Post Construction Report for North Carolina DOT Demonstration Project Implementation of Performance Engineered Concrete Mixtures (PEM)/AASHTO PP 84

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Submitted to:

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Introduction

The long service life expectations of pavements, bridges, and other components are often difficult to meet by using typical tests for specification and acceptance, which center around three criteria: slump, air content, and compressive strength. These three criteria are only loosely related to deterioration phenomena and so do not always ensure satisfactory field performance. Consistent with the focus of MAP-21 legislation on performance, there is a desire by FHWA, public agencies, and industry to move towards performance-engineered construction materials. Performance-engineered concrete mixtures include optimized mixture designs (materials selection, gradation, cement content, etc.) which, paired with advanced quality assurance methods, provide substantially improved durability, economy and sustainability. AASHTO PP 84, "Performance Engineered Concrete Pavement Mixtures" provides agencies "with tools to prepare a specification for concrete pavement mixtures that moves closer to measuring and basing acceptance on parameters that are truly critical to the long-term performance of the system (AASHTO 2019)."

Initial steps to move towards performance engineered concrete mixtures are being made as part of ongoing NCDOT Research Project 2018-14, "Durable and Sustainable Concrete Through Performance-Engineered Concrete Mixtures," and NCDOT Research Project 2020-13, "Continuing Towards Durable and Sustainable Concrete Through Performance-Engineered Concrete mixtures. Together, these research studies aim to 1) identify trends in currently used mixtures and linking to performance, 2) perform targeted laboratory testing to establish performance-related criteria for several emerging PEM test technologies, 3) provide insights into performance of concrete mixtures utilizing sustainable materials (fly ash and portland limestone cement) and 4) provide a "roadmap" of recommendations and guide specifications for additional work and pilot projects for performance engineered concrete.

Concurrently, NCDOT applied for additional funds to support PEM implementation as part of FHWA's "Demonstration Project for Implementation of Performance Engineered Mixtures/AASHTO PP 84." NCDOT applied for $80,000 in funds, in the categories listed below.

> **Category A:** $40,000 for incorporating two or more AASHTO PP 84-17 tests in the mix design/approval process. Shadow testing is acceptable.
> **Category B:** $20,000 for incorporating one or more AASHTO PP 84-17 test in the acceptance process. Shadow testing is acceptable.
> **Category D:** $20,000 for requiring the use of control charts, as called for in AASHTO PP 84-17.

Implementation funds were awarded to NCDOT in Spring 2018. Some of the FHWA funds were used internally to support equipment purchases and other NCDOT PEM implementation efforts. UNC Charlotte was requested to perform work to assist in implementation of PEM, in accordance with the guidelines use of the awarded FHWA PEM Implementation Project funding. UNC Charlotte's work included in project included support of contractor personnel in testing and data collection using PEM technologies at the pilot project site, analysis of data received from the implementation site, and preparation of this Post-Construction report to support NCDOT's deliverable requirements for the FHWA Implementation Funds.

Project Background

Lane Construction personnel approached UNC Charlotte early in 2018 and had indicated their interest in utilizing PEM tests to improve their QC and in supporting NCDOT's PEM initiatives. Due to this eagerness to become more engaged with PEM initiatives, Lane Construction was asked to partner in supporting a PEM demonstration project as part of the FHWA Implementation Funds program. Lane Construction suggested a design-build urban interstate project they were awarded, a stretch of I-85 widening north of Charlotte, North Carolina (TIP Project I-3802B), for the PEM demonstration project. The contract had been let prior to the decision of NCDOT to utilize this project as a PEM demonstration, but the parties collectively agreed on scopes of work to support the three categories of FHWA Implementation Funding outlined above.

The PEM demonstration project included the widening of 5.3 miles of I-85 in Rowan County, North Carolina. The existing four-lane interstate (two travel lanes in each direction) was widened to provide four additional travel lanes (two lanes in each direction) to support an eight-lane interstate from north of Lane Street (Exit 63) to north of the US 29/UW 601 Connector (Exit 68). The pavement design thickness is 12 inches. In addition to the 500,000 square yards of concrete pavement construction which is the subject of this demonstration project, the scope work also included construction of 6

new bridges, 2 bridge replacements, construction of two roundabouts, and associated storm drainage and asphalt pavement. The total project cost was $140 million (Lane 2020).

A vicinity map from the project drawings is shown in Figure 1. Note that although the project included additional roadway paving on US and State Routes, the mainline I-85 pavement was the focus of this PEM demonstration project. The concrete batch plant and QC laboratory for the project were located at the north end of the project site, just to the west of I-85 near Exit 68. Figure 2 provides an overview of the project site, with the approximate location of the concrete plant indicated with a red star.

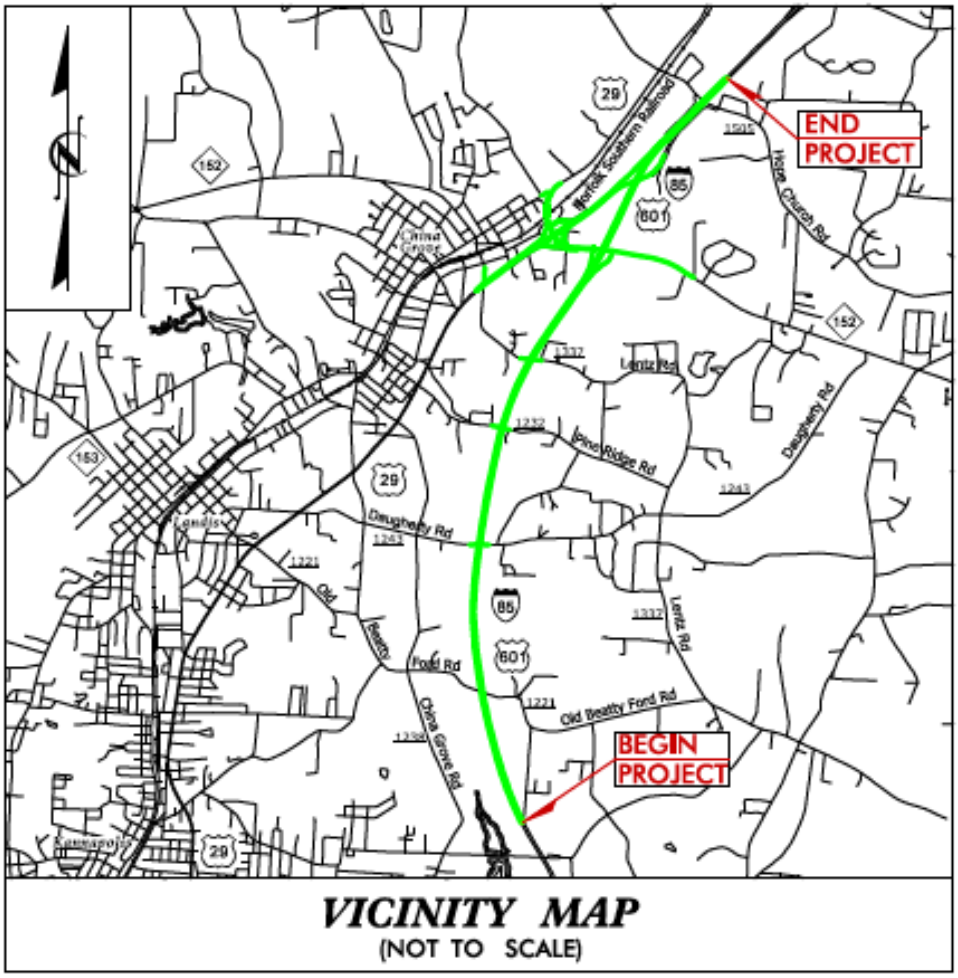


Figure 1: Vicinity map from project drawings showing the PEM implementation project, north of Charlotte, NC.

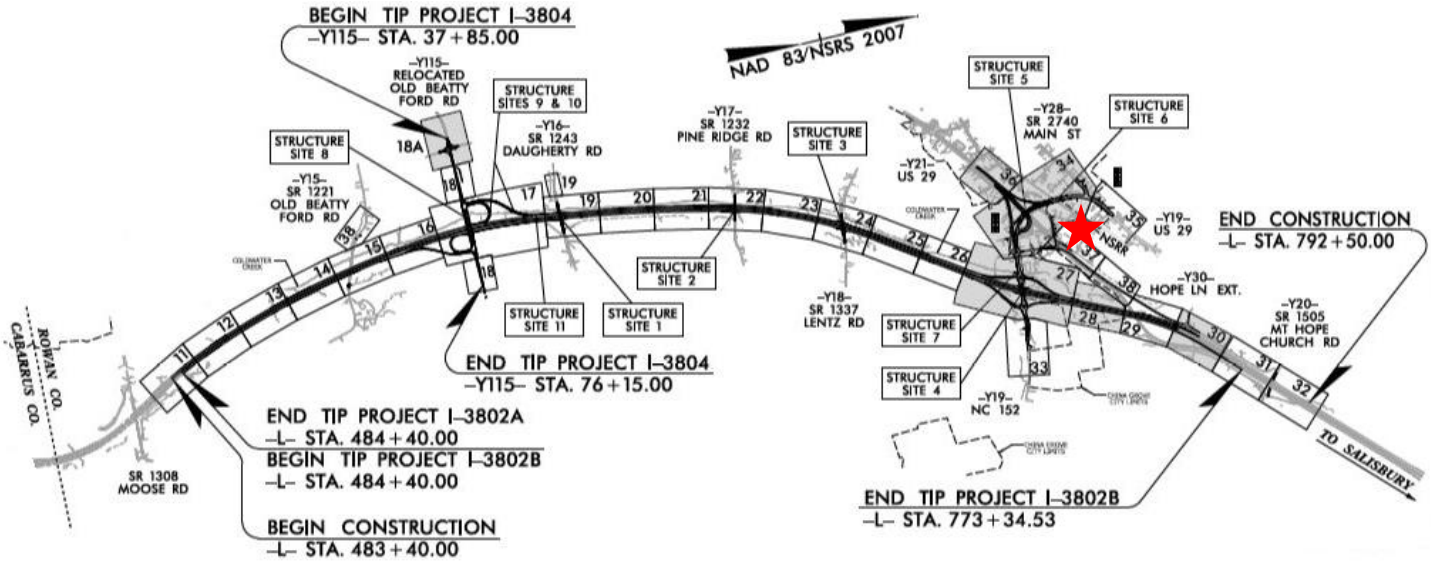


Figure 2: Overview of the project site from project drawings, with the approximate location of the batch plant and QC laboratory shown with red star.

HDR was the design partner for this design-build project. The existing 10-inch thick continuously reinforced concrete pavement was constructed in approximately 1978, was placed on an aggregate base course. The 2015 ADT for this segment of I-85 was 97,100, with a design year (2040) ADT of 179,500. Truck traffic in 2015 was estimated to be 19% (14% TTST and 5% duals). The design speed for this section of I-85 is 70 mph, with a posted speed of 65 mph.

The new mainline concrete pavement is 12-inch thick doweled jointed concrete, paved on a 1¼ inch asphalt cement concrete surface course interlayer (SF9.5A) placed on stabilized subgrade. A section detail is shown in Figure 3. The travel lanes are each 12 feet wide with a 22-foot median separating the four lanes in each direction. A description of phasing at the PEM Implementation project prepared by Lane Construction is provided in Figure 4.

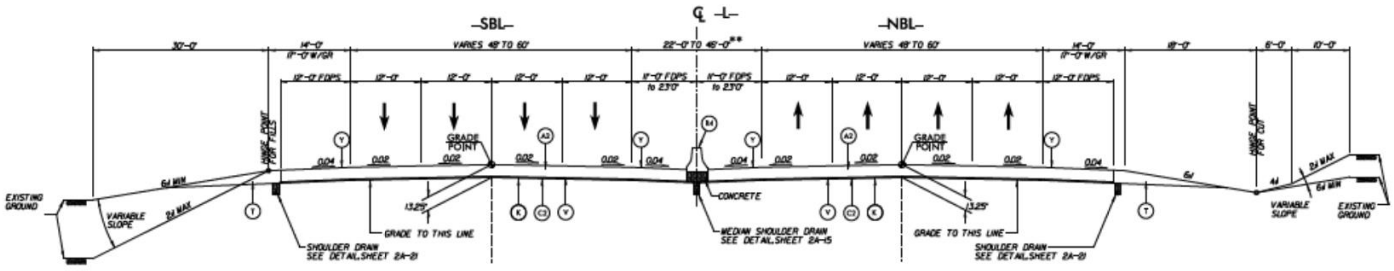
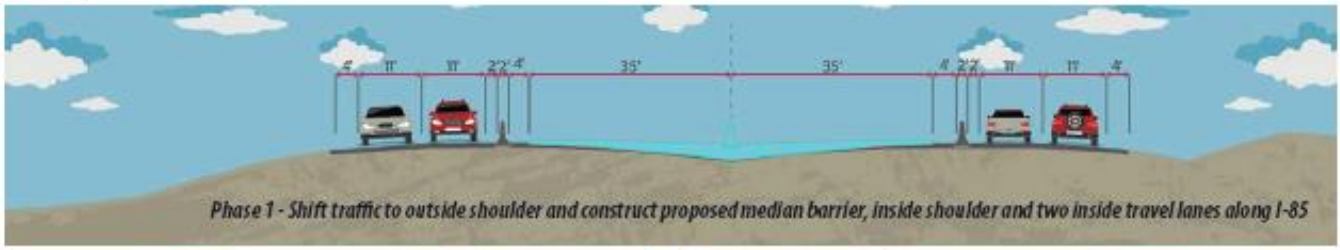


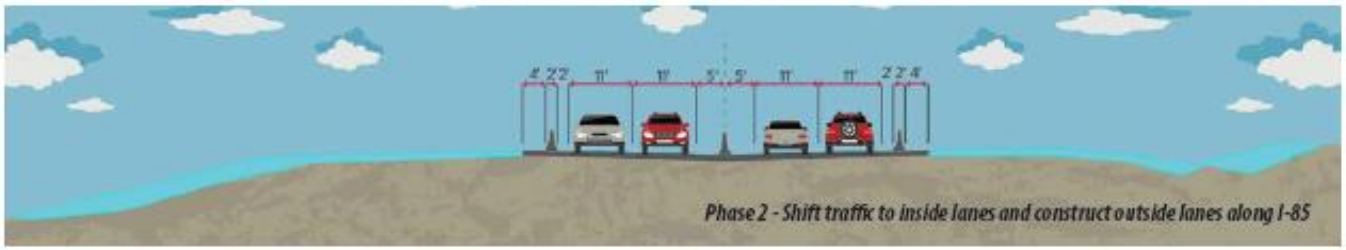
Figure 3: Cross section from project drawings showing widening of northbound and southbound lanes of I-85.

I-85

PHASE	DESCRIPTION
PHASE 1	**Step 1:** ▪ Place portable concrete barrier (PCB) along inside and outside lanes of I-85 for Daugherty Road, Lentz Road and NC 152 (-Y19-). ▪ **Using lane closures, a minimum of 1 ½" of asphalt will be placed over the outside shoulder and Phase 1 temporary travel lanes in both directions. This will provide the minimum pavement structural strength on the shoulder to shift I-85 traffic to the outside shoulder in Step 2, as well as a clean, smooth surface (in lieu of the traffic pattern masking) to place temporary markings over the existing travel lanes.** ▪ The shoulder and lane resurfacing will be completed after work has already begun on Daugherty Road, Lentz Road and NC 152 (-Y19-) bridges over I-85. **Step 2:** ▪ Shift traffic to the outside shoulder, place PCB along the inside travel lane and construct the proposed median barrier, inside shoulder, and two inside travel lanes.
PHASE 2	▪ Shift I-85 traffic to the completed inside lanes, place PCB along the outside travel lane and construct the outside of I-85. ▪ The following construction will need to be completed in order to shift I-85 traffic to the median along the entire project: » Proposed median barrier, shoulder and two inside travel lanes » Reconstruction of Daugherty Road and Lentz Road » Demolition of the existing flyover bridge center bent and construction of inside lanes, barrier and inside shoulder along I-85 at flyover » Demolition of existing bridge at Pine Ridge Road and construction of the proposed center bent » Left side of NC 152 (-Y19-) bridge over I-85 with traffic shifted to the left side, demolition of the center bent on right side of existing bridge and construction of inside lanes, barrier and inside shoulder along I-85 under NC 152 (-Y19-) Note: If work at NC 152 is not complete and/or the flyover bridge has not been demolished, I-85 will still be shifted to the inside lanes with temporary on-site detours around these two locations so work along I-85 can progress. Mill and resurface and replace bridge joints on Mt. Hope Church Road (-Y20-)



Phase 1 - Shift traffic to outside shoulder and construct proposed median barrier, inside shoulder and two inside travel lanes along I-85



Phase 2 - Shift traffic to inside lanes and construct outside lanes along I-85

Figure 4: Construction Phasing for PEM Implementation project at I-85.

Phase I mainline paving began in April 2018 and was completed in early September 2018, with work on shoulders completed later in Fall 2018. Phase 2 mainline paving began during April 2019 and concluded in October 2019. Concrete tested using the PEM tests was primarily concrete used in mainline paving, although some concrete used for some ramps and selected shoulder locations was also tested using the PEM tests.

Concrete Mixture Design

NCDOT Standard Specifications for Roads and Structures (NCDOT 2018) require that mixture designs for concrete pavements contain at least 526 pounds per cubic yard (pcy) of cement, a maximum water/cementitious materials (w/cm)

ratio of 0.559, an air content ranging from 4.5% to 5.5%, a maximum slump of 1.5 inches, a minimum flexural strength of 650 psi at 28 days and a minimum compressive strength of 4,500 at 28 days. Fly ash can be substituted for up to 30% of cement at a replacement rate of 1.0 pounds of fly ash for 1.0 pounds of cement. For approval, the mixture designs must be submitted in terms of saturated surface dry (SSD) weights on NCDOT Materials and Tests From 312U, at least 30 days prior to proposed use. Test results required for approval include 1, 3, 7, 14, and 28 day strengths averaged from two 6 inch by 6 inch by 20 inch beams and averaged from two 6 inch by 12 inch cylinders, made and tested in accordance with AASTHO R 39, AASHTO T 22, and AASHTO T 97 from a certified laboratory. For hand methods of placing and finishing, an adjusted mixture design is required to be submitted for approval. This "hand placed" mixture is allowed to have a maximum slump of 3 inches, and must maintain the same w/cm ratio as the original mixture design.

The concrete mixture designs for the project were developed by Lane Construction. Mixtures were and batched and tested at Lane's QC laboratory facilities to develop the required data for NCDOT approval. Category A of the FHWA PEM Implementation Funds program required incorporating two or more AASHTO PP 84-17 tests in the mix design/approval process, with shadow testing being acceptable.

At the time Lane agreed to partner for the PEM demonstration project, several concrete mixtures had already been approved for this project. However, Lane Construction also developed several additional mixtures during the course of the project, which were subsequently submitted to NCDOT for approval. In addition to tests currently required by NCDOT for approval (slump, air content, and aggregate specific gravity/absorption/unit weight/fineness modulus), PEM test data was collected on these new mixtures using the Box Test (per Appendix X3 of AASHTO PP84-17), the SAM test (per AASHTO TP 118), and surface resistivity testing (per AASHTO T 358). All mixtures were accepted using NCDOT's current process, utilizing the information submitted on the Statement of Concrete Mix Design and Source of Materials - NCDOT Form 312U, shown in Appendix A. PEM tests performed on mixtures developed during the project were considered as "shadow tests" only. Chris Ange and Fred White of Lane Construction led the training of technicians on the Box Test, SAM, and resistivity meter.

Materials used for all mixtures used on the project are shown in Table 1. Three mixture designs were primarily used for the mainline paving for the project. The Lane Construction ID numbers and NCDOT ID numbers for these mixtures are shown in Table 2, along with the cementitious materials contents and w/cm. Mixture proportions for each of these mixtures are shown in Table 3.

The intent of obtaining multiple approved mixture designs was to ensure that the compressive strength required by NCDOT specifications (4500 psi at 28-days) could be met in a variety of construction conditions. Paving operations began utilizing the 472SLNS mixture design, but as the concrete production process became reliable and favorable weather conditions prevailed, the primary mixture utilized for almost the entirety of the mainline pavement became mixture ID 460SLNS, which had a lower cementitious materials content. Mixture 496HPNS was utilized as the "hand placed" mixture, and had an increased water content in order to achieve the desired workability for non-paver placement. To ensure strength at the higher water content the cementitious materials content of this mixture was increased, although the w/cm was held roughly constant between the slipformed and hand placed mixtures. Mixture submittals on NCDOT Form 312U for each of these mixtures are provided in Appendix A. No verification mixtures were batched and tested by NCDOT.

Table 1: Materials used in mainline paving concrete mixtures.

Material	**Producer**	**Source / Product**
Cement	Roanoke Cement Company	Troutville, VA plant
Supplementary cementitious material	Ash Venture	Belews Creek Steam Station
Fine aggregate	G.S. Materials	Emery Pit – Candor, NC
Coarse aggregate	Martin Marietta	Woodleaf Quarry – Salisbury, NC
Water	City	
Air entraining admixture	Euclid Chemical Company	EUCON AEA 92
Retarding admixture	Euclid Chemical Company	EUCON LR
Water reducer	Euclid Chemical Company	EUCON WR

Table 2: Mixture IDs, cementitious materials contents, and w/cm for mainline paving mixtures.

Lane Mixture ID	NCDOT Mixture ID	Cement Content (lb/cy)	Fly Ash Content (lb/cy)	w/cm ratio
460SLNS	474TVFSLNS598E	460	138	0.435
472SLNS	474TVFSLNS614E	472	142	0.423
496HPNS	474TVFHPNS646E	496	150	0.433

Table 3: Mixture proportions for mainline paving mixtures.

Material	Lane Mixture ID		
	460SLNS (lb/cy)	472SLNS (lb/cy)	496HPNS (lb/cy)
Cement	460	472	496
Supplementary cementitious material	138	142	150
Fine aggregate	1046	1039	1012
Coarse aggregate	1940	1932	1878
Water	260	260	280
Air entraining admixture	As recommended	As recommended	As recommended
Retarding admixture	As recommended	As recommended	As recommended
Water reducer	As recommended	As recommended	As recommended

PEM Test Results Obtained During Mixture Development

As stated previously, the Box Test was performed intermittently during mixture development, and only qualitative assessment was performed. Surface void rankings were not utilized in assessment of the mixtures. However, Figures 5a-e illustrate some of the types of surface void rankings that were obtained during mixture development, prior to identifying a suitable mixture design.

The SAM was utilized on one mixture during the plant verification and test batching stages. The mixture had a fresh air content of 6.4% with a SAM number of 0.23. Resistivity measurements made on this mixture at ages of 1, 6, 7, and 14 days were 1.8, 3.2, 3.3, and 3.8 kΩ•cm.

Figure 5 (a-e): Example Box Test results obtained during mixture development phase.

Production and Construction

Lane Construction established a portable central-mixed batch plant at the north end of the project to the west of Exit 68. The double drum batch plant had a 12 cubic yard capacity, producing 10 cubic yard batch loads. The capacity of the plant according to the manufacturer's literature is 700 cubic yards per hour, although Lane typically sees 400 cubic yards per hour at maximum production from this particular batch plant. The site could be readily accessed from the plant, and materials arrived via truck. Aggregates were stockpiled on site, and stockpiles were placed on cement stabilized base to minimize contamination. Cement was stored in four non-pressurized silos, and fly ash was stored in pigs brought to the site by truck (12 loads per day). Concrete was transferred from the mixer into dump trucks for hauling to the paver. Given the location of the plant, the longest haul distance of concrete was approximately 5 miles to the southernmost end of the project. A photograph of the batch plant is shown in Figure 6. Paving operations were performed from both north to south, and from south to north, so hauling times varied over the duration of the work.

Figure 6: On-site batch plant at I-85 Widening in Rowan County, NC.

The concrete paving construction operation for mainline paving began with dump trucks hauling the fresh concrete over the asphalt interlayer. Fresh concrete was placed directly onto the prewetted asphalt interlayer and subsequently entered the paver (Figure 7). Two pavers were utilized for the project. The primary paver was a Guntert & Zimmerman (G&Z) GZ 850S paver capable of paving 24 feet (2 lanes) in width. This G&Z paver had dowel-bar inserter (DBI) technology, Trimble GPS guidance system, and a Gomaco GSI realtime smoothness indicator (Figure 8). A smaller paver, a Gomaco Commander III was used to pave shoulders and ramp areas. The smaller paver did not have DBI technology, and therefore dowels were installed using baskets prior to concrete placement.

Figure 7: Concrete placed onto asphalt interlayer prior to entering paver.

Figure 8: G&Z paver with 24 foot width, DBI technology, and Gomaco GSI real-time smoothness used for mainline pavement.

The on-site batch plant was capable of producing in the range of 280 to 320 cubic yards of concrete per hour on full production days. However, production was often limited due to the reduced availability of haul trucks during the exceptionally busy construction seasons of 2018 and 2019. Therefore, a typical production rate was approximately 200 cubic yards of concrete per hour. Typical paver rates were approximately 200 feet per hour, with a maximum of 325 feet per hour on a peak production day.

Consolidation of the concrete was achieved using internal vibrators at 1 foot spacings on center. The two-lane GZ 850S paver had 24 vibrators, while the one-lane Gomaco Commander III had 12 vibrators. Vibrators operated at 3,500 to 8,500 vibrations per minute. Finishing of the pavement behind the paver began with a wet burlap drag. The pavement was hand-floated and transverse tining was applied, with edging done using hand trowels (Figure 9). A membrane curing compound was applied using a Gomaco application machine at a rate of 0.0067 gallons per square foot (Figure 10). Early entry strength was determined using the maturity method. Transverse joints were sawcut to a depth of T/3 (4 inches). Joints were later widened, cleaned, and sealed using a Dow Corning 890 SL (self-leveling) silicone joint sealant applied over a backer rod. Diamond grinding of the pavement was performed to produce longitudinal tining.

Field adjustments within allowable NCDOT tolerances were performed periodically, typically due to haul time or ambient temperatures. On hot days, the dosage of retarding admixture was increased to slow the set times. Occasionally, brief rain showers occurred during the summer months. However, the finishing crew kept plastic on hand to protect the areas of the slab that had not reached initial set. No significant breakdowns of the batch plant or paver equipment occurred. Typical issues, such as belts breaking occasionally, were remedied quickly and did not impact paving operations. Of note, lightning struck the batch plant during one thunderstorm, requiring Lane Construction to obtain a new computer to control the batching.

Figure 9: Finishing operations.

Figure 10: Application of curing compound.

Production Mixture Properties and PEM Test Results

QC testing was performed by Lane Construction at their field laboratory (SAM test and hardened concrete tests) and in front of the paver (slump, temperature, and air content via pressure meter). QA tests were performed by consulting firms contracted by NCDOT personnel. Category B of the PEM Implementation funds required that one or more AASHTO PP 84-17 tests be utilized in the acceptance process. For this project, two PEM tests were performed on production mixtures. The SAM test per AASHTO TP 118 was performed on fresh concrete to evaluate the air void system characteristics. SAM tests were performed intermittently, with a target of once per day, on fresh concrete sampled at the batch plant. Samples of concrete used for casting cylinders were also taken at the batch plant. Cylinders were immediately taken into the laboratory for initial cure, then stripped and placed into a lime bath on the following day. Resistivity testing per AASHTO T358 was performed on hardened concrete cylinders typically at ages of 3, 28, 56, and 90 days. It is noted that during Phase 1 paving, resistivity measurements were taken at 90 days, while during Phase 2 paving resistivity measurements were taken at 56 days. This was done in order to help evaluate both 56-day and 90-day resistivity targets for future PEM implementation sites. Shadow testing was acceptable per the FHWA Implementation Funds application, and therefore these tests were only used in this manner for this demonstration project.

NCDOT's required contractor QC practices are outlined in specification section 1000-3 (E) Contractor's Responsibility for Process Control. A QC plan must be provided before or at the preconstruction conference detailing the process control and type and frequency of QC testing and inspection required to meet the project specifications. A Certified Concrete Batch Technician is required to be on site, and this individual is responsible for QC activities including tests and inspections on aggregate stockpiles, plant equipment calibration and inspection, tests of aggregates and concrete, verification of the mixing time and theoretical cement content, verification of vibrator operationality, tests for pavement thickness, and furnishing QC documentation.

In addition to typical contractor QC practices required, Category D of the FHWA PEM Implementation Funds required the contractor to use control charts, as recommended in AASHTO PP 84-17. Although not currently required by NCDOT, Lane Construction typically prepares an Excel-based database/control chart for air content, slump, unit weight, concrete temperature, and compressive strength with one measurement recorded per lot. As part of this PEM Demonstration Project, Lane also utilized an Excel-based database/control chart for the SAM test results and resistivity test results.

Analysis of SAM test results

This project marked the first use of the SAM by Lane Construction personnel, and similar to other SAM users, proficiency came with repetition of the test. At first, multiple users took measurements with the device, although roughly the last 70% of SAM measurements were made by a single user. Material was consolidated using the rodding procedure described in AASHTO TP 118. Early in the Phase 1 paving work, a number of SAM test results with very high values were recorded, indicative of the learning curve for technicians prior to becoming proficient with the SAM. As stated in AASHTO TP 118-17, the SAM number shall be reported to the nearest 0.01 and shall be within 0.03 to 0.82 psi. Based on the more extensive experience of UNC Charlotte personnel with typical NCDOT paving mixtures with air contents between 4.5% and 6.5%, SAM numbers greater than 0.60 are uncommon and often indicate an error (such as a leak) during the test procedure. Therefore, prior to analysis, SAM test results with values greater than 0.60 were removed from the dataset prior to analysis. The final data used for analysis presented in this report is provided in Appendix B.

The dataset used for analysis had a total of 78 SAM test results for mixture 460SLNS and 6 SAM test results for mixture 496 HPNS (n = 84 for the full dataset). A summary of the minimum, maximum, and average test results for each mixture and for the combined dataset is shown in Table 4. It is noted that the SAM air content (%) and SAM number (psi) were obtained from a sample at the plant and were used as shadow test results only. The ASTM C231 air content was measured using a Type B pressure meter from a sample taken before the paver, and was utilized for QC purposes.

Table 4: Summary of air content and air void system test results using ASTM C231 Type B pressure meter

		460SLNS	496HPNS	Both mixtures
SAM air content (%)	min	3.40	4.10	3.40
	avg	4.53	4.57	4.53
	max	6.70	5.40	6.70
ASTM C231 air content (%)	min	4.20	5.20	4.20
	avg	5.42	5.67	5.44
	max	7.00	6.00	7.00
SAM number (psi)	min	0.05	0.17	0.05
	avg	0.30	0.42	0.31
	max	0.60	0.60	0.60

It can be observed from Table 4 and from Figure 11 (below) that the SAM air content measured at the plant tended to consistently run slightly lower than the ASTM C231 air content measured at the paver using the Type B meter. The reason for this is not readily evident, and many studies including those at UNC Charlotte have shown strong agreement between the SAM and Type B meter (Tanesi et al. 2015, Ley et al. 2017, Cavalline et al. 2018, Cavalline et al. 2019, Cavalline et al. 2020). It is theorized that measurement of the air void system using the SAM at the paver (instead of at the plant) may have provided both total air contents closer to that of the ASTM C231 test and potentially, lower SAM numbers (Ley 2019). It is recommended that in future studies, the SAM test be performed at the same location as the Type B meter to provide a direct comparison.

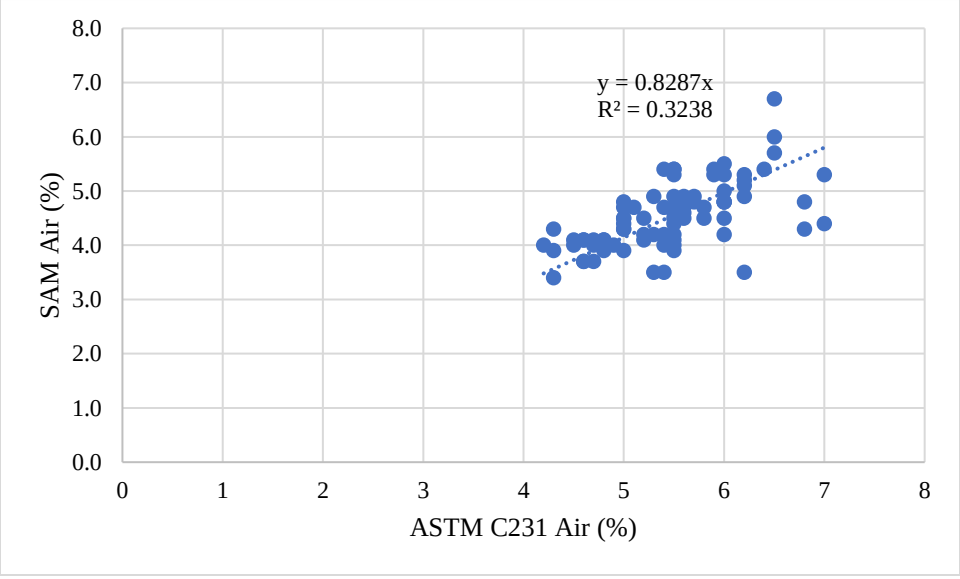
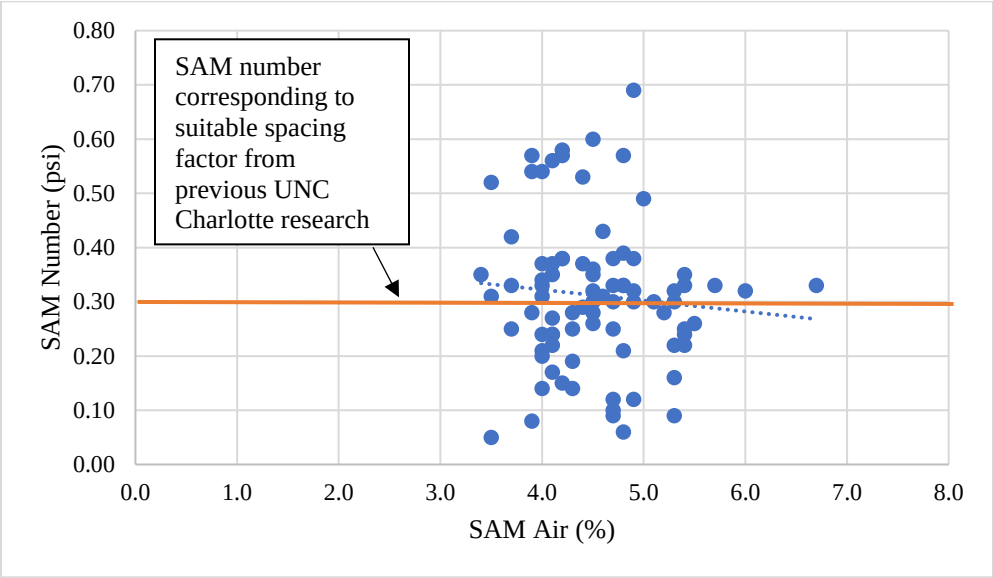
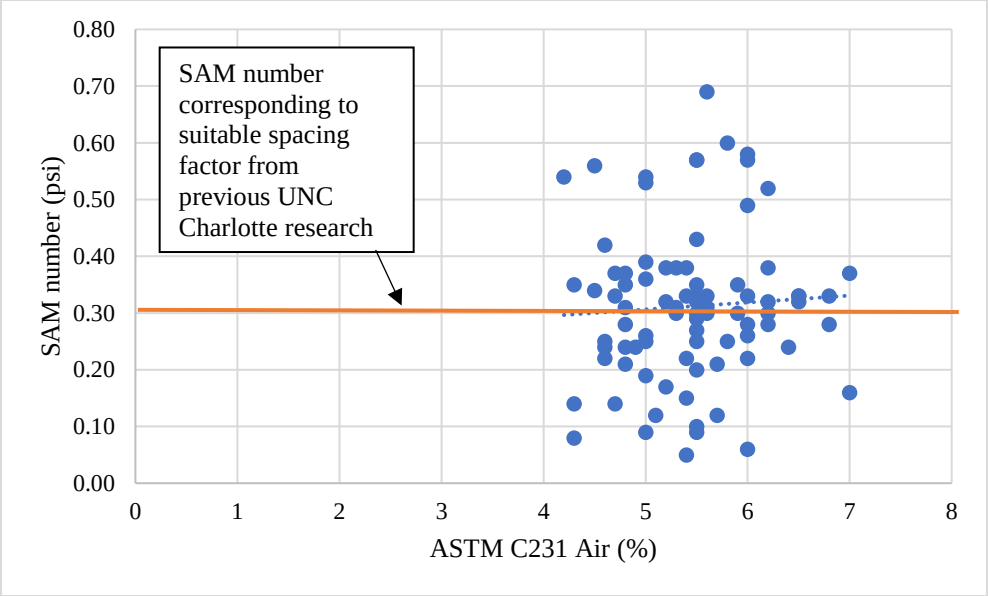


Figure 11: Air content measured using ASTM C231Type B pressure meter at paver vs. SAM at QC laboratory

Previous research at UNC Charlotte using typical NCDOT paving mixtures has shown that a SAM number of approximately 0.30 corresponds to North Carolina concrete mixtures exhibiting satisfactory freeze-thaw performance using the ASTM C666 Procedure A test (Ojo 2017, Cavalline et al. 2018, Cavalline et al. 2019). In Figures 12a and 12b, the relationship

between the SAM number and the air content measured by the SAM device (Figure 12a) and Type B pressure meter (Figure 12b) are shown. As can be observed, for the measurements obtained during this demonstration project very little correlation was observed between the total air content and SAM number, which provides a measurement of the relative dispersion of the air void system. This variability has not been observed in other studies. Ongoing laboratory-based work including manual and automated air void system analysis and freeze-thaw durability testing using ASTM C666 may provide additional insights into these findings. It is likely that SAM measurements made in front of the paver may have provided different (lower) SAM numbers, more consistent with the higher total air contents measured using the Type B pressure meter in front of the paver.





Figures 12a and 12b: Air content measured with SAM (Figure 12a) and Type B pressure meter (Figure 12b) vs. SAM number.

Analysis of Surface Resistivity Test Results

Surface resistivity measurements were made throughout both Phase 1 and Phase 2 paving operations. Lane's QC lab used lime water curing tanks, so per AASHTO T 358, the averages of all readings were multiplied by 1.1 to account for this type of curing method. During Phase 1 paving, surface resistivity measurements were made at 3 days, 28 days, and 90 days of age on cylinders cast for compressive strength testing. During Phase 2 paving, surface resistivity measurements were made at 3 days, 28 days, and 56 days of age on cylinders cast for compressive strength testing. The reason that the later-age tests were switched from day 90 (in Phase 1) to day 56 (in Phase 2) was driven by recently completed work at UNC Charlotte that identified 56-day resistivity targets that appear suitable to assess the performance of higher (up to 30%) fly ash mixtures. It was desired to compare 56-day field resistivity measurements from this project with proposed 56-day resistivity targets developed in the laboratory. Also of note, additional surface resistivity tests were made at different ages (e.g. 4 days, 8 days, 29 days, etc.) based upon Lane Construction's need to break cylinders for compressive strength on those days.

A total of 1360 surface resistivity measurements were made during the PEM demonstration project on the primary paving mixture 460SLNS, with 677 measurements made during Phase 1 paving in 2018 and 683 measurements made during Phase 2 paving in 2019. A plot of resistivity measurements for mixture 460SLNS at each testing age is shown in Figure 13. The proposed resistivity target for concrete pavement mixtures of 11 kΩ•cm (identified by UNC Charlotte as part of NCDOT RP 2018-14) is also shown on Figure 13. As can be observed, roughly 3/4 of the lots of the 460SLNS concrete mixture tested at 56-days met the proposed resistivity target of 11 kΩ•cm, and all lots of 460SLNS concrete tested at 90 days met the proposed target. It is noted that the 90-day resistivity of many mixtures significantly exceeded the proposed resistivity targets for North Carolina bridge concrete identified in previous UNC Charlotte research (15 to 16 kΩ•cm, depending on chloride exposure), indicating that the concrete comprising this demonstration project should exhibit a high level of durability.

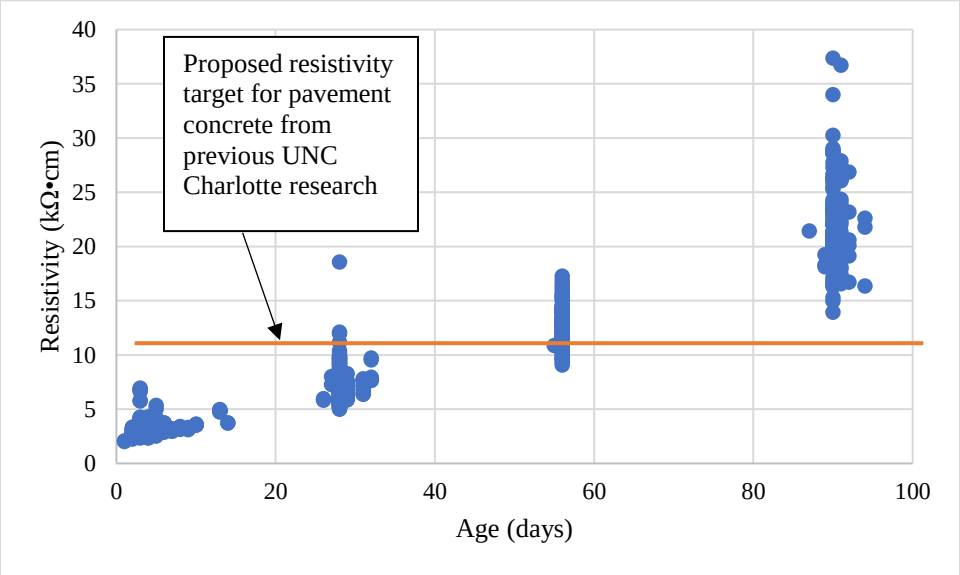


Figure 13: Surface resistivity vs. age for concrete mixture 460SLNS

A total of 125 surface resistivity measurements were made during the PEM demonstration project on the hand-placed mixture 496HPNS, with 67 measurements made during Phase 1 paving in 2018 and 58 measurements made during Phase 2 paving in 2019. A plot of resistivity measurements for mixture 496HPNS at each testing age is shown in Figure 14. The proposed resistivity target for concrete pavement mixtures of 11 kΩ•cm (identified by UNC Charlotte as part of NCDOT RP 2018-14) is also shown on Figure 14. As can be observed, the lots of 496HPNS concrete tested at 56-days did not quite meet the proposed resistivity target of 11 kΩ•cm. However, all lots of 496HPNS concrete tested at 90 days of age readily met the proposed resistivity target for durable performance.

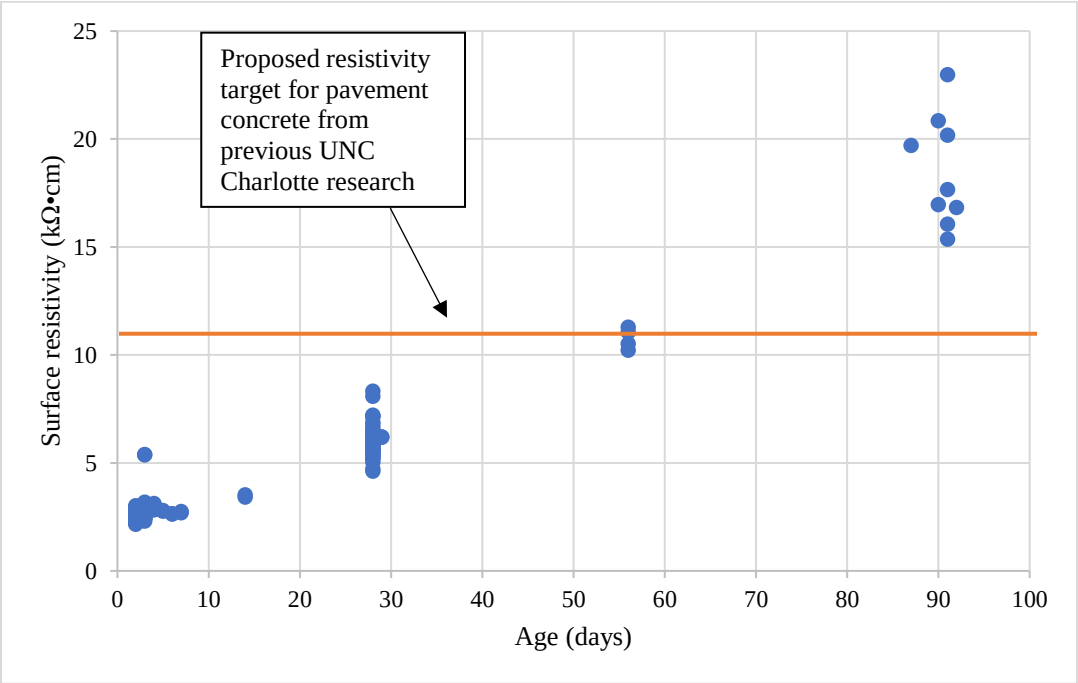


Figure 14: Surface resistivity vs. age for concrete mixture 496HPNS

Control charts for resistivity were prepared using an Excel-based spreadsheet, although lower and upper control limits were not utilized by Lane Construction. The 3-day resistivity of mixture 460SLNS produced during Phase 1 and Phase 2 paving plotted over time in control charts are shown in Figure 15a and 15b, respectively. The 28-day resistivity measurements of mixture 460SLNS produced during Phase 1 and Phase 2 paving plotted over time are shown in Figure 16a and 16b, respectively. It can be observed that although the 3-day and 28-day surface resistivity achieved during Phase 1 paving was fairly consistent, it was highly consistent during Phase 2 paving.

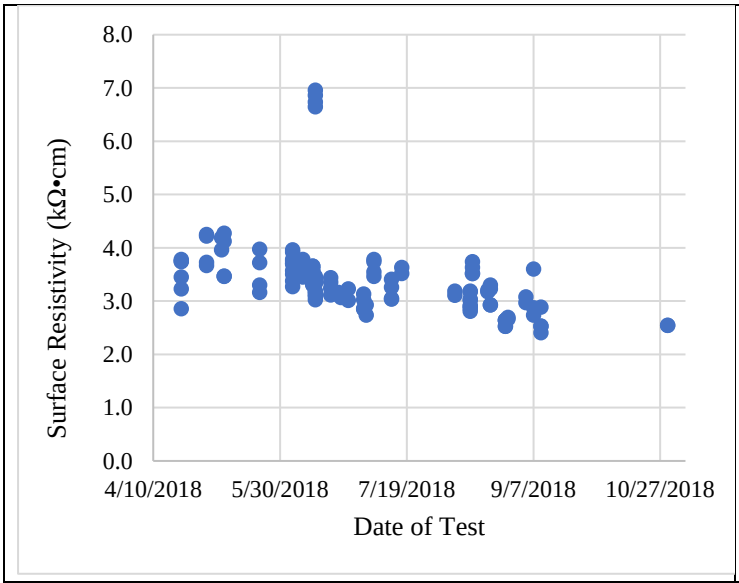


Figure 15a: Control chart showing 3-day resistivity for mixture 460SLNS during Phase 1 paving

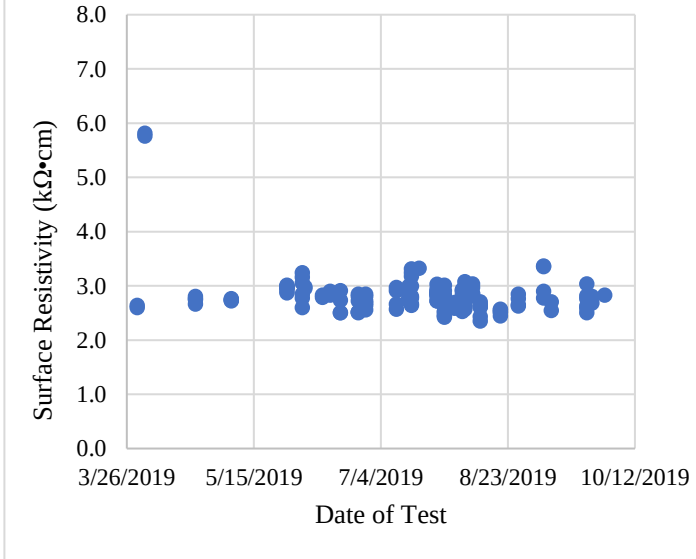


Figure 15b: Control chart showing 3-day resistivity for mixture 460SLNS during Phase 2 paving

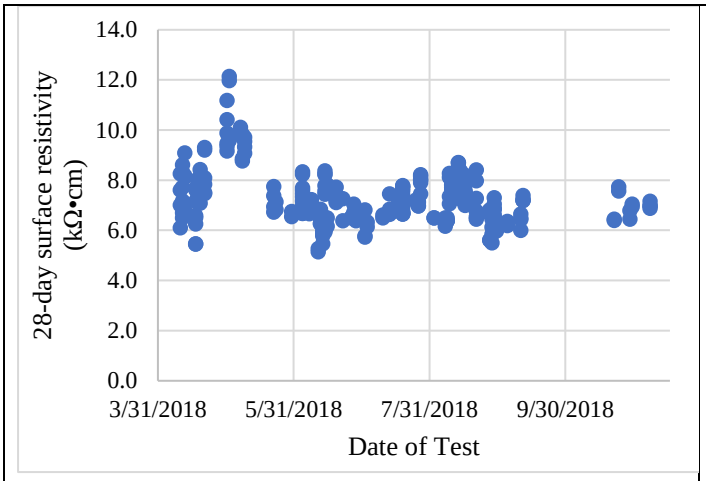


Figure 16a: Control chart showing 28-day resistivity for mixture 460SLNS during Phase 1 paving

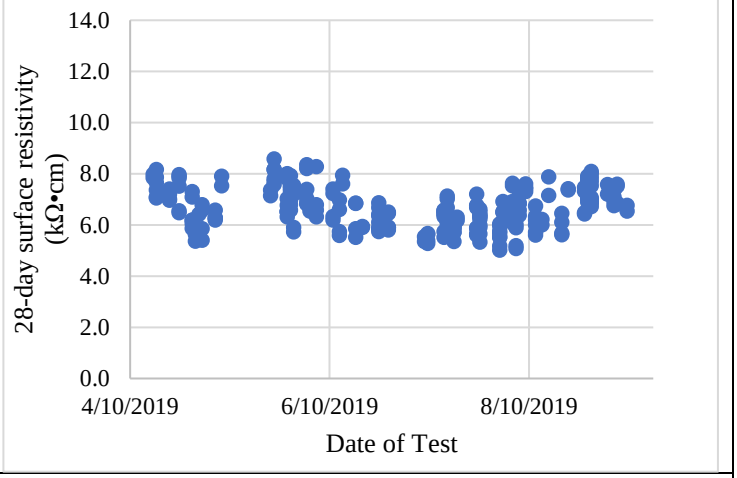


Figure 16b: Control chart showing 28-day resistivity for mixture 460SLNS during Phase 2 paving

Measurements of 56-day resistivity were primarily made on concrete produced during Phase 2 paving. These measurements plotted over time in a control chart are shown in Figure 17. As mentioned previously, it can be observed in Figure 17 that most concrete had met the proposed resistivity target by 56 days. Measurements of 90-day resistivity were primarily made during Phase 1 paving, and are plotted over time in a control chart and shown in Figure 18. It can again be seen in Figure 18 that all concrete met the proposed resistivity target by 90 days.

When comparing to the earlier age resistivity measurements, a larger spread in the data at 56 days and 90 days of age is evident. The proposed resistivity target for North Carolina pavement concrete is shown on these control charts for illustrative purposes. Should enhanced control charting techniques be developed and utilized, a central line would be shown on the control chart, with appropriate upper and lower control limits to prompt consideration of process changes.

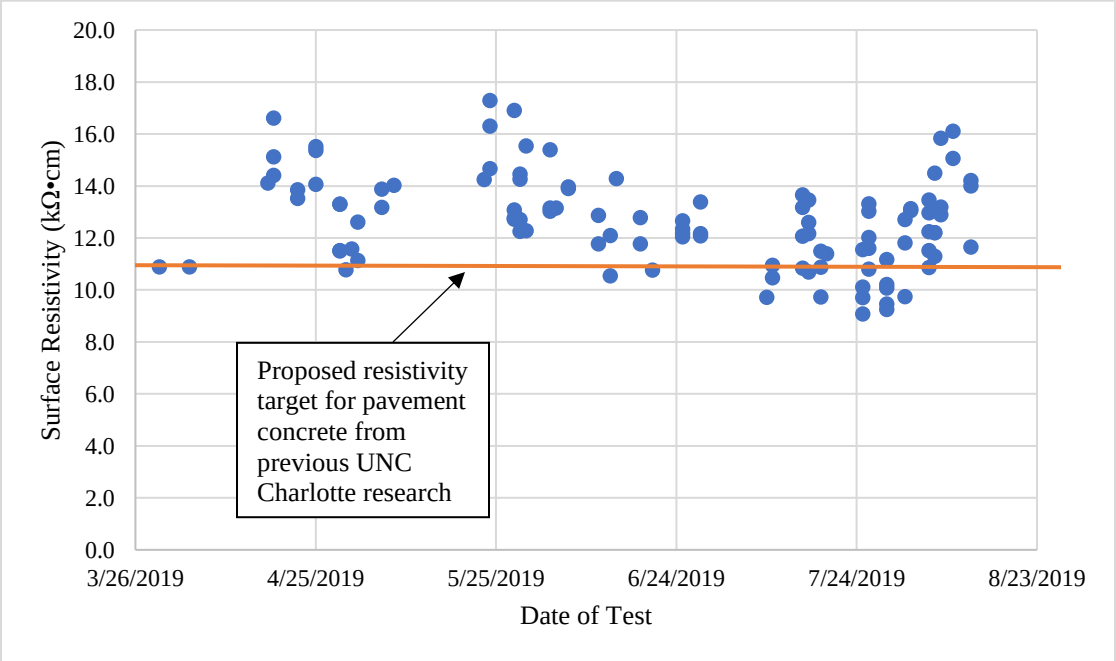


Figure 17: Control chart showing 56-day resistivity for mixture 460SLNS during Phase 2 paving.

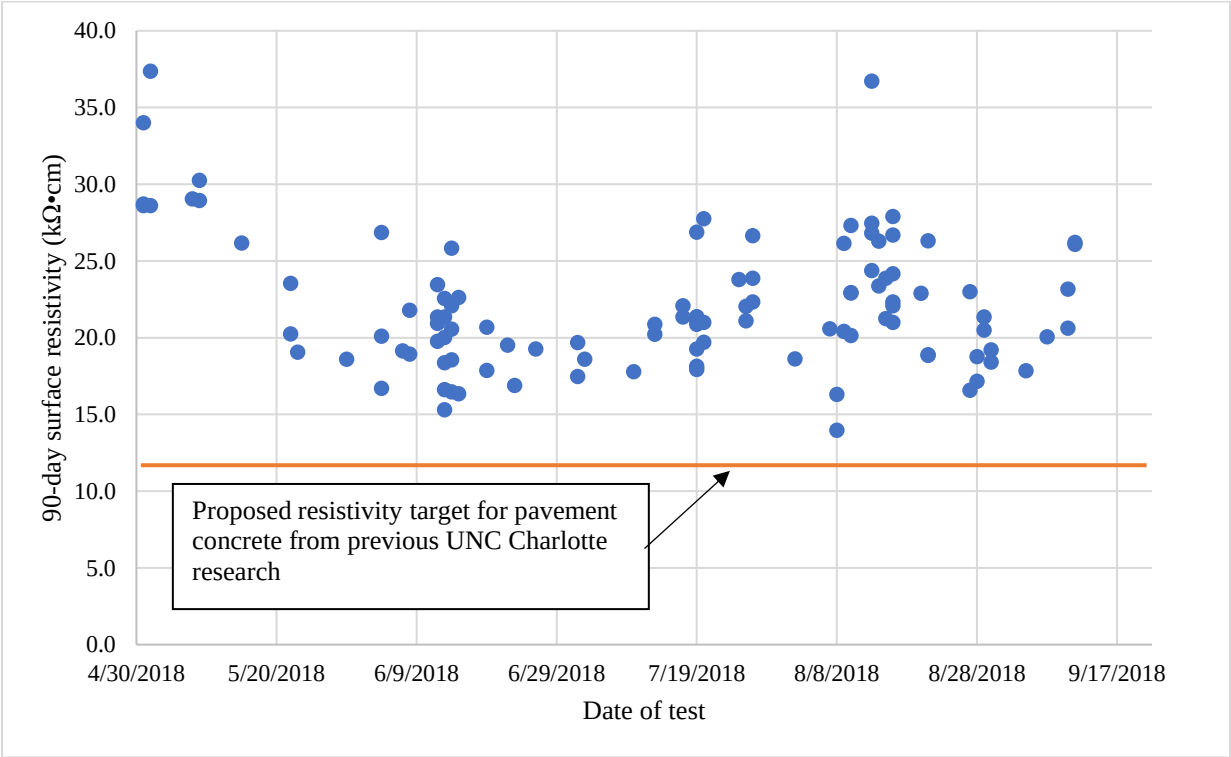


Figure 18: Control chart showing 90-day resistivity for mixture 460SLNS during Phase 1 paving.

FHWA Mobile Concrete Technology Center Open House

The FHWA's FHWA Mobile Concrete Technology Center (MCTC) visited the site in Spring 2019 during Phase 2 paving. The MCTC arrived on site the week of April 30, 2019, and the visit lasted approximately two weeks, during which the MCTC personnel sampled and tested concrete from the PEM Demonstration Project and worked with Lane Construction personnel to understand their practices and processes.

The visit culminated in an Open House event, coordinated by Greg Dean of the Carolinas Concrete Paving Association. A number of industry and NCDOT attendees were present, and presentations were made by personnel from Iowa State's Concrete Pavement Technology Center (CP Tech Center), FHWA, NCDOT, UNC Charlotte, Lane Construction, and others. Jagan Gudimettla and Jim Grove with the MCTC, as well as Mike Praul of FHWA were in attendance. During this visit, various PEM technologies were demonstrated at the MCTC, as well as QA/QC practices promoted with the PEM initiative, with both contractor and NCDOT personnel. A summary presentation of the MCTC's findings was presented at the Open House (Gudimettla 2019). A full report regarding FHWA MCTC visit and test results will be published by the MCTC staff in the near future.

Concluding Remarks

Overall, the PEM demonstration project was a success, and the PEM implementation funds were utilized in a manner consistent with the requirements of the application. The contractor and NCDOT personnel gained valuable experience with three PEM devices and tests during the course of the demonstration project.

Three PEM tests were utilized during the course of this demonstration project: the Box Test, SAM, and surface resistivity. The Box Test was found by the contractor to be highly useful in mixture development and in evaluation of mixture modifications during the course of the project. The SAM test was successfully performed over the course of the project, but the data was variable, and additional work is needed to understand these results. SAM testing was performed at the QC laboratories near the plant, and the ASTM C231 tests were performed before the paver. The SAM air content was consistently lower than the ASTM C231 air content, and a high degree of variation was observed in the SAM number.

Additional field study is recommended, with SAM tests performed closer to the paver alongside the ASTM C231 testing. The "train the trainer" approach used by other agencies, where developers of the SAM visit the jobsite or agency facility may be a useful approach for future PEM shadow projects. The daily leak check procedure suggested by the SAM developer should be implemented, and the reliability algorithm could be utilized to check the accuracy of the run. Additionally, the vibration procedure for consolidation of the concrete for the SAM could be utilized, as it would more consistently consolidate the concrete in the measuring bowl of the device. The contractor found that surface resistivity testing was very straightforward to perform and could be readily implemented in their QC practices. The primary concrete mixtures utilized for the I-85 pavement met the suggested resistivity target of 11 kΩ•cm by 90 days (and often by 56 days), indicating that the pavement constructed as part of this PEM demonstration project should provide satisfactory durability performance. Specific feedback includes:

From Lane Construction:

- *The training provided by the UNC Charlotte team gave us unique exposure to new testing equipment and methods, which we did not have access to previously. Our personnel gained useful insight into the mechanical properties of concrete, which improved our understanding of the impact of concrete quality on pavement durability and longevity.*

- *With the help of the UNC Charlotte team, we were able to quickly and easily implement the SAM and resistivity meter into our standard testing procedures. The SAM was used during routine sampling of plastic concrete during production, and the resistivity meter during routine breaking of hardened samples. We were pleased with the ease of these tests, and did not find a need to provide additional – scarce – QC staff to support the extra testing.*

- *As a result of our project schedule, we were unable to apply the PEM criteria during the preliminary mix design phase. However, going forward, we intend to implement PEM guidelines on future PCCP projects.*

From NCDOT Materials & Tests Unit:

Resistivity Meter

- *The surface resistivity test is a very easy test to perform and is non-destructive.*
- *We will be able to equip each of our labs with a testing instrument for a low cost.*
- *We are typically done performing cylinder compressive strength tests at 28 days. If surface resistivity specification targets are established at 56 or 90 days, the additional samples may pose a storage issue. Also, we would need to have a plan to concerns about low surface resistivity test results at 56 and or 90 days.*
- *UNC Charlotte research is identifying a 28-day surface resistivity target that generally correlates to a 56 56 day or 90 day resistivity that predicts good durability performance. This would likely address the concerns above.*

SAM Air Meter

- *We will do more shadow testing to get comfortable with this test.*
- *During this PEM Demonstration project, many SAM numbers were above the preliminary target value of 0.3. Historically we see good freeze thaw resistance with our mixtures. Additional laboratory and field data using the SAM will be used to refine the performance target.*

Box Test

- *This is a simple test that could provide the producer and contractor beneficial information on their concrete paving mixture performance.*
- *NCDOT could potentially add this as a requirement for pavement mix design submittals.*

Overall, we are very pleased with the results we saw and the cooperation by all parties involved. For the most part North Carolina has had very good concrete pavement performance with the prescriptive specifications that we currently utilize. The Department will continue to explore PEM to see how these tests and other AASHTO PP 84 provisions will work with our daily operations.

As part of the FHWA MCTC Open House held at the demonstration project, a large number of industry stakeholders and NCDOT personnel were able to become familiar with FHWA's PEM initiative, PEM devices and tests, and NCDOT's goals for improving the durability and sustainability of future concrete infrastructure using selected PEM approaches. NCDOT and UNC Charlotte also gained insight into the reasonableness of proposed performance targets for surface resistivity and SAM. Experience gained during this PEM demonstration project will guide two future PEM demonstration projects planned as part of ongoing NCDOT research project 2020-13, "Continuing Toward Durable and Sustainable Concrete Through Performance Engineered Concrete Mixtures." For this future work, efforts will support implementation of PEM on bridge applications. Two pilot projects are anticipated: 1) construction of a new bridge (substructure, superstructure, and deck if possible) and 2) construction of a concrete overlay.

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Appendix A: Mixture Submittals on NCDOT Form 312U

Form 312U
3-96

North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit
Statement of Concrete Mix Design and Source of Materials

Project	**Date Expires** 12/31/2075
Mix Design Status Active	**Concrete Producer** LANE CONSTRUCTION CORPORATION
County	**Plant Location & DOT No.** HAMPTONVILLE, NC - 474
Resident Engr.	**Contractor**
Class of Concrete PAVEMENT	**Date Assigned**
Mix Design No. 474TVFSLNS598E	**Contractor's Signature**
Note Mix Design Units (English or Metric) ENGLISH	

Mix Design Proportions Based on SSD Mass of Aggregates

Material	Producer	Source	Qty. per Cu. Yard
Cement	ROANOKE CEMENT COMPANY	ROANOKE - TROUTVILLE, VA	460 lbs.
Pozzolan	ASH VENTURE	ASH VENTURE - BELEWS CREEK STEAM STATI	138 lbs.
Fine Aggregate	G.S. MATERIALS	EMERY PIT	1046 lbs.
Coarse Aggregate	MARTIN MARIETTA	WOODLEAF QUARRY - SALISBURY	1940 lbs.
Total Water		CITY	31.2 gals.
Air. Entr. Agent	EUCLID CHEMICAL CO.	EUCON AEA 92	As recommended
Retarder	EUCLID CHEMICAL CO.	EUCON LR	As recommended
Water Reducer	EUCLID CHEMICAL CO.	EUCON WR	As recommended
Superplasticizer			
Corrosion Inhibitor			

Mix Properties and Specifications

Slump	1.50 in.	**Mortar Content**	15.22 cu. ft.
Max Water	38.6 gals.	**Air Content**	5.0 %

Material	Specific Gravity	% Absorption	Unit Mass	Fineness Modulus
Fine Aggregate	2.63	0.8	NA	2.81
Coarse Aggregate, #57	2.64	0.5	97.5	NA

Comment Coarse Aggregate is a blend of 1434 lbs. # 57 and 506 lbs. # 78M.

Cast-in-place concrete shall conform to Section 1000, precast concrete to Section 1077, and prestressed concrete to Section 1078 of the applicable edition of the Standard Specifications for Roads and Structures plus all applicable Special Provisions.

Form 312U
3-96

North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit
Statement of Concrete Mix Design and Source of Materials

Project	**Date Expires** 12/31/2075
Mix Design Status Active	**Concrete Producer** LANE CONSTRUCTION CORPORATION
County	**Plant Location & DOT No.** HAMPTONVILLE, NC - 474
Resident Engr.	**Contractor**
Class of Concrete PAVEMENT	**Date Assigned**
Mix Design No. 474TVFSLNS614E	**Contractor's Signature**
Note Mix Design Units (English or Metric) ENGLISH	

Mix Design Proportions Based on SSD Mass of Aggregates

Material	Producer	Source	Qty. per Cu. Yard
Cement	ROANOKE CEMENT COMPANY	ROANOKE - TROUTVILLE, VA	472 lbs.
Pozzolan	ASH VENTURE	ASH VENTURE - BELEWS CREEK STEAM STATI	142 lbs.
Fine Aggregate	G.S. MATERIALS	EMERY PIT	1039 lbs.
Coarse Aggregate	MARTIN MARIETTA	WOODLEAF QUARRY - SALISBURY	1932 lbs.
Total Water		CITY	31.2 gals.
Air. Entr. Agent	EUCLID CHEMICAL CO.	EUCON AEA 92	As recommended
Retarder	EUCLID CHEMICAL CO.	EUCON LR	As recommended
Water Reducer	EUCLID CHEMICAL CO.	EUCON WR	As recommended
Superplasticizer			
Corrosion Inhibitor			

Mix Properties and Specifications

Slump	1.50 in.	**Mortar Content**	15.27 cu. ft.
Max Water	39.6 gals.	**Air Content**	5.0 %

Material	Specific Gravity	% Absorption	Unit Mass	Fineness Modulus
Fine Aggregate	2.63	0.8	NA	2.81
Coarse Aggregate, #57	2.64	0.5	97.5	NA

Comment Coarse aggregate is a blend of 1428 lbs. # 57 and 504 lbs. # 78M.

Cast-in-place concrete shall conform to Section 1000, precast concrete to Section 1077, and prestressed concrete to Section 1078 of the applicable edition of the Standard Specifications for Roads and Structures plus all applicable Special Provisions.

Form 312U
3-96

North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit
Statement of Concrete Mix Design and Source of Materials

Project	**Date Expires** 12/31/2075
Mix Design Status Active	**Concrete Producer** LANE CONSTRUCTION CORPORATION
County	**Plant Location & DOT No.** HAMPTONVILLE, NC - 474
Resident Engr.	**Contractor**
Class of Concrete PAVEMENT	**Date Assigned**
Mix Design No. 474TVFHPNS646E	**Contractor's Signature**
Note Mix Design Units (English or Metric) ENGLISH	

Mix Design Proportions Based on SSD Mass of Aggregates

Material	Producer	Source	Qty. per Cu. Yard
Cement	ROANOKE CEMENT COMPANY	ROANOKE - TROUTVILLE, VA	496 **lbs.**
Pozzolan	ASH VENTURE	ASH VENTURE - BELEWS CREEK STEAM STATI	150 **lbs.**
Fine Aggregate	G.S. MATERIALS	EMERY PIT	1012 **lbs.**
Coarse Aggregate	MARTIN MARIETTA	WOODLEAF QUARRY - SALISBURY	1878 **lbs.**
Total Water		CITY	33.6 **gals.**
Air. Entr. Agent	EUCLID CHEMICAL CO.	EUCON AEA 92	**As recommended**
Retarder	EUCLID CHEMICAL CO.	EUCON LR	**As recommended**
Water Reducer	EUCLID CHEMICAL CO.	EUCON WR	**As recommended**
Superplasticizer			
Corrosion Inhibitor			

Mix Properties and Specifications

Slump	3.00 **in.**	**Mortar Content**	15.60 **cu. ft.**
Max Water	41.7 **gals.**	**Air Content**	5.0 **%**

Material	Specific Gravity	% Absorption	Unit Mass	Fineness Modulus
Fine Aggregate	2.63	0.8	**NA**	2.81
Coarse Aggregate, #57	2.64	0.5	97.5	**NA**

Comment Coarse Aggregate is a blend of 1388 lbs. # 57 and 490 lbs. # 78M.

Cast-in-place concrete shall conform to Section 1000, precast concrete to Section 1077, and prestressed concrete to Section 1078 of the applicable edition of the Standard Specifications for Roads and Structures plus all applicable Special Provisions.

Appendix B: Data used for Analysis of SAM test results

LOT #	Sample Made	Mix ID	Concrete Temp	Ambient Temp	Unit Weight	Slump	Air	SAM	SAM Air
			(degrees)	(degrees)	(pcf)	(in)	(%)		(%)
LOT32	5/7/2018	496HPNS	80	79	142.4	3.25	6.0	0.57	4.8
496HP TTF	5/31/2018	496HPNS	84	80	143.2	2.50	6.0	0.58	4.2
LOT 89	7/16/2018	496HP	86	73	147.8	2.75	5.5	0.29	4.4
LOT 154	9/11/2018	496HP	91	84		3	5.8	0.60	4.5
LOT 329	9/16/2019	496 HP	88		142.4	3	5.2	0.17	4.1
LOT 330	9/25/2019	496 HP	72		141.0	3	5.5	0.33	5.4
Test StripNB (Lot 1)	4/10/2018	460SLNS	58	41	145.6	1.75	6.2	0.52	3.5
LOT30	5/7/2018	460SLNS	71	65	146.4	0.75	5.2	0.38	4.2
LOT33	5/8/2018	460SLNS	80	72	141.2	2.75	6.0	0.49	5.0
LOT34	5/9/2018	460SLNS	78	61	143.2	2.00	4.6	0.42	3.7
LOT35	5/9/2018	460SLNS	80	79	145.2	2.00	4.5	0.56	4.1
LOT37	5/22/2018	460SLNS	76	70	145.9	1.50	5.3	0.30	4.9
LOT38	5/22/2018	460SLNS	82	83	146.5	1.75	4.8	0.35	4.1
LOT39	5/23/2018	460SLNS	80	74	147.0	2.50	5.5	0.43	4.6
LOT 40	5/30/2018	460SLNS	80	72	140.8	2.00	7.0	0.37	4.4
LOT 42	6/4/2018	460SLNS	80	73	144.9	1.25	6.0	0.33	4.8
LOT 43	6/4/2018	460SLNS	84	83	144.8	1.25	6.2	0.32	5.3
LOT 46	6/7/2018	460SLNS	84	80	143.4	2.00	5.4	0.38	4.7
LOT 47	6/8/2018	460SLNS	84	72	144.2	1.50	5.5	0.57	3.9
LOT 48	6/8/2018	460SLNS	86	80	143.5	1.50	5.5	0.57	4.2
LOT 49	6/11/2018	460SLNS	86	77	142.4	3.00	5.0	0.54	3.9
LOT 51	6/12/2018	460LNS	82	64	145.0	1.00	5.0	0.36	4.5
LOT 52	6/12/2018	460LNS	82	66	145.5	1.00	4.6	0.25	3.7
LOT 55	6/13/2018	460LNS	80	68	145.4	1.25	5.3	0.38	4.2
LOT 56	6/13/2018	460LNS	84	78	144.6	1.00	5.6	0.30	4.5
LOT 61	6/14/2018	460LNS	81	71	143.5	1.50	5.5	0.35	4.5
LOT 62	6/14/2018	460LNS	84	73	144.0	1.50	4.7	0.37	4.1
LOT 63	6/14/2018	460LNS	86	82	146.1	1.25	5.6	0.69	4.9
LOT 74	6/26/2018	460LNS	84	70	143.6	1.75	6.0	0.28	4.5
LOT 75 TTF	6/27/2018	460LNS	86	70	145.1	1.75	4.8	0.28	3.9
LOT 77	6/28/2018	460LNS	86	76	143.7	1.75	6.4	0.24	5.4
LOT 78	7/2/2018	460LNS	88	76	145.2	1.50	5.5	0.20	4.0
LOT 80	7/3/2018	460LNS	88	72	142.5	2.00	6.2	0.28	5.2
LOT 81	7/6/2018	460LNS	88	73	144.8	1.50	4.6	0.24	4.1
LOT 82	7/6/2018	460LNS	92	88	142.2	2.00	6.2	0.38	4.9
LOT 83	7/10/2018	460LNS	83	61	141.4	2.00	6.8	0.33	4.8
LOT 88	7/17/2018	460LNS	86	72	143.3	1.00	5.6	0.31	4.6
LOT 90	7/17/2018	460LNS	88	78	144.2	0.75	4.7	0.33	3.7
LOT 98	7/20/2018	460LNS	86	72	143.6	1.00	5.5	0.25	5.4

LOT 102	7/26/2018	460LNS			140.6	1.75	6.5	0.33	5.7
LOT 104	7/27/2018	460LNS	86	72	143.0	1.00	5.7	0.12	4.9
LOT #	Sample Made	Mix ID	Concrete Temp	Ambient Temp	Unit Weight	Slump	Air	SAM	SAM Air
			(degrees)	(degrees)	(pcf)	(in)	(%)		(%)
LOT 105	7/27/2018	460LNS	90	78	144.1	1.00	5.9	0.30	5.3
LOT 109	8/8/2018	460LNS	84	70	145.3	0.75	4.7	0.14	4.0
LOT 111	8/9/2018	460LNS	90	78	143.2	1.75	6.0	0.22	5.3
LOT 113	8/10/2018	460LNS	86	72		1.00	4.3	0.08	3.9
LOT 117	8/13/2018	460LNS	86	72	142.9	1.50	5.0	0.26	4.5
LOT 119	8/13/2018	460LNS	90	74	141.9	1.50	6.0	0.26	5.5
LOT 122	8/14/2018	460LNS	86	69	144.4	1.25	5.5	0.10	4.7
LOT 123	8/14/2018	460LNS	90	75	145.0	0.5	4.9	0.24	4.0
LOT 124	8/15/2018	460LNS	86	72	143.0	1.5	5.9	0.35	5.4
LOT 139	8/28/2018	460LNS	88	68		3	6.5	0.32	6.0
LOT 141	8/29/2018	460LNS	87	72	143.4	1.5	4.8	0.31	4.0
LOT 143	8/29/2018	460LNS	90	86	144.5	0.75	5	0.53	4.4
LOT 146	9/4/2018	460LNS	88	70	143.8	1.5	5.4	0.33	4.0
LOT 201	5/2/2019	460SLNS	77	68	143.0	1.2	4.2	0.54	4.0
LOT 225 TTF	6/6/2019	460SLNS	80	73	140.2	2.25	6.8	0.28	4.3
LOT 227 TTF	6/11/2019	460SLNS	80	69		2	6.5	0.33	6.7
LOT 229	6/13/2019	460SLNS	84	71	141.2	2.75	6.2	0.30	5.1
LOT 233	6/18/2019	460SLNS	78	70	142.0	2.5	7	0.16	5.3
LOT 236	6/25/2019	460SLNS	84	70		1.5	4.3	0.35	3.4
LOT 241 TTF	6/28/2019	460SLNS	80	67	142.1	2	5.3	0.31	3.5
LOT 245	7/10/2019	460SLNS	85	73	143.0	2	4.5	0.34	4.0
LOT 247	7/15/2019	460SLNS	80	74	142.4	1.25	5	0.19	4.3
LOT 252	7/16/2019	460SLNS	88	77	142.0	1.25	5.6	0.33	4.7
LOT 255	7/18/2019	460SLNS	84	72	141.8	1.75	5.4	0.05	3.5
LOT 258 TTF	7/19/2019	460SLNS	88	73	140.2	2.25	5.7	0.21	4.8
LOT 262	7/25/2019	460SLNS	89	83	141.4	1	5.5	0.09	5.3
LOT 263	7/26/2019	460SLNS	80	62	144.3	1	5	0.39	4.8
LOT 269 TTF	7/29/2019	460SLNS	84	73	142.4	2.25	6	0.06	4.8
LOT 273	8/1/2019	460SLNS	84	67	143.7	1	5	0.09	4.7
LOT 282	8/5/2019	460SLNS	88	75	143.7	1.25	4.8	0.21	4.0
LOT 284	8/6/2019	460SLNS	82	67	144.2	1.25	5.4	0.15	4.2
LOT 288	8/7/2019	460SLNS	86	74	144.2	1	4.8	0.37	4.0
LOT 298	8/16/2019	460SLNS	84	75	141.6	1.25	5	0.25	4.3
LOT 299	8/20/2019	460SLNS	84	75	143.0	1.5	5.4	0.22	5.4
LOT 302 TTF	9/3/2019	460SLNS	84	81	142.7	1.75	5.2	0.32	4.5
LOT 315	9/5/2019	460SLNS	83	73	143.9	1.25	5.5	0.27	4.1
LOT 316	9/6/2019	460SLNS	88	82	145.3	1.5	5.1	0.12	4.7
LOT 318	9/9/2019	460SLNS	82	73	143.9	1.5	4.6	0.22	4.1
LOT 320	9/11/2019	460SLNS	84	73	145.4	1.5	4.8	0.24	4.1
LOT 325	9/13/2019	460SLNS	82	75	144.6	1.5	4.3	0.14	4.3

LOT 328	9/19/2019	460SLNS	76	55	142.8	1.5	5.8	0.25	4.7
LOT 335	9/20/2019	460SLNS	82	73	144.2	2	5.5	0.32	4.9
LOT 337	9/23/2019	460SLNS	78	61	142.7	1.5	5.5	0.30	4.7

Appendix C: Data used for Analysis of Resistivity Test Results for Mixture 460SLNS

LOT #	Sample Made	Test Age	Concrete Temp	Ambient Temp	Unit Weight	Air	Surface Resistivity	Surface Resistivity Adjusted (x1.1)	Compressive Strength	NCDOT 28DAY comp str
		(days)	(°F)	(°F)	(pcf)	(%)	k-ohm*cm	k-ohm*cm	(psi)	(psi)
Lot 1	4/10/2018	1	58	41	145.6	6.2			2285	
Lot 1	4/10/2018	1	58	41	145.6	6.2			2354	
Lot 1	4/10/2018	2	58	41	145.6	6.2			3125	
Lot 1	4/10/2018	2	58	41	145.6	6.2			3143	
Lot 1	4/10/2018	2	58	41	145.6	6.2			3074	
Lot 1	4/10/2018	28	58	41	145.6	6.2	6.9	7.6	5379	5837
Lot 1	4/10/2018	28	58	41	145.6	6.2	7.5	8.3	5785	5677
Lot 1	4/10/2018	28	55			4.5				
Lot 2	4/10/2018	3	64	66	143.6	6.8	3.1	3.4	3441	
Lot 2	4/10/2018	3	64	66	143.6	6.8	3.0	3.3	3189	
Lot 2	4/10/2018	3	64	66	143.6	6.8			3412	
Lot 2	4/10/2018	28	64	66	143.6	6.8	6.4	7.0	5724	4743
Lot 2	4/10/2018	28	64	66	143.6	6.8	5.5	6.1	5762	5152
Lot 3	4/11/2018	3	62	57	148.3	4.5			4010	
Lot 3	4/11/2018	3	62	57	148.3	4.5			4048	
Lot 3	4/11/2018	28	62	57	148.3	4.5	6.5	7.2	6419	6306
Lot 3	4/11/2018	28	62	57	148.3	4.5	7.0	7.7	6383	6206
Lot 3	4/11/2018	90	62	57	148.3	4.5	18.5	20.3	8202	
Lot 4	4/11/2018	3	58	48	149.1	4.0			4157	
Lot 4	4/11/2018	3	58	48	149.1	4.0			4200	
Lot 4	4/11/2018	28	58	48	149.1	4.0	7.8	8.6	7241	6970
Lot 4	4/11/2018	28	58	48	149.1	4.0	7.6	8.3	6486	6641
Lot 4	4/11/2018	90	58	48	149.1	4.0	21.5	23.6	8158	
Lot 5	4/11/2018	3	60	46	148.3	4.5			3461	
Lot 5	4/11/2018	3	60	46	148.3	4.5			3349	
Lot 5	4/11/2018	28	60	46	148.3	4.5	5.9	6.5	6117	6363
Lot 5	4/11/2018	28	60	46	148.3	4.5	6.1	6.7	6160	6588
Lot 5	4/11/2018	90	60	46	148.3	4.5	17.7	19.5	7561	
Lot 6	4/11/2018	3	58	45	147.1	4.7			3618	
Lot 6	4/11/2018	3	58	45	147.1	4.7			3474	
Lot 6	4/11/2018	28	58	45	147.1	4.7	6.2	6.8	6156	6280
Lot 6	4/11/2018	28	58	45	147.1	4.7	6.4	7.0	6617	6072
Lot 6	4/11/2018	90	58	45	147.1	4.7	17.0	18.7	8467	
Lot 7	4/12/2018	4	64	68	N/A	3.8	3.3	3.7	4637	
Lot 7	4/12/2018	4	64	68	N/A	3.8	3.3	3.6	4606	
Lot 7	4/12/2018	28	64	68	N/A	3.8	7.4	8.1	6664	6478
Lot 7	4/12/2018	28	64	68	N/A	3.8	7.4	8.2	6933	6477
Lot 7	4/12/2018	90	64	68	N/A	3.8	23.0	25.3	7888	
Lot 8	4/12/2018	4	66	61	147.5	3.8	3.9	4.3	4933	
Lot 8	4/12/2018	4	66	61	147.5	3.8			5148	
Lot 8	4/12/2018	28	66	61	147.5	3.8			5345	7597
Lot 8	4/12/2018	28	66	61	147.5	3.8	8.3	9.1	7625	8091
Lot 8	4/12/2018	90	66	61	147.5	3.8			5258	
Lot 9	4/12/2018	28	62	57	147.1	4.8	6.1	6.7	6130	5697
Lot 9	4/12/2018	28	62	57	147.1	4.8	6.2	6.8	5650	5934
Lot 9	4/12/2018	90	62	57	147.1	4.8	17.0	18.7	7593	
Lot 9	4/12/2018	4	62	57	147.1	4.8	3.0	3.3	3969	
Lot 9	4/12/2018	4	62	57	147.1	4.8	3.0	3.3	4152	
Lot 10	4/17/2018	3	64	70	146.9	6.0			3964	
Lot 10	4/17/2018	3	64	70	146.9	6.0			4199	
Lot 10	4/17/2018	28	64	70	146.9	6.0	6.5	7.2	6401	5777
Lot 10	4/17/2018	28	64	70	146.9	6.0	6.9	7.6	6018	5962

Lot 10	4/17/2018	90	64	70	146.9	6.0	16.8	18.5	6828	
Lot 11	4/17/2018	3	60	57	147.5	5.2			4299	
Lot 11	4/17/2018	3	60	57	147.5	5.2			3997	
Lot 11	4/17/2018	28	60	57	147.5	5.2	7.0	7.7	7006	6804
Lot 11	4/17/2018	28	60	57	147.5	5.2	5.9	6.5	6189	6289
Lot 11	4/17/2018	90	60	57	147.5	5.2	21.1	23.2	8032	
Lot 12	4/17/2018	3	60	50	146.7	5.0			3393	
Lot 12	4/17/2018	3	60	50	146.7	5.0			3443	
Lot 12	4/17/2018	28	60	50	146.7	5.0	6.0	6.6	5219	5317
Lot 12	4/17/2018	28	60	50	146.7	5.0	5.7	6.2	4998	5769
Lot 12	4/17/2018	90	60	50	146.7	5.0	21.2	23.4	7326	
Lot 13	4/17/2018	3	60	50	146.7	5.0			2669	
Lot 13	4/17/2018	3	60	50	146.7	5.0			2510	
Lot 13	4/17/2018	28	60	50	146.7	5.0	5.0	5.5	5360	5621
Lot 13	4/17/2018	28	60	50	146.7	5.0	5.0	5.4	4846	5606
Lot 13	4/17/2018	90	60	50	146.7	5.0	13.6	15.0	6572	
Lot 15	4/18/2018	5	70	73	146.3	5.4	2.9	3.2	4229	
Lot 15	4/18/2018	5	70	73	146.3	5.4	3.0	3.3	3974	
Lot 15	4/18/2018	28	70	73	146.3	5.4	6.4	7.1	6146	5506
Lot 15	4/18/2018	28	70	73	146.3	5.4	6.7	7.4	6377	5431
Lot 15	4/18/2018	90	70	73	146.3	5.4	18.5	20.4	7078	
Lot 16	4/18/2018	5	68	72	146.3	5.3	3.5	3.8	4419	
Lot 16	4/18/2018	5	68	72	146.3	5.3	3.2	3.5	4539	
Lot 16	4/18/2018	28	68	72	146.3	5.3	7.3	8.0	6377	5957
Lot 16	4/18/2018	28	68	72	146.3	5.3	7.2	8.0	6118	6153
Lot 16	4/18/2018	90	68	72	146.3	5.3	21.7	23.8	7983	
Lot 17	4/19/2018	4	68	65	147.1	4.7	3.2	3.5	4663	
Lot 17	4/19/2018	4	68	65	147.1	4.7	3.2	3.6	5149	
Lot 17	4/19/2018	27	68	65	147.1	4.7	7.3	8.0	6971	5907
Lot 17	4/19/2018	27	68	65	147.1	4.7	6.6	7.3	6472	5894
Lot 17	4/19/2018	90	68	65	147.1	4.7	22.1	24.3	7858	
Lot 18	4/19/2018	4	66	55		5.6	3.1	3.4	4096	
Lot 18	4/19/2018	4	66	55		5.6	3.1	3.4	4226	
Lot 18	4/19/2018	28	66	55		5.6	7.0	7.7	6048	5497
Lot 18	4/19/2018	28	66	55		5.6	6.7	7.4	5777	5915
Lot 18	4/19/2018	90	66	55		5.6	20.0	22.0	7086	
Lot 19	4/19/2018	4	66	48	146.7	4.5	3.2	3.5	4322	
Lot 19	4/19/2018	4	66	48	146.7	4.5	2.9	3.1	4479	
Lot 19	4/19/2018	28	66	48	146.7	4.5	7.3	8.1	6567	6027
Lot 19	4/19/2018	28	66	48	146.7	4.5	7.1	7.8	6236	5947
7/18/2019	4/19/2018	90	66	48	146.7	4.5	23.2	25.5	7572	
Lot 20	4/19/2018	4	66	43		4.8	3.0	3.2	4619	
Lot 20	4/19/2018	4	66	43		4.8	3.1	3.4	4453	
Lot 20	4/19/2018	28	66	43		4.8	6.4	7.1	6600	6276
Lot 20	4/19/2018	28	66	43		4.8	7.4	8.1	6802	6112
Lot 20	4/19/2018	90	66	43		4.8	21.9	24.1	8225	
Lot 21	4/19/2018	4	66	41		4.6	2.4	2.6	5167	
Lot 21	4/19/2018	4	66	41		4.6	3.1	3.4	5026	
Lot 21	4/19/2018	28	66	41		4.6	7.7	8.4	7755	6278
Lot 21	4/19/2018	28	66	41		4.6	7.4	8.1	7171	6513
Lot 21	4/19/2018	90	66	41		4.6	23.9	26.2	9154	
LOT 22	4/21/2018	3	66	64	144.8	4.2	2.9	3.2	3841	
LOT 22	4/21/2018	3	66	64	144.8	4.2	2.6	2.9	3885	
LOT 22	4/21/2018	28	66	64	144.8	4.2	6.8	7.5	4950	5442
LOT 22	4/21/2018	28	66	64	144.8	4.2	6.8	7.5	5996	5290
LOT 22	4/21/2018	90	66	64	144.8	4.2	18.5	20.4	6946	
LOT 23	4/21/2018	3	64	57	144.4	3.8	3.4	3.8	4340	
LOT 23	4/21/2018	3	64	57	144.4	3.8	3.1	3.5	3793	
LOT 23	4/21/2018	28	64	57	144.4	3.8	7.1	7.8	6623	5563

LOT 23	4/21/2018	28	64	57	144.4	3.8	8.4	9.2	6438	6155
LOT 23	4/21/2018	90	64	57	144.4	3.8	19.1	21.0	7040	
LOT 24	4/21/2018	3	60	45		4.7	3.4	3.7	4046	
LOT 24	4/21/2018	3	60	45		4.7	3.4	3.8	3958	
LOT 24	4/21/2018	28	60	45		4.7	7.4	8.1	6457	6028
LOT 24	4/21/2018	28	60	45		4.7	8.5	9.3	6618	5870
LOT 24	4/21/2018	90	60	45		4.7	17.4	19.1	7336	
LOT 25	5/1/2018	2	61	64		4.1	3.0	3.3	3642	
LOT 25	5/1/2018	2	61	64		4.1	3.0	3.3	3825	
LOT 25	5/1/2018	2	61	64		4.1	2.9	3.2	4159	
LOT 25	5/1/2018	28	61	64		4.1	8.6	9.5	6215	6606
LOT 25	5/1/2018	28	61	64		4.1	8.3	9.2	5936	6572
LOT 25	5/1/2018	90					26.0	28.6	8425	
LOT 26	5/1/2018	3	72	81	143.6	4.8	3.4	3.7	4011	
LOT 26	5/1/2018	3	72	81	143.6	4.8	3.3	3.7	3976	
LOT 26	5/1/2018	28	72	81	143.6	4.8	9.0	9.9	6120	6029
LOT 26	5/1/2018	28	72	81	143.6	4.8	8.5	9.4	6190	5956
LOT 26	5/1/2018	90	72	81	143.6	4.8	26.1	28.7	6930	
LOT 27	5/1/2018	3	76	81		4.0	3.9	4.2	4435	
LOT 27	5/1/2018	3	76	81		4.0	3.8	4.2	4546	
LOT 27	5/1/2018	28	76	81		4.0	10.2	11.2	7229	6453
LOT 27	5/1/2018	28	76	81		4.0	9.5	10.4	6874	6794
LOT 27	5/1/2018	90	76	81		4.0	30.9	34.0	8718	
LOT 28	5/2/2018	5	70	50	144.4	4.1	3.8	4.2	4577	
LOT28	5/2/2018	5	70	50	144.4	4.1	3.7	4.1	4737	
LOT 28	5/2/2018	5	70	50	144.4	4.1	3.7	4.1	4737	
LOT 28	5/2/2018	28	70	50	144.4	4.1	8.8	9.7	6412	5994
LOT 28	5/2/2018	28	70	50	144.4	4.1	8.7	9.6	6558	6217
LOT 28	5/2/2018	90	70	50	144.4	4.1	26.0	28.6	8187	
LOT 29	5/2/2018	5	72	56	145.2	4.0	4.6	5.0	5250	
LOT 29	5/2/2018	5	72	56	145.2	4.0	4.9	5.4	5565	
LOT 29	5/2/2018	28	72	56	145.2	4.0	11.0	12.1	7258	6554
LOT 29	5/2/2018	28	72	56	145.2	4.0	10.9	12.0	7193	7019
LOT 29	5/2/2018	90	72	56	145.2	4.0	34.0	37.4	8984	
LOT30	5/7/2018	3	71	65	146.4	5.2	3.8	4.2	4033	
LOT 30	5/7/2018	3	71	65	146.4	5.2	3.6	4.0	4024	
LOT30	5/7/2018	28	71	65	146.4	5.2	9.2	10.1	6451	5832
LOT30	5/7/2018	28	71	65	146.4	5.2	9.0	9.9	6068	5913
LOT31	5/8/2018	3	78	70	142.8	5.8	3.9	4.3	4124	
LOT31	5/8/2018	3	78	70	142.8	5.8	3.8	4.1	4105	
LOT31	5/8/2018	28	78	70	142.8	5.8	8.9	9.7	6305	5808
LOT31	5/8/2018	28	78	70	142.8	5.8	8.9	9.8	6433	6069
LOT31	5/8/2018	90	78	70	142.8	5.8	26.4	29.0	7360	
LOT33	5/8/2018	3	80	72	141.2	6.0	3.2	3.5	3500	
LOT33	5/8/2018	3	80	72	141.2	6.0	3.2	3.5	3817	
LOT33	5/8/2018	28	80	72	141.2	6.0	8.1	8.9	5543	5448
LOT33	5/8/2018	28	80	72	141.2	6.0	8.0	8.8	6044	5474
LOT34	5/9/2018	5	78	61	143.2	4.6	3.4	3.7	4592	
LOT34	5/9/2018	5	78	61	143.2	4.6	3.4	3.8	4625	
LOT34	5/9/2018	28	78	61	143.2	4.6	8.8	9.7	6388	6162
LOT34	5/9/2018	28	78	61	143.2	4.6	8.7	9.5	6488	6013
LOT34	5/9/2018	90	78	61	143.2	4.6	27.5	30.3	8282	
LOT35	5/9/2018	5	80	79	145.2	4.5	3.6	3.9	4404	
LOT35	5/9/2018	5	80	79	145.2	4.5	3.4	3.7	4269	
LOT35	5/9/2018	28	80	79	145.2	4.5	8.3	9.1	6342	5902
LOT35	5/9/2018	28	80	79	145.2	4.5	8.5	9.3	6174	5812
LOT35	5/9/2018	90	80	79	145.2	4.5	26.3	28.9	8383	
LOT36	5/15/2018	2	82	76	142.0	5.0	2.8	3.1	3575	
LOT36	5/15/2018	2	82	76	142.0	5.0	2.8	3.1	3462	

LOT36	5/15/2018	2	82	76	142.0	5.0	2.9	3.1	3802	
LOT36	5/15/2018	28	82	76	142.0	5.0			6244	5991
LOT36	5/15/2018	28	82	76	142.0	5.0			5938	5850
LOT 36	5/15/2018	90					23.8	26.2	7404	
LOT37	5/22/2018	3	76	70	145.9	5.3	3.4	3.7	4011	
LOT37	5/22/2018	3	76	70	145.9	5.3	3.6	4.0	3860	
LOT37	5/22/2018	28	76	70	145.9	5.3	6.7	7.4	5762	5483
LOT37	5/22/2018	28	76	70	145.9	5.3	7.0	7.7	6058	5297
LOT37	5/22/2018	90	76	70	145.9	5.3	21.4	23.5	7232	
LOT38	5/22/2018	3	82	83	146.5	4.8	3.0	3.3	3967	
LOT38	5/22/2018	3	82	83	146.5	4.8	2.9	3.2	3841	
LOT38	5/22/2018	28	82	83	146.5	4.8	6.1	6.7	5929	5276
LOT38	5/22/2018	28	82	83	146.5	4.8	6.3	6.9	6325	5364
LOT38	5/22/2018	90	82	83	146.5	4.8	18.4	20.2	6972	
LOT39	5/23/2018	2	80	74	147.0	5.5	2.8	3.1	3076	
LOT39	5/23/2018	2	80	74	147.0	5.5	3.0	3.3	3079	
LOT39	5/23/2018	28	80	74	147.0	5.5	6.5	7.1	5422	5613
LOT39	5/23/2018	28	80	74	147.0	5.5	6.2	6.8	5472	5312
LOT39	5/23/2018	90	80	74	147.0	5.5	17.3	19.0	6719	
LOT 40	5/30/2018	2	80	72	140.8	7.0	2.8	3.1	3062	
LOT 40	5/30/2018	2	80	72	140.8	7.0	2.7	2.9	3119	
LOT 40	5/30/2018	2	80	72	140.8	7.0	2.7	3.0	3045	
LOT 40	5/30/2018	28	80	72	140.8	7.0	6.0	6.5	5478	4814
LOT 40	5/30/2018	28	80	72	140.8	7.0	6.1	6.8	5654	5223
LOT 40	5/30/2018	90	80	72	140.8	7.0	16.9	18.6	6810	
LOT41	6/4/2018	3	80	72	144.6	4.8	3.0	3.3	4093	
LOT41	6/4/2018	3	80	72	144.6	4.8	3.1	3.4	3993	
LOT41	6/4/2018	28	80	72	144.6	4.8	7.0	7.7	6332	5989
LOT41	6/4/2018	28	80	72	144.6	4.8	6.8	7.5	6366	5960
LOT41	6/4/2018	87	80	72	144.6	4.8	19.5	21.5	7926	
LOT 42	6/4/2018	3	80	73	144.9	6.0	3.6	4.0	4083	
LOT 42	6/4/2018	3	80	73	144.9	6.0	3.6	3.9	4079	
LOT 42	6/4/2018	28	80	73	144.9	6.0	7.5	8.2	6794	6305
LOT 42	6/4/2018	28	80	73	144.9	6.0	7.6	8.3	6628	5871
LOT 42	6/4/2018	92	80	73	144.9	6.0	24.4	26.9	7992	
LOT 43	6/4/2018	3	84	83	144.8	6.2	3.4	3.8	4107	
LOT 43	6/4/2018	3	84	83	144.8	6.2	3.4	3.7	4112	
LOT 43	6/4/2018	28	84	83	144.8	6.2	6.5	7.2	5598	5892
LOT 43	6/4/2018	28	84	83	144.8	6.2	6.7	7.3	5851	5579
LOT 43	6/4/2018	92	84	83	144.8	6.2	18.3	20.1	7366	
LOT 44	6/4/2018	3	84	80	143.8	6.2	3.4	3.7	3237	
LOT 44	6/4/2018	3	84	80	143.8	6.2	3.4	3.8	3214	
LOT 44	6/4/2018	28	84	80	143.8	6.2	6.1	6.7	5323	4711
LOT 44	6/4/2018	28	84	80	143.8	6.2	6.1	6.7	4547	4641
LOT 44	6/4/2018	92	84	80	143.8	6.2	15.2	16.7	5812	
LOT 45	6/4/2018	3	84	82	144.1	5.2	3.2	3.5	3933	
LOT 45	6/4/2018	3	84	82	144.1	5.2	3.3	3.6	4124	
LOT 45	6/4/2018	28	84	82	144.1	5.2	6.4	7.0	6249	5630
LOT 45	6/4/2018	28	84	82	144.1	5.2	6.1	6.7	6028	5744
LOT 45	6/4/2018	28	84	82	144.1	5.2	16.9	18.6	7632	
LOT 46	6/7/2018	4	84	80	143.4	5.4	3.2	3.5	4116	
LOT 46	6/7/2018	4	84	80	143.4	5.4	3.3	3.6	4283	
LOT 46	6/7/2018	28	84	80	143.4	5.4	6.2	6.8	5881	5825
LOT 46	6/7/2018	28	84	80	143.4	5.4	6.1	6.7	5999	5826
LOT 46	6/7/2018	92	84	80	143.4	5.4	17.4	19.1	7365	
LOT 47	6/8/2018	3	84	72	144.2	5.5	3.1	3.5	3917	
LOT 47	6/8/2018	3	84	72	144.2	5.5	3.4	3.8	3928	
LOT 47	6/8/2018	28	84	72	144.2	5.5	6.3	6.9	5510	5620
LOT 47	6/8/2018	28	84	72	144.2	5.5	6.3	6.9	5531	5314

LOT 47	6/8/2018	91	84	72	144.2	5.5	17.2	18.9	7344	
LOT 48	6/8/2018	3	86	80	143.5	5.5	3.3	3.7	4002	
LOT 48	6/8/2018	3	86	80	143.5	5.5	3.4	3.7	3923	
LOT 48	6/8/2018	28	86	80	143.5	5.5	6.6	7.2	6178	6028
LOT 48	6/8/2018	28	86	80	143.5	5.5	6.3	6.9	5707	6020
LOT 48	6/8/2018	94	86	80	143.5	5.5	19.8	21.8	7278	
LOT 49	6/11/2018	2	86	77	142.4	5.0	2.3	2.5	2942	
LOT 49	6/11/2018	2	86	77	142.4	5.0	2.2	2.4	3033	
LOT 49	6/11/2018	2	86	77	142.4	5.0	2.3	2.6	2919	
LOT 49	6/11/2018	28	86	77	142.4	5.0	4.8	5.3	5184	4982
LOT 49	6/11/2018	28	86	77	142.4	5.0	4.7	5.1	5284	5167
LOT 50	6/12/2018	3	82	64	145.6	4.0	3.0	3.3	3962	
LOT 50	6/12/2018	3					3.0	3.3	4230	
LOT 50	6/12/2018	13					4.3	4.7	5723	6398
LOT 50	6/12/2018	13					4.4	4.9	5989	6244
LOT 50	6/12/2018	90							7581	
LOT 51	6/12/2018	3	82	64	145.0	5.0	3.3	3.7	4121	
LOT 51	6/12/2018	3					3.3	3.7	3850	
LOT 51	6/12/2018	13					4.5	5.0	5226	5811
LOT 51	6/12/2018	13					4.4	4.9	5114	5940
LOT 51	6/12/2018	90					19.0	20.9	7386	
LOT 52	6/12/2018	3	82	66	145.5	4.6	3.1	3.4	4026	
LOT 52	6/12/2018	3					3.3	3.6	4068	
LOT 52	6/12/2018	13					4.5	5.0	5481	6098
LOT 52	6/12/2018	13					4.4	4.9	5421	6069
LOT 52	6/12/2018	90					21.3	23.5	7701	
LOT 53	6/12/2018	3	82	68	144.4	5.4	3.2	3.5	3942	
LOT 53	6/12/2018	3					3.2	3.6	3825	
LOT 53	6/12/2018	28					6.2	6.8	6259	6218
LOT 53	6/12/2018	28					5.9	6.4	6115	6235
LOT 53	6/12/2018	90					19.4	21.3	7458	
LOT 54	6/12/2018	3	82	72		5.4	3.0	3.3	3577	
LOY 54	6/12/2018	3					3.1	3.4	3698	
LOT 54	6/12/2018	28					5.7	6.3	5463	5225
LOT 54	6/12/2018	28					5.7	6.3	5588	5651
LOT 54	6/12/2018	90					18.0	19.8	7424	
LOT 55	6/13/2018	3	80	68	145.4	5.3	3.1	3.4	3738	5608
LOT 55	6/13/2018	3					2.9	3.2	3615	5596
LOT 55	6/13/2018	28					5.4	6.0	5526	
LOT 55	6/13/2018	28					5.3	5.8	5849	
LOT 55	6/13/2018	90					15.1	16.6	7324	
LOT 56	6/13/2018	3	84	78	144.6	5.6	2.8	3.0	3350	5432
LOT 56	6/13/2018	3							3693	5522
LOT 56	6/13/2018	28					5.3	5.9	5308	
LOT 56	6/13/2018	28					5.0	5.5	5221	
LOT 56	6/13/2018	90					13.9	15.3	6614	
LOT 57	6/13/2018	3	84	78	143.8	5.5	3.1	3.4	3757	6106
LOT 57	6/13/2018	3					3.1	3.4	3823	5526
LOT 57	6/13/2018	3					6.0	6.6	5876	
LOT 57	6/13/2018	3					6.3	7.0	5604	
LOT 57	6/13/2018	90					20.5	22.6	7053	
LOT 58	6/13/2018	3	84	82	144.3	5.5	2.8	3.1	3352	5923
LOT 58	6/13/2018	3					2.8	3.1	3406	6073
LOT 58	6/13/2018	28					5.8	6.4	5845	
LOT 58	6/13/2018	28					5.7	6.3	5937	
LOT 58	6/13/2018	90					16.7	18.4	7112	
LOT 59	6/13/2018	3	84	80	143.8	6.0	3.2	3.5	3644	5252
LOT 59	6/13/2018	3					3.1	3.4	3472	5613
LOT 59	6/13/2018	3					6.1	6.7	5512	

LOT 59	6/13/2018	3					6.2	6.9	5296	
LOT 59	6/13/2018	90					19.4	21.3	7041	
LOT 60	6/13/2018	3	86	84	145.9	3.8	2.9	3.2	3827	5893
LOT60	6/13/2018	3					3.0	3.3	3968	5989
LOT 60	6/13/2018	28					5.7	6.3	6028	
LOT 60	6/13/2018	28					6.0	6.6	5862	
LOT 60	6/13/2018	90					18.2	20.0	7993	
LOT 61	6/14/2018	4	81	71	143.5	5.5	3.1	3.5	4071	
LOT 61	6/14/2018	4					3.4	3.7	4214	
LOT 61	6/14/2018	28					5.9	6.5	5627	5569
LOT 61	6/14/2018	28					5.9	6.5	5599	5368
LOT 61	6/14/2018	90					16.9	18.6	7056	
LOT 62	6/14/2018	4	84	73	144.0	4.7	2.7	3.0	3803	
LOT62	6/14/2018	4					2.7	3.0	3866	
LOT 62	6/14/2018	28					5.4	5.9	5731	5562
LOT 62	6/14/2018	28					5.4	6.0	5560	5227
LOT 62	6/14/2018	90					15.0	16.5	7169	
LOT 63	6/14/2018	4	86	82	146.1	5.6	3.4	3.8	4060	
LOT 63	6/14/2018	4					3.4	3.8	4195	
LOT 63	6/14/2018	28					6.9	7.6	5742	5371
LOT 63	6/14/2018	28					6.8	7.4	5825	6049
LOT 63	6/14/2018	90					18.7	20.6	7510	
LOT 64	6/14/2018	4	88	86	145.2	6.0	3.6	4.0	4425	
LOT 64	6/14/2018	4					3.5	3.9	4436	
LOT 64	6/14/2018	28					7.6	8.4	5970	5653
LOT 64	6/14/2018	28					7.1	7.8	6282	5551
LOT 64	6/14/2018	90					20.1	22.1	7242	
LOT 65	6/14/2018	4	88	86	148.1	3.6	3.3	3.6	4489	
LOT 65	6/14/2018	4					3.4	3.7	4500	
LOT 65	6/14/2018	28					7.5	8.3	6520	6429
LOT 65	6/14/2018	28					7.5	8.2	6419	6094
LOT 65	6/14/2018	90					23.5	25.8	7788	
LOT 66	6/15/2018	4	80	64	143.0	5.5	2.9	3.2	3884	
LOT 66	6/15/2018	4					3.0	3.2	3939	
LOT 66	6/15/2018	28					5.6	6.2	5629	5984
LOT 66	6/15/2018	28					5.9	6.5	5707	6018
LOT 66	6/15/2018	94					14.9	16.3	6811	
LOT 67	6/15/2018	4	86	78	144.1	4.4	3.1	3.4	3737	
LOT 67	6/15/2018	4					3.1	3.4	3646	
LOT 67	6/15/2018	28					7.1	7.8	5764	5490
LOT 67	6/15/2018	28					7.1	7.8	5853	5468
LOT 67	6/15/2018	94					20.6	22.6	7279	
LOT 68	6/19/2018	3	86	78		4.5	2.8	3.1	3991	
LOT 68	6/19/2018	3					3.0	3.2	3903	
LOT 68	6/19/2018	28					6.6	7.3	6074	5456
LOT 68	6/19/2018	28					6.5	7.2	6176	5775
LOT 68	6/19/2018	90					16.2	17.9	7263	
LOT 70	6/19/2018	3	83	90		4.5	3.1	3.4	3790	
LOT 70	6/19/2018	3					3.1	3.4	3993	
LOT 70	6/19/2018	28					7.0	7.7	6113	5586
LOT 70	6/19/2018	28					6.5	7.1	6002	5588
LOT 70	6/19/2018	90					18.8	20.7	7381	
LOT 72	6/22/2018	3	86	79		5.8	2.9	3.2	3351	
LOT 72	6/22/2018	3					2.9	3.1	3560	
LOT 72	6/22/2018	28					6.6	7.3	5500	5167
LOT 72	6/22/2018	28					5.8	6.4	5262	5075
LOT 72	6/22/2018	90					17.7	19.5	6400	
LOT 73	6/23/2018	3	86	72		7.2	2.8	3.1	2966	
LOT 73	6/23/2018	3					2.8	3.1	3081	

LOT 73	6/23/2018	31					5.8	6.4	4880	4586
LOT 73	6/23/2018	31					5.8	6.4	4997	4579
LOT 73	6/23/2018	90					15.4	16.9	5596	
LOT 74	6/26/2018	3	84	70	143.6	6.0	2.9	3.2	3473	
LOT 74	6/26/2018	3					2.7	3.0	3395	
LOT 74	6/26/2018	28					5.9	6.5	5194	5239
LOT 74	6/26/2018	28					5.9	6.5	5435	5180
LOT 74	6/26/2018	90					17.5	19.3	6583	
LOT 75 TTF	6/27/2018	2	86	70	145.1	4.8	2.7	3.0	3352	
LOT 75 TTF	6/27/2018	2					2.6	2.8	3333	
LOT 75 TTF	6/27/2018	2					2.7	2.9	3455	
LOT 75 TTF	6/27/2018	28					6.1	6.7	5712	5464
LOT 75 TTF	6/27/2018	28					6.4	7.0	5892	5817
LOT 75 TTF	6/27/2018	89					17.5	19.3	7041	
LOT 76 State 28D	6/27/2018	28	89			5.1		0.0		4936/5093
LOT 77	6/28/2018	2	86	76	143.7	6.4	2.5	2.8	2883	
LOT 77	6/28/2018	2					2.5	2.8	2796	
LOT 77	6/28/2018	28					5.8	6.4	5241	5152
LOT 77	6/28/2018	28					6.1	6.7	5295	5161
LOT 77	6/28/2018	89					16.5	18.1	6552	
LOT 78	7/2/2018	3	88	76	145.2	5.5	2.8	3.0	3377	
LOT 78	7/2/2018	3					2.9	3.1	3148	
LOT 78	7/2/2018	28					6.2	6.8	5933	5517
LOT 78	7/2/2018	28					5.8	6.4	5789	5373
LOT 78	7/2/2018	91					17.9	19.7	6488	
LOT 79	7/2/2018	3	92	88	141.2	7.2	2.6	2.8	2797	
LOT79	7/2/2018	3					2.6	2.9	2819	
LOT 79	7/2/2018	3						0.0	3082	
LOT 79	7/2/2018	28					5.3	5.8	4729	4523
LOT 79	7/2/2018	28					5.2	5.7	5255	5007
LOT 79	7/2/2018	91					15.9	17.5	6379	
LOT 80	7/3/2018	3	88	72	142.5	6.2	2.7	2.9	3148	
LOT 80	7/3/2018	3					2.5	2.7	3062	
LOT 80	7/3/2018	28					5.8	6.3	4983	4967
LOT 80	7/3/2018	28					5.6	6.1	5110	5374
LOT 80	7/3/2018	90					16.9	18.6	6553	
LOT 81	7/6/2018	3	88	73	144.8	4.6	3.4	3.7	2961	
LOT 81	7/6/2018	3					3.2	3.5	3426	
LOT 81	7/6/2018	31					7.0	7.7	5753	5573
LOT 81	7/6/2018	31					7.0	7.7	5754	5320
LOT 81	7/6/2018	31						0.0		
LOT 82	7/6/2018	3	92	88	142.2	6.2	3.2	3.5	3167	
LOT 82	7/6/2018	3					3.4	3.8	3303	
LOT 82	7/6/2018	31					6.9	7.6	4975	4809
LOT 82	7/6/2018	31					7.1	7.8	5188	4829
LOT 82	7/6/2018	31						0.0		
LOT 83	7/10/2018	2	83	61	141.4	6.8	2.5	2.7	3013	
LOT 83	7/10/2018	2					2.6	2.9	2811	
LOT 83	7/10/2018	2					2.6	2.8	2842	
LOT 83	7/10/2018	28					6.0	6.6	4766	4756
LOT 83	7/10/2018	28					5.9	6.5	4690	5129
LOT 83	7/10/2018	90					16.2	17.8	6144	
LOT 85	7/13/2018	3	86	75	140.8	7.2	2.8	3.1	2867	
LOT 85	7/13/2018	3					2.8	3.0	2793	
LOT 85	7/13/2018	28					6.0	6.6	4535	4344
LOT 85	7/13/2018	28					6.1	6.7	4618	4282
LOT 85	7/13/2018	91					18.4	20.2	5833	
LOT 87	7/13/2018	3	88	81	142.2	6.0	3.1	3.4	3319	

LOT 87	7/13/2018	3					3.0	3.3	3129	
LOT 87	7/13/2018	28					6.8	7.5	5373	4776
LOT 87	7/13/2018	28					6.2	6.8	5469	4912
LOT 87	7/13/2018	91					19.0	20.9	6438	
LOT 88	7/17/2018	3	86	72	143.3	5.6	3.2	3.5	3974	
LOT 88	7/17/2018	3					3.3	3.6	3946	
LOT 88	7/17/2018	28					6.6	7.3	5851	5703
LOT 88	7/17/2018	28					6.2	6.9	5893	5226
LOT 88	7/17/2018	90					19.4	21.3	7722	
LOT 90	7/17/2018	6	88	78	144.2	4.7	3.4	3.7	4708	
LOT 90	7/17/2018	6					3.4	3.7	5097	
LOT 90	7/17/2018	28					6.4	7.0	6202	6226
LOT 90	7/17/2018	28					6.3	6.9	6198	6323
LOT 90	7/17/2018	90					20.1	22.1	7660	
LOT 91	7/19/2018	4	84	70	146.7	4.4	3.6	4.0	4818	
LOT 91	7/19/2018	4					3.4	3.7	4652	
LOT 91	7/19/2018	28					7.1	7.8	6452	6047
LOT 91	7/19/2018	28					6.0	6.6	6692	6159
LOT 91	7/19/2018	91					19.0	20.9	8391	
LOT 92	7/19/2018	4	84	71	145.0	5.0	3.1	3.4	4197	
LOT 92	7/19/2018	4					3.1	3.4	4053	
LOT 92	7/19/2018	28					6.0	6.6	6105	5508
LOT 92	7/19/2018	28					6.1	6.7	6120	5572
LOT 92	7/19/2018	91					17.5	19.3	7592	
LOT 93	7/19/2018	4	86	73	144.2	5.7	3.1	3.4	4209	
LOT 93	7/19/2018	4					3.1	3.4	4209	
LOT 93	7/19/2018	28					6.1	6.7	5434	5687
LOT 93	7/19/2018	28					6.1	6.7	5658	5612
LOT 93	7/19/2018	91					16.3	17.9	6916	
LOT 94	7/19/2018	4	88	82	145.2	5.2	3.6	4.0	4540	
LOT 94	7/19/2018	4					3.5	3.9	4597	
LOT 94	7/19/2018	28					6.6	7.2	6391	5417
LOT 94	7/19/2018	28					6.9	7.6	6371	5330
LOT 94	7/19/2018	91					19.4	21.4	8140	
LOT 95	7/19/2018	4	88	82	144.2	5.6	3.3	3.6	3895	
LOT 95	7/19/2018	4					3.4	3.7	4049	
LOT 95	7/19/2018	28					7.0	7.7	5918	5269
LOT 95	7/19/2018	28					7.1	7.8	6095	5182
LOT 95	7/19/2018	91					24.4	26.9	7203	
LOT 96	7/19/2018	4	90	86	145.5	5.4	3.4	3.7	4349	
LOT 96	7/19/2018	4					3.5	3.9	4215	
LOT 96	7/19/2018	28					6.7	7.4	6136	5586
LOT 96	7/19/2018	28					6.7	7.3	6055	5425
LOT 96	7/19/2018	91					19.2	21.1	7631	
LOT 97	7/19/2018	4	90	87		8.5	3.3	3.6	3000	
LOT 97	7/19/2018	4					3.2	3.5	3194	
LOT 97	7/19/2018	28					6.3	6.9	4089	4553
LOT 97	7/19/2018	28					6.2	6.8	4728	4529
LOT 97	7/19/2018	91					16.5	18.1	5837	
LOT 98	7/20/2018	3	86	72	143.6	5.5			3806	
LOT 98	7/20/2018	3							3726	
LOT 98	7/20/2018	32					7.2	7.9	6091	6104
LOT 98	7/20/2018	32					7.2	7.9	6226	6030
LOT 98	7/20/2018	90					17.9	19.7	7330	
LOT 99	7/20/2018	3	90	73		5.6			3586	
LOT 99	7/20/2018	3							3585	
LOT 99	7/20/2018	32					7.0	7.7	5607	5395
LOT 99	7/20/2018	32					7.0	7.6	5901	5417
LOT 99	7/20/2018	90					19.1	21.0	6896	

LOT 100	7/20/2018	3	90	78	147.8	3.7			4056	
LOT 100	7/20/2018	3							4260	
LOT 100	7/20/2018	32					8.8	9.7	6932	6197
LOT 100	7/20/2018	32					8.7	9.5	6541	6112
LOT 100	7/20/2018	90					25.2	27.7	8367	
LOT 101 TTF	7/25/2018	2	86	71	141.4	6.0	2.5	2.8	2692	
LOT 101 TTF	7/25/2018	2					2.5	2.8	2788	
LOT 101 TTF	7/25/2018	2					2.5	2.8	2646	
LOT 101	7/25/2018	28					6.6	7.2	5220	5470
LOT 101	7/25/2018	28					6.5	7.1	5212	5534
LOT 101	7/25/2018	91					21.6	23.8	5920	
LOT 102	7/26/2018	4	83	70			3.0	3.3	3092	
LOT 102	7/26/2018	4			140.6	6.5	2.9	3.2	3393	
LOT 102	7/26/2018	28					6.5	7.1	5134	4640
LOT 102	7/26/2018	28					6.3	7.0	4601	4443
LOT 102	7/26/2018	90					20.0	22.0	5920	
LOT 103	7/26/2018	4	88	72	142.6	5.8	3.1	3.4	3340	
LOT 103	7/26/2018	4					3.0	3.3	3517	
LOT 103	7/26/2018	28					6.3	7.0	5002	4998
LOT 103	7/26/2018	28					6.5	7.1	5275	4965
LOT 103	7/26/2018	90					19.2	21.1	6204	
LOT 104	7/27/2018	3	86	72	143.0	5.7			3692	
LOT 104	7/27/2018	3							3478	
LOT 104	7/27/2018	28					7.2	7.9	5634	5215
LOT 104	7/27/2018	28					6.8	7.5	4979	5463
LOT 104	7/27/2018	90					21.7	23.9	6630	
LOT 105	7/27/2018	3	90	78	144.1	5.9			3877	
LOT 105	7/27/2018	3							3853	
LOT 105	7/27/2018	28					7.3	8.0	5322	5411
LOT 105	7/27/2018	28					7.3	8.0	5401	5478
LOT 105	7/27/2018	90					20.3	22.3	6603	
LOT 106	7/27/2018	3	90	86	143.7	5.5			3336	
LOT 106	7/27/2018	3							3385	
LOT 106	7/27/2018	28					7.5	8.2	5048	5468
LOT 106	7/27/2018	28					7.4	8.2	5381	5219
LOT 106	7/27/2018	90					24.2	26.6	6677	
LOT 107	8/2/2018	4	86	73	142.0	6.8	3.1	3.4	3744	
LOT 107	8/2/2018	4					3.1	3.4	3755	
LOT 107	8/2/2018	28					5.9	6.5	5533	
LOT 107	8/2/2018	28					5.9	6.5	5459	
LOT 107	8/2/2018	90					16.9	18.6	6534	
LOT 108	8/7/2018	3	84	68	143.0	6.0	2.8	3.1	3740	
LOT 108	8/7/2018	3					2.9	3.2	3185	
LOT 108	8/7/2018	29					5.6	6.2	5557	
LOT 108	8/7/2018	29					5.9	6.5	5963	
LOT 108	8/7/2018	90					18.7	20.6	6953	
LOT 109	8/8/2018	5	84	70	145.3	4.7	2.8	3.1	4193	
LOT 109	8/8/2018	5					2.9	3.2	4212	
LOT 109	8/8/2018	28					5.8	6.4	5708	
LOT 109	8/8/2018	28					5.9	6.5	5913	
LOT 109	8/8/2018	90					14.8	16.3	6550	
LOT 110	8/8/2018	2	88	76	143.8	5.4	2.2	2.4	2515	
LOT 110	8/8/2018	5					2.3	2.5	3532	
LOT 110	8/8/2018	28					5.8	6.4	4825	
LOT 110	8/8/2018	28					5.8	6.4	5525	
LOT 110	8/8/2018	90					12.7	14.0	6187	
LOT 111	8/9/2018	4	90	78	143.2	6.0			3618	
LOT 111	8/9/2018	4							3598	
LOT 111	8/9/2018	28					6.4	7.1	4966	

LOT 111	8/9/2018	28					6.7	7.3	5006	
LOT 111	8/9/2018	91					18.6	20.4	6209	
LOT 112	8/9/2018	4	90	86	142.9	5.2			4075	
LOT 112	8/9/2018	4							3912	
LOT 112	8/9/2018	28					7.5	8.3	5609	
LOT 112	8/9/2018	28					7.4	8.1	5573	
LOT 112	8/9/2018	91					23.8	26.2	7007	
LOT 113	8/10/2018	3	86	72		4.3			3627	
LOT 113	8/10/2018	3							3700	
LOT 113	8/10/2018	28					7.0	7.7	5638	
LOT 113	8/10/2018	28					7.1	7.8	5598	
LOT 113	8/10/2018	90					18.3	20.1	6585	
LOT 114	8/10/2018	3	90	81	143.2	5.5			3747	
LOT 114	8/10/2018	3							3508	
LOT 114	8/10/2018	28					7.1	7.8	5898	
LOT 114	8/10/2018	28					6.9	7.6	5646	
LOT 114	8/10/2018	90					20.9	22.9	6542	
LOT 115	8/10/2018	3	90	84	144.7	4.4			3775	
LOT 115	8/10/2018	3							3709	
LOT 115	8/10/2018	28					7.2	7.9	5690	
LOT 115	8/10/2018	28					7.4	8.1	6011	
LOT 115	8/10/2018	90					20.8	22.9	7398	
LOT 116	8/10/2018	3	92	87	144.1	5.0			3178	
LOT 116	8/10/2018	3							3121	
LOT 116	8/10/2018	28					7.2	7.9	5600	
LOT 116	8/10/2018	28					7.3	8.0	5778	
LOT 116	8/10/2018	90					24.8	27.3	7262	
LOT 117	8/13/2018	3	86	72	142.9	5.0	2.6	2.8	2813	
LOT 117	8/13/2018	3					2.8	3.0	3737	
LOT 117	8/13/2018	28					7.7	8.5	6272	
LOT 117	8/13/2018	28					7.7	8.5	6272	
LOT 117	8/13/2018	91					25.0	27.5	7498	
LOT 119	8/13/2018	3	90	74	141.9	6.0	2.6	2.9	3383	
LOT 119	8/13/2018	3					2.6	2.9	3347	
LOT 119	8/13/2018	28					7.1	7.8	5123	
LOT 119	8/13/2018	28					6.9	7.6	5441	
LOT 119	8/13/2018	91					33.4	36.7	6732	
LOT 120	8/13/2018	3	86	76	145.4	4.4	2.9	3.2	3696	
LOT 120	8/13/2018	3					2.9	3.2	3736	
LOT 120	8/13/2018	28					7.9	8.7	6226	
LOT 120	8/13/2018	28					7.9	8.7	6588	
LOT 120	8/13/2018	91					24.4	26.8	7341	
LOT 121	8/13/2018	3	89	83	144.7	4.8	2.7	3.0	3569	
LOT 121	8/13/2018	3					2.7	2.9	3724	
LOT 121	8/13/2018	28					7.3	8.0	6580	
LOT 121	8/13/2018	28							6305	
LOT 121	8/13/2018	91					22.2	24.4	7796	
LOT 122	8/14/2018	3	86	69	144.4	5.5	3.4	3.7	4169	
LOT 122	8/14/2018	3					3.2	3.5	4164	
LOT 122	8/14/2018	28					7.5	8.3	6482	
LOT 122	8/14/2018	28					7.5	8.3	6304	
LOT 122	8/14/2018	90					21.3	23.4	7582	
LOT 123	8/14/2018	3	90	75	145.0	4.9	3.2	3.5	3830	
LOT 123	8/14/2018	3					3.3	3.6	3914	
LOT 123	8/14/2018	28					7.6	8.4	5802	
LOT 123	8/14/2018	28					7.5	8.3	6127	
LOT 123	8/14/2018	90					23.9	26.3	7692	
LOT 124	8/15/2018	5	86	72	143.0	5.9	3.4	3.7	4006	
LOT 124	8/15/2018	5					3.4	3.8	4066	

LOT 124	8/15/2018	28					7.1	7.8	5887	4535
LOT 124	8/15/2018	28					6.5	7.2	5652	5508
LOT 124	8/15/2018	90					19.3	21.2	7049	
LOT 125	8/15/2018	5	88	82	142.6	5.5	3.4	3.7	4205	
LOT 125	8/15/2018	5					3.2	3.5	3998	
LOT 125	8/15/2018	28					7.0	7.7	6050	4963
LOT 125	8/15/2018	28							6001	5105
LOT 125	8/15/2018	90					21.7	23.9	7003	
LOT 126	8/16/2018	4	89	77	143.8	5.5	3.1	3.4	3709	
LOT 126	8/16/2018	4					3.1	3.4	3808	
LOT 126	8/16/2018	28					6.8	7.5	6017	5530
LOT 126	8/16/2018	28					6.9	7.6	5851	4952
LOT 126	8/16/2018	91					22.0	24.2	7252	
LOT 127	8/16/2018	4	90	84	144.9	5.3	3.4	3.7	4009	
LOT 127	8/16/2018	4					3.2	3.5	3780	
LOT 127	8/16/2018	28					7.5	8.2	6280	5114
LOT 127	8/16/2018	28					7.4	8.1	6556	5716
LOT 127	8/16/2018	91					25.4	27.9	7343	
LOT 128	8/16/2018	4	90	86	144.8	5.1	3.3	3.6	3991	
LOT 128	8/16/2018	4					3.1	3.5	4038	
LOT 128	8/16/2018	28					6.6	7.2	5738	5365
LOT 128	8/16/2018	28					6.4	7.0	6273	5410
LOT 128	8/16/2018	91					19.1	21.0	7164	
LOT 129	8/16/2018	4	90	87	144.1	5.1	2.9	3.2	3716	
LOT 129	8/16/2018	4					2.9	3.2	3775	
LOT 129	8/16/2018	28					6.8	7.4	5886	5318
LOT 129	8/16/2018	28					6.4	7.1	5623	4985
LOT 129	8/16/2018	91					20.1	22.1	7513	
LOT 130	8/16/2018	4	91	88	146.1	3.8	2.8	3.1	3818	
LOT 130	8/16/2018	4					3.0	3.3	4118	
LOT 130	8/16/2018	28					7.1	7.8	6528	5125
LOT 130	8/16/2018	28					6.8	7.4	6567	5800
LOT 130	8/16/2018	91					24.3	26.7	8637	
LOT 131	8/16/2018	4	90	90	145.6	3.7	2.8	3.0	3804	
LOT 131	8/16/2018	4					2.8	3.0	4046	
LOT 131	8/16/2018	28					6.6	7.2	6079	5556
LOT 131	8/16/2018	28					6.7	7.4	5820	4907
LOT 131	8/16/2018	91					20.3	22.3	7046	
LOT 132	8/20/2018	3	86	75	144.3	4.9	2.9	3.2	3718	
LOT 132	8/20/2018	3					2.9	3.2	3736	
LOT 132	8/20/2018	91					20.8	22.9	7609	5173
LOT 132	8/20/2018	91								5334
LOT 132	8/20/2018	91								
LOT 133	8/21/2018	3	86	73	143.4	5.6	2.9	3.2	3615	
LOT 133	8/21/2018	3					3.0	3.3	3709	
LOT 133	8/21/2018	28					7.6	8.4	6287	5521
LOT 133	8/21/2018	28					7.3	8.0	6358	5864
LOT 133	8/21/2018	90					23.9	26.3	7504	
LOT 134	8/21/2018	3	88	80	141.8	6	2.7	2.9	3314	
LOT 134	8/21/2018	3					2.7	2.9	3382	
LOT 134	8/21/2018	28					6.6	7.3	5793	4792
LOT 134	8/21/2018	28					6.2	6.8	5894	5300
LOT 134	8/21/2018	90					17.1	18.8	6925	
LOT 135	8/21/2018	6	88	81	141.5	6	3.2	3.5	3416	
LOT 135	8/21/2018	6					3.1	3.4	3404	
LOT 135	8/21/2018	28					5.9	6.4	5119	4840
LOT 135	8/21/2018	28					5.9	6.5	5043	4219
LOT 135	8/21/2018	90					17.2	18.9	6252	
LOT 136	8/27/2018	3	86	75	142.4	6	2.3	2.5	3299	

LOT 136	8/27/2018	3					2.4	2.6	3077	
LOT 136	8/27/2018	3					2.4	2.6	3021	
LOT 136	8/27/2018	28					6.2	6.8	5180	4814
LOT 136	8/27/2018	28					6.1	6.7	5523	5343
LOT 136	8/27/2018	91					20.9	23.0	7035	
LOT 138	8/27/2018	3	90	88	140.6	6.4	2.4	2.6	2971	
LOT 138	8/27/2018	3					2.3	2.5	2773	
LOT 138	8/27/2018	28					5.1	5.6	5523	4872
LOT 138	8/27/2018	28					5.1	5.6	5072	4824
LOT 138	8/27/2018	91					15.1	16.6	6252	
LOT 139	8/28/2018	3	88	68		6.5	2.5	2.7	3036	
LOT 139	8/28/2018	3					2.4	2.7	2826	
LOT 139	8/28/2018	28					5.3	5.8	4883	4623
LOT 139	8/28/2018	28					5.0	5.5	5007	4541
LOT 139	8/28/2018	90					15.6	17.1	6557	
LOT 140	8/28/2018	7	90	84	143.9	5.3	2.8	3.1	3888	
LOT 140	8/28/2018	7					2.9	3.2	3868	
LOT 140	8/28/2018	28					5.6	6.1	5424	5089
LOT 140	8/28/2018	28					5.9	6.4	5348	4954
LOT 140	8/28/2018	90					17.1	18.8	7021	
LOT 141	8/29/2018	6	87	72	143.4	4.8	2.8	3.0	3848	
LOT 141	8/29/2018	6					2.8	3.0	4039	
LOT 141	8/29/2018	29					5.9	6.5	5608	5348
LOT 141	8/29/2018	29					6.0	6.6	6022	5432
LOT 141	8/29/2018	90					18.6	20.5	4809	
LOT 142	8/29/2018	6	88	75	145.0	4.5	3.3	3.6	4971	
LOT 142	8/29/2018	6					3.1	3.4	4636	
LOT 142	8/29/2018	29					6.4	7.0	5967	5348
LOT 142	8/29/2018	29					6.6	7.3	6714	5432
LOT 142	8/29/2018	29								
LOT 143	8/29/2018	6	90	86	144.5	5	3.2	3.6	4401	
LOT 143	8/29/2018	6					3.1	3.4	4499	
LOT 143	8/29/2018	29					6.2	6.9	6174	5198
LOT 143	8/29/2018	29					6.2	6.8	6450	5472
LOT 143	8/29/2018	90					19.4	21.4	7284	
LOT 144	8/30/2018	5	86	71	144.6	5	3.2	3.5	4083	
LOT 144	8/30/2018	5					3.0	3.3	4152	
LOT 144	8/30/2018	28					5.8	6.4	5865	5660
LOT 144	8/30/2018	28					5.7	6.3	5679	5214
LOT 144	8/30/2018	90					16.7	18.4	6944	
LOT 145	8/30/2018	5	90	80		4.5	2.6	2.8	4144	
LOT 145	8/30/2018	5					2.9	3.2	3999	
LOT 145	8/30/2018	28					5.4	6.0	6353	4878
LOT 145	8/30/2018	28					5.5	6.1	5957	5578
LOT 145	8/30/2018	90					17.5	19.2	7145	
LOT 146	9/4/2018	3	88	70	143.8	5.4	2.7	3.0	3175	
LOT 146	9/4/2018	3					2.8	3.1	3095	
LOT 146	9/4/2018	28					5.8	6.4	5656	5289
LOT 146	9/4/2018	28					5.6	6.2	5792	5260
LOT 146	9/4/2018	90					16.2	17.8	6188	
LOT 148	9/7/2018	3	86	68		6			2750	
LOT 148	9/7/2018	3					3.3	3.6	2941	
LOT 148	9/7/2018	31					6.6	7.2	4984	4810
LOT 148	9/7/2018	31					6.6	7.2	4915	4752
LOT 148	9/7/2018	91					18.2	20.0	5977	
LOT 149	9/7/2018	3	88	77	143.2	4.9	2.6	2.9	3373	
LOT 149	9/7/2018	3					2.5	2.7	3637	
LOT 149	9/7/2018	26					5.4	6.0	5521	5602
LOT 149	9/7/2018	26					5.3	5.8	5599	5551

LOT 149	9/7/2018	89					16.7	18.3	7231	
LOT 150	9/10/2018	3	82	66	139.8	7.6	2.6	2.9	2762	
LOT 150	9/10/2018	3					2.3	2.5	2960	
LOT 150	9/10/2018	28					5.9	6.5	4462	4798
LOT 150	9/10/2018	28					6.0	6.6	4226	4387
LOT 150	9/10/2018	92					18.8	20.6	5932	
LOT 151	9/10/2018	3	85	69	144.5	4	2.3	2.5	3443	
LOT 151	9/10/2018	3					2.2	2.4	3621	
LOT 151	9/10/2018	28					5.8	6.4	5993	
LOT 151	9/10/2018	28					5.5	6.0	6453	5525
LOT 151	9/10/2018	92					21.1	23.2	7800	5794
LOT 152	9/11/2018	6	86	70	142.8	5	3.1	3.4	4238	
LOT 152	9/11/2018	6					2.9	3.2	4387	
LOT 152	9/11/2018	28					6.5	7.2	6172	5253
LOT 152	9/11/2018	28					6.6	7.2	6546	5231
LOT 152	9/11/2018	91					23.7	26.1	8326	
LOT 153	9/11/2018	6	88	73	141.7	5.5	2.9	3.2	4225	
LOT 153	9/11/2018	6					2.8	3.1	4140	
LOT 153	9/11/2018	28					6.5	7.2	5695	5223
LOT 153	9/11/2018	28					6.7	7.4	6120	5204
LOT 153	9/11/2018	91					23.8	26.2	7317	
LOT 158 TTF	10/22/2018	2	76	61	141.8	6.4			3083	
LOT 158 TTF	10/22/2018	2							2620	
LOT 158 TTF	10/22/2018	2							3086	
LOT 158 TTF	10/22/2018	28					5.9	6.4	6122	5383
LOT 158 TTF	10/22/2018	28					5.8	6.4	6140	5463
LOT 159	10/24/2018	6	66	54	141.5	6.4	3.2	3.5	3766	
LOT 159	10/24/2018	6					3.2	3.5	3708	
LOT 159	10/24/2018	28					6.9	7.6	5568	5021
LOT 159	10/24/2018	28					7.0	7.7	5609	4813
LOT 160	10/29/2018	4	66	43		4.4			5051	
LOT 160	10/29/2018	4							4195	
LOT 160	10/29/2018	28					5.9	6.4	6264	5390
LOT 160	10/29/2018	28					6.2	6.8	6087	5962
LOT 160	10/29/2018	28								
LOT 162	10/30/2018	3	72	64	142.4	5.5	2.3	2.5	3527	
LOT 162	10/30/2018	3					2.3	2.5	3843	
LOT 162	10/30/2018	28					6.4	7.0	6647	5874
LOT 162	10/30/2018	28					6.3	6.9	6301	5890
LOT 162	10/30/2018	28								
LOT 166	11/7/2018	5	65	72	142.7		2.6	2.8	3496	
LOT 166	11/7/2018	5					2.8	3.1	3537	
LOT 166	11/7/2018	28					6.3	7.0	5641	4379
LOT 166	11/7/2018	28					6.3	6.9	5614	5285
LOT 167	11/7/2018	5	66	79	143.4	5.3	3.1	3.4	4278	
LOT 167	11/7/2018	5					3.0	3.3	4165	
LOT 167	11/7/2018	28					6.3	7.0	6455	5412
LOT 167	11/7/2018	28					6.5	7.2	6389	5555
LOT 168 TTF	1/28/2019	2	60	50	145.3	5			3461	
LOT 168	1/28/2019	2							3337	
LOT 168	1/28/2019	2							3310	
LOT 168	1/28/2019	28					6.7	7.4	7716	6153
LOT 168	1/28/2019	28					6.8	7.5	7611	5959
LOT 169	1/28/2019	3	60	53	145.5	4			3856	
LOT 169	1/28/2019	3							4028	
LOT 169	1/28/2019	28					6.4	7.1	7453	6529
LOT 169	1/28/2019	28					6.6	7.2	7564	5900
LOT 170	2/1/2019	3	52	47	144.3	5.5				
LOT 170	2/1/2019	3								

LOT 170	2/1/2019	28					6.5	7.2	5681	5921
LOT 170	2/1/2019	28					6.7	7.3	5838	6043
LOT 171	2/8/2019	3	70	63	142.6	6.4			3011	
LOT 171	2/8/2019	3							2904	
LOT 171	2/8/2019	31					6.3	6.9	5836	5727
LOT 171	2/8/2019	31					6.1	6.7	5657	5595
LOT 171	2/8/2019	56								
LOT 176 TTF	3/29/2019	3	65	42	146.9	4			3939	
LOT 176 TTF	3/29/2019	3							3971	
LOT 176 TTF	3/29/2019	3							3887	
LOT 176	3/29/2019	28					5.3	5.8	6090	5660
LOT 176	3/29/2019	28					5.5	6.0	6256	5985
LOT 177	3/30/2019	3	75	62	143.2	5.4	2.4	2.6	3427	
LOT 177	3/30/2019	3					2.4	2.6	3507	
LOT 177	3/30/2019	27							5628	5952
LOT 177	3/30/2019	27							6020	5615
LOT 177	3/30/2019	55					9.9	10.9	6771	
LOT 178	4/2/2019	3	60	37	138.7	7.4	5.3	5.8	3763	
LOT 178	4/2/2019	3					5.2	5.8	3826	
LOT 178	4/2/2019	28					7.1	7.8	5789	4833
LOT 178	4/2/2019	28					7.2	7.9	5908	5500
LOT 179	4/4/2019	4	70	72	141.2	6.8	2.7	2.9	3826	
LOT 179	4/4/2019	4					2.7	3.0	3990	
LOT 179	4/4/2019	28					5.7	6.3	5932	5510
LOT 179	4/4/2019	28					6.0	6.6	6144	5464
LOT 179	4/4/2019	56					9.9	10.9	7193	
LOT 180	4/17/2019	2	67	57	145.0	5.2	2.5	2.7	3016	
LOT 180	4/17/2019	2					2.4	2.6	2963	
LOT 180	4/17/2019	2					2.1	2.3	3041	
LOT 180	4/17/2019	28					7.3	8.0	5578	5805
LOT 180	4/17/2019	28					7.1	7.8	6130	5724
LOT 180	4/17/2019	56					12.8	14.1	184370	
LOT 184	4/18/2019	4	68	67	144.6	5.2	2.8	3.1	3983	
LOT 184	4/18/2019	4					2.9	3.2	3733	
LOT 184	4/18/2019	28					6.7	7.4	5946	5471
LOT 184	4/18/2019	28					7.0	7.6	6041	5490
LOT 184	4/18/2019	56					13.7	15.1	6888	
LOT 185	4/18/2019	4	72	71	144.9	4.5	2.6	2.8	4261	
LOT185	4/18/2019	4					2.6	2.8	4050	
LOT 185	4/18/2019	28					7.2	7.9	6622	5223
LOT 185	4/18/2019	28					7.4	8.2	6575	5427
LOT 185	4/18/2019	56					15.1	16.6	7696	
LOT 186	4/18/2019	4	71	77	144.3	4.8	2.7	3.0	3939	
LOT 186	4/18/2019	4					2.7	3.0	3613	
LOT 186	4/18/2019	28					6.4	7.1	6077	5891
LOT 186	4/18/2019	28					6.4	7.1	6611	5578
LOT 186	4/18/2019	56					13.1	14.4	7659	
LOT 187	4/22/2019	3	60	47	143.0	5	2.5	2.8	3502	
LOT187	4/22/2019	3					2.4	2.7	3669	
LOT 187	4/22/2019	28					6.6	7.2	6331	5525
LOT 187	4/22/2019	28					6.7	7.4	6479	5870
LOT 187	4/22/2019	56					12.3	13.5	6838	
LOT 188	4/22/2019	3	66	60	145.6	4	2.5	2.8	3918	
LOT 188	4/22/2019	3					2.6	2.8	3860	
LOT 188	4/22/2019	28					6.3	7.0	6787	6433
LOT 188	4/22/2019	28					6.4	7.0	6678	5908
LOT 188	4/22/2019	56					12.6	13.8	7910	
LOT 189	4/25/2019	4	67	57		6.4	3.1	3.4	4632	
LOT 189	4/25/2019	4					3.1	3.4	4738	

LOT 189	4/25/2019	28					7.2	7.9	7165	4728
LOT 189	4/25/2019	28					7.2	8.0	7256	5095
LOT 189	4/25/2019	56					14.0	15.4	7802	
LOT 191	4/25/2019	4	72	69	140.2	6.5	2.9	3.2	4108	
LOT 191	4/25/2019	4					2.9	3.2	4080	
LOT 191	4/25/2019	28					7.1	7.8	6163	5885
LOT 191	4/25/2019	28					6.8	7.5	6163	5282
LOT 191	4/25/2019	56					14.1	15.5	6885	
LOT 192	4/25/2019	4	73	74	144.6	4.6	2.6	2.9	4051	
LOT 192	4/25/2019	4					2.7	3.0	4140	
LOT 192	4/25/2019	28					5.9	6.5	6382	5960
LOT 192	4/25/2019	28					6.0	6.5	6742	5506
LOT 192	4/25/2019	56					12.8	14.1	7404	
LOT 194	4/29/2019	4	67	60	143.2	5.1	2.4	2.6	3190	
LOT 194	4/29/2019	4					2.4	2.6	3224	
LOT 194	4/29/2019	29					5.3	5.9	5486	4892
LOT 194	4/29/2019	29					5.5	6.1	5832	4821
LOT 194	4/29/2019	56					10.5	11.5	6457	
LOT 195 TTF	4/29/2019	2	67	60	144.0	5.1	2.3	2.6	3484	
LOT 195 TTF	4/29/2019	2					2.4	2.6	3514	
LOT 195 TTF	4/29/2019	2					2.4	2.6	3685	
LOT 195	4/29/2019	29					6.6	7.3	6790	6275
LOT 195	4/29/2019	29					6.4	7.1	7154	6560
LOT 195	4/29/2019	56					12.1	13.3	7929	
LOT 195	4/29/2019	56					12.1	13.3	7929	
LOT 196	4/29/2019	4	70	61	142.4	5.8	2.4	2.6	3889	
LOT 196	4/29/2019	4					2.3	2.6	3847	
LOT 196	4/29/2019	29					5.6	6.2	6544	6608
LOT 196	4/29/2019	29					5.6	6.2	6532	6374
LOT 196	4/29/2019	56					10.5	11.5	7180	
LOT 197	4/30/2019	7	78	76	140.2	6.6	2.7	3.0	3761	
LOT 197	4/30/2019	7					2.7	3.0	3923	
LOT 197	4/30/2019	28					4.9	5.4	5920	5474
LOT 197	4/30/2019	28					5.1	5.6	5787	5950
LOT 197	4/30/2019	56					9.8	10.8	6471	
LOT 200	5/1/2019	28					5.8	6.4	5827	5675
LOT 200	5/1/2019	56					10.5	11.6	6814	
LOT 201	5/2/2019	4	77	68	143.0	4.2	2.8	3.1	3410	
LOT 201	5/2/2019	4					2.8	3.1	3719	
LOT 201	5/2/2019	28					6.2	6.8	5481	5156
LOT 201	5/2/2019	28					6.0	6.6	5231	4821
LOT 201	5/2/2019	56					11.5	12.6	6832	
LOT 202	5/2/2019	4	79	79	142.8	4.7	2.3	2.5	3519	
LOT 202	5/2/2019	4					2.3	2.6	3542	
LOT 202	5/2/2019	28					5.3	5.8	MISREAD	4733
LOT 202	5/2/2019	28					4.9	5.4	5423	4949
LOT 202	5/2/2019	56					10.1	11.1	6455	
LOT 203	5/6/2019	3	78	63	144.3	5.5	2.5	2.7	3321	
LOT 203	5/6/2019	3					2.5	2.8	3459	
LOT 203	5/6/2019	28					5.7	6.3	5748	4525
LOT 203	5/6/2019	28					6.0	6.6	5949	5394
LOT 203	5/6/2019	56					12.6	13.9	7114	
LOT 204	5/6/2019	3	84	75	141.7	6.2	2.5	2.8	3077	
LOT 204	5/6/2019	3					2.5	2.7	3094	
LOT 204	5/6/2019	28					5.7	6.3	5629	5242
LOT 204	5/6/2019	28					5.6	6.2	5464	5307
LOT 204	5/6/2019	56					12.0	13.2	6375	
LOT 205	5/8/2019	5	84	74		4.9	2.8	3.1	4174	
LOT 205	5/8/2019	5					2.8	3.1	3969	

LOT 205	5/8/2019	28					6.8	7.5	6160	5967
LOT 205	5/8/2019	28					7.2	7.9	6535	5967
LOT 205	5/8/2019	56					12.8	14.0	6863	
LOT207 TTF	5/23/2019	5	80	72	145.4	4.5	2.9	3.2	4702	
LOT207 TTF	5/23/2019	5					2.8	3.1	4477	
LOT207 TTF	5/23/2019	5					2.8	3.1	4621	
LOT207	5/23/2019	28					6.7	7.4	6787	
LOT207	5/23/2019	28					6.5	7.1	6762	
LOT207	5/23/2019	56					13.0	14.2	7203	
LOT 208	5/24/2019	4	82	70	145.4	4.5	3.0	3.3	4095	
LOT 208	5/24/2019	4					3.0	3.3	4155	
LOT 208	5/24/2019	28					7.4	8.2	6143	5781
LOT 208	5/24/2019	28					7.1	7.8	6244	5666
LOT 208	5/24/2019	56					14.8	16.3	6973	
LOT 209	5/24/2019	4	88	82	144.1	4.9	3.0	3.3	3992	
LOT209	5/24/2019	4					2.9	3.2	4059	
LOT 209	5/24/2019	28					7.4	8.2	6093	5957
LOT 209	5/24/2019	28					7.8	8.6	6412	5773
LOT 209	5/24/2019	56					15.7	17.3	6999	
LOT 210	5/24/2019	4	88	90		5.4	3.0	3.2	3546	
LOT 210	5/24/2019	4					2.9	3.2	3543	
LOT 210	5/24/2019	28					7.0	7.7	5729	5560
LOT 210	5/24/2019	28					6.9	7.6	5722	4930
LOT 210	5/24/2019	56					13.3	14.7	6181	
LOT 211	5/28/2019	3	80	65		4.9	2.7	3.0	4067	
LOT 211	5/28/2019	3					2.7	3.0	4024	
LOT 211	5/28/2019	28					7.3	8.0	6514	5636
LOT 211	5/28/2019	28					7.1	7.8	6374	5614
LOT 211	5/28/2019	56					15.4	16.9	7040	
LOT 212	5/28/2019	3	84	75		5.4	2.7	3.0	3755	
LOT 212	5/28/2019	3					2.7	3.0	3716	
LOT 212	5/28/2019	28					6.2	6.8	5989	5017
LOT 212	5/28/2019	28					5.9	6.5	5924	5702
LOT 212	5/28/2019	56					11.9	13.1	6752	
LOT 213	5/28/2019	3	88	88		6	2.6	2.9	3370	
LOT 213	5/28/2019	3					2.7	3.0	3084	
LOT 213	5/28/2019	28					6.4	7.0	4801	4946
LOT 213	5/28/2019	28					5.7	6.3	5326	4452
LOT 213	5/28/2019	56					11.6	12.8	5824	
LOT 214	5/28/2019	3	88	90		6.6	2.6	2.9	3494	
LOT 214	5/28/2019	3					2.7	3.0	3318	
LOT 214	5/28/2019	28					5.9	6.5	5488	4987
LOT 214	5/28/2019	28					5.9	6.5	5458	5083
LOT 214	5/28/2019	56					11.6	12.7	6538	
LOT 215	5/29/2019	5	82	66		4.4	2.9	3.2	4546	
LOT 215	5/29/2019	5					2.9	3.1	4322	
LOT 215	5/29/2019	28					6.8	7.5	5690	5604
LOT 215	5/29/2019	28					6.2	6.8	6229	5999
LOT 215	5/29/2019	56					11.1	12.3	7543	
LOT 216	5/29/2019	5	84	79		5.4	2.7	3.0	3559	
LOT 216	5/29/2019	5					2.6	2.9	3667	
LOT 216	5/29/2019	28					6.3	6.9	5203	4680
LOT 216	5/29/2019	28					6.0	6.6	5515	4731
LOT 216	5/29/2019	56					11.6	12.7	6493	
LOT 217	5/29/2019	5	88	87		4.8	3.0	3.3	4560	
LOT 217	5/29/2019	5					2.9	3.2	4661	
LOT 217	5/29/2019	28					6.8	7.4	5941	6018
LOT 217	5/29/2019	28					6.9	7.6	6488	5821
LOT 217	5/29/2019	56					13.1	14.5	7253	

LOT 218	5/29/2019	5	88	90		6.4	3.1	3.4	4527	
LOT 218	5/29/2019	5					3.2	3.5	4410	
LOT 218	5/29/2019	28					7.2	7.9	6371	4900
LOT 218	5/29/2019	28					6.7	7.3	6551	6000
LOT 218	5/29/2019	56					13.0	14.3	7604	
LOT 219	5/30/2019	4	81	66		3.6	2.4	2.7	4492	
LOT 219	5/30/2019	4					2.5	2.8	4486	
LOT 219	5/30/2019	28					6.6	7.2	6724	5844
LOT 219	5/30/2019	28					6.9	7.5	6644	6733
LOT 219	5/30/2019	56					14.1	15.5	7684	
LOT 220	5/30/2019	4	80	72		5.5	2.2	2.4	3341	
LOT 220	5/30/2019	4					2.1	2.4	3486	
LOT 220	5/30/2019	28					5.2	5.7	5300	5212
LOT 220	5/30/2019	28					5.4	5.9	5643	5257
LOT 220	5/30/2019	56					11.2	12.3	6581	
LOT 221	6/3/2019	3	82	68	146.3	5	2.9	3.2	4069	
LOT 221	6/3/2019	3					3.0	3.2	4134	
LOT 221	6/3/2019	28					7.5	8.2	6747	5690
LOT 221	6/3/2019	28					7.6	8.3	6869	5460
LOT 221	6/3/2019	56					14.0	15.4	7631	
LOT 222	6/3/2019	3	86	79	144.2	5.5	2.8	3.1	3434	
LOT 222	6/3/2019	3					2.6	2.8	3471	
LOT 222	6/3/2019	28					6.7	7.4	5642	5157
LOT 222	6/3/2019	28					6.4	7.0	5511	5312
LOT 222	6/3/2019	56					12.0	13.1	6183	
LOT 223	6/3/2019	3	84	80	145.0	5.3	2.5	2.8	3351	
LOT 223	6/3/2019	3					2.4	2.6	3472	
LOT 223	6/3/2019	28					6.2	6.8	5811	5375
LOT 223	6/3/2019	28					6.2	6.8	5420	4741
LOT 223	6/3/2019	56					11.8	13.0	6390	
LOT 224	6/4/2019	3	72	59	145.0	4.3	2.7	3.0	4223	
LOT 224	6/4/2019	3					2.7	3.0	3827	
LOT 224	6/4/2019	28					5.9	6.5	6527	6140
LOT 224	6/4/2019	28					6.1	6.7	6574	5622
LOT 224	6/4/2019	56					12.0	13.1	7207	
LOT 225 TTF	6/6/2019	4	80	73	140.2	6.8	2.5	2.7	3469	
LOT 225 TTF	6/6/2019	4					2.4	2.7	3374	
LOT 225 TTF	6/6/2019	4					2.5	2.7	3570	
LOT 225	6/6/2019	29					7.5	8.3	5421	5240
LOT 225	6/6/2019	29					6.2	6.8	5465	4765
LOT 225	6/6/2019	56					12.6	13.9	6271	
LOT 226	6/6/2019	4	86	78	140.3	6	2.6	2.9	3260	
LOT 226	6/6/2019	4					2.6	2.9	3429	
LOT 226	6/6/2019	29					5.7	6.3	5273	4910
LOT 226	6/6/2019	29					6.0	6.6	4877	4602
LOT 226	6/6/2019	56					12.7	14.0	5939	
LOT 227 TTF	6/11/2019	2	80	69		6.5	2.6	2.8	3022	
LOT 227 TTF	6/11/2019	2					2.8	3.0	2812	
LOT 227 TTF	6/11/2019	2					2.4	2.7	3008	
LOT 227	6/11/2019	28					6.7	7.4	5590	5029
LOT 227	6/11/2019	28					6.6	7.2	5706	5200
LOT 227	6/11/2019	56					11.7	12.9	6106	
LOT 228	6/11/2019	3	82	79	142.1	5.6	2.5	2.8	2718	
LOT 228	6/11/2019	3					2.6	2.8	2882	
LOT 228	6/11/2019	28					5.8	6.3	4658	4123
LOT 228	6/11/2019	28					5.6	6.2	4717	4590
LOT 228	6/11/2019	56					10.7	11.8	5444	
LOT 229	6/13/2019	4	84	71	141.2	6.2	2.8	3.0	3649	
LOT 229	6/13/2019	4					2.7	3.0	3457	

LOT 229	6/13/2019	28					6.3	7.0	5605	4852
LOT 229	6/13/2019	28					6.0	6.6	5420	5144
LOT 229	6/13/2019	56					11.0	12.1	6338	
LOT 231	6/13/2019	4	84	75	141.4	6.4	2.5	2.8	3081	
LOT 231	6/13/2019	4					2.6	2.9	3001	
LOT 231	6/13/2019	28					5.1	5.6	4673	4657
LOT 231	6/13/2019	28					5.2	5.7	4781	4755
LOT 231	6/13/2019	56					9.6	10.5	5437	
LOT 232	6/14/2019	3	78	61	143.8	4.7	2.6	2.8	3965	
LOT 232	6/14/2019	3					2.6	2.9	3925	
LOT 232	6/14/2019	28					6.9	7.6	5735	5909
LOT 232	6/14/2019	28					7.2	7.9	6285	5829
LOT 232	6/14/2019	56					13.0	14.3	7037	
LOT 233	6/18/2019	3	78	70	142.0	7	2.7	2.9	3026	
LOT 233	6/18/2019	3					2.5	2.7	2940	
LOT 233	6/18/2019	28					6.2	6.8	5235	4626
LOT 233	6/18/2019	28					6.2	6.8	5219	4396
LOT 233	6/18/2019	56					11.6	12.8	5786	
LOT 234	6/18/2019	3	79	84		4.6	2.3	2.5	3256	
LOT 234	6/18/2019	3					2.3	2.5	3219	
LOT 234	6/18/2019	28					5.3	5.8	5623	4892
LOT 234	6/18/2019	28					5.0	5.5	5463	5119
LOT 234	6/18/2019	56					10.7	11.8	6644	
LOT 235	6/20/2019	4	84	78	142.1	5	2.5	2.8	3907	
LOT 235	6/20/2019	4					2.4	2.7	4016	
LOT 235	6/20/2019	28					5.4	5.9	5714	5758
LOT 235	6/20/2019	28					5.4	5.9	5960	5573
LOT 235	6/20/2019	56					9.8	10.8	6432	
LOT 236	6/25/2019	3	84	70		4.3	2.3	2.5	3969	
LOT 236	6/25/2019	3					2.3	2.5	3948	
LOT 236	6/25/2019	28					5.3	5.8	6408	5664
LOT 236	6/25/2019	28					5.6	6.1	6630	5737
LOT 236	6/25/2019	56					10.9	12.0	7209	
LOT 238	6/25/2019	3	88	77	141.6	6	2.6	2.8	3622	
LOT 238	6/25/2019	3					2.6	2.8	3716	
LOT 238	6/25/2019	28					6.1	6.7	5614	5309
LOT 238	6/25/2019	28					6.2	6.9	5744	5129
LOT 238	6/25/2019	56					11.5	12.7	6440	
LOT 239	6/25/2019	3	88	81	144.6	3.7	2.3	2.5	4074	
LOT 239	6/25/2019	3					2.5	2.7	4057	
LOT 239	6/25/2019	28					5.8	6.4	6438	5329
LOT 239	6/25/2019	28					5.8	6.4	6764	5555
LOT 239	6/25/2019	56					11.2	12.3	7381	
LOT 240 TTF	6/25/2019	2	88	82	142.6	5	2.1	2.3	2591	
LOT 240 TTF	6/25/2019	2					2.2	2.4	2724	
LOT 240 TTF	6/25/2019	2					2.2	2.4	2770	
LOT 240	6/25/2019	28					5.2	5.7	5420	5266
LOT 240	6/25/2019	28					5.4	5.9	5661	5132
LOT 240	6/25/2019	56					11.1	12.2	6371)	
LOT 241 TTF	6/28/2019	1	80	67	142.1	5.3	1.8	2.0	2031	
LOT 241 TTF	6/28/2019	1					1.9	2.1	1929	
LOT 241 TTF	6/28/2019	3					2.3	2.6	3217	
LOT 241 TTF	6/28/2019	3					2.5	2.7	3022	
LOT 241 TTF	6/28/2019	7					2.8	3.1	3921	
LOT 241 TTF	6/28/2019	7					2.8	3.1	3973	
LOT 241 TTF	6/28/2019	14					3.4	3.7	4567	
LOT 241 TTF	6/28/2019	14					3.4	3.7	4465	
LOT 241 TTF	6/28/2019	28					5.9	6.4	5628	5306
LOT 241 TTF	6/28/2019	28					5.9	6.5	5635	5578

LOT 241 TTF	6/28/2019	56					12.2	13.4	6139	
LOT 242	6/28/2019	3	88	82	141.1	5.5	2.6	2.8	2865	
LOT 242	6/28/2019	3					2.6	2.8	2909	
LOT 242	6/28/2019	28					5.4	5.9	5247	4444
LOT 242	6/28/2019	28					5.4	5.9	5605	4664
LOT 242	6/28/2019	56					11.0	12.1	5953	
LOT 243	6/28/2019	3	90	88	143.8	4.5	2.4	2.7	2988	
LOT 243	6/28/2019	3					2.4	2.6	3352	
LOT 243	6/28/2019	28					5.3	5.9	5886	
LOT 243	6/28/2019	28					5.3	5.8	5573	
LOT 243	6/28/2019	56					11.1	12.2	6649	
LOT 244 TTF	7/9/2019	2	85	74	142.3	5	2.1	2.4	2368	
LOT 244 TTF	7/9/2019	2					2.2	2.4	2341	
LOT 244 TTF	7/9/2019	2					2.1	2.3	2465	
LOT 244	7/9/2019	28					4.9	5.3	5424	4442
LOT 244	7/9/2019	28					5.0	5.5	5127	4540
LOT 244	7/9/2019	56					8.8	9.7	6273	
LOT 245	7/10/2019	3	85	73	143.0	4.5	2.3	2.6	3129	
LOT 245	7/10/2019	3					2.4	2.7	3238	
LOT 245	7/10/2019	28					5.2	5.7	5469	
LOT 245	7/10/2019	28					5.1	5.6	5335	
LOT 245	7/10/2019	56					10.0	10.9	6258	
LOT 246	7/10/2019	3	90	80		6.6	2.7	2.9	2593	
LOT 246	7/10/2019	3					2.7	3.0	2466	
LOT 246	7/10/2019	28					4.8	5.3	4376	4441
LOT 246	7/10/2019	28					4.9	5.4	4510	4171
LOT 246	7/10/2019	56					9.5	10.5	5491	
LOT 247	7/15/2019	3	80	74	142.4	5	2.5	2.7	3795	
LOT 247	7/15/2019	3							3866	
LOT 247	7/15/2019	28					6.0	6.5	6136	
LOT 247	7/15/2019	28					5.8	6.3	6150	
LOT 247	7/15/2019	56					12.4	13.7	7456	
LOT 248	7/15/2019	3	83	84		6	2.5	2.8	3342	
LOT 248	7/15/2019	3					2.5	2.8	3316	
LOT 248	7/15/2019	28					5.2	5.7	5516	
LOT 248	7/15/2019	28					5.0	5.5	5127	
LOT 248	7/15/2019	56					9.9	10.8	6494	
LOT 249	7/15/2019	3	92	86		3.7	2.6	2.9	4079	
LOT 249	7/15/2019	3					2.5	2.8	3876	
LOT 249	7/15/2019	28					5.9	6.4	6451	
LOT 249	7/15/2019	28					6.0	6.6	6592	
LOT 249	7/15/2019	56					12.0	13.2	7721	
LOT 250	7/15/2019	3	90	90		5.4	2.7	2.9	3856	
LOT 250	7/15/2019	3					2.7	3.0	3738	
LOT 250	7/15/2019	28					5.8	6.4	6266	
LOT 250	7/15/2019	28					5.9	6.5	6069	
LOT 250	7/15/2019	56					11.0	12.1	7033	
LOT 251	7/16/2019	3	86	74	143.8	5	3.0	3.2	4519	
LOT 251	7/16/2019	3					3.0	3.3	4418	
LOT 251	7/16/2019	28					6.5	7.1	6812	
LOT 251	7/16/2019	28					6.4	7.0	6567	
LOT 251	7/16/2019	56					12.2	13.4	7879	
LOT 252	7/16/2019	3	88	77	142.0	5.6	2.7	3.0	3621	
LOT 252	7/16/2019	3					2.9	3.2	3771	
LOT 252	7/16/2019	28					5.6	6.1	5782	
LOT 252	7/16/2019	28					6.1	6.7	5864	
LOT 252	7/16/2019	56					11.5	12.6	6443	
LOT 253	7/16/2019	3	90	84	143.4	4.6	2.5	2.8	3424	
LOT 253	7/16/2019	3					2.6	2.8	3354	

LOT 253	7/16/2019	28					5.2	5.7	5510	
LOT 253	7/16/2019	28					5.5	6.1	5881	
LOT 253	7/16/2019	56					11.1	12.2	6863	
LOT 254	7/16/2019	3	92	88	144.2	5.6	2.4	2.6	3005	
LOT 254	7/16/2019	3					2.4	2.7	3188	
LOT 254	7/16/2019	28					5.4	5.9	5149	
LOT 254	7/16/2019	28					5.3	5.8	5253	
LOT 254	7/16/2019	56					9.7	10.7	6185	
LOT 255	7/18/2019	4	84	72	141.8	5.4	2.9	3.2	3864	
LOT 255	7/18/2019	4					2.9	3.2	3720	
LOT 255	7/18/2019	28					5.2	5.7	5617	
LOT 255	7/18/2019	28					5.4	5.9	5831	
LOT 255	7/18/2019	56					10.4	11.5	6506	
LOT 256	7/18/2019	4	86	80	144.0	5.1	2.8	3.0	3284	
LOT 256	7/18/2019	4					2.8	3.0	3295	
LOT 256	7/18/2019	28					4.9	5.3	5026	
LOT 256	7/18/2019	28					5.2	5.7	4831	
LOT 256	7/18/2019	56					8.8	9.7	5788	
LOT 257	7/18/2019	4	92	89		4.6	2.7	3.0	4082	
LOT 257	7/18/2019	4					2.6	2.8	4358	
LOT 257	7/18/2019	28					5.3	5.9	5474	
LOT 257	7/18/2019	28					5.4	5.9	6036	
LOT 257	7/18/2019	56					9.9	10.9	7149	
LOT 258 TTF	7/19/2019	3	88	73	140.2	5.7	3.0	3.3	3252	
LOT 258 TTF	7/19/2019	3							3258	
LOT 258 TTF	7/19/2019	3							3170	
LOT 258	7/19/2019	28					5.6	6.2	4943	
LOT 258	7/19/2019	28					5.7	6.3	5292	
LOT 258	7/19/2019	56					10.4	11.4	5890	
LOT 259	7/25/2019	4	80	64	144.8	4.6	2.8	3.1	4196	
LOT 259	7/25/2019	4					2.9	3.2	4155	
LOT 259	7/25/2019	28					6.2	6.8	6169	5581
LOT 259	7/25/2019	28					6.1	6.7	6036	5582
LOT 259	7/25/2019	56					10.5	11.6	6799	
LOT 260	7/25/2019	4	80	72	142.2	6.6	3.2	3.6	3820	
LOT 260	7/25/2019	4					3.3	3.7	3700	
LOT 260	7/25/2019	28					6.6	7.2	5524	4669
LOT 260	7/25/2019	28					6.1	6.7	5624	4921
LOT 260	7/25/2019	56					8.8	9.7	6128	
LOT 261	7/25/2019	4	88	82	143.0	5.3	2.6	2.8	3301	
LOT 261	7/25/2019	4					2.6	2.8	3171	
LOT 261	7/25/2019	28					5.3	5.9	5370	4831
LOT 261	7/25/2019	28					5.1	5.6	5063	4902
LOT 261	7/25/2019	56					9.2	10.1	6125	
LOT 262	7/25/2019	4	89	83	141.4	5.5	2.7	3.0	3894	
LOT 262	7/25/2019	4					2.8	3.1	3469	
LOT 262	7/25/2019	28					5.3	5.9	5527	4908
LOT 262	7/25/2019	28					5.1	5.7	5971	5263
LOT 262	7/25/2019	56					8.3	9.1	6228	
LOT 263	7/26/2019	56					12.1	13.3	6577	
LOT 263	7/26/2019	3	80	62	144.3	5	2.6	2.8	3765	
LOT 263	7/26/2019	3					2.6	2.9	3868	
LOT 263	7/26/2019	28					5.9	6.5	5827	5356
LOT 263	7/26/2019	28					5.8	6.4	5990	5196
LOT 264	7/26/2019	3	82	63	143.8	4.8	2.8	3.0	4007	
LOT 264	7/26/2019	3					2.7	2.9	3925	
LOT 264	7/26/2019	28					5.8	6.4	6287	5121
LOT 264	7/26/2019	28					6.0	6.6	6248	5247
LOT 264	7/26/2019	56					10.9	12.0	7106	

LOT 265	7/26/2019	3	86	78	141.8	5.9	2.6	2.8	3749	
LOT 265	7/26/2019	3					2.6	2.9	3600	
LOT 265	7/26/2019	28					5.4	6.0	6009	4933
LOT 265	7/26/2019	28					5.4	5.9	5870	5409
LOT 265	7/26/2019	56					10.5	11.6	6594	
LOT 266	7/26/2019	3	90	81	143.1	5.4	2.6	2.9	3314	
LOT 266	7/26/2019	3					2.6	2.9	3106	
LOT 266	7/26/2019	28					5.7	6.2	5641	5273
LOT 266	7/26/2019	28					5.7	6.3	5540	4535
LOT 266	7/26/2019	56					11.8	13.0	6722	
LOT 267	7/26/2019	3	92	84	140.2	5.9	2.5	2.7	2981	
LOT 267	7/26/2019	3					2.5	2.7	2981	
LOT 267	7/26/2019	28					4.8	5.3	5053	4112
LOT 267	7/26/2019	28					5.1	5.7	4937	4998
LOT 267	7/26/2019	56					9.8	10.8	5860	
LOT 268	7/29/2019	3	80	64	141.6	5.4	2.7	2.9	3795	
LOT 268	7/29/2019	3					2.7	3.0	3997	
LOT 268	7/29/2019	56					10.2	11.2	6842	
LOT 269 TTF	7/29/2019	3	84	73	142.4	6	2.3	2.5	3224	
LOT 269 TTF	7/29/2019	3					2.2	2.5	3293	
LOT 269 TTF	7/29/2019	3					2.3	2.5	3122	
LOT 269	7/29/2019	56					8.6	9.4	5661	
LOT 270	7/29/2019	3	88	84	143.0	5	2.6	2.8	3347	
LOT 270	7/29/2019	3					2.4	2.6	3531	
LOT 270	7/29/2019	56					9.2	10.1	6139	
LOT 271	7/29/2019	3	92	88	142.4	4.8	2.5	2.7	3344	
LOT 271	7/29/2019	3					2.6	2.8	3342	
LOT 271	7/29/2019	56					9.3	10.2	6454	
LOT 272	7/29/2019	3	92	88	141.8	5.4	2.2	2.4	3226	
LOT 272	7/29/2019	3					2.2	2.4	3308	
LOT 272	7/29/2019	56					8.4	9.2	6158	
LOT 273	8/1/2019	4	84	67	143.7	5	2.5	2.8	3668	
LOT 273	8/1/2019	4					2.4	2.6	3469	
LOT 273	8/1/2019	28					5.5	6.0	5353	5047
LOT 273	8/1/2019	28					5.4	6.0	5159	5351
LOT 273	8/1/2019	56					11.6	12.7	6083	
LOT 274	8/1/2019	4	88	72	143.9	5	2.6	2.8	3076	
LOT 274	8/1/2019	4					2.4	2.6	3222	
LOT 274	8/1/2019	28					5.0	5.5	5022	4456
LOT 274	8/1/2019	28					5.2	5.7	4873	4655
LOT 274	8/1/2019	56					10.7	11.8	5673	
LOT 275	8/1/2019	4	90	84	143.2	5.1	2.3	2.6	3465	
LOT 275	8/1/2019	4					2.3	2.5	3434	
LOT 275	8/1/2019	28					5.0	5.5	4886	4853
LOT 275	8/1/2019	28					5.2	5.8	5054	4893
LOT 275	8/1/2019	56					8.9	9.7	5926	
LOT 276	8/1/2019	4	88	82	140.8	6	2.2	2.4	2842	
LOT 276	8/1/2019	4					2.2	2.4	2932	
LOT 276	8/1/2019	28					4.7	5.2	4061	4801
LOT 276	8/1/2019	28					4.6	5.0	4035	4282
LOT 277	8/2/2019	3	80	70	143.8	4.8	2.4	2.6	3406	
LOT 277	8/2/2019	3					2.4	2.6	3476	
LOT 277	8/2/2019	28					5.6	6.1	5379	5265
LOT 277	8/2/2019	28					5.9	6.5	5635	5231
LOT 277	8/2/2019	56					11.9	13.1	6003	
LOT 278	8/2/2019	3	86	76	142.2	5.69	2.4	2.7	2947	
LOT 278	8/2/2019	3					2.5	2.7	3077	
LOT 278	8/2/2019	28					5.9	6.5	4618	4805
LOT 278	8/2/2019	28					6.3	6.9	5184	4894

LOT 278	8/2/2019	56					11.9	13.0	5556	
LOT 279	8/5/2019	3	80	68	143.4	4.8	2.4	2.7	3615	
LOT 279	8/5/2019	3					2.5	2.7	3860	
LOT 279	8/5/2019	29					6.2	6.9	5935	5278
LOT 279	8/5/2019	29					6.1	6.7	5875	5290
LOT 279	8/5/2019	56					12.2	13.4	6472	
LOT 280	8/5/2019	3	82	71	142.7	5.5	2.3	2.5	3269	
LOT 280	8/5/2019	3					2.4	2.6	3452	
LOT 280	8/5/2019	29					5.6	6.2	5265	5119
LOT 280	8/5/2019	29					5.6	6.2	5281	5064
LOT 280	8/5/2019	56					10.5	11.5	5837	
LOT 281	8/5/2019	3	83	74	144.0	4	2.4	2.7	3750	
LOT 281	8/5/2019	3					2.6	2.9	3710	
LOT 281	8/5/2019	29					6.9	7.6	6121	5606
LOT 281	8/5/2019	29					6.8	7.5	6267	5356
LOT 281	8/5/2019	56					11.1	12.2	6970	
LOT 282	8/5/2019	3	88	75	143.7	4.8	2.6	2.8	3642	
LOT 282	8/5/2019	3					2.7	2.9	3670	
LOT 282	8/5/2019	29					6.3	6.9	5841	5663
LOT 282	8/5/2019	29					6.1	6.7	6238	5382
LOT 282	8/5/2019	56					11.8	13.0	6427	
LOT 283	8/5/2019	3	88	81	143.5	5.4	2.5	2.7	3454	
LOT 283	8/5/2019	3					2.5	2.8	3301	
LOT 283	8/5/2019	29					5.6	6.2	5685	4954
LOT 283	8/5/2019	29					5.5	6.1	5570	4780
LOT 283	8/5/2019	56					9.9	10.8	6422	
LOT 284	8/6/2019	3	82	67	144.2	5.4	2.6	2.9	3601	
LOT 284	8/6/2019	3					2.8	3.1	3340	
LOT 284	8/6/2019	28					5.9	6.5	5553	5475
LOT 284	8/6/2019	28					6.1	6.7	5678	4909
LOT 284	8/6/2019	56					13.2	14.5	6618	
LOT 285	8/6/2019	3	88	75	143.5	5	2.4	2.6	3630	
LOT 285	8/6/2019	3					2.3	2.6	3580	
LOT 285	8/6/2019	28					4.7	5.2	5633	4719
LOT 285	8/6/2019	28					4.6	5.1	5386	4958
LOT 285	8/6/2019	56					10.3	11.3	6453	
LOT 286	8/6/2019	3	88	82	143.8	5.2	2.7	3.0	3602	
LOT 286	8/6/2019	3					2.6	2.8	3558	
LOT 286	8/6/2019	28					5.5	6.0	5915	5700
LOT 286	8/6/2019	28					5.4	5.9	5771	5150
LOT 286	8/6/2019	56					11.1	12.2	6658	
LOT 287	8/6/2019	3	90	86	144.3	4.2	2.6	2.8	3851	
LOT 287	8/6/2019	3					2.7	2.9	3973	
LOT 287	8/6/2019	28					5.7	6.3	6048	5049
LOT 287	8/6/2019	28					5.7	6.2	6169	5338
LOT 287	8/6/2019	56					11.1	12.2	6658	
LOT 288	8/7/2019	5	86	74	144.2	4.8	2.8	3.1	4454	
LOT 288	8/7/2019	5					2.7	2.9	4213	
LOT 288	8/7/2019	28					5.8	6.4	5795	5025
LOT 288	8/7/2019	28					6.0	6.6	6048	5632
LOT 288	8/7/2019	56					12.0	13.2	7258	
LOT 289	8/7/2019	5	86	78	146.2	3.7	2.8	3.1	4556	
LOT 289	8/7/2019	5					2.9	3.2	4716	
LOT 289	8/7/2019	28					6.7	7.3	6287	5864
LOT 289	8/7/2019	28					6.7	7.4	6445	6030
LOT 289	8/7/2019	56					14.4	15.8	7435	
LOT 290	8/7/2019	5	90	82	143.2	4.9	2.8	3.1	3958	
LOT 290	8/7/2019	5					2.8	3.0	3956	
LOT 290	8/7/2019	28					6.2	6.8	5562	5280

LOT 290	8/7/2019	28					6.2	6.8	5753	5088
LOT 290	8/7/2019	56					11.7	12.9	6746	
LOT 291	8/9/2019	3	88	85	142.8	5.5	2.8	3.0	3285	
LOT 291	8/9/2019	3					2.6	2.9	3235	
LOT 291	8/9/2019	28					6.8	7.5	5199	4593
LOT 291	8/9/2019	28					6.9	7.6	5333	5050
LOT 291	8/9/2019	56					13.7	15.1	5927	
LOT 292 TTF	8/9/2019	3	88	85	142.8	5.5	2.7	3.0	3180	
LOT 292 TTF	8/9/2019	3					2.6	2.8	3367	
LOT 292 TTF	8/9/2019	3					2.6	2.9	3076	
LOT 292	8/9/2019	28					6.6	7.3	5476	4709
LOT 292	8/9/2019	28					6.7	7.4	5067	5131
LOT 292	8/9/2019	56					14.6	16.1	6143	
LOT 293	8/12/2019	3	84	72	143.4	5	2.4	2.7	3196	
LOT293	8/12/2019	3					2.4	2.6		
LOT 293	8/12/2019	28					6.1	6.7	5388	4948
LOT 293	8/12/2019	28					5.5	6.0	5421	4934
LOT 293	8/12/2019	56					12.9	14.2	6422	
LOT 294	8/12/2019	3	90	84	141.2	5.7	2.5	2.7	3148	
LOT 294	8/12/2019	3					2.4	2.6	3370	
LOT 294	8/12/2019	28					5.6	6.2	5570	4735
LOT 294	8/12/2019	28					5.8	6.3	5889	5256
LOT 294	8/12/2019	56					12.7	14.0	6389	
LOT 295	8/12/2019	3	90	88	141.0	5.7	2.1	2.4	2939	
LOT 295	8/12/2019	3					2.2	2.4	2907	
LOT 295	8/12/2019	28					5.1	5.6	5271	4409
LOT 295	8/12/2019	28					5.2	5.7	5076	4722
LOT 295	8/12/2019	56					10.6	11.6	5870	
LOT 296	8/14/2019	8	88	82	143.8	5.4	2.9	3.1	3966	
LOT 296	8/14/2019	8					3.1	3.4	4044	
LOT 296	8/14/2019	28					5.7	6.2	5209	4963
LOT 296	8/14/2019	28					5.5	6.0	5195	4857
LOT 297	8/22/2019	4	86	79	142.5	5.2	3.2	3.5	4196	
LOT 297	8/22/2019	4							4210	
LOT 297	8/22/2019	28					6.7	7.4	6325	5848
LOT 297	8/22/2019	28				…	6.7	7.4	6205	5629
LOT 298	8/16/2019	3	84	75	141.6	5			3428	
LOT 298	8/16/2019	3							3462	
LOT 298	8/16/2019	28					7.2	7.9	5974	
LOT 298	8/16/2019	28					6.5	7.2	5774	
LOT 299	8/20/2019	3	84	75	143.0	5.4	2.3	2.6	3022	
LOT 299	8/20/2019	3					2.3	2.5	2927	
LOT 299	8/20/2019	3					2.3	2.6	3032	
LOT 299	8/20/2019	28					5.9	6.5	5174	5459
LOT 299	8/20/2019	28					5.6	6.1	5638	5810
LOT 300	8/20/2019	3	86	83	141.6	5.4	2.2	2.4	2975	
LOT 300	8/20/2019	3					2.3	2.5	2810	
LOT 300	8/20/2019	28					5.1	5.6	5126	
LOT 300	8/20/2019	28					5.2	5.7	5250	
LOT 301	8/27/2019	3	78	66	142.3	5.5	2.4	2.6	3271	
LOT 301	8/27/2019	3					2.4	2.7	3261	
LOT 301	8/27/2019	28					5.8	6.4	5715	5389
LOT 301	8/27/2019	28					5.9	6.5	5367	5391
LOT 302 TTF	9/3/2019	6	84	81	142.7	5.2	3.2	3.5	3318	
LOT 302TTF	9/3/2019	6					3.0	3.3	3843	
LOT 302 TTF	9/3/2019	6					3.0	3.3	3806	
LOT 302TTF	9/3/2019	28					6.9	7.6	5516	
LOT 302TTF	9/3/2019	28					6.6	7.2	5453	
LOT 303	8/27/2019	3	80	68	142.2	5.3	2.6	2.8	3322	

LOT 303	8/27/2019	3					2.5	2.8	3313	
LOT 303	8/27/2019	28					6.7	7.3	5750	5579
LOT 303	8/27/2019	28					6.8	7.5	5880	5462
LOT 304	8/28/2019	6	80	70	142.3	5.8	3.1	3.4	4122	
LOT 304	8/28/2019	6					3.2	3.5	4078	
LOT 304	8/28/2019	28					7.1	7.8	5644	5447
LOT 304	8/28/2019	28					6.9	7.6	5679	5164
LOT 305	8/28/2019	6	82	71	140.9	5.8	2.8	3.1	3709	
LOT 305	8/28/2019	6					2.9	3.1	3780	
LOT 305	8/28/2019	28					6.5	7.1	5679	4605
LOT 305	8/28/2019	28					6.4	7.1	5740	4442
LOT 306	8/28/2019	6	85	75	143.3	4.6	2.8	3.0	4172	
LOT 306	8/28/2019	6					2.8	3.0	4226	
LOT 306	8/28/2019	28					6.4	7.1	6011	5487
LOT 306	8/28/2019	28					6.4	7.0	6115	5002
LOT 307	8/28/2019	6	90	79	143.7	5.2	2.8	3.1	3897	
LOT307	8/28/2019	6					2.8	3.1	3826	
LOT 307	8/28/2019	28					7.0	7.7	5720	4520
LOT 307	8/28/2019	28					7.1	7.8	5815	5018
LOT 308	8/28/2019	6	90	79	144.1	4.6	2.7	3.0	4122	
LOT 308	8/28/2019	6					2.6	2.9	4068	
LOT 308	8/28/2019	28					6.7	7.4	5820	5077
LOT 308	8/28/2019	28					6.3	6.9	6059	5300
LOT 309	8/28/2019	6	90	86	144.6	4.1	2.8	3.1	4464	
LOT 309	8/28/2019	6					3.0	3.3	4577	
LOT 309	8/28/2019	28					7.1	7.8	6226	5508
LOT 309	8/28/2019	28					7.2	7.9	6599	5858
LOT 310	8/29/2019	5	80		143.5	5.4	2.7	3.0	3867	
LOT 310	8/29/2019	5					2.8	3.0	3952	
LOT 310	8/29/2019	28					6.8	7.5	5822	5156
LOT 310	8/29/2019	28					7.3	8.0	5777	4929
LOT 311	8/29/2019	5	85	74	144.3	4.4	2.8	3.0	4113	
LOT 311	8/29/2019	5					2.7	3.0	4445	
LOT 311	8/29/2019	28					7.1	7.9	5709	5255
LOT 311	8/29/2019	28					6.4	7.0	6100	5656
LOT 312	8/29/2019	5	84	77	143.7	5.5	2.9	3.1	3725	
LOT 312	8/29/2019	5					2.8	3.1	3789	
LOT 312	8/29/2019	28					6.2	6.8	5527	4630
LOT 312	8/29/2019	28					6.4	7.1		5236
LOT 313	8/29/2019	5	89	87	144.2	4.9	2.7	2.9	4187	
LOT 313	8/29/2019	5					2.6	2.9	3914	
LOT 313	8/29/2019	28					7.0	7.7	6091	5547
LOT 313	8/29/2019	28					7.4	8.1	6196	5285
LOT 314	8/29/2019	5					2.8	3.0	3699	
LOT 314	8/29/2019	5					2.7	2.9	3855	
LOT 314	8/29/2019	28					6.3	6.9	5865	4649
LOT 314	8/29/2019	28					6.1	6.7	6004	5150
LOT 315	9/5/2019	4	83	73	143.9	5.5	2.6	2.9	3597	
LOT 315	9/5/2019	4					2.5	2.7	3636	
LOT 315	9/5/2019	28					6.3	6.9	5535	
LOT 315	9/5/2019	28					6.5	7.1	5974	
LOT 316	9/6/2019	3	88	82	145.3	5.1	3.1	3.4	3326	
LOT 316	9/6/2019	3					3.1	3.4	3346	
LOT 316	9/6/2019	28					6.9	7.6	5437	
LOT 316	9/6/2019	28					6.8	7.5	5656	
LOT 317	9/5/2019	4	85	77	145.2	5	2.5	2.8	3540	
LOT 317	9/5/2019	4					2.6	2.9	3753	
LOT 317	9/5/2019	28					6.7	7.3	5604	
LOT 317	9/5/2019	28					6.1	6.8	5991	

LOT 318	9/9/2019	3	82	73	143.9	4.6	2.5	2.7	2780	
LOT 318	9/9/2019	3					2.3	2.5	2901	
LOT 318	9/9/2019	28					5.9	6.5	4787	
LOT 318	9/9/2019	28					6.2	6.8	4816	
LOT 319	9/6/2019	3	86	88	144.5	5.2	2.6	2.9	3128	
LOT 319	9/6/2019	3					2.5	2.8	3141	
LOT 319	9/6/2019	28					6.2	6.8	5218	
LOT 319	9/6/2019	28					6.2	6.8	5415	
LOT 320	9/11/2019	5	84	73	145.4	4.8	3.2	3.6	4126	
LOT 320	9/11/2019	5					3.2	3.5	3892	
LOT 322	9/11/2019	5	88	81	144.7	4.6	2.5	2.8	3324	
LOT 322	9/11/2019	5					2.4	2.7	3023	
LOT 323	9/23/2019	3	84	88	144.1	5.8	2.5	2.8	3090	
LOT323	9/23/2019	3					2.4	2.6	3298	
LOT 325	9/13/2019	10	82	75	144.6	4.3	3.2	3.5	4437	
LOT 325	9/13/2019	10					3.2	3.6	4574	
LOT 326	9/13/2019	10	84	73	144.4	5.8	3.3	3.6	4155	
LOT 326	9/13/2019	10					3.3	3.6	3949	
LOT 327	9/14/2019	9	82	73	142.9	6.4	3.0	3.3	3784	
LOT 327	9/14/2019	9					2.8	3.1	3744	
LOT 328	9/19/2019	4	76	55	142.8	5.8	2.7	2.9	3619	
LOT 328	9/19/2019	4					2.8	3.0	3642	
LOT 331	9/19/2019	4	80	70		6.2	2.7	2.9	3251	
LOT 331	9/19/2019	4					2.4	2.7	3212	
LOT 332	9/19/2019	4	82	73	142.8	5.2				
LOT 333	9/19/2019	4					2.2	2.4	3539	
LOT 333	9/19/2019	4					2.2	2.4	3333	
LOT 334	9/20/2019	3	77	51	142.8	5.6			3742	
LOT 334	9/20/2019	3							3745	
LOT 335	9/20/2019	3	82	73	144.2	5.5			3354	
LOT 335	9/20/2019	3							3307	
LOT 336	9/20/2019	3	82	70	144.1	5.8			3035	
LOT 336	9/20/2019	3							3068	
LOT 337	9/23/2019	3	78	61	142.7	5.5	2.8	3.0	3573	
LOT 337	9/23/2019	3					2.6	2.8	3568	
LOT 338	9/23/2019	3	84	83	143.4	4.6	2.3	2.5	2925	
LOT 338	9/23/2019	3					2.4	2.6	3102	
LOT 339		0								
LOT 339		0								
LOT 339		0								
LOT 339		0								
LOT 339		0								
LOT 340	9/25/2019	3	80	70	145.3	4.7	2.6	2.8	3160	
LOT 340	9/25/2019	3					2.4	2.7	3257	
LOT 341	9/26/2019	4	82	72	141.1	5.7	2.4	2.7	3500	
LOT 341	9/26/2019	4					2.5	2.7	3600	
LOT 342	9/26/2019	4	84		143.6	4.4	2.4	2.6	2956	
LOT 342	9/26/2019	4					2.3	2.5	3326	
LOT 343	9/28/2019	6	82	73	142.0	5.2	3.0	3.3	3992	
LOT 343	9/28/2019	6					3.0	3.2	4213	
LOT 344	9/30/2019	3	82	72	141.6	5.7	2.6	2.8	2947	
LOT 344	9/30/2019	3					2.7	2.9	2966	
LOT 345	10/3/2019	4	84	79	140.2	5.6	3.0	3.3	3361	
LOT 345	10/3/2019	4					2.9	3.2	3508	
LOT 346	10/3/2019	4					2.9	3.2	3435	
LOT 346	10/3/2019	4					3.0	3.3	3333	
LOT 348	10/7/2019	3	76	71	141.1	5.8				

Appendix D: Data used for Analysis of Resistivity Test Results for Mixture 496HPNS

LOT #	Sample Made	Test Age	Concrete Temp	Ambient Temp	Unit Weight	Air	Surface Resistivity	Resistivity adj. x1.1	Compressive Strength	NCDOT 28-day Comp Str
		(days)	(°F)	(°F)	(pcf)	(%)	k-ohm*cm	k-ohm*cm	(psi)	PSI
LOT32	5/7/2018	2	80	79	142.4	6.0	2.6	2.8	3287	
LOT32	5/7/2018	2	80	79	142.4	6.0	2.8	3.0	3036	
LOT32	5/7/2018	2	80	79	142.4	6.0	2.6	2.8	3107	
LOT32	5/7/2018	28	80	79	142.4	6.0	7.6	8.3	5935	5962
LOT32	5/7/2018	28	80	79	142.4	6.0	7.4	8.1	6113	5522
LOT32	5/7/2018	91	80	79	142.4	6.0	20.9	23.0	7223	
496HP TTF	5/31/2018	2	84	80	143.2	6.0	2.5	2.7	2818	
496HP TTF	5/31/2018	2	84	80	143.2	6.0	2.6	2.9	2757	
496HP TTF	5/31/2018	2	84	80	143.2	6.0	2.5	2.7	3030	
496HP TTF	5/31/2018	28	84	80	143.2	6.0	5.8	6.3	5723	
496HP TTF	5/31/2018	28	84	80	143.2	6.0	5.8	6.4	5599	
496HP TTF	5/31/2018	28	84	80	143.2	6.0				
496HP TTF	6/11/2018	2	85	72	143.8	4.5	2.1	2.3	3420	
496HP TTF	6/11/2018	2	85	72	143.8	4.5	2.3	2.5	3292	
496HP TTF	6/11/2018	2	85	72	143.8	4.5	2.3	2.6	3345	
496HP TTF	6/11/2018	2	85	72	143.8	4.5				
496HP TTF	6/11/2018	2	85	72	143.8	4.5				
496HP TTF	6/11/2018	2	85	72	143.8	4.5				
LOT 69	6/18/2018	3					2.7	3.0	3232	
LOT 69	6/18/2018	3	90	85	143.2	6.2	2.8	3.1	3617	
LOT 69	6/18/2018	29					5.7	6.2	5807	
LOT 69	6/18/2018	29					5.6	6.2	6014	
LOT 69	6/18/2018	91					14.6	16.1	7396	
LOT 84 TTF	7/9/2018	2	82	71	138.6	6.0	2.5	2.7	3198	
LOT 84 TTF	7/9/2018	2					2.3	2.5	3033	
LOT 84 TTF	7/9/2018	2					2.3	2.5	3170	
LOT 84 TTF	7/9/2018	28					5.1	5.6	5736	4932
LOT 84 TTF	7/9/2018	28					5.1	5.6	5762	5297
LOT 84 TTF	7/9/2018	91					14.0	15.4	7306	
LOT 86	7/12/2018	4	92	88		6.5	2.6	2.8	3458	
LOT 86	7/12/2018	4					2.7	2.9	3275	
LOT 86	7/12/2018	28					4.8	5.3	5338	4450
LOT 86	7/12/2018	28					4.7	5.2	5077	4844
LOT 86	7/12/2018	92					15.3	16.8	6519	
LOT 89	7/16/2018	3	86	73	147.8	5.5	2.9	3.2	3189	
LOT 89	7/16/2018	3					2.7	3.0	3435	
LOT 89	7/16/2018	28					5.3	5.8	5704	5421
LOT 89	7/16/2018	28					5.5	6.1	5498	5240
LOT 89	7/16/2018	91					16.1	17.7	6785	
LOT 137	8/23/2018	3	86	73	143.8	6.5	2.3	2.5	3050	
LOT 137	8/23/2018	3					2.3	2.5	3124	
LOT 137	8/23/2018	3					2.4	2.6	3272	
LOT 137	8/23/2018	28					5.4	5.9	5289	4794
LOT 137	8/23/2018	28					5.3	5.8	5165	5102
LOT 137	8/23/2018	90					19.0	20.8	6744	
LOT 147	9/4/2018	3	88	82		5	2.6	2.9	3467	
LOT 147	9/4/2018	3					2.9	3.2	3570	
LOT 147	9/4/2018	28					5.6	6.1	6038	5891
LOT 147	9/4/2018	28					5.6	6.2	6580	5671

LOT 147	9/4/2018	90					15.4	17.0	7881	
LOT 154	9/11/2018	6	91	84		5.8	2.4	2.7	4275	
LOT 154	9/11/2018	6					2.4	2.6	4172	
LOT 154	9/11/2018	28					5.3	5.8	6147	4660
LOT 154	9/11/2018	28					5.0	5.4	6153	4777
LOT 154	9/11/2018	91					18.4	20.2	7769	
LOT 155	9/24/2018	3	80	69	141.2	6.2		0.0	2998	
LOT 155	9/24/2018	28					6.6	7.2	5233	5004
LOT 155	9/24/2018	28					6.5	7.2	5690	4960
LOT 155	9/24/2018	87					17.9	19.7	6837	
LOT 155	9/24/2018	87							2987	
LOT 161	10/23/2018	2	70	63	142.1	6.2	2.3	2.5	2826	
LOT 161	10/23/2018	2					2.2	2.5	2787	
LOT 161	10/23/2018	2					2.2	2.4	2857	
LOT 161	10/23/2018	28					5.4	6.0	5180	4777
LOT 161	10/23/2018	28					5.4	5.9	5027	5459
LOT 163	10/29/2018	3	70	62	143.1	5.2	2.2	2.4	3399	
LOT 163	10/29/2018	3					2.1	2.3	3351	
LOT 163	10/29/2018	28					4.8	5.3	5973	5817
LOT 163	10/29/2018	28					4.6	5.0	6132	5658
LOT 163	10/29/2018	28								
LOT 165	11/1/2018	3	66	61	139.4	7	2.8	3.1	3182	
LOT 165	11/1/2018	3					2.6	2.9	2984	
LOT 165	11/1/2018	28					5.4	5.9	4972	5006
LOT 165	11/1/2018	28					5.5	6.0	4896	5030
LOT 165	11/1/2018	28								
LOT 172	2/5/2019	2	58	43	144.2	5.5			2712	
LOT 172	2/5/2019	2							2704	
LOT 172	2/5/2019	2							2719	
LOT 172	2/5/2019	28					4.2	4.6	5108	5254
LOT 172	2/5/2019	28					4.3	4.7	5674	5002
LOT 174 TTF	2/8/2019	3	74	62	144.2	5			2756	
LOT 174	2/8/2019	3							2759	
LOT 174	2/8/2019	3							2882	
LOT 174	2/8/2019	3					4.9	5.4	6097	5351
LOT 174	2/8/2019	3					4.9	5.4	6120	5770
LOT 181	4/8/2019	2	70	71	142.8	5			3665	
LOT 181	4/8/2019	2							4060	
LOT 181	4/8/2019	2							3709	
LOT 181	4/8/2019	28					5.8	6.3	6547	5893
LOT 181	4/8/2019	28					5.9	6.5	6913	5832
LOT 181	4/8/2019	56					10.1	11.1	7956	
LOT 190	4/23/2019	2	72	72	139.9	6.5	2.2	2.4	2610	
LOT 190	4/23/2019	2					2.2	2.4	2707	
LOT 190	4/23/2019	2					2.2	2.4	2621	
LOT 190	4/23/2019	28					5.0	5.5	5501	6951
LOT 190	4/23/2019	28					5.2	5.7	5830	6451
LOT 190	4/23/2019	56					9.6	10.5	5933	
LOT 230 TTF	6/13/2019	2	72	61	140.6	6.5	2.1	2.3	2606	
LOT 230 TTF	6/13/2019	2					2.0	2.2	2745	
LOT 230 TTF	6/13/2019	2					2.2	2.5	2558	
LOT 230	6/13/2019	28					5.5	6.0	5349	4228
LOT 230	6/13/2019	28					5.9	6.5	5160	5143
LOT 230	6/13/2019	56					10.3	11.3	5489	
LOT 237 TTF	6/24/2019	2	76	67	143.3	7	2.2	2.4	2564	

LOT 237 TTF	6/24/2019	2					2.0	2.2	2626	
LOT 237 TTF	6/24/2019	2					2.1	2.3	2594	
LOT 237	6/24/2019	28					5.0	5.5	4977	4363
LOT 237	6/24/2019	28					5.1	5.6	4825	3975
LOT 237	6/24/2019	56					9.3	10.2	5465	
LOT 268	7/29/2019	28					5.9	6.5	6182	5671
LOT 268	7/29/2019	28					6.3	6.9	6010	5505
LOT 269	7/29/2019	28					5.4	5.9	5569	4372
LOT 269	7/29/2019	28					5.6	6.2	5067	5020
LOT 270	7/29/2019	28					5.6	6.1	5982	5456
LOT 270	7/29/2019	28					5.7	6.3	5736	5467
LOT 271	7/29/2019	28					6.0	6.6	5300	4872
LOT 271	7/29/2019	28					5.8	6.4	5863	5356
LOT 272	7/29/2019	28					5.1	5.6	5412	5522
LOT 272	7/29/2019	28					5.3	5.8	5443	5611
LOT 496 HP	8/22/2019	3					2.2	2.5	3183	
LOT 496 HP	8/22/2019	3					2.3	2.5	3164	
LOT 496 HP	8/22/2019	3					2.2	2.4	3204	
LOT 496 HP	8/22/2019	7					2.5	2.8	4052	
LOT 496 HP	8/22/2019	7					2.5	2.7	3755	
LOT 496 HP	8/22/2019	14					3.1	3.4	4726	
LOT 496 HP	8/22/2019	14					3.2	3.5	4590	
LOT 496 HP	8/22/2019	28					4.8	5.3	5447	
LOT 496 HP	8/22/2019	28					4.9	5.4	5644	
LOT 496 HP	8/22/2019	28								
LOT 496 HP	8/22/2019	28								
LOT 2P HP	9/6/2019	3	78	72	143.2	5.6	2.8	3.1	3177	
LOT 2P HP	9/6/2019	3					2.8	3.1	??	
LOT 2P HP	9/6/2019	3								
LOT 2P HP	9/6/2019	3								
LOT 2P HP	9/6/2019	3								
LOT 321 HP	9/9/2019	3	82	73	144.2	5.5	2.2	2.5	2758	
LOT 321 HP	9/9/2019	3					2.3	2.5	3279	
LOT 321 HP	9/9/2019	28					6.2	6.8	5573	
LOT 321 HP	9/9/2019	28					6.5	7.2	5711	
LOT 321 HP	9/9/2019	28								
LOT 324 HP	9/11/2019	5	90	84	141.6	5.3	2.6	2.8	2961	
LOT 324 HP	9/11/2019	5					2.5	2.8	2794	
LOT 324 HP	9/11/2019	5								
LOT 324 HP	9/11/2019	5								
LOT 324 HP	9/11/2019	5								
LOT 329	9/16/2019	3	88		142.4	5.2	2.4	2.7	3677	
LOT 329	9/16/2019	3					2.5	2.7	3627	
LOT 329	9/16/2019	3								
LOT 329	9/16/2019	3								
LOT 329	9/16/2019	3								
LOT 330	9/25/2019	3	72		141.0	5.5	2.5	2.7	3050	
LOT 330	9/25/2019	3					2.3	2.5	3039	
LOT 330	9/25/2019	3								
LOT 330	9/25/2019	3								
LOT 330	9/25/2019	3								
LOT 5P HP	10/3/2019	4	78	64	139.0	5.9	2.9	3.1	2940	
LOT 5P HP	10/3/2019	4					2.8	3.1	3080	
LOT 5P HP	10/3/2019	4								
LOT 5P HP	10/3/2019	4								

LOT 5P HP	10/3/2019	4								
LOT 347 HP	10/4/2019	3	86	88	140.8	5.8			3197	
LOT 347 HP	10/4/2019	3							3166	
LOT 347 HP	10/4/2019	3								
LOT 347 HP	10/4/2019	3								
LOT 347 HP	10/4/2019	3								