

STATE OF OHIO  
OFFICE OF THE INSPECTOR GENERAL

RANDALL J. MEYER, INSPECTOR GENERAL

REPORT OF  
INVESTIGATION



**AGENCY: OHIO DEPARTMENT OF TRANSPORTATION**  
**FILE ID NO.: 2010-330**  
**DATE OF REPORT: FEBRUARY 21, 2012**

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*“Safeguarding integrity in state government”*

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RANDALL J. MEYER, INSPECTOR GENERAL

## REPORT OF INVESTIGATION

**FILE ID NUMBER:** 2010-330

**SUBJECT NAME:** Chagrin Valley Paving

**AGENCY:** Ohio Department of Transportation

**BASIS FOR INVESTIGATION:** Complaint

**ALLEGATIONS:** Providing false core samples to ODOT for Project #48-10 (US RT 422 Geauga County).

**INITIATED:** September 9, 2010

**DATE OF REPORT:** February 21, 2012

## **INITIAL ALLEGATION AND COMPLAINT SUMMARY**

On August 19, 2010, a confidential informant approached an Ohio Department of Transportation (ODOT) District 12 field technician on the job site of ODOT Project #48-10, on U.S. Route 422 in Geauga County (RT 422) and claimed Chagrin Valley Paving (CVP) provided fraudulent asphalt core samples to ODOT.

The confidential informant stated CVP was penalized financially on the first two paving days of the four-day paving project for low asphalt density, but then received bonus compensation on the last two paving days for surpassing the density requirements. The confidential informant insisted nothing had changed with the paving pattern, so it was likely that CVP took high-density core samples from another paving job site and put the high-density core samples in place of the actual core samples from the RT 422 site. In response to this allegation, ODOT extracted sister core samples<sup>1</sup> for the Office of the Ohio Inspector General at the RT 422 job site eight days later, on August 27, 2010. ODOT tested the densities of the sister core samples and compared them to the densities of the original core samples provided by CVP. After finding a notable disparity between the densities of the samples, the Office of the Ohio Inspector General opened an investigation on September 9, 2010.

## **BACKGROUND**

### *Asphalt*

Asphalt is a combination of aggregate (various types of rock and sand) and a crude oil by-product known as bitumen, which is proportionally mixed at high temperatures at a hot-mix asphalt facility. Also, asphalt is considered a flexible pavement that is prone to air voids and varying densities, which can affect its quality and effectiveness when applied to roadways. Asphalt that is very high in density (98 percent or above) is susceptible to long-term rutting, which refers to a deformation, depression, and/or trenching of the asphalt. Conversely, asphalt that is very low in density (89 percent or below) negatively affects the durability of the road, causing cracking and potholes. **(Exhibit 1)**

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<sup>1</sup> Sister core samples refer to core samples pulled adjacent to an original core sample, approximately 1-2 feet from each other.

### *ODOT Item 446 Asphalt Specifications*

The ODOT Construction and Material Specifications Manual Item 446 Asphalt specifications establish specific requirements for asphalt concrete in regard to mixture, paving, and testing. ODOT Item 446 Asphalt specifications obligate contractors to develop specific job mix formulas within set limits for both composition and characteristics of the mixtures and require the mixtures to be confirmed by laboratory tests. ODOT Item 446 Asphalt specifications require contractors to perform quality control testing; this is accomplished through core sampling.

Under ODOT Item 446 Asphalt specifications, ODOT pays the vendor using a graduated payment system which is based on the quality and density of the asphalt: **(Exhibit 1)**

- a) If the density of the asphalt is too low, the contractor forfeits a percentage of the contract amount.
- b) If the asphalt density meets the designated standards, the contractor is paid the contract amount.
- c) If the asphalt exceeds the density expectations, the contractor is rewarded with bonus compensation.

### *The Core Sampling Process*

Core sampling is a widely accepted method of material testing because of its high accuracy. In its simplest form, core sampling involves drilling a hole into the asphalt and extracting a cylindrical chunk of asphalt that is subjected to laboratory testing to determine its density. ODOT applies a core sampling process of extracting multiple core samples at random locations in order to gather an average, or representative density, for the specific section of roadway. A computer software program is used to generate random core sample locations that are unknown to the contractor. Throughout the course of a road paving project, an ODOT employee marks the new pavement with a circle and an identifying number where the contractor is to extract a core sample for ODOT.

Upon extraction, the contractor then marks the sample with an identifying number to establish the location from which the sample was taken. According to the ODOT Construction and Material Specifications Manual, core samples must be extracted within 48 hours of the application of asphalt from the pavement for testing purposes. **(Exhibit 2)** The contractor is

then responsible for maintaining custody of all samples extracted throughout the production day by placing them into a special core box provided by ODOT. Furthermore, the Ohio Department of Transportation Construction Inspection Manual of Procedures requires the following:

There have been isolated incidents where cut cores have been “switched out” with other cores that presumably would provide better density test values. Project personnel must provide thorough oversight of the core cutting operation such that the cores being testing [sic] for payment are from the locations selected by the project through the random selection process. Substitution of cores by cutting in other locations or by replacing cut cores with others is absolutely prohibited and cannot be tolerated. **(Exhibit 3)**

As a practice, ODOT typically uses core boxes to organize extracted core samples. A core box is divided into 10 compartments. This design is used to protect the individual cores from damage and to ensure the location from which the samples were pulled. For example, core sample one is inserted into compartment one, core sample two is placed in compartment two, and so forth. The samples and the core box are later handed over to ODOT once all the samples are extracted from the lot<sup>2</sup> or by the end of the production day. The ODOT project engineer is responsible for delivering the samples at the end of the production day to the district testing facility for asphalt density testing.

#### *Project #48-10*

On January 28, 2010, ODOT invited bids for a repaving project that involved sections of roadway on State Route 174, State Route 87, and U.S. Route 422. ODOT received eight responses, and Chagrin Valley Paving (CVP) was awarded the project at a cost of \$1,796,190.99. ODOT Item 446 Asphalt specifications<sup>3</sup> were required only on specific sections of roadway for the RT 422 project.

On the RT 422 project, CVP subcontracted with Great Lakes CMT, Inc. (Great Lakes CMT) to perform quality control testing, including core sample extraction. To meet the objectives of ODOT testing requirements, Great Lakes CMT extracted 10 core samples from designated

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<sup>2</sup> In this instance, “lot” refers to a specific section of roadway.

<sup>3</sup> Item 446 Asphalt specifications refers to a specific section in ODOT’s Construction and Material Specifications Manual, pg. 247. Sections 446.01 – 446.07 specify requirements for asphalt concrete in regard to mixture, paving, and testing.

sections of pavement from each of four lots,<sup>4</sup> which totaled 40 core samples throughout the project.

## **INVESTIGATIVE SUMMARY**

### *Density Irregularities*

On the section of the RT 422 project that required job mix formulas in compliance with ODOT Item 446 Asphalt specifications, CVP paved the road in four separate lots. Lots 1 and 2 were rough, intermediate layers laid below lots 3 and 4, which were final surface or finished layers. On August 27, 2010, ODOT extracted 10 sister core samples for the Office of the Ohio Inspector General that were adjacent to the 10 original samples from lots 3 and 4 extracted by CVP's subcontractor, Great Lakes CMT. ODOT labeled CVP's original samples as 3-1, 3-2, 3-3, and so forth. Sister core samples extracted by ODOT for the Office of the Ohio Inspector General were labeled 3a-1, 3a-2, 3a-3, and so forth. On August 31, 2010, the sister samples extracted by ODOT for the Office of the Ohio Inspector General were tested at the ODOT District 12 Materials Testing Facility and the average densities were 1.1 percent less than CVP's original core samples on lot 3, and an average of 2.3 percent less dense when compared to CVP's original core samples on lot 4. **(Exhibit 4)** According to ODOT, an acceptable density variance in this matter would be approximately 0.2 – 0.3 percent.

In several discussions with the Office of the Ohio Inspector General, ODOT engineers stated density variances of the magnitude between core samples taken at the time of the project and the time the sister core samples were taken from used pavement eight days later were unlikely. Asphalt is a flexible material; however, the number of air voids which cause fluctuation in density would not increase over this period of time. ODOT engineers stated this particular section of RT 422 was open to traffic for eight days prior to the extraction of sister core samples, and there should be either no change in the density, or an increase in the overall density of the asphalt – not a decrease. Theoretically, the tires of vehicles continually running over a stretch of roadway within an eight-day timeframe would act like small asphalt rollers, increasing the compaction and density of the asphalt over time.

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<sup>4</sup> The four lots were split into four separate production days. Lot 1 on August 6, 2010; lot 2 on August 12, 2010; lot 3 on August 17, 2010; and lot 4 on August 19, 2010.

The Office of the Ohio Inspector General consulted further with the National Center of Asphalt Technology (NCAT) at Auburn University, a recognized authority in asphalt and materials testing. Similar to the ODOT engineers, NCAT concluded that the results of tests conducted on the second set of core samples should have found that the density was unchanged or had a greater density than the original samples given the pavement's exposure to eight days of traffic. NCAT indicated there could be a variance between the two sets of core samples, even if they were paved and extracted at the same time, due to the nature of hot-mix, flexible asphalt. However, when asked if a density variance of 3 percent or greater between the original and sister core samples was likely, NCAT stated that such a variance was improbable and unlikely.

On February 18, 2011, Richard Torkar, owner of Great Lakes CMT, and the field technician during the paving of lot 4, was asked to explain how these density irregularities could have occurred. In asking if traffic would affect asphalt density, Torkar expressed his belief that the density of the asphalt would increase as a result of tires traveling along the same path and the density would decrease in the areas between the tires. When asked to further explain how a difference of 6.4 percent could occur, Torkar agreed that a difference of 6.4 percent seemed odd. The conclusions of both ODOT engineers and NCAT disagreed with Torkar's comments regarding a decrease in density. When asphalt is compressed by rollers and/or traffic, air voids, which directly affect the density of asphalt, are released from the asphalt and are not displaced to non-compacted areas.

#### *Asphalt Content Irregularities*

NCAT also discussed an additional testing procedure to determine whether core and sister samples came from the same load of hot-mix asphalt. The Asphalt Content Test (AC-Test) is a destructive test that measures the amount of asphalt content within a core sample of asphalt by breaking down the core sample through separating the aggregate (rock and sand) from the binder (adhesive). According to ODOT, asphalt is generally comprised of approximately 95 percent aggregate and the remaining percentage is asphalt content, a bitumen-based binder material that holds the aggregate together. NCAT stated a slight variance (0.1 – 0.2 percent) in asphalt content between core and sister core samples would not be unusual. However, it would be unusual for core or sister core samples taken within close proximity of each other to have a difference of up to 0.4 – 0.5 percent in asphalt content.

Because of the destructive nature of the AC-Test, three pairs of core samples with the highest density differences from lots 4 and 4a were selected for testing. **(Exhibit 5)** The test results are depicted in the table below:

<b>Original Core</b>	<b>Sister Core</b>	<b>Asphalt Content Variance</b>
Lot 4-Core 3	Lot 4a-Core 3	1.9%
Lot 4-Core 5	Lot 4a-Core 5	0.6 %
Lot 4-Core 10	Lot 4a-Core 10	0.5%

The asphalt content variance of core 3 significantly exceeded what is considered to be normal.

#### *Core Sample Extraction and Chain of Custody*

As stated earlier, Great Lakes CMT was subcontracted by CVP to perform necessary quality control testing procedures for the RT 422 project. For the designated section of roadway, Great Lakes CMT was responsible for extracting core samples from the asphalt and providing them to ODOT for density testing. Great Lakes CMT Field Technician Justin McSween was on site for the extraction of core samples for lots 1, 2, and 3, while Torkar was only on site for lot 4.

According to statements made in separate interviews with McSween and Torkar, their core cutter was attached to the rear of the truck and used to extract core samples throughout the day. McSween and Torkar said they stayed behind the column of pavers and rollers to collect the core samples, as well as provide real-time density figures to the contractor using a nuclear asphalt content gauge, an instrument used to determine asphalt density by measuring the amount of hydrogen in the mix.<sup>5</sup> In further statements, McSween and Torkar both explained that once a sampling location was defined, the core was removed and placed in a five-gallon bucket on the bed of their truck; this procedure was repeated until all 10 samples from the production day were extracted. Great Lakes CMT was not provided a core box by ODOT, so they used a bucket to store the core samples.

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<sup>5</sup> According to the US DOT, Federal Highway Administration, testing core samples is a more accurate tool for measuring asphalt densities than the nuclear asphalt content gauge. ODOT uses the core samples to determine the pay scale.

The ODOT District 12 project engineer for the RT 422 project, Fred Amir, was asked about the use of a bucket to store samples and indicated it was possible that cores were placed in a bucket and later transferred to a core box. Amir was unable to recall why he did not provide a core box to Great Lakes CMT per ODOT policy.

The Office of the Ohio Inspector General's investigation revealed that ODOT was not present at the cutting of all core samples. Once extracted, and placed in a bucket, samples were susceptible to tampering. In an interview with the Office of the Ohio Inspector General on February 18, 2011, Torkar explained that after a core sample was extracted, it was placed in a bucket located on the open bed of his truck. Torkar also said there were instances during the extractions when he was miles away from his truck.

Torkar stated that Amir told him that on the last day of paving (August 19, 2010), Amir still had core samples from the previous production day (lot 3 on August 17, 2010), in the back of his ODOT truck. Torkar expressed his belief that some cores were left in ODOT trucks for four days before they were taken to the testing facility. Moreover, Torkar recalled that Project Engineer Fred Amir was joking and laughing about actually having cores in the back of the truck. When Amir was asked about this during his interview, he denied this, saying, "Never, because the next day we would take it and submit it to the test lab." Amir also stated that there was never an incident where core samples from two different lots were mixed together.

Analysis of ODOT's materials testing database confirmed that samples from lot 3 were tested on August 19, 2010, which was the same day lot 4 was paved. According to ODOT District 12 Materials Testing Facility personnel, core samples are routinely dropped off overnight and tests are conducted the next work day.

In interviews with the Office of the Ohio Inspector General, Torkar discussed the process used to extract core samples at the end of the paving project. Torkar recalled that he extracted the last couple of core samples from lot 4 and placed them in the bucket while Amir waited and appeared anxious to leave. When asked, Amir did not recall this, but said it was a possibility. The 10 core samples from lot 4 that Torkar recalled collecting had an unusually high asphalt content variance

of 0.5 percent, and a significantly high 5.5 percent density variance when compared to the sister core extracted by ODOT for the Office of the Ohio Inspector General.

The authenticity of the core samples at the moment of extraction was not in question. However, lack of control over the core sampling process could result in opportunities for tampering or the possibility of unintentional errors associated with core samples. This is best exemplified by the testimony surrounding the extraction process of the initial core samples from lot 4. Although the ODOT project engineer was on site, he did not visually witness core samples from the time of extraction until they were placed in a bucket located on the back of his truck. The practice used by ODOT on Project #48-10 failed to ensure the integrity of the core sampling process.

**Accordingly, we find reasonable cause to believe wrongful acts or omissions occurred in these instances.**

## **CONCLUSION**

The Office of the Ohio Inspector General found no evidence supporting the allegation that Chagrin Valley Paving provided fraudulent asphalt core samples to ODOT. However, during the course of the investigation, the Office of the Ohio Inspector General found there was a lack of integrity over the core sampling process. Failure to ensure a solid chain of custody leaves open the possibility of wrongdoing.

The purpose of testing and analyzing road pavement samples is to confirm the pavement provided to the state of Ohio by contractors is, in fact, the product the state of Ohio specified and agreed to pay for, and the product the contractor agreed to provide. Under ODOT Item 446 Asphalt specifications, contractors have a financial incentive to meet or exceed the specifications required under the contract. Contractors who meet the asphalt density specifications receive 100 percent of the amount of money agreed to in the contract. Contractors who exceed the asphalt density receive a bonus if the quality and content exceed the specifications. Those who do not meet the asphalt density specifications are penalized and are paid an amount less than 100 percent. The opportunity to tamper with the process of extracting core samples and influencing the analysis and testing of core samples increases if the controls surrounding the testing procedures are weak.

When comparing the analysis and test results of the initial core samples allegedly extracted from the RT 422 roadway by Chagrin Valley Paving to the test results of the sister core samples taken at the RT 422 paving site under the direction of the Office of the Ohio Inspector General, there was a substantial difference in density.

The Office of the Ohio Inspector General concluded that there are significant deficiencies in the core sampling process by the Ohio Department of Transportation. The department's practices are inconsistent and, at times, do not follow the established policies and procedures for managing the core samples. Moreover, the policies and procedures do not ensure the integrity of the core samples due to lack of controls and the absence of chain of custody requirements.

### **RECOMMENDATIONS**

The Office of the Ohio Inspector General makes the following recommendation and asks the Ohio Department of Transportation to respond within 60 days with a plan detailing how the recommendations will be implemented. ODOT should:

1. Review and modify the core sampling policies and procedures from the moment extraction begins through the time the samples are tested to ensure the integrity of the core samples. The department should also ensure that the practices of its staff mirror the revised policies and procedures.
2. Require all employees to read, acknowledge, and sign the existing policies of the agency and their department. New or revised policies should also be read, acknowledged, and signed.



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RANDALL J. MEYER, INSPECTOR GENERAL

**NAME OF REPORT: Ohio Department of Transportation**  
**FILE ID #: 2010-330**

**KEEPER OF RECORDS CERTIFICATION**

**This is a true and correct copy of the report which is required to be prepared by the Office of the Ohio Inspector General pursuant to Section 121.42 of the Ohio Revised Code.**

A handwritten signature in black ink, appearing to be "Jill Jones".

**Jill Jones**  
**KEEPER OF RECORDS**

**CERTIFIED**  
**February 21, 2012**

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