant to many previous notices and as a reminder, please see attached email from Karvo to ODOT on 4-11-25.

Karvo respectfully disagrees with the department's analysis on the total disincentive of -435,731.46. Please let us know what the next steps are.

Respectfully,
Yianni Karvounides

---

**From:** Brian.Dell@dot.ohio.gov <Brian.Dell@dot.ohio.gov>
**Sent:** Wednesday, June 4, 2025 9:44 AM
**To:** Yianni Karvounides <yianni.karvounides@karvocompanies.com>
**Cc:** Jonathan.Dudt@dot.ohio.gov <Jonathan.Dudt@dot.ohio.gov>; John Jacobs <John.Jacobs@karvocompanies.com>
**Subject:** 230484 PN 420 Post Grind Analysis

Yianni,

The Department has reviewed the post grind data per PN 420 dated 1/20/2023 – please see attachments.

A total disincentive of -$435,731.46 was calculated using these attachments and is summarized in "230484 PN 420 Summary.xlsx". Please note that identified areas of remove and replace were taken at maximum disincentive since remove and replace was not performed; all other disincentives were calculated per the Proposal Note.

Please let me know if you have any questions.

Respectfully,
**Brian Dell, Jr., P.E.**
**Project Engineer**
ODOT District 4, Construction
2088 S. Arlington Rd.
Akron, OH 44306
330.786.6935

## Dell, Brian

**From:** Dudt, Jonathan
**Sent:** Wednesday, June 18, 2025 8:17 AM
**To:** Yianni Karvounides; Dell, Brian
**Cc:** Beth Dannaher; Andrew Cross; John Jacobs; Joshua Fenstermaker
**Subject:** RE: 230484 PN 420 Post Grind Analysis

Yianni,

We had a step 1 meeting last season and there was a mutually agreed pause in the step process between yourself and Mike Simpkins until we could establish costs. If you would like to escalate the dispute to step 2 please send written notice to Mr. Simpkins and he will get the meeting scheduled.

---

**From:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Sent:** Tuesday, June 17, 2025 1:21 PM
**To:** Dell, Brian <Brian.Dell@dot.ohio.gov>; Dudt, Jonathan <Jonathan.Dudt@dot.ohio.gov>
**Cc:** Beth Dannaher <Beth.Dannaher@karvocompanies.com>; Andrew Cross <andrew.cross@karvocompanies.com>; John Jacobs <John.Jacobs@karvocompanies.com>; Joshua Fenstermaker <Joshua.Fenstermaker@karvocompanies.com>
**Subject:** Re: 230484 PN 420 Post Grind Analysis

Gentlemen,

Please advise what step is next in the dispute resolution and administrative claims process?

Respectfully,
Yianni Karvounides

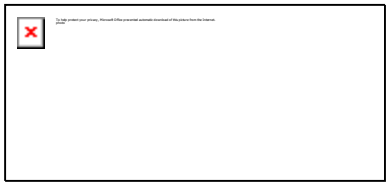
---

**From:** Andrew Cross <andrew.cross@karvocompanies.com>
**Sent:** Tuesday, June 17, 2025 1:03 PM
**To:** brian.dell@dot.ohio.gov <brian.dell@dot.ohio.gov>; jonathan.dudt@dot.ohio.gov <jonathan.dudt@dot.ohio.gov>
**Cc:** Yianni Karvounides <Yianni.Karvounides@karvocompanies.com>
**Subject:** 230484 PN 420 Post Grind Analysis

Good afternoon,

Please see attached force account worked for Diamond Grinding on SR 11.

Thanks,



**Andrew Cross**
**Assistant Project Manager, Karvo Companies, Inc.**

andrew.cross@karvocompanies.com

# Appendix B

# Prebid Questions

# Ohio Department of Transportation - Prebid Questions

**Project No. 230484** **Sale Date - 10/12/2023**

ATB-84625 - SR 11-22.16

*Question Submitted:* 10/11/2023 9:39:35 AM **Question Number - 16**

Addendum 2 added a ramp closure at SR11/SR84 Ramp D-2 for paving. Will this closure also be allowed for bridge painting as there is no room available on the narrow shoulder to place the necessary equipment?

*Question Submitted:* 10/11/2023 9:05:26 AM **Question Number - 15**

ATB-84-1475 - there are no existing plans in the folder on the ftp site. please direct us where we can find these plans.

*Question Submitted:* 10/11/2023 3:30:45 AM **Question Number - 14**

On sheet 4 of the plans there is a note under PAVEMENT TRANSITIONS AT STRUCTURES that states"The contractor shall use item 897 Pavement Planing, Asphalt Concrete, Class A and ,If necessary, Item 251 Partial Depth Repairs, as directed by the project Engineer, to provide smooth transitions from approach pavement to the approach slab."There is no pay item for 897 Pavement Planing, Asphalt concrete, Class A.How is the contractor paid for this work?

**An addendum will be generated to correct this**

*Question Submitted:* 10/10/2023 3:30:22 PM **Question Number - 13**

Please verify the quantity for item 0034 Asphalt Surface Course. The quantity of 18,711 CY appears to overstated.

*Question Submitted:* 10/10/2023 1:34:07 PM **Question Number - 12**

Structure ATB-11-2822, Reference 208 has refurbish bearing device quantity of 10 each. There 20 abutment bearings on this structure. Will all 20 abutment bearings be refurbished or just a select 10 bearings at the Engineers discretion?

*Question Submitted:* 10/10/2023 1:28:21 PM **Question Number - 11**

There are no plans on the ftp site for ATB-84-1475 or ATB-531-0917. please add asap.

**https://ftp.dot.state.oh.us/pub/Contracts/Attach/ATB-84625/**

*Question Submitted:* 10/9/2023 3:50:22 PM **Question Number - 10**

Plan sheet 10 lists allowable closure times for specified ramps on the job. There are several ramps not included in this chart. Will there be allowable closures for these other ramps or will these be required to maintain traffic during construction?

*Question Submitted:* 10/9/2023 3:05:22 PM **Question Number - 9**

For the Pavement milling, app. Will the Townships accept milling material at night? Who is responsible for site lighting during the nightly milling operations at the township dump locations? Who is responsible for damage to existing pavement at the township dump locations?

**As per the note on plan page 6, the contractor will coordinate with the project engineer and townships.**

*Question Submitted:* 10/6/2023 12:24:07 PM **Question Number - 8**

Please provide framing plans for the structures receiving paint. we cannot bid LS paint without knowing the dimensions of the beams.

**The existing plans are available on the ODOT FTP website.**

*Question Submitted:* 10/5/2023 9:31:23 AM **Question Number - 7**

Plan page 11 says all work associated with Structure ATB-531-0917 shall be complete by March 31. Will the limitations of 514.06 be waived to accomplish this date?

**The project engineer will waive the timeframe restrictions provided that the temperatures meet the requirements of CMS 514.06.**

*Question Submitted:* 9/25/2023 8:19:00 AM **Question Number - 6**

There is no width called out for the 617 Berm. How was the quantity of 617 berm derived?

**An addendum will be generated to show the proposed 617 will be 2' wide.**

# Ohio Department of Transportation - Prebid Questions

*Question Submitted:* 9/25/2023 8:01:00 AM **Question Number - 5**

Sheet 4 has plan notes for 251 partial depth repairs for longitudinal and transverse. However, there are no corresponding bid items for these 2 repairs. These two methods of repairs carry very different production rates, and should have 2 separate pay items. Please revise and add pay items.Additionally, the plan notes state the repairs should be completed after mainline milling. This is not possible in the 7 day window, and will negatively affect the 420 ride. These repairs should be completed BEFORE mainline milling. The State should also consider providing the same two bid items for repairs that take place on ramps, vs. mainline repairs; or consider adding a plan note, that state: "Repairs made on ramps, regardless of orientation, shall be paid under transverse."

**An addendum will be generated to split the partial depth repairs into 2 pay items.ODOT prefers to have a milled surface covered within 7 days after exposure as per plan in order to protect the subbase.All partial depth repairs on ramps shall be paid for as either longitudinal or transverse, just like the mainline.**

*Question Submitted:* 9/20/2023 1:56:50 PM **Question Number - 4**

Plan pages 34-36 show work for ATB-531-0917. This bridge is not listed in the proposal and thus has no bid items, please advise.

**An addendum will be filed to add this bridge to the Proposal.**

*Question Submitted:* 9/18/2023 9:49:57 AM **Question Number - 3**

THE APP NOTE FOR THE 442 ASPHALT SURFACE, 12.5MM, TYPE A (447), PWL 2024 PG70-22 STATES THIS PROJECT IS A PWL ACCEPTANCE. THE PROPOSAL DOES NOT NOTE PWL ACCEPTANCE.DOES THIS PROJECT REQUIRE PWL?

**This project will require PWL acceptance. An upcoming addendum will correct the issue.**

*Question Submitted:* 9/13/2023 10:20:52 AM **Question Number - 2**

Please post existing plans for structure ATB-84-1475.

**The plans will be posted soon.**

*Question Submitted:* 9/11/2023 10:25:16 AM **Question Number - 1**

Please post existing structure drawings.

**Existing structure drawings will be posted soon.**

# Appendix C

# Pictures


**Figure 1: Milled Surface**

**Figure 2: Milled Surface**

**Figure 3: Milled Surface and New Pavement**

**Figure 4: Milled Surface and New Pavement**

**Figure 5: Milled Surface and New Pavement**


**Figure 6: Milled Surface**

**Figure 7: Milled Surface**


**Figure 8: Milled Surface**


**Figure 9: Repair Reflecting**

**Figure 10: Repair Reflecting**

**Figure 11: Southern Pavement Joint**


**Figure 12: Longitudinal Repair**


**Figure 13: Milled Surface and Longitudinal Repair**


**Figure 14: Longitudinal Repair**

**Figure 15: Full Depth Repair**

# Appendix D

# FHWA Technical Brief

TechBrief

The Asphalt Pavement Technology Program is an integrated national effort to improve the long-term performance and cost effectiveness of asphalt pavements. Managed by the Federal Highway Administration through partnerships with State highway agencies, industry and academia, the program's primary goals are to reduce congestion, improve safety, and foster technology innovation. The program was established to develop and implement suggestions, methods, procedures and other tools for use in asphalt pavement materials selection, mixture design, testing, construction and quality control.

Office of Preconstruction, Construction, and Pavements
FHWA-HIF-21-022
Date: December 2020

U.S. Department of Transportation
Federal Highway Administration

# Overcoming Obstacles to Achieving Density

*This Technical Brief summarizes techniques used to overcome obstacles to achieving increased density on individual State projects associated with the FHWA Enhancing Durability of Asphalt Pavements Through Increased In-Place Density Demonstration Project.*



## Introduction

This is the third of four planned Technical Briefs on ***Enhancing Durability of Asphalt Pavements Through Increased In-Place Density*** associated with the Federal Highway Administration (FHWA) Accelerated Implementation and Deployment of Pavement Technologies (AID-PT) program. The AID-PT program advances best practices and technologies for constructing and maintaining high-quality, long-lasting pavements in accordance with six goals established by Congress (1). The overall objective of the demonstration project was to show that additional density could be obtained through improved techniques.

This set of Tech Briefs focuses on the importance of mat and joint density, techniques and tools that have been demonstrated to help improve density, examples of specifications, and overcoming obstacles to achieving density. The information used to develop them was obtained through review of the technical literature identified in the references in this document, a series of workshops and support of 29 field demonstration projects performed by State Departments of Transportation (DOTs). This is the third in the planned series of the four Technical Briefs that are organized as follows:

1. Density Demonstration Projects and Related Specifications
2. Techniques and Tools for Improving Density
3. Overcoming Obstacles to Achieving Density
4. Improving Longitudinal Joint Performance

Although several factors can influence the performance of an asphalt pavement, one of the most important factors is in-place density (2). A small in-place density increase can potentially lead to a significant increase in the service life of asphalt pavements. According to the studies reviewed in the literature, a 1 percent increase in density (percent of $G_{mm}$) was estimated to improve the fatigue performance of asphalt pavements between 8 and 44 percent and improve rutting resistance by 7 to 66 percent (3, 4). In addition, based on field data, a 1 percent increase in density would conservatively extend the asphalt pavement service life by 10 percent.

Recognizing the importance of in-place density in building cost effective asphalt pavements, FHWA initiated the Demonstration Project for "Enhanced Durability of Asphalt Pavements through Increased In-place Pavement Density" (4, 5, 6, 7). The objective of this demonstration project was to support DOTs in their evaluation of their existing density requirements for acceptance. Twenty-six DOTs participated with 121 experimental sections constructed, comprised of 35 control sections and 86 test sections.

There were many variables including mixture type, construction equipment, and procedures between States and within States, making it very difficult to compare the density results between various pavement sections. The number of variables that were intentionally changed within a State was much less than the number of changes between States. This was expected, as it was a demonstration project and not a formal experiment. As a demonstration project, each State (the contractor and agency) was empowered to focus on changes to improve density that it thought would be most beneficial for its situation. So, it was much easier to compare the changes made within a State to show the effect of these changes on in- place density. This Tech Brief highlights what contractors and DOTs did to overcome obstacles to achieve density. Additional details on the demonstration projects can be found in References 4 through 7.

While constructing the experimental sections throughout the three phases of the demonstration project, there were situations that presented obstacles for increasing in-place density. In most cases, these obstacles were overcome.

There are several practices to overcome obstacles to obtain increased density documented in the literature (2, 8, 9). A summary of these include:

- Understanding factors affecting compaction such as material properties (aggregates, asphalt binder and mixture properties), environmental variables (layer thickness, temperature, wind velocity, solar flux, and time available for compaction), and types of rollers,
- Determining a roller pattern and identifying the tender zone if it exists, measuring density while using applying the roller pattern, and adjusting the roller patter to compact stiff and/or tender mixture as they occur, and
- Addressing mat problems such as surface waves, tearing, nonuniform texture, screed marks, screed responsiveness, surface shadows, poor compaction, joint problems, checking, shoving, bleeding, roller marks, and segregation.

The information presented here is intended to document some of the practices encountered on FHWA's density demonstration project and to supplement and expand upon the published literature.

# Obstacles to Achieving Higher In-Place Density

The following are seven primary obstacles to achieving higher in-place density observed during construction of the experimental sections throughout the three phases of the demonstration project. Other obstacles not observed during the demonstration project could arise. The primary obstacles encountered

were:

- Stiff Mixture.
- Tender Mixture.
- Aggregate Degradation.
- Weak Subgrade and/or Base.
- Break Point Density Control.
- Smoothness.
- "Roll Until Meets" Philosophy.

A description of each obstacle follows. Examples of techniques used to minimize impacts of or eliminate the obstacles are also described.

## Stiff Mixture

Some asphalt mixtures are very stiff, posing challenges to obtaining higher in-place density. Several factors influence mixture stiffness. Examples include asphalt binder stiffness, aggregate properties and gradation, recycled materials, mixture temperature and ambient conditions. Figure 1 illustrates the sensitivity of asphalt mixture stiffness (modulus) to temperature for an array of different mixture types (10).

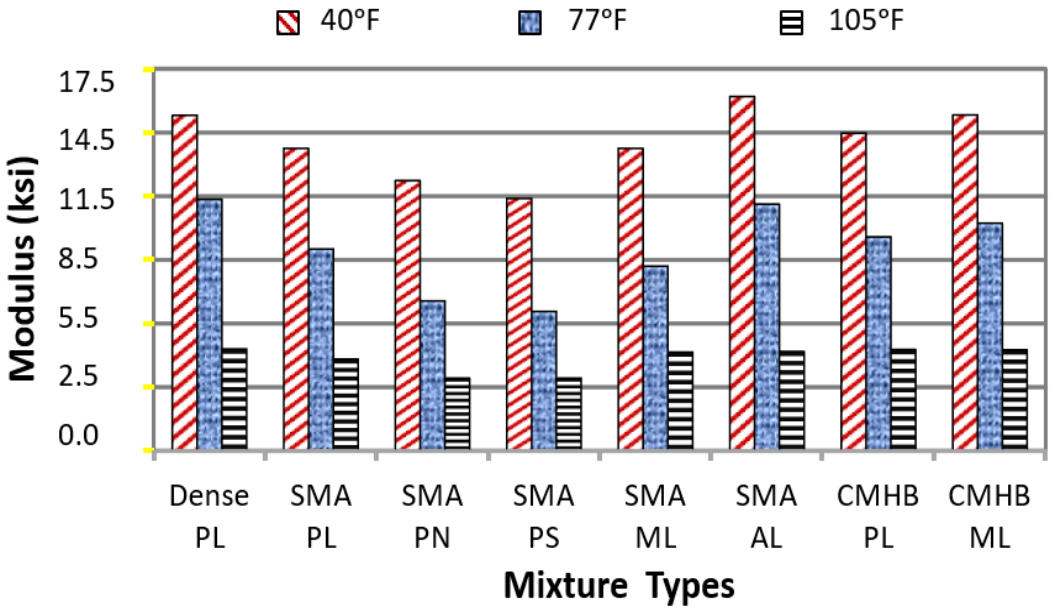



**Figure 1. Effect of Temperature on Mixture Stiffness (10).**

One of the most important strategies with stiff mixtures is to compact them while they are hottest and have the lowest stiffness. Ten demonstration projects used breakdown rollers in echelon. This strategy allows for twice the number of passes in the same time, as compared to a conventional roller pattern that has one breakdown roller. With breakdown rollers in echelon, more passes are applied while the asphalt mixture is hottest. This is also an important benefit when compacting thin lifts and late season compaction when the mat cools very quickly. Figure 2, generated with Multicool Software output data, illustrates how rapidly mat temperature drops under typical conditions, for different lift thicknesses (11). The free Multicool tool can be used to determine the amount of time available to achieve compaction. The output can be used to help make decisions about paving speed, roller types and number of rollers. In Figure 2, 1.5 and 3.0 inch lift thicknesses are illustrated. The 1.5 inch lift cools from 300°F to 200°F in just 9 minutes with ambient and base mixture temperatures of 40°F. The 3.0 inch lift cools from 300°F to 200°F

in 28 minutes under the same conditions.

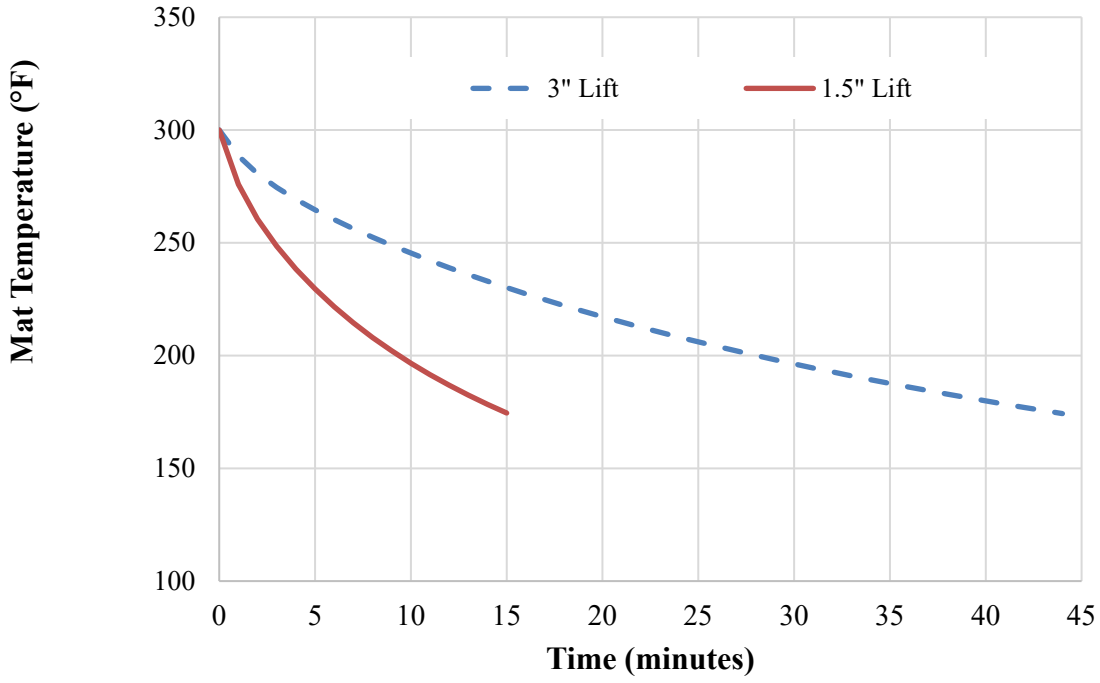



**Figure 2. Multicool Mixture Cooling Rate Example.**

Three demonstration projects also used intermediate pneumatic tire rollers in echelon. Applying the most compactive effort while the asphalt mixtures were hot was a very effective strategy. A few suggestions to obtaining density on a stiff mixture include:

- Tight roller patterns were effective on two of the demonstration projects. Keeping rollers at consistent spacing and the breakdown roller near the paver helped achieve density more quickly. It also reduced the standard deviation of the density results. Conversely, it is particularly important to avoid the "lazy" roller pattern in which the rollers have large spaces between them and are far behind the paver.
- Balancing the paver speed with the speed of the rolling is important. If a paver speed is too fast, it can "outrun" the rollers and make achieving density more challenging. Often a consistent paver speed which is balanced with the available rollers can have the same production as using a fast paver speed and a lot of stopping and starting. Figure 3 is a reminder that, to have consistent paving and compaction speed, the entire operation from plant production to final compaction should be balanced. A balanced operation also leads to improved ride quality because it reduces stops and starts.
- It is generally desirable to obtain all but approximately 2 percent of the target density needed by completion of the breakdown rolling. If this is not being achieved, then this would be a time for a contractor to review the common practices such as temperature, speed, using breakdown rollers in the echelon position, etc.

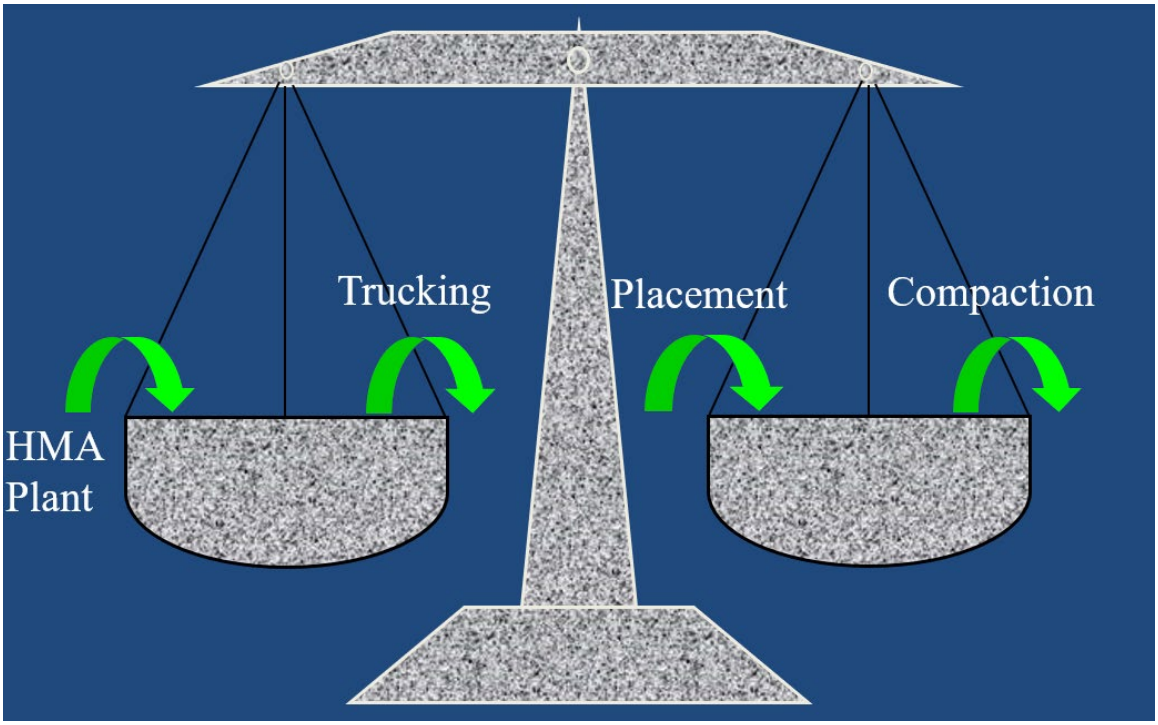



**Figure 3. Balanced Operation Considerations.**

## Tender Mixture

Some asphalt mixture moves a lot under the rollers. The mixture may form a large bow wave in front of the roller and/or move laterally. This is sometimes noticeable only with the first pass of a steel drum breakdown roller. Lateral movement is considered excessive if it continues after the initial pass. This was experienced on one demonstration project. These asphalt mixtures are difficult to compact and often referred to as "tender mixture." Tender mixture may be created by properties of the mixture design or additional fluids. In this demonstration project, it was believed to be primarily from additional fluids. The fluids could be from moisture within the aggregates or reclaimed materials that was not removed by the asphalt plant. The additional fluids could also be from additives (e.g., anti-stripping additives, warm mixture asphalt additives, etc). Tender mixture may also be a result of a soft binder. Some binders have very low, low-temperature grades or modifiers that are used for the binder to meet State-DOT-specified performance grades.

The "tender zone" occurs through a specific temperature range for any given mixture. Tender behavior (pushing and shoving under the roller) occurs in the tender zone and the mixture behaves normally (more stable) at temperatures above and below the tender zone. The upper and lower temperature limits of the tender zone are commonly identified by observation in the field and measuring temperature of the mat while observing mixture behavior under the action of steel drum rollers. A typical example of a tender zone may be from 230°F down to 190°F. Echelon rolling can be used to achieve density before the mixture cools to 230°F (in this example). Alternatively, where density is not achieved before the mixture temperature reaches the upper limit of the tender zone, further compaction is carried out after the mixture cools below the lower limit (190°F in this example). Depending on job-site conditions, this approach may be nearly impossible to achieve and echelon rolling may be necessary. It has also been found that the diameter of the roller's drum can have an impact. The larger the diameter of the drum, the less impact the roller has on creating the bow wave. A larger diameter drum has a lower angle of attack.

In any case, the cause of a tender mixture should be identified and addressed. When dealing with tender

mixture from additional fluids (i.e., moisture), it is important to make adjustments at the plant. The moisture needs to be removed in the drying process and/or the additives need to be accounted for as part of the mixture design.

Time typically heals these issues, and the pavement can experience normal performance once the asphalt mat "sets," "cures," or "dries." If the mat does not do this in a reasonable time, then the mat can be removed with a skid steer or front-end loader. A question often arises when tender mixtures are encountered, which is to ask about the appropriateness of rolling to obtain additional density tomorrow. Although it is possible, it is not desirable. It is important to identify the cause of the tenderness and make the appropriate adjustments at the plant (e.g., removing the moisture during the drying process in this example.)

## Aggregate Degradation

There were aggregates that degraded under compaction on two of the demonstration projects. During the control section, the normal compaction process was followed. Two double drum vibratory rollers were used in echelon in the static mode. The density in these sections was lower than the density observed with many of the other DOT specifications (6). As part of the test section, a pneumatic roller was added. The density was increased such that the density in the test section averaged over 94.0 percent. Pneumatic rollers can be very effective when compacting asphalt mixtures with aggregates that degrade. Further, pneumatic rollers were used on three demonstration projects in the intermediate position in echelon. Not only could this strategy assist with preventing degradation of aggregate, it was also observed that there was a lower standard deviation of density results. Pneumatic rollers have also been known to provide more uniform compaction through the depth of the asphalt layer.

Another demonstration project had some lessons learned related to aggregate degradation. The maximum in-place density of the mat achieved for Section 1 at Location A was 93.0 percent after 20 passes applied by the breakdown and intermediate rollers. The compaction process stopped when some aggregate degradation was observed in the mat. The roller's amplitude, frequency, and speed were not coordinated, and it was apparent that something was wrong. Section 1 was not considered positive as the contractor was not able to "break" the density (i.e., a peak density was not realized) of the mat. However, several lessons can be learned from this experiment, and they are discussed below with suggestions for future improvement.

- Mixture design. The mixture design used in Section 1 may need to be examined. A mixture design with a high recycled content (from recycled asphalt pavement—RAP—and recycled asphalt shingles—RAS), such as the one used in Section 1, may need more virgin asphalt than the optimum binder content determined based on the volumetric parameters alone (i.e., AASHTO M323). The high recycled content made the mixture very stiff and more difficult to achieve a higher in-place density.
- Compacting when it is hot. An effective way to achieve a higher density and prevent aggregate degradation is to compact the mat when it is hot. The temperature of the mat behind the paver could have been higher, especially for an asphalt mixture with a high recycled content. One of the methods to compact the mixture when it is hot is to have two breakdown rollers operating in echelon. Twice the number of passes can be made in a given amount of time.
- Importance of vibration amplitude. The high amplitude used for compaction may have been too high. A lower amplitude would have reduced aggregate degradation. However, with the stiff mixture (low temperatures and high recycle), high amplitude may have been the only option to achieve

higher density. To reduce aggregate degradation, a lower amplitude with higher frequency and higher temperatures would have been better.

- Use of pneumatic roller. A pneumatic roller has successfully been used as an intermediate roller in other demonstration projects to increase in-place density without breaking aggregates in the mat. On one demonstration project, with a limestone aggregate with a history of degradation during compaction, a single pass was made with a typical steel double drum breakdown roller operated in the static mode. Then echelon compaction with pneumatic rollers was used to obtain all but 1.0 percent density of the DOT specified density. This technique led to 93.8 percent average density and a standard deviation of less than 1.0 with no visible broken aggregates. The echelon pneumatic rolling is illustrated in Figure 4.
- Use of WMA at lower temperatures made the mat more challenging to compact. Although WMA can allow for lowered temperatures, this generally applies for WMA with virgin mixture. This particular mixture in Section 1 had a high recycled content. The combination of lower temperatures (even with WMA) and higher recycled material contents still resulted in the mixture being very stiff and difficult to compact. This scenario could result in a lower maximum in-place density and aggregate degradation.

*Image: University of Nevada Reno*

**Figure 4. Use of Tandem Pneumatic Rollers for Achieving Density without Broken Aggregates.**

# Weak Subgrade and/or Base

Often the asphalt pavement is paved directly on soil subgrade or aggregate base course. In many of these cases, the subgrade and base are weak or soft (particularly when compared to the stiffness of the asphalt mat) and make it challenging to obtain density in the asphalt mixture being placed.

One State participating in the demonstration project uses a lower density requirement in the lowest lift for these cases, recognizing in advance that there will be an obstacle to achieving density. In high traffic applications, the lower limit of density is decreased by 1.0%, and in low traffic applications, the lower limit is decreased by 2.0%.

Prior to a State DOT lowering the density requirement, options should be considered. One option is to see that the subgrade or base is properly compacted by using an appropriate density specification. Historically, proof rolling is also an option to check for soft spots. More recently, intelligent compaction has shown to be an effective tool to identify areas of weak base support by pre-mapping prior to paving. It is important to determine the cause of the weak subgrade or base and corrected it for long-life pavements.

A second option can be employed as part of the mixture design. Since the lowest lift is almost always a fatigue resistant layer, it could be designed at a higher asphalt content. A higher asphalt content will help the fatigue resistant layer meet its intended function and also make it more compactible against a soft or weak subgrade or base. In these cases, a DOT could create special mixture design criteria for the purpose of increasing the asphalt content. A fatigue resistant pavement layer will be more effective with a higher asphalt content and higher in-place density.

## Break Point Density Control

On some demonstration projects, plots of the relationship between number of roller passes and density were developed, commonly on a test strip or at the start of the project. The number of passes at which the density peaked was identified as the “Break Point” density and “Break Point” number of passes.

On three demonstration projects, a strict emphasis was placed on the Break Point number of passes being the number of passes used during construction. The density curve and break point provide valuable information, but there needs to be flexibility when conditions vary during a project. It was noted that these same three projects had some of the lowest densities in the control sections of the entire demonstration project.

Conversely, strict adherence to the density curve and break point can be misleading in identification of the number of roller passes needed. There are many factors that change with time: temperature, moisture, type of roller, etc. Sometimes a pause may be necessary to start increasing density again. Sometimes aggregates reorient and decrease density prior to increasing density again. This could be considered a density that could be a “false summit.” This has also been observed with many asphalt mixtures, including some polymer modified mixtures. The density curves do not account for rollers in echelon and could even encourage “lazy” roller patterns. The density curve and break point are a useful tool, but they should not be used so strictly as to hinder gaining additional density.

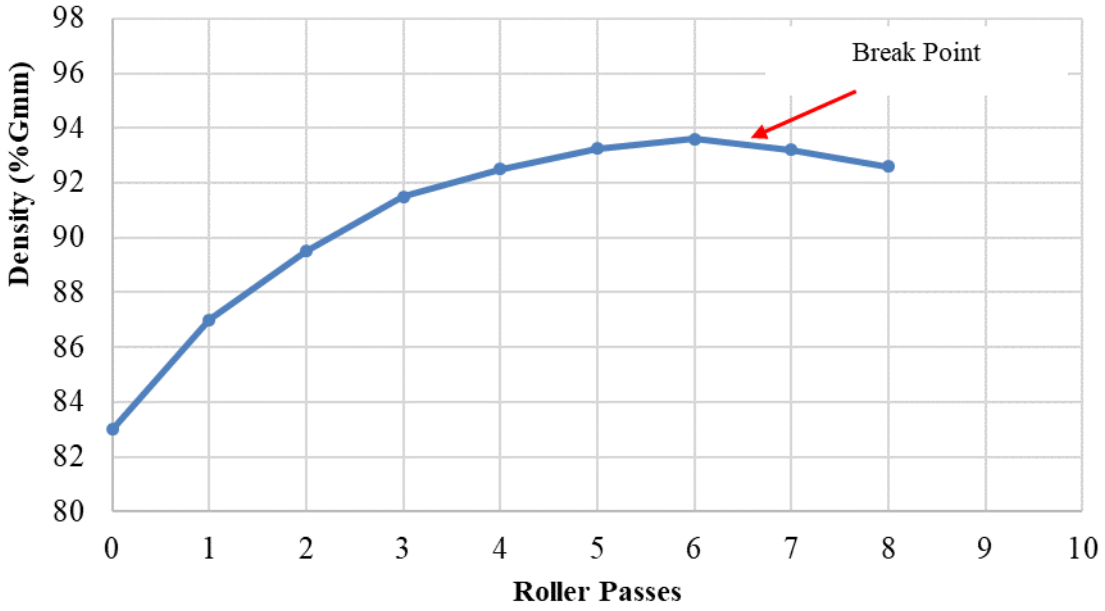



**Figure 5. Density versus Roller Passes Curve.**

As another point, a contractor's most focused effort is often provided during the construction of the test strip. When actual production for the project begins, things can change. Contractors may speed up their paving operation and go faster than they did on the test strip, which can negatively impact the ability to obtain density. The results of the roller pattern study are then no longer applicable. This further emphasizes the importance of flexibility.

## Smoothness

In some cases, it has been reported that excessive rolling of the asphalt mat creates issues with smoothness. Throughout the course of this demonstration project, that issue did not occur but was raised as a concern. It should be noted that the biggest influence on smoothness under the contractor's control is related to the paver operation and mixture delivery. The biggest influence to obtain smoothness under the agency's control is the number of lifts and thickness of each lift.

Rollers play a minor role in impacting smoothness. If for some reason the roller is creating an issue with smoothness, it can be fixed by matching the amplitude, frequency and speed. This is often accomplished by slowing down the roller and making sure there are 10 to 12 (sometimes even up to 16) impacts per foot. If fewer impacts per foot are applied, usually due to increasing roller speed, it can become visible on the mat, as shown in Figure 6. This is a clear indication that a vibratory roller frequency and operating speed should be reviewed to increase the drum impacts per foot. However, it is recognized that slowing down the roller can be challenging if the paver speed is fast. As another consideration, by going slower with the roller there may need to be fewer passes by the roller, making it easier to keep up with the paver.

The type of roller can impact smoothness. Oscillation was a helpful tool for creating a smoother finish. Some demonstration projects successfully used oscillatory rollers. The oscillatory roller can be used when the mixture gets below the temperature in which vibration can't be used and create a much smoother finish.

*Image: Adam Hand*

**Figure 6. Visible Drum Impacts from Excess Roller Speed.**

Throughout the demonstration project, it was observed that roller pattern techniques are a key to smooth pavements as well. Operators stopped at the end of their passes on an angle, not straight. They also did not stop in the same location. Instead, they rolled through their last stopped location at the end of their pass. Further, operators neither shut off vibratory mode too soon nor start them back up too late. The roller only went as far as a length and a half of the machine or as long as the rear drum goes past where the front drum stopped vibrating.

## "Roll Until Meets" Philosophy

As a finding in the FHWA's density demonstration project, no extraordinary compactive effort was generally needed to obtain increased density. States and contractors worked together to identify numerous methodologies to do this. When a DOT writes a specification, the contractor's goal is to meet the specification and be the lowest bidder. Thus, the contractor strives to provide the DOT what is required in the specification as efficiently as possible. This often leads to a philosophy toward the compaction process of "rolling it until it meets."

There is nothing intrinsically wrong with this philosophy. However, when a DOT has low density-specification requirements, the contractor may bid the project with fewer rollers and fewer passes. This was observed most notably on one of the demonstration projects. The specification was a lot average with a lower limit of 91.0 percent. The contractor met the specification with only one, double-drum vibratory roller making seven passes. A one percent higher density was achieved with only two more passes in the test section. This was the fewest number of rollers and fewest number of passes in this entire

demonstration project. By setting reasonable limits, DOTs can encourage contractors to respond with innovative approaches to obtain the higher density.

## Summary

There are sometimes challenges when trying to increase in-place density. When DOTs embrace the idea to increase the density requirements in their specifications, contractors and agencies often have a learning curve that can identify such challenges. There are examples of strategies, presented in this Technical Brief, to overcome the challenges of obtaining increased in-place density. The in-place density challenges may be overcome with strategies that can involve partnering, time, and education.

This third Technical Brief in the series of four on ***Enhancing Durability of Asphalt Pavements Through Increased In-Place Density*** presented an effort as part of a larger project to improve in-place density achievable for asphalt pavements across the country. The other three Technical Briefs describe the density demonstration projects and related specifications, techniques and tools for achieving density, and improving longitudinal joint density.

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# Overcoming Obstacles to Achieving Density

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**Researcher** — This TechBrief was developed by Adam Hand (University of Nevada Reno), Tim Aschenbrener (FHWA), Nam Tran (Consultant), and Fabricio Leiva (Consultant) as part of FHWA's Development and Deployment of Innovative Asphalt Pavement Technologies cooperative agreement. The TechBrief is based on research cited within the document.

**Distribution** — This Technical Brief is being distributed according to a standard distribution. Direct distribution is being made to the Division Offices and Resource Center.

**Availability** — This Tech Brief may be found at http://www.fhwa.dot.gov/pavement/.

**Key Words** — Durability, asphalt pavement, In-place density



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