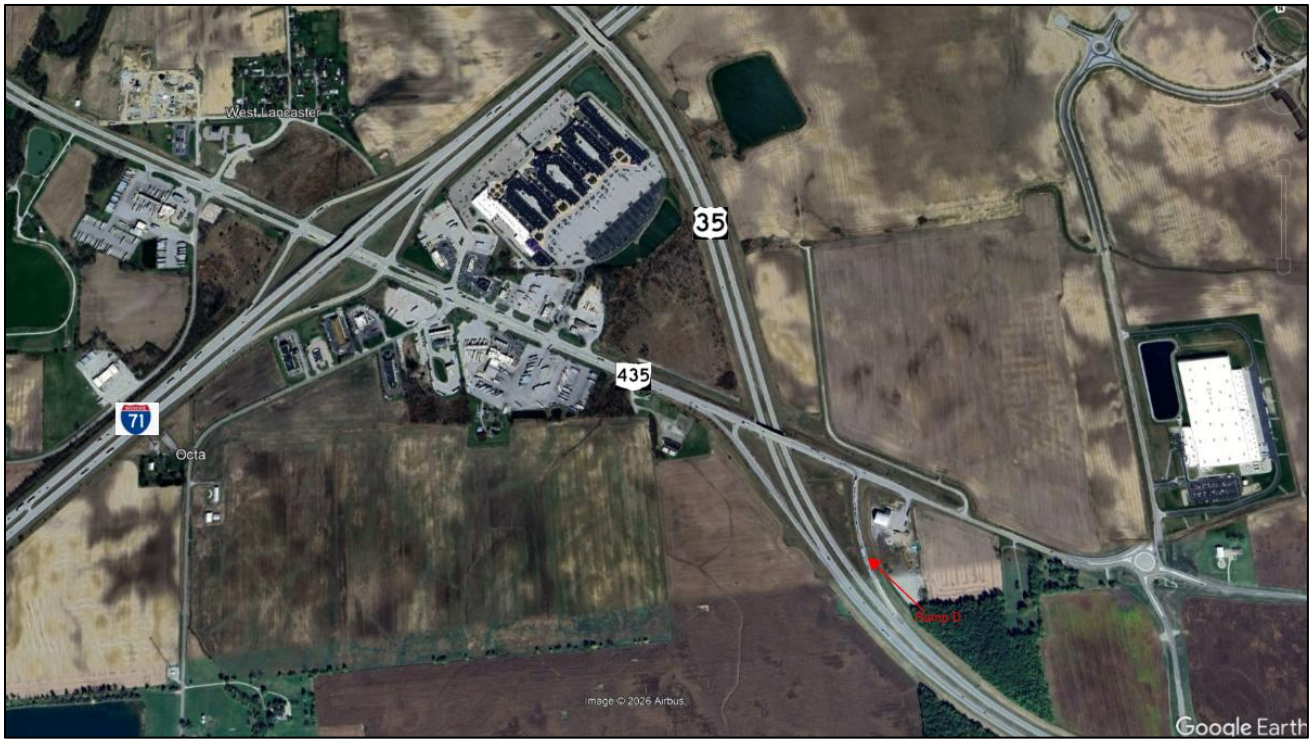
Project 23-3008, PID 117955, FAY-435-1.52
Dispute No. 06-233008-01
Step 3 – Cracked Concrete Pavement

This letter is in response to John R Jurgensen Company's Step 3 claim paper that was submitted to The Department on June 15th, 2026.

Contents

1. Project Description

This project is in Fayette County and is aimed at improving safety and congestion on SR 435 from the IR 71 interchange to SR 729. The work on the project includes adding through and turn lanes on the IR 71 ramps, and the US 35 to SR 435 ramp. Turn lanes will be added to SR 435 at various locations and the route will be widened from 2 to 4 lanes from the US 35 ramp to SR 729. A roundabout will be constructed at the intersection of SR 435 and SR 729. A new signal will be constructed at the US 35 to SR 435 ramp. The project is being completed to improve safety and in response to the economic development in the area.



2. Description of Issue

The project included reconstruction of the ramp from SR 35 WB to SR 435. The reconstruction included expanding the single lane ramp to a two-lane concrete ramp (dedicated lane for right and left turns onto SR 435). The contract required the ramp to be maintained throughout (phased construction). Since opening to traffic, many panels have experienced mid panel cracking. The cracking is primarily isolated to pour dates 8/20/2024 and 9/10/2024 with a couple of outliers in the single lane portion of the ramp. A small section of the left lane of the ramp (STA 237+40 to 243+00) was poured on 8/20/2024. The pour on 9/10/2024 includes a small portion (60 feet) of the single lane (STA 243+60 to 243+00) and continues into the right lane of the ramp (STA 243+00 to 237+50). The JMF used for these pours was C750291P1A (QC 1P) and the area was finished using a self-propelled triple roller screed. There are 18 panels in the locations of these 2 pour dates that have at one point been replaced with JMF QCMS1B (QC MS).

As indicated above, 8/20/2024 and 9/10/2024 placement dates experienced 80% of the cracking. In the area poured 8/20/2024 there has been a total of 27 cracks (including current cracked panels and previously repaired, as of 10/27/2025). In the area poured 9/10/2024 there are a total of 25 cracks (including current

cracked panels and previously repaired, as of 10/27/2025). The single lane portion (apart from 60 feet poured 9/10/2024) has a total of 6 cracked panels. As of 7/20/2026, there are 53 cracked panels.

The cracking has been noted at various times since work on Ramp D started and completed. The final piece of the left lane was placed on 8/20/2024. This lane was open to traffic on 8/27/2024. While proof rolling subgrade for the following phase, the early cracking was noticed on 9/3/2024. The final piece of the right lane was placed on 9/25/2024. The right lane was opened to traffic on 9/30/2024.

3. Contractor's Claims

a. The contractor claims that the scoped pavement design was in error.

Sections 13.2 and 13.3 of the design build scope of services provided information regarding the proposed pavement buildup and subgrade treatment. Ramp D pavement buildup consisted of 6" aggregate base and 10" non-reinforced concrete pavement. The scope also indicated that global stabilization was required (14" depth), including several samples and a cement stabilization mixture design (to be performed by the contractor). The scope discusses the potential for high sulfates and steps that may be necessary in that circumstance.

The contract was awarded on 10/5/2023. Through project development, ODOT worked with a consultant to perform a traffic study for the project. The pavement design was provided by ODOT in the project scope and was based on the following input parameters (ODOT D6 Pavement Engineer Planning Notes):

Rigid Pavement Design – PID 117955

Given:

- Pavement of choice: Doweled, jointed concrete
- Subbase: 6" Item 304 Aggregate Base
- Shoulders: Tied, jointed concrete
- Number of Lanes:
  - Mainline 35 - 4 (2 per direction)
  - Ramp D - 1 (1 per direction)
- Functional Classification: #2 – Rural Expressway – so use rural interstate values
- 2024 ADT: From IOS – Appendix C of Design Build Scope
  - Mainline 35 - 7960
  - Ramp D - 4240
- 2044 ADT: From IOS – Appendix C of Design Build Scope
  - Mainline 35 - 13060
  - Ramp D - 7280
- 24 hour truck %: From IOS – Appendix C of Design Build Scope
  - Mainline 35 - 35% (listed W of interchange – no values given E) – do we want to see if LJB has truck counts on US35 East of SR435 interchange?
  - Ramp D - 31%
- Design Period: 20 Years
- Open to Traffic: 2024
- Subgrade CBR: 7 (from Appendix B of Design Build Scope)

ODOT utilized ramp traffic volumes (from the traffic study) for the ramp pavement design. In addition to the traffic study, a geotechnical investigation was performed by the consultant. Considering ODOT had soils data for the ramp, this approach is considered acceptable per the ODOT Pavement Design Manual (PDM Section 302.1):

302 Thickness Determination

All of the design input information is required prior to determination of design thickness. Design thickness is determined using the nomographs found in Figures 302-2 and 302-3. An example rigid pavement design is provided in Figure 302-1. Concrete pavement thicknesses should be rounded to the nearest 0.5 inch (10 mm) increment.

Adequate concrete cover is needed to transfer stresses between the concrete and the dowel bars. Because of the required concrete cover, the minimum thickness of concrete pavement is 8 inches (200 mm). In special situations where the standard specifications are modified to eliminate the dowels, the minimum recommended thickness for concrete pavement is 6 inches (150 mm).

302.1 Ramps and Interchanges

If traffic and soils data is available, ramps, collector-distributor lanes, directional roadways, etc., may be designed individually. More common is to use the same thickness as the mainline or reduce the mainline thickness by 1-inch (25 mm).

The ODOT PDM "has been taken from and based on the results of the AASHO Road Test, the AASHTO Guide for Design of Pavement Structures, Federal Highway Administration (FHWA) guidelines and technical advisories, industry publications, various training course manuals, ODOT research reports, as well as from the experience of the authors". Per the ODOT PDM, "pavement

structural design is based on a projection of the anticipated traffic loading". The pavement design is developed by utilizing an average value of the opening day ADT and the design year ADT to calculate values for equivalent single axle loads (ESAL, 18,000 lbs.). PDM Section 102 describes the intent and timeframes that are associated with pavement designs that are performed according to the manual. Following the recommendations of this manual, new pavements on the priority system are designed for a 20-year design period.

Concrete pavement thickness design is based on the ability of a given slab depth to withstand repeated loading over a design period. The selected slab thickness is designed for a given number of Equivalent Single Axle Loads (ESAL). The use of ESALs standardizes wheel loading of different configurations as an equivalent 18,000-pound single axle load. The estimated ESALs is the primary factor that affects design life. The slab depth establishes the total number of ESALs that it can withstand over the intended pavement life. Fatigue of concrete pavement is based on loading repetitions. As fatigue accumulates with repeated loading, microcracks will develop and grow until the pavement life is depleted. And this is known as terminal serviceability.

The design equations add some factors of safety – standard normal deviate (corresponds to a reliability probability) and standard deviation (combined standard error of traffic prediction and performance predication). The standard deviation is included as a buffer for the traffic prediction, knowing that the actual traffic over the design life may be different than estimated. These safety factors are included knowing that the design input values may vary and are not known with complete certainty.

When the cracking was initially discovered, ODOT and the contractor reviewed the contract pavement design for errors. Through that process, the team discovered some of the input parameters that were believed to be potentially incorrect. These errors were a combination of multiple inputs that made the design more and less conservative. The identified errors are listed below:

1. Functional Classification should have been Rural Interstate not Rural Principal Arterial
    a. As a result, the B:C should have been 7:1 not 5:1
2. The Trucks should have been 35% not 31% (based on mainline data vs. ramp data)
3. Resilient Modulus should have been 11,424 psi not 8,400 psi (design did not account for required stabilization)
4. Subbase Modulus should have been 36,000 psi not 30,000 psi (design did not account for required stabilization)
5. Load Transfer coefficient should have been 2.7 not 3.2 (design did not account for tied concrete shoulder edge support)
6. The lane factor should have been 95% not 100% (due to 2 lane ramp)

As this issue has progressed to Step 3, the project engaged Central Office Pavements to review the contractual pavement design. The office advised that the original scoped pavement design was adequate and provided the following comments:

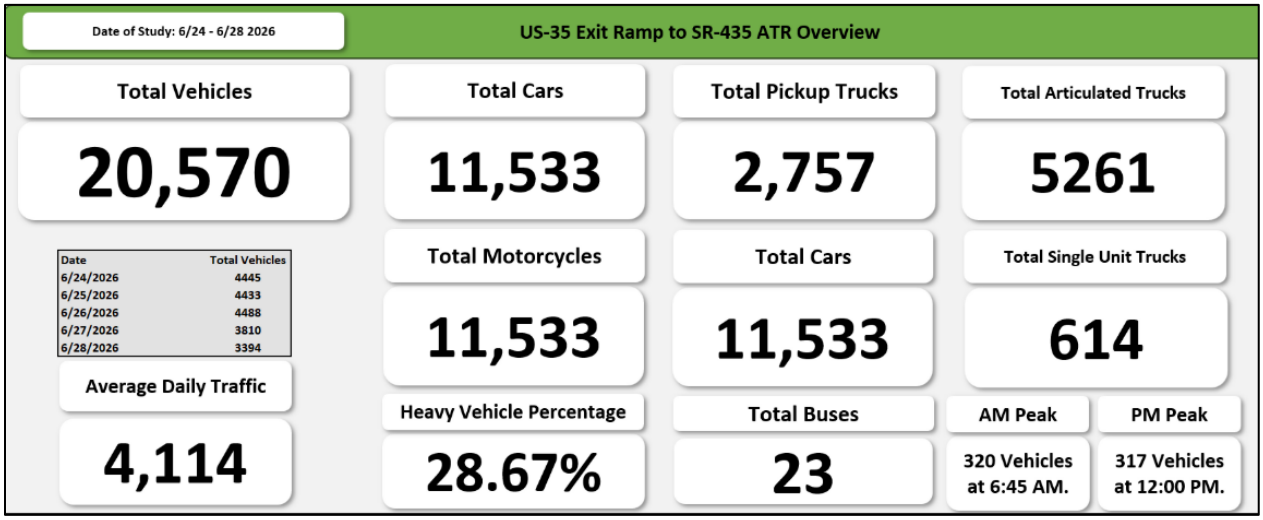
1. FAY-35 is a principal arterial, not an interstate. If this were an interchange directly between 71 and 35, using an interstate classification may be appropriate.
2. The ramp ADT is unidirectional so the directional distribution should be 100%.

3. The design designation in the scope showed 31% trucks and TMMS shows 32% currently. Changing the design to 35% doesn't change the final thickness.
4. Part of the ramp is a single, so a 100% lane factor is more appropriate and is more conservative. The traffic distribution across lanes on a ramp is nothing like on mainline (95%).
5. Cement stabilization has almost no effect on concrete pavement.
6. Dowelled with edge support is the appropriate load transfer coefficient.
7. One issue with The Step 2 revised pavement design is that it is incorrectly rounding up to the next 0.5" increment. According to the Pavement Design Manual, Section 302, concrete pavement is to be rounded to the nearest 0.5" increment (up or down).

In addition to the scope traffic study, ODOT collected 24-hour weekday (1/15/2026) and weekend (1/17/2026) counts to better understand existing traffic volumes. The weekday ADT (2143 PA & 1382 BC) greatly exceeded the weekend ADT (2019 PA & 716 BC) and therefore it can be used as a conservative representation of the existing ADT. The existing ADT as of January 2026 is less than the opening ADT (2926 PA & 1314 BC) used in design. Note that the opening year ADT used in the design was intended for year 2024. With a 2044 design year, it is anticipated that the traffic would increase linearly by [1/20 x (design year ADT – opening year ADT)] each year throughout the 20-year service life of the pavement. This would result in a 2026 traffic volume of 4544 ADT (3135 PA & 1409 BC), accounted for in the design.

Day	Date	24-hour Count	Passenger Car Count	Truck Count	% Trucks
Thursday (Weekday)	1/15/2026	3525	2143	1382	39%
Saturday (Weekend)	1/17/2026	2735	2019	716	26%

In June 2026, ODOT again obtained traffic data from Ramp D. Data was collected from June 24-28, 2026 and is summarized by the following:



The ADT and truck percentage are less than the opening day information that was utilized in the pavement design calculation.

The contractor mentions that the design did not account for the maintenance of traffic phasing and ramp traffic being maintained in a single lane for a short duration while the concrete pavement was being constructed (half width). The contractor was responsible for the maintenance of traffic design for the project. The ramp was required to be maintained per the contract documents, and the scope provided a 60-day allowable duration for lane and shoulder width restrictions on Ramp D. The

phasing and durations were unknown and solely a function of the contractor's design, schedule, and means & methods. The Pavement Design Manual does not direct the design to be driven by maintenance of traffic setups during construction. Furthermore, utilizing a 100% lane factor in the pavement design accounts for single lane operation.

The ramp starts as a single lane as it exits SR-35 and opens to two lanes as it approaches the stop condition at US-435. 30% of the concrete pavement on the ramp is a single lane. This area only accounts for 8% of the cracking that is experienced on the ramp. 30% of the two-lane section of concrete pavement is cracked. If traffic and loading were the primary issue behind the cracking, the single lane section of ramp would see the same amount or likely more cracking compared to the two-lane section. The single lane section carries 100% of the loading from traffic on the ramp, where the lanes of the two-lane section carry presumably less (or the same amount).

b. The contractor claims that roller screeds did not play a role in the concrete cracking.

After the initial concrete pavement placement, the Department realized that the contractor was planning to finish the concrete pavement on the project by utilizing roller screeds. At that point, a meeting was held and ODOT expressed concerns about surface finish and concrete consolidation. The Department agreed that some of the widening areas were not conducive for using a slipform paver and restricted the usage of single tube roller screeds. Contrary to CMS 451.04B, the contractor elected to finish most of the concrete pavement using a triple tube roller screed. The total concrete pavement on the ramp was roughly 3940 square yards. Of those 3940 square yards, 1200 square yards were placed with a slip form paver and 2740 square yards were placed with roller screed. It is important to note that the area slip formed contains only 4 cracked panels, while the areas finished with roller screed contain 49 cracked panels.

Early in the project, the Central Office Pavement Engineer performed a site visit and provided a trip report to the project. The trip report summarized the work that was witnessed along with comments/concerns. This trip report was shared with the contractor. The report made note of the following (during roller screed operations): inconsistent vibration, spraying the surface of the concrete with water, excess paste on the surface, and segregation. The machines are more prone to issues with segregation and over finishing. The two placement dates (35% of ramp placement) that contained 80% of the total cracking were finished using roller screeds.

c. The contractor claims that the considerable amount of out of specification concrete (per CMS 499.06-1) that was supplied did not play a role.

Per CMS 499.06-1, the batching tolerance for pozzolan is +/-1% based on cumulative target weight when weighed together with cement. Of the 117 loads of QC1P, 61 of those loads were batched out of tolerance for pozzolans. The appendix provides a table with more information regarding the concrete that was batched to the site and indicates which loads were out of specification. The Department is not dissecting the severity of the out of specification material or its role in the cracking, simply noting that the material is in fact out of specification.

TABLE 499.06-1 CONCRETE BATCHING TOLERANCES

Material	Batching Tolerance (%)
Cement	±1.0
Pozzolan[1]	±1.0
Carbonate Micro-fines[2]	±2.0
Aggregates[2]	±2.0
Water[3]	±1.0
Chemical Admixtures	±3.0

[1] Tolerance is on cumulative target weight when weighing together with cement
[2] Tolerance is on cumulative target weight when weighing together with more than one aggregate
[3] Measured by weight or volume

d. The contractor claims that the Department's flexural strength requirements and testing (for opening to traffic) are flawed.

The contractor is asserting that the Department's test procedures and flexural strength requirements lend the concrete pavement to be opened to traffic too early. Throughout the project, the field staff made and tested concrete beams according to CMS 451.07, CMS 451.17, and Supplement 1023. ODOT and many other DOTs have followed a similar process for a considerable amount of time. Supplement 1023 makes no claim to meet any other specifications but has been used as an accurate representation of strength for some time. CMS 451.17 specifies – "When 7 days have elapsed, the Contractor may use the completed pavement for traffic, including construction traffic. If a modulus of rupture of 600 psi (4.2 MPa) has been attained, the Contractor may open the pavement to traffic when 5 days have elapsed." Both statements provide minimum requirements that must be met with a resultant option for the contractor. ODOT never directed the contractor to open the pavement to traffic. Opening pavement to traffic was done at the discretion of the contractor and their schedule. ODOT made and tested the beams and reported the results to the contractor.

ODOT PCC JMF

Date: 8/16/2013 SUBMITTAL STATUS: APPROVED
PRODUCER/SUPPLIER: ERNST JMF # C3110011A
CLASS OF CONCRETE: QC 1

MIX DESIGN

CEMENTITIOUS MATERIALS:

Source	Material	Sp. Gr.		
HOLCIM/GENEVIEVE,MO (BLOOMSVILLE)	CEMENT TYPE 1	3.15	395	TOTAL
HOLCIM SLAG/CHICAGO	GGBF SLAG GR 100	2.87	169	564

AGGREGATES:

Source	Size / Type	Sp. Gr.	Abs.	SSD Design Wt	
MARTIN MARIETTA-SPRING VALLEY	57 GRAVEL 57SS/02	2.68	1.52	1206	TOTAL
MARTIN MARIETTA-SPRING VALLEY	8 GRAVEL 8SS/02	2.66	1.88	646	2982
MARTIN MARIETTA-SPRING VALLEY	SAND, NATURAL /02	2.66	1.72	1130	
DESIGN AIR: 6.0%	MAXIMUM W/Cm: 0.50		Water	282	

ADMIXTURES:

Source	Admix Type	
EUCLID CHEMICAL CO	AEA	Dose the admixtures according to the Manufacturer's recommendations; contract requirements; and project needs.
EUCLID CHEMICAL CO	A	
EUCLID CHEMICAL CO	D	

CONCRETE PROPERTIES

DESIGN STRENGTH (psi)	4000	AGG. CORR. FACTOR	0.4	THEORETICAL UNIT WT	141.6
28 DAY STRENGTH (psi)	5490	TOTAL WEIGHT	3828	ABSOLUTE VOLUME	27.03
3 DAY STRENGTH (psi)	2830	SPECIAL DESIGN INFO:	NONE		
7 DAY STRENGTH (psi)	3880				

Additionally, ODOT does not own the concrete mix that was supplied to the project. The contractor selected this specific mix out of approximately 450 approved QC1P JMFs. The contractor was aware of the time constraints that were associated with the concrete pavement work on the ramp. The contractor was also aware of the maintenance of traffic schemes for the concrete pavement placement, as it was part of the design build package. The QC1P mix that the contractor elected to utilize on this project was submitted for approval in 2013. The submittal provides 3-, 7-, & 28-day strengths for the mix. Utilizing ACI 319, the 3-day flexural strength converts to 399 psi, and the 7-day flexural strength converts to 467 psi. Only one placement date for the ramp obtained less than 7 days cure time prior to opening to traffic. The average cure time for concrete placements was just under 13 days.

	Placement Date	Open Date	Cure Time (prior to opening)
DAY 1	8/15/2024	8/27/2024	12
DAY 2	8/20/2024	8/27/2024	7
DAY 3	9/9/2024	9/30/2024	21
DAY 4	9/10/2024	9/30/2024	20
DAY 5	9/12/2024	9/30/2024	18
DAY 6	9/15/2024	9/30/2024	15
DAY 7	9/16/2024	9/30/2024	14
DAY 8	9/17/2024	9/30/2024	13
DAY 9	9/19/2024	9/30/2024	11
DAY 10	9/20/2024	9/30/2024	10
DAY 11	9/23/2024	9/30/2024	7
DAY 12	9/25/2024	9/30/2024	5

Though the contract specification includes a minimum 600 psi flexural strength prior to opening to traffic, this is now considered overly conservative. A lot of research has been performed and indicates that 300 psi flexural strength is a more appropriate minimum. Many DOTs have already moved in this direction with their specifications. ODOT has made this change as well, as the current CMS 451.17 requires 350psi modulus of rupture for opening to traffic. For a 10" non-reinforced concrete pavement, the National Concrete Consortium published a study that recommends a flexural strength opening requirement of 300 psi. Any time the contractor was permitted to open the concrete pavement to traffic, a beam had reached 600 psi flexural strength or 7 days of cure time

had elapsed (most often both). Only one placement date was opened to traffic with less than 7 days of cure time.

Presumably the contractor communicated their schedule and opening/strength expectations with the concrete supplier. The contractor's baseline schedule shows 3 days of cure time for each phase of Ramp D construction:

US35 RAMP D										
	D-P2-1160	PREP & PLACE REMAINING JPC	5d	5d	79d	15-Jun-24	08-Oct-24	21-Jun-24	14-Oct-24	233008 6 Day w/Weather - 233008 6 Day w/Weather
	D-P2-1170	CURE JPC PAVEMENT	3d	3d	115d	22-Jun-24	15-Oct-24	24-Jun-24	17-Oct-24	233008 7 Day No Restriction - 233008 7 Day No Restriction
	D-P2-1180	INSTALL BMPs & SEEDING	1d	1d	79d	25-Jun-24	18-Oct-24	25-Jun-24	18-Oct-24	233008 6 Day w/Weather - 233008 6 Day w/Weather
	D-P2-1190	COMPLETE FINAL RAMP SHIFT	4d	4d	79d	26-Jun-24	19-Oct-24	01-Jul-24	24-Oct-24	233008 6 Day w/Weather - 233008 6 Day w/Weather
	D-P2-1200	INSTALL BU6 SIGNS & STRIPING	5d	5d	79d	02-Jul-24	25-Oct-24	10-Jul-24	31-Oct-24	233008 6 Day w/Weather - 233008 6 Day w/Weather

US35 RAMP D										
	D-P1-1000	INSTALL TEMPORARY PAVMENT	5d	5d	60d	12-Apr-24	01-Aug-24	19-Apr-24	09-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1010	SHIFT TRAFFIC RAMP D	1d	1d	60d	22-Apr-24	12-Aug-24	22-Apr-24	12-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1020	REMOVE PAVEMENT	3d	3d	60d	23-Apr-24	13-Aug-24	26-Apr-24	16-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1030	EXCAVATE & PLACE EMBANKMENT	2d	2d	60d	30-Apr-24	19-Aug-24	01-May-24	21-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1040	STABILIZE SUBGRADE	1d	1d	60d	02-May-24	22-Aug-24	02-May-24	22-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1060	INSTALL UD	1d	1d	60d	07-May-24	23-Aug-24	07-May-24	23-Aug-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1050	CURE SUBGRADE	5d	5d	108d	08-May-24	24-Aug-24	12-May-24	28-Aug-24	233008 7 Day No Restriction - 233008 7 Day No Restriction
	D-P1-1070	INSTALL STRAIN POLE FNDS & UG	2d	2d	60d	13-May-24	29-Aug-24	15-May-24	03-Sep-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1080	INSTALL SIGNAL POWER SERVICE	3d	3d	60d	16-May-24	04-Sep-24	20-May-24	10-Sep-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1090	PLACE AGGREGATE BASE	1d	1d	60d	21-May-24	11-Sep-24	21-May-24	11-Sep-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1100	PREP & PLACE JPC PAVEMENT	7d	7d	60d	23-May-24	12-Sep-24	05-Jun-24	25-Sep-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1110	CURE JPC PAVEMENT	3d	3d	110d	06-Jun-24	24-Sep-24	08-Jun-24	26-Sep-24	233008 7 Day No Restriction - 233008 7 Day No Restriction
	D-P1-1120	PERFORM FINAL GRADING	2d	2d	61d	10-Jun-24	27-Sep-24	12-Jun-24	01-Oct-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1130	INSTALL TEMPORARY STRIPING	1d	1d	61d	13-Jun-24	02-Oct-24	13-Jun-24	02-Oct-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1140	SHIFT TRAFFIC OPEN RAMP	1d	1d	61d	14-Jun-24	04-Oct-24	14-Jun-24	04-Oct-24	233008 5 Day w/ Weather - 233008 5 Day w/ Weather
	D-P1-1150	INSTALL SIGNALS	5d	5d	107d	17-Jun-24	20-May-25	24-Jun-24	28-May-25	233008 5 Day w/ Weather - 233008 5 Day w/ Weather

4. Relevant Specifications (CMS 105.11, 106.07, 451.04B, 451.07, 451.17, & Supplement 1023)

The following portions of the ODOT Construction and Materials Specifications are some of the primary references that were utilized in this response document:

CMS 105.11 – Removal of Defective and Unauthorized Work. "Work that does not conform to the requirements of the Contract is defective. Unless the Department formally accepts defective Work according to 105.03, immediately remove and replace defective Work."

CMS 106.07 – Unacceptable Materials. "Unacceptable materials are all materials not conforming to the requirements of these Specifications at the time they are used. Immediately remove all unacceptable materials from the project site unless otherwise instructed by the DCA."

CMS 451.07 – "Make two test beams from each 7500 square yards (6300 m2) of concrete or fraction thereof incorporated in the work each day. Construct and test concrete beams for modulus of rupture according to Supplement 1023."

CMS 451.04B – "Spread, screed, and consolidate concrete using one or more machines between previously set side forms. Furnish an adequate number and capacity of machines to perform the work at

a rate equal to the concrete delivery rate. Furnish machines capable of uniformly distributing and consolidating the concrete without segregation. Do not use vibrating truss screeds or roller screeds."

CMS 451.17 - Pavement Repairs before Department Acceptance. "Remove and replace, or repair diagonal cracks; longitudinal cracks; transverse cracks; spalled pavement surfaces, and any pavement panels with cement balls or mud balls; as approved by and at no cost to the Department. Do not repair single hairline transverse cracks in the middle third of panels with reinforcing conforming to BP-1.1. Submit a repair plan with the location, type of repair, materials to be used and procedures to the Department for approval. Do not perform any repairs without Department approval. The Engineer may approve repair of isolated transverse or diagonal cracks with a full depth repair according to Item 255 and applicable standard construction drawings. Repair cracks by replacing the pavement the full width between longitudinal joints, perpendicular to the centerline and at least 6 feet (1.8 m) longitudinally. Install smooth dowel bars at the interface between the original pavement and the replaced pavement section. Locate and size the repairs to ensure that the repair limits are at least 7 feet (2.1 m) away from any transverse joint."

5. Conclusion

One of the primary claims that is made by the contractor is that the provided pavement design for Ramp D is under designed and the current traffic volumes far exceed the design values. The contract design approximated an opening ADT of 4,240 (31% trucks, year 2024 opening) and design ADT of 7,280 (31% trucks, year 2044). Actual traffic counts from January 2026 resulted in an ADT of 3,525 w/ 39% trucks (2,150PA & 1,375BC). Additional traffic counts from June 2026 resulted in an ADT of 4,114 w/ 29% trucks (2,921PA & 1,193BC). These traffic volumes are less than the projected design values for total ADT, PA, and BC. As a result, the actual ESALs are less than what was estimated in the design.

Additionally, ODOT project staff and the contractor initially discussed potential needed revisions to the contract pavement design inputs. Through this process, it was discussed that the scope provided pavement design was potentially deficient by 0.5". Since, Central Office Pavements has reviewed the pavement design and available information. This review found issue with some of the revised pavement design input assumptions and determined that a 10" non-reinforced pavement section was correct. The additional traffic count data from 2026 (January 15-17 & June 24-28) also refutes the claim that the traffic data used for the pavement design was in error. Actual traffic counts from 2026 resulted in ADT values that are less than pavement design opening year ADT and truck percentages that are similar or less than the design truck percentages.

Many of the concrete loads that were delivered to the project for concrete pavement work were outside of specification. The primary issue being out of tolerance batching for cementitious materials per CMS 499.06-1. Two JMFs were utilized for the concrete pavement on Ramp D, 90% of the ramp was placed using C750291P1A (QC1P w/ slag) and the remaining 10% was placed using C75029MS1B (MS w/o slag). The out of tolerance batching was only an issue for the QC1P mix. The panel cracking was only an issue with the QC1P mix as well (98% of the cracking).

Another factor that has some correlation with the cracking is the contractor's selection of finishing equipment. The contractor elected to use roller screeds for some areas throughout the project limits. Regardless of ODOT accepting the contractor's use of the equipment, the contractor is responsible for the work and ultimately the finished product. 72% of ramp D was placed utilizing a roller screed and the two

dates that account for 80% of the cracking on the ramp (8/20 & 9/10) were made using roller screeds. The use of roller screeds is prohibited by CMS 451 and requires special care for quality use (as documented through meetings and correspondence from ODOT throughout the project).

The contractor has questioned the Departments opening to traffic flexural strength, cure time, and test methods that are detailed in CMS 451.17 and Supplement 1023. ODOT has utilized CMS 451 and Supplement 1023 to provide guidance for making and testing beams for many years. Several other specification sections also direct making and testing beams in this manner. Many DOTs, FHWA, and the industry have been involved in research providing evidence that opening to traffic minimum flexural strength should be closer to 300 psi. ODOT's 600 psi requirement is far too conservative and has been changed to 350 psi in a specification update. Regardless, the testing was done in accordance with Supplement 1023 and anything opened to traffic met the 600 psi requirement. ODOT did not direct the opening of any portion of the roadway as this is the responsibility of the contractor. Only one placement date for Ramp D (12 placements total) cured for less than 7 days prior to opening with the average cure time (prior to opening being 13 days.

Bottom line, the design & traffic volumes and concrete testing/opening requirements are not the reason for the pavement failures. There seems to be some failure correlation founded on the concrete mix & finishing equipment. It is worth noting that two particular placement dates account for the bulk of the pavement failures. Based on the information presented in this paper, ODOT has directed the contractor to remove and replace the broken panels at no cost to the Department.

6. Appendices

1) Project Site Aerial
2) Scope of Services
3) Ramp D Pavement Placement Dates Map
4) Concrete – Out of Specification Material Summary
5) Pavement Design Input Notes
6) Contract Traffic Study
7) January 2026 Traffic Counts (Ramp D)
8) Contract Geotechnical Report
9) Contract Pavement Design
10) Projected Traffic Volumes per Year (contract design)
11) Revised Ramp Pavement Design (Step 2)
12) Revised Mainline Pavement Design (Step 2)
13) Ramp D Pavement Cracking Map (Step 2)
14) Ramp D Concrete Mix Designs (JMF C750291P1A & C75029MS1B)
15) June 2026 Traffic Counts (Ramp D)
16) JMF C3110011A Submittal
17) Ramp D Pavement Cracking Map (Step 3)
18) Supplement 1023
19) Relevant Research – Strength & Opening to Traffic
20) Updated Concrete Pavement Design Revision (Step 3)
21) Roller Screed – CO Trip Report
22) Photos of Cracking

23) Baseline Schedule
24) Table of Cracking Correlations