Optimizing Pavement Base, Subbase, and Subgrade Layers for Cost and Performance on Local Roads

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Final Field Data Report

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National Concrete Pavement Technology Center

Iowa State University
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16. Abstract

This report is one of two products for this project with the other being a design guide.

This report describes test results and comparative analysis from 16 different portland cement concrete (PCC) pavement sites on local city and county roads in Iowa. At each site the surface conditions of the pavement (i.e., crack survey) and foundation layer strength, stiffness, and hydraulic conductivity properties were documented. The field test results were used to calculate in situ parameters used in pavement design per SUDAS and AASHTO (1993) design methodologies. Overall, the results of this study demonstrate how in situ and lab testing can be used to assess the support conditions and design values for pavement foundation layers and how the measurements compare to the assumed design values.

The measurements show that in Iowa, a wide range of pavement conditions and foundation layer support values exist. The calculated design input values for the test sites (modulus of subgrade reaction, coefficient of drainage, and loss of support) were found to be different than typically assumed. This finding was true for the full range of materials tested. The findings of this study support the recommendation to incorporate field testing as part of the process to field verify pavement design values and to consider the foundation as a design element in the pavement system. Recommendations are provided in the form of a simple matrix for alternative foundation treatment options if the existing foundation materials do not meet the design intent.

The PCI prediction model developed from multi-variate analysis in this study demonstrated a link between pavement foundation conditions and PCI. The model analysis shows that by measuring properties of the pavement foundation, the engineer will be able to predict long term performance with higher reliability than by considering age alone. This prediction can be used as motivation to then control the engineering properties of the pavement foundation for new or re-constructed PCC pavements to achieve some desired level of performance (i.e., PCI) with time.

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GLOSSARY OF TERMS

a, b, c	Regression coefficients
a_1	Factor used in CHP data calculations depending on the depth to impermeable layer
AADT	Annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
$AREA_4$	Parameter determined from FWD deflection basin using data from 4 sensors
b_1	Thickness of the tested layer during CHP test
C_d	Coefficient of drainage
CL	Low plasticity clay (or lean clay)
CH	High plasticity clay (or fat clay)
CBR	California bearing ratio
CBR_{SG}	California bearing ratio of subgrade (averaged over the top 12 in. of subgrade)
$CBR_{SG\text{-}Weak}$	California bearing ratio of subgrade (averaged over a minimum 3 in. “weak” layer within the top 16 in. of subgrade)
CBR_{SB}	California bearing ratio of subbase (averaged over thickness of the subbase layer)
CHP	Core hole permeameter
d	Effective inside diameter of standpipe (in CHP test)
d_1	Inside diameter of bottom casing (in CHP test)
Dynamic k_{FWD}	Dynamic modulus of subgrade reaction determined from FWD test
D_0	Deflection under FWD load at plate center
D_0^*	Non-dimensional deflection coefficient
D_1	Deflection under FWD load at 12 in. away from plate center (on adjacent slab)
D_2	Deflection under FWD load at 12 in. away from plate center
D_4	Deflection under FWD load at 24 in. away from plate center
D_5	Deflection under FWD load at 36 in. away from plate center
DCP	Dynamic cone penetrometer
DPI	Dynamic penetration index
E	Excellent (rating)
E_{SB}	Elastic modulus of subbase determined from CBR_{SB}
F	Fair (rating)
G	Good (rating)
FWD	Falling weight deflectometer
H	Subbase layer thickness
H_1	Effective head at time t_1 (during CHP test)
H_2	Effective head at time t_2 (during CHP test)
I	Intercept
k	Modulus of subgrade reaction
k_{PLT}	Modulus of subgrade reaction determined from static plate load test
k_{FWD}	Modulus of subgrade reaction determined from FWD test
k_{comp}	Composite modulus of subgrade reaction (determined based on M_r, E_{SB}, and H)
$k_{comp\text{-}DCP}$	Composite modulus of subgrade reaction (determined based on M_r estimated from CBR_{SG}, E_{SB} estimated from CBR_{SB}, and H)

$k_{comp\text{-}DCP\text{-}Weak}$	Composite modulus of subgrade reaction (determined based on M_r estimated from $CBR_{SG\text{-}Weak}$, E_{SB} estimated from CBR_{SB}, and H)
$k_{comp\text{-}FWD\text{-}Corr}$	Static modulus of subgrade reaction determined from FWD test that is corrected for slab size and converted to composite value based on M_r estimated from Static $k_{FWD\text{-}Corr}$, E_{SB} estimated from CBR_{SB}, and H
K	Saturated hydraulic conductivity
K_{CHP}	Saturated hydraulic conductivity determined from CHP test
L	Radius of relative stiffness
L′	Slab size (smaller dimension of a rectangular slab, length of width)
LOS	Loss of support
LTE	Load transfer efficiency
M_r	Resilient modulus of subgrade
P	Applied load by FWD
P	Poor (rating)
PCI	Pavement condition index
PCC	Portland cement concrete
PLT	Plate load test
RPCC	Recycled portland cement concrete
R_t	Ratio of kinematic viscosity of permeant at temperature during time increment t_1 to t_2 to that of water at temperature (T) 68oF (20^{o}C)
SUDAS	State urban design and specifications
Static k_{FWD}	Static modulus of subgrade reaction determined from FWD test (which is equivalent to ½ of Dynamic k_{FWD})
Static $k_{FWD\text{-}Corr}$	Static modulus of subgrade reaction determined from FWD test that is corrected for slab size
T	Temperature
QC	Quality control
QA	Quality assurance
VG	Very good (rating)
VP	Very poor (rating)
x_1 to x_4	Coefficients used on calculating radius of relative stiffness

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EXECUTIVE SUMMARY

This field data report presents results from field forensic investigation conducted at 16 different portland cement concrete (PCC) pavement sites on local city and county roads in Iowa. This report is one of two products for this project with the other being a design guide.

The test sites are located in Polk and Story Counties in central Iowa, Marion and Des Moines Counties in southeast Iowa, Pottawattamie County in Western Iowa, and Winneshiek County in northeast Iowa. The sites tested varied in:

a) pavement age from about 30 days to 42 years,
b) surface distress conditions from "poor" to "excellent" (PCI values from 35 to 100),
c) type of support conditions from directly supported over natural subgrade to fly ash stabilized subgrade to 12 in. thick granular subbase materials,
d) pavement thickness from 6 to 11 in, and
e) annual average daily traffic (AADT) from 110 to 8900.

The main objectives of field testing included documenting the surface conditions of the pavement (i.e., crack survey) and characterizing the foundation layer strength, stiffness, and hydraulic conductivity properties. The field test results were used to calculate in situ parameters used in rigid pavement design per current Iowa State Urban Design and Specifications (SUDAS) and AASHTO (1993) design methodologies. Test samples of the foundation layers were obtained from each sites to characterize their laboratory index properties. PCC core samples were obtained to determine compressive strengths.

The foundation layer design input parameters determined from field testing include:

a) Modulus of subgrade reaction (k),
b) Composite modulus of subgrade reaction (if subbase layer is present) (k_c),
c) Loss of support (LOS) , and
d) Coefficient of drainage (C_d).

Parameters (a) to (c) were determined using falling weight deflectometer (FWD) and dynamic cone penetrometer (DCP) tests, and parameter (d) was determined using a newly developed core hole permeameter (CHP) test device. FWD tests provided a measure of subgrade k values (hereafter, referred to as k_{FWD}). The k_{FWD} values determined from this study were corrected for slab size and dynamic effects and reported as Static $k_{FWD\text{-}Corr}$ values. DCP tests were used to empirically estimate the modulus of subgrade and subbase layers, and the graphically determine the composite modulus of subgrade reaction k_{comp} values (hereafter, referred to as $k_{comp\text{-}DCP}$), per AASHTO (1993) guidelines. k_{comp} values were also determined from Static $k_{FWD\text{-}Corr}$ values using subbase layer modulus estimated from DCP tests and the AASHTO (1993) graphical procedure and are reported as Static $k_{comp\text{-}FWD\text{-}Corr}$. Loss of support under pavements was evaluated based on FWD testing using the concept of zero load intercept, and also by comparing the k_{comp} values determined from FWD and DCP tests. It is assumed that the FWD tests take into account the loss of support that is existing under pavements at the time of testing, but the DCP tests do not because only properties of individual layers are used in the calculation.

CHP tests were conducted to determine in situ hydraulic conductivity (K_{CHP}) values. The C_d values were determined by estimating the time of drainage using the K_{CHP} values, pavement geometry (i.e., width and cross slope), and effective porosity of the drainage layer material.

In addition to these design input parameters, frost-heave susceptibility classification of the foundation materials was determined.

Previous research indicated that uniformity of pavement support conditions plays a critical role in long-term performance of PCC pavements (White et al. 2004). Uniformity of pavement support conditions was also evaluated in this study based on FWD test results. A uniformity classification matrix was developed to compare results from each site.

Overall, the results of this study demonstrate how in situ and lab testing can be used to assess the support conditions and design values for pavement foundation layers. The measurements show that in Iowa, a wide range of pavement conditions and foundation layer support values exist. The calculated design input (modulus of subgrade reaction, coefficient of drainage, and loss of support) values are different than typically assumed. This finding was true for the full range of materials tested. This finding supports the recommendation to incorporate field testing as part of the process to field verify the selected pavement design values.

A summary of key analysis results obtained from all field sites are as follows:

- The joint LTE at 13 out of the 15 sites showed an average of ≥ 92% at the joints, irrespective of the foundation layer conditions. The remaining three projects showed average LTE < 50%.
- It is found that modulus of subgrade reaction values determined from FWD test (Static $k_{FWD\text{-}Corr}$) correlate well with subgrade layer CBR, when the weakest layer CBR within the top 16 in. of subgrade ($CBR_{SG\text{-}Weak}$) is used. These correlations are also in line with the data published previously by the U.S. Army Corps of Engineers (Barker and Alexander 2012), Thornton (1983), and Darter et al. (1995). There is significant variability in the *k* versus CBR relationships, however.
- Composite *k* values determined that account for subbase layer modulus and thickness based on FWD tests (Static $k_{comp\text{-}FWD\text{-}Corr}$) were on average about 0.9 to 6.2 times lower than the values determined from DCP test results using $CBR_{SG\text{-}Weak}$ ($k_{comp\text{-}DCP\text{-}Weak}$).
- The $k_{comp\text{-}DCP\text{-}Weak}$ values do not account for LOS under the pavement in situ, while the $k_{comp\text{-}FWD\text{-}Corr}$ values do as the measurement is directly on the pavement. The LOS values back-calculated by comparing the averages (per site) of these values ranged from about 0.7 to 1.7. These LOS values are higher than the values currently suggested in the SUDAS design procedures (1 for natural subgrade and 0 for granular subbase). For sections with granular subbase, the LOS values ranged from 0.7 to 1.3.
- On average, the $k_{comp\text{-}FWD\text{-}Corr}$ and $k_{comp\text{-}DCP}$ values increased with increasing subbase layer thickness. The Westlawn Dr. site (with 8.5 to 10 in. of subbase) was an exception because of poorly compacted backfill material in the subgrade at that site, which

contributed to LOS and lower $k_{\text{comp-FWD-Corr}}$ values. The W38/Locust Rd. section with 12 in. of granular subbase (3 in. of subbase and 9 in. of macadam subbase) showed the highest $k_{\text{comp-FWD-Corr}}$ and $k_{\text{comp-DCP}}$ values.

- In situ hydraulic conductivity measurements (K_{CHP}) values measured for the seven different foundation layer support categories did not show improvement in C_d values with increasing subbase layer thickness and were generally lower than suggested for design in SUDAS (C_d = 1.0 for natural subgrade and 1.1 when granular subbase is present).
- Multi-variate statistical analysis performed on various parameters measured during this study revealed that improving subgrade strength/stiffness (within about the top 16 in. of the subgrade layer), improving drainage, providing a subbase layer, and reducing variability, can contribute to increasing the PCI value. Subgrade layer properties can be improved by stabilization, drainage can be improved by the presence of a relatively thin drainable subbase layer (note that subbase layer thickness was not statistically significant), and variability can be reduced by adequate in situ testing. Some recommendations regarding these aspects are provided in Chapter 8. The PCI prediction model developed from this analysis is based on limited data (16 sites), and must be validated with a larger pool of data.

Recommendations from this study include the following:

The field investigation demonstrates that there can be several factors that affect pavement foundation performance include at least the following:

a. Poor support (due to low stiffness or CBR)
b. Poor drainage
c. Seasonal variations (freeze-thaw and frost-heave)
d. Shrink-swell due to moisture variations
e. Loss of support (due to erosion, non-uniform settlement, curling/warping)
f. Poorly compacted utility trench backfill
g. Differential settlement of foundation layers
h. Overall non-uniformity

Characterization of these problems can be determined from in situ testing. Options for field testing are summarized.

The PCI prediction model developed from multi-variate analysis in this study demonstrated a link between pavement foundation conditions and PCI. These results should be validated with data collected from more projects. The key aspect of this model is that by measuring properties of the pavement foundation, the engineer will be able to predict long term performance with higher reliability (by factor of 2.4 based on ratio of standard errors) than by considering age alone. These prediction can be used as motivation to then control the engineering properties of the pavement foundation for new or re-constructed PCC pavements to achieve some desired level of performance (i.e. PCI) with time.

CHAPTER 1: INTRODUCTION

It is common for local street and road pavements to be constructed using Portland Cement Concrete (PCC) directly supported on natural subgrade without considering subgrade treatment or structural support layers such as granular subbase. In order to optimize the performance of concrete pavement, it is critical to understand how the support layers can be designed and constructed to provide the most economical life cycle cost of the pavement system and minimize public funds expenditures on local roads.

Overview

To improve the understanding between PCC pavement performance and foundation support conditions, 16 different test sites on local city and county roads in Iowa were tested. Natural subgrades, stabilized (with fly ash) subgrades, and granular subbases (with thicknesses varying from about 3.5 in. to 12 in. were tested. Pavement condition, surface deflections, support layer stiffness and support layer drainage were studied at each site. Results from this field testing is documented in this report. These results will be used to develop a companion design guide.

The field test results were used to calculate in situ parameters that are linked to rigid pavement design parameters per SUDAS and AASHTO (1993) design methodologies. The foundation layer design input parameters that are determined from field testing include:

a) Modulus of subgrade reaction (k),
b) Composite modulus of subgrade reaction (if subbase layer is present) (k_{comp}),
c) Loss of support (LOS), and
d) Coefficient of drainage (C_d).

Parameters (a) to (c) were determined using falling weight deflectometer (FWD) and dynamic cone penetrometer (DCP) tests, and parameter (d) was determined using a newly developed core hole permeameter (CHP) test device. FWD tests provided a measure of subgrade k values (hereafter, referred to as k_{FWD}). The k_{FWD} values determined from this study were corrected for slab size and dynamic effects and reported as Static $k_{FWD\text{-}Corr}$ values. DCP tests were used to empirically estimate the modulus of subgrade and subbase layers, and the graphically determine the k_{comp} values (hereafter, referred to as $k_{comp\text{-}DCP}$), per AASHTO (1993) guidelines. k_{comp} values were also determined from Static $k_{FWD\text{-}Corr}$ values using subbase layer modulus estimated from DCP tests and the AASHTO (1993) graphical procedure and are reported as Static $k_{comp\text{-}FWD\text{-}Corr}$. Loss of support under pavements was evaluated based on FWD testing using the concept of zero load intercept, and also by comparing the k_{comp} values determined from FWD and DCP tests. It is assumed that the FWD tests take into account the loss of support that is existing under pavements at the time of testing, but the DCP tests do not (because only properties of individual layers are used in the calculation). CHP tests were used to determine in situ hydraulic conductivity (K_{CHP}) values. The C_d values were determined by estimating the time of drainage using the K_{CHP} values, pavement geometry (i.e., width and cross slope), and effective porosity of the drainage layer material. In addition to these design input parameters, frost-heave susceptibility classification of the foundation materials was determined.

Report Organization

This report contains seven chapters. Chapter 2 summarizes key references pertinent to this research project. Chapter 3 provides information regarding the experimental plan developed for field testing, field and laboratory test methods used in this study, and procedures followed to estimate the pavement design input parameters, Chapter 4 provides material properties of the samples collected from the field sties, Chapter 5 provides results from the field test sites, Chapter 6 provides the results of analysis based on results from all field test sites, Chapter 7 provides a summary of key findings from this study, and Chapter 8 provides a summary of recommendations with a catalogue of options to improve foundation layer support conditions under PCC pavements for local roads. Notes taken during field testing and raw field and laboratory test results are provided in Appendices A to F included at the end of this report.

CHAPTER 2: BACKGROUND

The Iowa Highway Research Board has sponsored several recent studies on pavement foundation layer soil stabilization and characteristics. A few key projects along with other key relevant references are listed below:

- Experimental Macadam Stone Base – Des Moines County (HR-175) – Less and Paulson (1977)
- Pavement Surface on Macadam Base – Adair County (HR-209) – Lynam and Jones (1979)
- Low Cost Techniques of Base Stabilization (HR-312) – Jobgen et al. (1994)
- Determination of the optimum base characteristics for pavements (TR-482) – White et al. (2004a)
- Soil stabilization of non-uniform subgrade soils (TR-461) – White et al. (2004c, 2005a,b)
- Performance evaluation of concrete pavement granular subbase (TR-554) – White et al. (2008)
- Field evaluation of compaction monitoring technology: Phases I and II (TR-495) – White et al. (2004b, 2005c, 2006)
- Utility cut repair techniques – Investigation of improve cut repair techniques to reduce settlement of repaired areas (TR-503) – Schaefer et al. (2005)

Key findings and conclusions (relevant to this research project) from the projects/references listed above are summarized in the following sections of this chapter.

HR-175 – Experimental Macadam Stone Base

The IHRB HR-175 research project (Less and Paulson 1977) evaluated the feasibility and economics of using macadam subbase material (with different thicknesses) with choke stone under PCC and asphalt pavements. The macadam subbase material used on this project had a typical gradation with 4 in. maximum particle size and 12 to 26% passing the 1 in. sieve. The choke stone had a typical gradation with 1 in. maximum particle size and 6 to 12% passing the No. 200 sieve. The study indicated that the macadam subbase performed well under both PCC and asphalt pavements, but the cost was relatively more. During construction, the finished macadam subbase showed a uniform structure with negligible amount of degradation during compaction. Production rates on placement of the macadam subbase material varied from about 2900 to 5000 tons per day. Lateral subdrain trenches backfilled with porous backfill was used on this project for drainage. This system performed well and minimized effects of frost boils, spring thaw, and other subsurface drainage issues.

HR-209 – Pavement Surface on Macadam Base – Adair County

The IHRB HR-209 research project (Lynam and Jones 1979) evaluated the feasibility and economics of using macadam subbase material (without choke stone) under PCC and asphalt pavements. The macadam subbase material used on this project had a typical gradation with 3 in.

maximum particle size and < 1% passing the #8 sieve. Field testing was conducted using Road Rater testing and visual crack/distress surveys. Some key findings from this study were as follows:

- Road Rater testing indicated that the structural rating of a PCC pavement is improved if macadam subbase is used under the pavement. However, the improvement structural rating from using 5 in. of macadam subbase is equivalent to about additional ½ or ¾ in. PCC. The macadam subbase served primarily as a drainage layer and therefore could be reduced to 3.5 to 4 in. thickness instead of 5 in. Asphalt treating the macadam stone could be of additional benefit for stability of the base.
- 2 to 3 in. thick PCC pavements over 5 in. macadam subbase showed poor performance and low structural rating. It is indicated that a minimum 5.5 in. PCC pavement is required over macadam to obtain 20 year design life.
- Macadam served as a good drainage layer and prevented D-cracking on PCC pavements (within the 5 years of evaluation), which was a common problem in the area with using Class 1 aggregate (which contained fines).
- Significant allowance should be made for material overruns when placing either PCC or asphalt pavement on macadam without chokestone (215 cubic yards per mile for PCC).
- The quarry must be in close proximity for the project (within 10 to 20 miles) for macadam stone base to be economically practical.

HR312 – Low Cost Techniques of Base Stabilization

The IHRB HR-312 research project (Jobgen et al. 1994) evaluated performance of four different stabilization methods for on unsurfaced roads. These stabilization methods included using:

a) high float emulsion (HFE-300) to treat top 3 in. of base stone,
b) a bio-chemical formula called as BIO CAT 300-1 to treat the base stone for different thicknesses (6 in., 8in., and 10 in.),
c) Consolid System method in the top 10 in. of subgrade soil, wherein when the soil is dry a combination of two inverted emulsions are used and when the soil is wet a combination of an inverted emulsion and a lime hydrated base powder are used to treat the base stone, and
d) 5 in. of macadam base and 2 in. of choke stone along with fabric under one of the sections

All test sections were sealed using a double seal coat and performance evaluation was conducted on these sections using Iowa Road Rater, Roughometer, and visual inspection annually from 1989 to 1992. Some key findings from the field testing were as follows:

- Test sections stabilized with BIO CAT300-1 and Consolid system showed the highest average k-value (207 pci to 225+ pci) four years after construction. HFE-300 stabilized section showed an average k-value of 181 pci, macadam subbase section showed an average k-value of 172 pci, and macadam subbase with fabric section showed an average k-value of 116 pci, four years after construction.

- Although the BIO CAT 300-1 and Consolid System stabilized sections showed high k-values, they showed poor performance with alligator cracking and rutting under traffic, and continued deterioration every year. It is speculated in the report that these failures could have been due to freeze/thaw cycles in the stabilized layers.
- HFE-300 treated test sections showed some deterioration with alligator cracking. Macadam subbase test sections (with and without fabric) experienced minor rutting and showed the best overall performance than all other sections. The use of fabric did not show noticeable improvement.
- Use of macadam base and HFE-300 treatment showed cost effectiveness than other treatment options evaluated in this study.

TR-482 – Determination of the optimum base characteristics for pavements

The IHRB TR-482 research project (White et al. 2004a) included a wide range of activities to evaluate relationships between stability and permeability of granular base course layers. Those activities included reviewing literature, development of a new in-situ testing device to measure permeability, considerable field testing, analysis, construction observations, development of recommended quality assurance/quality control (QA/QC) protocols, and development of recommendations for improving construction operations and design procedures. Some key findings and conclusions are as follows:

- The amount of fines content (passing No. 200 sieve) is a key factor influencing permeability. Lab and field measurements showed that as fines content increases, the permeability decreases dramatically (Figure 1).
- Stability is enhanced by aggregate angularity, particles resistance to degradation, and having a dense gradation (dense gradation that does not separate large particles). In some cases a dense gradation can enhance stability and reduce permeability. It is important to note that many high density materials can be unstable; therefore, density measurements are likely to be of little use in a base course QA/QC program.
- Recycled concrete aggregate samples were found to have lower permeability, lower strength, and lower resistance to particle degradation compared to limestone and gravel samples tested. It is indicated that the use of this material as a drainable base course under high volume pavements need to be further evaluated.
- Drainage is affected by subgrade cross-slope; base thickness; edge drain placement; material gradation; and the permeability of the material. A computer program (*Pavement Drainage Estimator, PDE*) was developed to help designers quickly explore several alternatives for improving base drainage.
- In developing a QA/QC specification, it is desirable to set testing limits that will provide an adequate "factor of safety" between the desired material properties and the average test results. Test protocols and engineering properties that produce more variation should have a larger "factor of safety."
- Permeability measurements exhibited the most variation and therefore need to have the largest "factor of safety." The study recommended that the average test limits for permeability be set at 11,340 ft/day (4 cm/s) and 2,300 ft/day (0.8 cm/s) to achieve 90% and 50% drainage, respectively, in less than 2 hours.

- DCP, Clegg Impact Hammer and GeoGauge were used for assessment of base layer stability. A target CBR of 15% was selected for in-place stability of Iowa DOT granular subbase materials (under high volume roads). To achieve this target a maximum DCP Index of 0.55 in./blow (14 mm/blow), a minimum Clegg Impact Value of 20, and a minimum GeoGauge modulus of 80 MPa, is desired. Of the three methods, it is indicated that the DCP provides the most reliable results but is more labor intensive, and the other two devices will allow the operator to make more tests in a shorter period of time. It is recommended to use Clegg Hammer or GeoGauge to find areas of weaknesses and conduct DCP tests at select locations (approximately every two stations).
- An air permeability test device was developed to provide a rapid measure (< 30 sec) of in situ saturated hydraulic conductivity of granular base materials.
- Trimming operations appeared to contribute the most to aggregate segregation and spatial variation (Figure 2). Aggregate dumping and spread operations are other likely contributors. The following three construction recommendations were provided to limit aggregate segregation: (a) limit movement of aggregate by primarily transporting aggregate transversely rather than longitudinally, (b) considering using of GPS aided grading equipment as an alternative to trimmers, (c) consider moisture conditioning the aggregate before trimming to reduce fines migration.
- Significant spatial variation was found over a relatively small area (25 ft x 30 ft) on compacted granular base materials with regard to permeability, density, moisture content, fines content, and stiffness (see Figure 3 for example). Although there is considerable spatial variation in base layer properties, it is not clear if the level of variation found adversely affects pavement performance. Moreover, it is not known what level of spatial uniformity is required for good pavement performance.

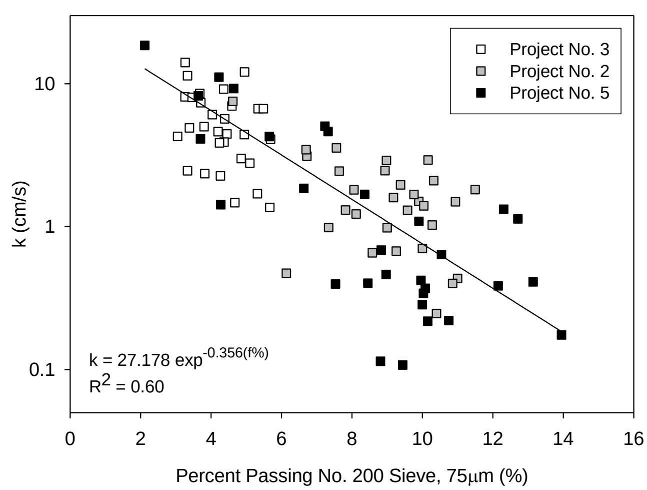


Figure 1. Relationship between in-situ saturated hydraulic conductivity (from air permeability tests) and percent passing no. 200 sieve (from Vennapusa et al. 2006)

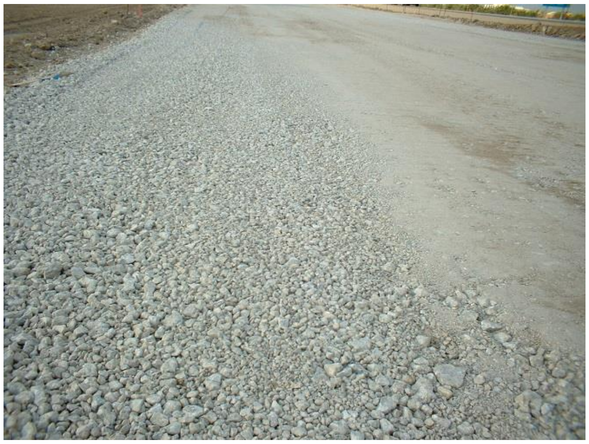


Figure 2. Visual indication of aggregate segregation following trimming and compaction operations on a recycled PCC material on I35 in Hamilton County, Iowa

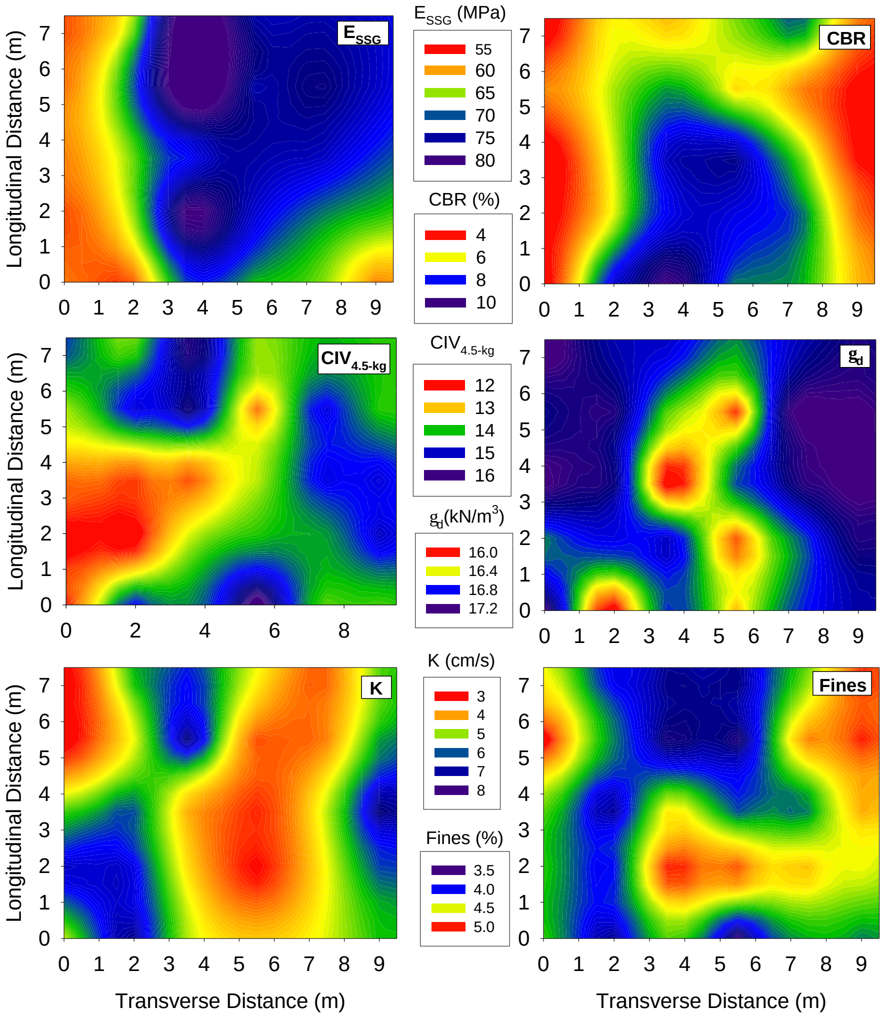


Figure 3. Kriged contour plots of in-situ test measurements from a site on US151 near Cedar Rapids, Iowa (reproduced from White et al. 2004a)

TR-461 – Soil stabilization of non-uniform subgrade soils

The IHRB TR-461 research project included field and laboratory evaluation of fly ash stabilization of subgrade soils. To develop a broader understanding of the engineering properties of fly ash, mixtures of five different soil types, ranging from ML to CH, and several different fly ash sources (including hydrated and conditioned fly ashes) were evaluated. Results showed that soil compaction characteristics, compressive strength, wet/dry durability, freeze/thaw durability, hydration characteristics, rate of strength gain, and plasticity characteristics are all affected by the addition of fly ash. Specimens for strength and durability testing were prepared and subjected to freeze/thaw and wet/dry curing environments to simulate Iowa field conditions. Some specimens were cured for up to 2.5 years. The morphology of soil fly ash mixtures and the soil clay mineralogy were also studied using x-ray diffraction and scanning electron microscopy techniques. Some of the key findings are as follows (White et al. 2005a):

- Iowa self-cementing fly ashes at addition rates of 10% to 20% (by dry weight of soil) are effective at stabilizing fine-grained Iowa soils for earthwork and paving operations.
- Fly ash increases the compacted dry density and reduces the optimum moisture content.
- Strength gain in soil-fly ash mixtures is dependent on cure time and temperature, compaction energy, and compaction delay. To develop a mix design, soaked laboratory samples before compressive strength testing is recommended for evaluating samples in a saturated condition.
- Sulfur contents can cause formation of expansive minerals in soil-fly ash mixtures, which severely reduces the long-term strength and durability. Tests should be performed to determine the sulfur contents of the fly ash, soil, and mix water.
- Fly ash increases the CBR of fine-grained soils, and in the case of 20% fly ash addition, the CBR can be increased up to values similar to compacted gravel (~75%).
- Fly ash effectively dries wet soils and provides an initial rapid strength gain, which is useful during construction in wet, unstable ground conditions.
- Fly ash decreases swell potential of expansive soils.
- Soil-fly ash mixtures cured below freezing temperatures and then soaked in water are highly susceptible to slaking and strength loss.
- Soil stabilized with fly ash exhibits increased freeze-thaw durability.
- Strength of soil can be increased by adding hydrated fly ash (HFA) and conditioned fly ash (CFA), but at higher quantities and not as effectively as self-cementing fly ash.

The influence of non-uniform subgrade support on critical pavement responses (maximum stresses, strains, and deflections) that affect pavement performance were also studied as part of the TR-461 project (White et al. 2005b). In situ tests were performed at 12 sites to determine the subgrade and subbase engineering properties, and develop a database of engineering parameter values for statistical and numerical analysis. Field tests included DCP, nuclear density gauge, GeoGauge, and Clegg Impact Hammer tests. Tests were performed in a dense grid pattern to develop a spatial database of the subgrade/subbase engineering property values (similar to shown in Figure 3). Results of stiffness, moisture and density, strength, and soil classification were then used to determine the spatial variability of a given property. Natural subgrade soils, fly ash-stabilized subgrade, reclaimed HFA subbase, and granular subbase were studied. Field data from White et al. (2005b) showed that HFA, self-cementing fly ash-stabilized subgrade, and granular subbases exhibit lower variability than natural subgrade soils. This was determined by calculating and comparing the coefficient of variation (COV) for the stiffness of natural subgrade (COV up to 71 percent), fly ash-stabilized subgrade (COV about 22 percent), reclaimed HFA (COV about 20 percent), and granular subbase (COV about 16 percent)

The influence of the spatial variability of subgrade/subbase on pavement performance was evaluated by modeling the elastic properties of the pavement structure and the pavement foundation using the ISLAB2000 finite element model. Results showed that non-uniform subgrade/subbase support increases localized deflections and causes stress concentrations in the pavement, which can lead to premature failures, fatigue cracking, faulting, pumping, rutting, and other types of pavement distresses for rigid and flexible pavement systems. Results indicated that when pavement foundations are modeled using a uniform subgrade, the maximum principal stresses and deflections are reduced in the pavement structure and thus the fatigue life is increased by about 1.7 times (Figure 4). It is recommended that pavement subgrade/subbase construction in the future should consider uniformity as one of the key issues for long-term pavement performance.

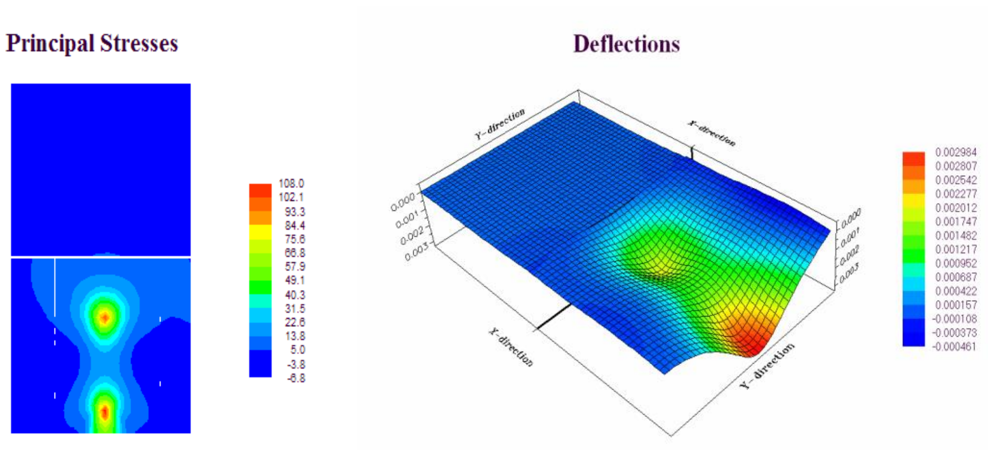


Figure 4. Contour plots of principal stresses and deflections under uniform and non-uniform subgrade conditions (from White et al. 2005b)

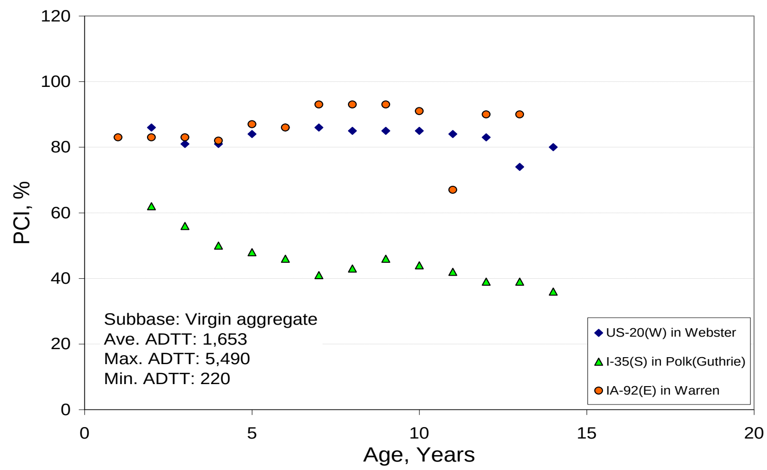
TR-554 – Performance evaluation of concrete pavement granular subbase

The IHRB TR-554 research project (White et al. 2008) evaluated the relationships between stability, pavement distress, and recycled PCC (RPCC) subbase materials. Laboratory and field tests and distress surveys were conducted at 26 sites in Iowa. Some key finidngs from this study are as follows:

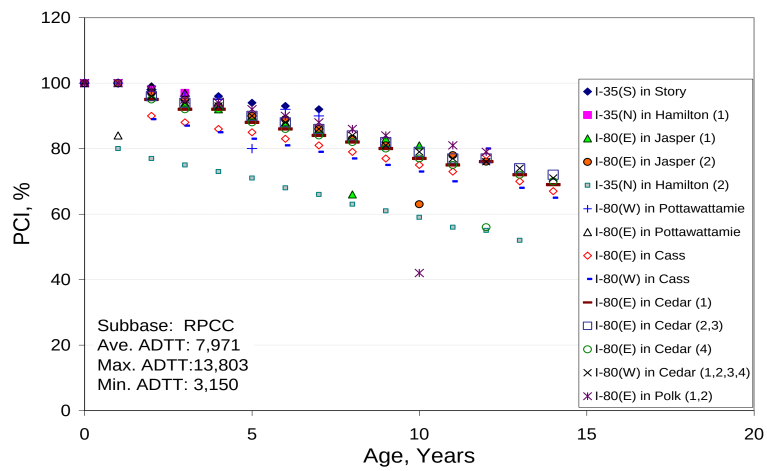
- Specific gravities of RPCC are lower than those of virgin crushed limestone.
- RPCC aggregate material varied from either poorly or well-graded sand to gravel.
- A modified Micro-Deval test procedure was created to conduct tests on virgin and RPCC aggregate materials. Abrasion losses of virgin aggregate materials were within the maximum Micro-Deval abrasion loss of 30% recommended by ASTM D6028-06. Micro-

Deval abrasion loss of RPCC aggregate materials was much higher than those of virgin materials exceeding 30% loss.

- Modulus of elasticity of RPCC subbase materials was generally high, but variable from one project to another. RPCC subbase layers normally showed low permeability.
- The current pavement surface condition of RPCC subbase sections is comparable to that of virgin aggregate subbase sections in terms of the Pavement Condition Index (PCI) and the International Roughness Index (IRI).
- The pavement surface condition history of RPCC subbase sections is not much different from that of virgin aggregate subbase sections (Figure 5).
- Few longitudinal and transverse cracks were observed on all test sections. The featured distresses on RPCC are the lane-to-shoulder separation and lane-to-shoulder drop off, which are consistent with the findings reported by previous researchers.
- No correlation was observed between the pavement surface condition indices and the RPCC subbase layer thickness.



(a)



(b)

Figure 5. Variations in PCI with age on PCC pavement sections with (a) virgin aggregate subbase, and (b) RPCC subbase

TR-495 – Field evaluation of compaction monitoring technology

The IHRB TR-495 research project (White et al. 2004b, 2006) describes field evaluation of a compaction monitoring technology develop by Caterpillar, Inc. (Figure 6), for use as a QC/QA tool during earthwork construction operations (e.g., pavement subgrade and subbase layer construction), which has the advantage of 100% coverage of compacted areas. The compaction monitoring technology evaluated was based on machine drive power (see White et al. 2005c) for more details), which works in both static and vibratory modes. Results from this study indicated that the compaction monitoring technology identified “wet” and “soft” sports that were artificially incorporated into test areas. The results indicated that single in situ test point does not provide a high level of confidence in representing the average soil engineering property values over a given area as variation always exists and several samples must be tested to determine soil properties with any confidence. Correlations between in situ tests and machine drive power measurements indicated that the machine drive power measurements can be related to dry unit weight, DCP index, elastic modulus, Clegg impact values, but stronger correlations were found with soil stiffness values (i.e., Clegg impact values, DCP index, and elastic modulus). As a result, it is recommended that new acceptance criteria must be developed to define quality in terms of compaction monitoring output. This effort, which is a leap from density-based quality criteria to strength/stiffness-based quality criteria, may take considerable time to identify target values, especially for cohesive soils where stiffness is highly dependent on moisture content. It is emphasized that compaction monitoring technology currently does not eliminate the need for soil moisture control during earthwork construction.

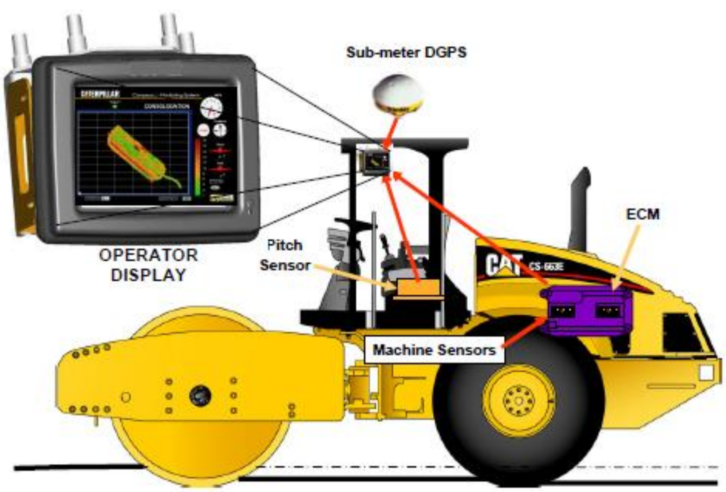


Figure 6. CAT compaction monitoring system components (White et al. 2004b)

TR-503 Utility cut repair techniques

The IHRB TR-503 research project (Schaefer et al. 2005) involved conducting a variety of activities related pavement foundation layer settlement problems due to utility trenches and providing recommendations to improve utility cut construction problems in Iowa by reducing maintenance costs. The various activities involved conducting review of literature, survey of city personnel, field testing and observation during utility backfill construction, laboratory testing, and designing, constructing, testing a few trial trenches for evaluation. Some significant results from this study are as follows:

- Data provided by the city of Ames indicated that January and December are the prominent months for water main breaks. This trend may be a result of frost loading, which could substantially increase vertical loads (i.e., up to twice the original load) on buried pipes.
- Each city surveyed (Ames, Cedar Rapids, Davenport, Des Moines, Dubuque, Waterloo, and Burlington) indicated that the current method of utility cut construction resulted in satisfactory results and there was virtually no problem. However, these cuts were estimated to last less than two years, which is a relatively short period. The life of an undisturbed pavement can be approximately ten times this length. This may be a result of minimal documentation kept on utility cut maintenance and repairs, as well as a personal opinion of the definition of a poorly performing utility cut.
- Construction requirements varied between each city. The material selection is based on regional availability. Burlington experienced problems with using sand backfill, and was the only city at the time of survey that consistently used flowable fill for utility cuts. Other cities in Iowa have used flowable fill under specific circumstances.
- All surveyed cities used granular backfill materials with a requirement of a minimum 90% to 95% standard Proctor density in the specifications. QC was found to be minimal. Dubuque and Waterloo used nuclear density gauge to monitor compaction. In some cases, however, an inspection program consisted of only visual inspection.
- Lift thicknesses generally ranged from 2 to 4 feet, with compaction done sporadically throughout the fill using a vibrating plate on the end of a backhoe. In most cases, the method of obtaining compaction was based on experience. Backfill materials were compacted using large compaction equipment sometimes very close to the edge of the cut. This resulted in damage to pavement surfaces along the perimeter of the excavation.
- It was often observed that saturated native materials were added to the excavation in an attempt to clean the utility cut area. Because of this, the potential to formation of voids increased and thus leading to potential settlement in the future. This is an undesirable practice because saturated material is very weak, has low compaction properties, and achieving its original density is extremely difficult after its disturbed (specifically in clay-type native materials). The use of native materials in an excavation also requires monitoring of the moisture content for optimum performance.
- Field relative density values in utility backfills tested varied from very loose to very dense state on different projects.
- DCP results indicated that CBR values were higher near the center of the excavated areas when compared to CBR values near the edge of the trench. It is recommended to use smaller compaction equipment to achieve uniform compaction throughout the trench so that confined areas can be reached and compacted properly. DCP profiles indicated zones of low compaction with depth due to thicker lifts (> 12 inches).
- The backfill material used in most of the sites had fines contents (percentage passing sieve No. 200) greater than the maximum limit allowed by Iowa DOT (i.e., 10%) for backfill material gradation. Most of these materials were placed at or near the bulking moisture content, which increases the settlement (collapse) potential.
- Laboratory collapse tests indicated a high collapse potential of 36% for loosely placed limestone screenings, 9% for 3/8-inch material used in Ames, 8.5% for 3/4-inch material used in Cedar Rapids, and 24% for manufactured sand. The material specified in SUDAS

(1½-inch clean stone) had a low collapse potential of 0.35%. The collapse potential increases as the percentage of sand particles increases. Each material has a different bulking moisture content, which should be avoided when placed.

- The use of granular backfill materials may require watering the material in the trench to reduce settlement potential induced by moisture change. The addition of water 2%–4% above the bulking moisture content could be used in the field during construction to reduce future settlement potential due to water effects.
- Six trial trenches were designed and proposed to the City of Ames for construction with the goal of minimizing future settlement. Settlement expected to result from collapse and low compaction effort used in the field was avoided by using the SUDAS Class I gradation backfill with 100% passing 1½ inch sieve and with a maximum passing sieve No. 4 of 10%. Structural geogrid was used to bridge over an excavated area along with 3/8-inch backfill material with no moisture or compaction control.

CHAPTER 3: EXPERIMENTAL TESTING

This chapter describes: (1) the experimental plan developed for field test sites, (2) the field and laboratory test methods followed in this study, and (3) the interpretation of field and lab test results in terms of pavement design parameters.

Experimental Plan

The experimental plan developed by the research team is presented in Figure 7, which was generally followed at all field sites. A summary of the experimental plan features and the research teams' early conceptual approach to link field results to PCC design and cost analysis is provided in Table 1.

The experimental plan included conducting FWD, DCP, and CHP tests, taking digital photographs to document pavement surface conditions, collecting samples from core locations. In addition, a crack survey map was developed from each field site. Samples collected from the field were sealed and transported to laboratory to conduct classification tests.

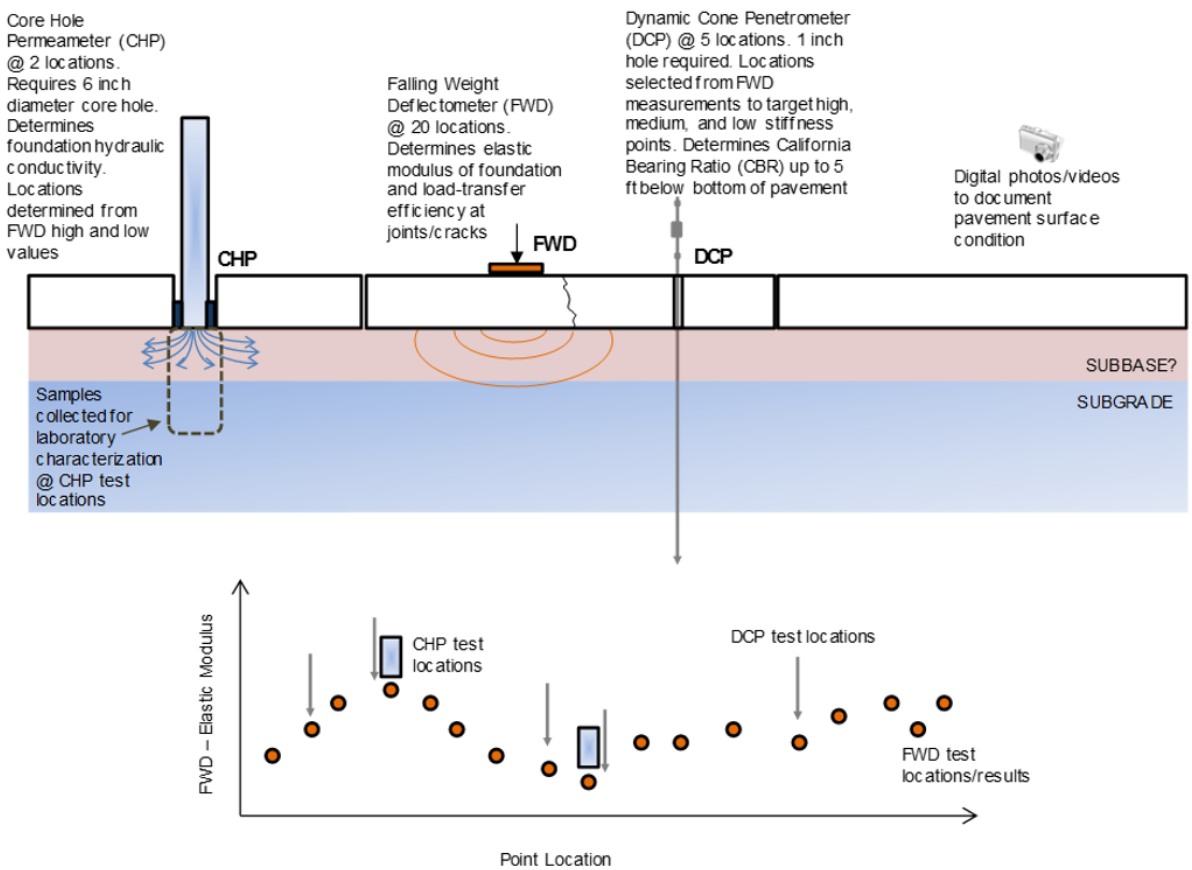


Figure 7. Experimental plan developed for field testing and sampling

Table 1. Summary of experimental plan and link to PCC design and cost analysis

Test	No. of test points	Parameter	Link to PCC Design	Link Cost Analysis
FWD	20	Elastic modulus of subbase/subgrade layers	Need to establish quality standards for measured parameters.	Need to establish range of unit costs for PCC, subbase, subgrade, stabilization, other? Then assess influence on the engineering parameter values in order to optimize using PCC design.
DCP	5	CBR profile up to 3 ft below bottom of pavement		
CHP	2	Drainage/hydraulic conductivity		
Photos/video	10-20	PCC surface condition		
Samples	@ CHP locations	Index properties: Gradation/Atterberg limits, estimates of shrink/swell and freeze/thaw potential		

Laboratory Test Methods

Particle Size Analysis

Particle-size analysis tests on granular subbase layers samples were performed in accordance with ASTM C136-06 "*Standard test method for sieve analysis of fine and coarse aggregates"*. Particle-size analysis tests on fine-grained subgrade materials were conducted in accordance with ASTM D422-63 "*Standard Test Method for Particle-Size Analysis of Soils.*"

Atterberg Limits Tests and Soil Classification

Atterberg limit tests (i.e., liquid limit—LL, plastic limit—PL, and plasticity index—PI) were performed in accordance with ASTM D4318-10 "*Standard test methods for liquid limit, plastic limit, and plasticity index of soils*" using the dry preparation method. Using the results from particle size analysis and Atterberg limits tests, the samples were classified using the unified soil classification system (USCS) in accordance with ASTM D2487-10 *"Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)"* and AASHTO classification system in accordance with ASTM D3282-09 "*Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes".* In addition, the color of each sample was identified using a Munsell color chart in accordance with ASTM D1535-12a *"Standard Practice for Specifying Color by the Munsell System"*.

Material Color

Material color was determined using Munsell color chart according to ASTM D1535-12a "*Standard Practice for Specifying Color by the Munsell System.*"

In Situ Moisture Content

Samples collected from subgrade layers were carefully sealed and transported to the laboratory. Moisture content tests were conducted on these samples in accordance with ASTM D2216-10 "*Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*"

PCC Core Compressive Strength

The compressive strength of the cores was determined in accordance with ASTM C39/C 39M-01 "*Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens".* All cores obtained from field were at a nominal diameter of 6 in. Height of cores varied from about 6 in. to 11 in. To be in compliance with the requirement of length to diameter (L/D) ratio of 2 in the ASTM standard, 3 in. diameter by 6 in. length cores were prepared (see Figure 8 and Figure 9).

Figure 8. Picture of coring 3 in. cores from field 6 in. cores

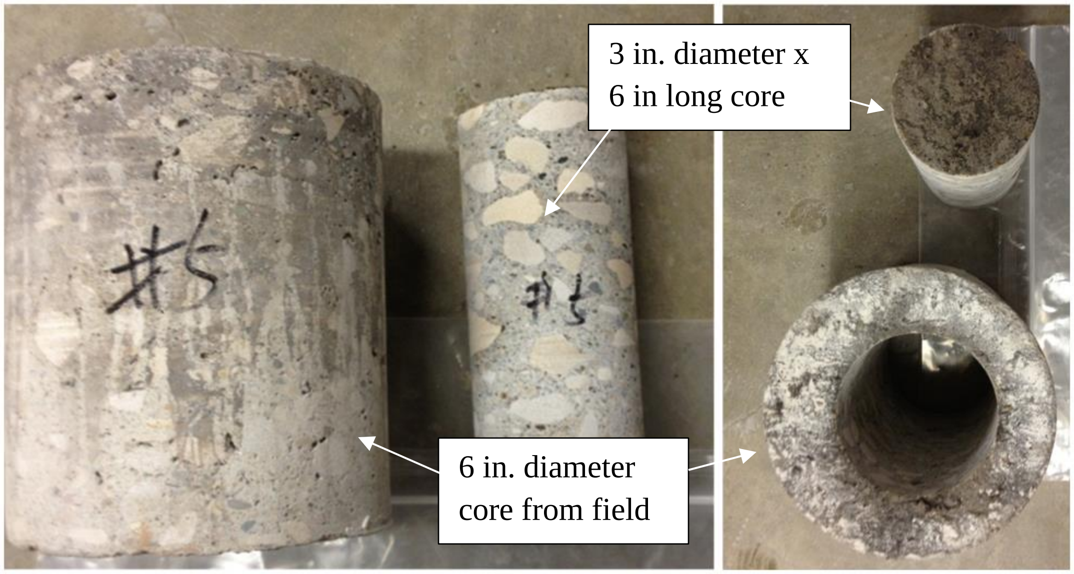


Figure 9. Pictures of field 6 in. cores and 3 in. cores

In Situ Testing Methods

Falling Weight Deflectometer

Falling weight deflectometer (FWD) tests were conducted using a Kuab FWD setup with a 11.81 in. diameter loading plate by applying one seating drop and four loading drops (Figure 10). The applied loads varied from about 5,000 to 15,000 lb in the four loading drops. The actual applied loads were recorded using a load cell, and deflections were recorded using seismometers mounted on the device, per ASTM D4694-09 *"Standard Test Method for Deflections with a Falling-Weight-Type Impulse Load Device".* The FWD plate and deflection sensor setup, and a typical deflection basin is shown in Figure 11. To compare deflection values from different test locations at the same applied contact stress, the values at each test location were normalized to a 9,000 lb applied force.

FWD tests were conducted at the center of the PCC slab panels and at the joints. Tests conducted at the joints were used to determine joint load transfer efficiency (LTE) and voids beneath the pavement based on "zero" load intercept values. Tests conducted at the center were used to determine modulus of subgrade reaction (k) values and the intercept values. The procedure used to calculate these parameters are described below.

LTE was determined by obtaining deflections under the plate on the loaded slab (D_0) and deflections of the unloaded slab (D_1) using a sensor positioned about 12 in. away from the center of the plate (Figure 12). The LTE was calculated using Eq. 1.

$$LTE\ (\%) = \frac{D_1}{D_0} \times 100 \tag{1}$$

If the entire applied load is transferred over to the adjacent slab, then the LTE would be 100%. If any loss of support exists under the slab, the LTE will be reduced.

Figure 10. KUAB falling weight deflectometer

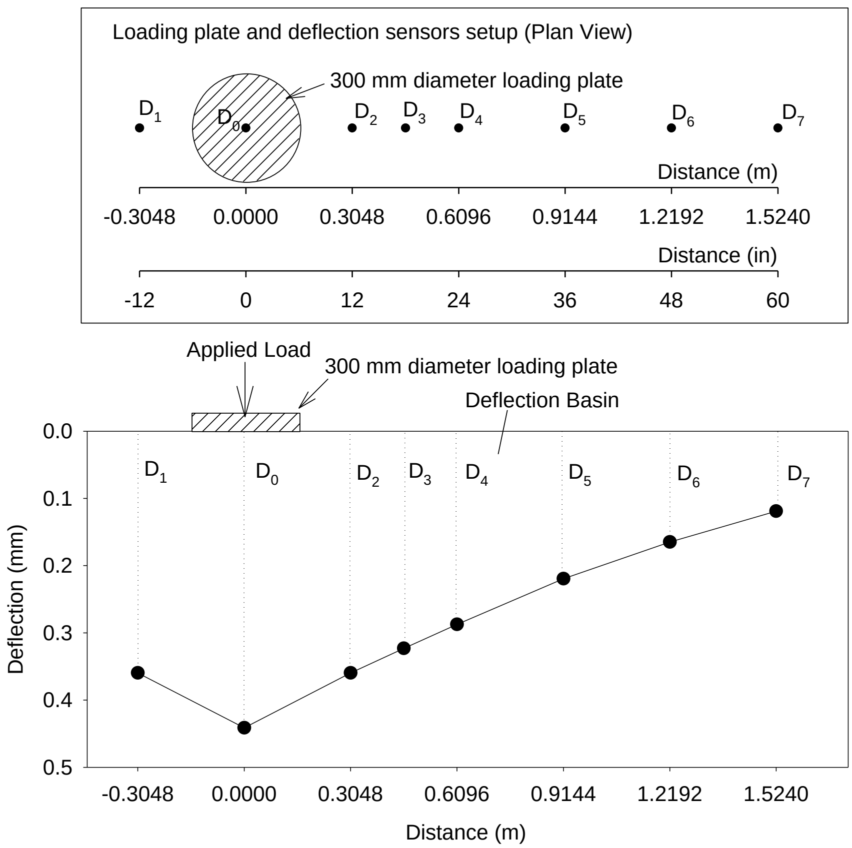


Figure 11. FWD plate and sensor setup (top), and typical deflection basin (bottom)

Figure 12. FWD test at a joint for LTE determination

Voids underneath pavements can be detected by plotting the applied load measurements on the x-axis and the corresponding deflection measurements on the y-axis, and plotting a best fit linear regression line as illustrated in Figure 13, to determine the "zero" load intercept (I) values. AASHTO (1993) suggests I = 2 mils as a critical value for void detection.

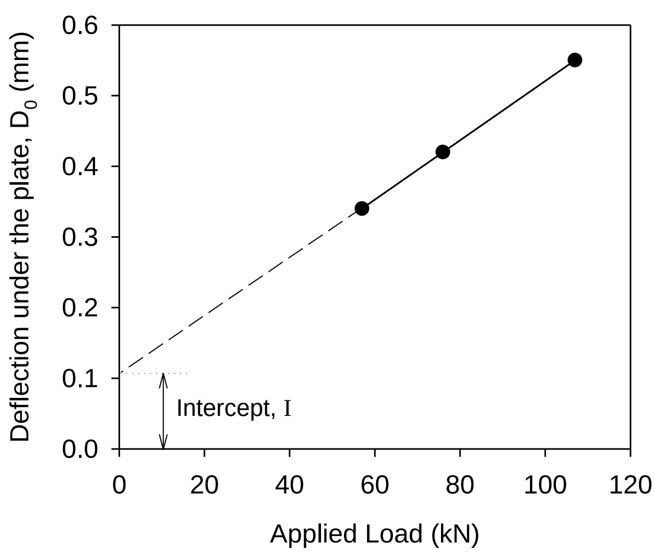


Figure 13. Void detection using load-deflection data from FWD test

The k values were determined using the $AREA_4$ method described in AASHTO (1993). Since the k value determined from FWD test represents a dynamic value, it is referred to here as Dynamic k_{FWD}. Deflections obtained from four sensors, i.e., D_0, D_2, D_4, and D_5 (see Figure 11) are used in the $AREA_4$ calculation. The AREA method was first proposed by Hoffman and Thompson (1981) for flexible pavements and has since been applied extensively for concrete pavements (Darter et al. 1995). $AREA_4$ is calculated using Eq. (1) and has dimensions of length, as it is normalized with deflections under the center of the plate (D_0):

$$AREA_4 = 6 + 12\left(\frac{D_2}{D_0}\right) + 12\left(\frac{D_4}{D_0}\right) + 6\left(\frac{D_5}{D_0}\right) \quad (1)$$

where D_0 = deflections measured directly under the plate, D_2 = deflections measured at 12 in. away from the plate center, D_4= deflections measured at 24 in. away from the plate center, and D_5 = deflections measured at 36 in. away from the plate center. AREA method can also be calculated using different sensor configurations and setups, i.e., using deflection data from 3, 5, or 7 sensors and those methods are described in detail in the literature (Stubstad et al. 2006, Smith et al. 2007)

In the early research conducted using the AREA method, ILLI-SLAB finite element program was used to compute a matrix of maximum deflections at the plate center and the AREA values by varying the subgrade k, the modulus of the PCC layer, and the thickness of the slab (ERES Consultants, Inc. 1982). Measurements obtained from FWD tests were then compared with the ILLI-SLAB program results to determine the k-values through back calculation. Later in the 1990s, Barenberg and Petros (1991) and Ioannides (1990) proposed a forward solution procedure based on Westergaard's solution for loading on an infinite plate, to replace the back calculation procedure. This forward solution presented a unique relationship between AREA value (for a given load and sensor arrangement) and the dense liquid radius of relative stiffness (L) in which subgrade is characterized by the k-value. The radius of relative stiffness (L) is estimated using Eq. (2):

$$L = \left[\frac{ln\left(\frac{x_1 - AREA_4}{x_2}\right)}{x_3}\right]^{x_4} \quad (2)$$

where x_1 = 36, x_2 = 1812.279, x_3 = -2.559, x_4 = 4.387. It must be noted that the x_1 to x_4 values vary with the sensor arrangement and these values are only valid for the $AREA_4$ sensor setup. Once, the L value is known, the Dynamic k_{FWD} value can be estimated using Eq. 3:

$$Dynamic\ k_{FWD}(pci) = \frac{PD_0^*}{D_0 L^2} \quad (3)$$

where P = applied load (lbs), D_0 = deflection measured at plate center (inches), and D_0^* = non-dimensional deflection coefficient calculated using Eq. 4.

$$D_0^* = a\, e^{-be^{-cL}} \quad (3)$$

where a = 0.12450, b = 0.14707, c = 0.07565. It must be noted that these equations and coefficients are valid for FWD setup with a 11.81 in. diameter plate.

The advantages of the AREA method are the ease of use without any back calculations and its use of multiple sensor data. The disadvantages are that the process assumes the slab and the subgrade are horizontally infinite. This assumption leads to an underestimation of the k value. Crovetti (1993) developed the following slab size corrections for a square slab, based on finite element analysis conducted using the ILLI-SLAB program, for use in the Dynamic k_{FWD}:

$$Adjusted\ D_0 = D_0\left(1 - 1.15085e^{-0.71878\left(\frac{L'}{L}\right)^{0.80151}}\right) \tag{3}$$

$$Adjusted\ L = L\left(1 - 0.89434e^{-0.61662\left(\frac{L'}{L}\right)^{1.04831}}\right) \tag{3}$$

where L′ = slab size (smaller dimension of a rectangular slab, length or width). This procedure also has limitations: (1) it considers only a single slab with no load transfer to adjacent slabs, and (2) it assumes a square slab. The square lab assumption is considered to produce sufficiently accurate results when the smaller dimension of a rectangular slab is assumed as L′ (Darter et al. 1995). Darter et al. 1995 suggested using $L' = \sqrt{Length \times Width}$, to further refine the slab size corrections. There are no established procedures reported to-date on correcting for load transfer to adjacent slabs and remains as a limitation of this method. In this project, Dynamic k_{FWD} values corrected for slab size are reported as Dynamic $k_{FWD\text{-}Corr}$.

AASHTO (1993) suggests dividing the Dynamic k_{FWD} value by a factor of 2 to determine the equivalent Static k_{FWD} value. The origin of this factor 2 dates back to Foxworthy's work in the 1980's. Foxworthy (1985) reported comparisons between the Dynamic k_{FWD} values obtained using Dynatest model 8000 FWD and the Static k values (Static k_{PLT}) obtained from 30 in. diameter plate load tests (the exact procedure followed to calculate the Static k_{PLT} is not reported therein). Foxworthy used the AREA based back calculation procedure using the ILLI-SLAB finite element program. Results obtained from Foxworthy's study are shown in Figure 14, and are based on 7 FWD tests conducted on PCC pavements with slab thicknesses varying from about 10 in. to 25.5 in. and plate load tests conducted on the foundation layer immediately beneath the pavement over a 4 ft x 5 ft test area. A few of these sections consisted of a 5 to 12 in. thick base course layer and some did not. The subgrade layer material consisted of CL soil from Sheppard Air Force Base in Texas, SM soil from Seymour-Johnson Air Force Base in North Carolina, and from McDill Air Force base in Florida (soil type was unspecified). No slab size correction was performed on this dataset.

Data from Foxworthy (1985) yielded a logarithmic relationship between the dynamic and the static k-values. On average, the Dynamic k_{FWD} values were about 2.4 times greater than the Static k_{PLT} values. Darter et al. (1995) indicated that the factor 2 is reasonable based on results from other test sites (Figure 14). Darter et al. (1995) also compared FWD test data from eight long term pavement performance (LTPP) test sections with the Static k_{PLT} values and reported factors ranging from 1.78 to 2.16, with an average of about 1.91. The Dynamic k_{FWD} values used in this comparison were corrected for slab size.

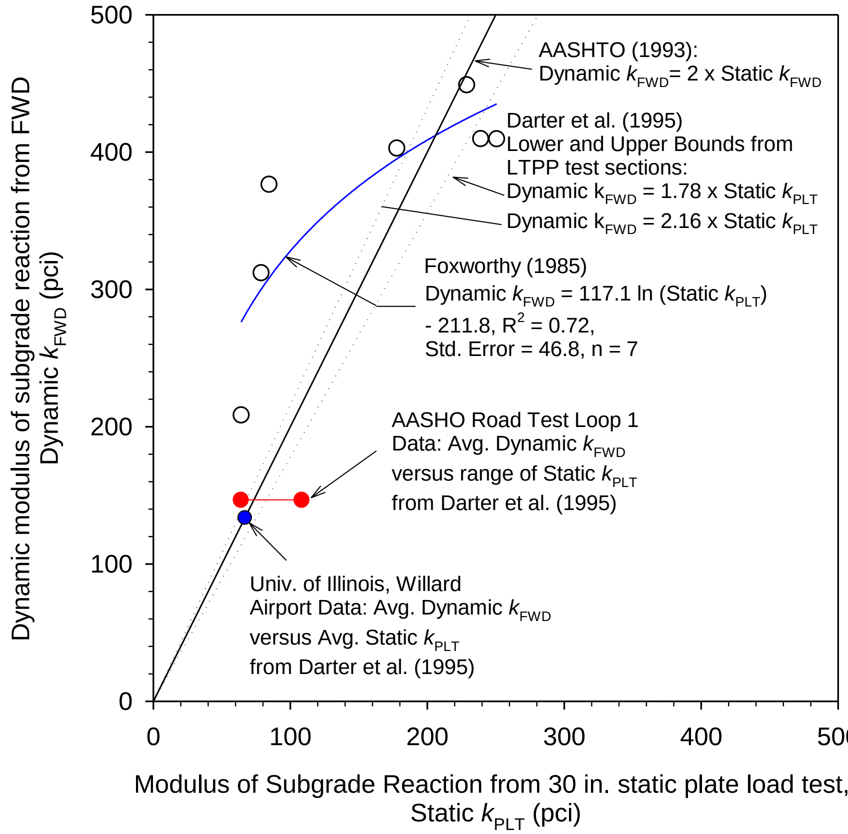


Figure 14. Static k_{PLT} values versus Dynamic k_{FWD} measurements reported in literature

For the analysis conducted in this research project, the Dynamic $k_{FWD\text{-}Corr}$ values were divided by 2 and are reported as Static $k_{FWD\text{-}Corr}$ values.

Darter et al. (1995) reported data from LTPP test sections comparing subgrade CBR values and Static $k_{FWD\text{-}Corr}$ values as well as values from static plate load tests (Figure 15). Based on this data, they suggested an upper bound, a lower bound, and a midrange in estimating k from CBR. Other data published by U.S. Army Corps of Engineers (Barker and Alexander 2012) and Thornton (1983) are added to this database in Figure 15 along with relationships suggested by Carlos Gonzalez from U.S. Army Corps of Engineers (as presented in Barker and Alexander 2012), Packard (1973), and Air Force Manual (1966). It is not known how the CBR values were determined in the LTPP database and the U.S. Army Corps of Engineers studies. In Thornton's study, CBR was determined on laboratory samples compacted to similar field moisture and densities as under static PLTs conducted using a 30 in. diameter plate. Results from the U.S. Army Corps of Engineers were mostly below the midrange and some below the low range specified in Darter et al. (2005). Thornton's data points were mostly within the lower and upper range bounds specified in Darter et al. (2005). Results obtained from this study are compared with this database later in this report.

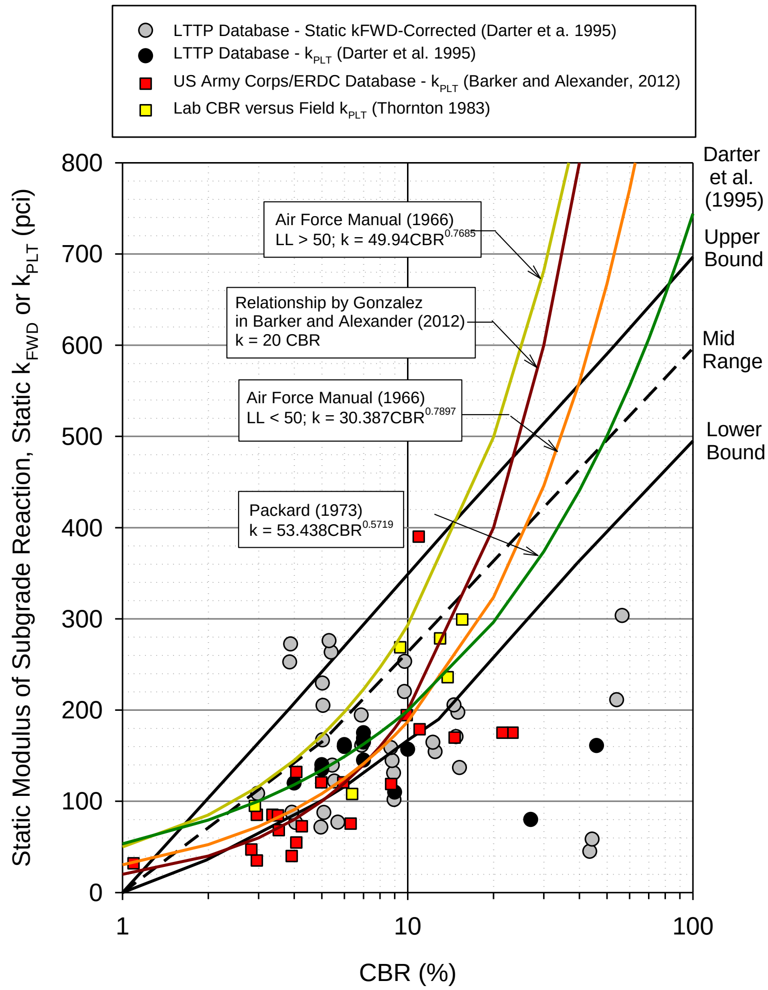


Figure 15. Relationships between Static *k* values determined from FWD and PLT, and CBR from literature

Dynamic Cone Penetrometer

Dynamic cone penetrometer (DCP) tests (Figure 16) were performed in accordance with ASTM D6951-03 *"Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications".* A 3/4 in. hole was drilled in the pavement to facilitate testing in the foundation layers. The tests involved dropping a 17.6 lb hammer from a height of 22.6 in. and measuring the resulting penetration depth. California bearing ratio (CBR) values were determined using either Eq. 3 or 4 or 5, as appropriate, where the dynamic penetration index (DPI) is in units of mm/blow.

$$CBR\ (\%) = \frac{292}{DPI^{1.12}} \text{ for all soils with CBR > 10} \tag{3}$$

$$CBR\ (\%) = \frac{1}{(0.017019 \times DPI)^2} \text{ when CBR < 10 on CL soils} \tag{4}$$

$$CBR\ (\%) = \frac{1}{0.002871 \times DPI} \text{ for CH soils} \tag{5}$$

The DPI of each layer was calculated as the ratio of the cumulative number of blows for each layer and the depth of the layer. These DPI values were used to determine the average CBR of each layer using the equations shown above. CBR of subgrade layers is denoted as CBR_{SG} and CBR of subbase layers is denoted as CBR_{SB} in this report.

Relative ratings of support conditions based for CBR values for subbase and subgrade layers per SUDAS (2013a) is provided in Table 2.

Figure 16. Dynamic cone penetrometer test

Table 2. Relative ratings of subbase and subgrade layers based on CBR values (SUDAS 2013a)

CBR (%)	Layer	Rating
> 80	Subbase	Excellent (E)
50 to 80	Subbase	Very Good (VG)
30 to 50	Subbase	Good (G)
20 to 30	Subgrade	Very Good (VG)
10 to 20	Subgrade	Fair to Good (F to G)
5 to 10	Subgrade	Poor to Fair (P to F)
< 5	Subgrade	Very Poor (VP)

Core Hole Permeameter

The core hole permeameter (CHP) is a test device that was recently developed at Iowa State University. The test procedure involves coring a 6 in. diameter hole in the PCC pavement down to the underlying support layer. The CHP device is inserted into the core hole and sealed at the bottom of the device and against the interior of the core hole at the bottom of the pavement. To seal the bottom of the CHP, an open cell foam ring is compressed under the CHP. By inflating a rubber tube between the outside of the CHP ring and the core hole wall, the perimeter of the CHP is sealed against the core hole wall. About 20 to 25 psi air pressure was used to inflate the rubber tube. Figure 17 shows the components of the CHP device and Figure 18 shows the field setup.

Tests are performed by filling the permeameter with water and recording the head loss with time for 1 minute intervals. Test readings are taken intermittently over a period of about 60 minutes or until the readings stabilize. Determination of the hydraulic conductivity was based on concepts from ASTM D6391-06 *"Standard for Field Measurement of Hydraulic Conductivity Limits of Porous Materials Using Two Stages of Infiltration from a Borehole"*. For each set of readings, the water temperature was measured to correct for the viscosity of the water.

Figure 17. Core hole permeameter (CHP) device and components.

Figure 18. Core hore permeability testing in situ

The following equations were used to calculate the in situ hydraulic conductivity using the CHP (K_{CHP}).

$$K_{CHP} = \frac{R_t G_1}{t_2 - t_1} \ln\left(\frac{H_1}{H_2}\right) \tag{6}$$

$$R_t = \frac{2.2902(0.9842^T)}{T^{0.1702}} \tag{7}$$

$$G_1 = \frac{\pi d^2}{11 D_1}\left[1 + \frac{a_1 d_1}{4 b_1}\right] \tag{8}$$

where, R_t = ratio of kinematic viscosity of permeant at temperature during time increment t_1 to t_2 to that of water at temperature (T) 68°F (20°C); T = Temperature, H_1 = effective head at time t_1; H_2 = effective head at time t_2; d = effective inside diameter of standpipe = 1.363 in. (3.461 cm) at top and 12.985 in. (32.9816 cm) at middle; d_1 = inside diameter of bottom casing = 5 in. (12.700 cm); a_1 = +1 for impermeable base with thickness b_1, 0 for infinite (i.e., 20 times D_1) depth of tested material, and -1 for permeable base with thickness b_1; b_1 = thickness of tested layer between bottom of device and top of underlying stratum.

CHP tests were conducted by taking measurements after about 1, 3, 5, 10, 15, 30, 40, and 60 minutes after the test is initiated. Generally, measurements showed decreasing permeability with time, indicating increasing saturation in the base material. Sometimes, the permeability values increased after a certain time due to erosion of base material or voids underneath the pavement. For comparison of K_{CHP} values between the test sites, the lowest permeability value is reported in this report.

Pavement Condition Index

Pavement condition index (PCI) was determined at each site by Snyder and Associates, Inc., research team in accordance with ASTM D6433-11 *"Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys"*. The PCI is a numerical indicator that rates the surface condition of the pavement, based on the distresses observed on the surface of the pavement. The PCI cannot measure the structural capacity. This measure is commonly used as a rational basis for determining maintenance and repair needs.

Field distress measurements were entered into an inventory management software called PAVER™ 6.5 developed by the United States Army Corps of Engineers, Construction Engineering Research Laboratory. Pavement rating based on the PCI values is provided in Figure 19.

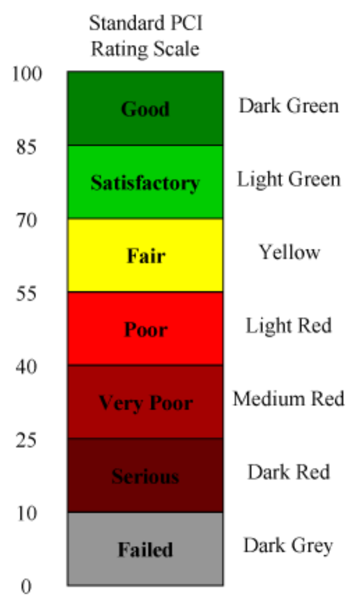


Figure 19. PCI rating scale used in PAVER™ 6.5

Estimation of Foundation Layer Design Input Parameters

The foundation layer design input parameters in rigid pavement design, per SUDAS and AASHTO (1993) include: (a) modulus of subgrade reaction k, (b) composite modulus of subgrade reaction k_{comp} (if subbase layer is present), (c) loss of support (LOS), and (d) coefficient of drainage C_d. It is also important to assess the frost-heave susceptibility rating of the foundation materials. The field and laboratory test results from this study were used to estimate these parameters as described below.

Previous research indicated that uniformity of pavement support conditions plays a critical role in long-term performance of PCC pavements (White et al. 2004). Uniformity of pavement support conditions is evaluated in this study based on FWD test results.

Modulus of Subgrade Reaction

In rigid pavement design, the foundation layer support is characterized by the modulus of subgrade reaction, *k* value. SUDAS rigid pavement design (SUDAS 2013b) suggests estimating the *k* value empirically using Eqs. 9 and 10, per Til et al. (1972) and AASHTO (1993), where M_r = resilient modulus of subgrade in psi.

$$M_r\ (psi) = 1941.49(CBR_{SG}^{0.684}) \tag{9}$$

$$k\ (pci) = \frac{M_r\ (psi)}{19.4} \tag{10}$$

Typical ranges for *k*, M_r, and CBR are provided in SUDAS (2013a) as summarized in Table 3.

Table 3. Typical ranges of *k*, Mr, and CBR for various soil types (SUDAS 2013a)

Type of Soil	**USCS Classification**	**Load Support and Drainage Characteristics**	***k* (pci)**	**M_r (psi)**	**CBR**
Crushed stone	GW, GP	Excellent support and drainage characteristics with no frost potential	220 to 250	> 5,700	30 to 80
Gravel	GW, GP	Excellent support and drainage characteristics with very slight frost potential	200 to 220	4,500 to 5,700	30 to 80
Silty gravel	GW-GM, GP-GM, and GM	Good support and fair drainage, characteristics with moderate frost potential	150 to 200	4,000 to 5,700	20 to 60
Sand	SW, SP, GP-GM, and GM	Good support and excellent drainage characteristics with very slight frost potential	150 to 200	4,000 to 5,700	10 to 40
Silty sand	SM, non-plastic, and >35% silt	Poor support and poor drainage with very high frost potential	100 to 150	2,700 to 4,000	5 to 30
Silty sand	SM, PI < 10, and < 35% silt	Poor support and fair to poor drainage with moderate to high frost potential	100 to 150	2,700 to 4,000	5 to 20
Silt	ML, > 50% silt, LL < 40, and PI < 10	Poor support and impervious drainage with very high frost potential	50 to 100	1,000 to 2,700	1 to 15
Clay	CL, LL > 40 and PI > 10	Very poor support and impervious drainage with very high frost potential	50 to 100	1,000 to 2,700	1 to 15

The k values determined using Eq. (10) based on DCP-CBR values are denoted as Static k_{DCP} in this study and are compared with the Static $k_{FWD\text{-}Corr}$ determined from FWD tests.

Composite Modulus of Subgrade Reaction

Composite modulus of subgrade reaction (k_{comp}) is determined if a subbase layer is used between the pavement and the subgrade layer. SUDAS (2013b) refers to AASHTO (1993) to estimate k_{comp}, which is based on a graphical procedure based on depth to a rigid layer beneath the subgrade. Figure 20 shows a graph to estimate k_{comp} based on M_r, subbase layer modulus (E_{SB}), and thickness of subbase (D_{SB}), for a semi-infinite depth of subgrade (i.e., > 10ft). E_{SB} is assumed as 30,000 psi in SUDAS (2013b), regardless of the material type and thickness.

For the field data collected in this study, Figure 20 was used to determine k_{comp} assuming a semi-infinite depth to subgrade at all sites (based on DCP-CBR profiles). E_{SB} was calculated based on correlations between subbase layer modulus and CBR from AASHTO (1993), as shown in Figure 21. Eq.11 was developed based on Figure 21, where CBR_{SB} was estimated from DCP tests.

$$E_{SB}\ (psi) = 4187.7 \times \ln(\mathrm{CBR}_{SB}) + 657.6 \tag{11}$$

In this study, the k_{comp} values are estimated using the following two procedures for comparison:

- Using Static $k_{FWD\text{-}Corr}$ determined from FWD test and converting the k value to M_r from Eq (10), E_{SB} from Eq. (11), and Figure 20, which is denoted as Static $k_{comp\text{-}FWD\text{-}Corr}$.
- Using Static k_{DCP} determined from DCP test and Eqs. (9) and (10), E_{SB} from Eq. (11), and Figure 20, which is denoted as Static $k_{comp\text{-}DCP}$.

In the design procedure, an effective k_{comp} value is estimated to account for seasonal variations. SUDAS (2013b) design procedure assumes frozen conditions for the months of December, January, and February, and spring thawing conditions for the months of March and April (with about 30% of normal strength) in estimating the effective k_{comp} value.

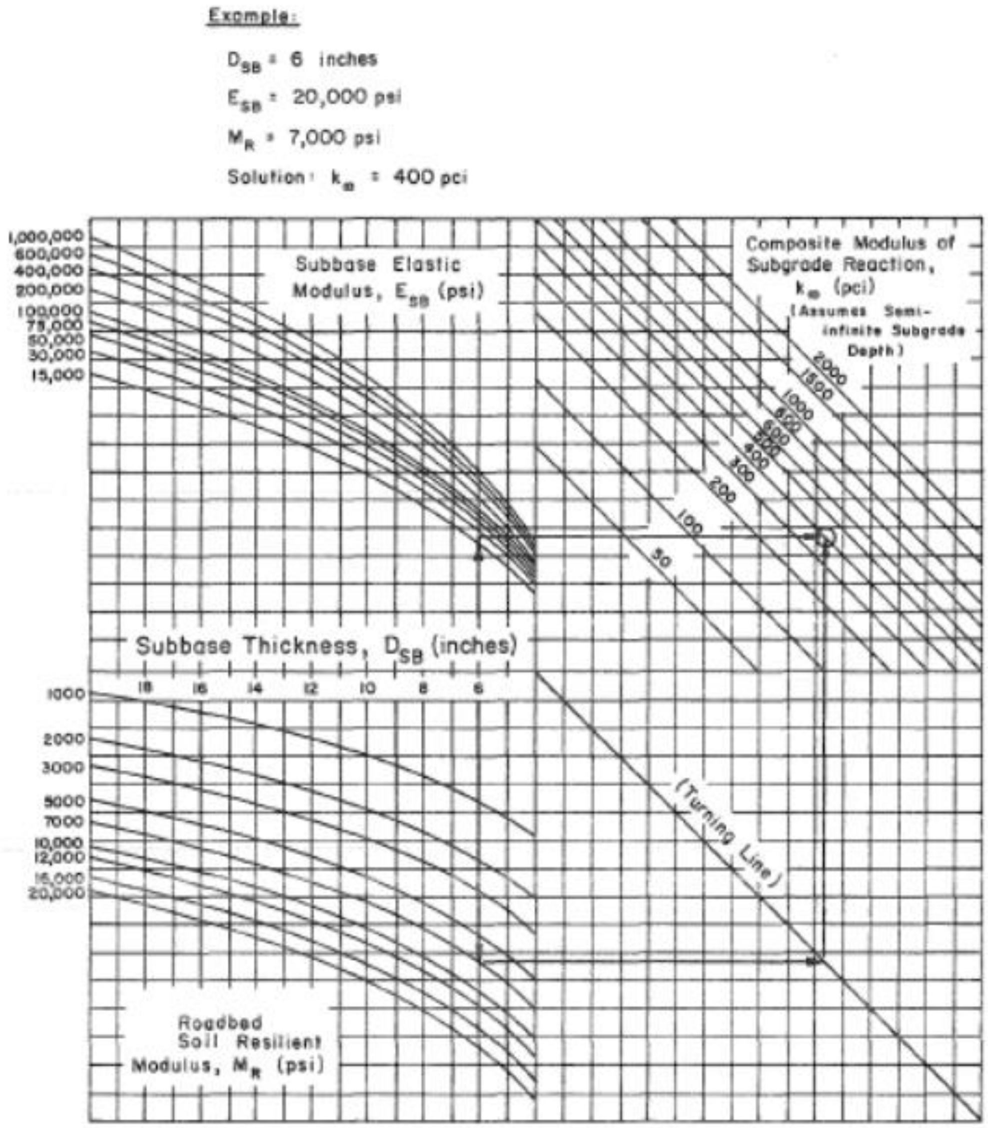


Figure 3.3. Chart for Estimating Composite Modulus of Subgrade Reaction, k_∞, Assuming a Semi-Infinite Subgrade Depth. (For practical purposes, a semi-infinite depth is considered to be greater than 10 feet below the surface of the subgrade.)

Figure 20. Chart for estimating composite modulus of subgrade reaction (k_{comp}) assuming a semi-infinite subgrade depth (from AASHTO 1993)

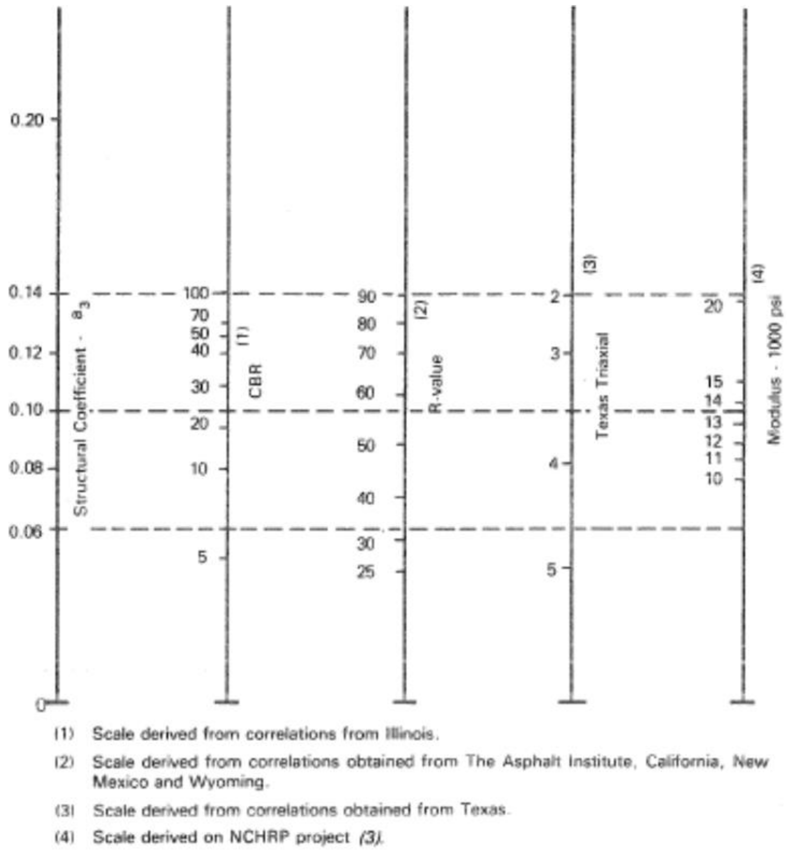


Figure 21. Chart to estimate modulus of subbase layer (E_{SB}) from CBR (from AASHTO 1993)

Loss of Support and Adjusted Modulus of Subgrade Reaction

Loss of support (LOS) factor is used in rigid pavement design to account for potential loss of support due to erosion of subbase materials and/or differential vertical movements beneath the pavement. AASHTO (1986) design guide presented a theoretical approach to evaluate the effects of loss of support on pavement performance. This factor defines the size of the area of pavement slab which experience a complete loss of support. Three different sizes and shapes of eroded areas are defined in the design guide to define the LOS factors (1, 2, and 3), as shown in Figure 22. It is indicated in the AASHTO (1986) design guide that the LOS factor is influenced by precipitation, amount of water on and under the pavement, erosion, cross slope, grades, joint patterns, scaling efficiency, subbase materials, subgrade, compaction, slab thicknesses, traffic loads, and number of load repetitions. AASHTO (1993) provides typical ranges of LOS factors for different stabilized and unstabilized materials based on work by McCullough and Elkins (1979), as shown in Table 4. SUDAS (2013b) uses LOS = 1 for natural materials and LOS = 0 for granular base materials. The effective k_{comp} value estimated from the procedure described above, is then adjusted to account for potential loss of support using Figure 23. Figure 23 illustrates that to achieve an adjusted effective k_{comp} value of 150 pci (minimum recommended value by the Iowa DOT for rigid pavement design), an effective k_{comp} value of 470 pci is required for the foundation layer, for a LOS = 1.

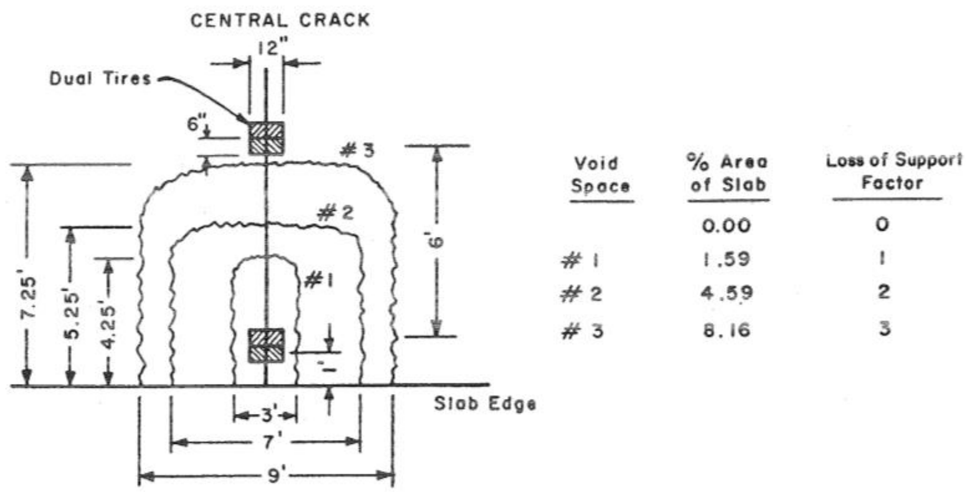


Figure 22. Slab and support conditions defining loss of support factors (from AASHTO 1986)

Table 4. Typical ranges of LS factors for different types of materials (AASHTO 1993)

Type of Material	Range of Modulus (psi)	LS Factor
Cement treated granular base	1,000,000 to 2,000,000	0.0 to 1.0
Cement aggregate mixtures	500,000 to 1,000,000	
Asphalt treated base	350,000 to 1,000,000	
Bituminous stabilized mixtures	40,000 to 300,000	
Lime Stabilized Materials	20,000 to 70,000	1.0 to 3.0
Unbound Granular Materials	15,000 to 45,000	
Fine Grained Subgrade Materials	3,000 to 40,000	2.0 to 3.0

In this study, the loss of support beneath pavements was evaluated from FWD tests by calculating the zero-load intercept value. As indicated earlier in the field test methods section of this report, AASHTO (1993) indicates that intercept > 2 mils indicates void underneath the pavement. In addition, loss of support was also evaluated based on observations during CHP tests, where erosion of material at the pavement/foundation layer interface was noticed due to sudden increase in permeability.

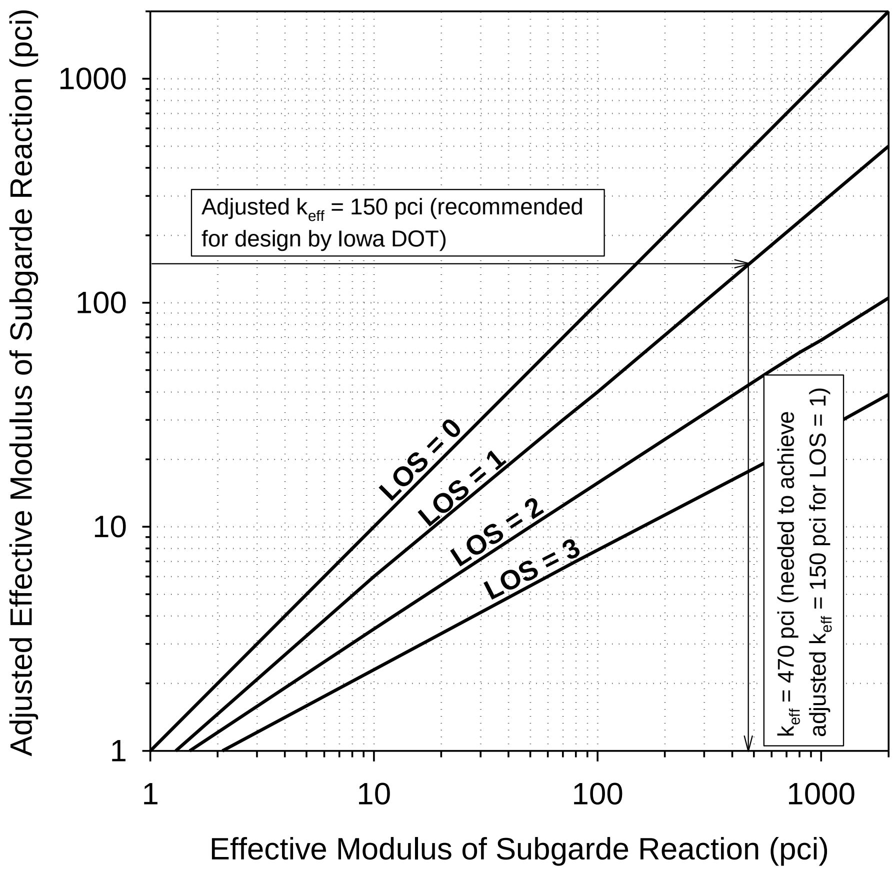


Figure 23. Chart for estimating adjusted or effective modulus of subgrade reaction (modified from AASHTO 1993)

Coefficient of Drainage

The coefficient of drainage (C_d) design parameter provides an indication of the quality of drainage, i.e., the time within which a prescribed amount of water can be removed from the pavement system. AASHTO (1993) suggests the criteria presented in Table 3, to assess the quality of drainage. The recommended C_d values from AASHTO (1993) for different amount of times the pavement structure is exposed to moisture levels approaching saturation is provided in Table 5. SUDAS (2013b) defines that at least 50% of drainage is occurred within the times shown in Table 5, to evaluate the quality of drainage. The procedure to estimate this time of drainage is provided in the following discussion. To estimate the C_d values, it is assumed in this study that the pavement structure is exposed to moisture levels approach saturation as > 25%. This assumption is reasonable as the subgrades in Iowa are wet for at least two months due to thawing and one to two months due to rain and high ground water tables.

Table 5. AASHTO (1993) drainage quality rating

Quality of Drainage	Water Removed Within
Excellent	2 hours
Good	1 day
Fair	1 week
Poor	1 month
Very Poor*	(water will not drain)

*Assumed as 90 days in estimating C_d value

Table 6. Recommended values of C_d for PCC pavement design (AASHTO 1993)

Quality of Drainage	Percent of Time Pavement Structure is Exposed to Moisture Levels Approaching Saturation			
	< 1%	1% - 5%	5% - 25%	> 25%
Excellent	1.25-1.20	1.20-1.15	1.15-1.10	1.10
Good	1.20-1.15	1.15-1.10	1.10-1.00	1.00
Fair	1.15-1.10	1.10-1.00	1.00-0.90	0.90
Poor	1.10-1.00	1.00-0.90	0.90-0.80	0.80
Very Poor	1.00-0.90	0.90-0.80	0.80-0.70	0.70

Procedure to Estimate Time of Drainage

Estimating the time within which the water is removed from the pavement system is dependent on the following factors: (a) pavement geometry, (b) degree of drainage required, (c) effective porosity of the drainage layer, (d) thickness of the drainage layer, and (e) coefficient of permeability of the drainage material. The calculations required estimating the time of drainage involves the following steps:

Step 1: Estimate the flow path gradient and flow path length based on pavement geometry (see Figure 24):

$$S = \sqrt{S_c^2 + g^2} \tag{9}$$

$$L = \frac{W}{2}\sqrt{1 + \left(\frac{g}{S_c}\right)^2} \tag{10}$$

where, S = flow path gradient (ft/ft) L = flow path length (ft), W = width of drainage layer including pavement and shoulders (between drainage outlets) (ft), S_c = cross slope (ft/ft), g = longitudinal gradient (ft/ft).

Step 2: Estimate the time factor based on the degree of drainage (Barber and Sawyer 1952):

$$T_f = \frac{c}{2}\left[S' + S' \times ln\left(\frac{2S' - 2US' + 1}{(2-2U)(S'+1)}\right)\right] - S'^2 \times ln\left(\frac{S'+1}{S'}\right) \rightarrow \text{for U} > 0.5 \quad (11)$$

$$T_f = \frac{c}{2}\left[2US' - S'^2 \times ln\left(\frac{S'+2U}{S}\right)\right] \rightarrow \text{for U} \leq 0.5 \quad (12)$$

where, T_f = time factor, U = degree (or percentage) of drainage required, S' = slope index = $H/(L \tan S)$, H = thickness of the drainage layer (ft), c = geometrical coefficient = $2.4 - 0.8/S^{1/3}$.

Step 3: Estimate the time required for the drainage (Barber and Sawyer 1952):

$$t = T_f \times \frac{n_e L^2}{K_{sat}\, H} \quad (13)$$

where, t = time of drainage (days), n_e = effective porosity of the material, K_{sat} = saturated hydraulic conductivity (ft/day).

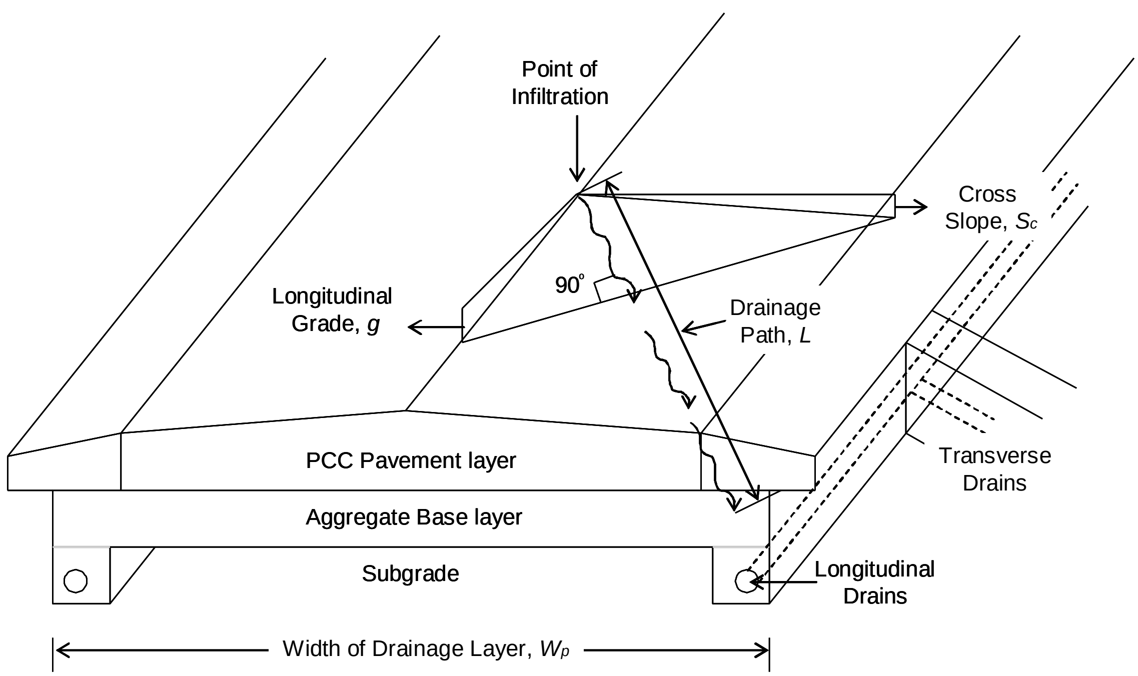


Figure 24. Typical cross-section showing drainage system in a PCC pavement (reproduced from Moulton, 1980)

The effective porosity, n_e, is defined as the ratio of the volume of water that drains under gravity to the total volume of the sample (FAA 2008, FHWA 1992). The value is smaller than the porosity (n) value. The difference between n and n_e is larger for fine-gradined materials (i.e., silts and clays) because of disconnected pores through which the water can travel, and smaller for coarse-grained materials (sands and gravels). Table 4 shows a summary of typical n_e values reported in literature for various materials.

Table 7. Summary of typical effective porosity values

Material	Typical n_e value	Reference
Glacial till (21% clay content)	0.04	Horton et al. (1988)
Loess (35% clay content)	0.08	
Paleosol (44% clay content)	0.09	
Well graded base course material	0.15	FAA (2008)
Uniform graded medium coarse sands	0.25	
Open graded aggregates	0.25 to 0.35	

Pavement Drainage Estimator to Estimate Time of Drainage

An EXCEL based Visual Basic program was developed at Iowa State University (Vennapusa 2004) called the Pavement Drainage Estimator (PED v1.0) using the calculations described above to quickly determine the time for required amount of drainage. This program was used in this study to estimate the time for drainage, and consequently the C_d based on Table 5 and Table 6.

Some of the field sites tested in this study included edge drains while some did not. Where there were no edge drains, either the base layers are daylighted or there was no subsurface drainage system (i.e., curb and gutter pavements). Determination of parameter *W* in Eq. 8, which defines the extent at which the water is out of the pavement system, is straight forward for sites with edge drains and sites with day lighted drainage (*W* is assumed as the width of the pavement for those cases). For sites with no subsurface drainage system, the water is expected to either drain down through the subgrade layers or travel longer distances laterally to drain out of the pavement system. Figure 25 illustrates the sensitivity of *W* in determining the time for achieving 50% drainage for materials with different K_{sat} values. For curb and gutter situation, *W* is assumed to be 2 times the width of the pavement, as an approximate estimate.

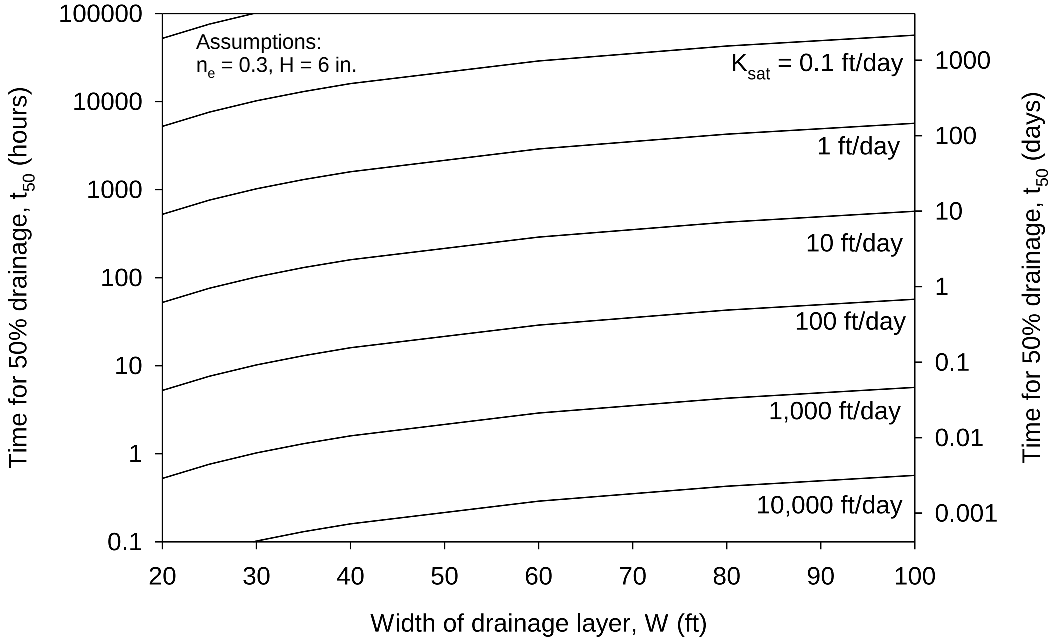


Figure 25. Relationship between width of drainage layer and time for 50% drainage

Saturated Hydraulic Conductivity

Hydraulic conductivity of the foundation layer materials was directly measured in situ using the CHP and was also estimated based on empirical relationships with soil gradation and classification parameters. Empirical Eqs. 14 and 15 were used to estimate the K_{Sat} values of granular non-plastic and plastic materials, respectively (Zapata and Houston 2008).

$$K_{Sat}\ (ft/day) = 10^{-6} \times 10^{\left(5.3D_{10}+0.049D_{60}+0.0092\frac{D_{60}}{D_{10}}-0.1P_{200}+1.5\right)} \times 2834 \quad (14)$$

$$K_{Sat}\ (ft/day) = 2\ \times 10^{(-0.1\times P_{200}PI-6)} \times 2834 \quad (15)$$

where, D_{10} = particle size at 10% passing (mm), D_{60} = particle size at 60% passing, P_{200} = percentage of material passing the No. 200 sieve (in decimal), PI = plasticity index in percentage.

Figure 26 shows the data used in developing Eqs. 14 and 15. These equations are currently incorporated in the Mechanistic Empirical Pavement Design Guide (MEPDG). It must be noted that Eq. 14 was developed based on a dataset with K_{sat} ranging from 2.8E-3 to 28 ft/day and Eq. 15 was developed based on a dataset with K_{sat} ranging from 2.8E-5 to 2.8E-2 ft/day. Zapata and Houston (2008) reported coefficient of determination (R^2) values for Eq. 14 as 0.82 and -10.6 for Eq. 14, and a combined R^2 of 0.83, between the measured and predicted values. The procedure used for measuring Ksat is not described in Zapata and Houston (2008). It is indicated therein the empirical relationships will only produce a crude estimate of K_{sat} and that if a good estimate of drainage is required, it must be measured directly.

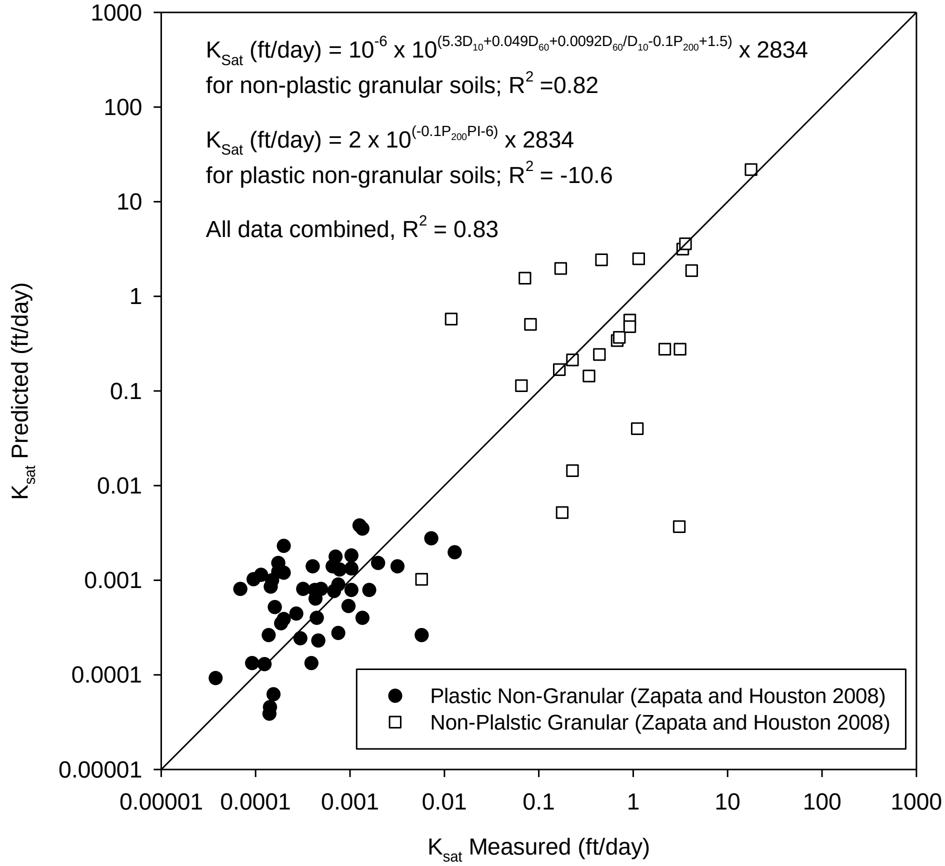


Figure 26. Empirical relationships between K_{Sat} measured and K_{Sat} predicted from empirical models (reproduced from Zapata and Houston 2008)

Some typical recommended values for hydraulic conductivity for granular bases are reported in the literature. The ACPA (2008) recommends a target hydraulic conductivity of 60 to 120 ft/day for drainable bases. Hall et al. (2005) reported that a hydraulic conductivity range of 350 to 1500 ft/day is adequate for cement stabilized permeable bases. Corvetti and Dempsey (1991) reported that open graded drainage layer should have hydraulic conductivity values greater than 1000 ft/day and for extreme cases greater than 5000 ft/day. NCHRP (2004) requires permeable bases have a minimum hydraulic conductivity of 1000 ft/day.

Frost-Heave Susceptibility Rating

The Joint Departments of Army and Air Force (1985) states that "*the detrimental effects of frost action in subsurface materials are manifested by non-uniform heave of pavements during the winter and by loss of strength of affected soils during the ensuing thaw period".* Based on a temperature profile data available under a roadway in Plainfield, Iowa, Johnson (2012) presented the annual number of freeze-thaw (F/T) cycles occurred in 2010-2011 winter as shown in Figure 28, which showed F/T cycles on the order of 40 to 50 at the top of the foundation layer. It is therefore important to ensure materials that are susceptible to frost-heave and thaw-weakening are not present under the pavements.

A frost heave susceptibility rating based on percent finer than 0.02 mm and USCS soil classification of the material is developed by the Joint Departments of Army and Air Force (1985), as shown in Figure 28. This figure was developed based on tests conducted on 16 soil samples by Chamberlain (1981) as shown in Table 5. AASHTO (1993) adopted this rating system to classify frost-susceptibility of foundation materials. This rating system was used to rate the foundation materials in the field sites in this study, based on soil classification results and percent finer than 0.02 mm.

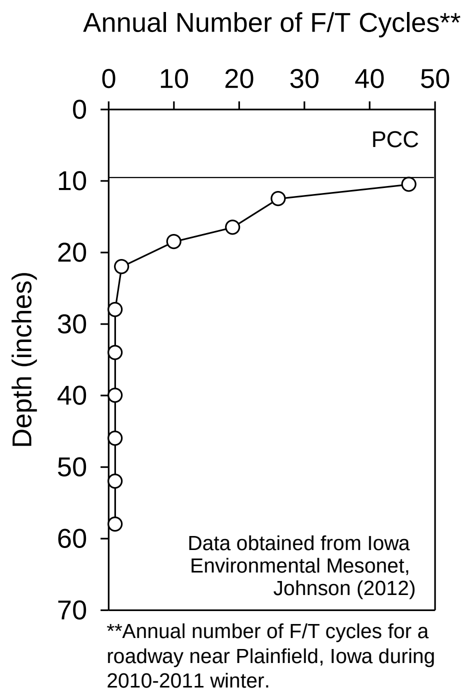


Figure 27. Annual number of F/T cycles recorded under a pavement near Plainfield, Iowa during winter 2010-2011

ASTM D5918 describes a standard method to determine frost heave and thaw weakening susceptibility of soils, but the test is rarely performed in practice due to the cost involved with the experimental setup. The ASTM standard has a different frost-heave susceptibility rating system than the one presented in Figure 28, and is based on the heave rate and the California bearing ratio of the sample after thawing. Johnson (2012) recently conducted these tests on 18 unstabilized granular and non-granular materials and cement and fly ash stabilized loess. Results from that study are summarized in Tables 6 and 7. Johnson (2012) provided the following key conclusions from his study:

- CL materials showed frost-heave rates between 0.17 and 0.49 in./day; ML materials showed rates between 0.43 and 0.75 in./day; SC materials showed rates between 0.31 and 0.52 in./day; and samples with classifications from GM to GW had rates between 0.07 and 0.31 in./day. The results showed that variable frost-heave rates can be expected for materials with the same soil classifications and that not all granular materials are non-frost-susceptible.

- The frost-heave rates for 6 of the 8 samples with USCS classifications between GM and GW were higher during the first freeze than the second. A SP classified material also showed a decrease in heave-rate during the second cycle. The remaining 11 materials tested showed a higher heave rate during the second freezing cycle compared to the first.
- No frost-heave was observed on cement-stabilized loess and 7 of the 8 samples tested had CBR values over 100%. The cement-stabilized samples with low initial moisture contents showed moisture content changes of up to 15.8%, which shows that stabilized materials can become saturated and yet remain non-frost-susceptible. Fly ash-stabilized samples heaved, with some samples heaving as much or more than unstabilized loess. Generally, the frost-heave rate decreased as the fly ash content increased and the CBR value increased as the fly ash content increased.

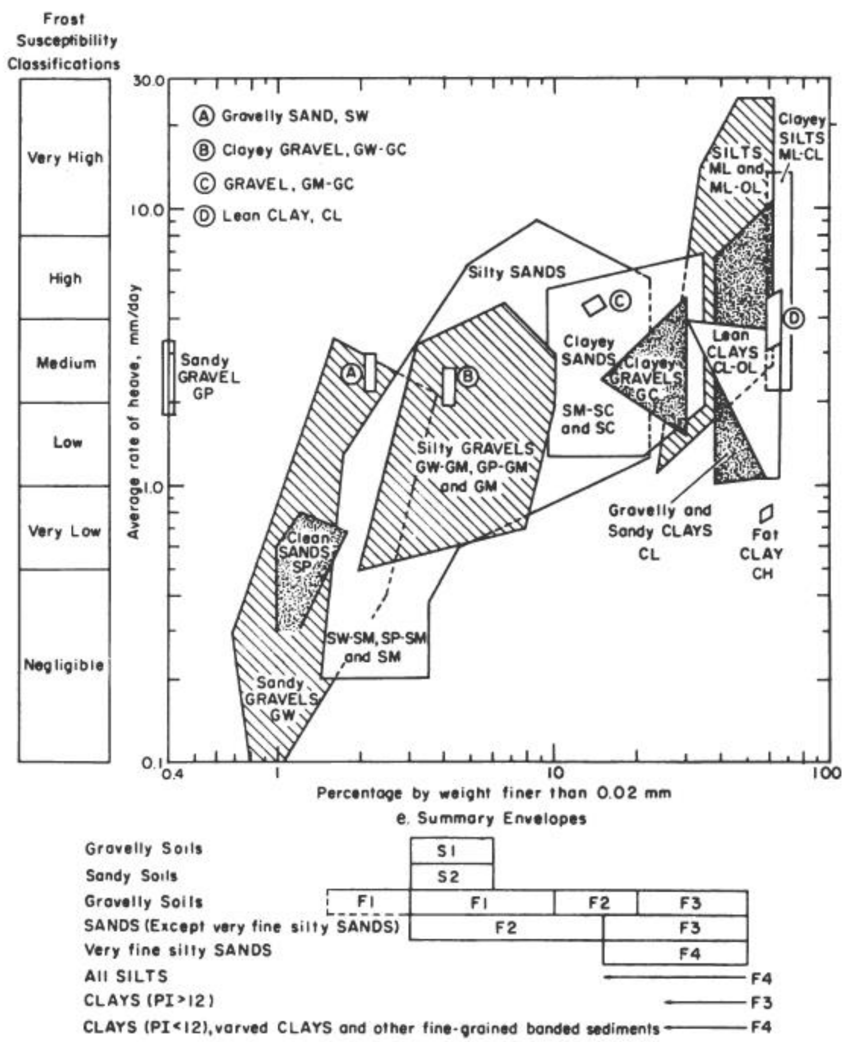


Figure 28. Frost susceptibility of soils (Joint Departments of Army and Air Force 1985)

Table 8. Summary of frost susceptibility rating and frost groups of various materials (Chamberlain 1981)

Frost susceptibility	Frost group	Type of Material	Amount finer than 0.02 mm (% by weight)	USCS soil classification
Negligible to low	NFS*	Gravels	0-1.5	GW, GP
		Sands	0-3	SW,SP
Possible	PFS**	Gravels	1.5-3	GW, GP
		Sands	3-10	SW, SP
Low to medium	S1	Sands	3-6	GW, GP, GW-GM, GP-GM
Very low to high	S2	Sands	3-6	SW,SP, SW-SM, SP-SM
Very low to high	F1	Gravels	6-10	GM, GW-GM, GP-GM
Medium to high	F2	Gravels	10-20	GM, GM-GC, GW-GM, GP-GM
Very low to very high	F2	Sands	6-15	SM, SW-SM, SP-SM
Medium to high	F3	Gravels	> 20	GM, GC
Low to high	F3	Sands except very fine silty sands	> 15	SM, SC
Very low to very high	F3	Clays, PI > 12	—	CL, CH
Low to very high	F4	All silts	—	ML, MH
Very low to high	F4	Very fine silty sands	> 15	SM
Low to very high	F4	Clays, PI < 12	—	CL, CL-ML
Very low to very high	F4	Varved clays and other fine-grained, banded sediments	—	CL and ML; CL, ML and SM; CL, CH, and ML; CL, CH, ML and SM

*Non-frost-susceptible; **Requires laboratory frost-heave test to determine frost susceptibility

Table 9. Summary of frost-heave and thaw-weakening tests performed on unstabilized materials according to ASTM D5918 (Johnson 2012)

Material	USCS	Standard CBR (%)	Thawed CBR (%)	Average 2nd frost-heave rate (mm/day)	Average w% change	Thaw-weakening susceptibility rating	Frost-heave susceptibility rating
IA I-29 lean clay subgrade	CL	21.8	0.7	12.4	9.4 ^{x}	Very high	High
PA US-22 sandy lean clay subgrade	CL	21.1	3.0	4.3	3.8 ^{x}	High	Medium
WI US-10 sandy lean clay subgrade	CL	25.9	7.2	5.5	5.0 ^{x}	Medium	Medium
IA I-29 silt with sand subgrade	ML	21.6	1.4	11.0	6.9 ^{x}	Very high	High
Loess	ML	10.0	0.5	19.1	7.7 ^{x}	Very high	Very high
IA US-30 clayey sand subgrade	SC	8.4	2.7	7.8	1.7 ^{x}	High	Medium
MI I-96 clayey sand subgrade	SC	26.3	5.8	13.1	1.6 ^{x}	Medium	High
160th Street poorly graded sand with silt and gravel	SP-SM	65.1	28.9	11.5	-0.5 ^{x}	Negligible	High
160th Street well graded sand with silt and gravel	SW-SM	39.7	15.0	13.4	0.1 ^{x}	Very low	High
Manatts concrete sand subbase	SP	9.4	8.1	0.9*	10.4	Medium	Negligible
IA US-30 RPCC subbase	GM	70.3	33.3	6.1*	4.4	Negligible	Medium
IA US-30 RPCC/RAP subbase	GP-GM	40.6	37.6	5.4*	-0.8	Negligible	Medium
IA US-30 limestone subbase	GP-GM	70.5	33.2	6.4	0.0	Negligible	Medium
Martin Marietta crushed limestone subbase	GP-GM	87.3	47.5	8.0	0.7	Negligible	High
IA US-30 RPCC subbase modified (half of fines removed)	GP	—	39.2	6.1*	3.1	Negligible	Medium
IA US-30 RPCC subbase modified (all fines removed)	GP	—	35.5	6.1*	3.7	Negligible	Medium
Manatts RAP subbase	GW	11.6	8.7	1.8*	7.4	Medium	Very low
Manatts RPCC/RAP subbase	GW	48.2	33.2	1.9*	8.5	Negligible	Very low

*Average 1st frost-heave rate is higher than 2nd
^{x} Placed at optimum moisture content

Table 10. Summary of frost-heave and thaw-weakening tests performed on cement and fly ash stabilized loess according to ASTM D5918 (Johnson 2012)

Material	Initial moisture content (%)	Stabilizer Content	Thawed CBR (%)	Average 2^{nd} frost-heave rate (mm/day)	Average moisture content change (%)	Thaw-weakening susceptibility rating	Frost-heave susceptibility rating
Cement + Loess	13	3	71.6	0	15.8	Negligible	Negligible
	20	3	>100	0	3.2	Negligible	Negligible
	20	5	>100	0	5.6	Negligible	Negligible
	20	7	>100	0	5.1	Negligible	Negligible
	13	9	>100	0	14.9	Negligible	Negligible
	20	9	>100	0	4.9	Negligible	Negligible
	20	11	>100	0	5.4	Negligible	Negligible
	22	13	>100	0	3.0	Negligible	Negligible
Fly Ash + Loess	10	10	3.8	15.8	21.9	High	High
	19	10	5.0	22.2	7.5	High	Very high
	19	15	7.1	14.1	12.2	Medium	High
	22	20	25.5	11.0	5.3	Negligible	High

Uniformity of Pavement Support Conditions

Uniformity of pavement support conditions is rated in this study based on the coefficient of variation (COV) of the $k_{c\text{-}FWD}$ values observed from each site. The rating system is summarized in Table 11 and based on previous experience.

Table 11. Uniformity rating pavement support conditions (developed for this study)

COV (%) of $k_{c\text{-}FWD}$	Rating
10%	Excellent
10% - 25%	Very Good
25% - 40%	Good
40% - 55%	Fair
> 55%	Poor

CHAPTER 4: MATERIALS

This chapter describes the laboratory soil classification and index parameters for pavement foundation materials collected at each site. Samples were collected from core hole samples at each site by excavating with hand tools. Table 12 to Table 18 provides a summary of the laboratory test results. Pictures of soil samples collected from field are shown in Figure 29 to Figure 33. Particle size distribution curves of subgrade and subbase materials are shown in Figure 34. Results indicated that the subgrade material gradations are more variable than subbase material gradations. For example, the percent fines content (passing the No. 200 sieve) for subgrade materials varied from about 34% to 97% for subgrade materials, while it varied from about 5% to 20% for subbase materials. Raw data files from particle size analysis and Atterberg limits tests are provided in Appendix A.

Table 19 presents the frost susceptibility ratings of the subgrade and subbase materials collected from this study, based on USCS soil classification and percent finer than 0.02 mm per Joint Departments of Army and Air Force (1985). For a few granular subbase samples that did not have percent finer than 0.02 mm data, rating was estimated based on just the USCS classification.

Table 20 summarizes the estimated saturated hydraulic conductivity values based on empirical relationships (Eqs. 14 and 15), for both subgrade and subbase materials. D_{10} information was not available for a few granular subbase materials, and therefore, the saturated hydraulic conductivity values could not be estimated.

Table 21 provides a summary of PCC compressive strengths of core samples collected from the field test sites.

Table 12. Summary of laboratory test results

Parameter	NW 3rd and Greenwood, Ankeny	NW 5th and Greenwood, Ankeny	E63, Story County	
Sample ID	Core # 2 8.5 to 19 in. Subgrade	Core # 2 8.25 to 14 in. Subgrade	Core # 1 8.5 to 22 in. Subgrade	Core # 3 8 to 23 in. Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Dark Yellowish Brown Clayey Sand	Black Lean Clay with Sand	Brown Clayey Sand	Very Dark Brown Lean Clay with Sand
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	3	0	6	1
Sand Content (%) (4.75mm – 75μm)	63	29	52	34
Silt Content (%) (75μm – 2μm)	23	47	27	45
Clay Content (%) (< 2μm)	11	24	15	20
Fines Content (%) (<75μm)	34	71	42	65
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]
D_{30} (mm)	0.0532	0.0049	0.0236	0.0047
D_{60} (mm)	0.2370	0.0423	0.02066	0.0440
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	26	46	24	46
Plasticity Index, PI (%)	13	24	7	33
AASHTO Classification (ASTM D3282-09)	A-2-6(1)	A-7-6(16)	A-4	A-7-6(18)
USCS Classification (ASTM D2487-10)	SC	CL	SC	CL
In Situ Moisture Content (%) (ASTM D2216-10)	7.6	20.1	8.7	17.7

[a]Hydrometer test not performed
[b]Cannot be determined

Table 13. Summary of laboratory test results (contd.)

Parameter	Riverside Road, Ames	E23, Story County	SW Westlawn, Ankeny	
Sample ID	Core # 1 11 to 17 in. Crushed Limestone Subbase	Core #1 6.75 to 11 in. Subgrade	Core # 1 Crushed Limestone Subbase	Core # 1 Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Light Brownish Gray Silty Gravel with Sand	Very Dark Gray Lean Clay with Sand	Light Gray Poorly Graded Gravel with Silt and Sand	Grayish Brown Clayey Sand
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	49	1	56	8
Sand Content (%) (4.75mm – 75µm)	38	35	35	43
Silt Content (%) (75µm – 2µm)	—[a]	41	—[a]	33
Clay Content (%) (< 2µm)		23		16
Fines Content (%) (<75µm)	13	64	9	49
D_{10} (mm)	—[b]	—[b]	0.1062	—[b]
D_{30} (mm)	1.5105	0.0066	2.5415	0.0166
D_{60} (mm)	6.1207	0.0599	8.9820	0.1736
Coefficient of Uniformity, c_u	—[b]	—[b]	84.61	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	6.77	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	Non Plastic	37	Non Plastic	29
Plasticity Index, PI (%)		13		14
AASHTO Classification (ASTM D3282-09)	A-1-a	A-6(7)	A-1-a	A-6(3)
USCS Classification (ASTM D2487-10)	GM	CL	GP-GM	SC
In Situ Moisture Content (%) (ASTM D2216-10)	Not Performed	16.7	Not Performed	12.0

[a]Hydrometer test not performed
[b]Cannot be determined

Table 14. Summary of laboratory test results (contd.)

Parameter	SW Logan, Ankeny		West Main, Knoxville	South 5th, Knoxville
Sample ID	Core # 1 Crushed Limestone Subbase	Core # 1 Subgrade	Core # 1 Crushed Limestone Subbase	Core # 1 Crushed Limestone Subbase
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Light Gray Well Graded Gravel with Silt and Sand	Pale Yellow Silt (fly ash stabilized)	Light Gray Silty Gravel with Sand	Light Gray Silty Gravel with Sand
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	48	2	54	49
Sand Content (%) (4.75mm – 75µm)	43	41	26	30
Silt Content (%) (75µm – 2µm)	—[a]	42	—[a]	—[a]
Clay Content (%) (< 2µm)		15		
Fines Content (%) (<75µm)	9	57	20	21
D_{10} (mm)	0.0901	—[b]	—[b]	—[b]
D_{30} (mm)	0.8616	0.0103	1.0932	0.7141
D_{60} (mm)	7.4111	0.0943	9.0175	7.4654
Coefficient of Uniformity, c_u	82.26	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	1.11	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	Non Plastic	30	Non Plastic	Non Plastic
Plasticity Index, PI (%)		5		
AASHTO Classification (ASTM D3282-09)	A-1-a	A-4(1)	A-1-b	A-1-b
USCS Classification (ASTM D2487-10)	GW-GM	ML	GM	GM
In Situ Moisture Content (%) (ASTM D2216-10)	Not Performed	15.2	Not Performed	Not Performed

[a]Hydrometer test not performed
[b]Cannot be determined

Table 15. Summary of laboratory test results (contd.)

Parameter	Valley View Drive, Council Bluffs			
Sample ID	Core # 1 9 to 15 in Crushed Limestone Subbase	Core # 2 9 to 16 in. Recycled PCC Subbase	Core # 1 15 to 18 in Subgrade	Core # 2 16 to 18 in Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Gray Silty Gravel with Sand	Light Brownish Gray Poorly Graded Sand with Silt and Gravel	Olive Brown Lean Clay	Olive Brown Silt
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	51	36	3	4
Sand Content (%) (4.75mm – 75μm)	33	59	9	6
Silt Content (%) (75μm – 2μm)	—[a]	—[a]	70	70
Clay Content (%) (< 2μm)			18	20
Fines Content (%) (<75μm)	16	5	88	90
D_{10} (mm)	—[b]	0.2187	—[b]	—[b]
D_{30} (mm)	1.3838	0.9231	0.0112	0.0110
D_{60} (mm)	7.3655	3.9040	0.0342	0.0346
Coefficient of Uniformity, c_u	—[b]	17.85	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	1.00	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	Non Plastic	Non Plastic	36	34
Plasticity Index, PI (%)			13	9
AASHTO Classification (ASTM D3282-09)	A-1-b	A-1-a	A-6(12)	A-4(9)
USCS Classification (ASTM D2487-10)	GM	SP-SM	CL	ML
In Situ Moisture Content (%) (ASTM D2216-10)	Not Performed	Not Performed	14.4	14.1

[a]Hydrometer test not performed
[b]Cannot be determined

Table 16. Summary of laboratory test results (contd.)

Parameter	9th Avenue, Council Bluffs		Cliff Rd (Site A), Burlington	
Sample ID	Core # 1 8 to 17 in. Fly Ash Stabilized Subgrade	Core # 1 17 to 27 in. Subgrade	Core # 1 6 to 11.5 in. Crushed Limestone Subbase	Core # 1 11.5 to 20 in. Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Very Dark Gray Sandy Silt (fly ash stabilized)	Dark Brown Fat Clay	Light Brownish Gray Silty Gravel with Sand	Very Dark Gray Silt
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	9	1	48	1
Sand Content (%) (4.75mm – 75µm)	35	6	37	8
Silt Content (%) (75µm – 2µm)	37	57	—[a]	69
Clay Content (%) (< 2µm)	19	36		22
Fines Content (%) (<75µm)	56	93	15	91
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]
D_{30} (mm)	0.0082	—	1.5547	0.0044
D_{60} (mm)	0.1746	0.0212	6.1654	0.0146
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	45	68	Non Plastic	35
Plasticity Index, PI (%)	9	38		10
AASHTO Classification (ASTM D3282-09)	ML	CH	A-1-a	A-4(10)
USCS Classification (ASTM D2487-10)	A-5(4)	A-7-5(42)	GM	ML
In Situ Moisture Content (%) (ASTM D2216-10)	24.1	26.0	Not Performed	18.6

[a]Hydrometer test not performed
[b]Cannot be determined

Table 17. Summary of laboratory test results (contd.)

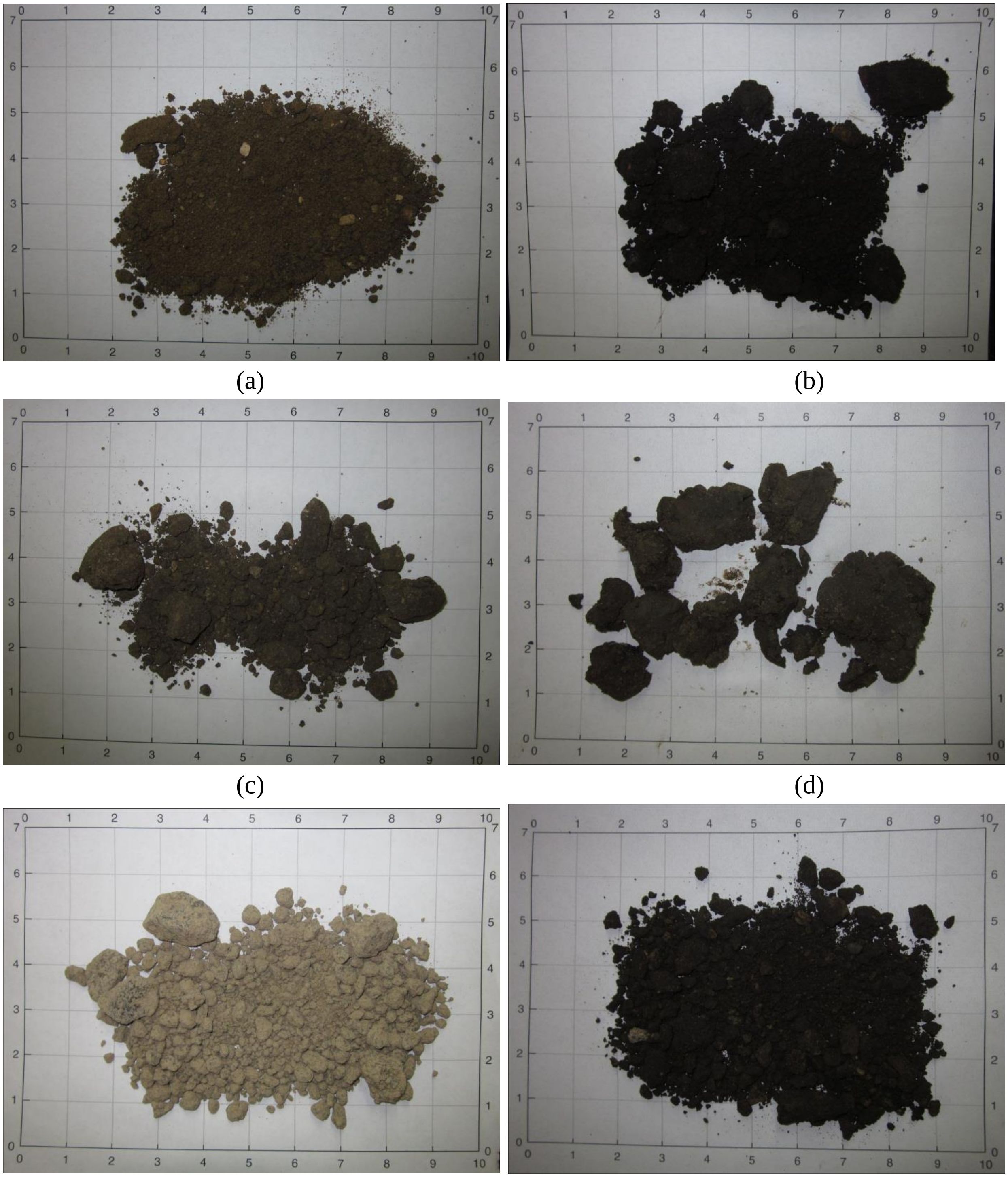
Parameter	Cliff Rd (Site B), Burlington		Meadowbrook Dr., Burlington	
Sample ID	Core # 1 8 to 11.75 in Crushed Limestone Subbase	Core # 1 11.75 to 24 in Subgrade	Core # 1 6.5 to 10.5 in Crushed Limestone Subbase	Core # 1 10.5 to 21 in Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Gray Poorly Graded Gravel with Silt and Sand	Very Dark Grayish Brown Fat Clay	Pale Yellow Silty Gravel with Sand	Dark Yellowish Brown Lean Clay
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	59	0	61	2
Sand Content (%) (4.75mm – 75µm)	29	4	26	12
Silt Content (%) (75µm – 2µm)	—[a]	62	—[a]	60
Clay Content (%) (< 2µm)		34		26
Fines Content (%) (<75µm)	12	96	13	86
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]
D_{30} (mm)	2.9744	—	2.9607	0.0037
D_{60} (mm)	7.9831	0.0120	12.1126	0.0187
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	Non Plastic	52	Non Plastic	39
Plasticity Index, PI (%)		28		15
AASHTO Classification (ASTM D3282-09)	A-1-a	A-7-6(30)	A-1-a	A-6(13)
USCS Classification (ASTM D2487-10)	GP-GM	CH	GM	CL
In Situ Moisture Content (%) (ASTM D2216-10)	Not Performed	28.9	Not Performed	14.8

[a]Hydrometer test not performed
[b]Cannot be determined

Table 18. Summary of laboratory test results (contd.)

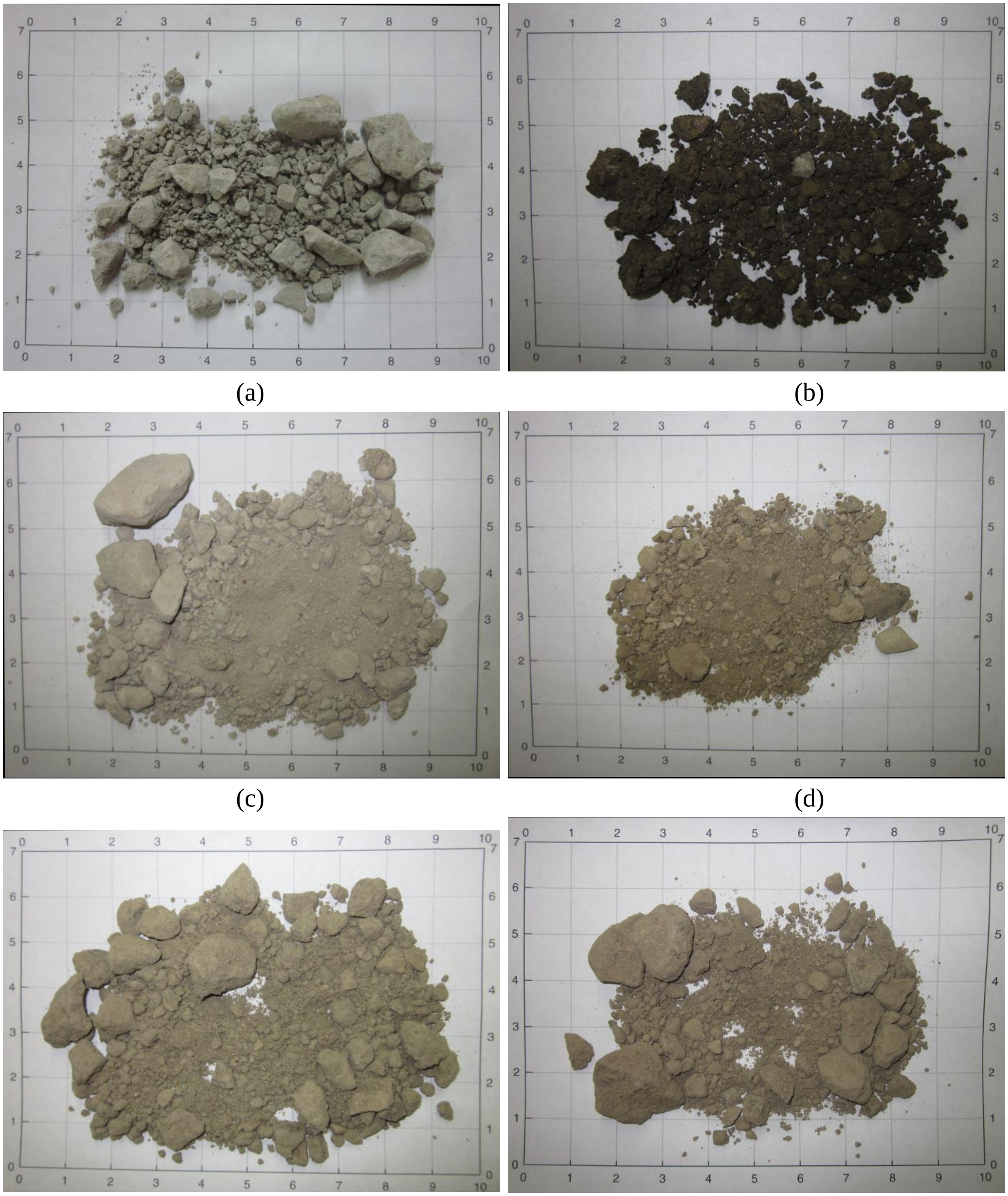
Parameter	W38 Locust Rd, Winneshiek County			175th Street, Winneshiek County
Sample ID	Core #2 0 to 2 in. Crushed Limestone Choke Stone	Core # 1 3 to 12 in. Crushed Limestone Subbase	Core # 2 2 to 7 in. Crushed Limestone Subbase	Core # 1 Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Pale Yellow Silty Gravel with Sand	Light Gray Silty Gravel with Sand	Light Gray Silty Gravel withy Sand	Very Dark Grayish Brown Lean Clay with Sand
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)				
Gravel Content (%) (> 4.75mm)	45	42	44	6
Sand Content (%) (4.75mm – 75μm)	39	40	40	24
Silt Content (%) (75μm – 2μm)	—[a]	—[a]	—[a]	54
Clay Content (%) (< 2μm)				16
Fines Content (%) (<75μm)	16	18	16	70
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]
D_{30} (mm)	1.1411	0.08286	1.0105	0.0134
D_{60} (mm)	5.7516	5.2978	5.6496	0.0530
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)				
Liquid Limit, LL (%)	Non Plastic	Non Plastic	Non Plastic	28
Plasticity Index, PI (%)				9
AASHTO Classification (ASTM D3282-09)	A-1-b	A-1-b	A-1-b	A-4(4)
USCS Classification (ASTM D2487-10)	GM	GM	GM	CL
In Situ Moisture Content (%) (ASTM D2216-10)	Not Performed	Not Performed	Not Performed	11.3

[a]Hydrometer test not performed
[b]Cannot be determined



(a) (b) (c) (d) (e) (f)

Figure 29. (a) Subgrade sample at *w* = 7.6% from NW 3rd St. and Greenwood Dr., Ankeny, (b) subgrade sample at *w* = 20.1% from NW 5rd St. and Greenwood Dr., Ankeny, (c) subgrade sample at *w* = 8.7% from E63, Story County, (d) subgrade sample at *w* = 17.7% from E63, Story County, (e) subbase sample from Riverside Road, Ames, (f) subgrade sample at *w* = 16.7% from E23, Story County



(a) (b) (c) (d) (e) (f)

Figure 30. (a) Subbase sample from SW Westlawn Dr., Ankeny (b) subgrade sample at w = 12% from SW Westlawn Dr., Ankeny, (c) Subbase sample from SW Logan St., Ankeny, (d) subgrade sample at w = 15.2% from SW Logan St., Ankeny, (e) Subbase sample from West Main St., Knoxville, and (f) Subbase sample from South 5th St., Knoxville

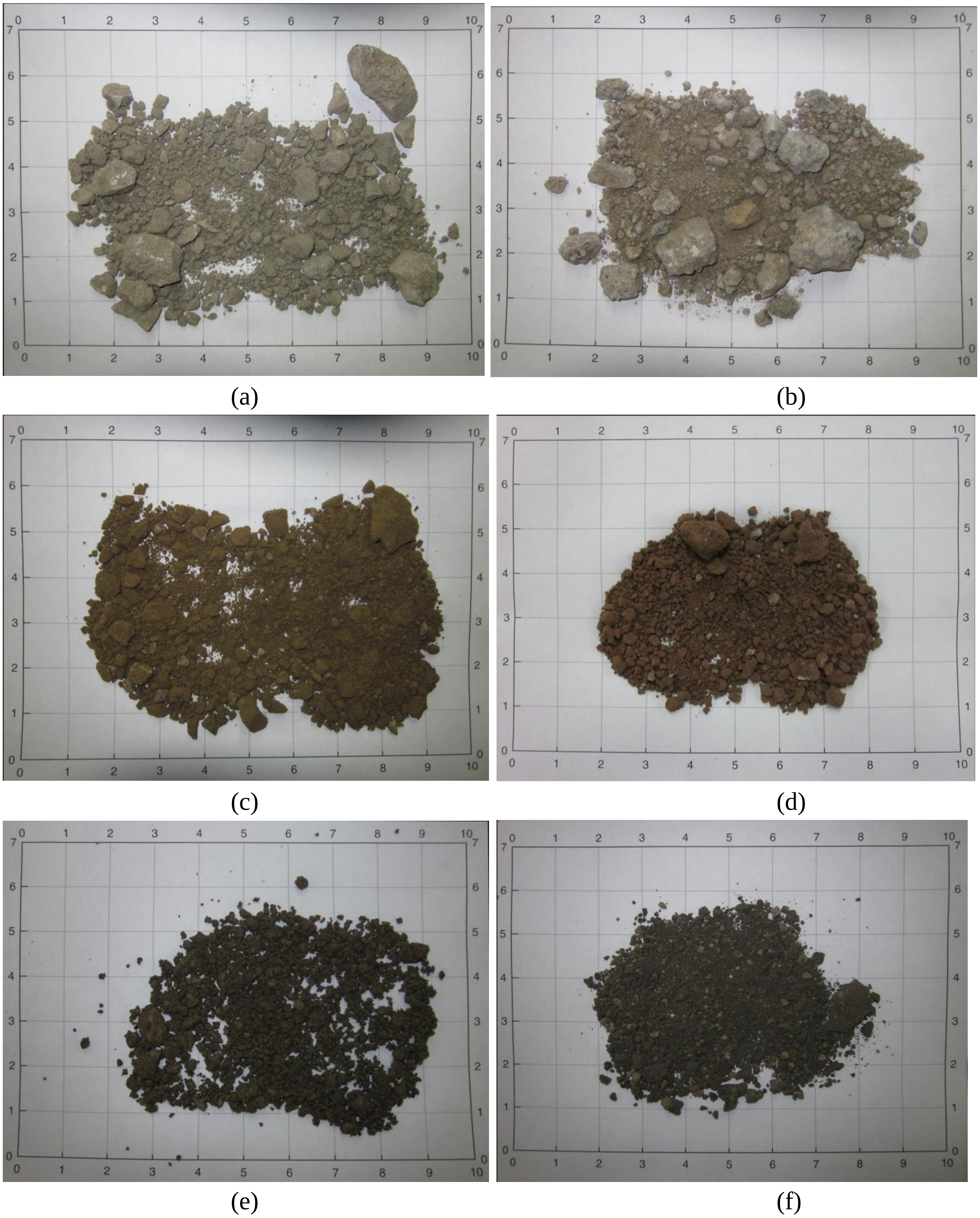


Figure 31. (a) Subbase (crushed limestone) sample (b) subbase (crushed PCC) sample, (c) subgrade sample from Core # 1 at *w* = 14.4%, and (d) subgrade sample from Core # 12 at *w* = 14.1% from Valley View Dr., and (e) stabilized subgrade sample at air dry moisture content and (f) subgrade sample at air dry moisture content from 9th Ave., Council Bluffs

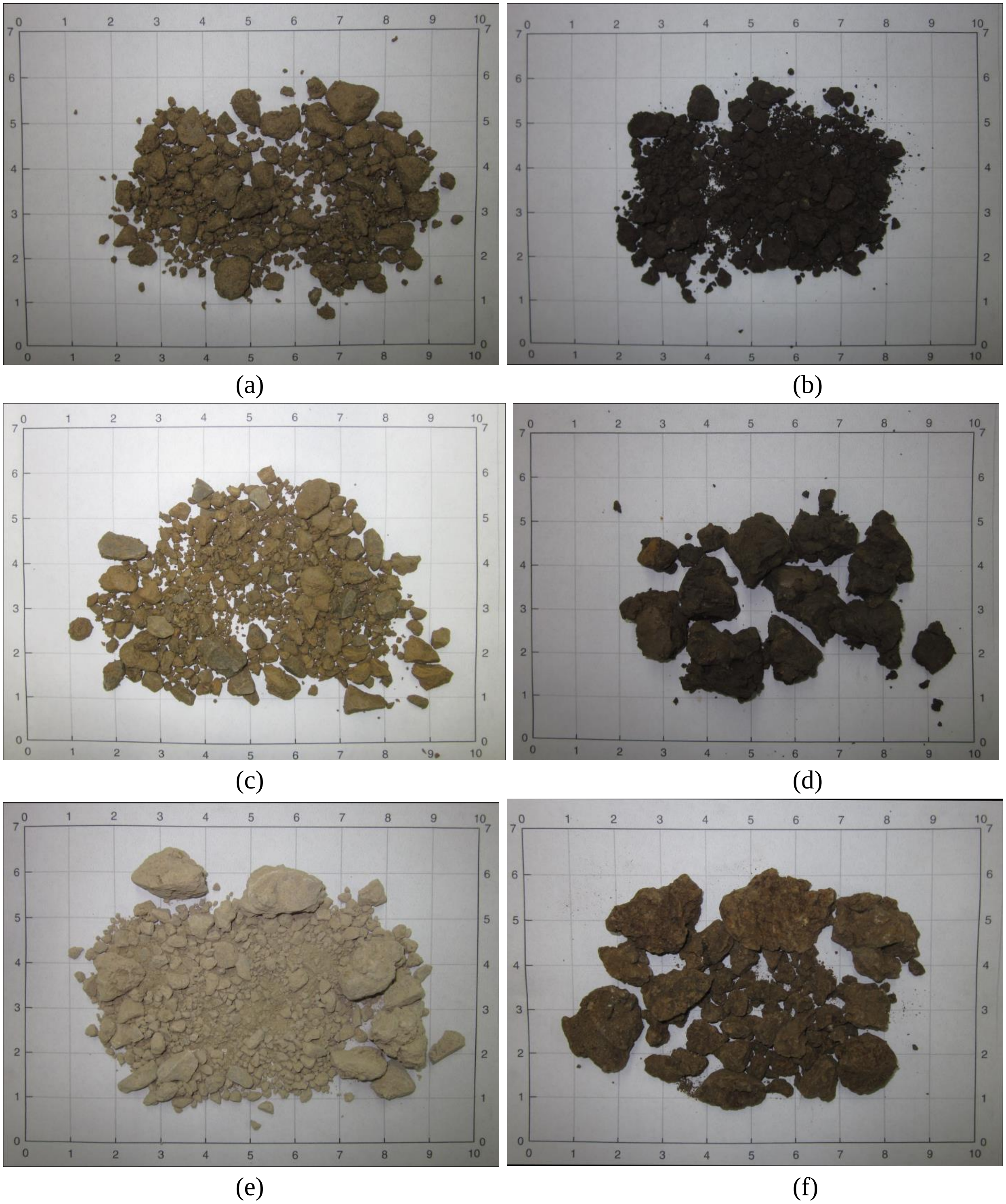
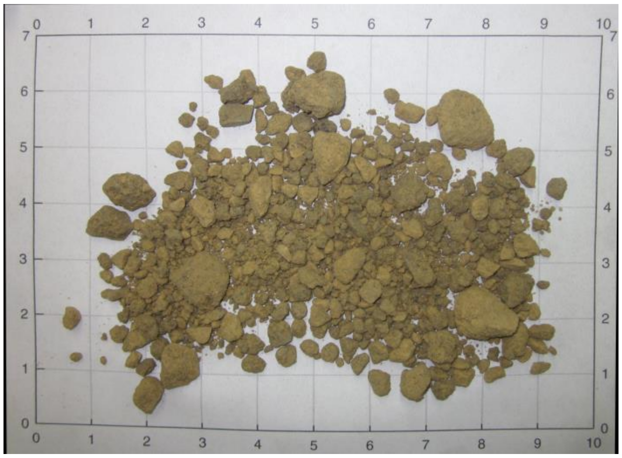
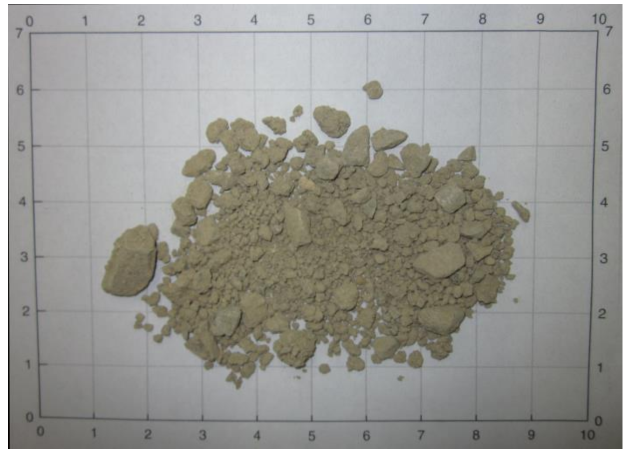


Figure 32. (a) Subbase sample from Cliff Rd (Site A), (b) subgrade sample at *w* = 18.6% from Cliff Rd (Site A), (c) Subbase sample from Cliff Rd (Site B), (d) subgrade sample at *w* = 28.9% from Cliff Rd (Site B), and (e) subbase sample from Meadowbrook Dr., and (b) subgrade sample at *w* = 14.8% from Meadowbrook Dr., Burlington

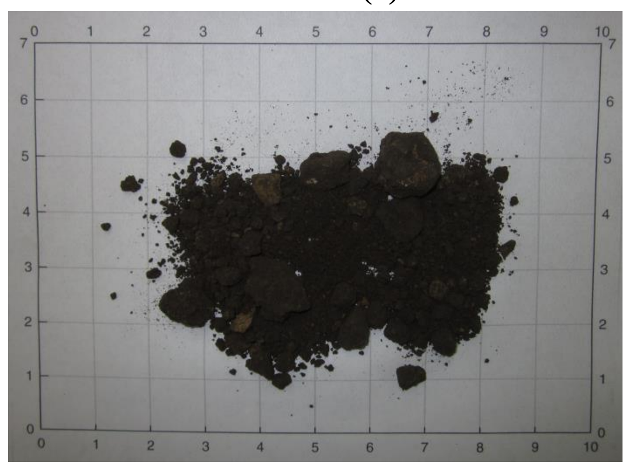


(a)



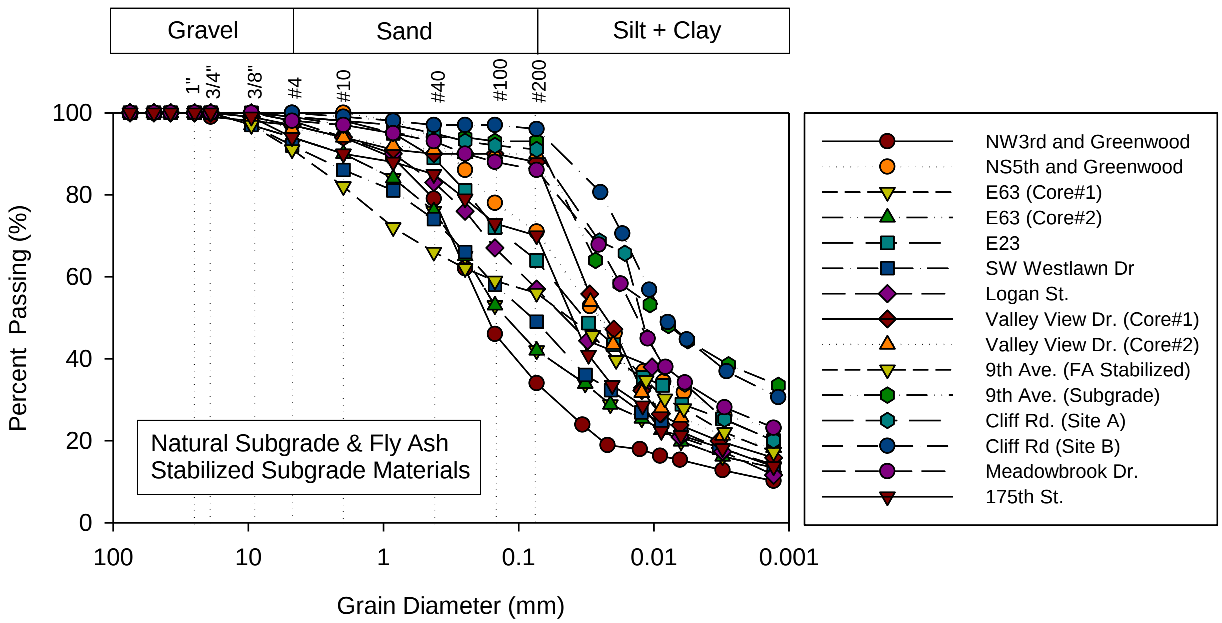
(b)

(c)



(d)

Figure 33. (a) Subbase sample from W38 Locust Rd., (b) Macadam subbase sample (Core#1) from W38 Locust Rd., (c) Macadam subbase sample (Core#2) from W38 Locust Rd., and (d) subgrade sample at *w* = 11.3% from 175th Street, Winneshiek County



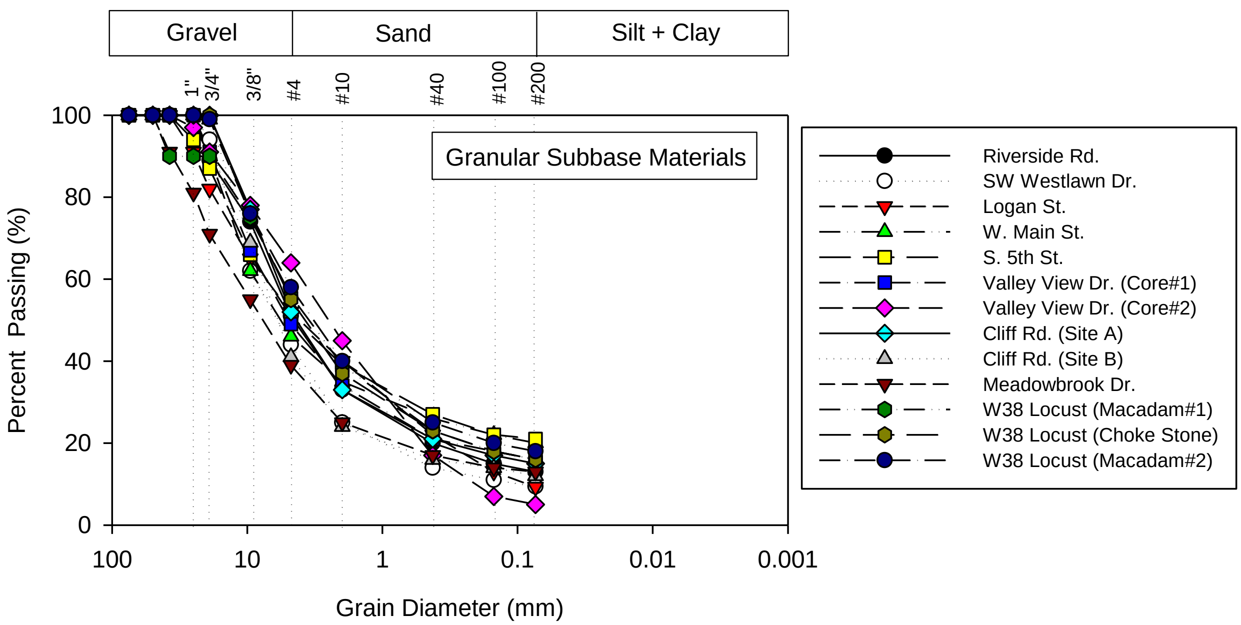


Figure 34. Particle size distribution curves of subgrade and subbase materials

Table 19. Summary of frost-heave susceptibility ratings

Project	Layer	AASHTO Classification	USCS Classification	Percent finer than 0.02 mm	Range of Frost Susceptibility Classification[1]	Frost Group[2]
NW 3rd and Greenwood, Ankeny	Subgrade	A-2-6(1)	SC	19%	Low-High	F3
NW 5th and Greenwood, Ankeny	Subgrade	A-7-6(16)	CL	48%	Low-Medium	F3
E63, Story County	Subgrade	A-4	SC	29%	Low-High	F3
	Subgrade	A-7-6(18)	CL	43%	Medium	F3
Riverside Road, Ames	CLS Subbase	A-1-a	GM	—[a]	Very Low-Medium[4]	F1
E23, Story County	Subgrade	A-6(7)	CL	44%	Low-Medium	F3
SW Westlawn, Ankeny	CLS Subbase	A-1-a	GP-GM	—[a]	Very Low-Medium[4]	F1
	Subgrade	A-6(3)	SC	32%	Low-High	F3
SW Logan, Ankeny	CLS Subbase	A-1-a	GW-GM	—[a]	Very Low-Medium[4]	F1
	FA Stabilized Subgrade	A-4(1)	ML	39%	Low-Very High	F4
West Main Knoxville	CLS Subbase	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
South 5th Knoxville	CLS Subbase	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
Valley View Drive, Council Bluffs	CLS Subbase	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
	RPCC Subbase	A-1-a	SP-SM	—[3]	Very Low-Medium[4]	F1
	Subgrade	A-6(12)	CL	48%	Low-Medium	F4
	Subgrade	A-4(9)	ML	43%	Low-Very High	F4
9th Avenue, Council Bluffs	FA Stabilized Subgrade	A-5(4)	ML	40%	Low-Very High	F4
	Subgrade	A-7-5(42)	CH	58%	Very Low	F3
Cliff Rd (site A), Burlington	CLS Subbase	A-1-a	GM	—[3]	Very Low-Medium[4]	F1
	Subgrade	A-4(10)	ML	67%	Medium-Very High	F4
Cliff Rd (site B), Burlington	CLS Subbase	A-1-a	GP-GM	—[3]	Very Low-Medium[4]	F1
	Subgrade	A-7-6(30)	CH	76%	Very Low	F3
Meadowbrook Dr., Burlington	CLS Subbase	A-1-a	GM	—[3]	Very Low-Medium[4]	F1
	Subgrade	A-6(13)	CL	63%	Low-Medium	F3
W38 Locust Rd, Winneshiek County	CLS Choke Stone	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
	CLS Subbase	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
	CLS Subbase	A-1-b	GM	—[3]	Very Low-Medium[4]	F1
175th Street Winneshiek County	Subgrade	A-4(4)	CL	33%	Medium	F4

[1]From Joint Departments of Army and Air Force (1985), based on percent finer than 0.02 mm and USCS classification; [2]From Chamberlain (1981); [3]Could not be determined; [4]Only based on USCS classification

Table 20. Summary of estimated saturated hydraulic conductivity values

Project	Layer	D_{10} (mm)	D_{60} (mm)	P_{200} (%)	PI (%)	Estimated K_{sat} (ft/day)	
						Zapata and Houston (2008) Granular Non-Plastic Soils	Zapata and Houston (2008) Non-Granular Plastic Soils
NW 3rd and Greenwood, Ankeny	Subgrade	—	0.2370	34	13	NA	2.0E-03
NW 5th and Greenwood, Ankeny	Subgrade	—	0.0423	71	24	NA	1.1E-04
E63, Story County	Subgrade	—	0.0207	42	7	NA	2.9E-03
	Subgrade	—	0.0440	65	33	NA	4.1E-05
Riverside Road, Ames	CLS Subbase	—	6.1207	13	NP	—*	NA
E23, Story County	Subgrade	—	0.0599	64	13	NA	8.3E-04
SW Westlawn, Ankeny	CLS Subbase	0.1062	8.9820	9	NP	5.3	NA
SW Logan, Ankeny	CLS Subbase	0.0901	7.4111	9	NP	3.5	NA
West Main Knoxville	CLS Subbase	—	9.0175	20	NP	—*	NA
South 5th Knoxville	CLS Subbase	—	7.4654	21	NP	—*	NA
Valley View Drive, Council Bluffs	CLS Subbase	—	7.3655	16	NP	—*	NA
	RPCC Subbase	0.2187	3.9040	5	NP	2.9	NA
Cliff Rd (site A), Burlington	CLS Subbase	—	6.1654	15	NP	—*	NA
Cliff Rd (site B), Burlington	CLS Subbase	—	7.9831	12	NP	—*	NA
Meadowbrook Dr., Burlington	CLS Subbase	—	12.113	13	NP	—*	NA
W38 Locust Rd, Winneshiek County	CLS Choke Stone	—	5.7516	16	NP	—*	NA
175th Street Winneshiek County	Subgrade	—	0.0530	70	9	NA	1.3E-03

[1]NA – Not applicable, *Could not be determined as D_{10} was not available.

Table 21. Summary of PCC core compressive strength test results

Field Site Location	Pavement Age (years)	Compressive Strength (psi)
NW3rd and Greenwood Dr., Ankeny	23	8529
NW5th and Greenwood Dr., Ankeny	36	Not Performed
E63, Story County	22	6159
Riverside Road, Ames	18	7488
E23, Story County	26	6761
SW Westlawn Dr, Ankeny	4	8112
SW Logan Street, Ankeny	< 1 (30 days)	8496
West Main Street, Knoxville	5	7925
SW 5th Street, Knoxville	3	Not performed
9th Avenue, Council Bluffs	23	7144
Valley View Drive, Council Bluffs	15	7973
Cliff Road (Site A), Burlington	20	6870
Cliff Road (Site A), Burlington	20	7097
Meadowbrook Drive, Burlington	21	8483
W38 Locust Road, Winneshiek County	16	9085
175th Street, Winneshiek County	42	7679

CHAPTER 5: FIELD TEST RESULTS

Field testing was conducted at a total of 16 sites in Polk, Story, Marion, Pottawattamie, Des Moines, and Winneshiek Counties. A summary of the field test sites with testing dates, limits of each test site, location address, the year the pavement was built, and the average annual average daily traffic (AADT) is provided in Table 22. Field test results individually from each site are described in this chapter. Notes taken during field testing, FWD raw data, DCP raw data, and CHP raw data are provided in Appendices B, C, and D.

Table 22. Summary of field test sites

Site No.	County	City	Date Tested	Street Name	Limits	Address/ Location	Year Built	AADT
1	Polk	Ankeny	05/02/12	NW Greenwood St	NW Greenwood St. and 3rd St.	206 NW Greenwood St.	1989	2000
2	Polk	Ankeny	05/02/12	NW Greenwood St	NW Greenwood St. and 5th St.	501 NW Greenwood St.	1976	2000
3	Story	N/A	05/31/12	E63	580th St - 550th St	57284 315th Street	1990	1040
4	Story	N/A	06/07/12	Riverside Rd.	560th St - US 69	0.65 mi west of N. Dayton Ave.	1994	2910
5	Story	N/A	06/21/12	E23	700th St - 740 St.	600' east of US 65	1986	150
6	Polk	Ankeny	07/19/12	SW Westlawn Dr.	410 SW Westlawn Dr. - 1515 SW 4th St.	410 SW Westlawn Dr.	2008	1000
7	Polk	Ankeny	07/19/12	SW Logan St.	410 SW Logan St. - 418 SW Logan St.	410 SW Logan St.	2012	500
8	Marion	Knoxville	07/12/12	West Main St.	701 West Main St.	701 West Main St.	2007	500
9	Marion	Knoxville	07/12/12	South 5th St.	909 South 5th St.	909 South 5th St.	2009	680
10	Pottawattamie	Council Bluffs	07/26/12	Valley View Dr.	15263 Valley View Drive - Madison Avenue	15263 Valley View Drive	1997	8900
11	Pottawattamie	Council Bluffs	07/26/12	9th Ave.	3100 block of 9th Ave.	3105 9th Ave.	1989	7600
12	Des Moines	Burlington	08/02/12	Cliff Rd.	2500 - 2505 Cliff Rd.	2500 - 2505 Cliff Rd., 2910 Cliff Rd.	1993	1120
13	Des Moines	Burlington	08/02/12	Cliff Rd.	2910 Cliff Rd.	2910 Cliff Rd.	1993	1120
14	Des Moines	Burlington	08/02/12	Meadowbrook Dr.	2700 - 2708 & 2724 - 2736 Meadowbrook	2700 - 2708 & 2724 - 2736 Meadowbrook	1994	300
15	Winneshiek	N/A	08/09/12	W38 Locust Rd.	337th Street - MN State Line	3821 Locust Rd	1996	660
16	Winneshiek	N/A	08/09/12	175th Street	265th Street - U.S. 52	2442 175th Street	1970	560

In the following sections, Static $k_{FWD\text{-}Corr}$ are reported by correcting the Static k_{FWD} values for slab size. Slab size correction was performed assuming a square slab with the size equal to the width of the slab (shortest dimension), as described earlier in the report. Figure 35 shows the relationship between the corrected and the uncorrected values.

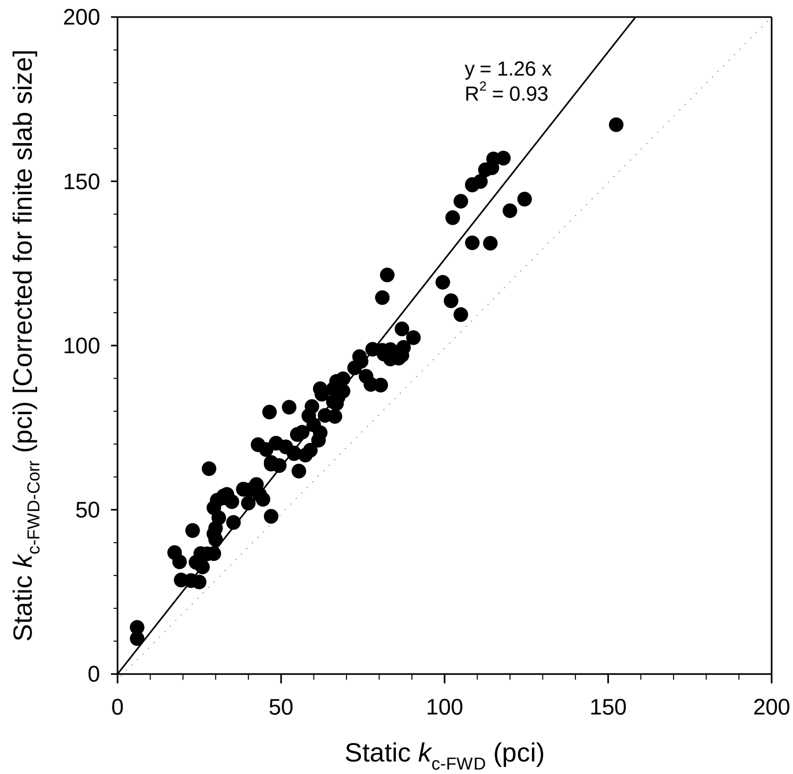


Figure 35. Relationship between corrected (for finite slab size) and uncorrected Static *k* values determined from FWD tests

NW 3rd St. and Greenwood Drive, Ankeny, Polk County

This site is located on NW Greenwood Dr. just south of NW3rd St. in Ankeny, Polk County. The section was constructed in 1989 with a nominal 8 in. thick PCC pavement and experiences an AADT of 2000. The pavement was 31.2 ft wide with a cross-slope of 2%, and the panels were about 10 to 11 ft wide by 15.9 ft long. No subsurface drainage system was present at this site. Curb and gutters were present for surface water drainage. The pavement had a few longitudinal cracks (on the south end of the test section) and is rated as “satisfactory” with PCI = 83. The pavement was supported on clayey sand subgrade (classified as SC, A-2-6(1)). At the time of testing, the in situ moisture content of the subgrade was about 7.6%.

Field testing at this site was conducted on May 2, 2012. FWD testing was conducted on 15 panels at mid panel and at joint. DCP tests were conducted at four test locations and CHP test was conducted at one test location. Photos of the test site are shown in Figure 36.

The measured core thickness at this site was 8.25 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 37. DCP-CBR profiles and cumulative blows with depth are shown in Figure 38. Average and coefficient of variation (COV) of CBR_{SG} is noted on Figure 38. Figure 39 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 40.

LTEs at joints were all at or close to 100%. The average Static $k_{FWD\text{-}Corr}$ was 52 pci and the average CBR_{SG} was 5.9, which indicate "very poor to poor" subgrade conditions per SUDAS (2013a). The average $k_{comp\text{-}DCP}$ value estimated using the DCP-CBR values was about 334 pci. The uniformity of support conditions is rated as "very good" based on COV = 25% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed an in situ K_{CHP} = 0.2 ft/day. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.04 (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (84 days). This time of drainage corresponds to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.71.

Figure 36. Photographs of field test site during testing — NW 3rd Street and Greenwood Drive, Ankeny

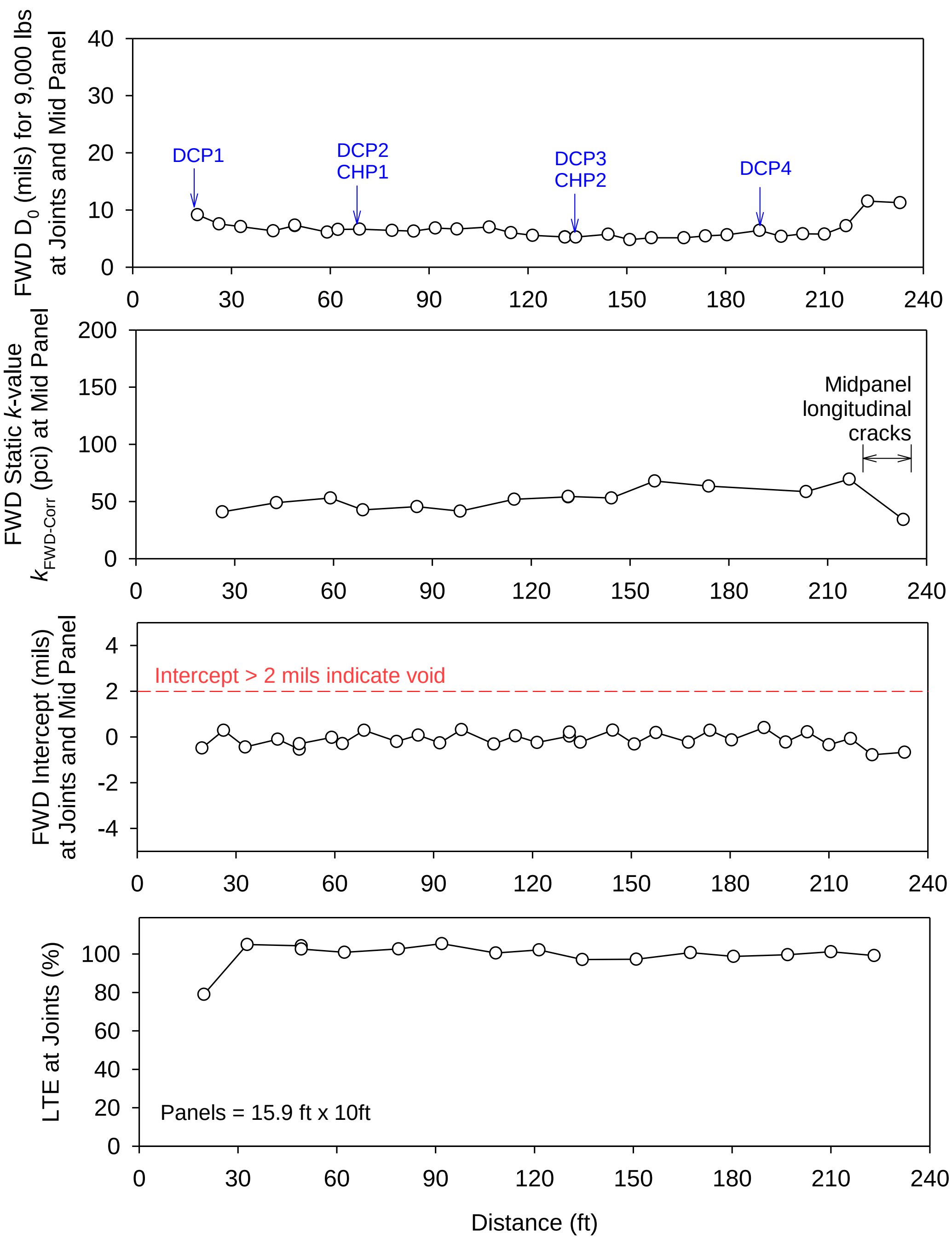


Figure 37. FWD test results — NW3rd Street and Greenwood Drive, Ankeny

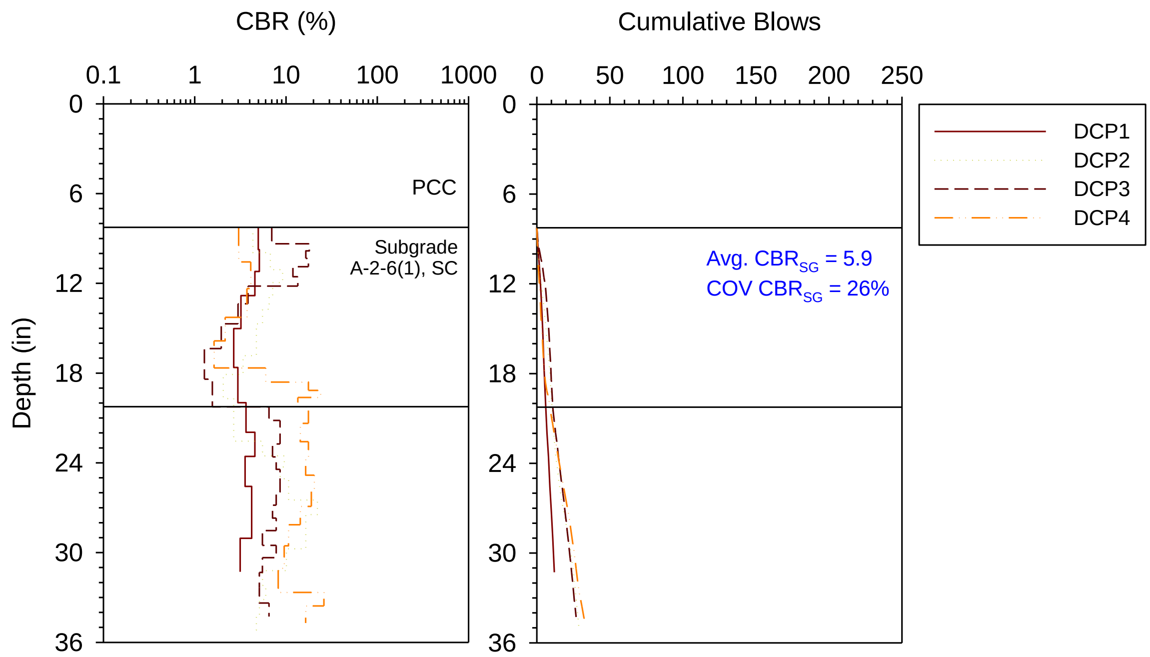


Figure 38. DCP-CBR and cumulative blows with depth profiles — NW3rd Street and Greenwood Drive, Ankeny

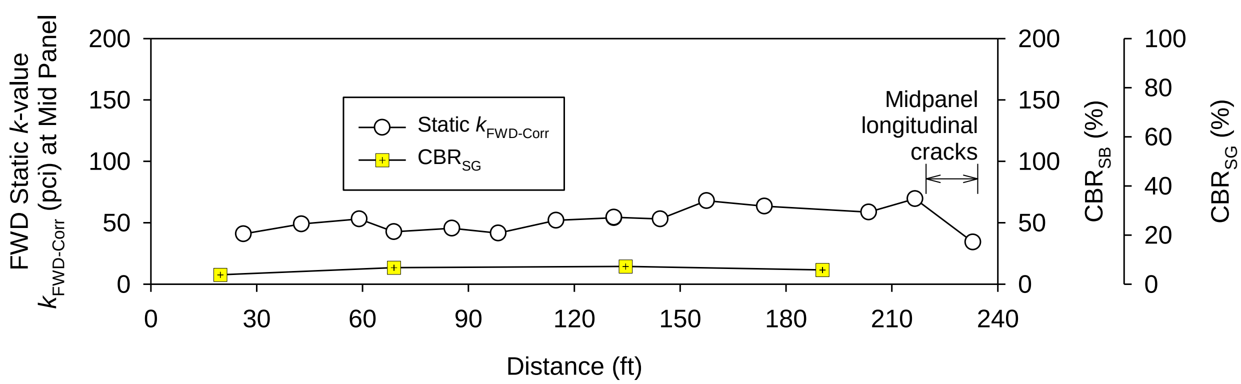


Figure 39. Comparison of $k_{\mathbf{FWD\text{-}Corr}}$ and CBR of foundation layers — NW3rd Street and Greenwood Drive, Ankeny

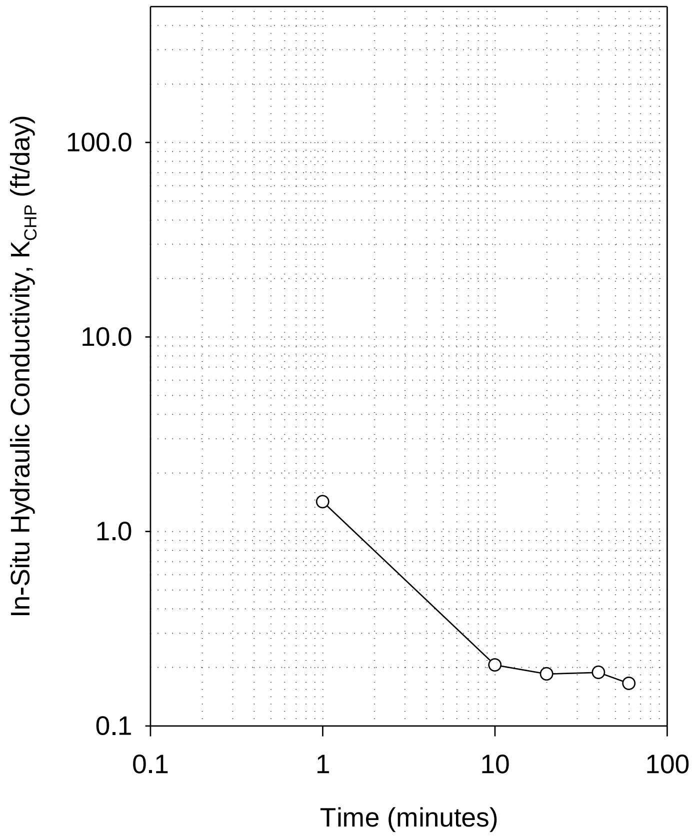


Figure 40. CHP test results — NW3rd Street and Greenwood Drive, Ankeny

NW 5th and Greenwood Drive, Ankeny, Polk County

This site is located on NW Greenwood Dr. just north of NW5th St. in Ankeny, Polk County. The section was constructed in 1976 with a nominal 6.5 in. thick PCC pavement and experiences an AADT of 2000. The pavement was 31.3 ft wide with a cross-slope of 2%, and the panels were about 15.8 ft wide by 20 ft long. The concrete panels were reinforced with steel (Figure 41). Subsurface drainage system was not present at this site. Curb and gutters were present for surface water drainage. The pavement consisted of longitudinal cracks on all the panels tested and is rated as "very poor" with PCI = 38. Photos of the test site are shown in Figure 41. The pavement was supported on lean clay subgrade (classified as CL, A-7-6(16)). The in situ moisture content of the subgrade was about 20.1% at the time of testing.

Field testing at this site was conducted on May 2, 2012. FWD testing was conducted on 6 panels at mid panel and at joint. DCP tests were conducted at four test locations and CHP test was conducted at one test location.

The measured core thickness at this site was 6.9 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 42. DCP-CBR profiles and cumulative blows with depth are shown in Figure 43. Average and COV of

CBR_{SG} is noted on Figure 43. Figure 44 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 45.

Average LTE at joints was about 37%, which indicates poor joint efficiency. The average static Static $k_{FWD\text{-}Corr}$ was 39 pci and the average CBR_{SG} was 1.5, which indicate "very poor" subgrade conditions per SUDAS (2013a). The average $k_{comp\text{-}DCP}$ value estimated using the DCP-CBR values was about 127 pci. The uniformity of support conditions is rated as "fair" based on COV = 41% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed an in situ K_{CHP} = 0.2 ft/day. Permeability values increased for readings taken after 10 min and this increase is attributed to erosion of material at the pavement/subgrade interface and potential void underneath the pavement. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.04 (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (84 days). This time of drainage corresponds to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.71.

Figure 41. Photographs of field test site during testing — NW 5th Street and Greenwood Drive, Ankeny

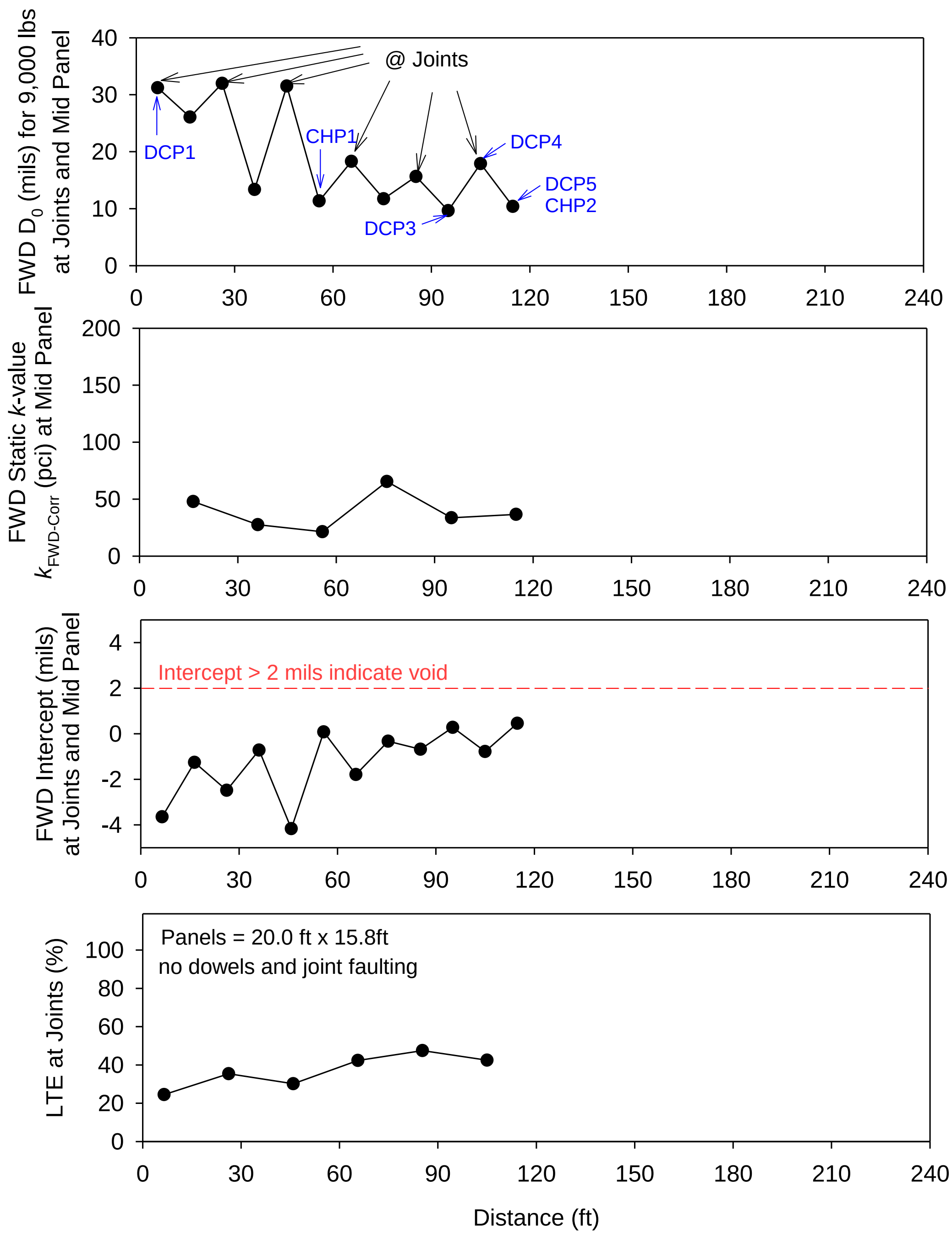


Figure 42. FWD test results — NW5th Street and Greenwood Drive, Ankeny

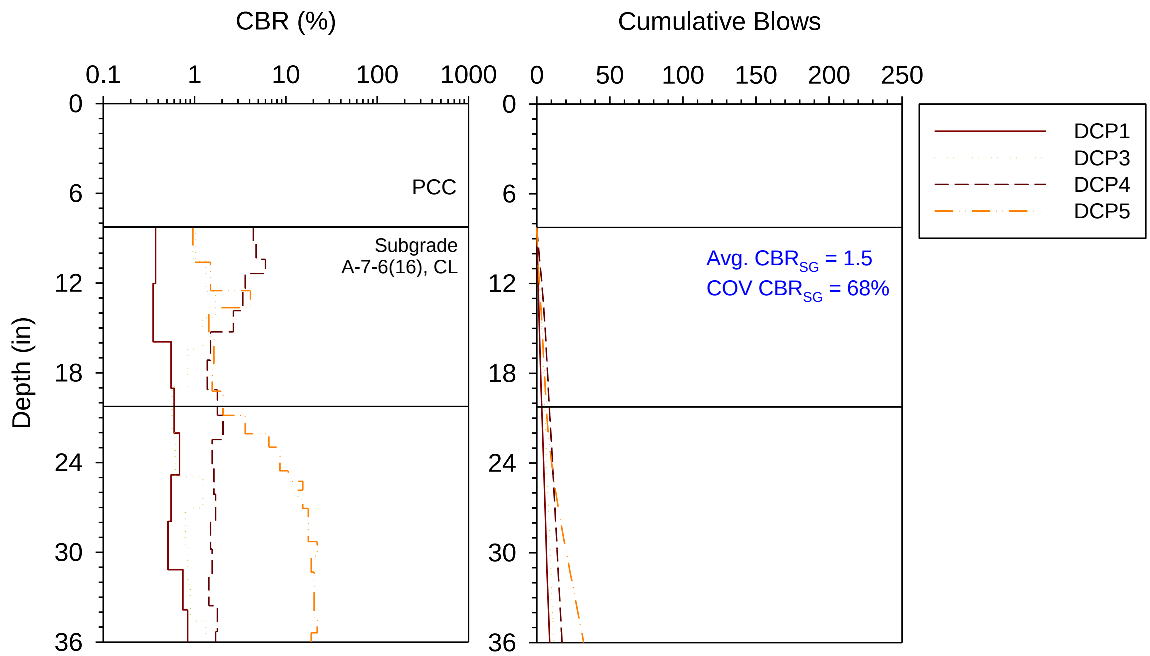


Figure 43. DCP-CBR and cumulative blows with depth profiles — NW5th Street and Greenwood Drive, Ankeny

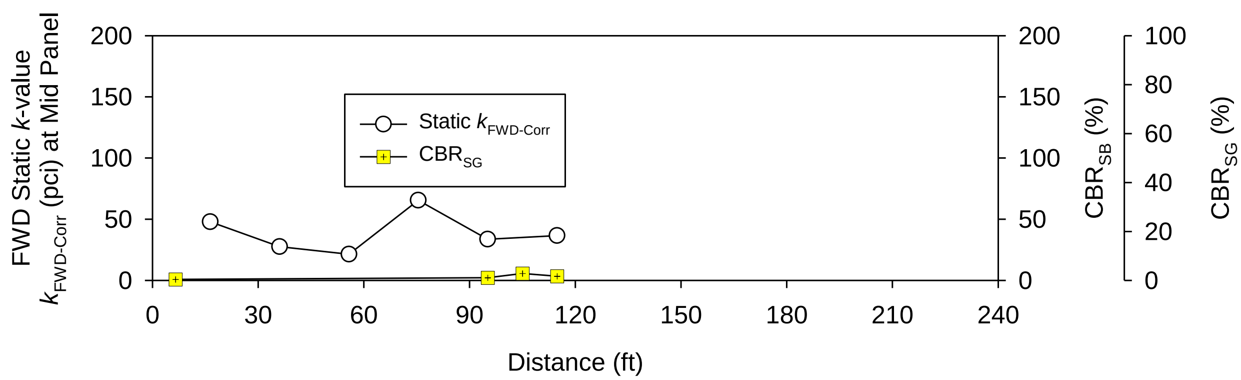


Figure 44. Comparison of $k_{FWD\text{-}Corr}$ and CBR of foundation layers — NW5th Street and Greenwood Drive, Ankeny

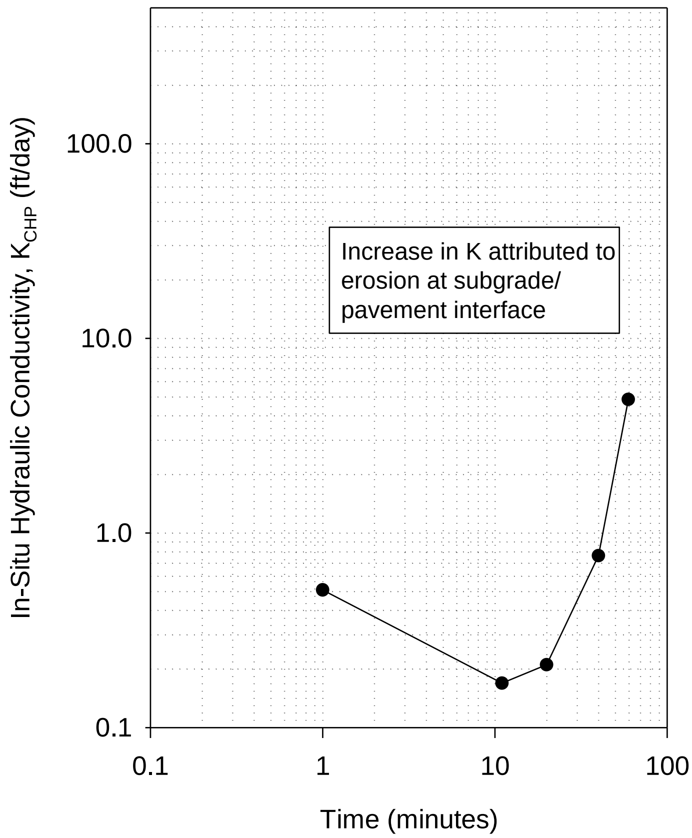


Figure 45. CHP test results — NW5th Street and Greenwood Drive, Ankeny

E63, Story County

This site is located on County Road E63 between 570th and 580th Avenue, west of Cambridge, Story County. The section was constructed in 1990 with a nominal 8 in. thick PCC pavement and experiences an AADT of 1040. The site was a two-lane divided roadway and was 24 ft wide with a cross-slope of 2%, and the panels were about 12 ft wide by 15 ft long. Granular shoulders and drainage ditches were present on both sides of the pavement. The pavement consisted of longitudinal cracks, transverse cracks, and corner cracks on 18 out of the 22 panels tested at this site, and is rated as “poor” with PCI = 46. Faulting at joints and cracks varied from about 0 in. to 0.6 in. Photos of the test site are shown in Figure 46. The pavement was supported on natural subgrade (classified as CL and SC, A-7-6(18) and A-4). The in situ moisture contents of the CL and SC subgrade materials were about 17.7% and 8.7%, respectively, at the time of testing.

Field at this site was conducted on May 31, 2012. A crack survey map along with in situ test locations at the site are shown in Figure 47. FWD testing was conducted on 22 panels at mid panel and at joint. DCP tests were conducted at four locations and CHP tests were conducted at two locations. All tests were conducted on the west bound lane along the center line of each panel.

The core thickness from two CHP test locations were 8.5 in. and 8 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 48. DCP-CBR profiles and cumulative blows with depth are shown in Figure 49. Average and COV of CBR_{SG} is noted on Figure 49. Figure 50 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 51.

Average LTE at joints was about 94%, which indicates good joint efficiency. LTE at one of the joints with longitudinal and transverse cracks was about 53%, but all remaining joints showed LTE ≥ 83%. The average Static $k_{FWD\text{-}Corr}$ was 75 pci, while the average $k_{comp\text{-}DCP}$ value was about 464 pci. The average CBR_{SG} was 9.9, which indicate "poor to fair" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "very good" based on COV = 25% of Static $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed an in situ K_{CHP} = 0.1 ft/day under a panel with no cracks and K_{CHP} = 1.0 ft/day under a panel with cracks. Photographs of the two panels with CHP tests are shown in Figure 52. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.04 (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (39 days) under the panel with no cracks and 4 days under the panel with cracks. The times of drainage correspond to "very poor" to "fair" drainage quality per SUDAS (2013b) and AASHTO (1993) with C_d = 0.77 to 0.93.

Figure 46. Photographs of field test site during testing — E63, Story County

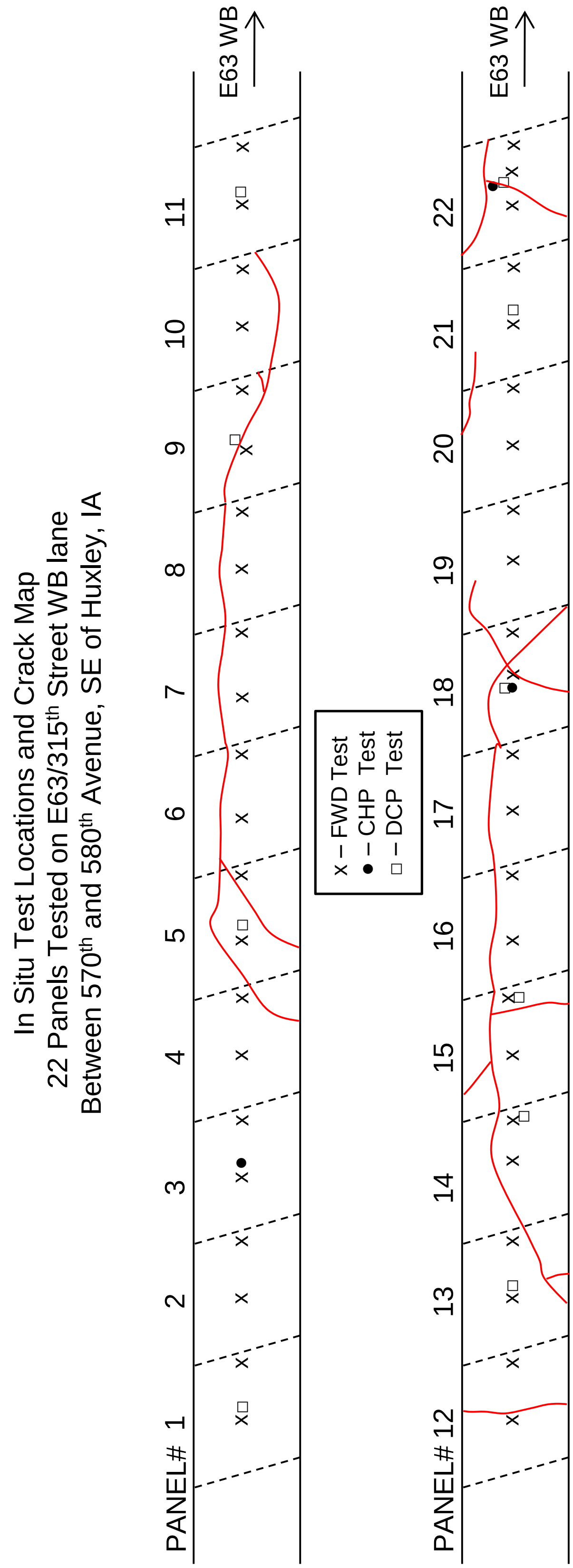


Figure 47. Crack Survey Map — E63, Story County

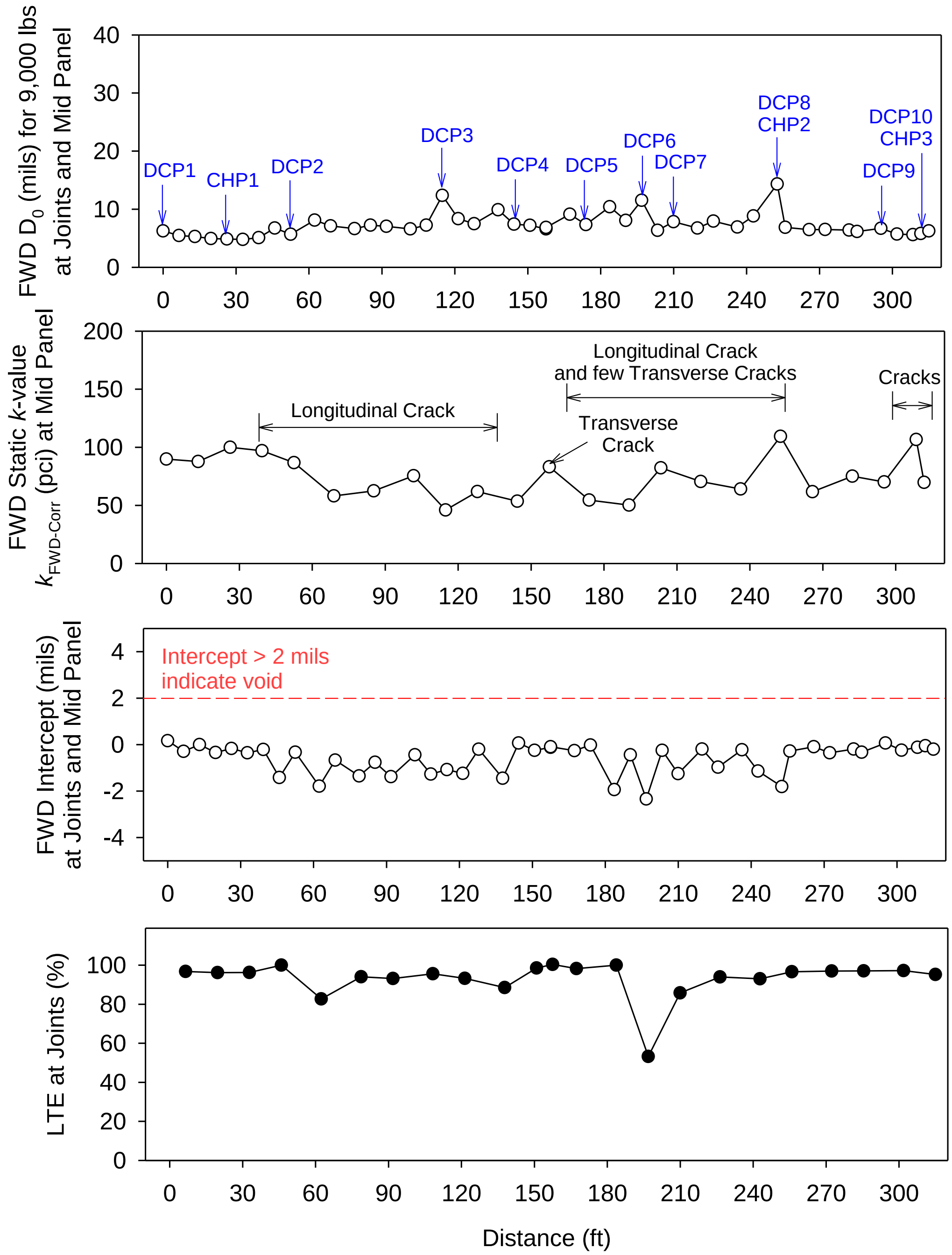


Figure 48. FWD test results — E63, Story County

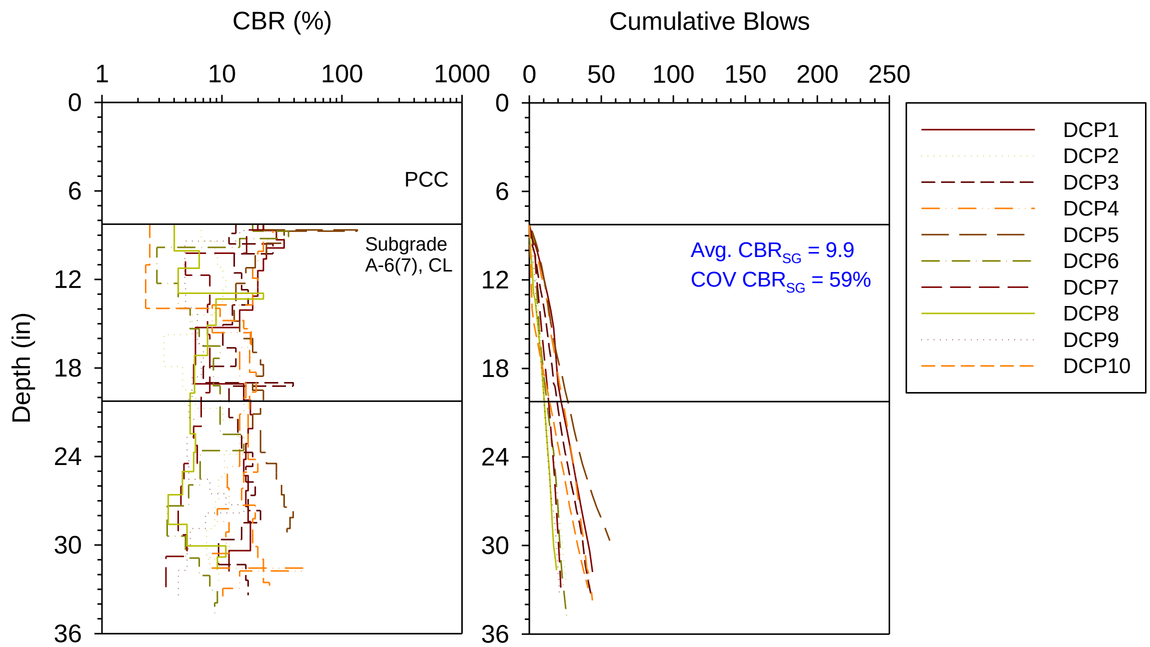


Figure 49. DCP-CBR and cumulative blows with depth profiles — E63, Story County

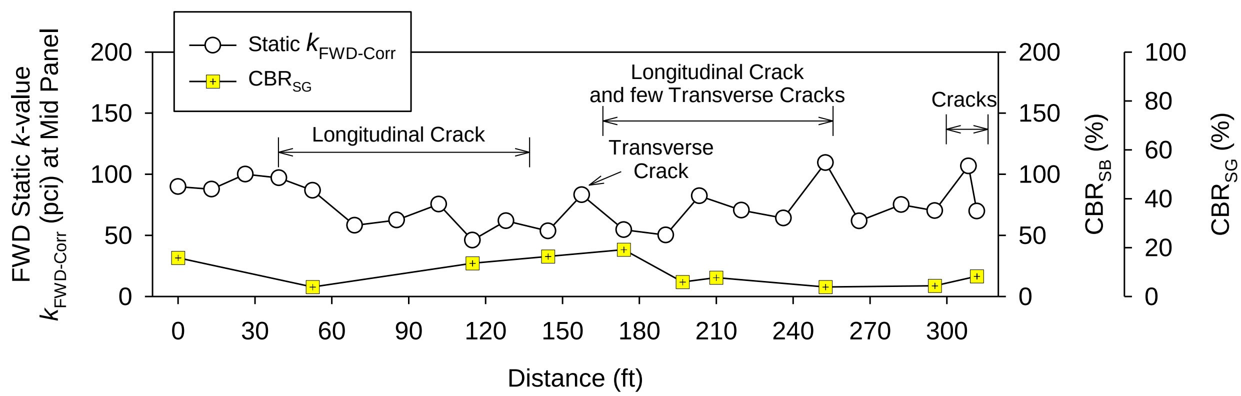


Figure 50. Comparison of $k_{FWD\text{-}Corr}$ and CBR of foundation layers — E63, Story County

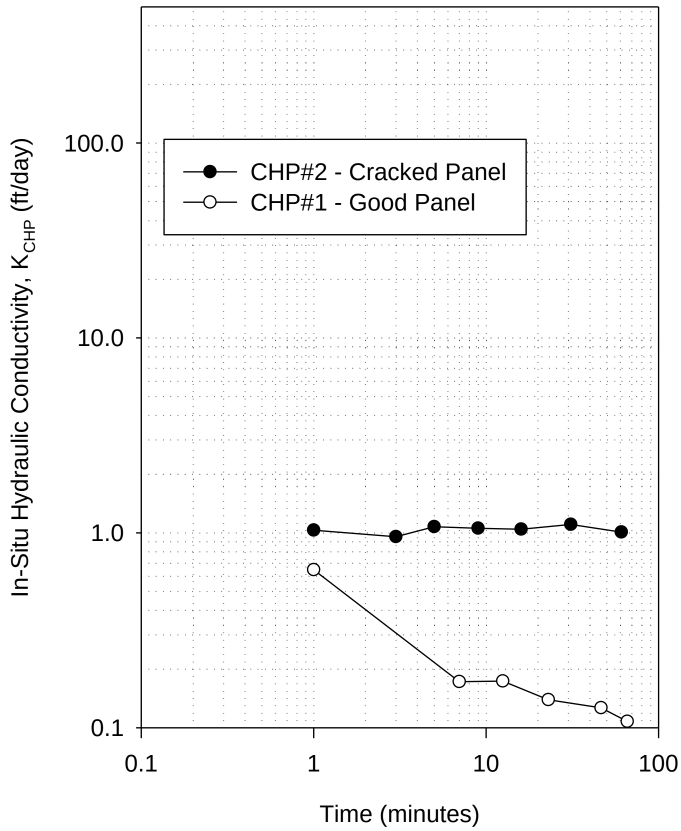


Figure 51. CHP test results — E63, Story County

Figure 52. Photographs of good panel with CHP#1 test (left) and cracked panel with CHP#2 test (right) — E63, Story County

Riverside Road, Ames, Story County

This site is located on East Riverside Road, just west of North Dayton Ave., northeast of Ames, Story County. The section was constructed in 1994 with a nominal 11 in. thick PCC pavement and experiences an AADT of 2910. This roadway experiences heavy truck traffic due to the proximity of Martin Marietta's limestone quarry. The site was a two-lane divided roadway and was 27 ft wide with a cross-slope of 2%. Edge drains were present at this site for subsurface drainage. The pavement consisted of longitudinal cracks on three panels and transverse cracks on one out of the 16 panels tested, and is rated as "satisfactory" with PCI = 79. Faulting at joints and cracks mostly varied from about 0 in. to 0.2 in, but one of the cracked panels showed 0.5 to 1.0 in faulting. Photos of the test site are shown in Figure 53. The pavement was supported on 6 in. thick crushed limestone subbase (classified as GM, A-1-a).

In situ testing at this site was conducted on June 7, 2012. A crack survey map along with in situ test locations at the test site are shown in Figure 54. FWD testing was conducted on 16 panels at mid panel and at joint. DCP tests were conducted at ten locations and CHP tests were conducted at two locations. All tests were conducted on the west bound lane along the center line of each panel.

The measured core thickness was 11.0 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 55. DCP-CBR profiles and cumulative blows with depth are shown in Figure 56. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 56. Figure 57 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 58.

Average LTE at joints was about 100%. The average Static $k_{FWD\text{-}Corr}$ was 109 pci, while the average $k_{ccomp\text{-}DCP}$ value was higher with about 666 pci. Panels with longitudinal cracks showed the lowest Static $k_{FWD\text{-}Corr}$ value with about 45 pci. The average CBR_{SB} was 78, which indicate "very good" subbase conditions per SUDAS (2013a). One of the panels with longitudinal cracks showed a CBR_{SB} of 28. The average CBR_{SG} was 20, which indicate "fair to very good" subgrade conditions per SUDAS (2013a). One of the panels with longitudinal cracks showed a CBR_{SG} of 8.1. The uniformity of support conditions is rated as "good" based on COV = 32% of Static $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed an in situ K_{CHP} = 4.0 ft/day under a panel with no cracks and K_{CHP} = 10.9 ft/day under a panel with cracks. Photographs of the two panels are shown in Figure 59. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 7 days and 3 days under the panel with no cracks and the panel with cracks, respectively. The times of drainage correspond to "fair" quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.88 and 0.95.

One of the panels with transverse mid-panel crack (panel #4) was patched sometime after testing. Photos of the panel during testing and recently (June 10, 2013) after patching are shown in Figure 60. The new patch also developed a similar transverse crack as the old one.

Figure 53. Photographs of field test site during testing — Riverside Road, Ames

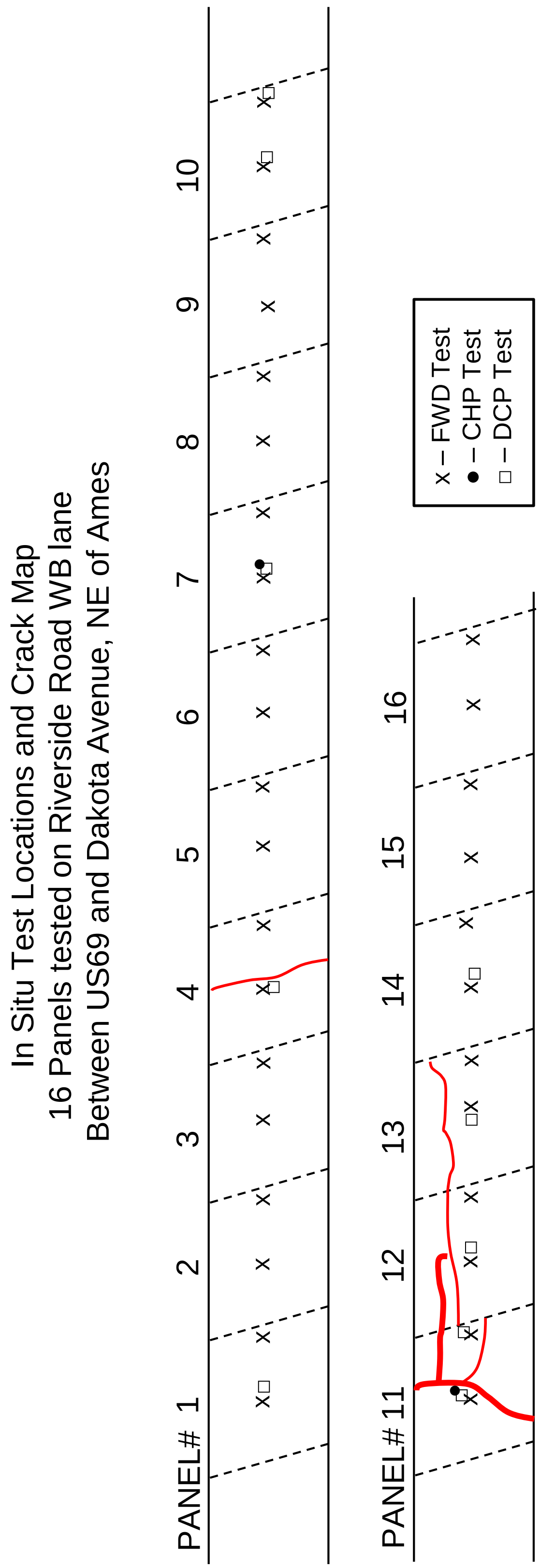


Figure 54. Crack Survey Map — Riverside Road, Ames

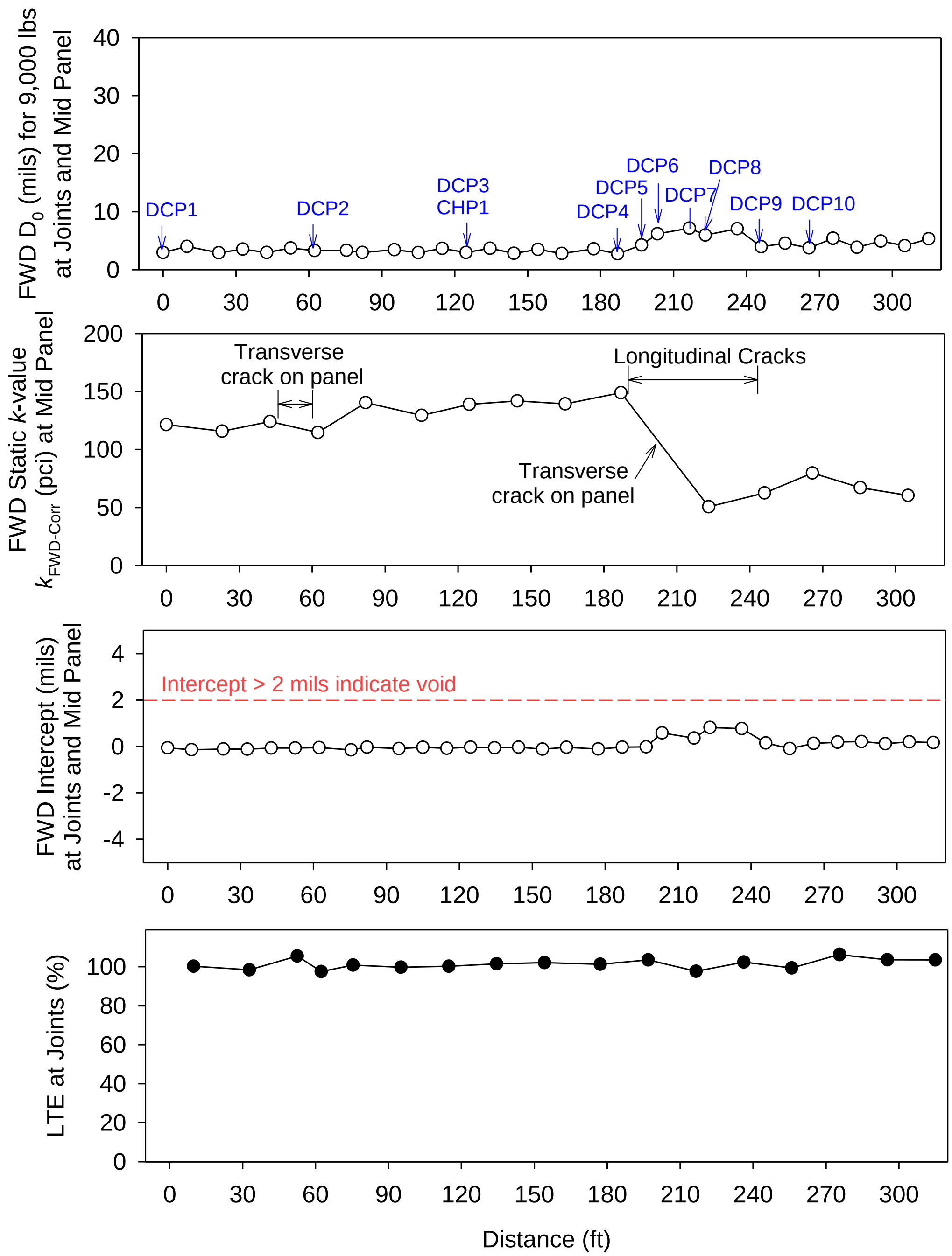


Figure 55. FWD test results — Riverside Road, Ames

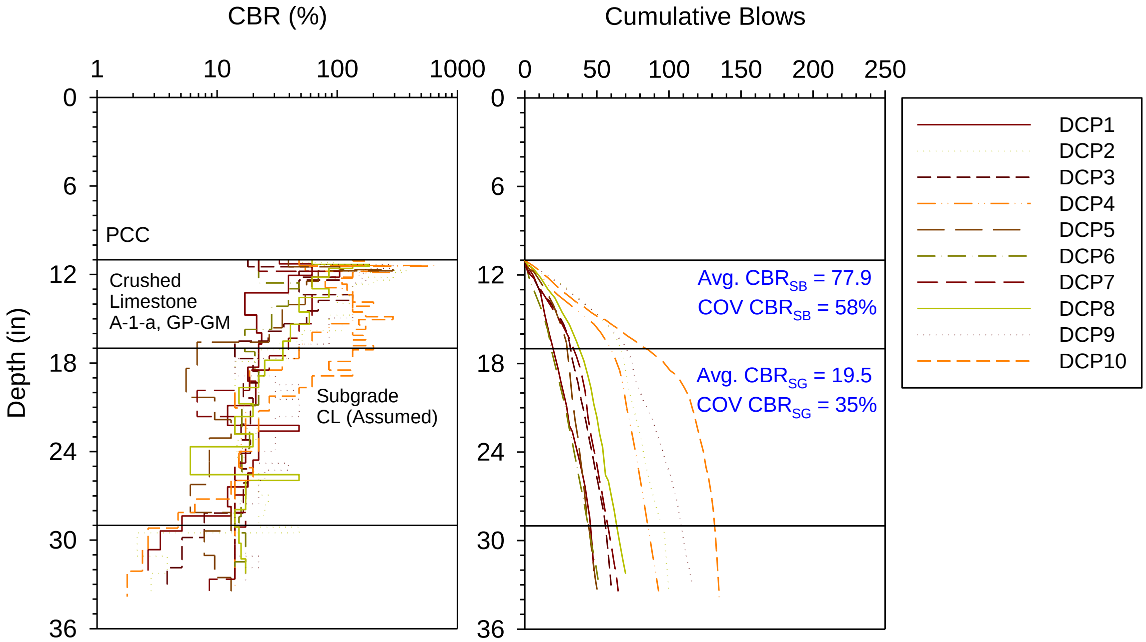


Figure 56. DCP-CBR and cumulative blows with depth profiles — Riverside Road, Ames

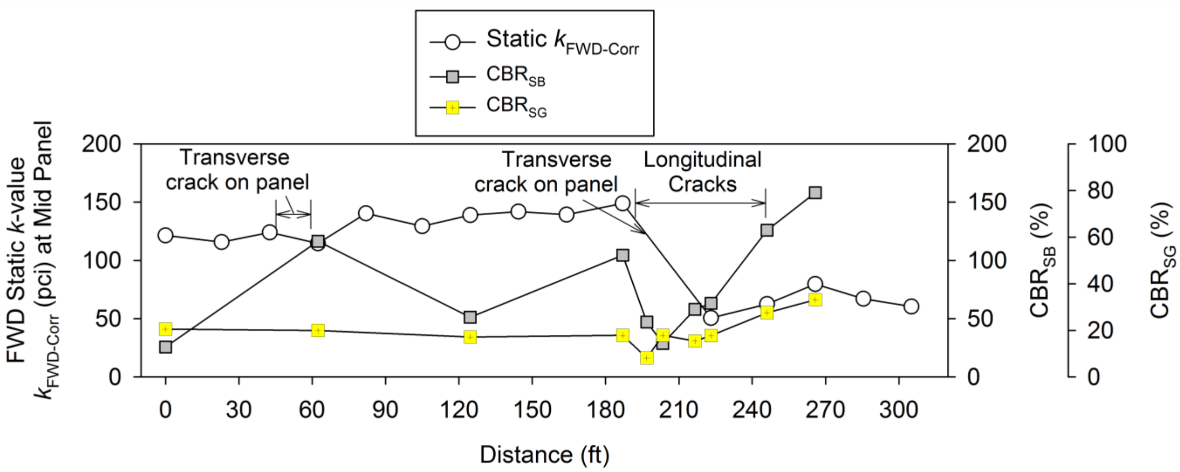


Figure 57. Comparison of $k_{FWD\text{-}Corr}$ and CBR of foundation layers — Riverside Road, Ames

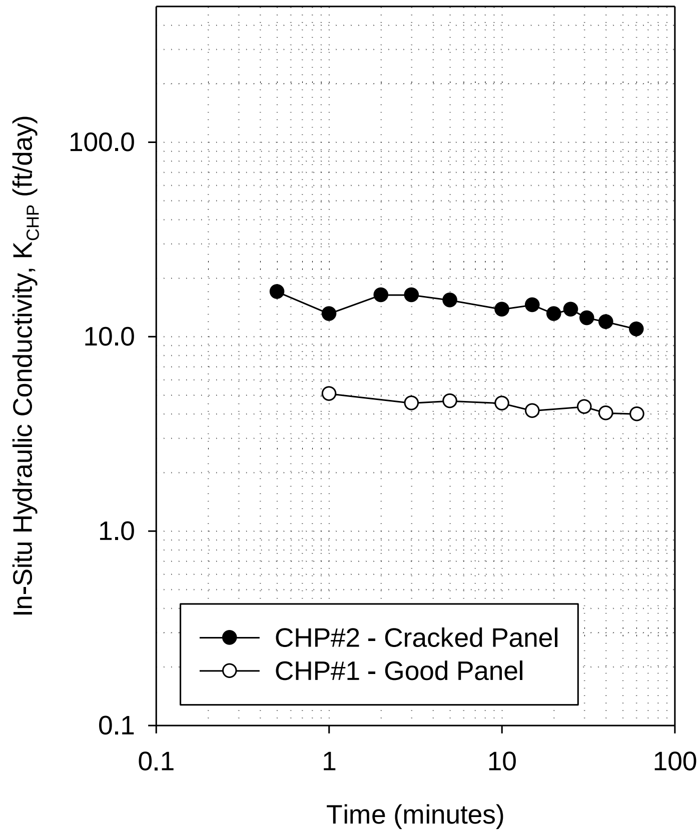


Figure 58. CHP test results — Riverside Road, Ames

Figure 59. Photographs of good panel with CHP#1 test (left) and cracked panel with CHP#2 test (right) —Riverside Road, Ames

Figure 60. Photographs of panel # 4 with mid-panel transverse crack during testing (top on June 7, 2012) and after patching (bottom on June 10, 2013)—Riverside Road, Ames

E23, Story County

This site is located on County Road E23, just east of US Highway 65, south of Zearing, Story County. The section was constructed in 1986 with a nominal 6.5 in. thick PCC pavement and experiences an AADT of 150. The site was a two-lane divided roadway and was 22 ft wide with a cross-slope of 2%, and the panels were about 11 ft wide by 14.1 ft to 16.6 ft long. Edge drains were present at this site for subsurface drainage. The pavement was partly in “good” condition and partly with “poor” condition. The pavement consisted of cracks on 11 panels (7 panels with corner cracks, 4 panels showed longitudinal cracks, and 1 panel showed transverse mid-panel crack) out of the 21 panels tested at this site and is rated as “poor to fair” with PCI = 55. Faulting at joints and cracks varied between 0 and 0.2 in. Photos of the test site are shown in Figure 61. The pavement was supported on lean clay subgrade (classified as CL, A-6(7)). The in situ moisture content of the subgrade was about 16.7%, at the time of testing.

Field testing at this site was conducted on June 21, 2012. A crack survey map along with in situ test locations at the test site are shown in Figure 62. FWD testing was conducted on 21 panels at mid panel and at joint. DCP tests were conducted at ten locations and CHP tests were conducted at two locations. All tests were conducted on the west bound lane along the center line of each panel.

The measured core thickness was 6.75. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 63. DCP-CBR profiles and cumulative blows with depth are shown in Figure 64. Average and coefficient of variation (COV) of CBR_{SG} is noted on Figure 64. Figure 65 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 66.

Average LTE at joints was about 93%. With the exception of one joint with LTE = 65%, all other joints showed LTE ≥ 90%. The average Static $k_{FWD\text{-}Corr}$ was 86 pci, while the average $k_{comp\text{-}DCP}$ was higher with about 508 pci. One of the panels with longitudinal cracks showed the lowest $k_{c\text{-}FWD}$ value with about 30 pci. The average CBR_{SG} was 11, which indicate “fair” to “good” subgrade conditions per SUDAS (2013a). One of the panels with longitudinal cracks showed the lowest CBR_{SG} of 2.6. The uniformity of the support conditions is rated as “very good” with COV = 17% of $k_{FWD\text{-}Corr}$.

CHP tests showed in situ K_{CHP} = 0.1 ft/day under a panel with no cracks and 0.2 ft/day under a panel with cracks. Photographs of the two panels are shown in Figure 67. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.04 (see Table 7), the time to 50% drainage at this site is estimated as 34 days and 17 days, under the panel with no cracks and the panel with cracks, respectively. The times of drainage corresponds to “poor” to “fair” drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.78 and 0.83.

Figure 61. Photographs of field test site during testing — E23, Story County

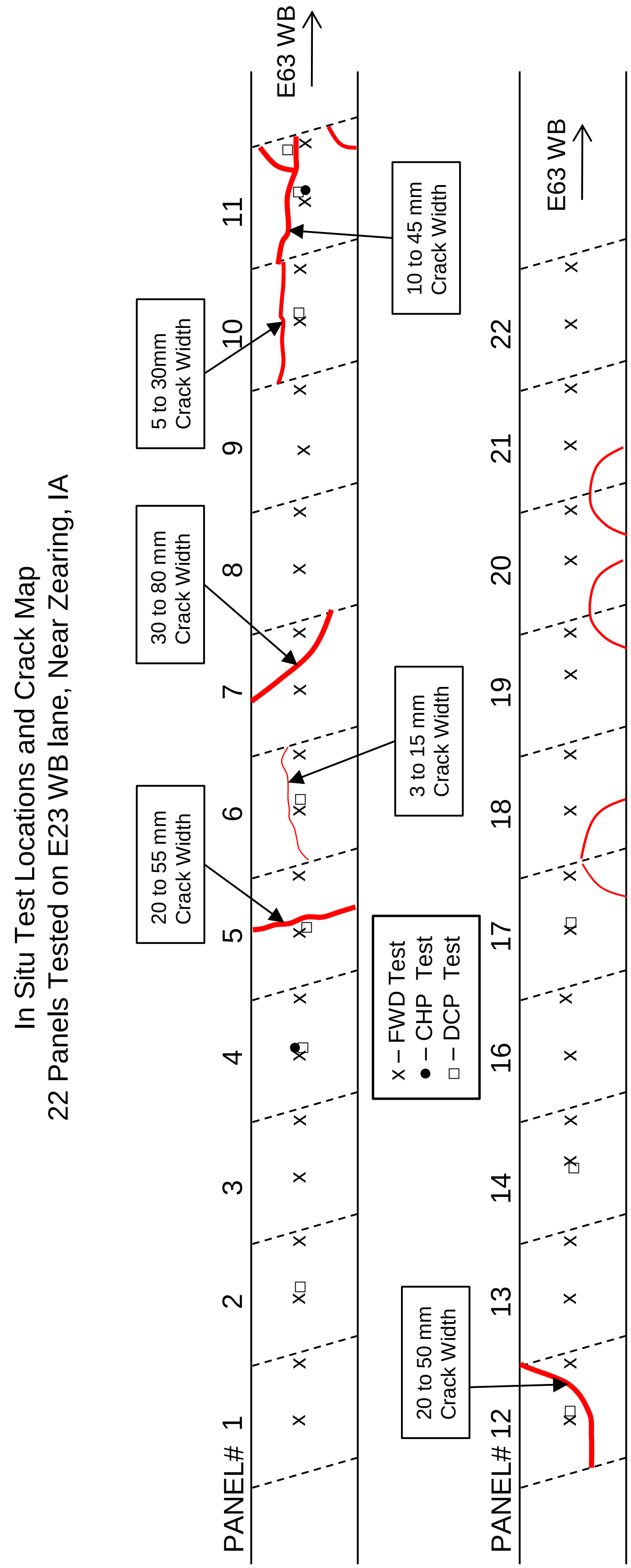


Figure 62. Crack Survey Map — E23, Story County

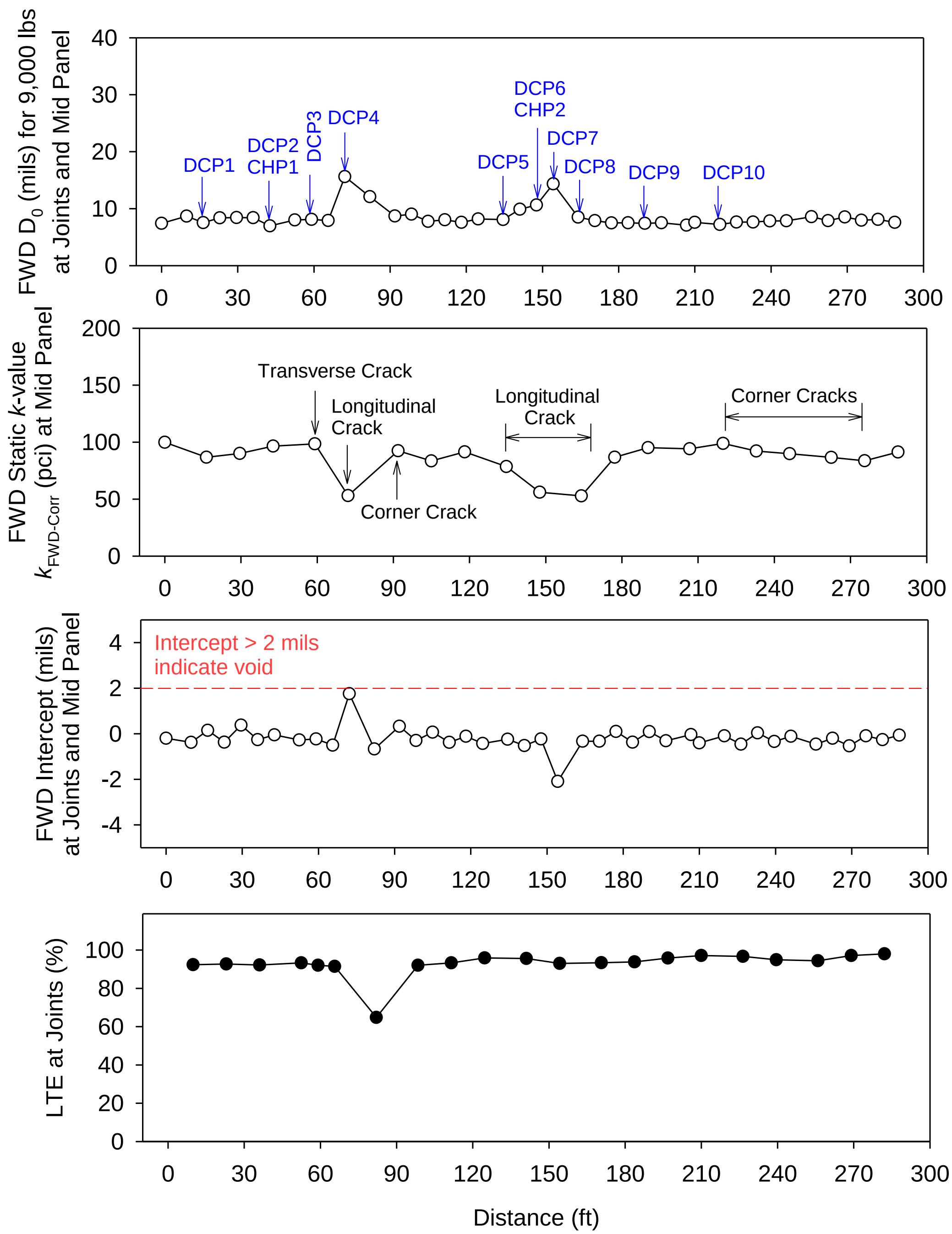


Figure 63. FWD test results — E23, Story County

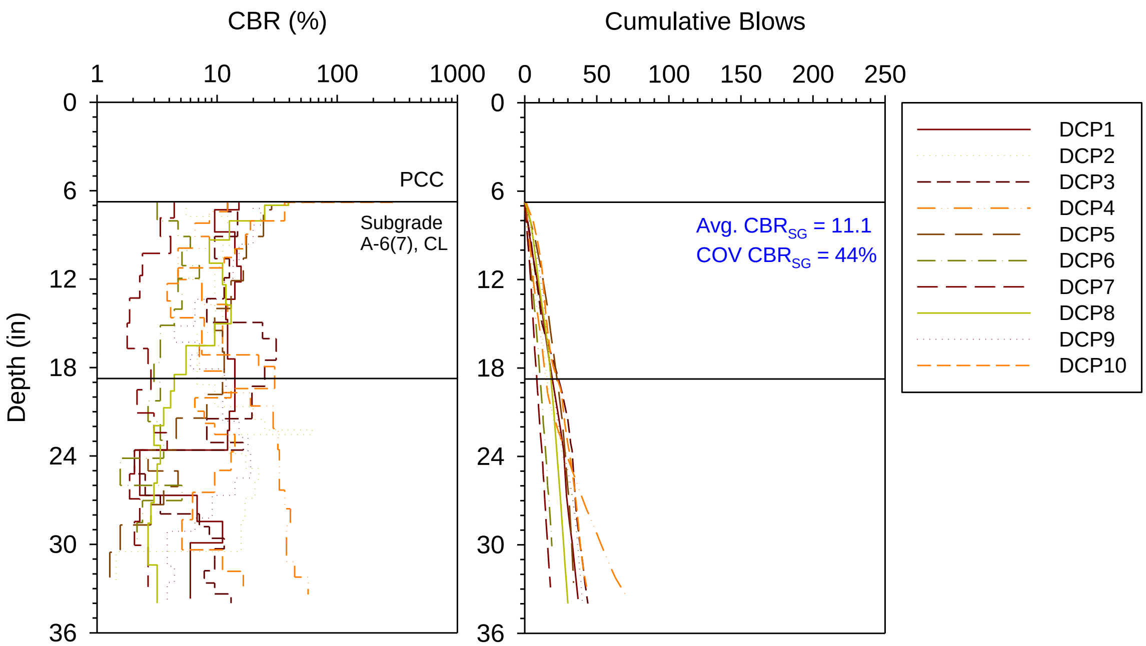


Figure 64. DCP-CBR and cumulative blows with depth profiles — Riverside Road, Ames

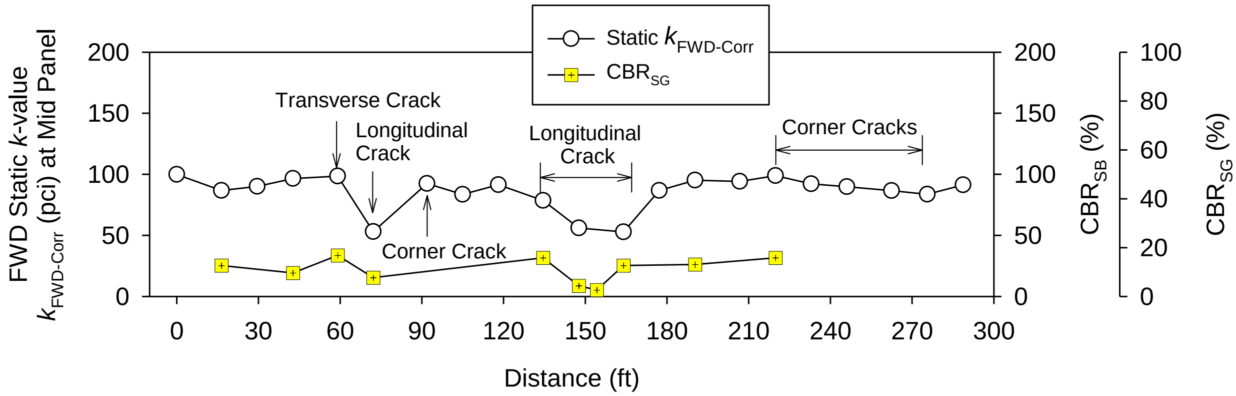


Figure 65. Comparison of $k_{FWD\text{-}Corr}$ and CBR of foundation layers — E23, Story County

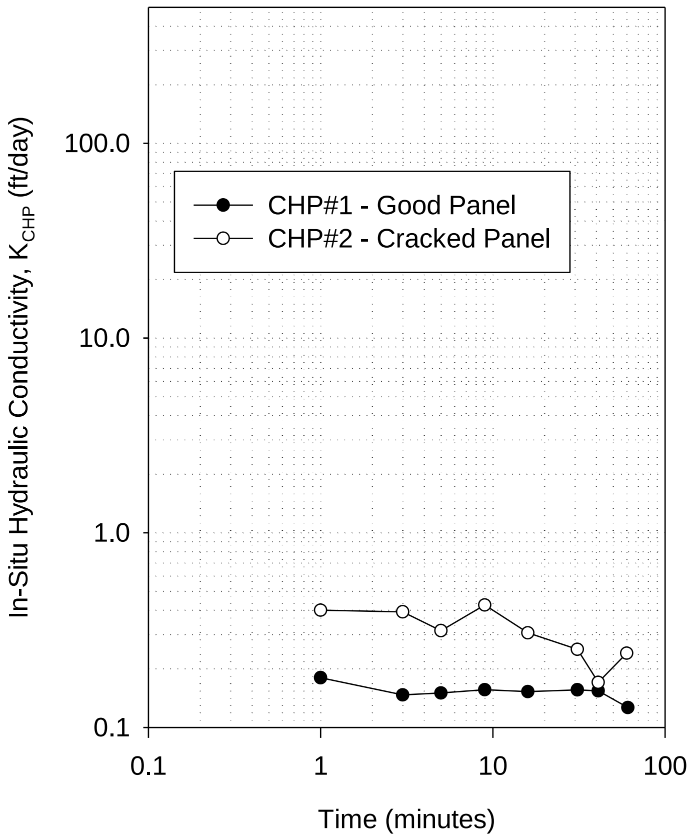


Figure 66. CHP test results — E23, Story County

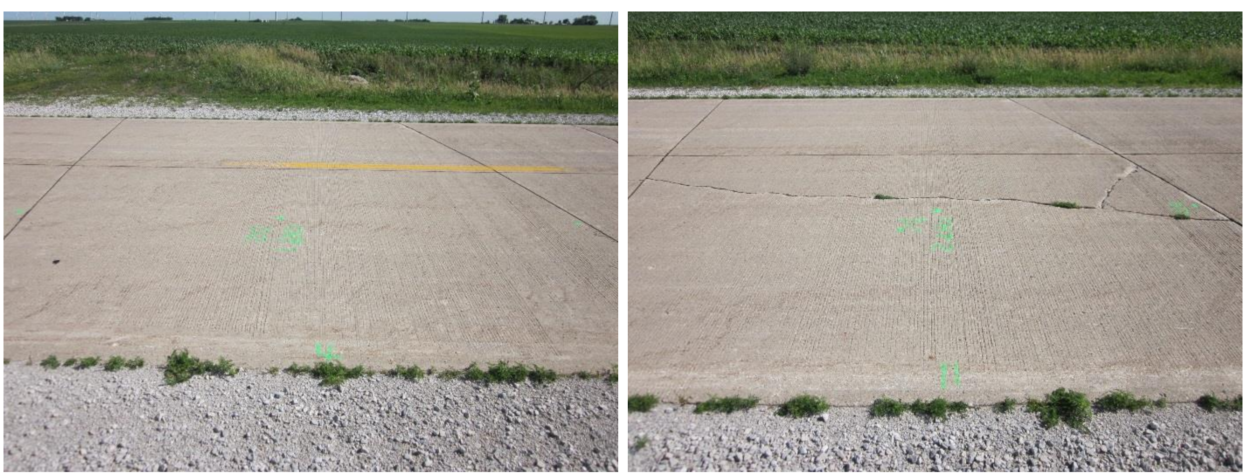


Figure 67. Photographs of good panel with CHP#1 test (left) and cracked panel with CHP#2 test (right) — E23, Story County

SW Westlawn Drive, Ankeny, Polk County

This site is located on SW Westlawn Dr., just south of SW 4th St., in Ankeny, Polk County. The section was constructed in 2008 and experiences an AADT of 1000. The pavement is about 25 ft wide with a cross-slope of 3% and three panels across the pavement width. The panels were 8.3 ft wide by 9.4 to 15.3 ft long. Edge drains were present at this site for subsurface drainage. The pavement consisted of relatively thin longitudinal cracks on almost all of the panels tested and is rated as “satisfactory to good” with PCI = 85. Photos of the test site are shown in Figure 68. The pavement was supported on 8.5 in. to 10.5 in. thick crushed limestone subbase (classified as GP-GM, A-1-a). Nine out of the 22 panels tested at this site consisted of a woven geotextile at the subbase and subgrade interface, while the remaining panels did not. The subgrade material was classified as SC, A-6(3). The in situ moisture content of the subgrade material was about 12%, at the time of testing.

Field testing at this site was conducted on July 19, 2012. A crack survey map along with in situ test locations at the test site are shown in Figure 69. FWD testing was conducted on 22 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at test locations (one in the area without geotextile and one in the area with geotextile, at the subgrade/subbase interface). There were three panels across the pavement width, and tests were conducted along the middle panel. All tests were conducted along the along the center line of each panel.

The measured core thickness was 9.0 in. and 7.25 in., in sections without geotextile and with geotextile, respectively. FWD test results with deflection under the loading plate (D_0), static $k_{c\text{-}FWD}$, intercept, and LTE at joints are shown in Figure 70. DCP-CBR profiles and cumulative blows with depth are shown in Figure 71. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 71. Figure 72 compares CBR_{SG} and static $k_{c\text{-}FWD}$. CHP test results showing K_{CHP} with time are shown in Figure 73.

Average LTE at joints was about 96%. The average Static $k_{FWD\text{-}Corr}$ was about 50 and 35 pci in the sections without geotextile and with geotextile, respectively. The average $k_{comp\text{-}DCP}$ values were higher with about 410 and 397 pci in the sections without geotextile and with geotextile, respectively. About 45% of the test locations indicated voids beneath pavement (based on FWD intercept > 2 mils). The uniformity of the support conditions at site is rated as “poor” based on COV = 53% to 65% of $k_{FWD\text{-}Corr}$ measurements.

The average CBR_{SB} in sections with and without geosynthetic were similar. The average CBR_{SB} was 64 in the section without geotextile and 54 in the section with geotextile, which indicate “very good” subbase conditions per SUDAS (2013a). The average $CBR_{SG,}$ however, was lower in the section with geosynthetic (~11) compared to the section without geosynthetic (~1.9). The CBR_{SG} values indicate “very poor” subgrade conditions in the section without geosynthetic and “fair” conditions in the section with geosynthetic, per SUDAS (2013a).

CHP tests showed in situ K_{CHP} = 1.2 ft/day (CHP#1) in the section without geosynthetic and K_{CHP} = 160 ft/day (CHP#2) in the section with geosynthetic. Although not noticed in the FWD intercept values, voids were noticed in the CHP#2 core hole at the pavement/subbase interface, which contributed to the higher K_{CHP} in CHP#2. Based on the K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as about 14 days at CHP#1 and about 2.4 hours at CHP#2. The times of drainage correspond to "poor" to "fair" drainage quality at CHP# 1 with C_d = 0.84 and "excellent" drainage quality at CHP#2 with C_d = 1.09, per SUDAS (2013b) and AASHTO (1993).

Figure 68. Photographs of field test site during testing — SW Westlawn Drive, Ankeny

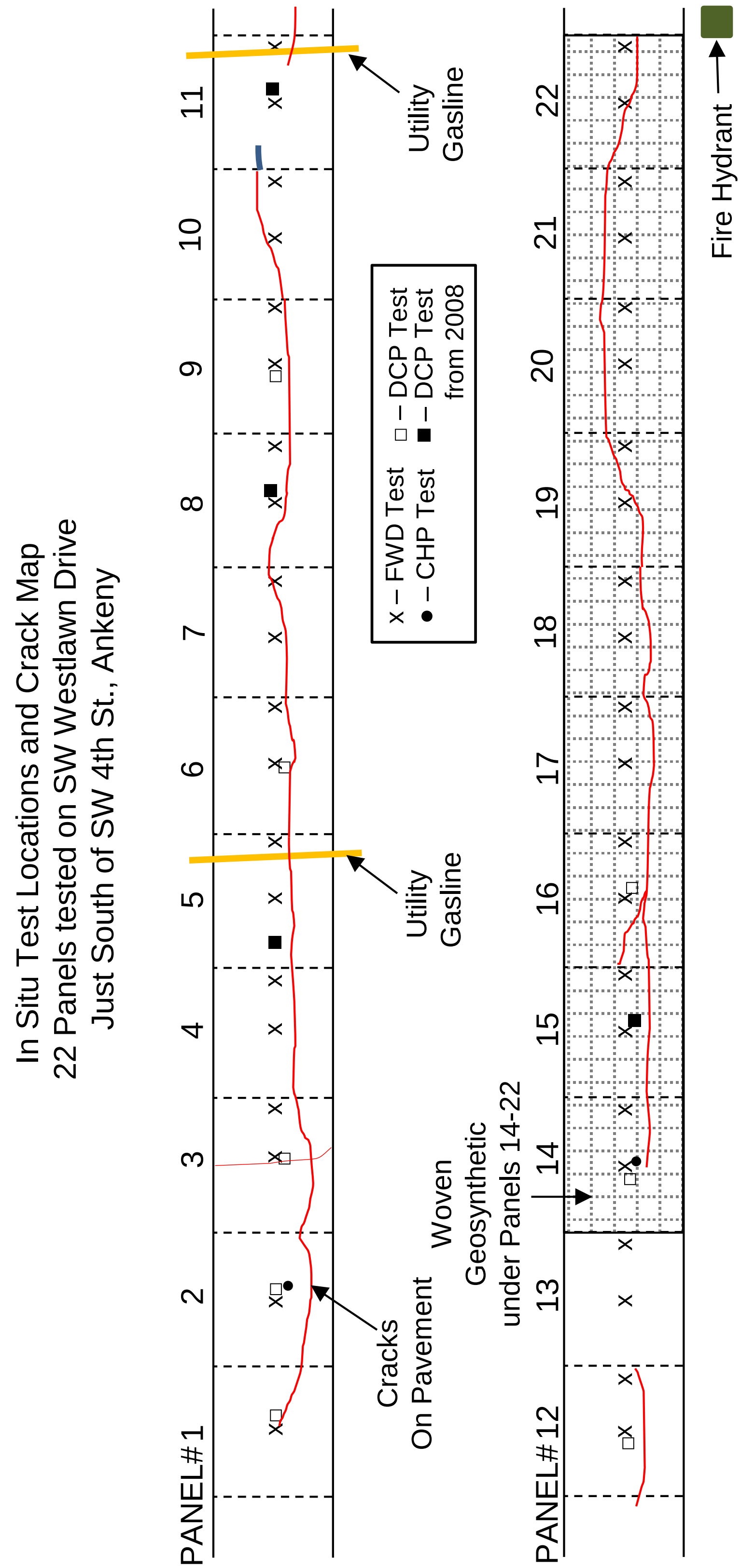


Figure 69. Crack Survey Map — SW Westlawn Drive, Ankeny

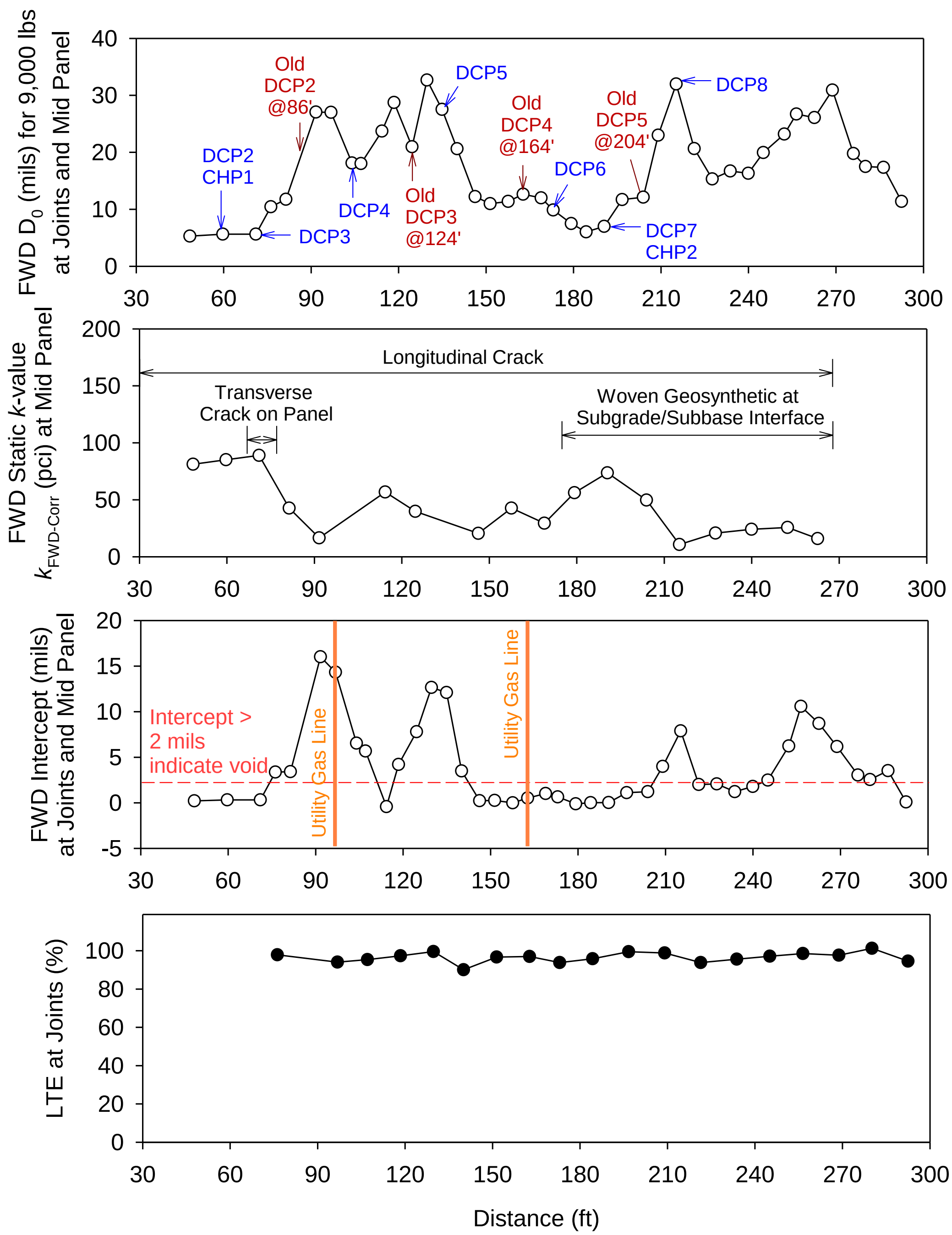


Figure 70. FWD test results — SW Westlawn Drive, Ankeny

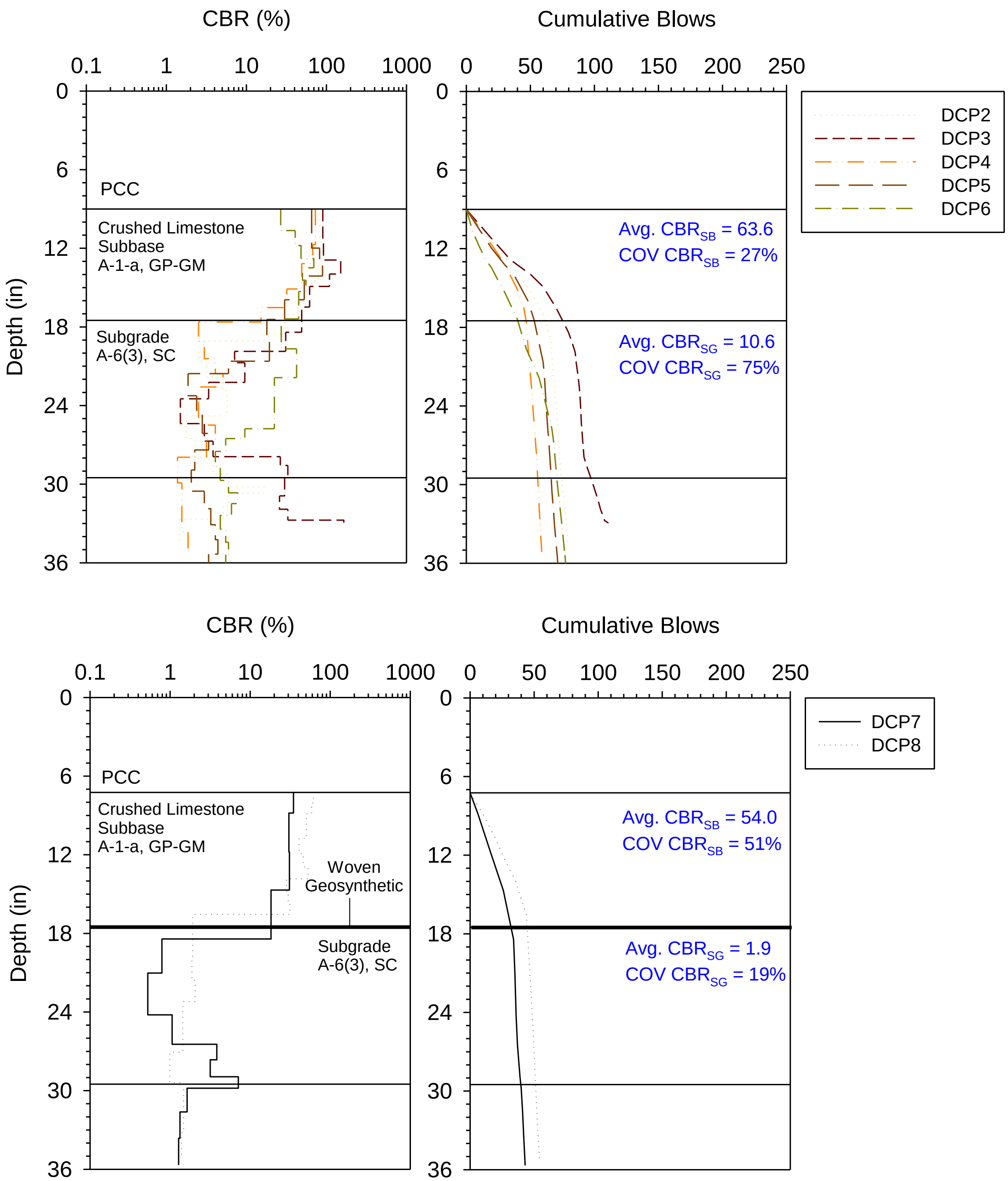


Figure 71. DCP-CBR and cumulative blows with depth profiles — SW Westlawn Drive, Ankeny

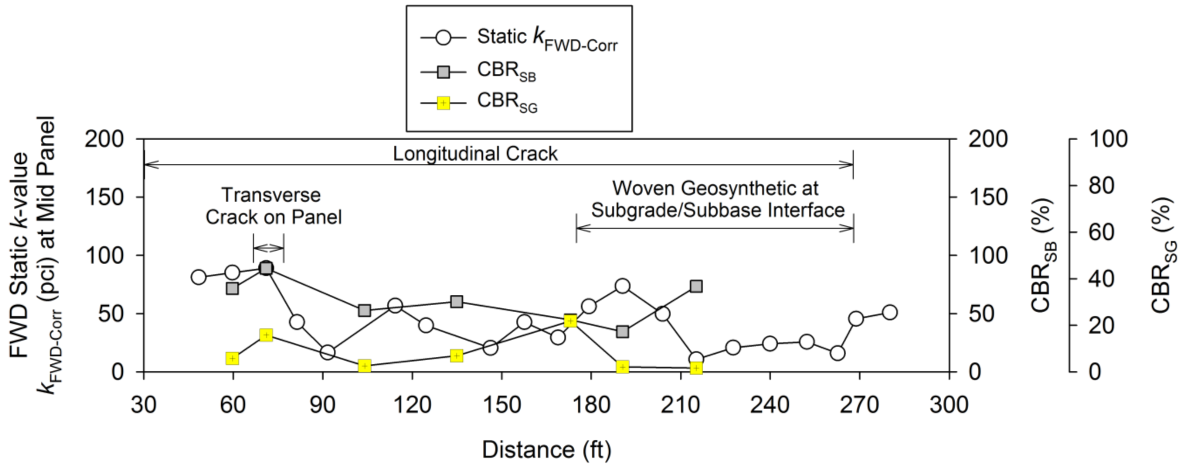


Figure 72. Comparison of $k_{\mathbf{FWD\text{-}Corr}}$ and CBR of foundation layers — SW Westlawn Drive, Ankeny

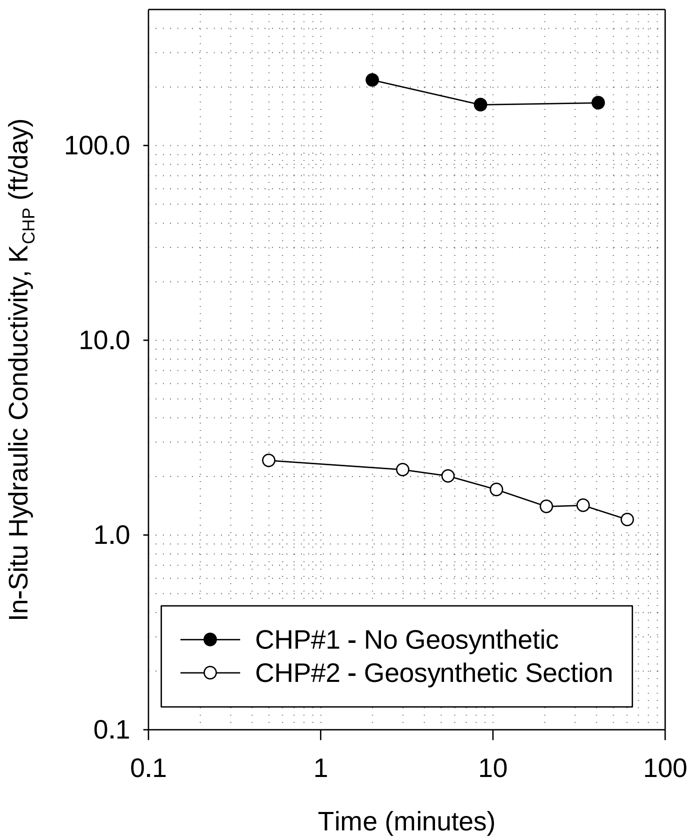


Figure 73. CHP test results — SW Westlawn Drive, Ankeny

The research team was present at this site in 2008 during construction of the subgrade and conducted 6 ft deep DCPs in the subgrade (Figure 74). The locations of these DCPs are shown in Figure 70 in reference to the new test locations (labelled as old DCPs). The 2008 tests were conducted in trench backfill material placed along this road that was compacted using a vibratory plate compactor (Figure 74). DCP-CBR profiles from 2008 testing are shown along with the 2012 testing results in Figure 75. Results showed poor subgrade compaction with CBR < 3 in the top 3 ft of the subgrade during construction. The high intercept values on this site (Figure 70), premature cracks on the surface and voids beneath pavement can likely be related to non-uniform vertical deformations of this poorly compacted backfill material and potential loss of support beneath the pavement.

Figure 74. Photos during construction and testing in 2008 — SW Westlawn Drive, Ankeny

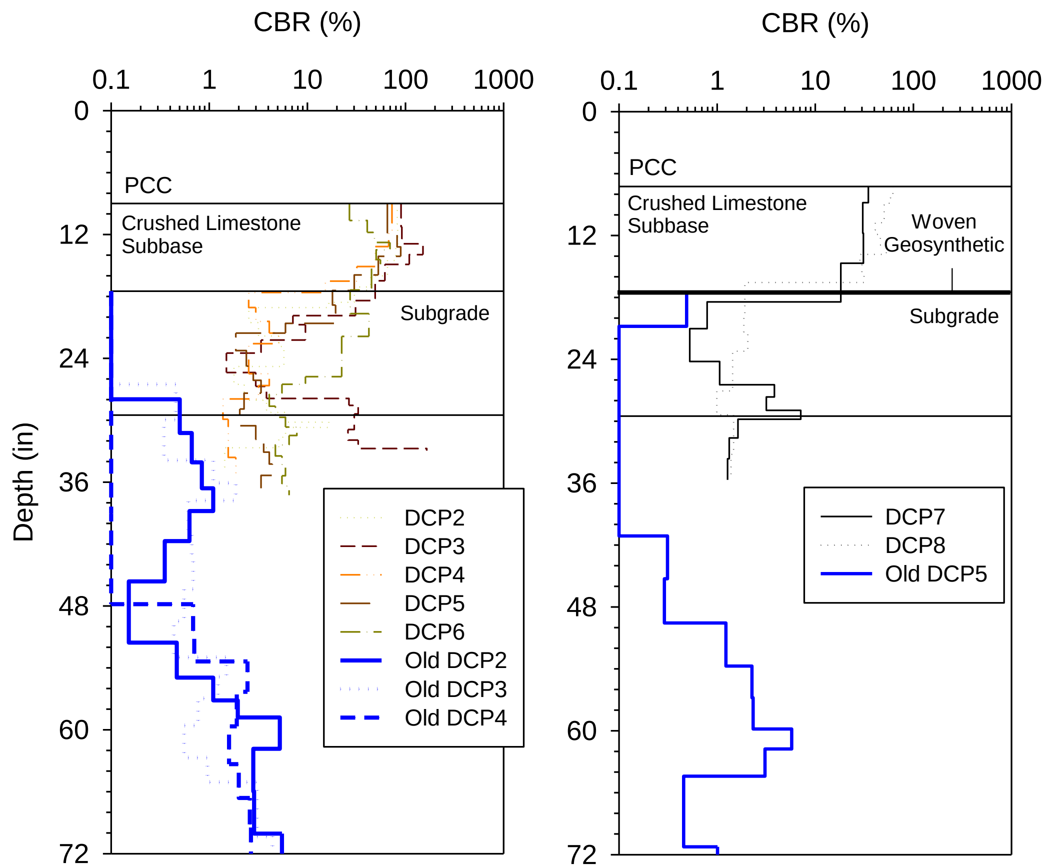


Figure 75. Comparison between 2008 DCP-CBR profiles and 2012 DCP-CBR profiles — SW Westlawn Drive, Ankeny

Results in Figure 75 shows that CBR values obtained in 2012 were comparatively higher than CBR obtained in 2008 during construction. This increase in CBR can be attributed to changes in moisture content, densification of the material due to settlement of backfill, and trafficking during placement of subbase material over the subgrade. Moisture contents of the subgrade material during 2008 testing varied from about 15% to 16%, while the material was at about 12% during 2012 testing (materials' standard Proctor optimum moisture content was about 12%).

SW Logan St., Ankeny, Polk County

This site is located on SW Logan St., just north of SW Southlawn Dr. intersection, in Ankeny, Polk County. The section tested was constructed in 2012 with a nominal 7.5 in. thick PCC pavement and experiences an AADT of 500. The section was 30 days old at the time of testing. No distresses were present on the pavement and is rated as "good" with PCI = 100. The pavement was about 25 ft wide with a cross-slope of 2% and three panels across the pavement width. The panels were 8.3 ft wide by 9.6 to 14.8 ft long. Edge drains were present at this site for subsurface drainage. Photos of the test site are shown in Figure 76. The pavement was supported on 3.5 in. thick crushed limestone subbase (classified as GW-GM, A-1-a) underlain by 6 in. of fly ash stabilized subgrade (classified as ML, A-4(1)). At the time of testing, the in situ moisture content of the fly ash stabilized subgrade material was 15%.

Field testing at this site was conducted on July 19, 2012. FWD testing was conducted on 20 panels at mid panel and at joint. DCP tests were conducted at six locations and CHP test was conducted at one location. There were three panels across the pavement width, and tests were conducted along the middle panel. All tests were conducted along the center line of each panel.

The measured core thickness was 7.5 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 77. DCP-CBR profiles and cumulative blows with depth are shown in Figure 78. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 78. Figure 79 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 80.

The average LTE at joints was about 95%, which indicates good joint efficiency. The average Static $k_{FWD\text{-}Corr}$ was 75 pci, while the average $k_{comp\text{-}DCP}$ was higher with about 817 pci. The average CBR_{SB} was 66, which indicate "very good" subbase conditions per SUDAS (2013a). The average CBR of fly ash stabilized subgrade ($CBR_{FA\text{-}SG}$) layer was 34, which indicate excellent subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "very good" based on COV = 21% of $k_{FWD\text{-}Corr}$ measurements.

CHP test showed in situ K_{CHP} = 0.5 ft/day. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (71 days). This time of drainage corresponds to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.71.

Figure 76. Photographs of field test site during testing — SW Logan Street, Ankeny

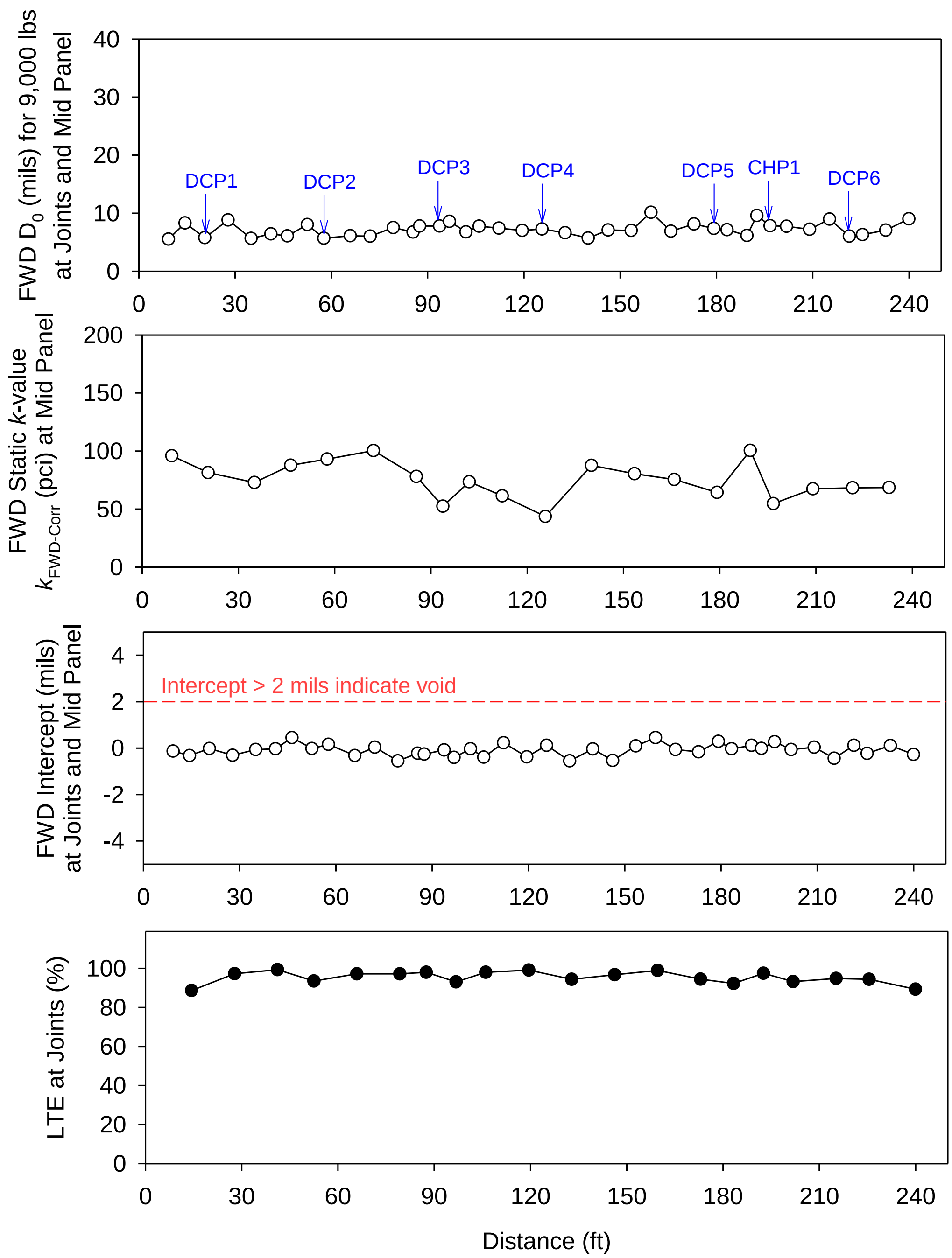


Figure 77. FWD test results — SW Logan Street, Ankeny

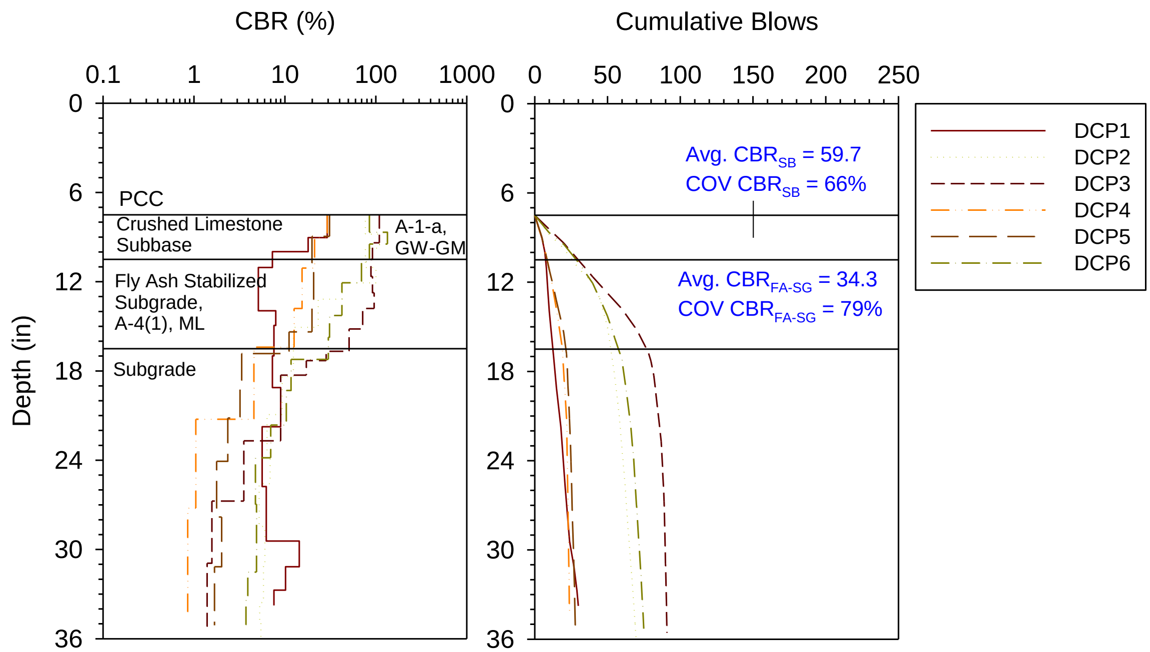


Figure 78. DCP-CBR and cumulative blows with depth profiles — SW Logan Street, Ankeny

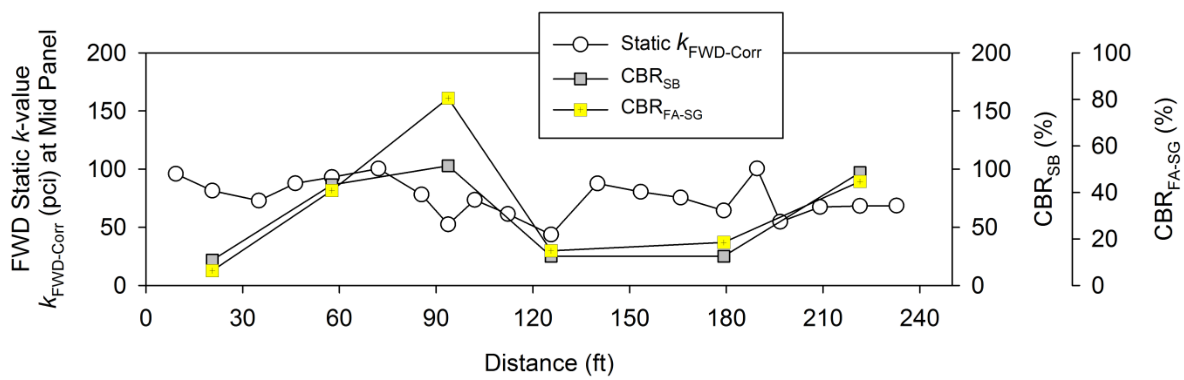


Figure 79. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — SW Logan Street, Ankeny

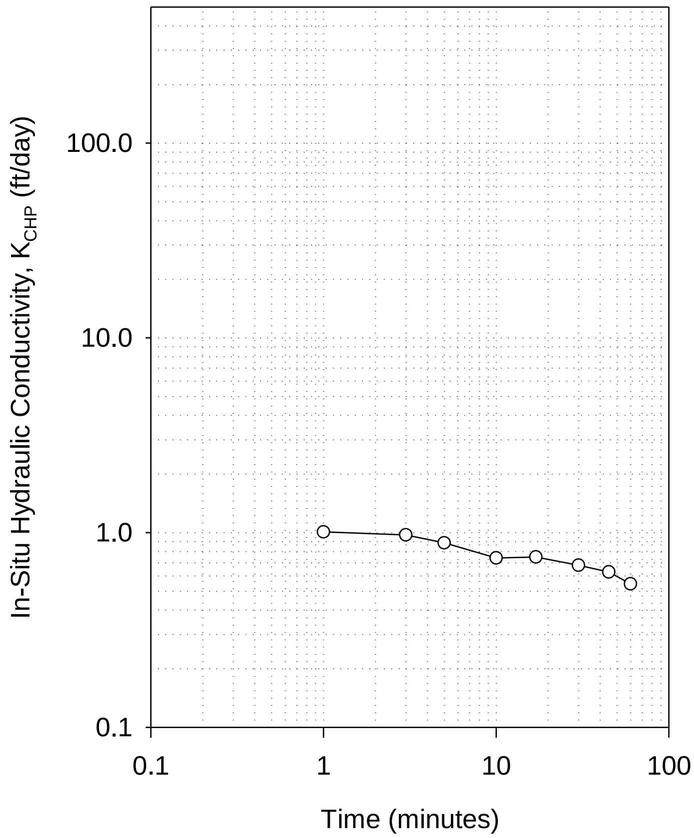


Figure 80. CHP test results — SW Logan Street, Ankeny

West Main Street, Knoxville

This site is located on West Main St., between S. Fremont St. and Iowa St, in Knoxville, Marion County. The section tested was constructed in 2007 and experiences an AADT of 500. The pavement was about 26 ft wide with a cross-slope of 2% and three panels across the pavement width. Edge drains were present at this site for subsurface drainage. The pavement is rated as "good" with PCI = 99 as no distresses were present on the panels tested. However, cracks were present on one of the panels located adjacent to the test panels. Photos of the test site are shown in Figure 81. The pavement was supported on 12 in. thick crushed limestone subbase (classified as GM, A-1-a) underlain by 12 in. of fly ash stabilized subgrade.

Field testing at this site was conducted on July 12, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 82. FWD testing was conducted on 19 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at two locations. There were three panels across the pavement width, and tests were conducted along the middle panel. All tests were conducted along the center line of each panel. One of the panels tested (on the west end of the test section and close to Iowa St.) was located directly over a utility line.

The measured core thickness was 7.0 in. and 7.5 in. at two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 83. DCP-CBR profiles and cumulative blows with depth are shown in Figure 84. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 84. Figure 85 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 86.

LTE at joints were all close to 100%. The intercept values were higher at joints compared to at the center of each panel. About 11% of the tests showed intercept > 2 mils. The average Static $k_{FWD\text{-}Corr}$ was 67 pci, while the average $k_{comp\text{-}DCP}$ values were higher with 564 pci. The lowest static $k_{c\text{-}FWD}$ value was 20 pci and was located at the end of the test section where a utility line was located under the panel, which could likely be due to poorly compacted backfill around the trench.

The average CBR_{SB} was 46, which indicate "good" subbase conditions per SUDAS (2013a). The average CBR of fly ash stabilized subgrade ($CBR_{FA\text{-}SG}$) layer was 11, which indicate "fair" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "very good" based on COV = 20% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed in situ K_{CHP} = 0.3 and 0.2 ft/day. Based on these K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 57 days and 86 days, respectively. These time of drainage correspond to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.74 and 0.71.

Figure 81. Photographs of field test site during testing — West Main Street, Knoxville

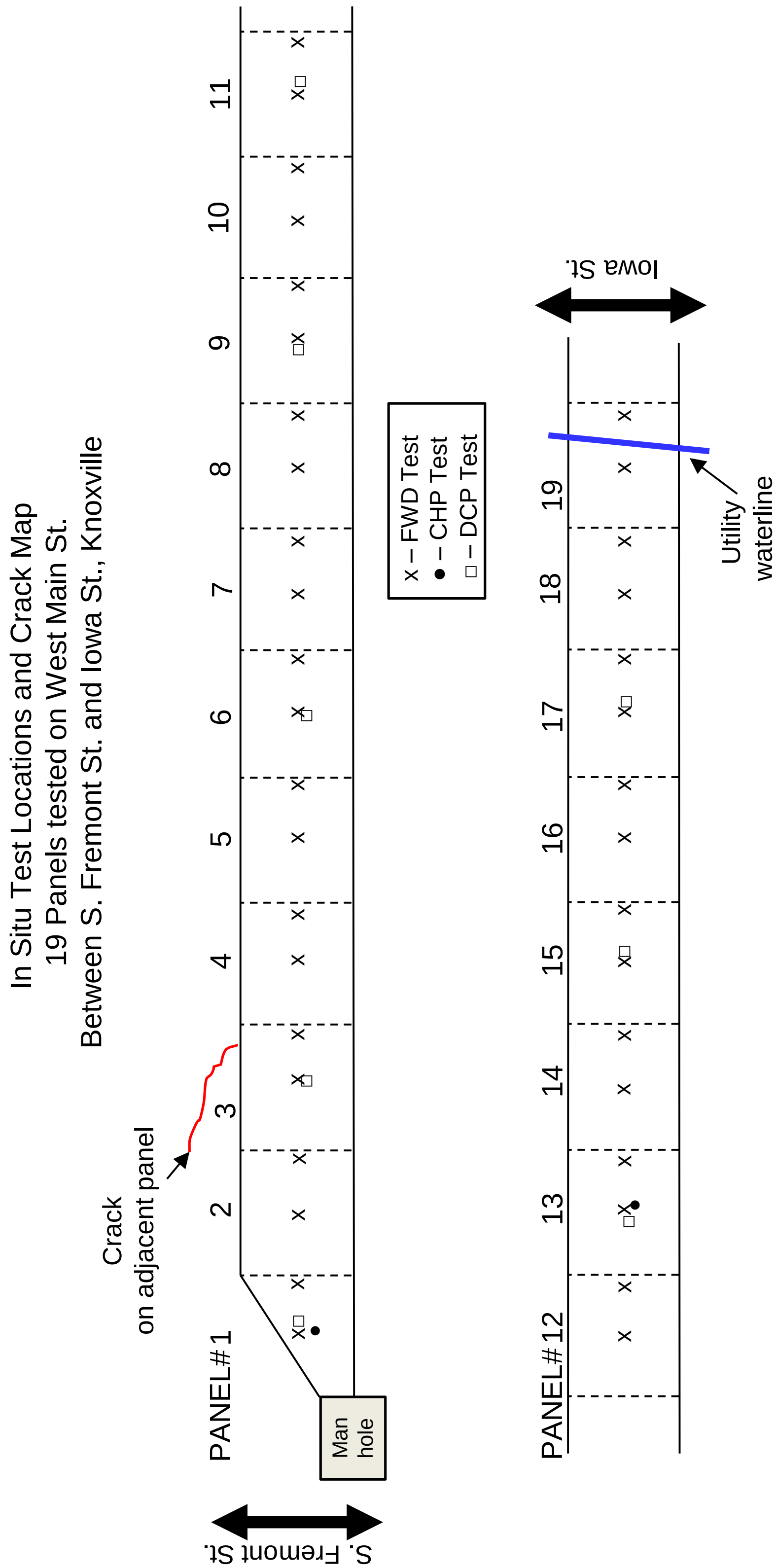


Figure 82. Crack Survey Map — West Main Street, Knoxville

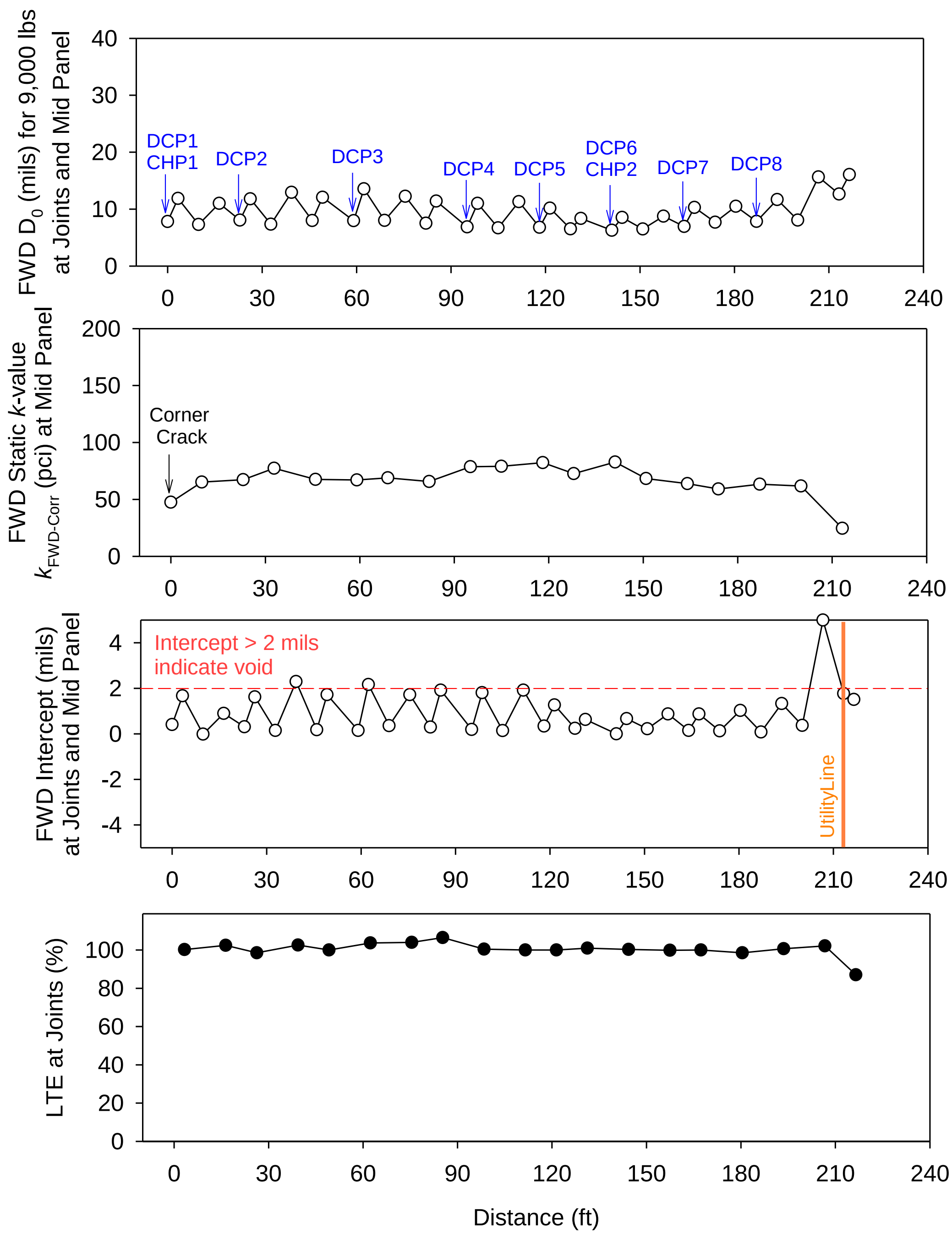


Figure 83. FWD test results — West Main Street, Knoxville

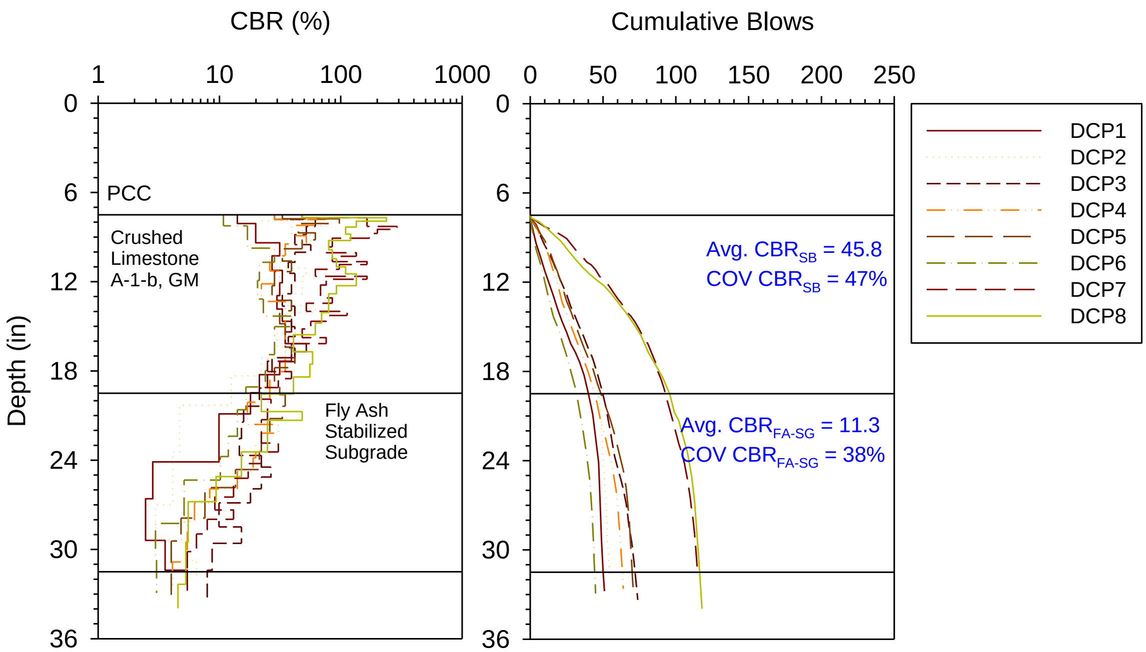


Figure 84. DCP-CBR and cumulative blows with depth profiles — West Main Street, Knoxville

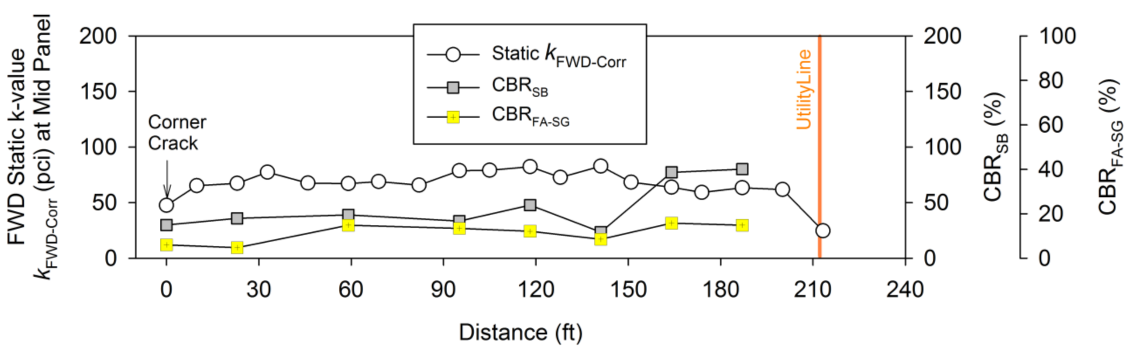


Figure 85. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — West Main Street, Knoxville

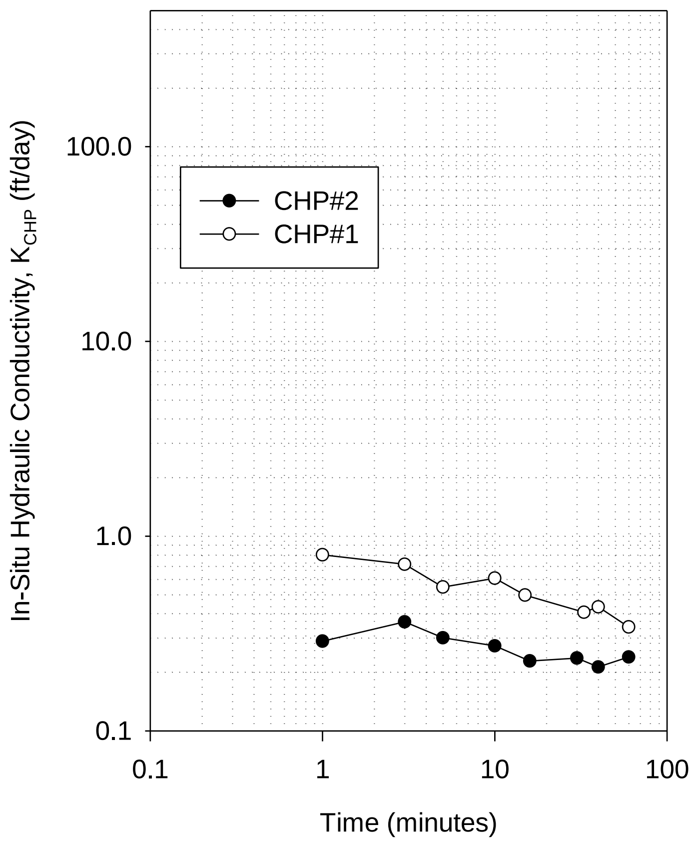


Figure 86. CHP test results — West Main Street, Knoxville

South 5th Street, Knoxville

This site is located on South 5th St., near E Competine St, in Knoxville, Marion County. The section tested was constructed in 2009 and experiences an AADT of 680. The pavement was about 26 ft wide with a cross-slope of 2% and four panels across the pavement width. Panels were about 8.3 ft wide and generally 14.9 to 15.2 ft long. Some panels close to the E Competine St intersection (in the middle of the test section) were about 6 to 8 ft long. Edge drains were present at this site for subsurface drainage. The pavement is rated as "good" with PCI = 98. Longitudinal cracks were present on 3 panels and corner cracks were present on 2 panels out of the 22 panels tested. Photos of the test site are shown in Figure 87. The pavement was supported on 12 in. thick crushed limestone subbase (classified as GM, A-1-a) underlain by 12 in. of fly ash stabilized subgrade.

In situ testing at this site was conducted on July 12, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 88. FWD testing was conducted on 22 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at two locations (one each in panels with and without cracks). All tests were conducted along the center line of each panel. There were utility lines across the pavement at two locations and along the pavement alignment as shown in Figure 88.

The measured core thickness was 8.0 in. at two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 89. DCP-CBR profiles and cumulative blows with depth are shown in Figure 90. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 90. Figure 91 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 92.

Average LTE at joints was about 92%, which indicate good joint efficiency. The average Static $k_{FWD\text{-}Corr}$ was 124 pci, while the average $k_{comp\text{-}DCP}$ values was higher with 820 pci. The average CBR_{SB} was 40, which indicate "good" subbase conditions per SUDAS (2013a). The average CBR of fly ash stabilized subgrade ($CBR_{FA\text{-}SG}$) layer was 26, which indicate "very good" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "very good" based on COV = 19% of Static $k_{FWD\text{-}Corr}$ measurements.

CHP test in the cracked panel showed K_{CHP} = 0.4 ft/day while in the panel with no cracks showed K_{CHP} = 0.2 ft/day. Based on these K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (43 and 86 days). The times of drainage corresponds to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.76 and 0.71.

Figure 87. Photographs of field test site during testing — South 5th Street, Knoxville

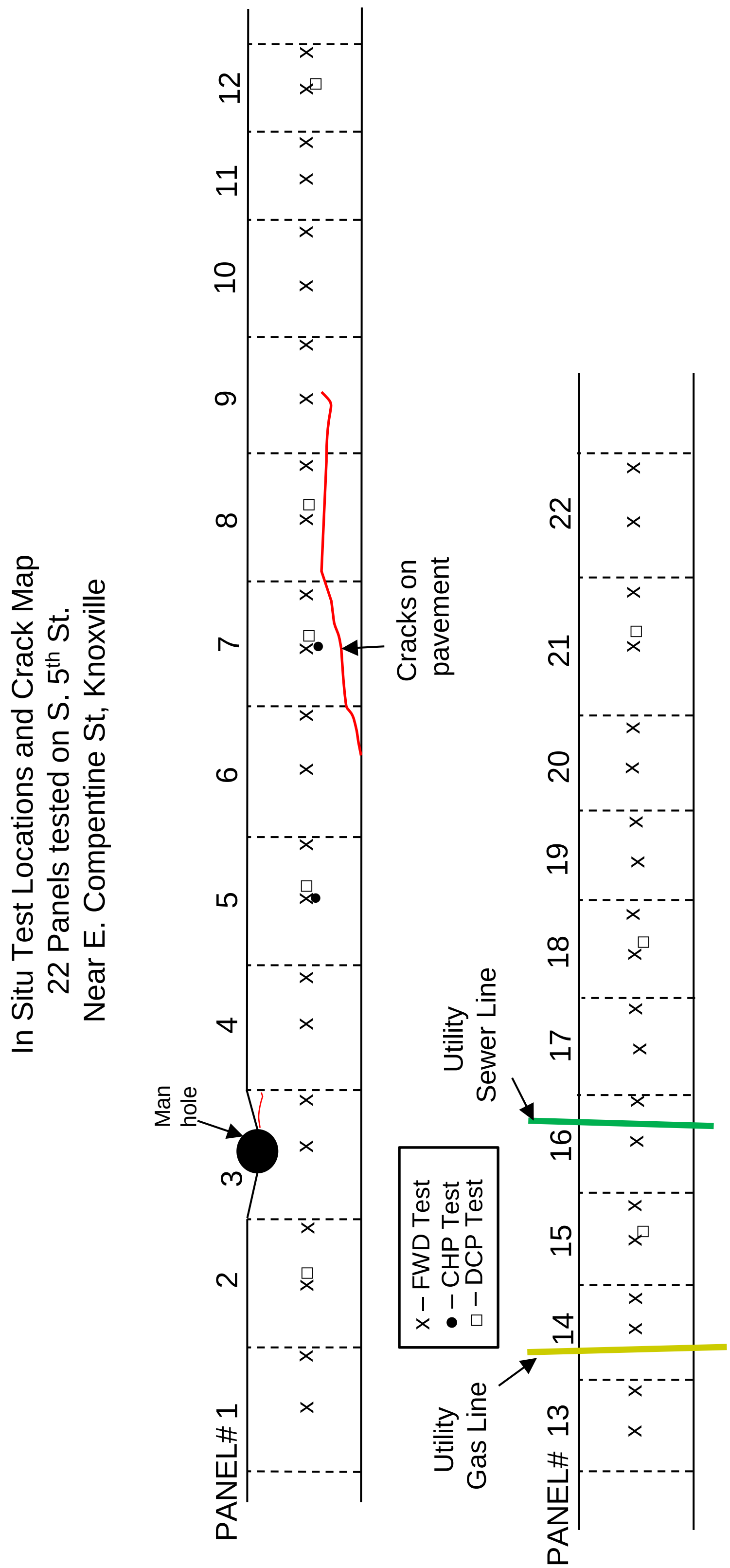


Figure 88. Crack Survey Map — South 5th Street, Knoxville

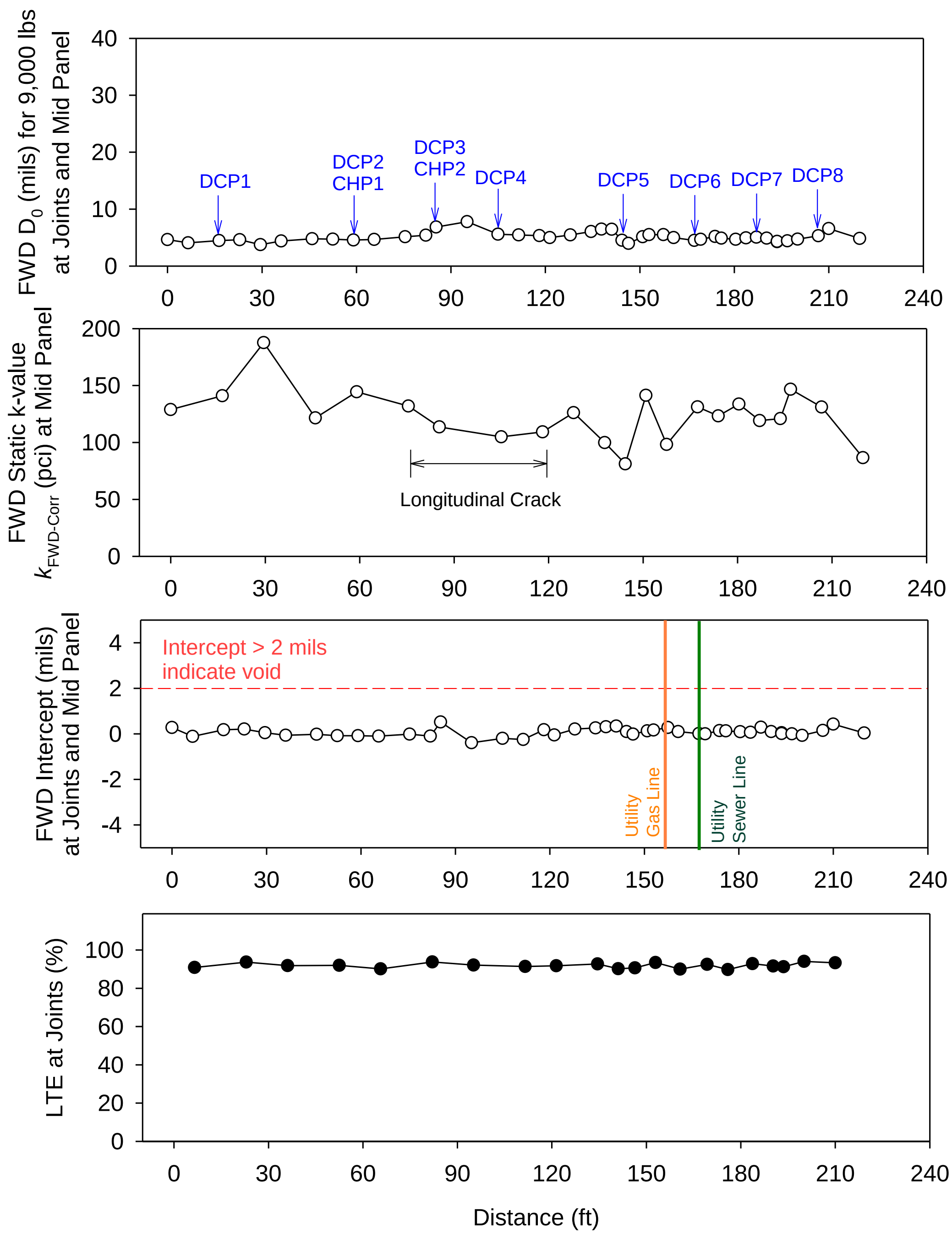


Figure 89. FWD test results — South 5th Street, Knoxville

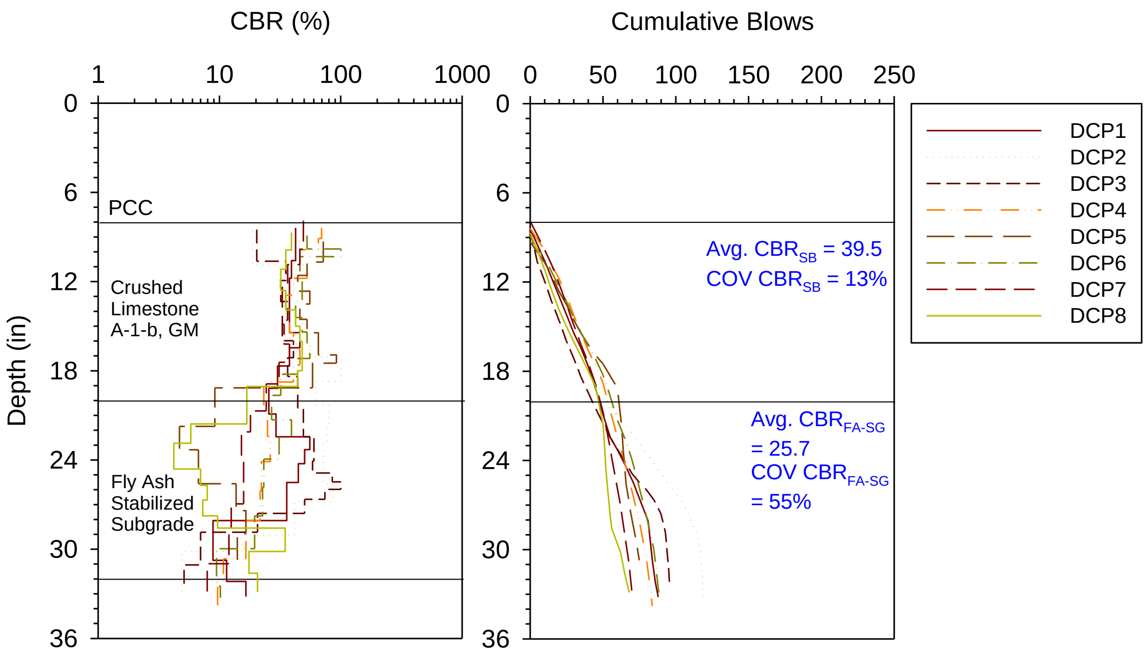


Figure 90. DCP-CBR and cumulative blows with depth profiles — South 5th Street, Knoxville

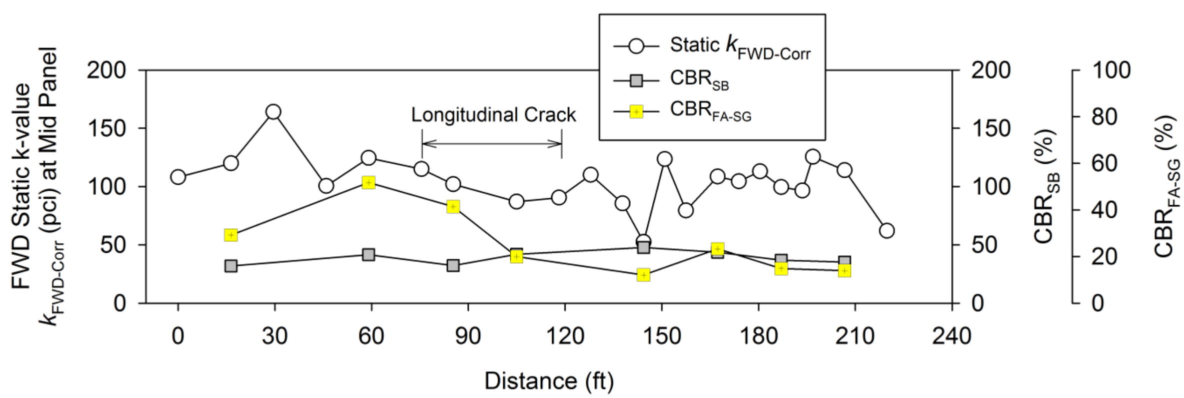


Figure 91. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — South 5th Street, Knoxville

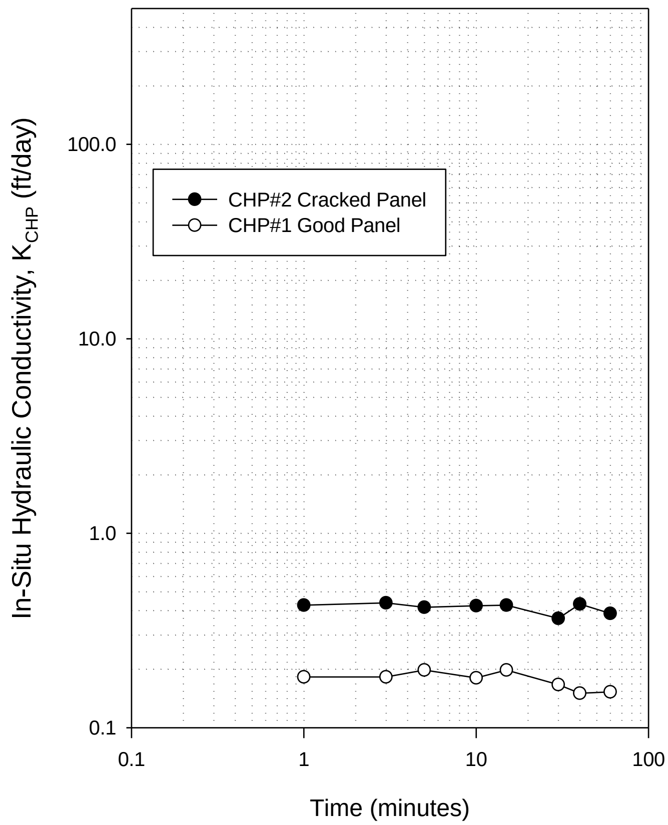


Figure 92. CHP test results — South 5th Street, Knoxville

Valley View Drive, Council Bluffs

This site is located on Valley View Dr. (near 15263 Valley View Dr.), in Council Bluffs, Pottawattamie County. The section tested was constructed in 1997 and experiences an AADT of 8900. The pavement is about 24 ft wide with a cross-slope of 2%. The pavement is divided into two travel lanes (north and south bound) and paved shoulders on each side. The pavement is rated "satisfactory" with PCI = 77. Most of the joints showed distresses (Figure 93) and thin longitudinal cracks were present on 4 panels, and corner cracks were present on 1 panel, out of the 22 panels tested. Subsurface drainage system was not present at this site. Curb and gutters were present to drain surface water. Photos of the test site are shown in Figure 93. The pavement was supported on a 6 in. thick subbase material. The subbase material consisted of crushed limestone (classified as GM, A-1-b) at one core location and recycled PCC (classified as SP-SM, A-1-a) at another core location.

Field testing at this site was conducted on July 26, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 94. FWD testing was conducted on 22 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at two locations (one with RPCC subbase and other with crushed limestone subbase). All tests were conducted on the north bound lane along the center line of each panel.

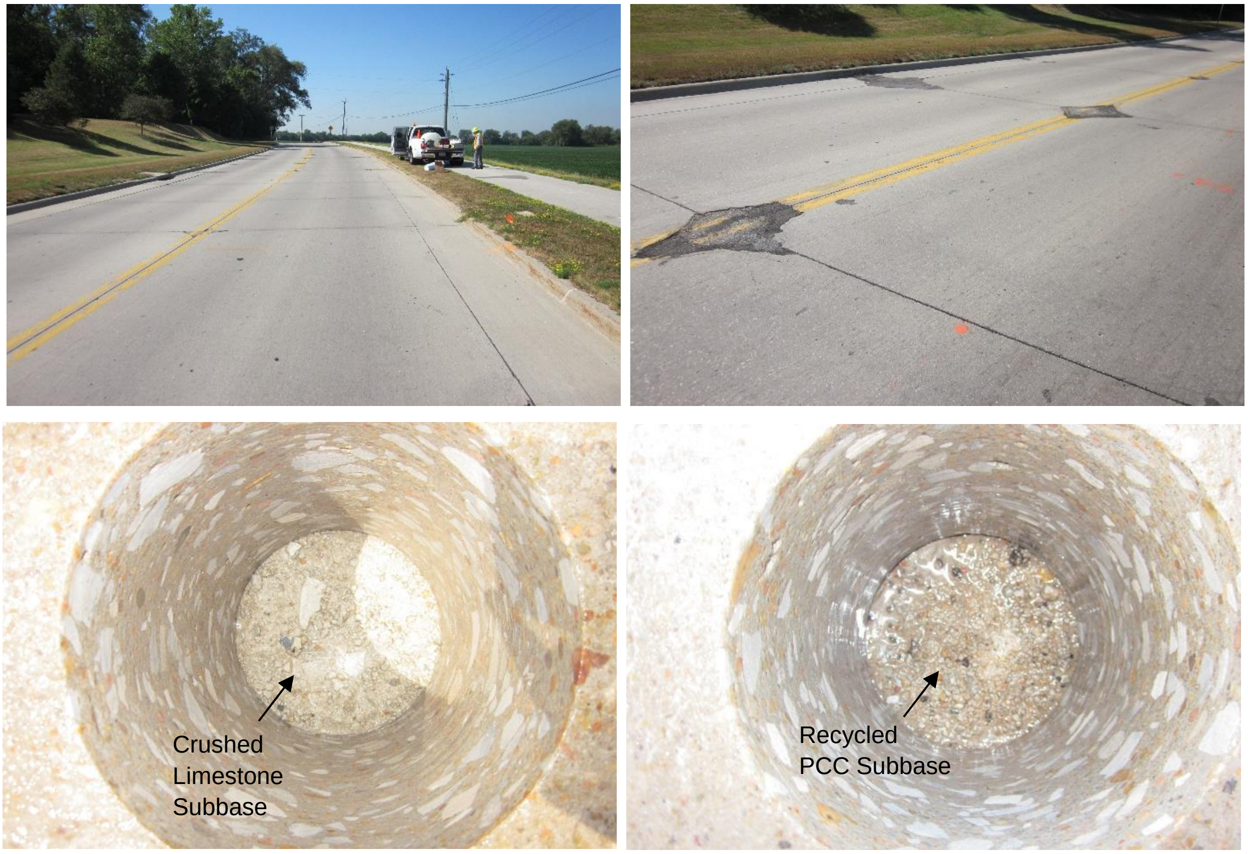


Figure 93. Photographs of field test site during testing — Valley View Drive, Council Bluffs

The measured core thickness was 9.75 in. and 9.0 in. at the two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{\text{FWD-Corr}}$, intercept, and LTE at joints are shown in Figure 95. DCP-CBR profiles and cumulative blows with depth are shown in Figure 96. Note that seven out of ten DCPs were terminated within the subbase layer due to refusal (i.e., < 0.1 mm/blow). Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 96. Figure 97 compares CBR_{SG} and Static $k_{\text{FWD-Corr}}$. CHP test results showing K_{CHP} with time are shown in Figure 98.

Average LTE at joints was about 93%, which indicate good joint efficiency. The Static $k_{\text{FWD-Corr}}$ was 84 pci, while the average $k_{\text{comp-DCP}}$ was higher with about 757 pci. The average CBR_{SB} was 122, which indicate “excellent” subbase conditions per SUDAS (2013a). The average CBR_{SG} was 24, which indicate “very good” subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as “very good” based on COV = 18% of $k_{\text{FWD-Corr}}$ measurements.

CHP tests showed K_{CHP} = 0.3 ft/day in the recycled PCC subbase and 5.2 ft/day in the crushed limestone subbase material. Previous work by White et al. (2008) also indicated that the permeability of recycled PCC materials were generally lower than that of virgin crushed limestone materials. Both CHP tests indicated increase in K_{CHP} after about 10 minutes (Figure 98). Based on these K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 446 days in the recycled PCC subbase and 26 days in the crushed limestone subbase materials. These times of drainage correspond to “very poor” to “poor” drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.70 and 0.80.

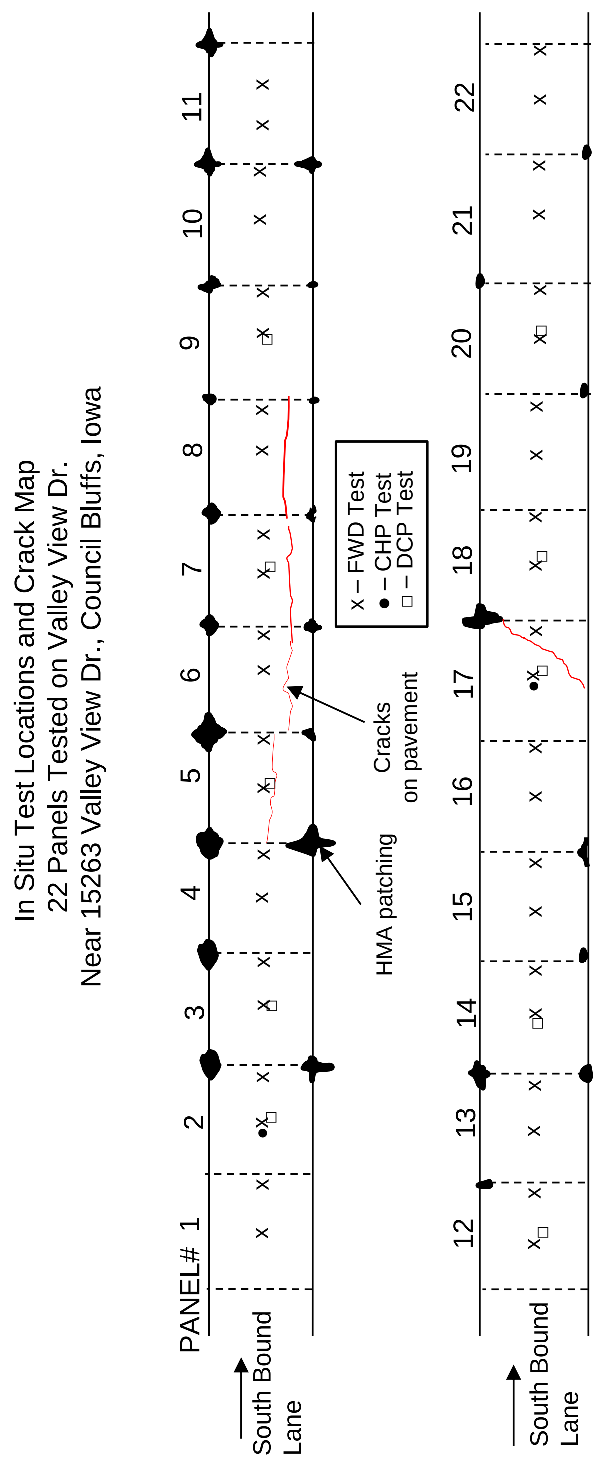


Figure 94. Crack Survey Map — Valley View Drive, Council Bluffs

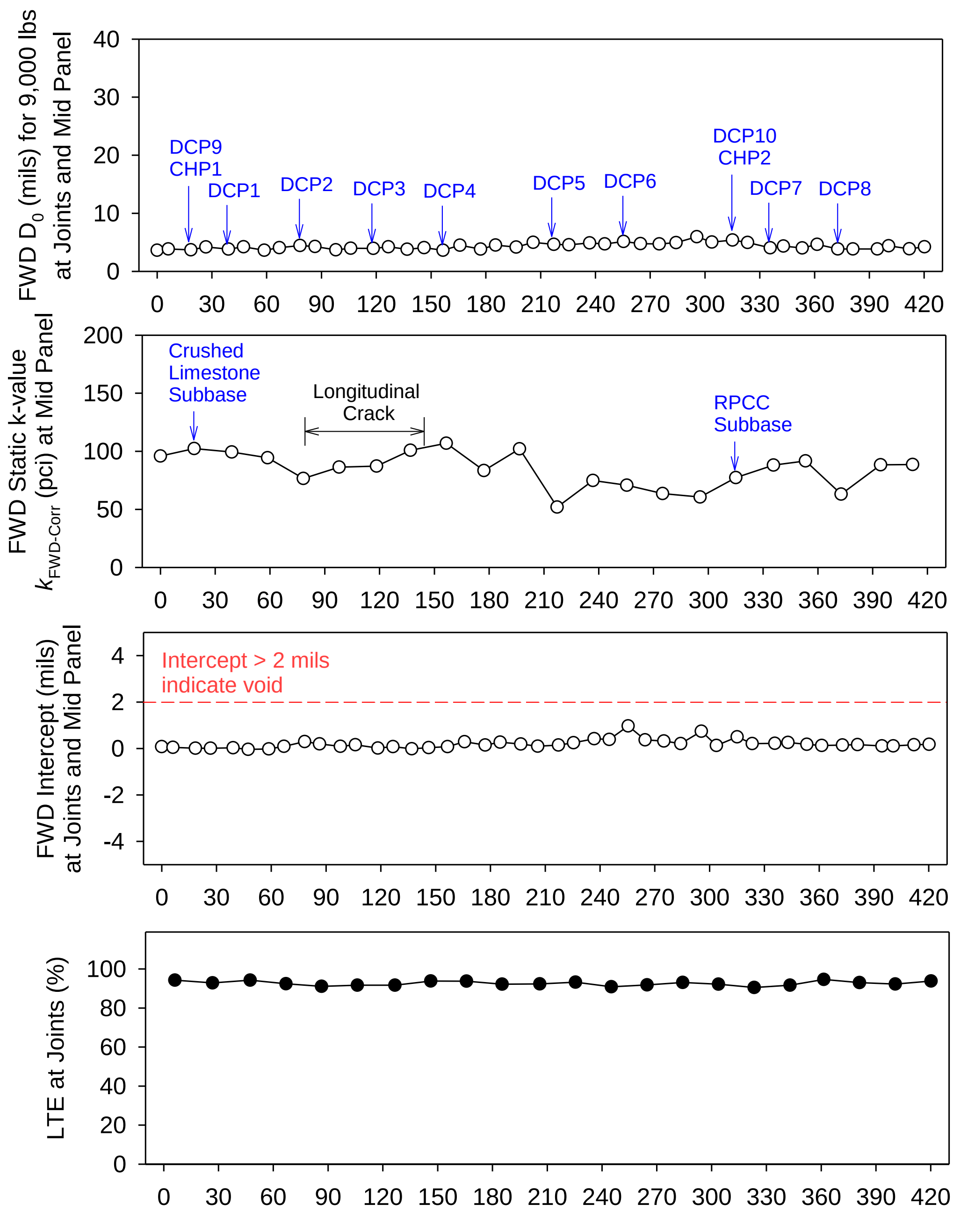


Figure 95. FWD test results — Valley View Drive, Council Bluffs

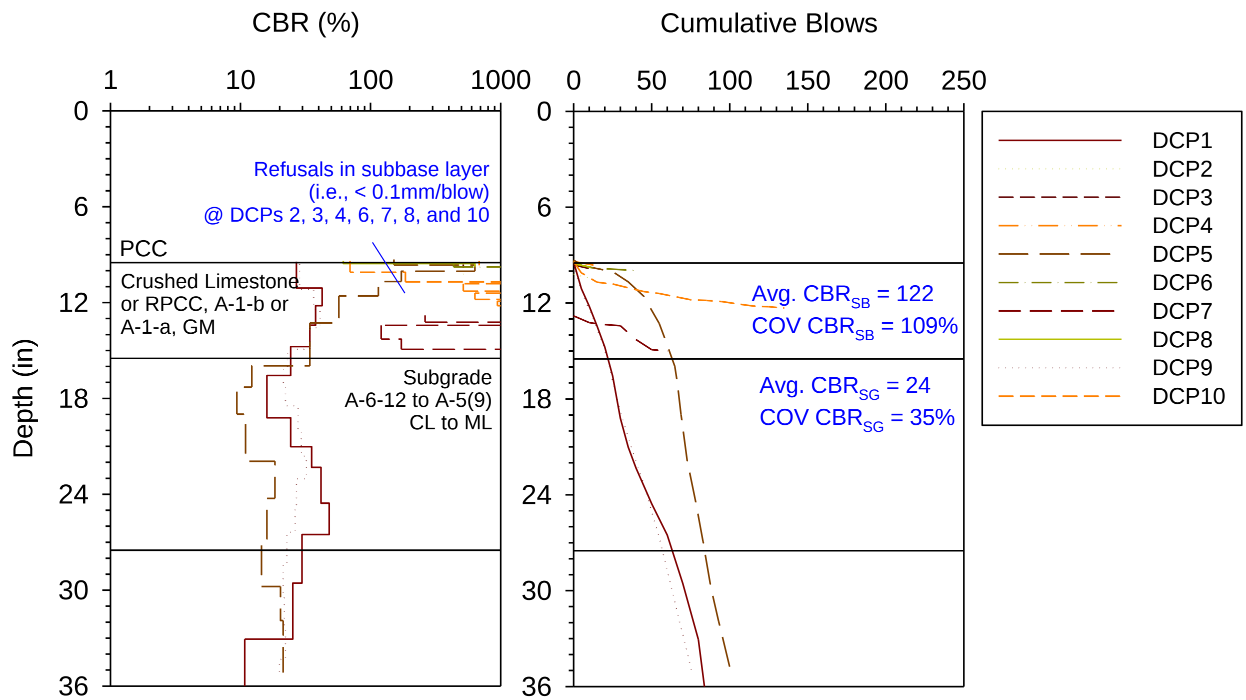


Figure 96. DCP-CBR and cumulative blows with depth profiles — Valley View Drive, Council Bluffs

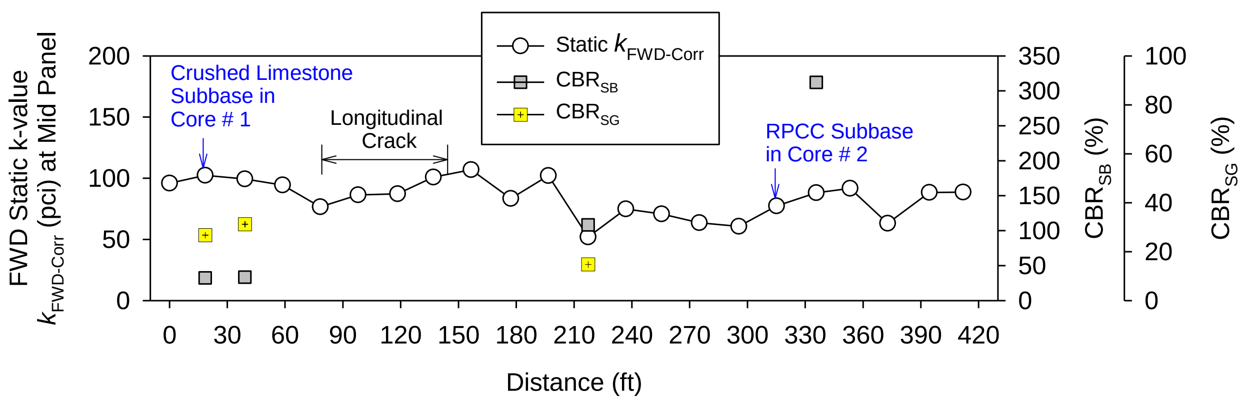


Figure 97. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — Valley View Drive, Council Bluffs

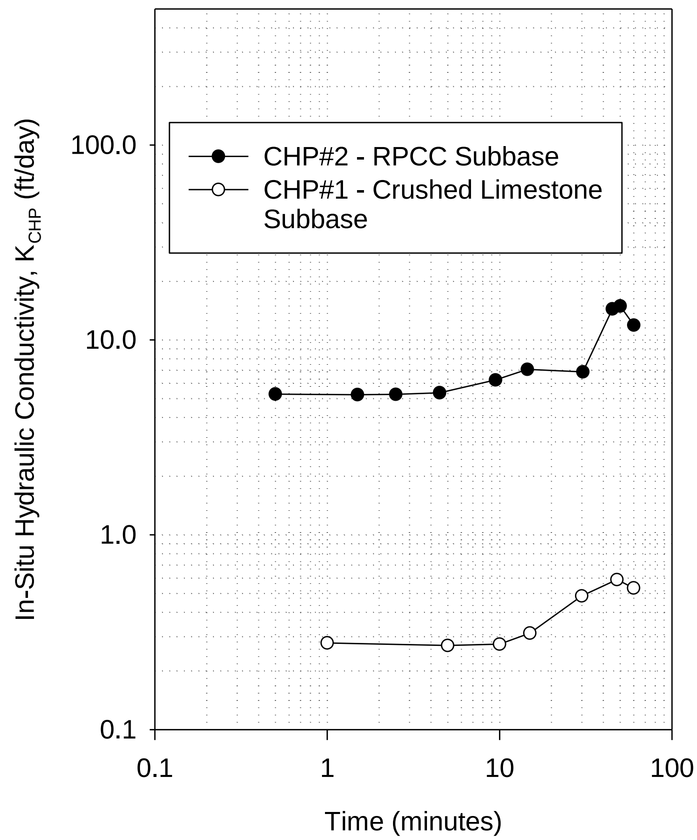


Figure 98. CHP test results — Valley View Drive, Council Bluffs

9th Avenue, Council Bluffs

This site is located on 9th Ave., between South 31st and South 32nd St., in Council Bluffs, Pottawattamie County. The section tested was constructed in 1989 and experiences an AADT of 7600. The pavement is about 37 ft wide with a cross-slope of 2%. The pavement is divided into two travel lanes (east and west bound) and a paved parking lane on the west bound side. The panels were about 13 ft wide by 14.8 to 15.2 ft long. The pavement is rated as "fair" with PCI = 77. The pavement consisted of longitudinal cracks on 7 out of 12 panels tested and faulting at joints ranging from 0 in to 0.3 in. Several wide cracks were patched with asphalt. Subsurface drainage system was not present at this site. Curb and gutters were present for surface water drainage. Photos of the test site are shown in Figure 99. The pavement was supported on a (~1 in. thick) leveling sand layer underlain by about 9.5 in. of fly ash stabilized subgrade (classified as ML, A-5(4)) and subgrade (classified as CH, A-7-5(42)).

Field testing at this site was conducted on July 26, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 100. FWD testing was conducted on 12 panels at mid panel and at joint. DCP tests were conducted at five locations and CHP test was conducted at one location (on a panel with wide longitudinal crack). All tests were conducted on east bound lane along the center line of each panel.

The measured core thickness was 7.75 in. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 101. DCP-CBR profiles and cumulative blows with depth are shown in Figure 102. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 102. Figure 103 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 104.

Average LTE at joints was about 92%, which indicate good joint efficiency. One of the joint showed LTE = 63% and all remaining joints showed LTE ≥ 85%. About 8% of the tests showed FWD intercept > 2 mils, which indicate potential voids underneath pavement. The average Static $k_{FWD\text{-}Corr}$ was 45 pci, while the average $k_{comp\text{-}DCP}$ values was higher with 432 pci. The average CBR of fly ash stabilized subgrade ($CBR_{FA\text{-}SG}$) layer was 18, which indicate "good" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "good" based on COV = 26% of $k_{FWD\text{-}Corr}$ measurements.

CHP test showed K_{CHP} = 0.8 ft/day. Based on these K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 for the leveling sand layer (see Table 7), the time to 50% drainage at this site is estimated as > 1 month (120 days). This time of drainage corresponds to "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.70.

Figure 99. Photographs of field test site during testing — 9th Avenue, Council Bluffs

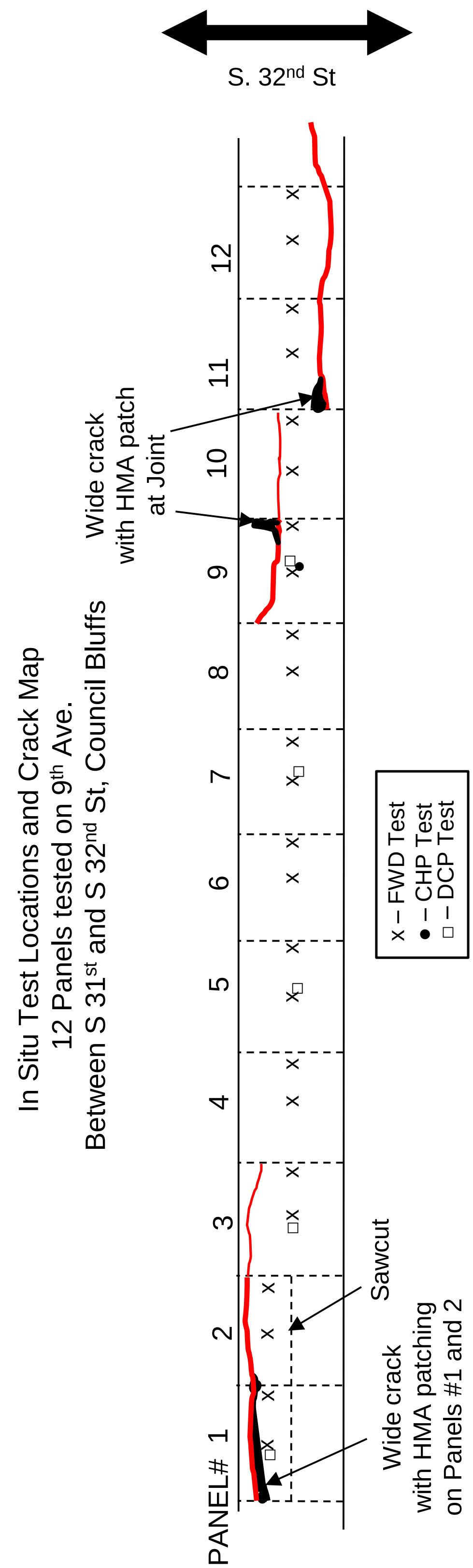


Figure 100. Crack Survey Map — 9th Avenue, Council Bluffs

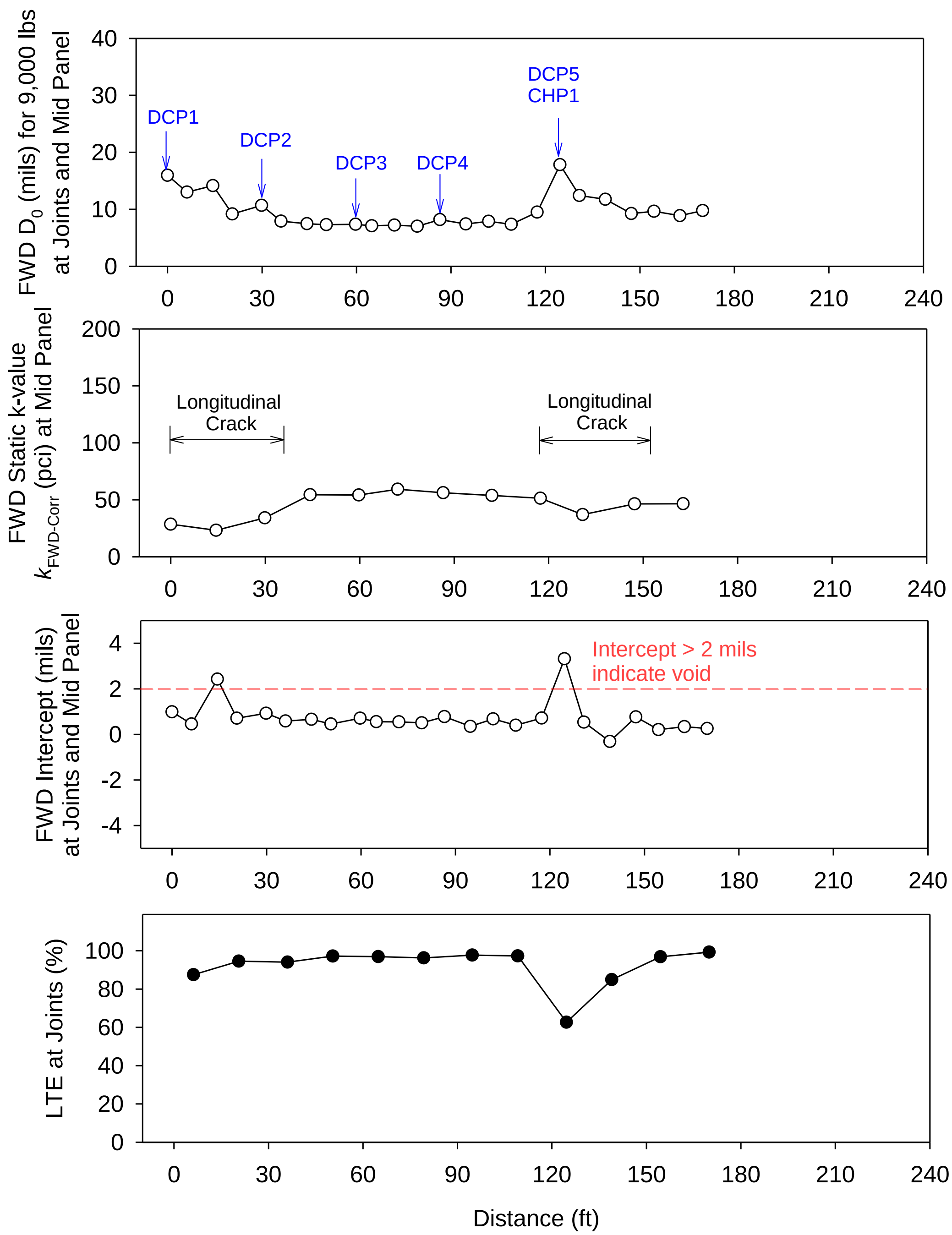


Figure 101. FWD test results — 9th Avenue, Council Bluffs

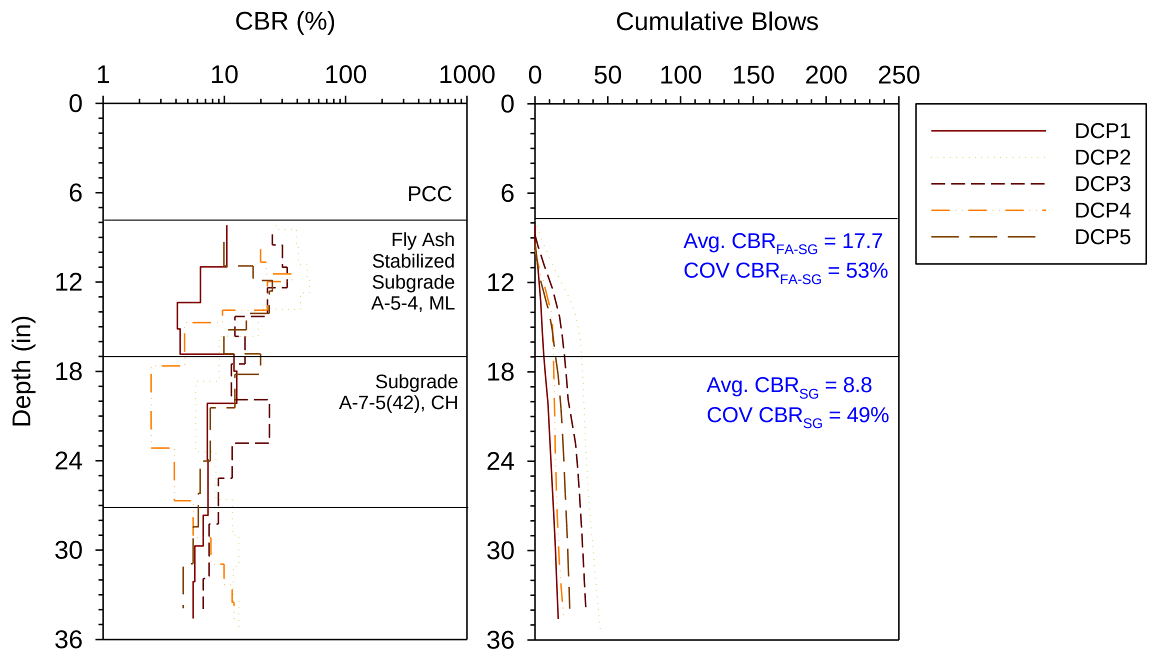


Figure 102. DCP-CBR and cumulative blows with depth profiles — 9th Avenue, Council Bluffs

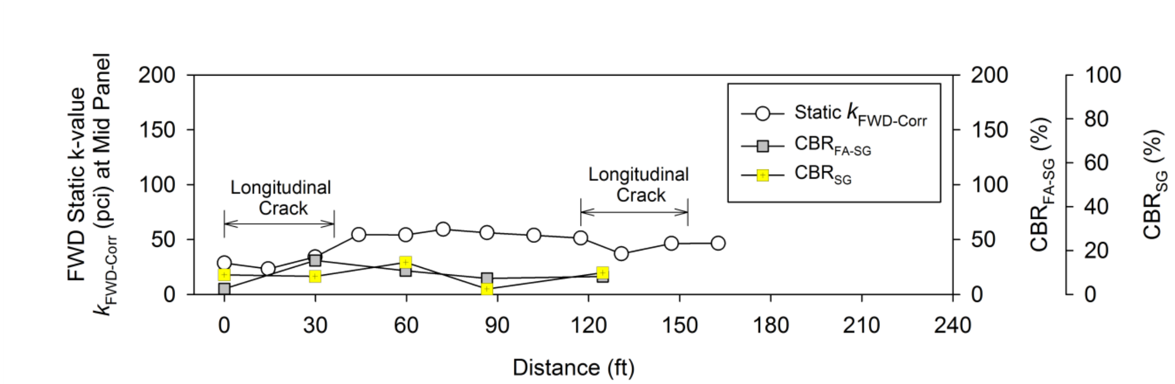


Figure 103. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — 9th Avenue, Council Bluffs

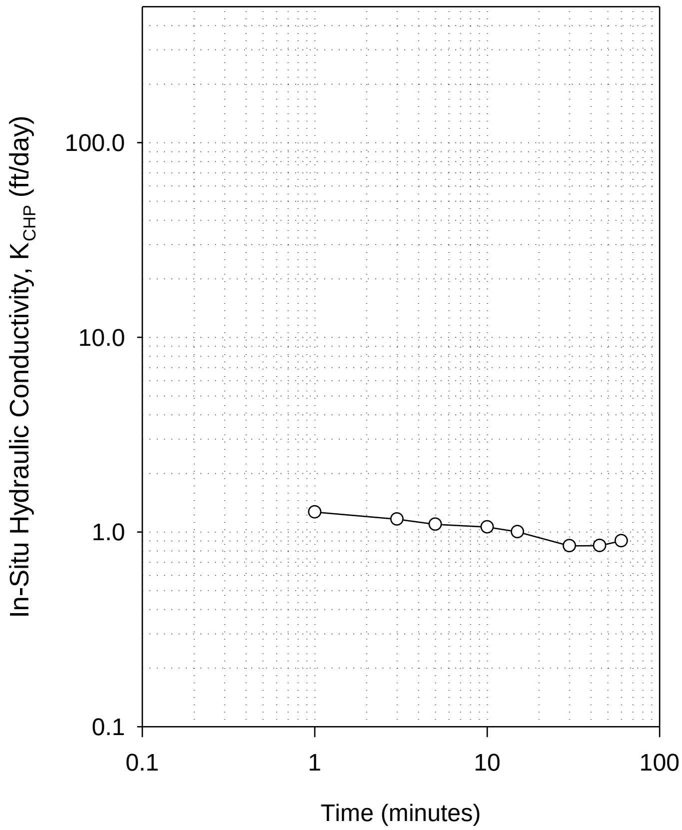


Figure 104. CHP test results — 9th Avenue, Council Bluffs

Cliff Road (Site A), Burlington

This site is located on Cliff Rd. (between 2500 and 2505 Cliff Rd.) in Burlington, Des Moines County. The section tested was constructed in 1993 and experiences an AADT of 1120. The pavement was about 25.7 ft wide with a cross-slope of 2% and three panels across the pavement width. Subsurface drainage system was not present at this site. Curb and gutters were present to drain surface water. The pavement is rated as "satisfactory" with PCI = 78. The pavement showed distresses on 4 out of the 18 panels tested with longitudinal, transverse, and corner cracks. Photos of the test site are shown in Figure 105. The pavement was supported on 5 in. thick crushed limestone subbase (classified as GM, A-1-a) underlain by silt subgrade (classified as ML, A-4(10)). The in situ moisture content of the subgrade material was about 18.6%, at the time of testing.

Field testing at this site was conducted on August 2, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 106. FWD testing was conducted on 18 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at two locations (one under a panel with no cracks and one under a panel with cracks). All tests were conducted along the center line of the north bound lane panels.

The measured core thickness was 6.5 in. and 6.75 in. at two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in

Figure 107. DCP-CBR profiles and cumulative blows with depth are shown in Figure 108. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 108. Figure 109 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 110.

Average LTE at joints was about 94%. The average Static $k_{FWD\text{-}Corr}$ was 78 pci, while the average $k_{c\text{-}DCP}$ values were higher with 360 pci. The lowest Static $k_{FWD\text{-}Corr}$ value was 48 pci and was located under a panel with cracks. The average CBR_{SB} was 20, which indicate "poor" subbase conditions per SUDAS (2013a). The average CBR_{SG} was 8.4, which indicate "fair" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "very good" based on COV = 21% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed in situ K_{CHP} = 59 ft/day and 1.3 ft/day under panel with no cracks and panel with cracks, respectively. Based on these K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 1.5 days and 66 days, respectively. These times of drainage correspond to "good" and "very poor" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.99 and 0.73, respectively.

Figure 105. Photographs of field test site during testing — Cliff Road (Site A), Burlington

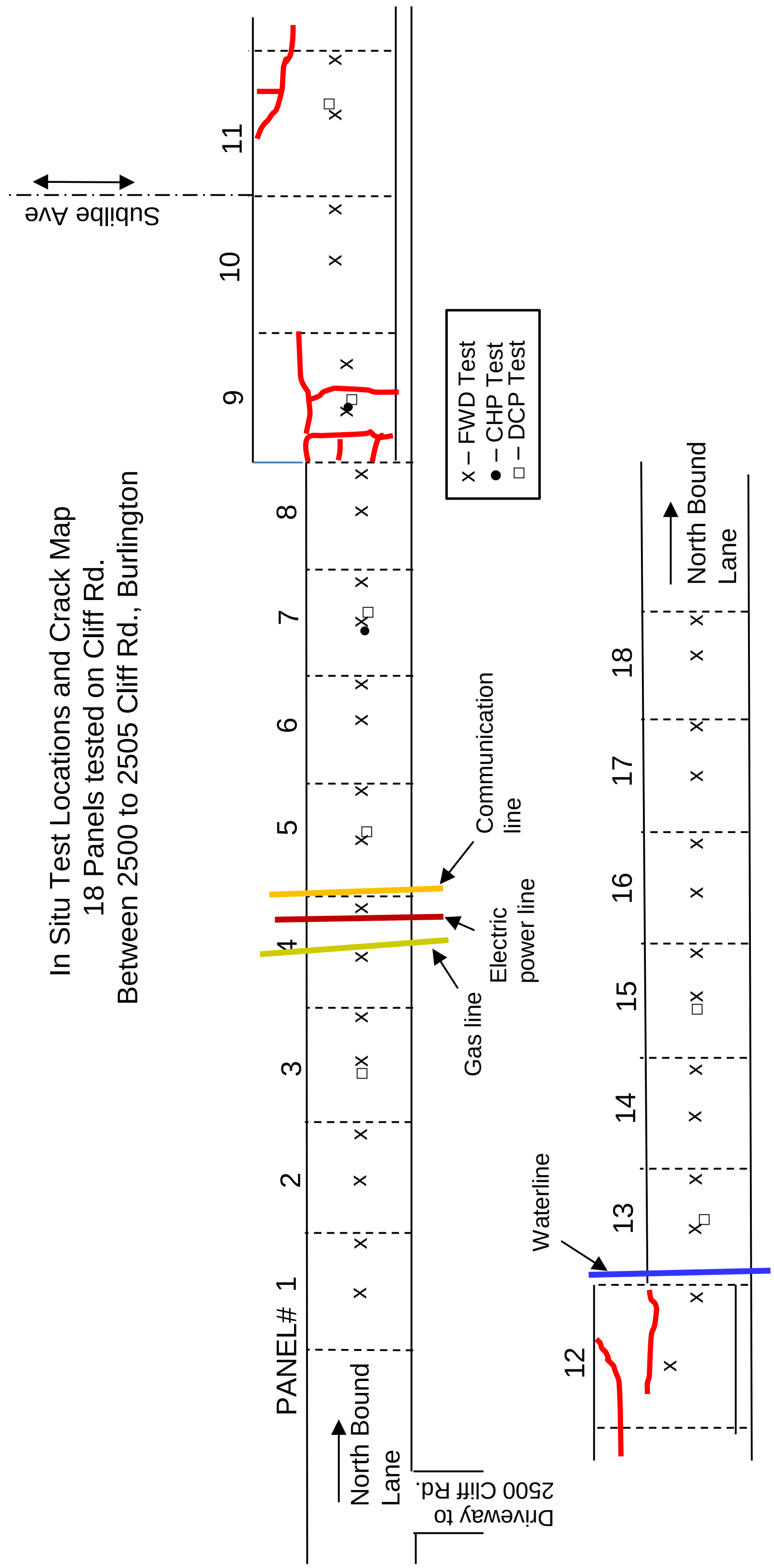


Figure 106. Crack Survey Map — Cliff Road (Site A), Burlington

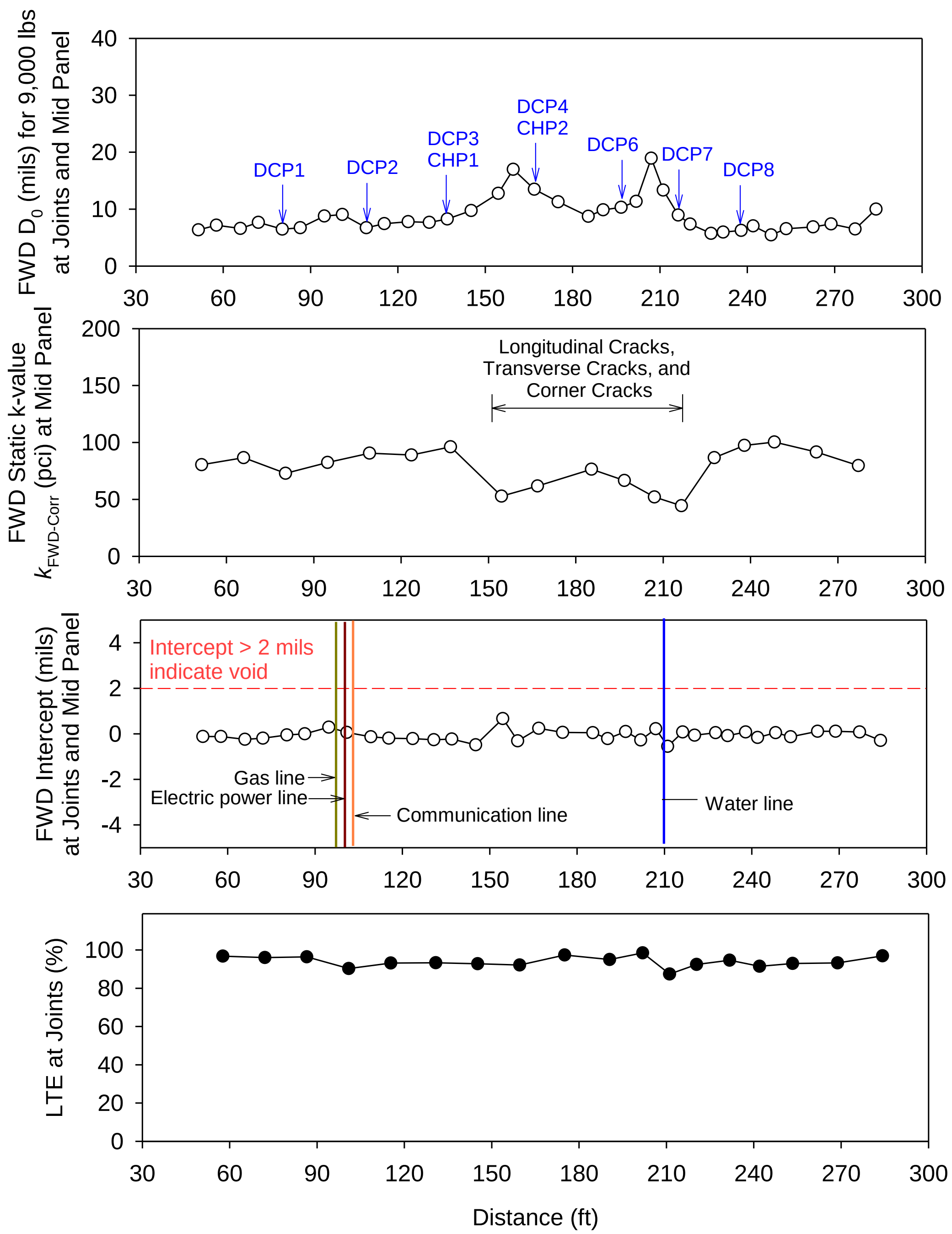


Figure 107. FWD test results — Cliff Road (Site A), Burlington

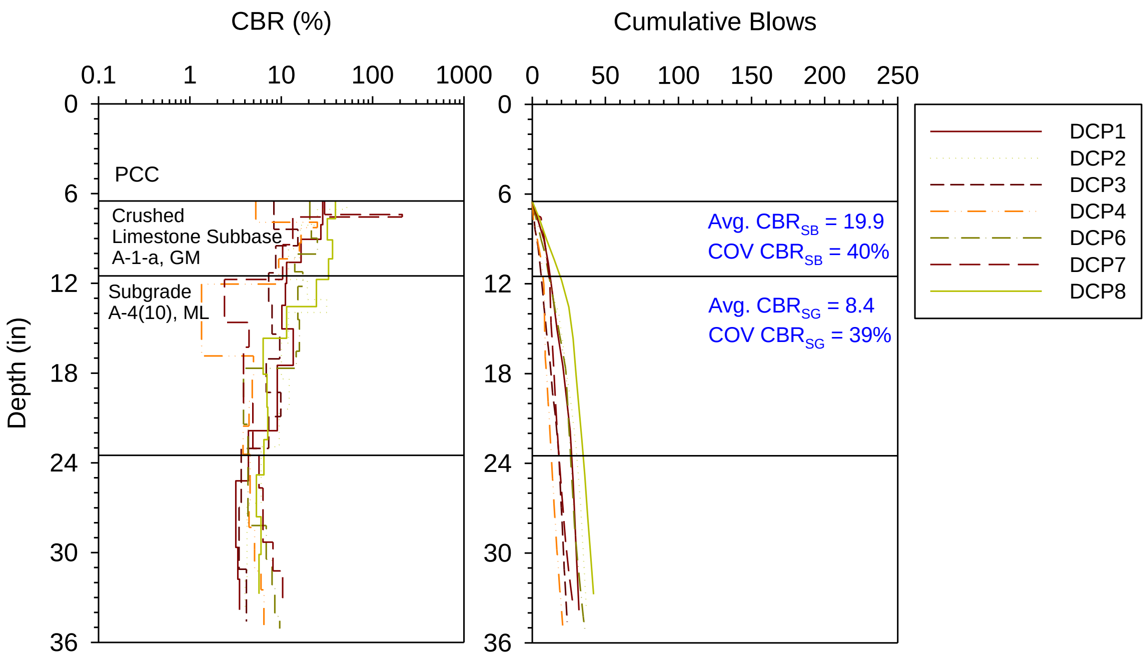


Figure 108. DCP-CBR and cumulative blows with depth profiles — Cliff Road (Site A), Burlington

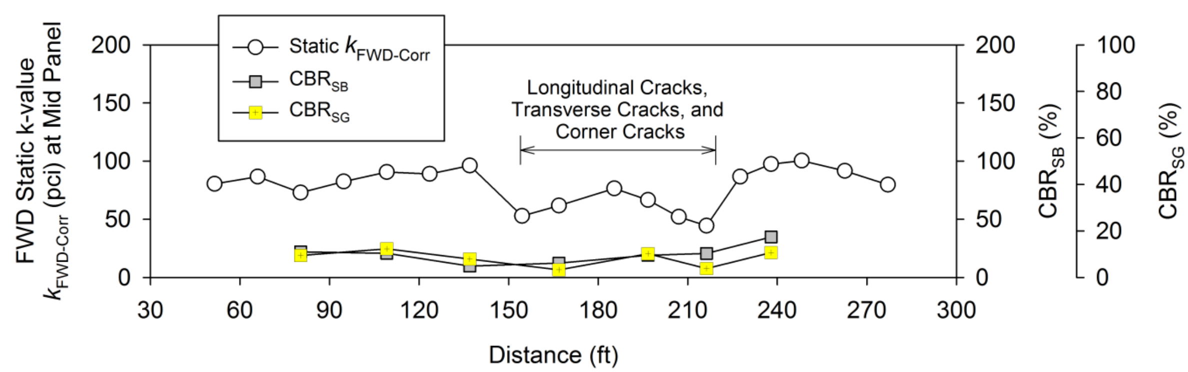


Figure 109. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — Cliff Road (Site A), Burlington

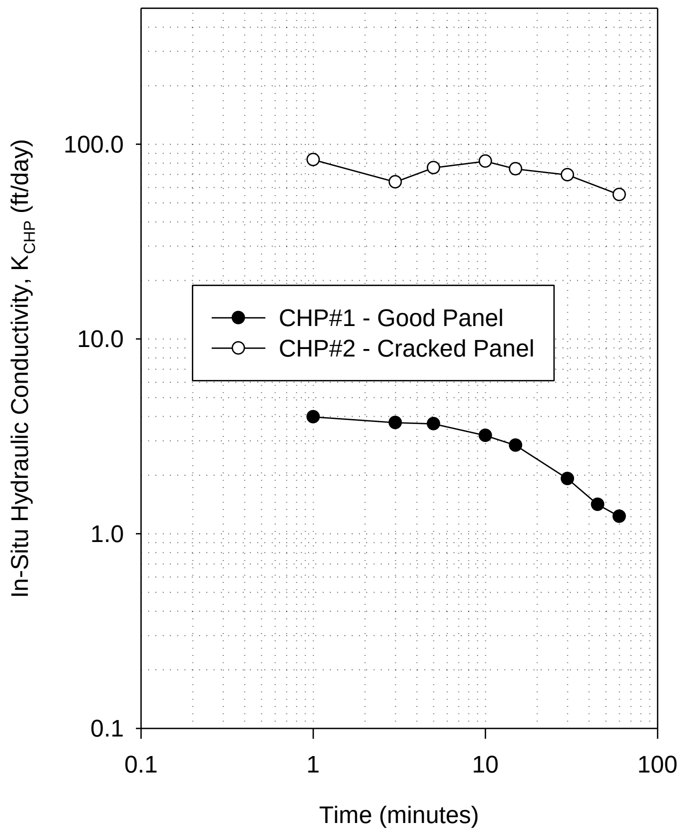


Figure 110. CHP test results — Cliff Road (Site A), Burlington

Cliff Road (Site B), Burlington

This site is located on Cliff Rd. (near 2910 Cliff Rd.) in Burlington, Des Moines County. The section tested was constructed in 1993 and experiences an AADT of 1120. The pavement was about 25.7 ft wide with a cross-slope of 2% and two panels across the pavement width. Subsurface drainage system was not present at this site. Curb and gutters were present to drain surface water. The pavement is rated as "good" with PCI = 87. The pavement consisted of longitudinal cracks on 7 panels and transverse crack on 1 panel, out of the 16 panels tested. Photos of the test site are shown in Figure 111. The pavement was supported on 4.5 in. thick crushed limestone subbase (classified as GM, A-1-a) underlain by fat clay subgrade (classified as CH, A-7-6(30)). The in situ moisture content of the subgrade material was about 28.9%, at the time of testing.

Field testing at this site was conducted on August 2, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 112. FWD testing was conducted on 16 panels at mid panel and at joint. DCP tests were conducted at six locations and CHP test was conducted at one locations (under a panel with longitudinal crack). All tests were conducted along the center line of the north bound lane panels.

The measured core thickness was 7.5 in. at one core location. FWD test results with deflection under the loading plate (D_0), Static $k_{\text{FWD-Corr}}$, intercept, and LTE at joints are shown in Figure

113. DCP-CBR profiles and cumulative blows with depth are shown in Figure 114. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 114. Figure 115 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 116.

Average LTE at joints was about 94%. The average Static $k_{FWD\text{-}Corr}$ was 48 pci, while the average $k_{comp\text{-}DCP}$ values were higher with 363 pci. The lowest static $k_{comp\text{-}FWD}$ value was 14 pci and was located under a panel with cracks. The average CBR_{SB} was 20, which indicate "poor" subbase conditions per SUDAS (2013a). The average CBR_{SG} was 8.7, which indicate "fair" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "fair" based on COV = 44% of $k_{FWD\text{-}Corr}$ measurements.

CHP test showed in situ K_{CHP} = 21 ft/day. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 4 days. The times of drainage correspond to "good" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.92.

Figure 111. Photographs of field test site during testing — Cliff Road (Site B), Burlington

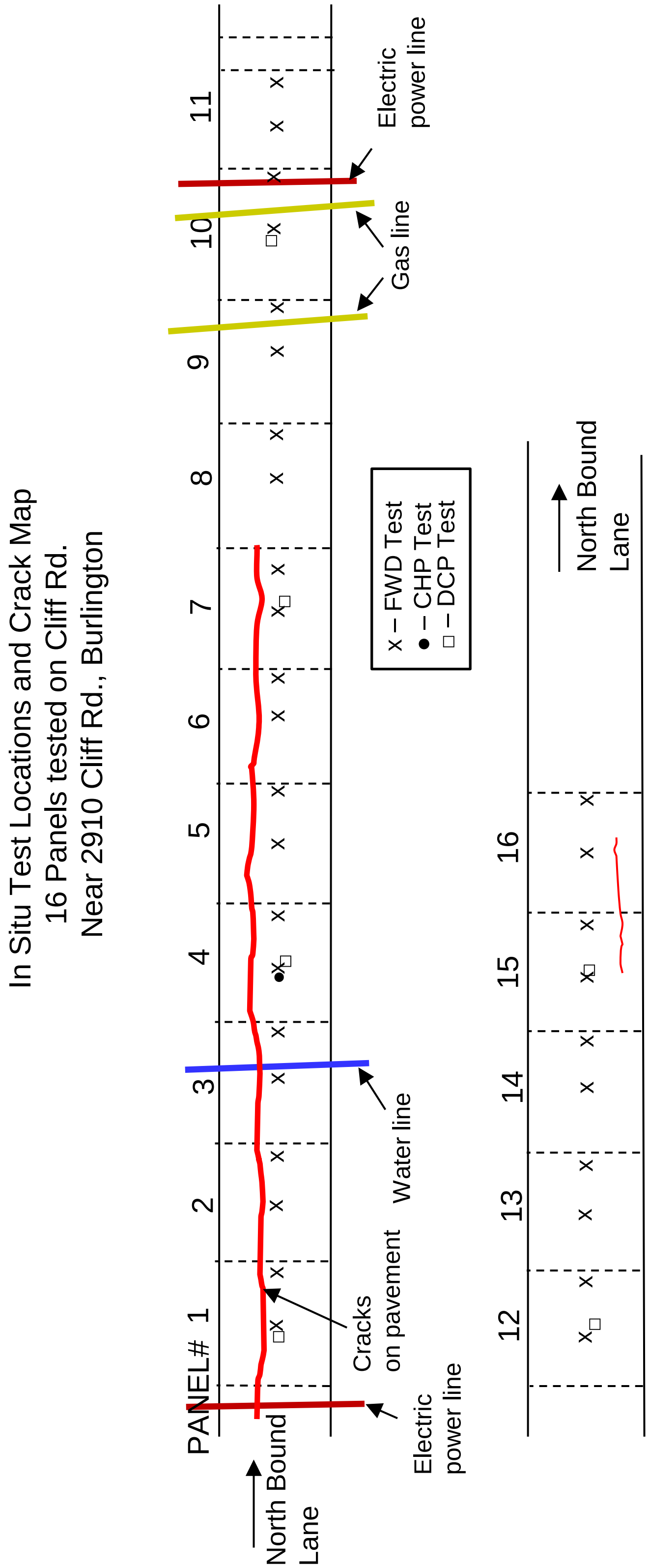


Figure 112. Crack Survey Map — Cliff Road (Site B), Burlington

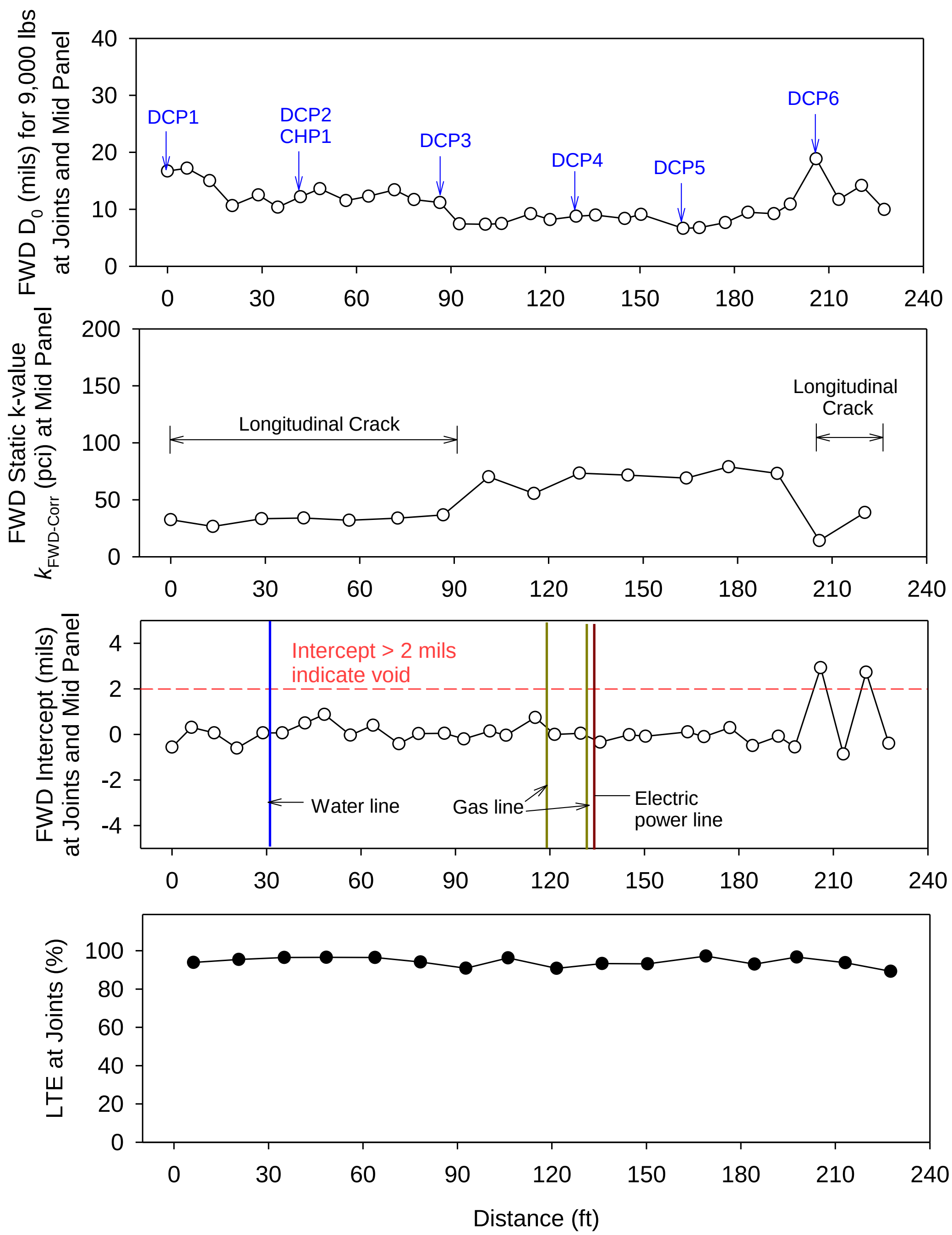


Figure 113. FWD test results — Cliff Road (Site B), Burlington

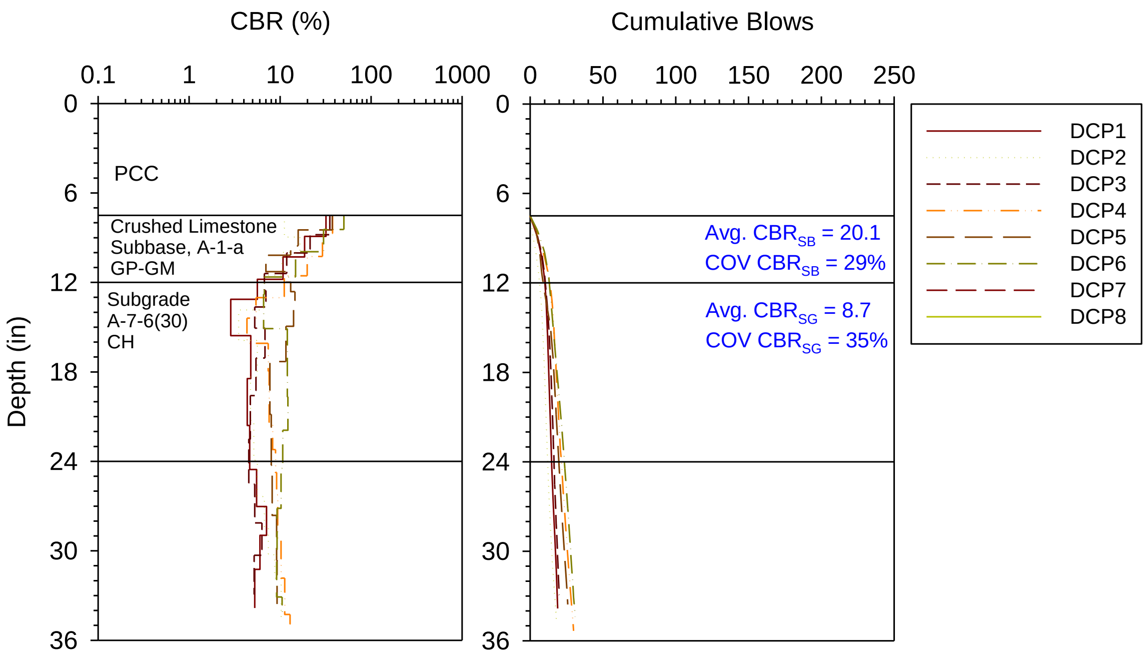


Figure 114. DCP-CBR and cumulative blows with depth profiles — Cliff Road (Site B), Burlington

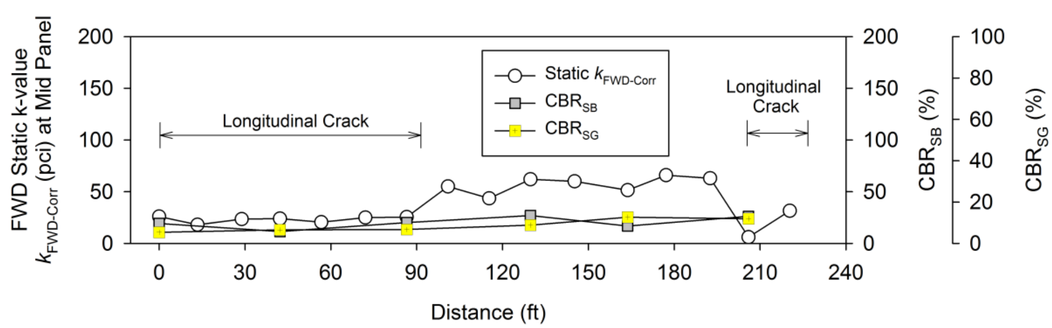


Figure 115. Comparison of $k_{\text{FWD-Corr}}$ and CBR of foundation layers — Cliff Road (Site B), Burlington

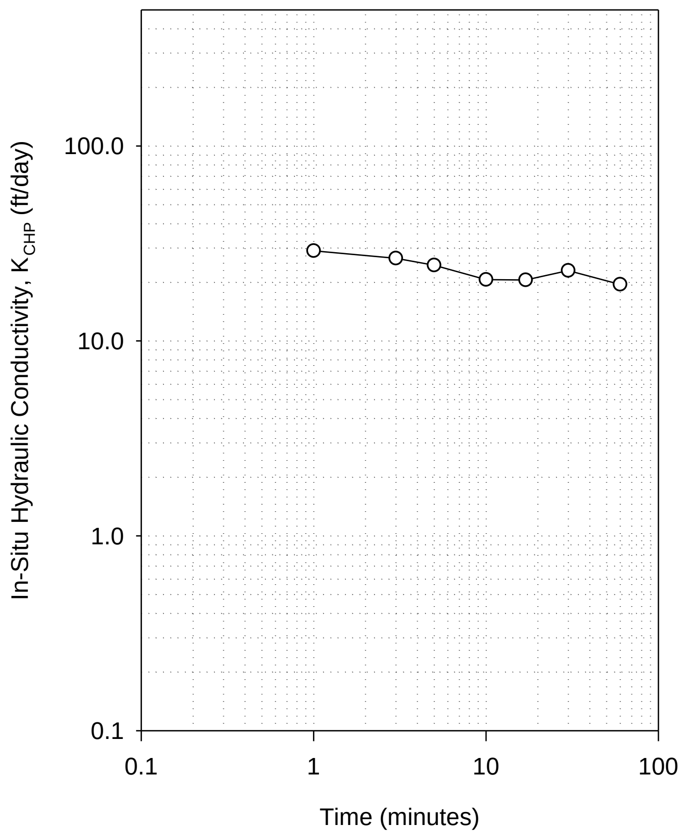


Figure 116. CHP test results — Cliff Road (Site B), Burlington

Meadowbrook Drive, Burlington

This site is located on Meadowbrook Dr., between Terrace Dr. and Sunrise Ln., in Burlington, Des Moines County. The section tested was constructed in 1994 and experiences an AADT of 300. The pavement was about 27 ft wide with a cross-slope of 2% and two panels across the pavement width. Edge drains were present at this site for subsurface drainage. The pavement is rated as "good" with PCI = 97. Corner cracks were present on 2 panels and transverse cracks were present on 1 panel, out of the 24 panels tested. Photos of the test site are shown in Figure 117. The pavement was supported on 4 in. thick crushed limestone subbase (classified as GM, A-1-a) underlain by lean clay subgrade (classified as CL, A-6(13)). The in situ moisture content of the subgrade material was about 14.8%, at the time of testing.

Field testing at this site was conducted on August 2, 2012. A crack survey map of the test site along with in situ test locations is shown in Figure 118. FWD testing was conducted on 28 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP test was conducted at one location (under a panel with transverse crack). All tests were conducted along the center line of the east bound lane panels.

The measured core thickness was 7.5 in. at one core location. FWD test results with deflection under the loading plate (D_0), Static $k_{\text{FWD-Corr}}$, intercept, and LTE at joints are shown in Figure 119. DCP-CBR profiles and cumulative blows with depth are shown in Figure 114. Average and

COV of CBR_{SB} and CBR_{SG} are noted on Figure 120. Figure 121 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 122.

Average LTE at joints was about 92%. The average Static $k_{FWD\text{-}Corr}$ was 104 pci, while the average $k_{comp\text{-}DCP}$ values were higher with 317 pci. The lowest Static $k_{FWD\text{-}Corr}$ value was 37 pci. The average CBR_{SB} was 22, which indicate "poor" subbase conditions per SUDAS (2013a). The average CBR_{SG} was 7, which indicate "fair" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "good" based on COV = 40% of $k_{FWD\text{-}Corr}$ measurements.

CHP test showed in situ K_{CHP} = 20 ft/day. Based on the K_{CHP} value, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 3 days. The times of drainage correspond to "good" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.94.

Figure 117. Photographs of field test site during testing — Meadowbrook Drive, Burlington

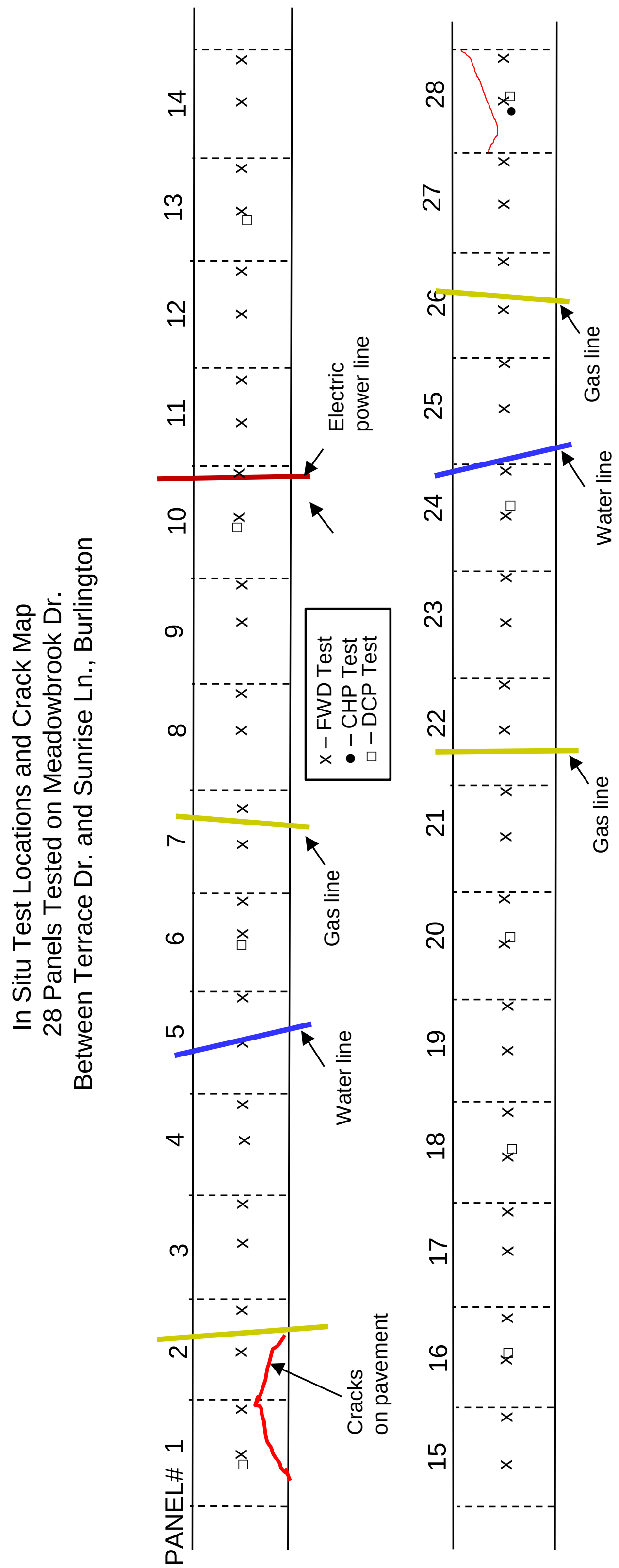


Figure 118. Crack Survey Map — Meadowbrook Drive, Burlington

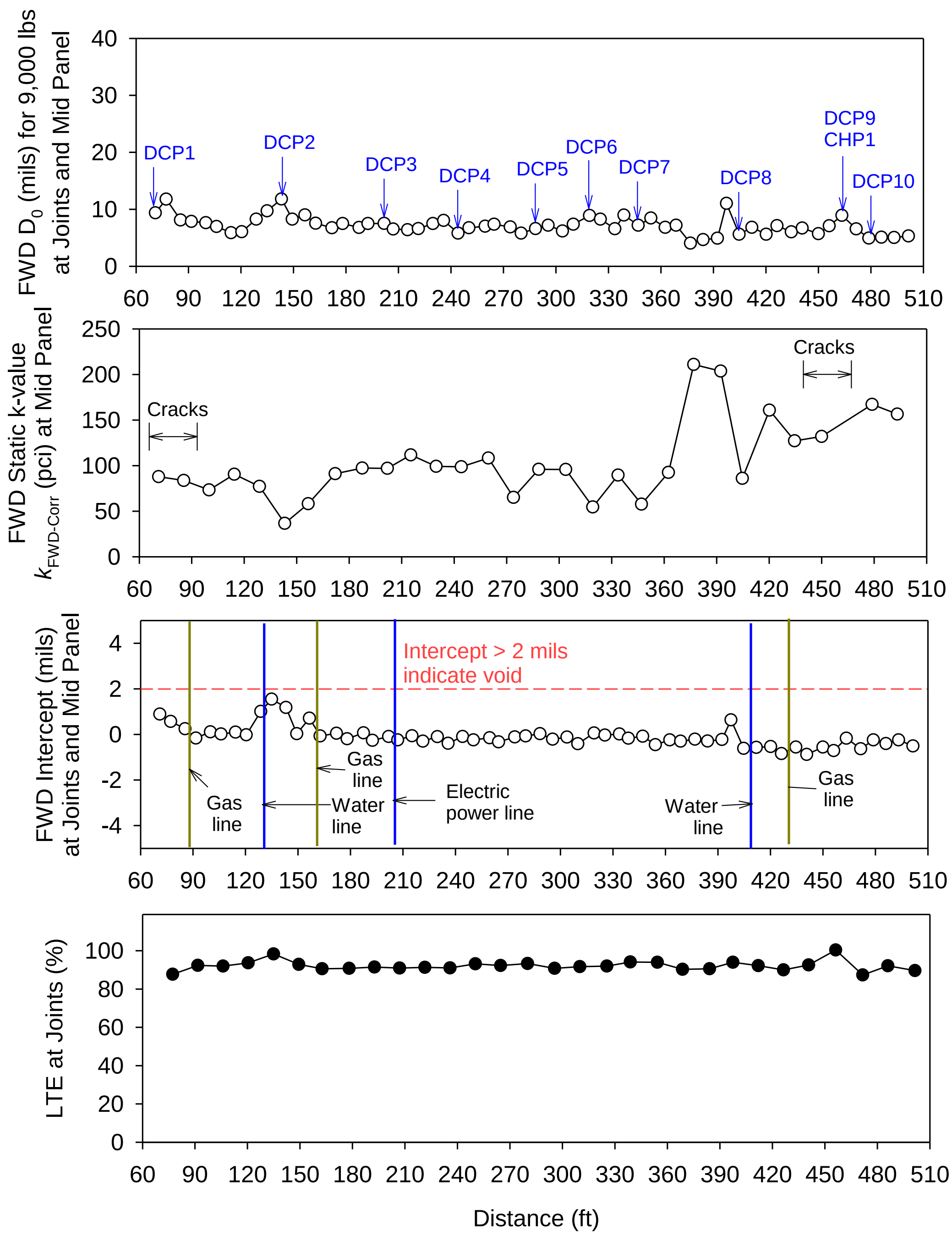


Figure 119. FWD test results — Meadowbrook Drive, Burlington

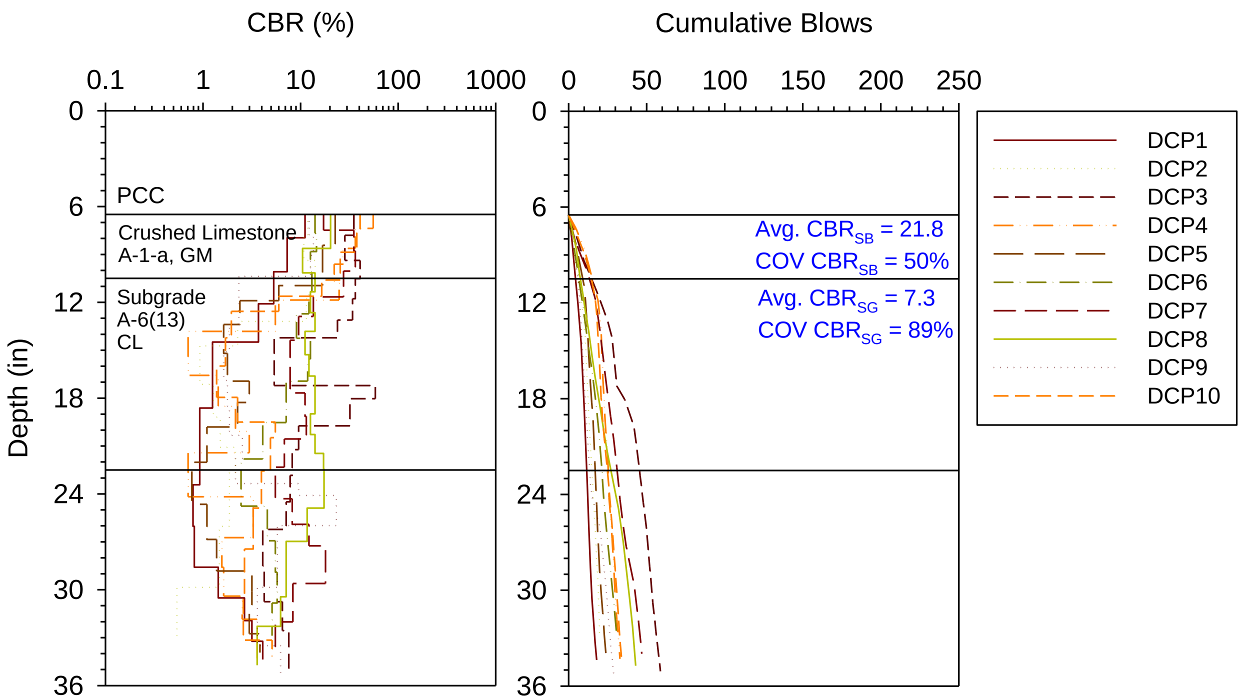


Figure 120. DCP-CBR and cumulative blows with depth profiles — Meadowbrook Drive, Burlington

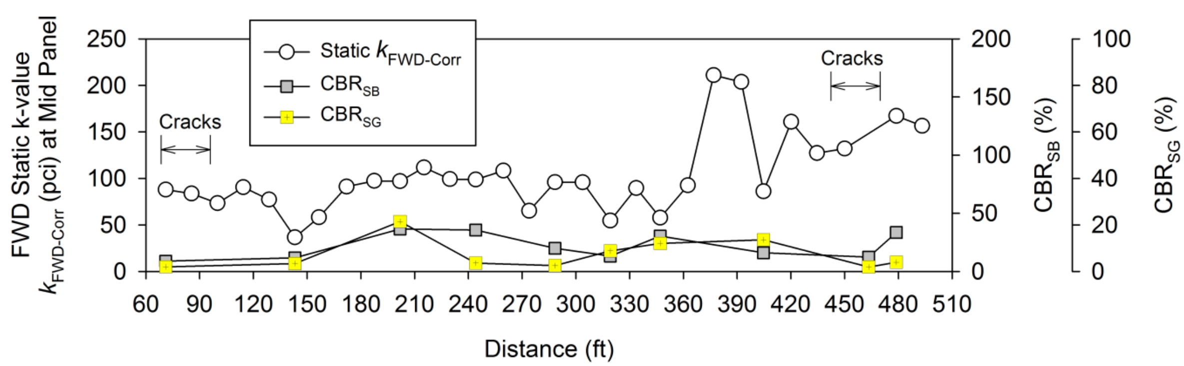


Figure 121. Comparison of $k_{\text{FWD-Corr}}$ and CBR of foundation layers — Meadowbrook Drive, Burlington

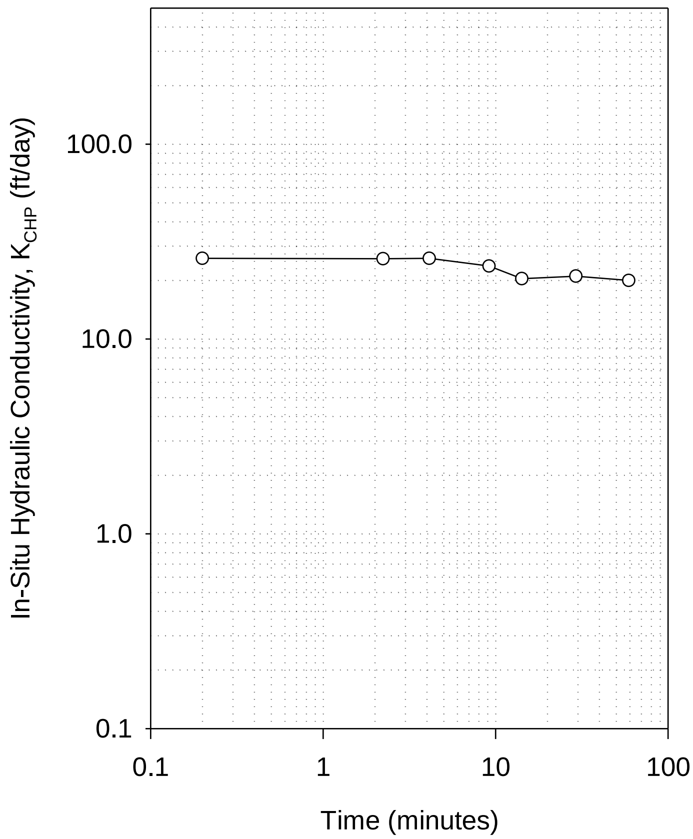


Figure 122. CHP test results — Meadowbrook Drive, Burlington

W38/Locust Road, Winneshiek County

This site is located on County Road W38/Locust Rd., north of 380th St. (near 3821 Locust Rd) in Winneshiek County. The section tested was constructed in 1996 and experiences an AADT of 660. The pavement was about 21.5 ft wide with a cross-slope of 2% and two panels across the pavement width. Subsurface drainage system was not present at this site. The shoulders were surfaced with gravel and there were drainage ditches on both sides of the pavement. The pavement is rated as “good” with PCI = 92. No distresses were present on the pavement panels tested. Photos of the test site are shown in Figure 123. The pavement was supported on 12 in. of crushed limestone subbase (classified as GM, A-1-a), which included 3 in. of choke stone (with ¾ in. maximum particle size) and 9 in. of macadam subbase material (with 3 in. maximum particle size).

Field testing at this site was conducted on August 9, 2012. FWD testing was conducted on 20 panels at mid panel and at joint. DCP tests were conducted at eight locations and CHP tests were conducted at two locations. All tests were conducted along the center line of the south bound lane panels.

The measured core thicknesses were 7.5 in. and 7.0 in at the two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 124. DCP-CBR profiles and cumulative blows with depth are shown in Figure 125. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 125. Figure 126 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 127.

The average LTE at joints was about 42%, which indicates poor joint efficiency. The average static Static $k_{FWD\text{-}Corr}$ was 151 pci, while the average $k_{comp\text{-}DCP}$ values were higher with 1049 pci. These *k* values were highest of all the field projects tested as part of this study. The average CBR_{SB} was 111, which indicate "excellent" subbase conditions per SUDAS (2013a). The average CBR_{SG} was 56, which indicate "excellent" subgrade conditions per SUDAS (2013a). The uniformity of support conditions is rated as "excellent" based on COV = 4% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed in situ K_{CHP} = 0.8 ft/day and 0.84 ft/day. Based on the K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.30 (see Table 7), the time to 50% drainage at this site is estimated as 25 days and 14 days, respectively, at the two core locations. The times of drainage correspond to "poor" to "fair" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.80 and 0.84.

Figure 123. Photographs of field test site during testing — W38/Locust Road, Winneshiek County

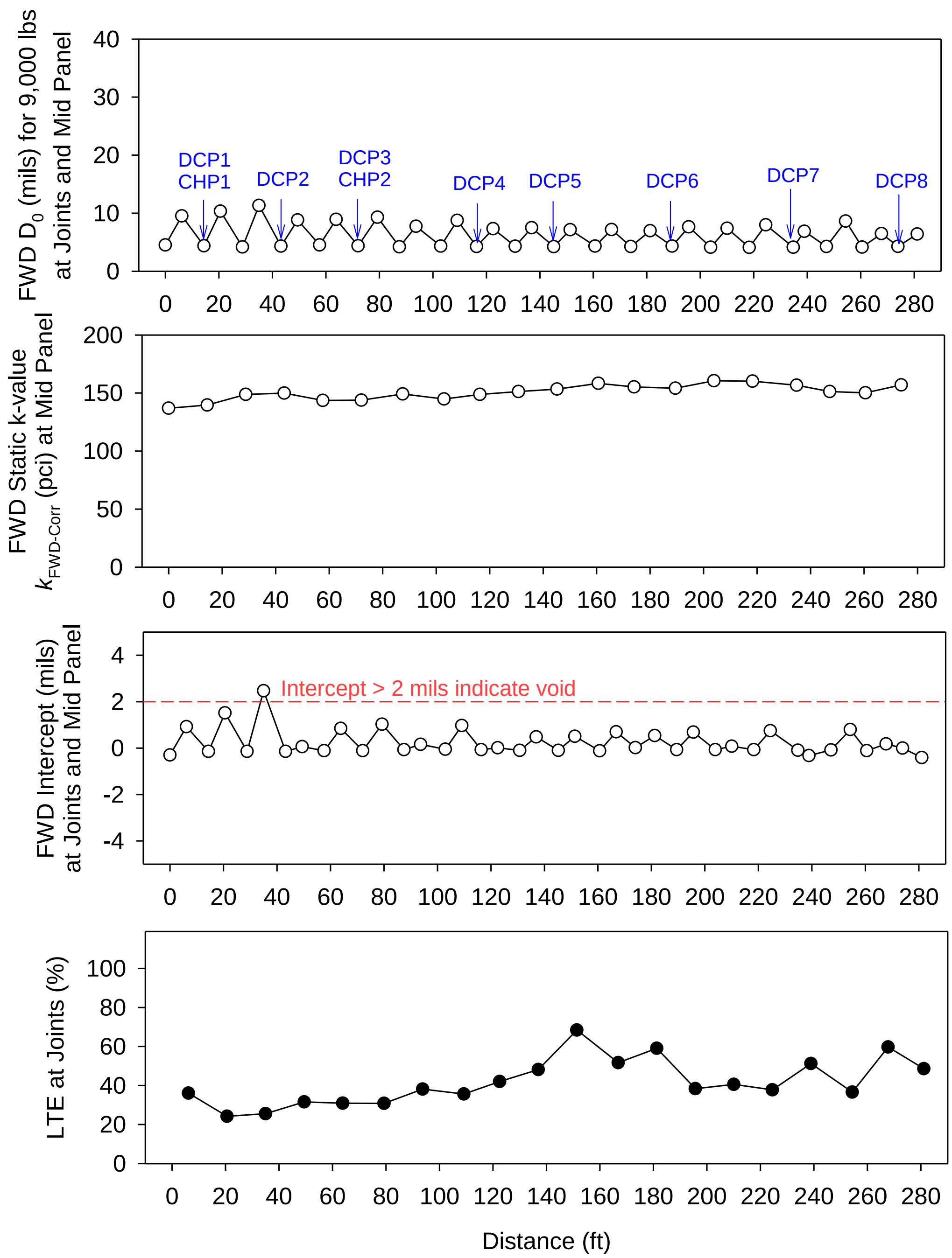


Figure 124. FWD test results — W38/Locust Road, Winneshiek County

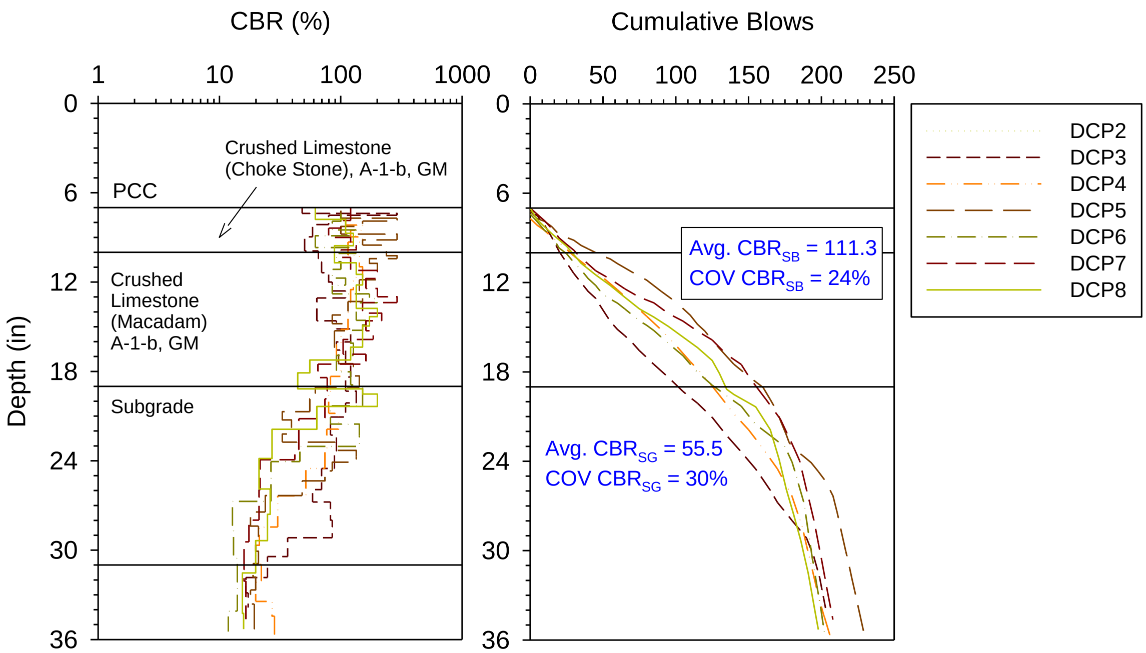


Figure 125. DCP-CBR and cumulative blows with depth profiles — W38/Locust Road, Winneshiek County

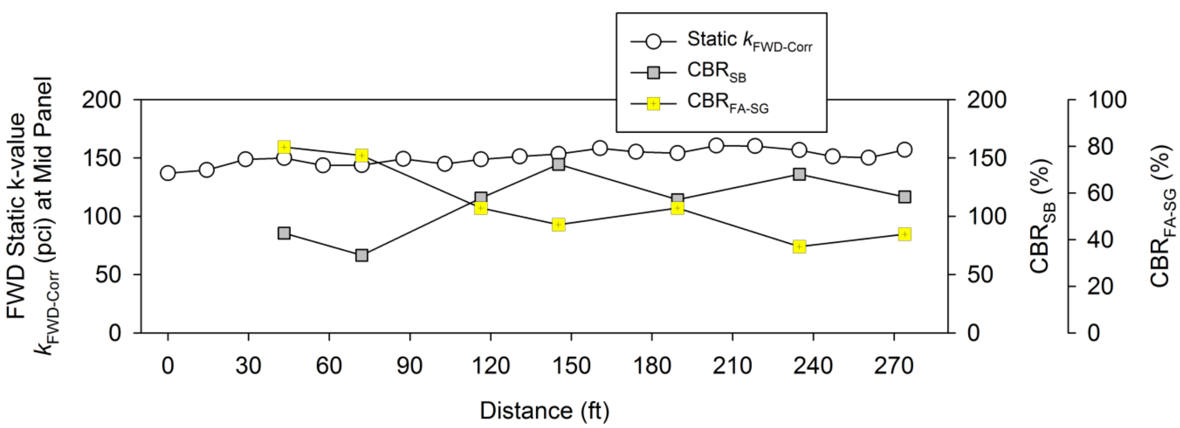


Figure 126. Comparison of $k_{FWD-Corr}$ and CBR of foundation layers — W38/Locust Road, Winneshiek County

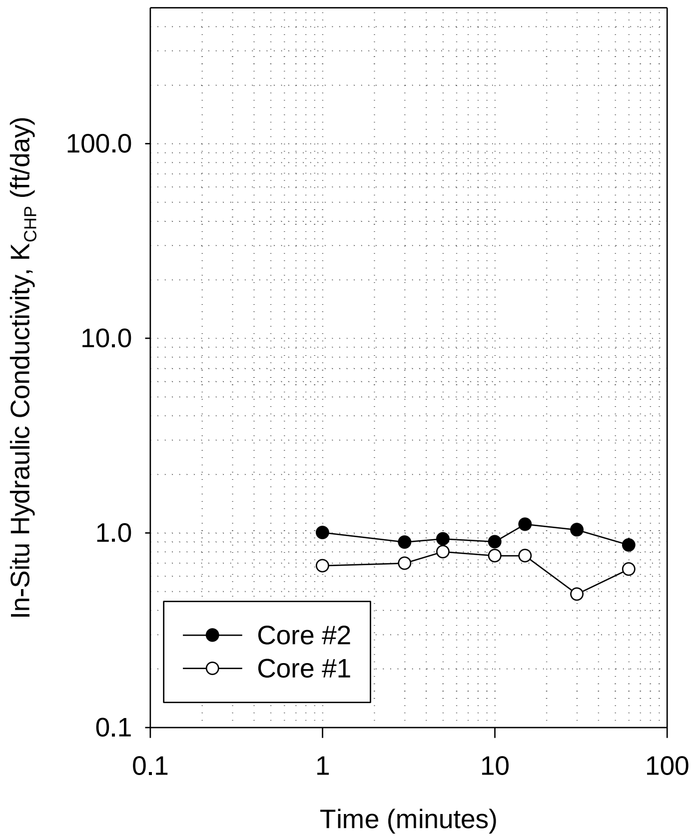


Figure 127. CHP test results — W38/Locust Road, Winneshiek County

175th Street, Winneshiek County

This site is located on 175th St., just west of 240th Ave., in Winneshiek County. The section tested was constructed in 1970 and experiences an AADT of 110. The pavement was about 22 ft wide with a cross-slope of 2% and two panels across the pavement width. The panels were generally about 40 ft long, but there were several panels which were patched. Subsurface drainage system was not present at this site. The shoulders were surfaced with gravel and there were drainage ditches on both sides of the pavement. The pavement is rated as "very poor" with PCI = 35. The pavement consisted of longitudinal and transverse cracks, deteriorated joints, patches, and cracked patches, and faulting up to 1 in. at joints and cracks. Photos of the test site are shown in Figure 128 and Figure 129. The pavement was supported on natural lean clay subgrade (classified as CL, A-4(4)).

Field testing at this site was conducted on August 9, 2012. FWD testing was conducted on 17 panels at mid panel and at joint. Load transfer efficiency was evaluated at joints as well as at mid panel with transverse cracks. DCP tests were conducted at eight locations and CHP tests were conducted at two locations. All tests were conducted along the center line of the east bound lane panels. A crack map with in situ test locations are shown in Figure 130.

The measured core thickness was 6 in. at the two core locations. FWD test results with deflection under the loading plate (D_0), Static $k_{FWD\text{-}Corr}$, intercept, and LTE at joints are shown in Figure 131. DCP-CBR profiles and cumulative blows with depth are shown in Figure 132. Average and COV of CBR_{SB} and CBR_{SG} are noted on Figure 132. Figure 133 compares CBR_{SG} and Static $k_{FWD\text{-}Corr}$. CHP test results showing K_{CHP} with time are shown in Figure 134.

The average LTE at joints was about 47%, which indicates poor joint efficiency. The average Static $k_{FWD\text{-}Corr}$ was 64 pci, while the average $k_{comp\text{-}DCP}$ values were higher with 358 pci. The average CBR_{SG} was 6.8, which indicate "poor" subgrade conditions per SUDAS (2013a). One of the DCP-CBR profiles (DCP8) located in a patching area indicated high CBR values (~ 60 to 100) in the top 6 in., which is likely due to subbase layer installed under the patch. The uniformity of support conditions is rated as "good" based on COV = 32% of $k_{FWD\text{-}Corr}$ measurements.

CHP tests showed in situ K_{CHP} = 0.7 ft/day and 0.2 ft/day at the two core locations. Based on the K_{CHP} values, pavement geometry, and an assumed effective porosity of 0.04 (see Table 7), the time to 50% drainage at this site is estimated as 5 days and 17 days, respectively, at the two core locations. The times of drainage correspond to "poor" to fair" drainage quality per SUDAS (2013b) and AASHTO (1993) and C_d = 0.91 and 0.83.

Figure 128. Photographs of field test site during testing — 175th Street, Winneshiek County

Figure 129. Photographs of new patching areas — 175th Street, Winneshiek County

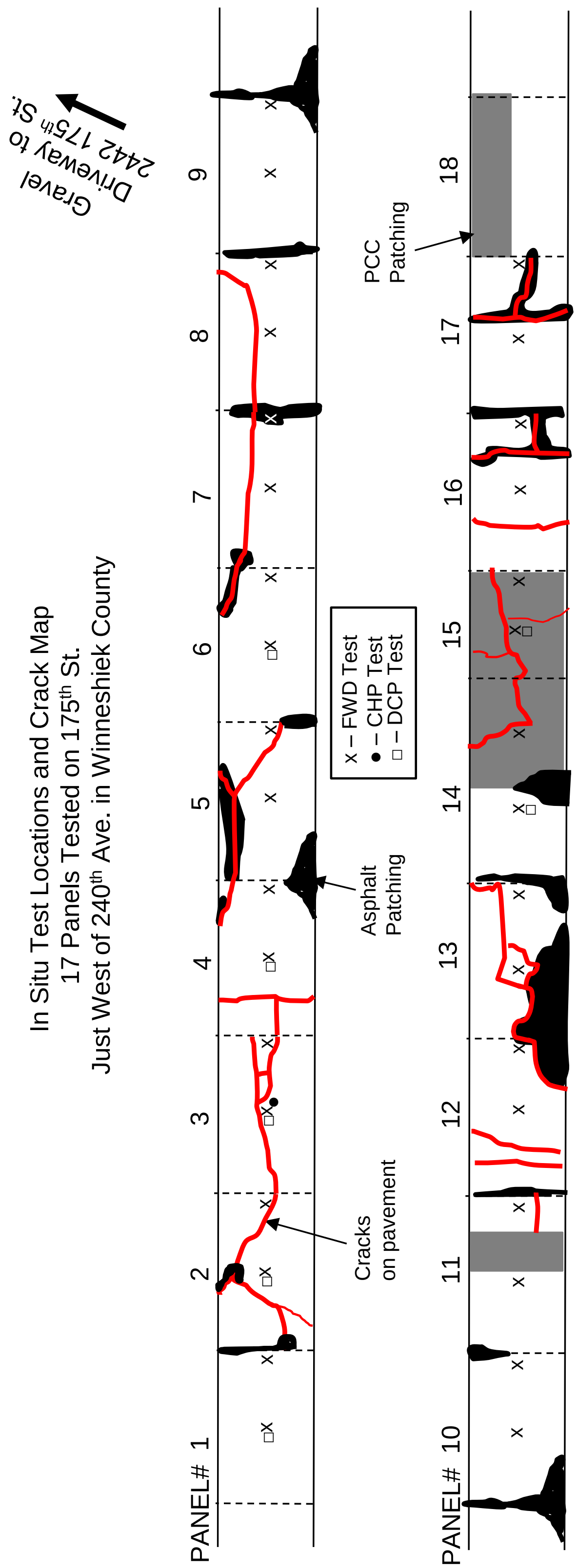


Figure 130. Crack Survey Map — 175th Street, Winneshiek County

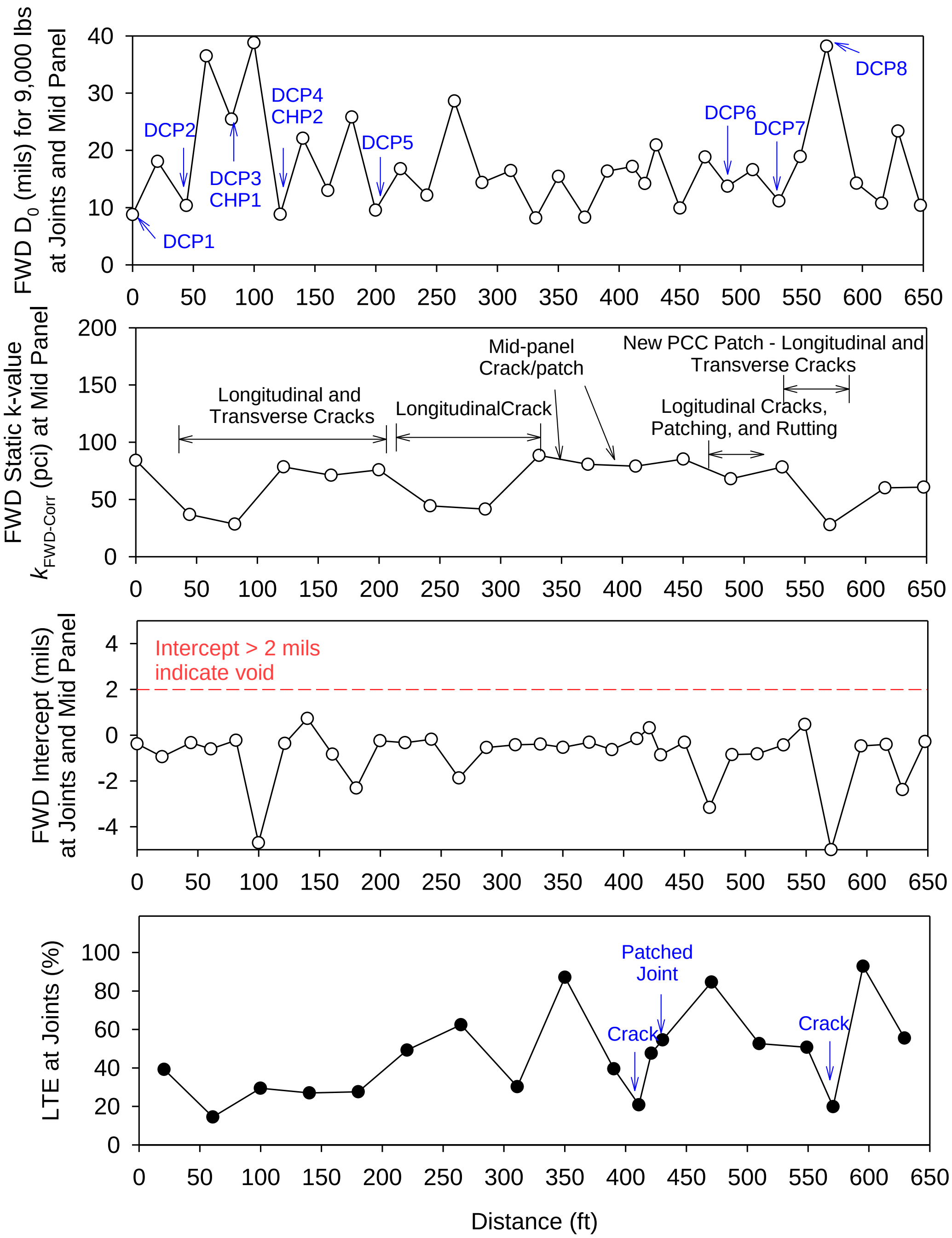


Figure 131. FWD test results — 175th Street, Winneshiek County

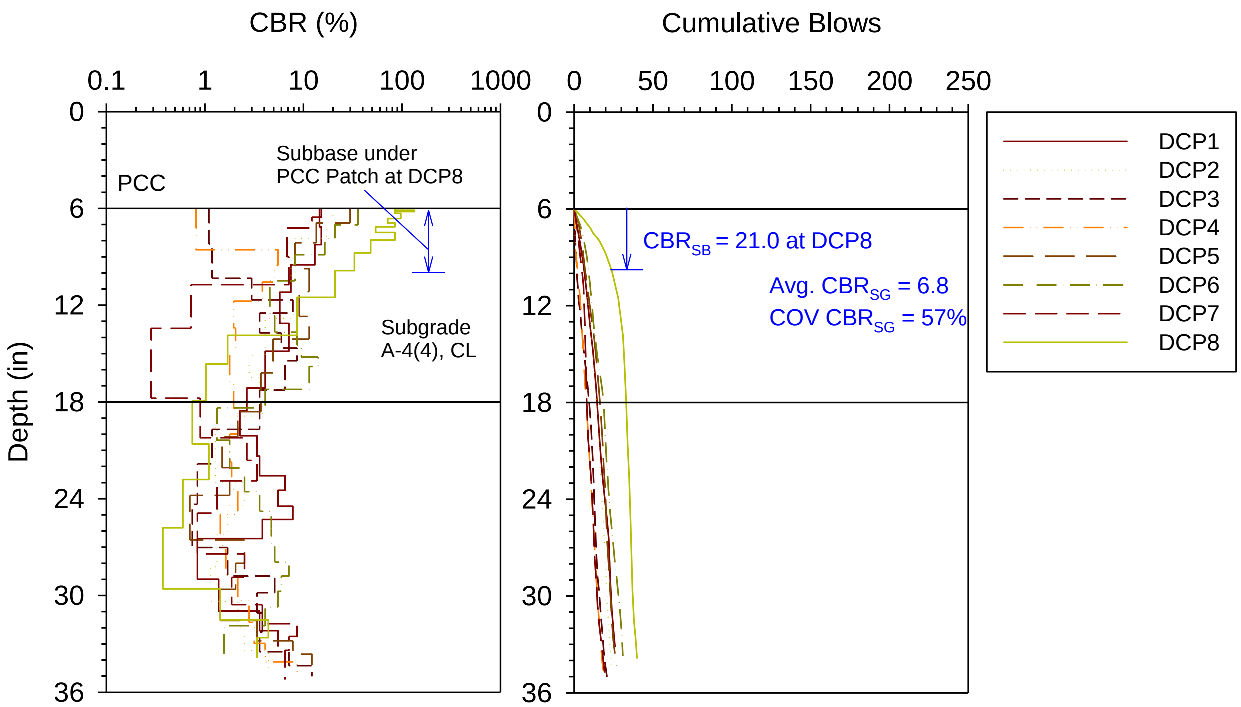


Figure 132. DCP-CBR and cumulative blows with depth profiles — 175th Street, Winneshiek County

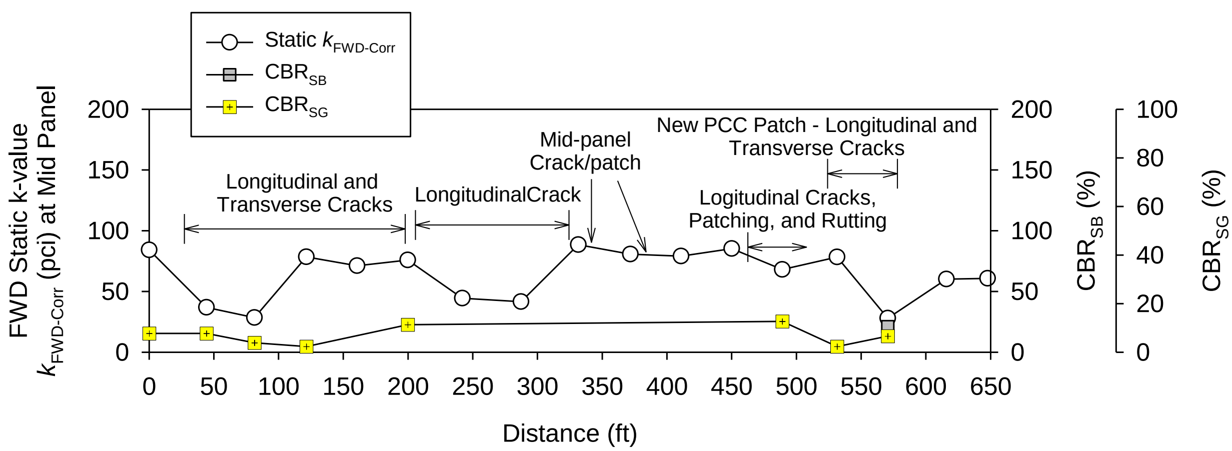


Figure 133. Comparison of $k_{FWD\text{-}Corr}$ and CBR of foundation layers — 175th Street, Winneshiek County

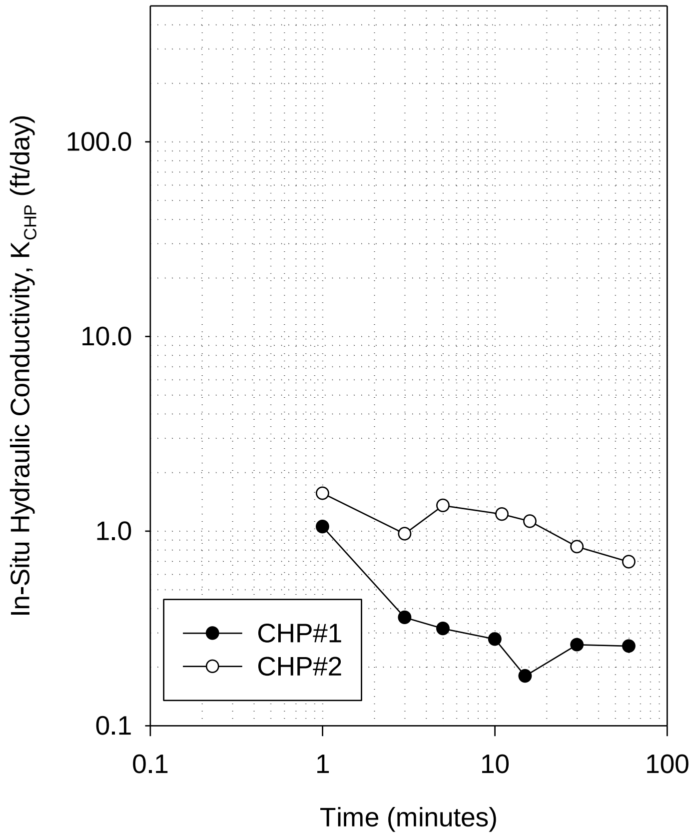


Figure 134. CHP test results — 175th Street, Winneshiek County

CHAPTER 6: ANALYSIS OF RESULTS

The foundation layer support conditions encountered at the 16 field sites can be broadly categorized into the following with PCC placed over:

1. Subgrade (SG) (not subbase)
2. Fly ash stabilized subgrade (FA-SG)
3. 3 to 6 in. of subbase (SB) and SG
4. 3.5 in. of SB over FA-SG
5. 12 in. SB over FA-SG
6. 8.5 to 10 in. SB over SG
7. 12 in. of SB (with 9 in. of macadam subbase) over SG

In this chapter, the following measurement parameters: (a) joint LTE, (b) Static $k_{\text{FWD-Corr}}$ and $k_{\text{comp-DCP}}$ (c) FWD intercept, (d) loss of support, (e) in situ permeability, and (f) C_d, are discussed comparing results obtained from the different field sites with respect to the differences in the support conditions at each site (as categorized above). In addition, multi-variate statistical analysis was performed to assess influence of these parameters and other parameters (i.e, age, traffic, uniformity) on PCI.

Comparison between the average (based on 3 to 10 measurements per site) $k_{\text{FWD-Corr}}$ and CBR_{SG} (which represents the average of the top 12 in. of subgrade) indicated that the $k_{\text{FWD-Corr}}$ values were generally lower than results published in the literature. All DCP-CBR profiles were reviewed closely to assess if “weak” layers within the subgrade could be contributing to the low *k* values. An average CBR of a minimum 3 in. thick layer within the top 16 in. of subgrade (represented as $CBR_{\text{SG-Weak Layer}}$) was calculated as illustrated in Figure 136. Comparison between the average $k_{\text{FWD-Corr}}$ and $CBR_{\text{SG-Weak Layer}}$ is shown in Figure 137, which shows that the data collected from this project is generally in line with the data published in the literature.

Since Static $k_{\text{FWD-Corr}}$ values are believed to reflect the subgrade layer property (i.e., without the effect of the base layer), a composite *k* value (represented as Static $k_{\text{comp-FWD-Corr}}$) was also calculated at locations where DCP tests were available. This value was calculated by determining M_r based on Static $k_{\text{FWD-Corr}}$ using Eq. (10) and using Figure 20 based on E_{SB} and subbase layer thicknesses determined from DCP tests. Similar to $k_{\text{comp-DCP}}$ calculations, $k_{\text{comp-DCP-Weak}}$ was calculated using $CBR_{\text{SG-Weak}}$ values. The composite *k* values determined from these different procedure are compared in this chapter. A summary of results obtained from all field sites is provided in Table 23.

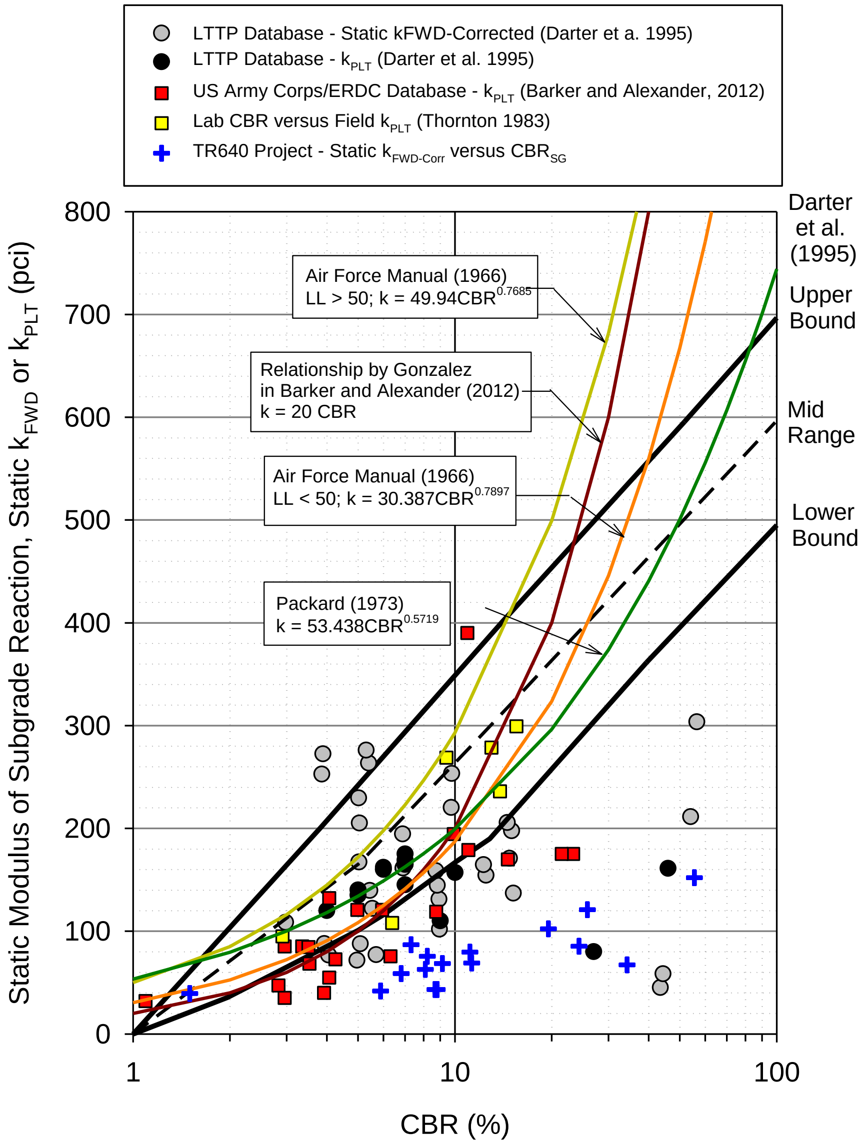


Figure 135. Average Static $k_{FWD\text{-}Corr}$ versus average CBR_{SG} (average from each site) in comparison with relationships published in the literature

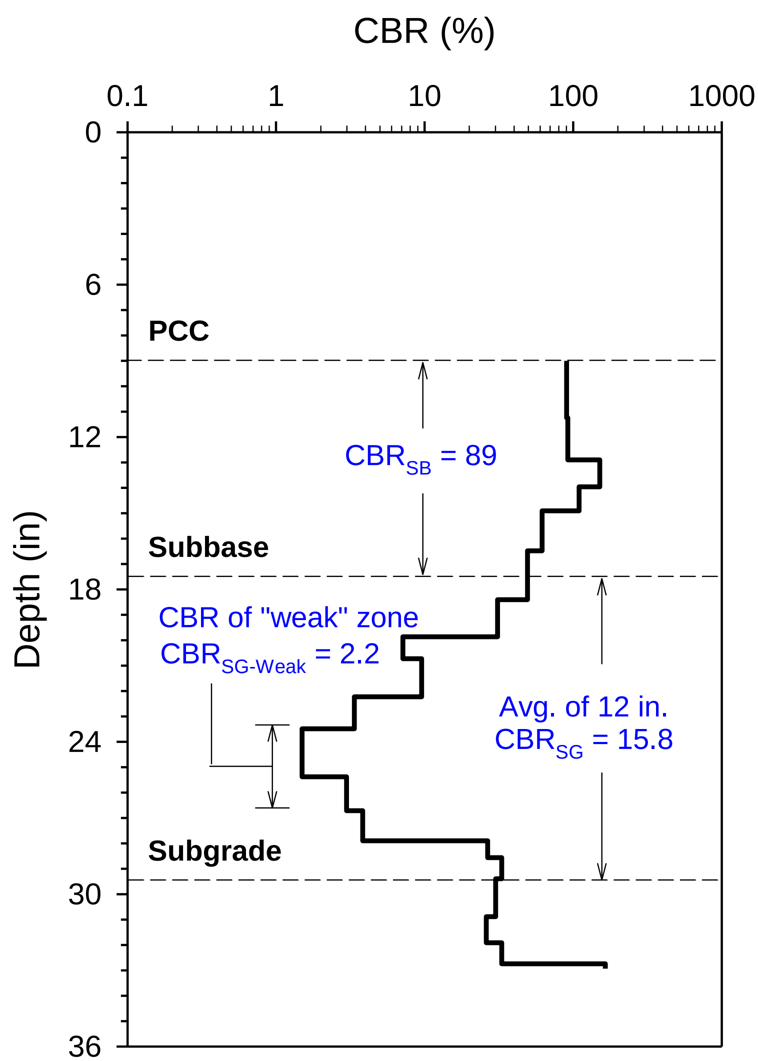


Figure 136. Determination of average CBR of top 12 in. of subgrade and CBR of the "weak" layer within the subgrade

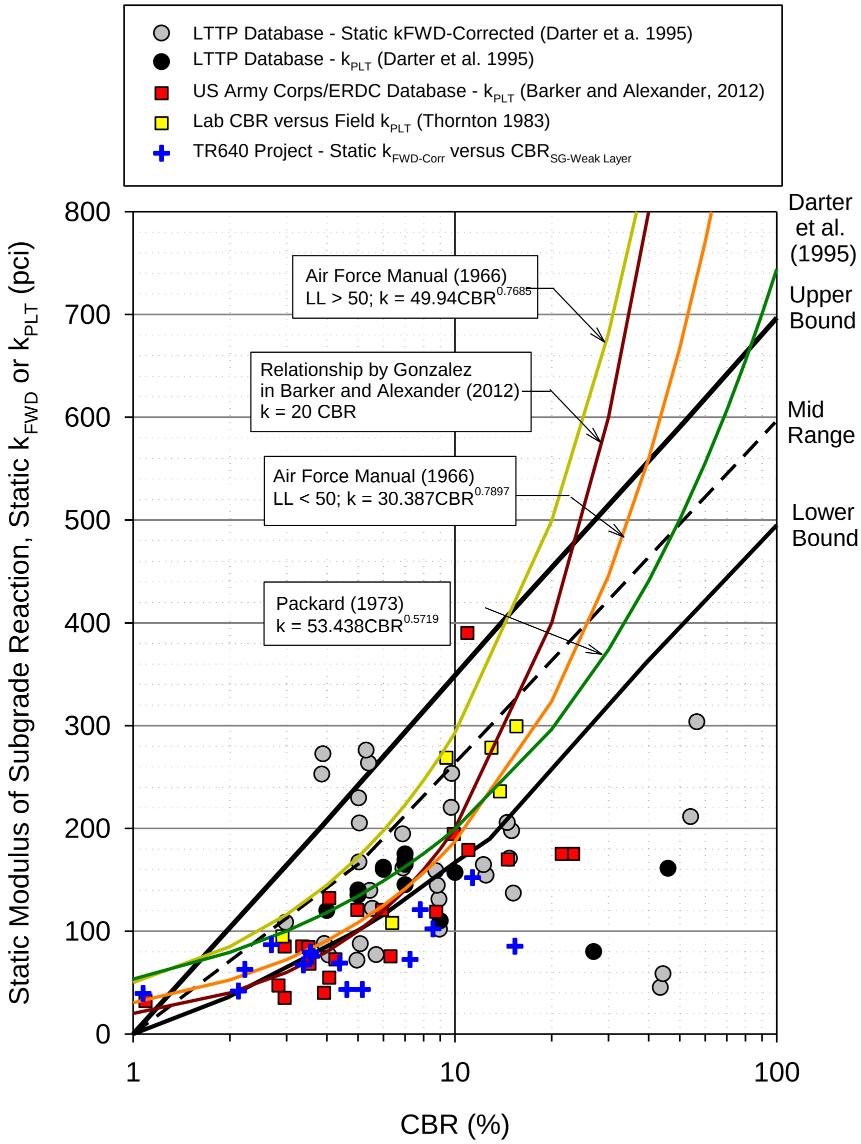


Figure 137. Average Static $k_{FWD\text{-}Corr}$ versus average $CBR_{SG\text{-}Weak\ Layer}$ (average from each site) in comparison with relationships published in the literature

Table 23. Summary of field test results

Parameter	NW Greenwood St. and 3rd St., Ankeny 5/2/12	NW Greenwood St. and 5th St., Ankeny 5/2/12	E63, Story County 5/31/12	Riverside Rd., Ames 6/7/12
PCC Thickness (in.)	8.50	8.25	8.5, 8.0	11.0
Pavement Age (Years)	23	36	22	18
Doweled PCC (Yes/No)	No	No	No	No
Subbase Type, Classification, Thickness	—	—	—	Limestone, GM, A-1-a, 6 in.
Subgrade Classification	SC, A-2-6(1)	CL, A-7-6(16)	SC, CL A-4, A-7-6(18)	—
Subgrade Stabilization	None	None	None	None
PCI	83	38	46	79
AADT, Percentage of Trucks	2000, 1.5%	2000, 1.5%	1040, 5.0%	2910, 20.0%
Pavement Width (ft), cross slope	31.2, 2%	31.3, 2%	24.0 , 2%	27.0, 2%
Average and COV (in parenthesis) values of in situ FWD, DCP, and CHP test measurements				
LTE (%)	100 (6)	37 (23)	94 (10)	100 (3)
D_0 (mils)[1]	6.6 (24)	19.1 (46)	7.2 (27)	4.0 (30)
Intercept (mils)	-0.1 (286)	-1.3 (120)	-0.6 (103)	0.1 (348)
% points with I > 2 mils	0%	0%	0%	0%
Dynamic k_{FWD} (pci)[1]	78 (25)	66 (54)	107 (34)	146 (43)
Static k_{FWD} (pci)[1,2]	39 (25)	33 (54)	53 (34)	73 (43)
Static $k_{FWD\text{-}Corr}$ (pci)[1,2]	52 (20)	39 (41)	75 (24)	109 (32)
E_{SG} (psi)[3]	8,617 (18)	5,417 (28)	9,715 (22)	17,714 (29)
CBR_{SB} (%)[4]	None	None	None	78 (58)
CBR_{SG} (%)[4,5]	5.9 (26)	1.5 (68)	9.9 (59)	20 (35)
$CBR_{SG\text{-weak layer}}$ (%)[4,6]	2.1 (29)	1.1 (49)	7.3 (64)	8.6 (61)
$k_{comp\text{-}DCP}$ (pci)[7]	334 (18)	127 (50)	464 (42)	666 (23)
$k_{comp\text{-}DCP\ Weak}$ (pci)[8]	166 (20)	103 (36)	373 (45)	405 (37)
K_{CHP} (ft/day)	0.2	0.2	0.1, 1.0	4.0, 10.9
Edge Drains (Yes/No)	No (C/G)	No (C/G)	No (D)	Yes
t_{50} (days)	84	85	39, 4	7, 3
C_d (based on K_{CHP})	0.71	0.71	0.77, 0.93	0.88, 0.95
C_d (SUDAS)	1.00	1.00	1.00	1.10
Drainage Rating (C_d)	VP	VP	VP to F	F
Support Rating (CBR)	VP	VP	P to F	VG
Uniformity Rating (COV)[9]	E	F	VG	G
LOS Range[10] (Avg.)	1.7-1.9 (1.8)	0.0-1.3 (1.0)	0.8-2.0 (1.6)	1.0-3.0 (1.3)
LOS Range[11] (Avg.)	1.4-1.5 (1.3)	0.0-1.2 (1.0)	0.9-2.0 (1.4)	0.4-1.6 (1.0)
LOS (AASHTO 1993)	2.0-3.0	2.0-3.0	2.0-3.0	1.0-3.0
LOS (SUDAS)	1.0	1.0	1.0	0.0

Table 23. Summary of field test results (Contd.)

Parameter	E23, Story County 6/21/12	SW Westlawn Dr., Ankeny 7/19/12		SW Logan St., Ankeny 7/19/12	West Main St., Knoxville 7/12/12
PCC Thickness (in.)	6.75, 6.75	9.0		7.25	7.5
Pavement Age (Years)	26	4		< 1 (30 days)	5
Doweled PCC (Yes/No)		No		No	No
Subbase Type, Classification, Thickness	—	Limestone, GP-GM, A-1-a, 8.5 to 10 in.		Limestone, GW-GM, A-1-a, 3.5 in.	Limestone, GM, A-1-a, 12 in.
Subgrade Classification	CL, A-6(7)	SC, A-6(3)		ML, A-4(1)	—
Subgrade Stabilization	None	None	Fabric	Fly Ash	Fly Ash
PCI	55	85		100	99
AADT, Percentage of Trucks	150, 5.0%	1000, 1.0%		500, 1.0%	500, 3.0%
Pavement Width (ft), cross slope	22.0, 2%	25.0, 3%		25.0, 2%	26.0, 2%
Average and COV (in parenthesis) values of in situ FWD, DCP, and CHP test measurements					
LTE (%)	93 (7)	96 (3)	97 (2)	95 (3)	100 (4)
D_0 (mils)[1]	8.5 (21)	16.8 (50)	18.1 (42)	7.2 (16)	9.6 (27)
Intercept (mils)	-0.2 (230)	4.4 (119)	3.2 (96)	-0.1 (301)	1.0 (104)
% points with I > 2 mils	0%	45%	45%	0%	11%
Dynamic k_{FWD} (pci)[1]	133 (20)	75 (58)	50 (72)	112 (28)	103 (24)
Static k_{FWD} (pci)[1,2]	66 (20)	38 (58)	25 (72)	56 (28)	52 (24)
Static $\underline{k}_{FWD\text{-}Corr}$ (pci)[1,2]	86 (17)	50 (53)	35 (65)	75 (21)	67 (20)
E_{SG} (psi)[3]	10,095 (16)	6,554 (57)	4,698 (64)	10,199 (19)	9,169 (19)
CBR_{SB} (%)[4]	None	64 (27)	54 (51)	60 (66)	46 (47)
CBR_{SG} (%)[4,5]	11 (44)	11 (75)	1.9 (19)	34 (79)	11.3 (38)
$CBR_{SG\text{-}weak\ layer}$ (%)[4,6]	3.6 (54)	2.6 (18)	1.3 (150)	3.4 (60)	4.6 (40)
$k_{comp\text{-}DCP}$ (pci)[7]	508 (33)	410 (58)	397 (84)	817 (48)	564 (32)
$k_{comp\text{-}DCP\ Weak}$ (pci)[8]	232 (37)	242 (15)	160 (73)	280 (37)	351 (22)
K_{CHP} (ft/day)	0.1, 0.2	1.2	162	0.5	0.3, 0.2
Edge Drains (Yes/No)	Yes	Yes	Yes	Yes	Yes
t_{50} (days)	34, 17	14	0.1	71	57, 86
C_d (based on K_{CHP})	0.78, 0.83	0.84	1.09	0.72	0.74, 0.71
C_d (SUDAS)	1.00	1.10	1.10	1.10	1.10
Drainage Rating (C_d)	P to F	P to F	E	VP	P
Support Rating (CBR)	F to G	VG	VG	VG	G
Uniformity Rating (COV)[9]	VG	P	P	VG	VG
LOS Range[10] (Avg.)	1.3-1.8 (1.5)	0.7-1.7 (1.3)		1.0-2.0 (1.8)	1.0-1.5 (1.2)
LOS Range[11] (Avg.)	0.5-1.6 (1.0)	0.0-1.5 (1.1)		0.9-1.3 (1.1)	0.7-1.1 (1.0)
LOS (AASHTO 1993)	2.0-3.0	1.0-3.0		1.0-3.0	1.0-3.0
LOS (SUDAS)	1.0	0.0		0.0	0.0

Table 23. Summary of field test results (Contd.)

Parameter	S 5th St., Knoxville 7/12/12	Valley View Dr., Council Bluffs 7/26/12	9th Ave., Council Bluffs 7/26/12	Cliff Rd. (Site A), Burlington 8/2/12
PCC Thickness (in.)	8.0, 8.0	9.75, 9.0	7.75	6.5, 6.75
Pavement Age (Years)	3	15	23	19
Doweled PCC (Yes/No)	No	No	No	No
Subbase Type, Classification, Thickness	Limestone, GM, A-1-a, 12 in.	Limestone - GM, A-1-a; RPCC – SP-SM; 6 in.	Sand, 1 in.	Limestone, GM, A-1-a, 5 in
Subgrade Classification	—	CL to ML, A-6(12) to A-4(9)	ML to CH, A-5(4) to A-7-5(42)	ML, A-4(10)
Subgrade Stabilization	Fly Ash	None	None	None
PCI	98	77	61	78
AADT, Percentage of Trucks	680, 2.0%	8900, 8.0%	7600, 5.0%	1120, 5.0%
Pavement Width (ft), cross slope	26.0, 2%	37.0, 2%	24.0, 2%	25.7, 2%
Average and COV (in parenthesis) values of in situ FWD, DCP, and CHP test measurements				
LTE (%)	92 (1)	93 (1)	92 (11)	94 (3)
D_0 (mils)[1]	5.1 (16)	4.3 (12)	9.8 (31)	8.8 (35)
Intercept (mils)	0.1 (233)	0.2 (99)	0.7 (98)	-0.1 (404)
% points with I > 2 mils	0%	0%	8%	0%
Dynamic k_{FWD} (pci)[1]	208 (22)	147 (20)	58 (30)	130 (22)
Static k_{FWD} (pci)[1,2]	104 (22)	74 (20)	29 (30)	65 (22)
Static $k_{FWD\text{-}Corr}$ (pci)[1,2]	124 (19)	84 (18)	45 (26)	78 (21)
E_{SG} (psi)[3]	16,044 (16)	14,616 (16)	6,675 (26)	10,104 (23)
CBR_{SB} (%)[4]	39 (15)	122* (109)	None	20 (26)
CBR_{SG} (%)[4,5]	26 (55)	24 (35)	8.8 (49)	8.2 (44)
$CBR_{SG\text{-weak layer}}$ (%)[4,6]	7.7 (32)	15 (32)	5.2 (35)	3.6 (29)
$k_{comp\text{-}DCP}$ (pci)[7]	820 (22)	757 (19)	432 (37)	360 (31)
$k_{comp\text{-}DCP\ Weak}$ (pci)[8]	454 (13)	540 (10)	304 (26)	244 (20)
K_{CHP} (ft/day)	0.2, 0.4	0.3, 5.2	0.8	59, 1.3
Edge Drains (Yes/No)	Yes	No (C/G)	No (C/G)	No (C/G)
t_{50} (days)	86, 43	446, 26	120	1.5, 66
C_d (based on K_{CHP})	0.71, 0.76	0.70, 0.80	0.70	0.99, 0.73
C_d (SUDAS)	1.10	1.10	1.00	1.10
Drainage Rating (C_d)	VP	VP	VP	G, VP
Support Rating (CBR)	G	E	G	P
Uniformity Rating (COV)[9]	VG	VG	G	VG
LOS Range[10] (Avg.)	1.0-1.3 (1.1)	1.2 to 1.6 (1.5)	1.1-2.5 (1.9)	1.0-1.5 (1.2)
LOS Range[11] (Avg.)	0.5-1.0 (0.8)	1.1-1.6 (1.3)	1.1-2.0 (1.7)	0.6-1.3 (1.0)
LOS (AASHTO 1993)	1.0-3.0	1.0-3.0	2.0-3.0	1.0-3.0
LOS (SUDAS)	0.0	0.0	1.0	0.0

Table 23. Summary of field test results (Contd.)

Parameter	Cliff Rd. (Site B), Burlington 8/2/12	Meadow-brook Dr., Burlington 8/2/12	W38/Locust Rd., Winneshiek County 8/9/12	175th St., Winneshiek County 8/9/12
PCC Thickness (in.)	7.5	6.5	7.5, 7.0	6.0, 6.0
Pavement Age (Years)	19	18	16	42
Doweled PCC (Yes/No)	No	No	No	No
Subbase Type, Classification, Thickness	Limestone, GP-GM, A-1-a, 4.5 in	Limestone, GM, A-1-a, 4 in	Limestone, GM, A-1-b, 12 in (3 in. Choke Stone and 9 in. Macadam)	—
Subgrade Classification	CH, A-7-6(30)	CL, A-6(13)	—	CL, A-4(4)
Subgrade Stabilization	None	None	None	None
PCI	87	97	92	35
AADT, Percentage of Trucks	1120, 5.0%	300, 1.5%	660, 6.0%	560, 3.0%
Pavement Width (ft), cross slope	25.8, 2%	27.0, 2%	21.5, 2%	22.0, 2%
Average and COV (in parenthesis) values of in situ FWD, DCP, and CHP test measurements				
LTE (%)	94 (3)	92 (3)	42 (28)	47 (49)
D_0 (mils)[1]	10.9 (29)	7.2 (22)	6.2 (35)	17.4 (48)
Intercept (mils)	0.1 (549)	-0.1 (478)	0.3 (299)	-0.9 (146)
% points with I > 2 mils	6%	0%	3%	0%
Dynamic k_{FWD} (pci)[1]	75 (51)	182 (45)	221 (6)	102 (37)
Static k_{FWD} (pci)[1,2]	38 (51)	91 (45)	111 (6)	51 (37)
Static $\underline{k}_{FWD-Corr}$ (pci)[1,2]	48 (44)	104 (40)	151 (4)	64 (32)
E_{SG} (psi)[3]	6,554 (41)	14,221 (33)	19,530 (4)	7,961 (32)
CBR_{SB} (%)[4]	20 (29)	22 (50)	111 (24)	None
CBR_{SG} (%)[4,5]	8.7 (35)	7.3 (90)	56 (30)	6.8 (57)
$CBR_{SG\text{-weak layer}}$ (%)[4,6]	5.2 (34)	2.7 (69)	16 (28)	1.4 (50)
$k_{comp\text{-}DCP}$ (pci)[7]	363 (20)	317 (58)	1049 (9)	358 (41)
$k_{comp\text{-}DCP\ Weak}$ (pci)[8]	302 (23)	196 (45)	667 (22)	125 (35)
K_{CHP} (ft/day)	21	20	0.5, 0.9	0.7, 0.2
Edge Drains (Yes/No)	No (C/G)	Yes	No (D)	No (D)
t_{50} (days)	4	3	25, 14	5, 17
C_d (based on K_{CHP})	0.92	0.94	0.80, 0.84	0.91, 0.83
C_d (SUDAS)	1.10	1.10	1.10	1.00
Drainage Rating (C_d)	G	P to F	P to F	VP to P
Support Rating (CBR)	F to G	VG	E	P to F
Uniformity Rating (COV)[9]	F	F	E	G
LOS Range[10] (Avg.)	1.2-3.1 (1.8)	0.0-1.8 (1.0)	1.0-1.1 (1.0)	0.9-2.0 (1.6)
LOS Range[11] (Avg.)	1.2-3.0 (1.6)	0.0-1.3 (0.7)	0.4-1.0 (0.8)	0.0-1.5 (0.7)
LOS (AASHTO 1993)	1.0-3.0	1.0-3.0	1.0-3.0	2.0-3.0
LOS (SUDAS)	0.0	0.0	0.0	1.0

Notes:[1]Normalized to 9,000 lb applied loads; [2]AASHTO(1993): Static k_{FWD} = Dynamic $k_{FWD}/2$; [3]From DCP-CBR to E_{SB} correlation per AASHTO (1993); [4]From DCP tests per ASTM D6951; [5]Average of top 12 in. of subgrade; [6]CBR of a minimum 3 in. thick weak layer within the top 16 in. of subgrade; [7]From empirical correlations between CBR_{SG} (average of top 12 in. of SG) and k, E_{SB}, and subbase layer thickness per AASHTO (1993); [8]From empirical correlations between CBR_{SG} (weak layer within top 16 in. of SG) and k, E_{SB}, and thickness subbase layer thickness per AASHTO (1993); [9]Uniformity rating based on COV of $k_{comp\text{-}FWD\text{-}Corr}$: ≤ 10% - Excellent (E), 10 to 25% - Very Good (VG), 25 to 40% - Good (G), 40 to 55% - Fair (F), > 55% Poor; [10]Back-calculated range of LOS by comparing $k_{comp\text{-}DCP}$ and Static $k_{comp\text{-}FWD\text{-}Corr}$; [11]Back-calculated range of LOS by comparing $k_{comp\text{-}DCP\ Weak}$ and Static $k_{comp\text{-}FWD\ Corr}$; C/G – curb and gutter pavement; D – day lighted drainage system; *7 out of 10 DCPs showed refusals within the subbase layer; **CHP tests indicated erosion at the pavement/subgrade interface.

Load Transfer Efficiency

The joint LTE at 13 out of the 15 sites showed an average of ≥ 92% at the joints. The remaining 3 projects showed average LTE < 50%. Out of these, the W38/Locust Rd. site showed an average LTE = 42%, but there were minimal distresses at the surface (PCI = 92). However, the other two projects (175th St., and NW Greenwood St. and 5th) showed significant distresses at the surface with longitudinal and transverse cracks (PCI < 40). The difference between these sites is that the W38/Locust Rd. site consisted of 12 in. of subbase (3 in. subbase and 9 in. of macadam subbase) while at the other two sites the PCC was directly over the subgrade.

Composite Modulus of Subgrade Reaction and Loss of Support

Box plots of Static $k_{comp\text{-}FWD\text{-}Corr}$ and $k_{comp\text{-}DCP}$ values for the seven foundation layer support categories listed above, are presented in Figure 138. The CBR values of subgrade and subbase layers used in determination of $k_{comp\text{-}DCP}$ are plotted in Figure 139. In the box plots, the box boundary closest to zero indicates the 25th percentile; solid and dotted lines within the box indicate median and mean, respectively; and box boundary farthest from zero indicates the75th percentile. Error bars above and below box indicate the 90th and 10th percentiles. Points beyond the error bars indicate the 95th and 5th percentiles.

The Static $k_{comp\text{-}FWD\text{-}Corr}$ values were on average about 3.2 to 12.2 times lower than the $k_{comp\text{-}DCP}$, while they were on average about 0.9 to 6.2 times lower than the $k_{comp\text{-}DCP\text{-}Weak}$. It must be noted that the $k_{comp\text{-}DCP}$ or the $k_{comp\text{-}DCP\text{-}Weak}$ values do not account for LOS under the pavement in situ, while the $\mathrm{k}_{comp\text{-}FWD\text{-}Corr}$ values do. The k_{comp} values calculated from FWD and DCP tests are compared in Figure 140, by overlaying the LOS factors from AASHTO (1993), as a way to interpret the LOS at each test location. Average values from each site are shown in Figure 141. The LOS factors are back-calculated for each test location and the average values per site using these charts. The range of back-calculated LOS and the average LOS value for each site is summarized in Table 23. These LOS values are compared with the recommended LOS values in AASHTO (1993) based on the material type in Table 23 as well as with values currently being used in the SUDAS design procedure.

The range and average of LOS values computed using this procedure are within the AASHTO recommended range and higher than the values currently suggested in the SUDAS design procedures (1 for natural subgrade and 0 for granular subbase). Interestingly, the LOS value calculated using this procedure on a newly constructed pavement (SW Logan St.) also showed an average of 1.1 with a range of about 0.9 to 1.3. This is possible if the pavement was placed in hot weather. Previous research by Sargand and Morrison (2007) documented that if a concrete pavement is placed in hot weather, a positive built-in temperature gradient develops leading to irreversible curling and permanent loss of support under pavement. It must be noted that the procedure described above to estimate LS values warrants further investigation with detailed temperature measurements in the PCC panel (to verify conditions of curling or warping, etc.). FWD test measurements in a dense grid pattern over each panel and possibly ground penetrating radar scanning could also help assess LS conditions.

Results presented in Figure 138 indicate that on average, the $k_{comp\text{-}FWD\text{-}Corr}$ values generally increased with increasing subbase layer thickness. The Westlawn Dr. site (with 8.5 to 10 in. of subbase) was an exception because of poorly compacted backfill material in the subgrade at that site, which likely contributed to loss of support and lower $k_{comp\text{-}FWD\text{-}Corr}$ values. The W38/Locust Rd. section with 12 in. of granular subbase (3 in. subbase and 9 in. of macadam subbase) showed the highest k_{comp} values.

Permeability Measurements and Coefficient of Drainage

The K_{CHP} values measured in situ are compared with empirically estimated K_{sat} values in Figure 142. Results indicate that the measurement K_{CHP} values on granular non-plastic (subbase) materials compare well with the empirical data. However, the K_{CHP} values on the fine-grained (subgrade) materials were higher than the estimated K_{sat} values. This should be expected because water seepage is likely to occur at the pavement/ subgrade interface during CHP tests and not all water is expected to infiltrate through the low permeability subgrade.

K_{CHP} values measured for the seven different foundation layer support categories and the corresponding C_d values are presented in Figure 144 and Figure 144, respectively. The results did not show improvement in C_d values with increasing subbase layer thickness.

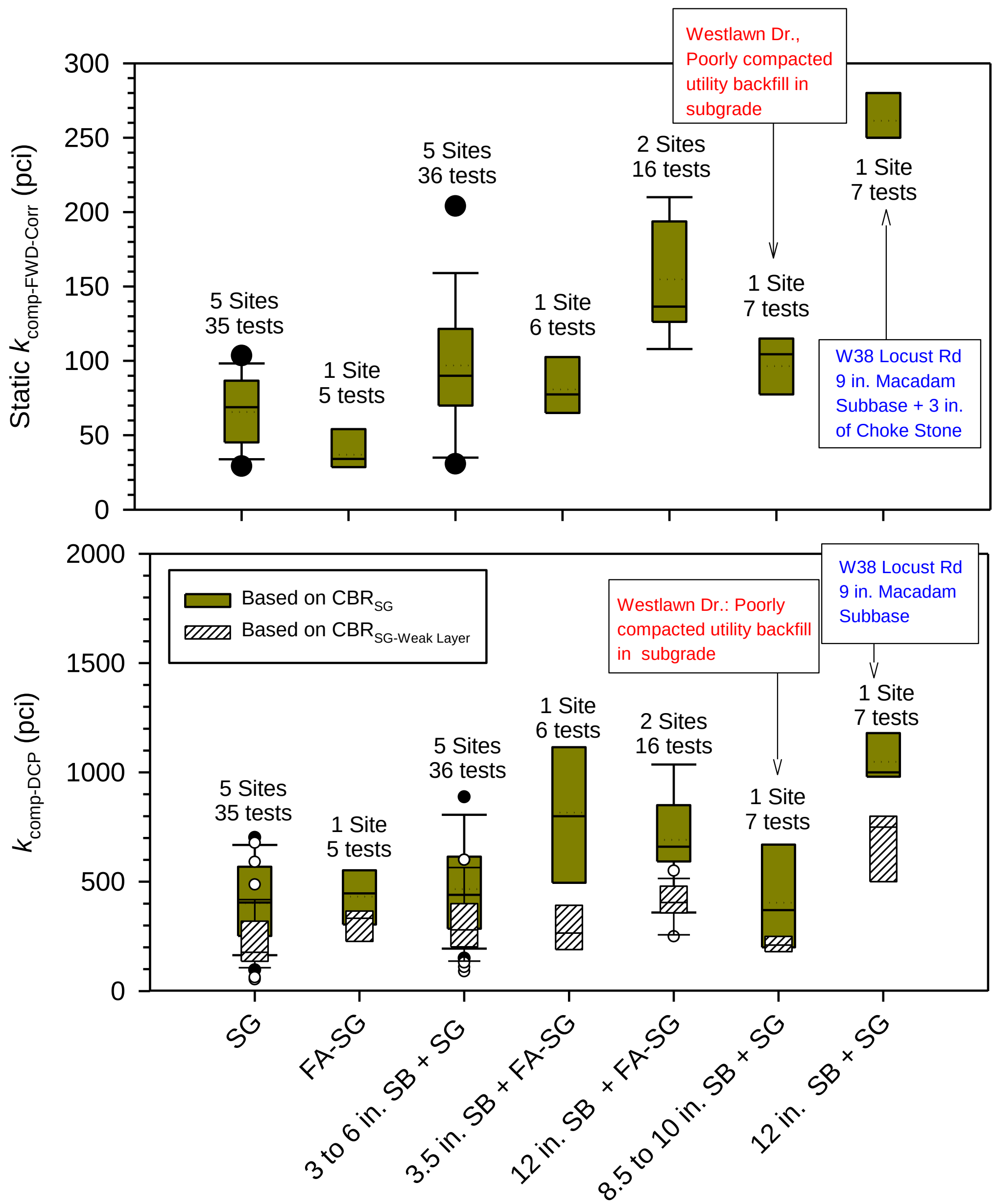


Figure 138. Boxplots of Static $k_{comp\text{-}FWD\text{-}Corr}$ and $k_{comp\text{-}DCP}$ values for different foundation layer support conditions

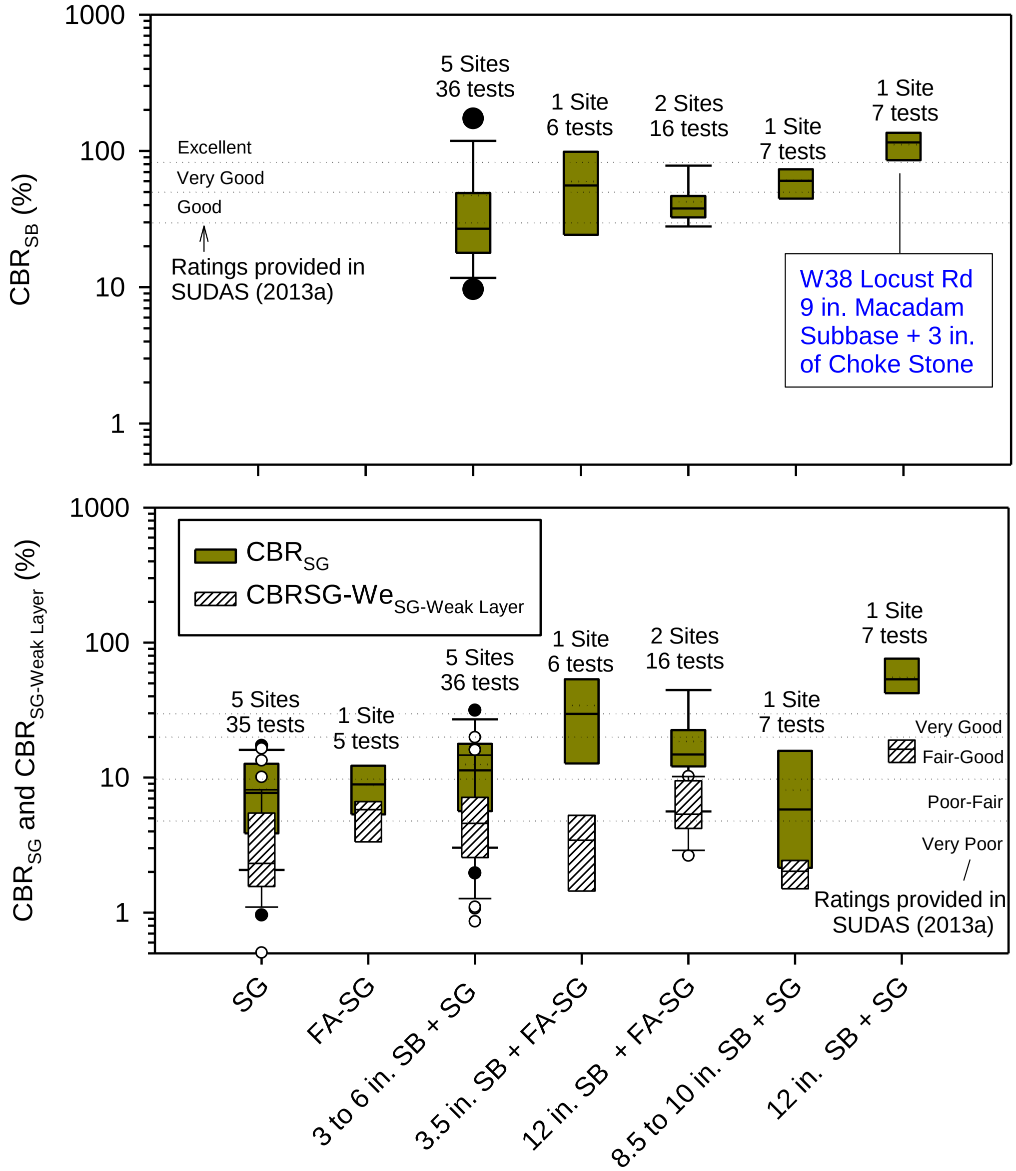


Figure 139. Boxplots of CBR of subgrade and subbase layers observed at different sites

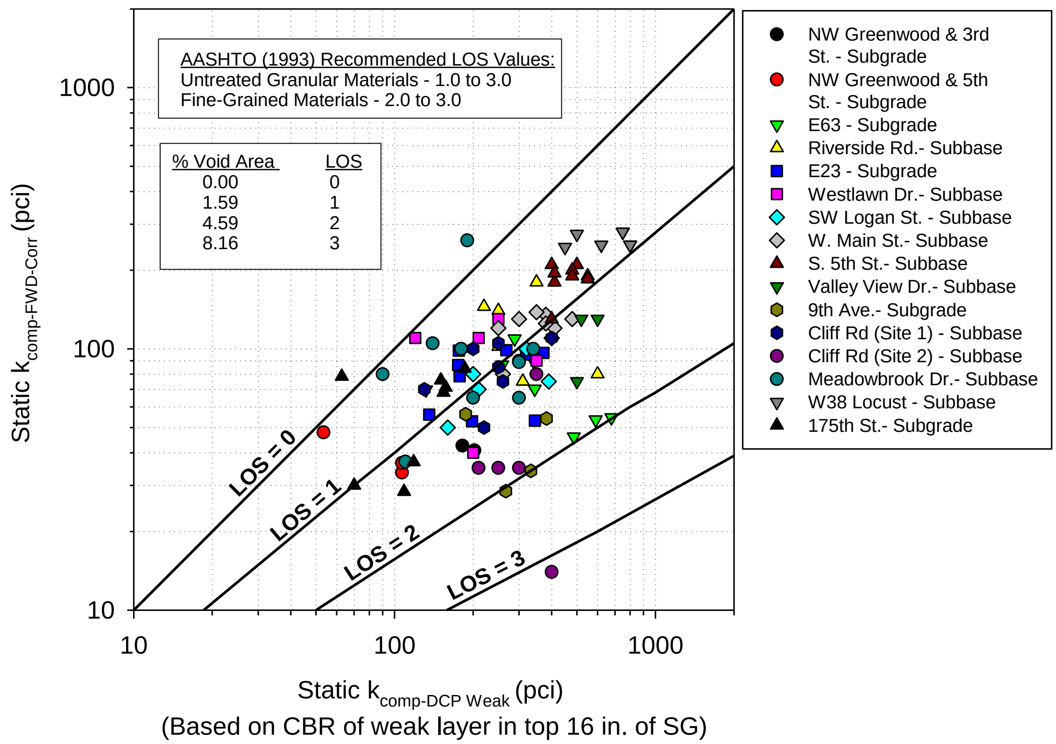


Figure 140.

Static $k_{\text{comp-FWD-Corr}}$ versus $k_{\text{comp-DCP Weak}}$ (bottom) in relationship with loss of support

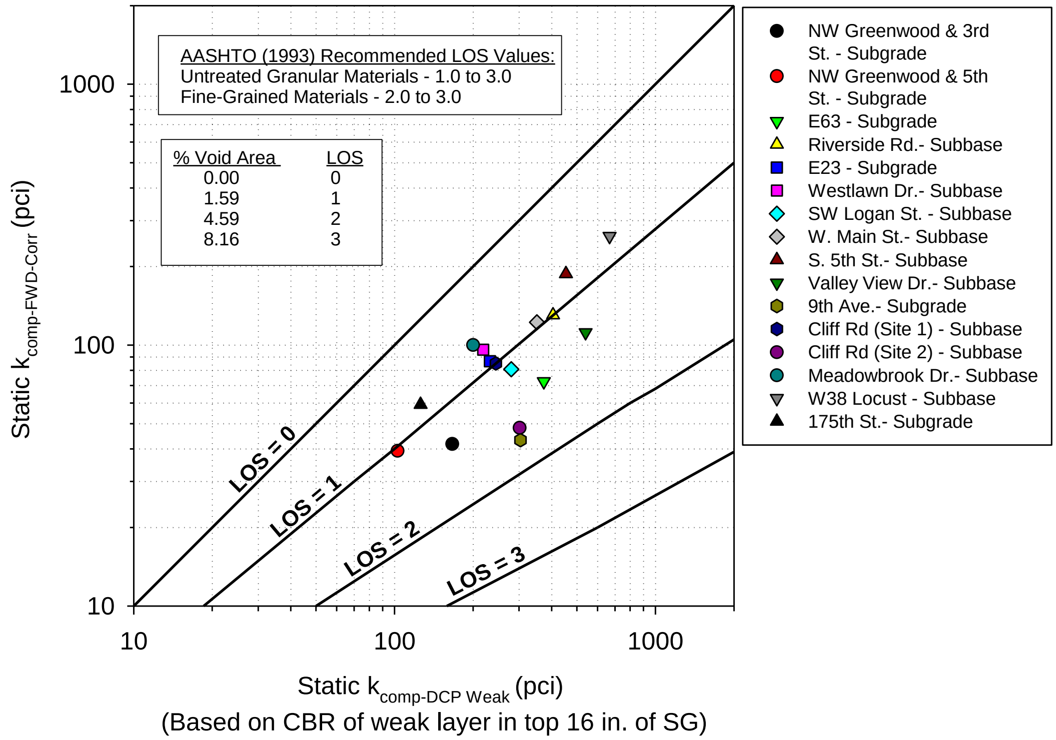


Figure 141. Static $k_{\text{comp-FWD-Corr}}$ versus $k_{\text{comp-DCP Weak}}$ (bottom) based on average values from each site in relationship with loss of support

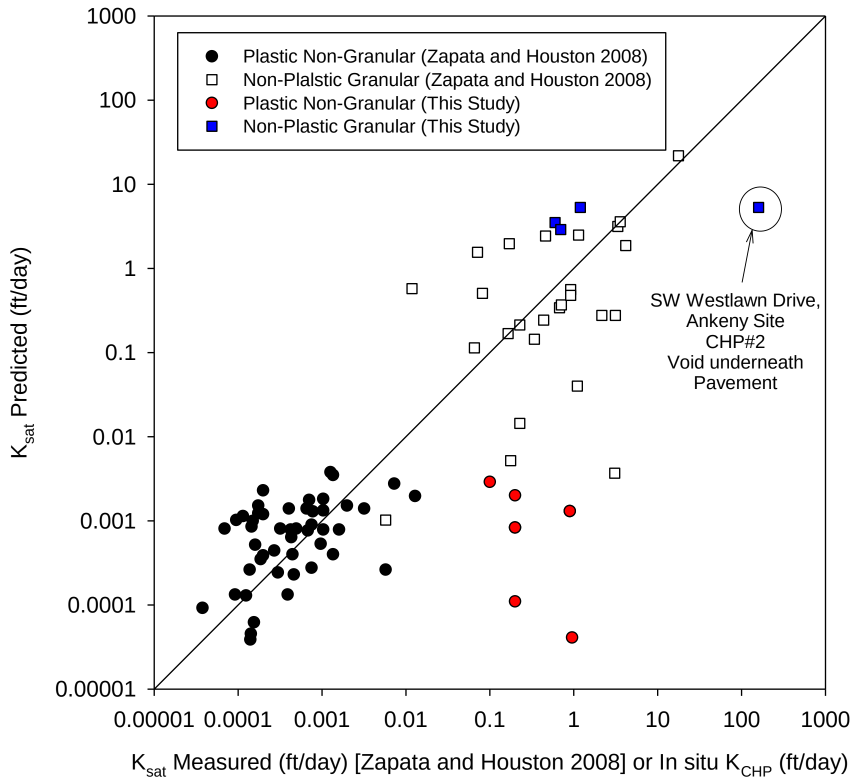


Figure 142. Measured K_{CHP} versus predicted K_{sat} in comparison with data used in empirical models from Zapata and Houston (2008)

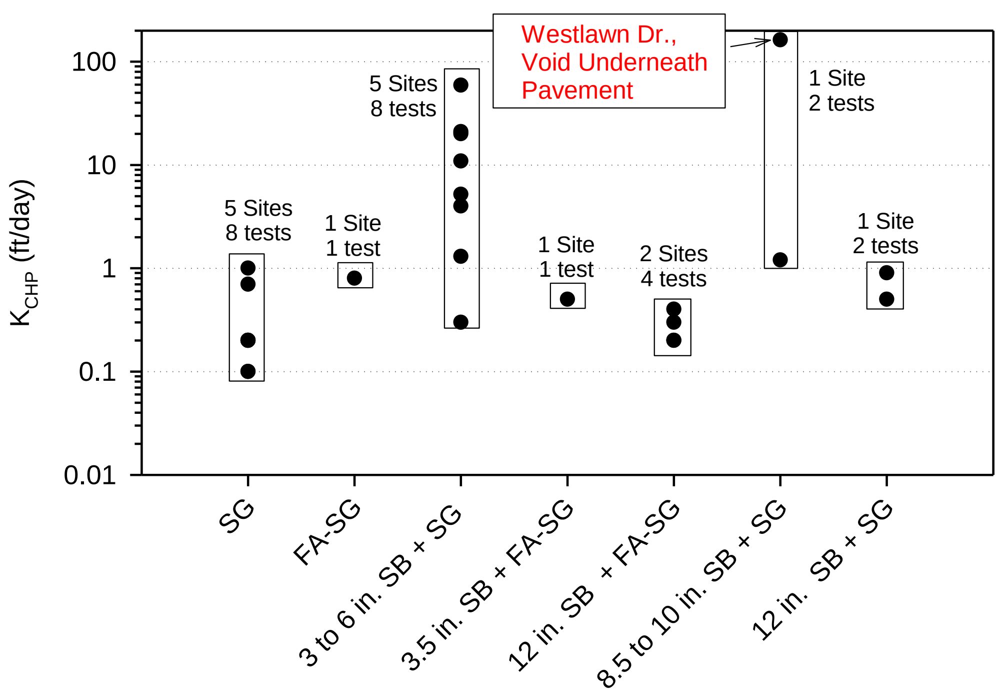


Figure 143. K_{CHP} values measured for different foundation layer support materials

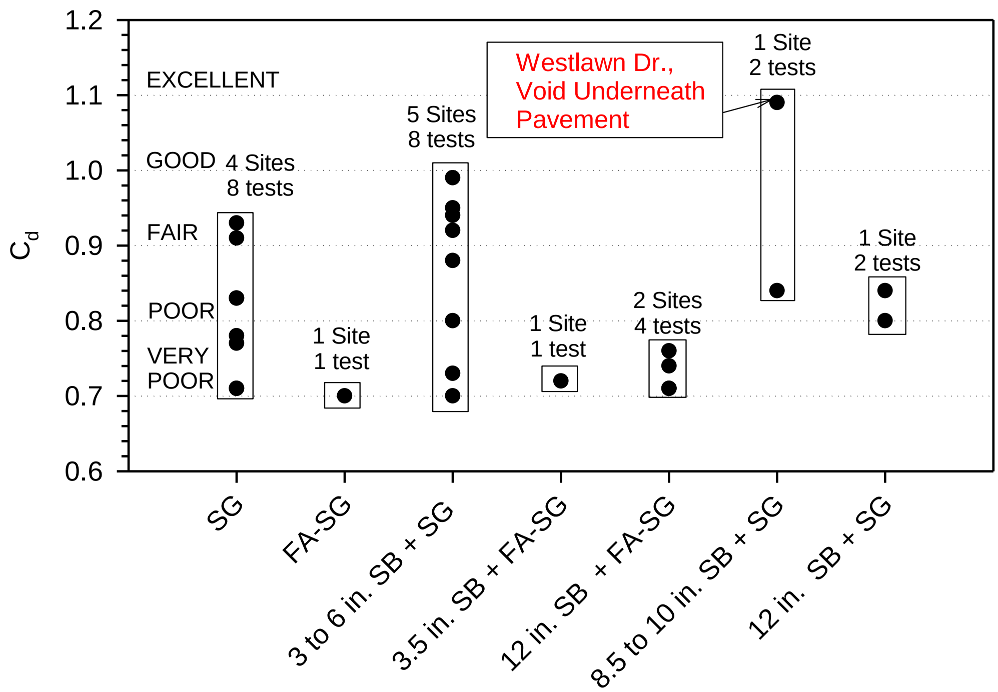


Figure 144. C_d values observed for different foundation layer support materials

Statistical Analysis

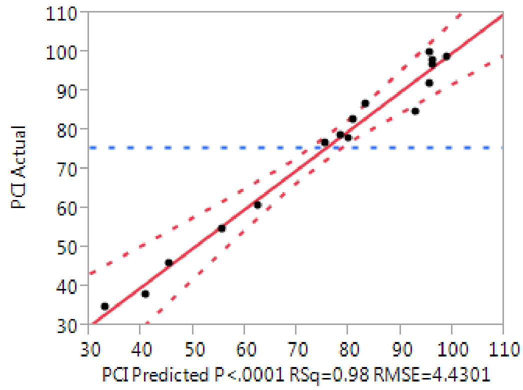
The PCI values from each site are summarized in Table 23. In this section, multi-variate statistical analysis was performed to assess the effect of the following parameters in predicting the PCI value:

1. Pavement age
2. PCC thickness
3. AADT
4. Percentage of trucks
5. Subbase thickness (used as 0 when no subbase was present)
6. Presence of Subbase (Yes – 1 or No – 0)
7. Average and COV of Static $k_{FWD\text{-}Corr}$
8. Average and COV of Static $k_{comp\text{-}FWD\text{-}Corr}$
9. Average and COV of $\mathrm{k}_{comp\text{-}DCP\text{-}Corr}$
10. Average and COV of CBR_{SG}
11. Average and COV of $CBR_{SG\text{-}Weak}$
12. Average and COV of CBR_{SB}
13. C_d

Multi-variate analysis was performed using JMP statistical analysis software. All of the parameters above were considered as continuous, while parameter (6) was considered nominal in the analysis. The analysis was performed by incorporating the above listed parameters in a linear multiple regression model in different combinations. The statistical significance of these parameters were assessed using the *t*- and *p*-values associated with each parameter. The selected criteria for identifying the significance of a parameter included *p*-value ≤ 0.05 is significant, ≤ 0.10 is possibly significant, > 0.10 = not significant, and t-value <-2 or >+2 = significant. Higher the *t*- and *p*- values, greater is the statistical significance of the parameter.

The results of multi-variate analysis are summarized in Figure 145. Of all the parameters assessed, the following parameters were found to be statistically significant in the decreasing order of significance (based on *t*- and *p*- values): (1) pavement age; (2) C_d; (3) COV of $k_{FWD\text{-}Corr}$; (4) $CBR_{SG\text{-}Weak}$; (5) AADT; (6) presence of subbase; (7) COV of $CBR_{SG\text{-}Weak}$; and (8) PCC thickness. The coefficient estimate values summarized under parameter estimates in Figure 145 indicate whether the parameter has a positive or a negative influence on the PCI value. For e.g., the negative coefficient values for pavement age, COV of $k_{FWD\text{-}Corr}$, $CBR_{SG\text{-}Weak}$, COV of $CBR_{SG\text{-}Weak}$, and PCC thickness indicate that as these parameters increase, the PCI value decreases. On the other hand, the positive coefficient value for C_d indicates that PCI increases with increasing C_d. In case of the subbase layer parameter, which was modeled as a nominal parameter, the intercept value shown must be subtracted if subbase layer is not present and must be added if subbase layer is present. This indicates that the presence of subbase layer increases the PCI value (see prediction profiler in Figure 145).

Actual versus Predicted Plot



Prediction Model

$$PCI = 5.553 - 1.615\,(Age) - 2.009\,(CBR_{SG-Weak}) - 0.2245\,(COV\ of\ CBR_{SG-Weak}) + 205.907\,(C_d) + 0.004\,(AADT) - 1.055\,(COV\ of\ k_{FWD-Corr}) - 2.395\,(PCC\ Thickness) + a$$

[a = +6.891 if subbase is present and -6.891 if subbase is not present]

Summary of Fit

R^2	0.981024
Adjusted R^2	0.959337
Root Mean Square Error	4.430148
Mean of Response	75.625
Observations (or Sum Wgts)	16

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	8	7102.367	887.796	45.2352
Error	7	137.3835	19.626	**Prob > F**
C. Total	15	7239.75		<.0001*

Analysis of Variance

Term	Coefficient Estimate	Std Error	t Ratio	Prob>|t|
Intercept	5.553235	18.5751	0.3	0.7737
AGE (years)	-1.6148	0.197197	-8.19	<.0001*
C_d	205.9067	30.80738	6.68	0.0003*
COV of $k_{FWD-Corr}$ (%)	-1.05463	0.163932	-6.43	0.0004*
$CBR_{SG-Weak}$ (%)	-2.00856	0.425624	-4.72	0.0022*
AADT	0.003655	0.000869	4.21	0.004*
Subbase [0 if no, 1 if yes]	-6.89072 [0] +6.89072 [1]	2.448017	-2.81	0.026*
COV of $CBR_{SG-weak}$ (%)	-0.2245	0.115308	-1.95	0.0926
PCC Thickness (in)	-2.39461	1.245348	-1.92	0.0959

Prediction Profiler

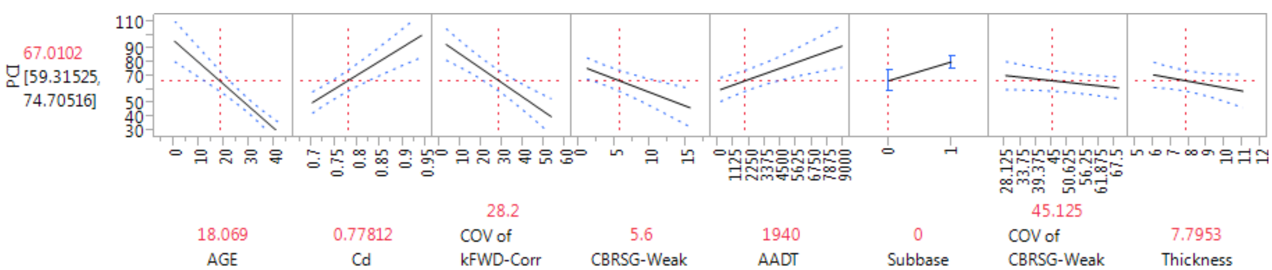


Figure 145. Summary of multi-variate analysis results

Pavement age versus PCI with a simple linear regression model is shown in Figure 146. The linear regression trend yielded a coefficient of determination (R^2) value of 0.72 with root mean squared error (RMSE) of about 12. A multiple linear regression trend including the various parameters identified in the analysis above is also shown in Figure 146, which showed an R^2 value of 0.94 and RMSE of about 5. PCI versus age data documented recently in White et al. (2008) on interstate highways is included in this figure, which falls generally in line with the current project data.

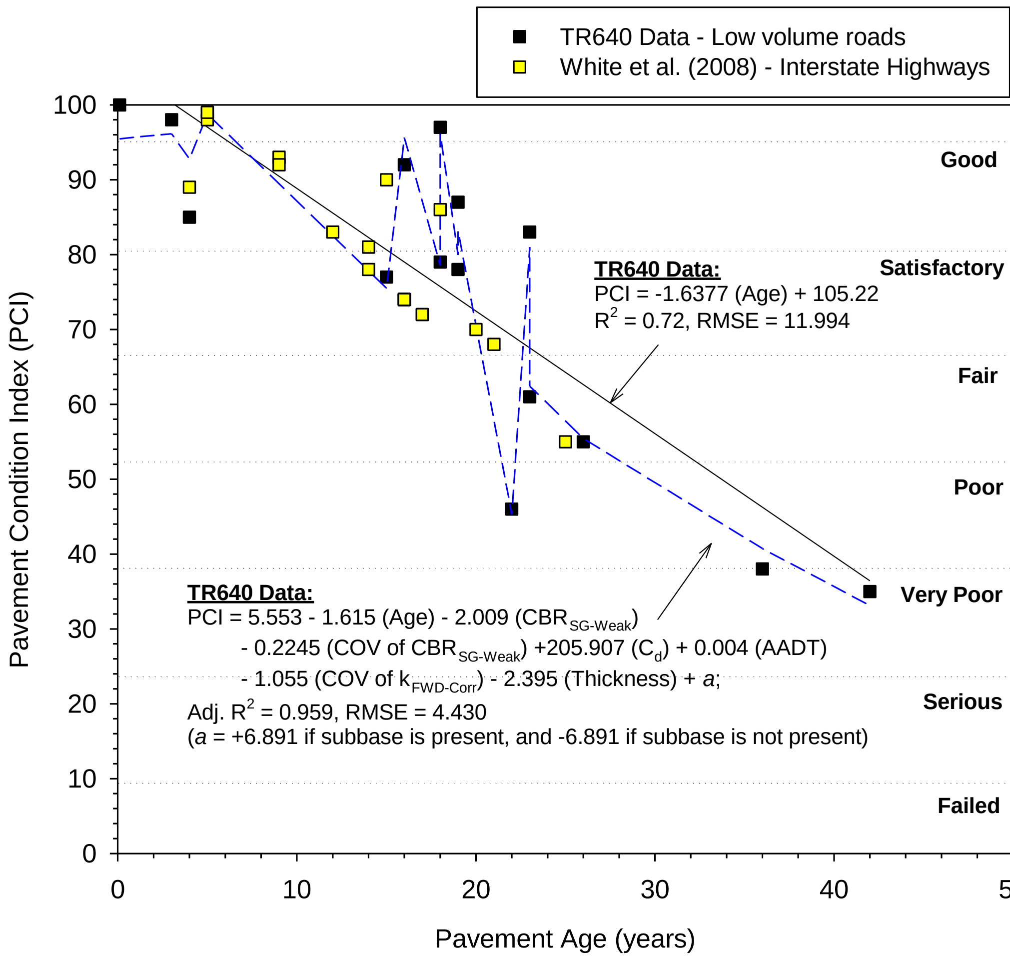


Figure 146. Relationships between pavement age and PCI with simple linear and multi-variate regression analysis results

The multi-variate analysis revealed that improving subgrade strength/stiffness (within the top 16 in. of the subgrade layer), improving drainage, providing a subbase layer, and reducing variability, can contribute to increasing the PCI value. Subgrade layer properties can be improved by stabilization, drainage can be improved by the presence of a relatively thin drainable subbase layer (note that subbase layer thickness was not statistically significant), and variability can be reduced by adequate in situ testing. Some recommendations regarding these aspects are provided in Chapter 8. The PCI prediction model developed from this analysis is based on limited data (16 points), and should be updated and validated with a larger pool of data.

CHAPTER 7: SUMMARY OF KEY FINDINGS

This report describes test results and comparative analysis from 16 different portland cement concrete (PCC) pavement sites on local city and county roads in Iowa. The sites tested varied in:

- pavement age from about 0.1 years (30 days) to 42 years,
- surface distress conditions from “poor” to “excellent” (PCI values from 35 to 100),
- type of support conditions from directly supported over natural subgrade to fly ash stabilized subgrade to 12 in. thick granular subbase,
- pavement thickness from 6 to 11 in, and
- annual average daily traffic (AADT) from 110 to 8900.
- Variable subbase and subgrade materials and fines contents

At each site the surface conditions of the pavement (i.e., crack survey) and foundation layer strength, stiffness, and hydraulic conductivity properties were documented. The field test results were used to calculate in situ parameters used in pavement design per SUDAS and AASHTO (1993) design methodologies.

Overall, the results of this study demonstrate how in situ and lab testing can be used to assess the support conditions and design values for pavement foundation layers. The measurements show that in Iowa, a wide range of pavement conditions and foundation layer support values exist. The calculated design input (modulus of subgrade reaction *k*, coefficient of drainage C_d, and loss of support) values are much different than typically assumed. This finding was true for the full range of materials tested. This finding supports the recommendation to incorporate field testing as part of the process to field verify the selected pavement design values.

A summary of key analysis results obtained from all field sites are as follows:

- The joint LTE at 13 out of the 15 sites showed an average of ≥ 92% at the joints, irrespective of the foundation layer conditions. The remaining three projects showed average LTE < 50%.
- It is found that modulus of subgrade reaction values determined from FWD test (Static $k_{\text{FWD-Corr}}$) correlate well with subgrade layer CBR, when the weakest layer CBR within the top 16 in. of subgrade ($\text{CBR}_{\text{SG-Weak}}$) is used. These correlations are also in line with the data published previously by the U.S. Army Corps of Engineers (Barker and Alexander 2012), Thornton (1983), and Darter et al. (1995). There is significant variability in the *k* versus CBR relationships, however.
- Composite *k* values determined accounting for subbase layer modulus and thickness based on FWD tests (Static $k_{\text{comp-FWD-Corr}}$) were on average about 0.9 to 6.2 times lower than the values determined from DCP test results using $\text{CBR}_{\text{SG-Weak}}$ ($k_{\text{comp-DCP-Weak}}$).
- The $k_{\text{comp-DCP-Weak}}$ values do not account for LOS under the pavement in situ, while the $k_{\text{comp-FWD-Corr}}$ values do as the measurement is directly on the pavement. The LOS values back-calculated by comparing the averages (per site) of these values ranged from about 0.7 to 1.7. These LOS values are higher than the values currently suggested in the

SUDAS design procedures (1 for natural subgrade and 0 for granular subbase). For sections with granular subbase, the LOS values ranged from 0.7 to 1.3.

- On average, the $k_{\text{comp-FWD-Corr}}$ and $k_{\text{comp-DCP}}$ values increased with increasing subbase layer thickness. The Westlawn Dr. site (with 8.5 to 10 in. of subbase) was an exception because of poorly compacted backfill material in the subgrade at that site, which contributed to LOS and lower $k_{\text{comp-FWD-Corr}}$ values. The W38/Locust Rd. section with 12 in. of granular subbase (3 in. subbase and 9 in. of macadam subbase) showed the highest $k_{\text{comp-FWD-Corr}}$ and $k_{\text{comp-DCP}}$ values.
- In situ hydraulic conductivity measurements (K_{CHP}) values measured for the seven different foundation layer support categories did not show improvement in C_d values with increasing subbase layer thickness and were generally lower than suggested for design in SUDAS (C_d = 1.0).
- Multi-variate statistical analysis performed on various parameters measured during this study to predict PCI revealed that improving subgrade strength/stiffness (within about top 16 in. of the subgrade layer), improving drainage, providing a subbase layer, and reducing variability, can contribute to increasing the PCI value. Subgrade layer properties can be improved by stabilization, drainage can be improved by the presence of a relatively thin drainable subbase layer (note that subbase layer thickness was not statistically significant), and variability can be reduced by adequate in situ testing. Some recommendations regarding these aspects are provided in Chapter 8. The PCI prediction model developed from this analysis is based on limited data (16 points), and must be validated with a larger pool of data.

CHAPTER 8: RECOMMENDATIONS

The field investigation demonstrates that there can be several factors that affect pavement foundation performance include at least the following:

i. Poor support (due to low stiffness or CBR)
j. Poor drainage
k. Seasonal variations (freeze-thaw and frost-heave)
l. Shrink-swell due to moisture variations
m. Loss of support (due to erosion, non-uniform settlement, curling/warping)
n. Poorly compacted utility trench backfill
o. Differential settlement of foundation layers
p. Overall non-uniformity

Characterization of these problems can be determined from in situ testing. Options for field testing are summarized in Table 24 along with notes for test depth, time, skill level and the foundation layers assessed.

The PCI prediction model developed from multi-variate analysis in this study demonstrated a link between pavement foundation conditions and PCI. These results should be validated with data collected from more projects. Data from project sites that are 4 to 12 years old is lacking from the current dataset.

The key aspect of this model is that by measuring properties of the pavement foundation, the engineer will be able to predict long term performance with higher reliability (by factor of 2.4 based on ratio of standard errors) than by considering age alone. These prediction can be used as motivation to then control the engineering properties of the pavement foundation for new or re-constructed PCC pavements to achieve some desired level of performance (i.e. PCI) with time.

In the future, IRI measurements could be included with pavement foundation measurements to related ride quality to similar foundation properties. The IRI data was not available for this study.

Table 24. In situ testing for pavement foundation layer characterization

<table>
<tr><th>Test Method</th><th>Parameter Measured</th><th>Correlated Design Input Parameters</th><th>Assessment Depth (in.)</th><th>Time per Test (min.)</th><th>Training/ Skill Level</th><th>Tested Layers</th></tr>
<tr><td>Nuclear Gauge</td><td>Moisture Content and Dry Density</td><td>None</td><td>12</td><td>1 to 5</td><td>High</td><td>Subbase and Subgrade</td></tr>
<tr><td>Drive Core</td><td>Moisture Content and Dry Density</td><td>None</td><td>12+ (4 inch sample)</td><td>1 to 5</td><td>Low</td><td>Subbase and Subgrade</td></tr>
<tr><td>Dynamic Cone Penetrometer</td><td>Penetration Index</td><td>CBR, Elastic Modulus</td><td>36</td><td>1 to 5</td><td>Low</td><td>Subbase and Subgrade</td></tr>
<tr><td>Light Weight Deflectometer</td><td colspan="2">Elastic Modulus or Stiffness</td><td>12</td><td>2</td><td>Low</td><td>Subbase and Subgrade</td></tr>
<tr><td>Falling Weight Deflectometer</td><td colspan="2">Elastic Modulus or Modulus of Subgrade Reaction, Loss of Support</td><td>60</td><td>3</td><td>High</td><td>Pavement, Subbase, and Subgrade</td></tr>
<tr><td>Clegg Impact Hammer Test</td><td>Clegg Impact Value</td><td>CBR</td><td>6</td><td>< 1</td><td>Low</td><td>Subbase and Subgrade</td></tr>
<tr><td>ISU Air Permeameter Test</td><td>Saturated Hydraulic Conductivity</td><td>Coeff. of Drainage</td><td>4</td><td>< 1</td><td>Medium</td><td>Subbase</td></tr>
<tr><td>ISU Core Hole Permeameter Test</td><td>Saturated Hydraulic Conductivity</td><td>Coeff. of Drainage, Loss of Support[4]</td><td>6</td><td>90</td><td>Medium</td><td>Subbase or Subgrade[4]</td></tr>
<tr><td>Mn/DOT Permeameter Test</td><td>Saturated Hydraulic Conductivity</td><td>Coeff. of Drainage</td><td>4</td><td>90</td><td>Medium</td><td>Subbase or Subgrade[4]</td></tr>
</table>

[1]DC – During construction for QC/QA or F – Forensic evaluation after pavement is placed.
[2]Pavement must be cored down to the foundation layer.
[3]Not typically used on subgrades.
[4]Test performed by coring through the pavement – measures the system permeability and not just the permeability of the material and therefore can potentially identify loss of support issues.

Table 25. Typical foundation treatment options to improve performance

Foundation treatment	Issues that can be mitigated
Engineered Subgrade and Backfill Compaction with Moisture, Density, and Lift Thickness Control	• Poorly compacted utility trench backfill • Differential settlement of foundation layers • Loss of support (due to non-uniform settlement) • Shrink-swell potential due to moisture variations (if high plasticity clays are excavated and replaced with engineered fill)
Portland Cement Stabilization of Subgrade	• Frost-heave and thaw-softening • Shrink-swell potential (applicable for high plasticity clays) • Wet/soft subgrade conditions during construction (to serve as construction platform) • Non-uniformity of stiffness[1]
Fly Ash Stabilization of Subgrade (Self-Cementing)	• Wet/soft subgrade conditions during construction (to serve as construction platform) • Shrink-swell potential (applicable for high plasticity clays) • Non-uniformity of stiffness[1]
Lime Stabilization of Subgrade	• Shrink-swell potential (applicable for high plasticity clays) • Non-uniformity of stiffness[1]
Granular Subbase (Untreated)	• Poor drainage[2] • Frost-heave[3] and thaw-softening • Poor support (low stiffness)[4]
Cement or Asphalt Stabilization of Subbase	• Poor drainage[5] • Poor support (low stiffness) • Frost-heave and thaw-softening
Cement + Fiber Stabilization of Subbase	• Poor drainage[5] • Poor support (low stiffness) • Frost-heave and thaw-softening
Geotextile Separation Layer at Subbase/Subgrade Interface	• Poor drainage[6] • Poor support (low CBR)
Geogrid Reinforcement at Subbase/Subgrade Interface	• Poor support (low CBR)
Geocomposite Drainage System at Subbase/Subgrade Interface	• Poor drainage
Granular Macadam Subbase with Choke Stone Cover	• Poor drainage[7] • Poor Support (low stiffness and CBR)[8] • Frost-heave and thaw-softening
Emulsified Asphalt Stabilized Granular Macadam Subbase	• Poor drainage[9] • Poor Support (low stiffness and CBR)[9] • Frost-heave and thaw-softening

[1] Non-uniformity can be potentially reduced if proper construction techniques are followed (i.e., use of uniform mixing, moisture-conditioning, and compaction procedures) (see White et al. 2005a, 2010)
[2]Recycled PCC materials can exhibit poor drainage characteristics over time (see results in this study and White et al. 2008).
[3]Recycled PCC materials are more susceptible to frost-heave than crushed limestone materials (see Johnson 2012).
[4]Results obtained from this study indicated that as the thickness of the subbase layer is increased, the foundation layer stiffness properties are increase on-average, but with significant scatter in the data. Stiffness in the underlying support conditions (in the subgrade) play a major role.
[5]Poor drainage issues may not be mitigated if dense-graded aggregate mixtures or recycled PCC materials are used in the subbase.
[6]Contamination of subbase with migration of subgrade fines can be mitigated and thereby improving drainage characteristics.
[7]Gradataion of macadam subbase material vary significantly and drainage can be improved if the material is open-graded.
[8]Gradataion of macadam subbase material vary significantly and support stability can be improved if the material is dense-graded.
[9]This stabilization method has been conceptually indicated (by Less and Paulson 1977) to have the potential to improve both stability and drainage, but warrants future research.

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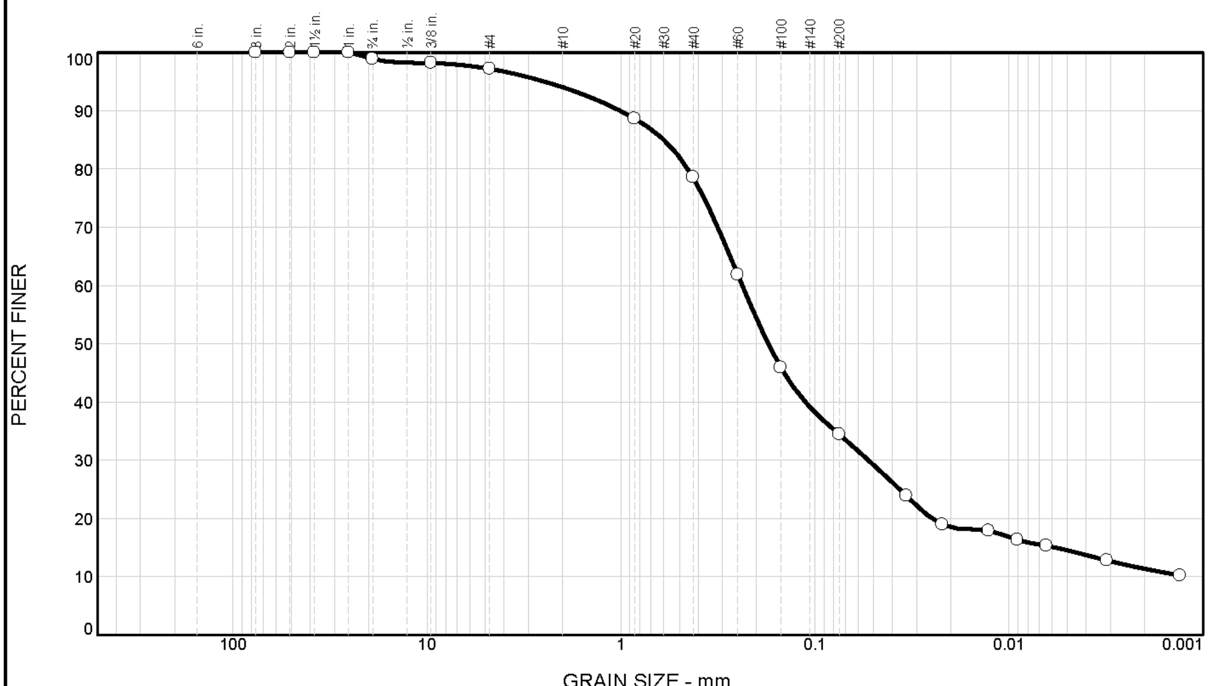
APPENDIX A: LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	2	3	15	45	23	11

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	99		
3/8 in	98		
# 4	97		
# 10	94		
#20	89		
#40	79		
#60	62		
#100	46		
#200	34		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 13 LL= 26 PI= 13

Classification

USCS= SC AASHTO= A-2-6(1)

Coefficients

D_{85}= 0.6005 D_{60}= 0.2370 D_{50}= 0.1745
D_{30}= 0.0532 D_{15}= 0.0058 D_{10}=
C_u= C_c=

Date Tested: 2-12-13 **Tested By:** LK

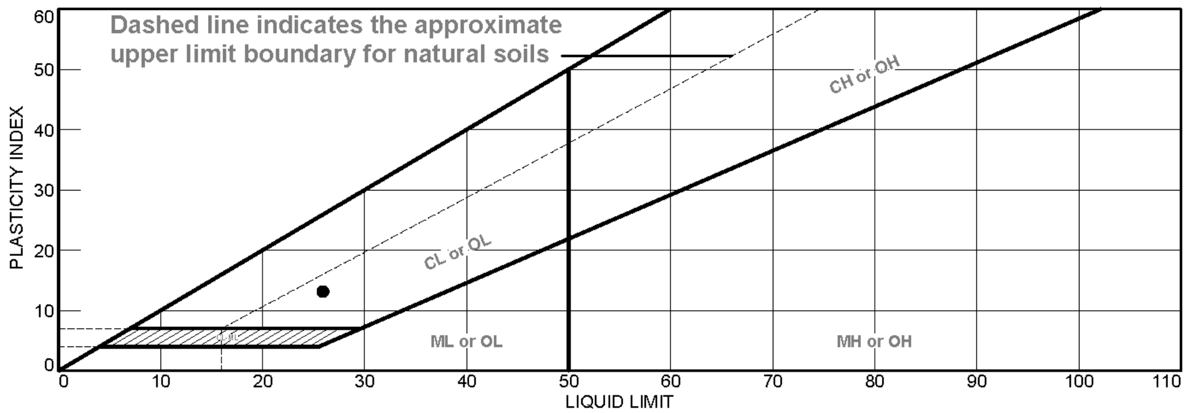
Remarks

Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 5/2/12
Location: NW 3rd St and Greenwood, Ankeny **Elev./Depth:** 8.5" to 19"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	26	13	13	79	34	SC

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** NW 3rd St and Greenwood, Ankeny **Depth:** 8.5" to 19" **Sample No.:** C2

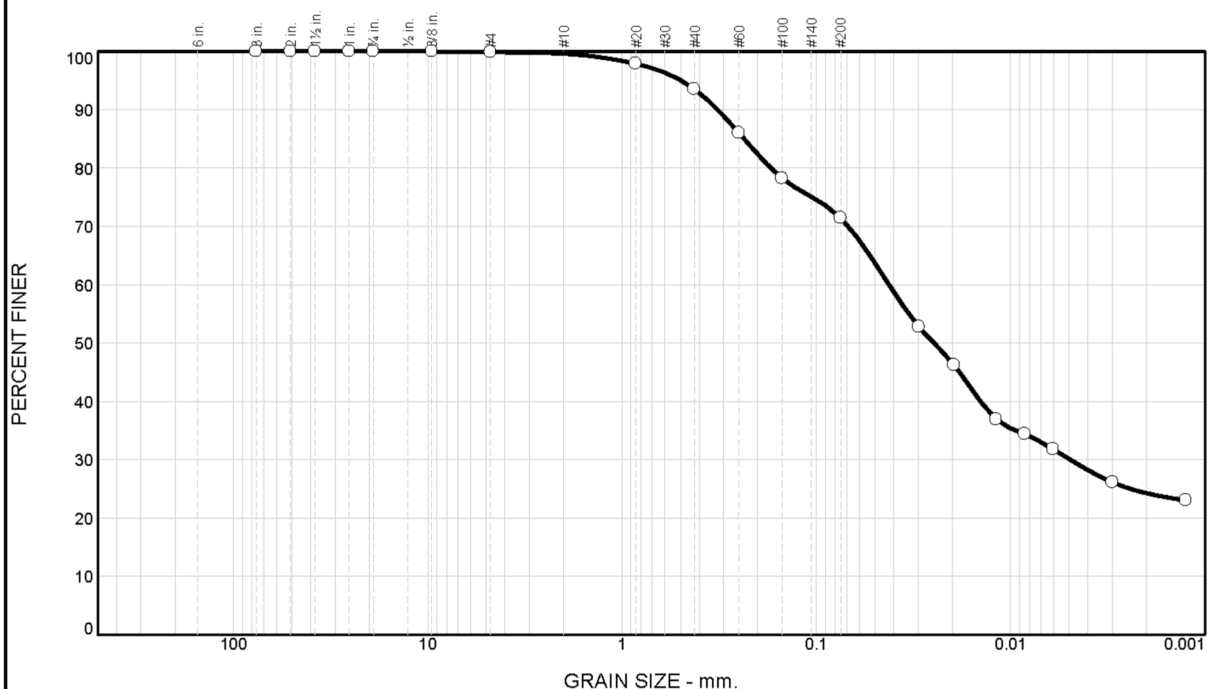
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	6	23	47	24

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	100		
# 10	100		
#20	98		
#40	94		
#60	86		
#100	78		
#200	71		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 22 LL= 46 PI= 24

Classification

USCS= CL AASHTO= A-7-6(16)

Coefficients

D_{85}= 0.2351 D_{60}= 0.0423 D_{50}= 0.0249
D_{30}= 0.0049 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-12-13 **Tested By:** LK

Remarks

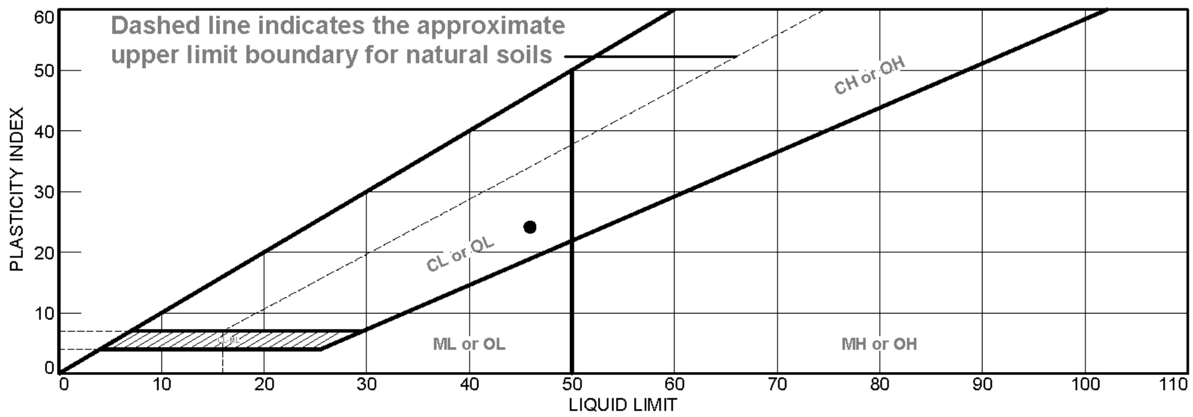
Sample No.: C1 **Source of Sample:** Core 2 **Date Sampled:** 5-2-12
Location: NW 5th and Greenwood, Ankeny **Elev./Depth:** 8.25" to 14"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640

Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	46	22	24	94	71	CL

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** NW 5th and Greenwood, Ankeny **Depth:** 8.25" to 14" **Sample No.:** C1

Remarks:

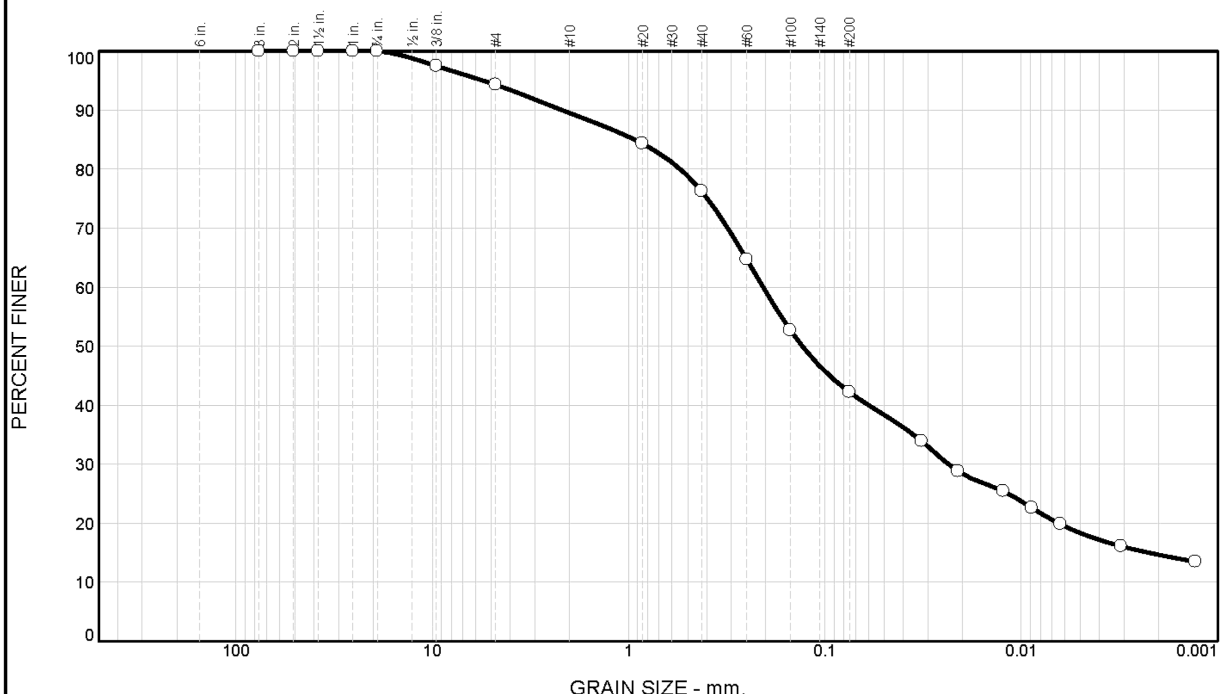
Iowa State University

Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	6	4	14	34	27	15

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	97		
# 4	94		
#10	90		
#20	84		
#40	76		
#60	65		
#100	53		
#200	42		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 16 LL= 24 PI= 8

Classification

USCS= SC AASHTO= A-4(0)

Coefficients

D_{85}= 0.9314 D_{60}= 0.2066 D_{50}= 0.1307
D_{30}= 0.0236 D_{15}= 0.0023 D_{10}=
C_u= C_c=

Date Tested: 2-12-13 **Tested By:** LK

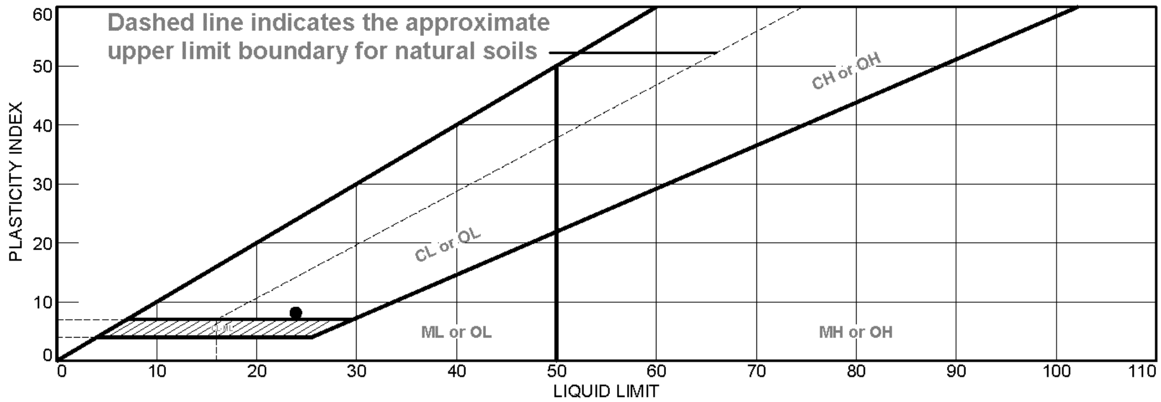
Remarks

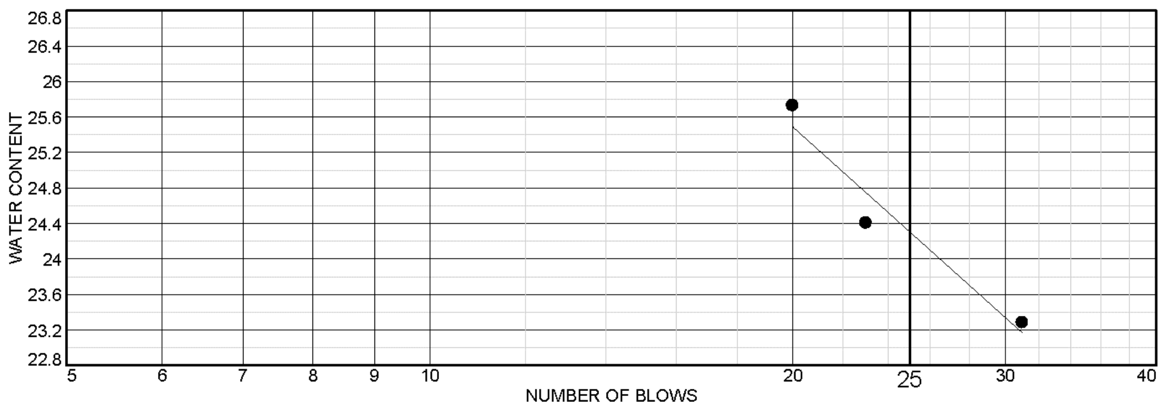
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 5-31-12
Location: E63, Story County **Elev./Depth:** 8.5"-22"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	24	16	8	76	42	SC

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** E63, Story County **Depth:** 8.5"-22" **Sample Number:** C1

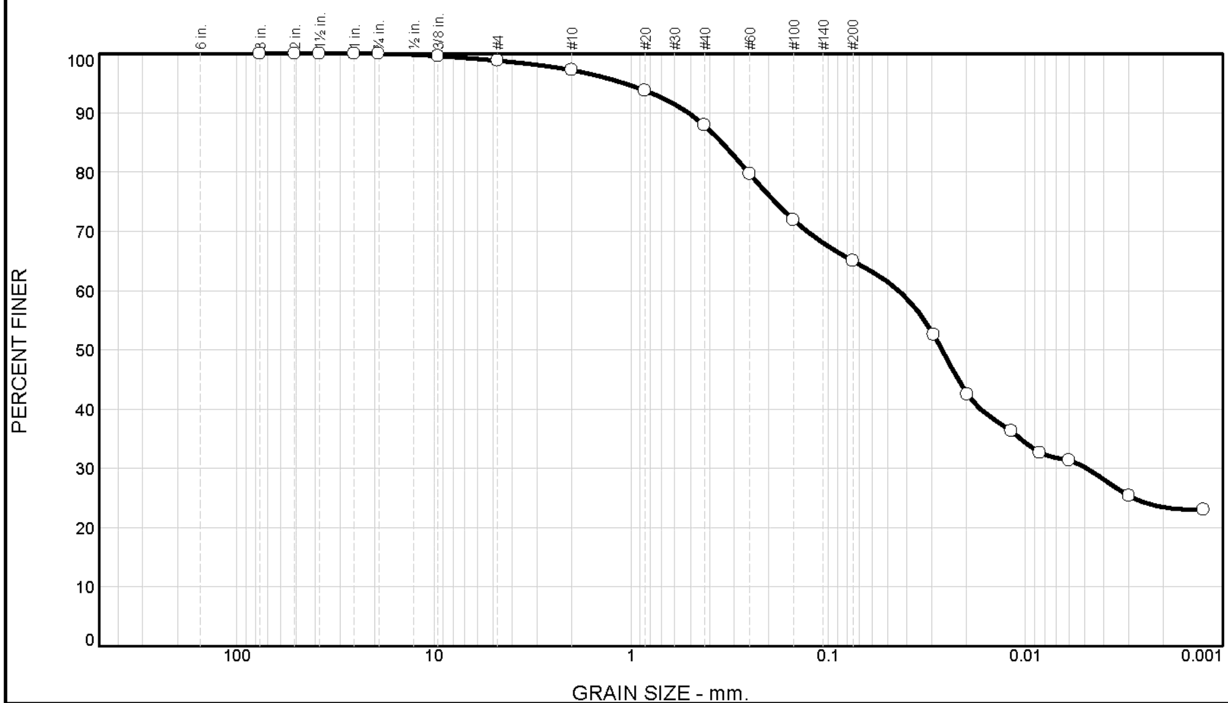
Iowa State University
Civil, Construction and Environmental Engineering Department

Remarks:

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	2	9	23	42	23

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	99		
# 10	97		
#20	94		
#40	88		
#60	80		
#100	72		
#200	65		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 13 LL= 46 PI= 33

Classification

USCS= CL AASHTO= A-7-6(18)

Coefficients

D_{85}= 0.3463 D_{60}= 0.0440 D_{50}= 0.0265
D_{30}= 0.0049 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-12-13 **Tested By:** LK

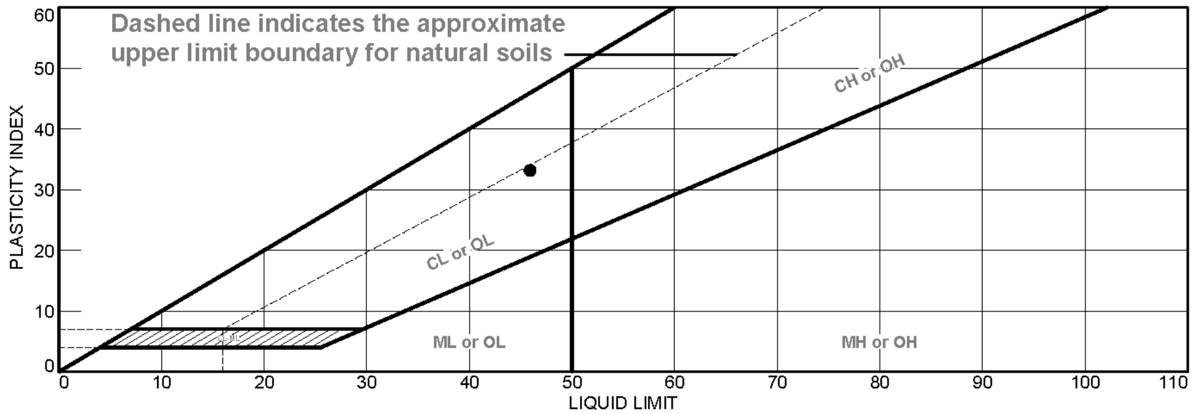
Remarks

Sample No.: C3 **Source of Sample:** Core 3 **Date Sampled:** 5-31-12
Location: E63, Story County **Elev./Depth:** 8"-23"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	46	13	33			

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** E63, Story County **Depth:** 8"-23" **Sample Number:** C3

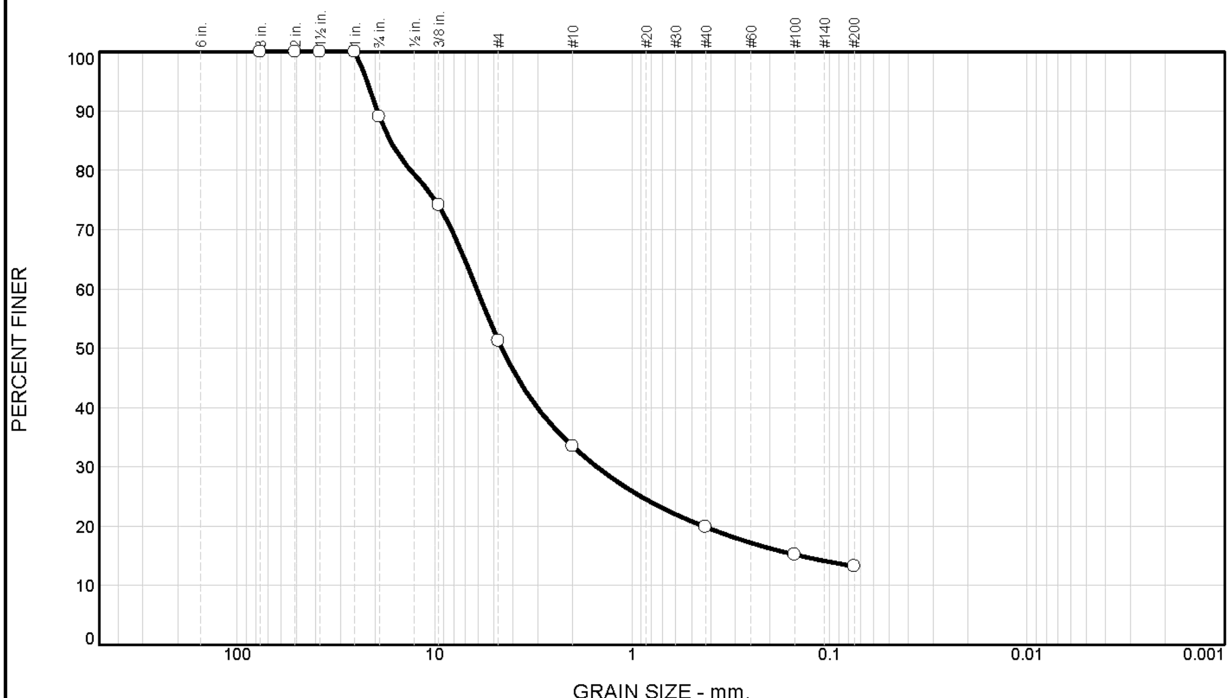
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	11	38	18	13	7	13	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1	100		
3/4 in	89		
3/8 in	74		
#4	51		
#10	33		
#40	20		
#100	15		
#200	13		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-a

Coefficients

D_{85}= 16.8192 D_{60}= 6.1207 D_{50}= 4.5662
D_{30}= 1.5105 D_{15}= 0.1427 D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

Remarks

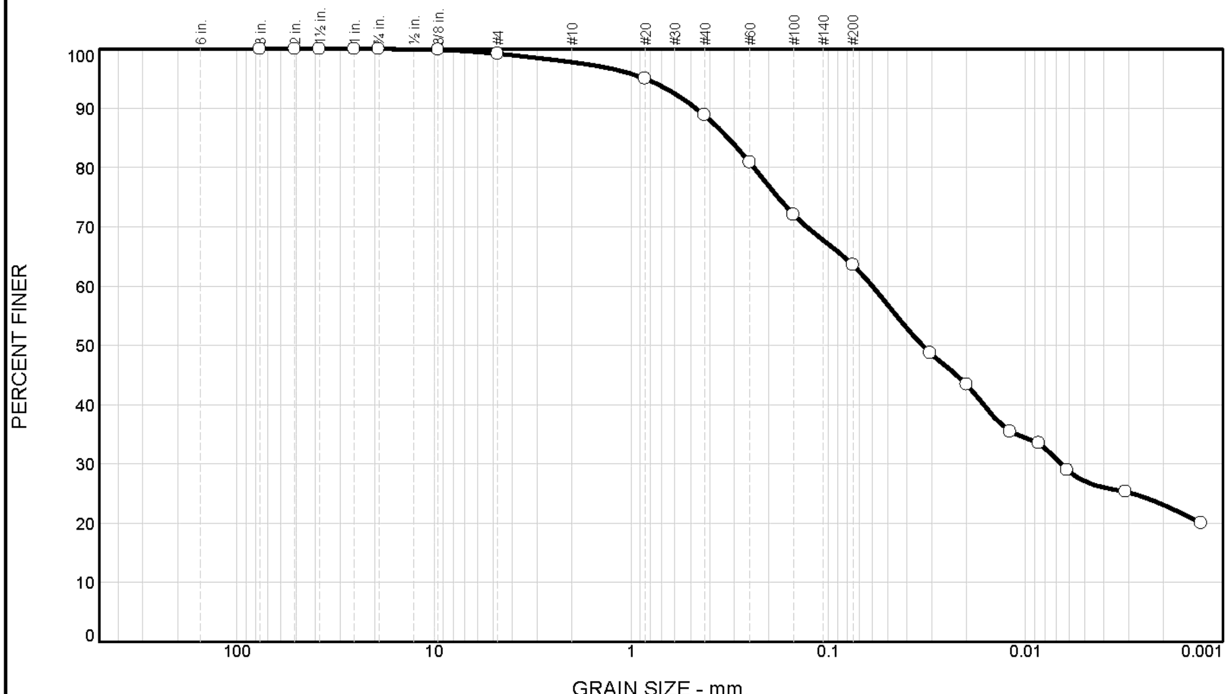
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 6-7-12
Location: Riverside Rd Ames, IA **Elev./Depth:** 11" to 17"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ______________ **Checked By:** ______________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	1	9	25	41	23

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	99		
# 10	98		
#20	95		
#40	89		
#60	81		
#100	72		
#200	64		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 24 LL= 37 PI= 13

Classification

USCS= CL AASHTO= A-6(7)

Coefficients

D_{85}= 0.3221 D_{60}= 0.0599 D_{50}= 0.0335
D_{30}= 0.0066 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

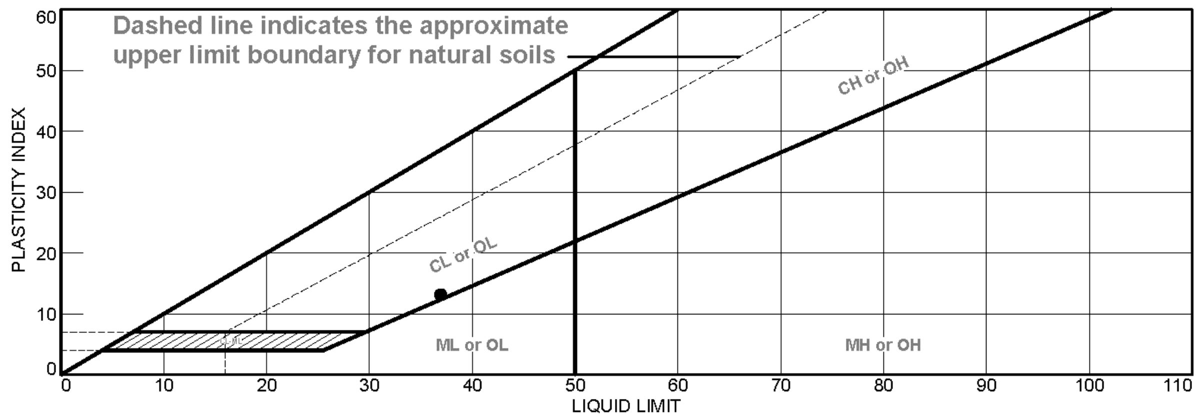
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 6-21-12
Location: E23, Story County **Elev./Depth:** 6.75"-11"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	37	24	13	89	64	CL

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** E23, Story County **Depth:** 6.75"-11" **Sample Number:** C1

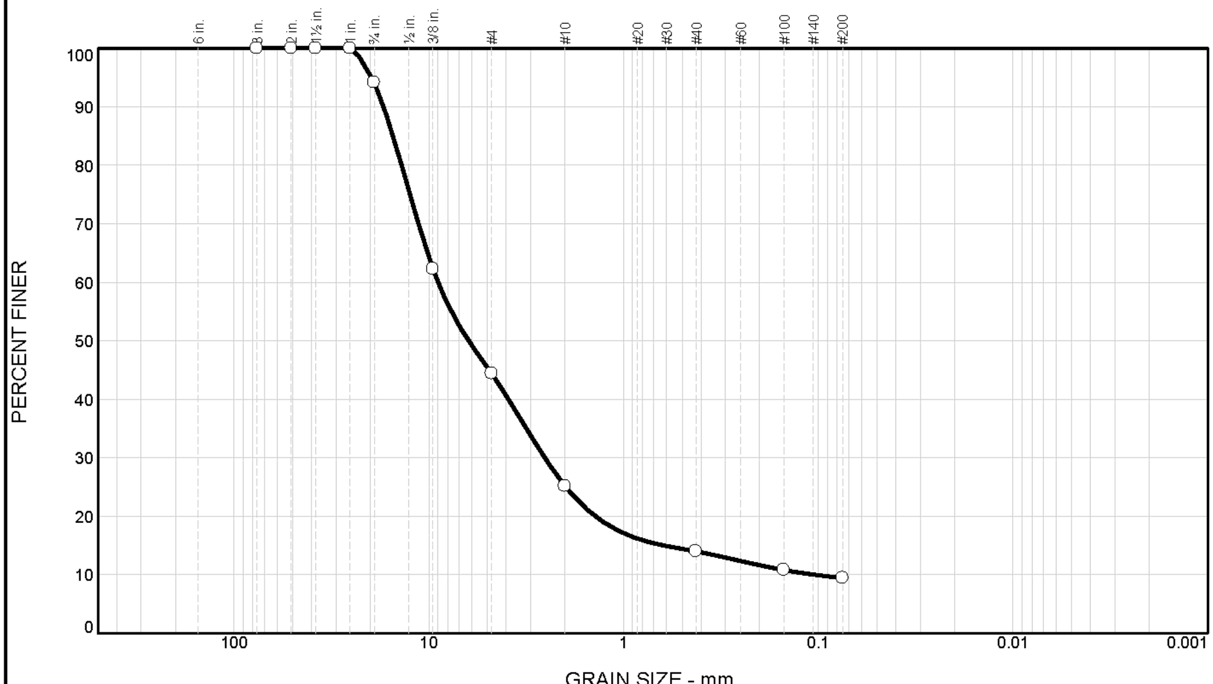
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	6	50	19	11	5	9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	94		
3/8 in	62		
# 4	44		
# 10	25		
# 40	14		
# 100	11		
# 200	9.4		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GP-GM AASHTO= A-1-a

Coefficients

D_{85}= 15.2545 D_{60}= 8.9820 D_{50}= 6.2513
D_{30}= 2.5415 D_{15}= 0.6290 D_{10}= 0.1062
C_u= 84.61 C_c= 6.77

Date Tested: **Tested By:**

Remarks

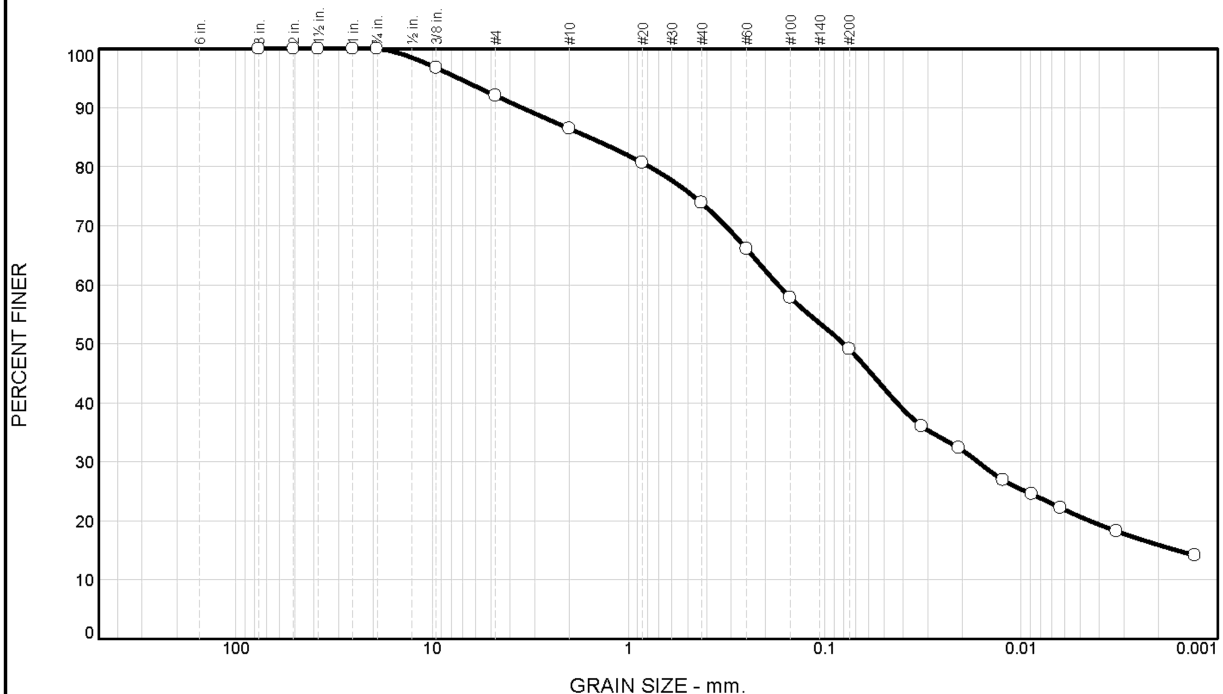
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:**
Location: SW West Lawn Dr Ankeny, IA **Elev./Depth:**
Checked By: **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	8	6	12	25	33	16

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	97		
# 4	92		
# 10	86		
#20	81		
#40	74		
#60	66		
#100	58		
#200	49		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 15 LL= 29 PI= 14

Classification

USCS= SC AASHTO= A-6(3)

Coefficients

D_{85}= 1.5866 D_{60}= 0.1736 D_{50}= 0.0802
D_{30}= 0.0166 D_{15}= 0.0016 D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

Remarks

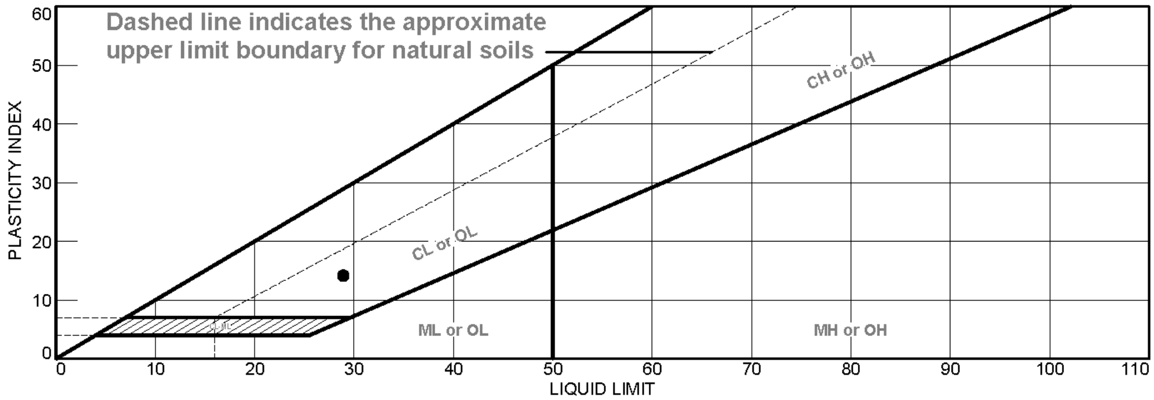
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-19-12
Location: SW Westlawn, Ankeny **Elev./Depth:**
Checked By: PV **Title:**

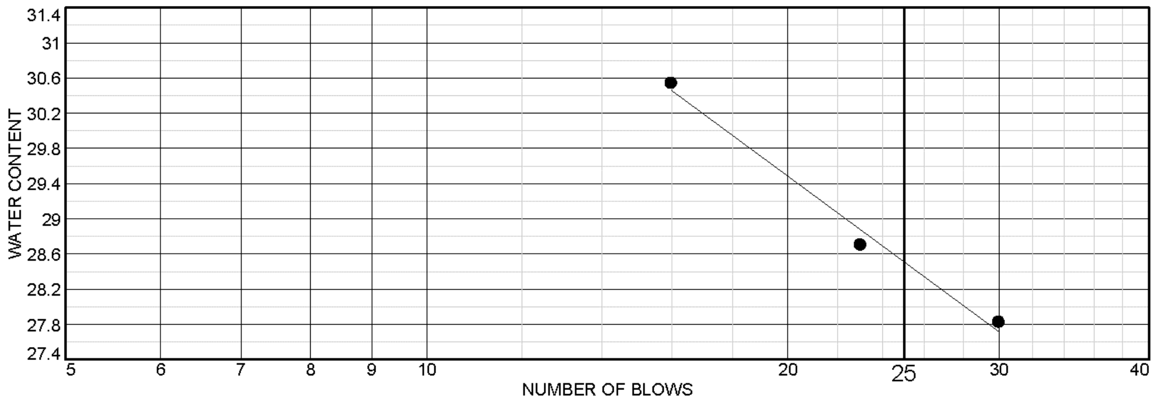
Iowa State University
Civil, Construction and Environmental
Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ______________________ **Checked By:** ______________________

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	29	15	14	74	49	SC

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** SW Westlawn, Ankeny **Sample Number:** C1

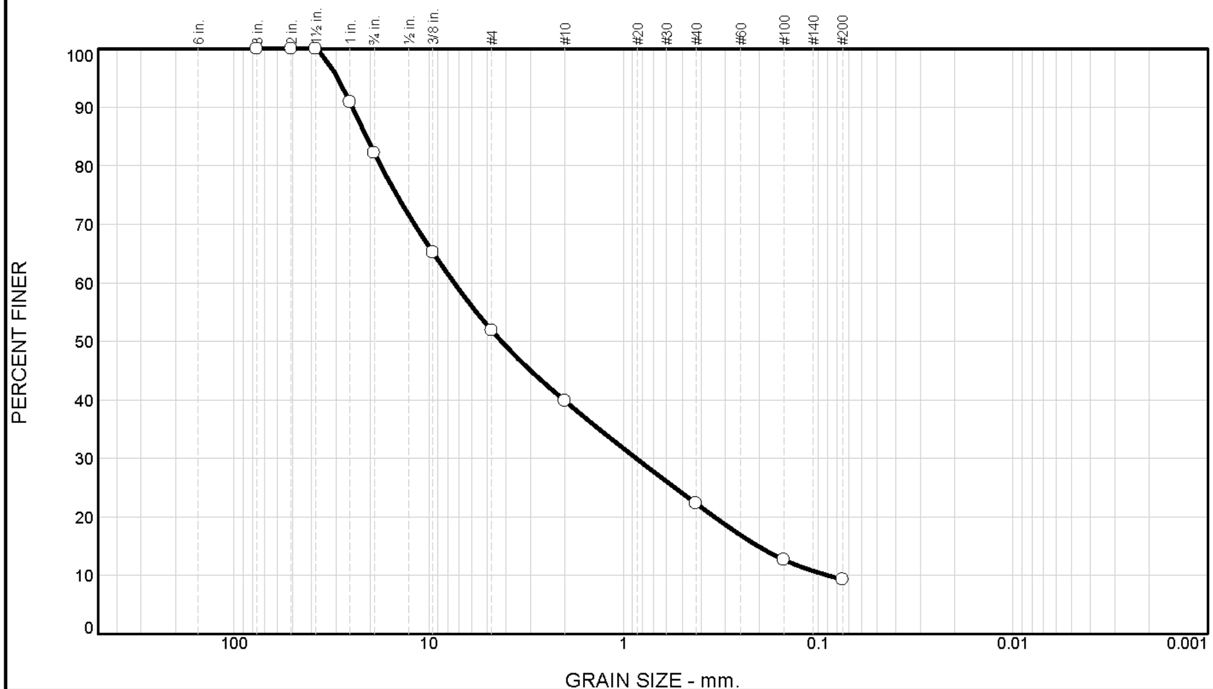
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	18	30	12	18	13	9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	91		
3/4 in	82		
3/8 in	65		
# 4	52		
# 10	40		
# 40	22		
# 100	13		
# 200	9.3		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GW-GM AASHTO= A-1-a

Coefficients

D_{85}= 20.9450 D_{60}= 7.4111 D_{50}= 4.2398
D_{30}= 0.8616 D_{15}= 0.2043 D_{10}= 0.0901
C_u= 82.26 C_c= 1.11

Date Tested: 2-5-13 **Tested By:** LK

Remarks

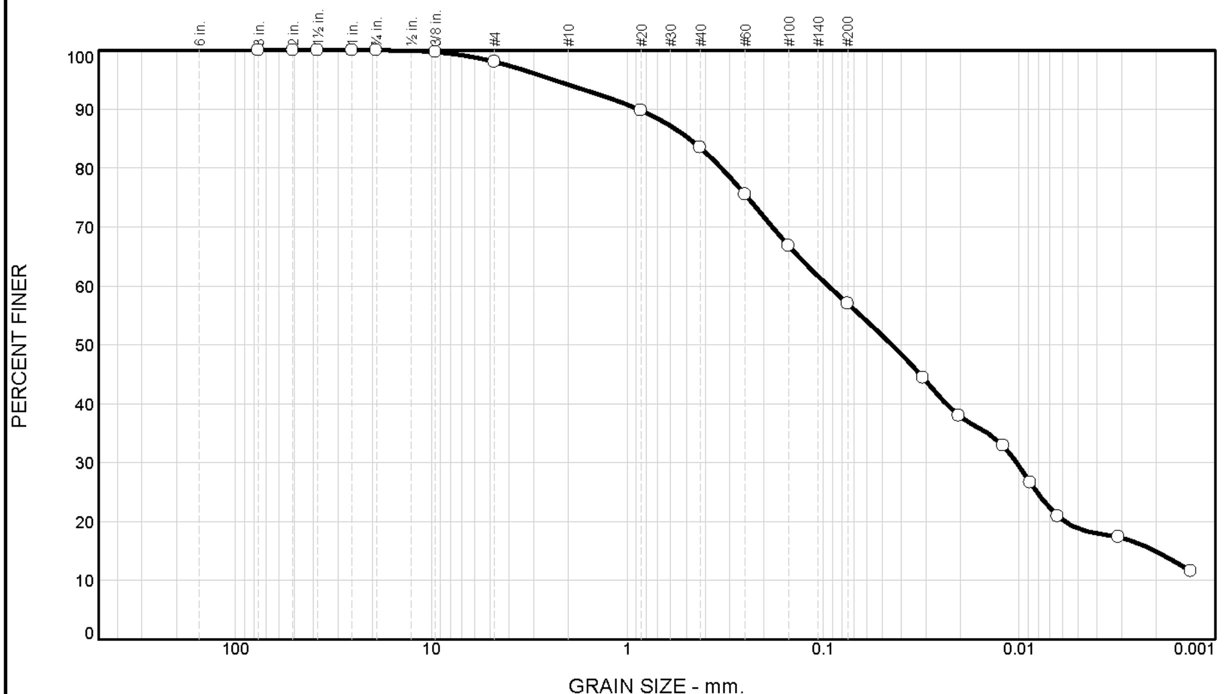
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-19-12
Location: SW Logan St Ankeny, IA **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	2	4	11	26	42	15

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	98		
#10	94		
#20	90		
#40	83		
#60	76		
#100	67		
#200	57		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 25 LL= 30 PI= 5

Classification

USCS= ML AASHTO= A-4(1)

Coefficients

D_{85}= 0.4830 D_{60}= 0.0943 D_{50}= 0.0446
D_{30}= 0.0103 D_{15}= 0.0020 D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

Remarks

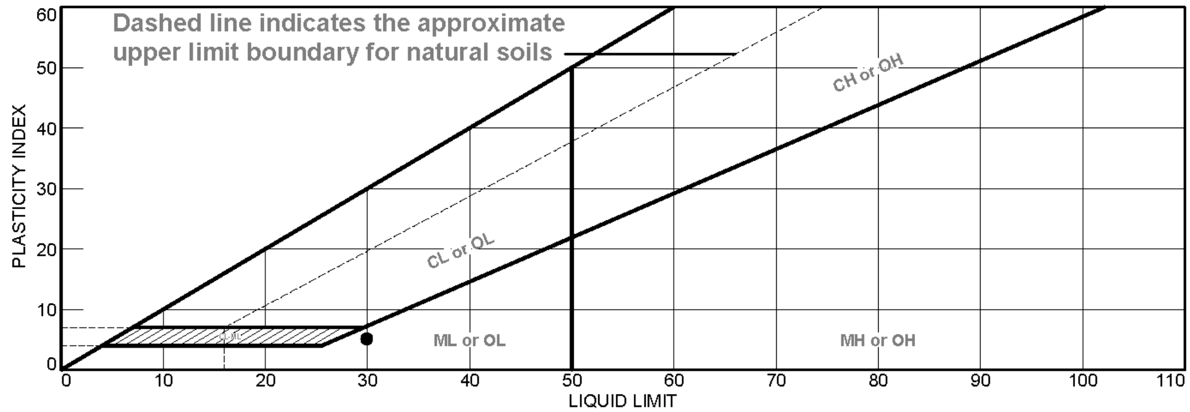
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-19-12
Location: SW Logan, Ankeny **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ______________ **Checked By:** ______________

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	30	25	5	83	57	ML

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** SW Logan, Ankeny **Sample Number:** C1

Remarks:

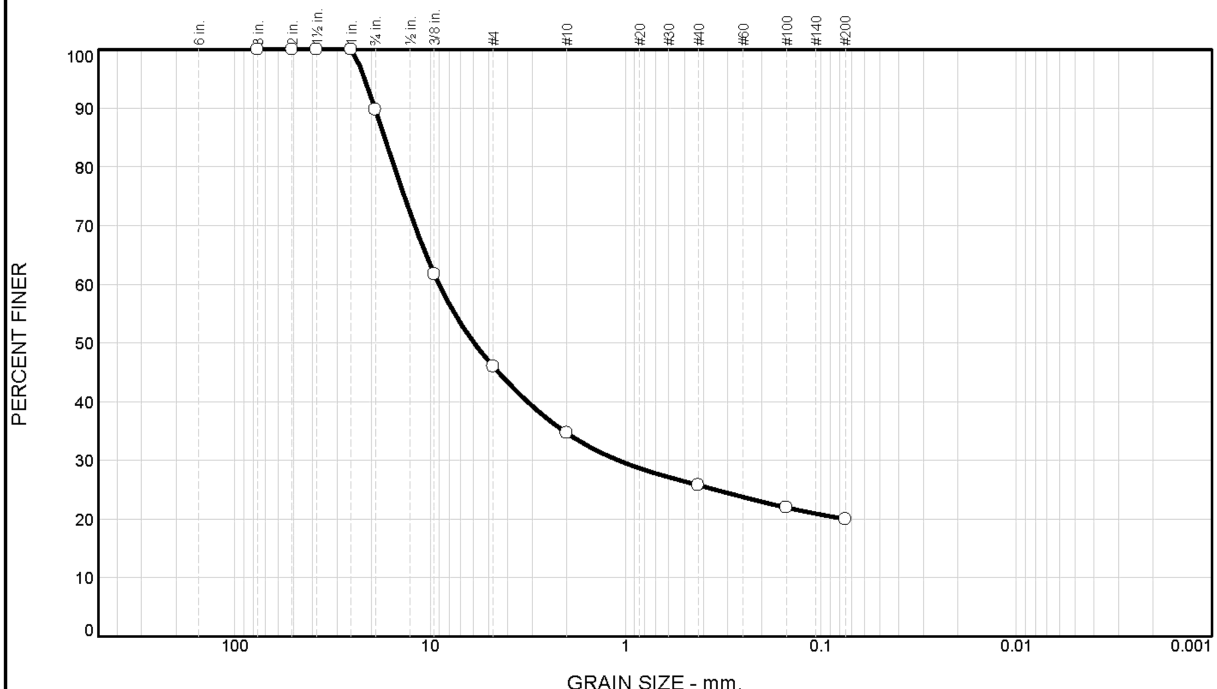
Iowa State University

Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	10	44	11	9	6	20	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	90		
3/8 in	62		
# 4	46		
# 10	35		
# 40	26		
# 100	22		
# 200	20		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 17.1062 D_{60}= 9.0175 D_{50}= 5.9633
D_{30}= 1.0932 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

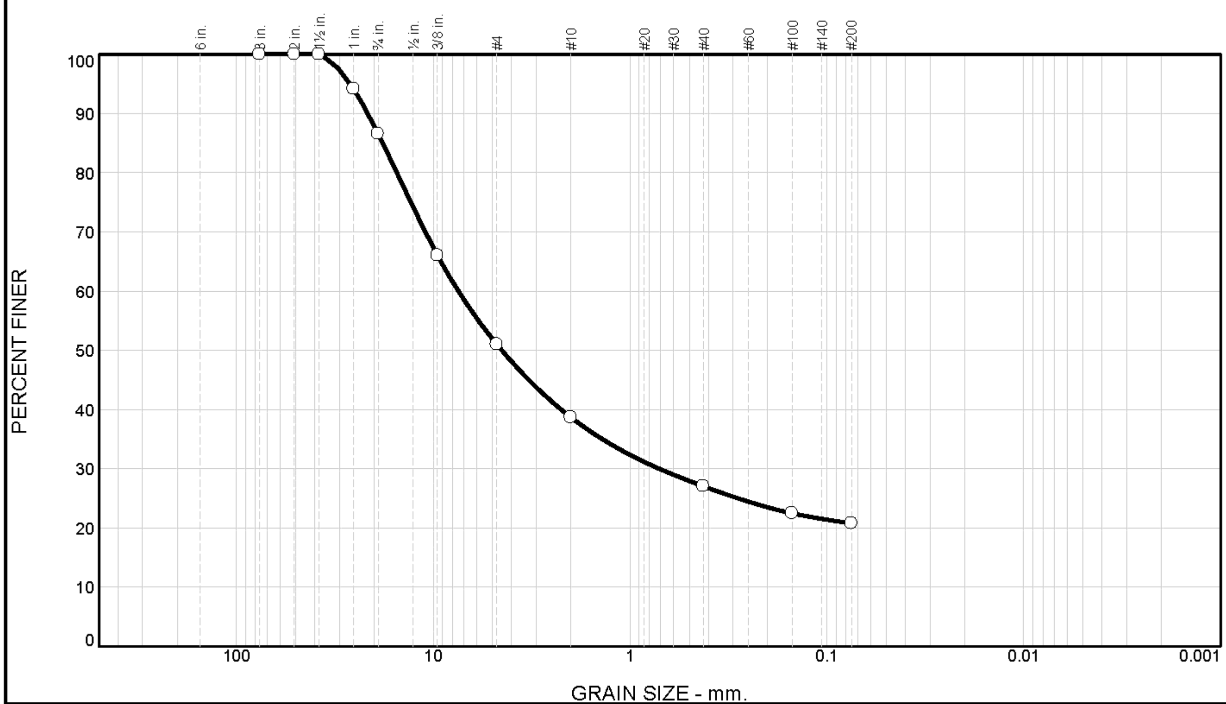
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-12-12
Location: West Main St, Knoxville **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	13	36	12	12	6	21	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	94		
3/4 in	87		
3/8 in	66		
# 4	51		
# 10	39		
# 40	27		
# 100	22		
# 200	21		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 18.0638 D_{60}= 7.4654 D_{50}= 4.4897
D_{30}= 0.7141 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

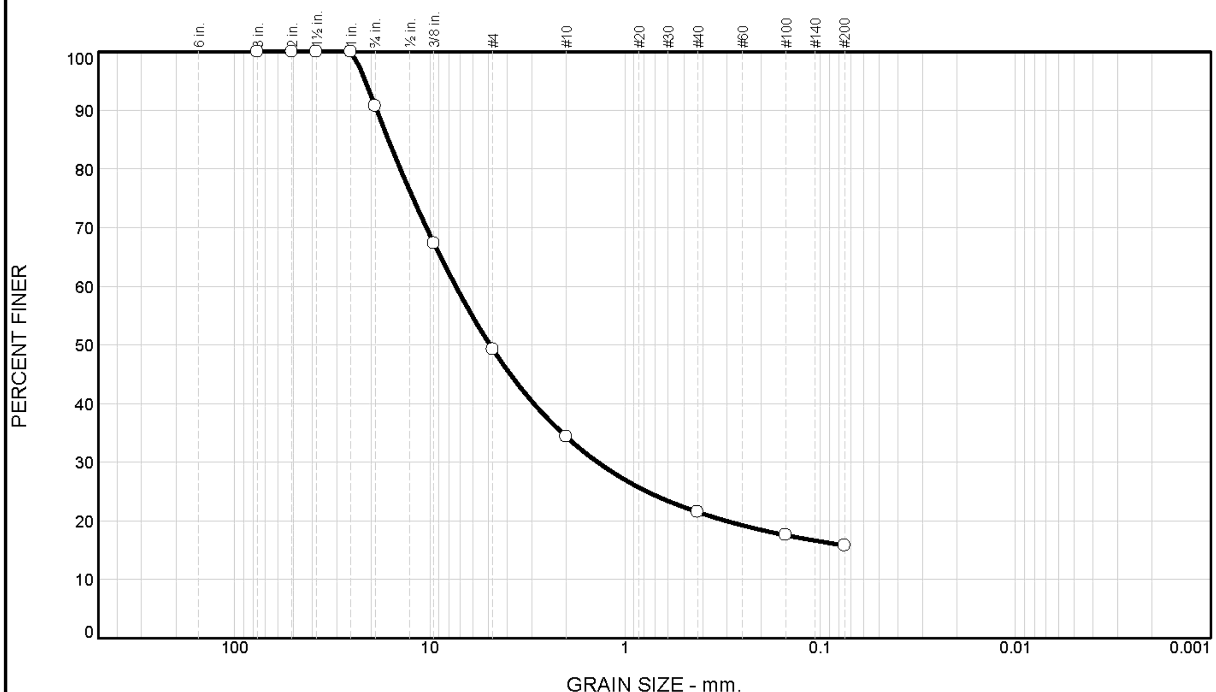
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-12-12
Location: South 5th St, Knoxville **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	42	15	13	5	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	91		
3/8 in	67		
# 4	49		
# 10	34		
# 40	21		
# 100	18		
# 200	16		

* (no specification provided)

Material Description

Crushed Limestone

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 16.3148 D_{60}= 7.3655 D_{50}= 4.9199
D_{30}= 1.3838 D_{15}= D_{10}=
C_u= C_c=

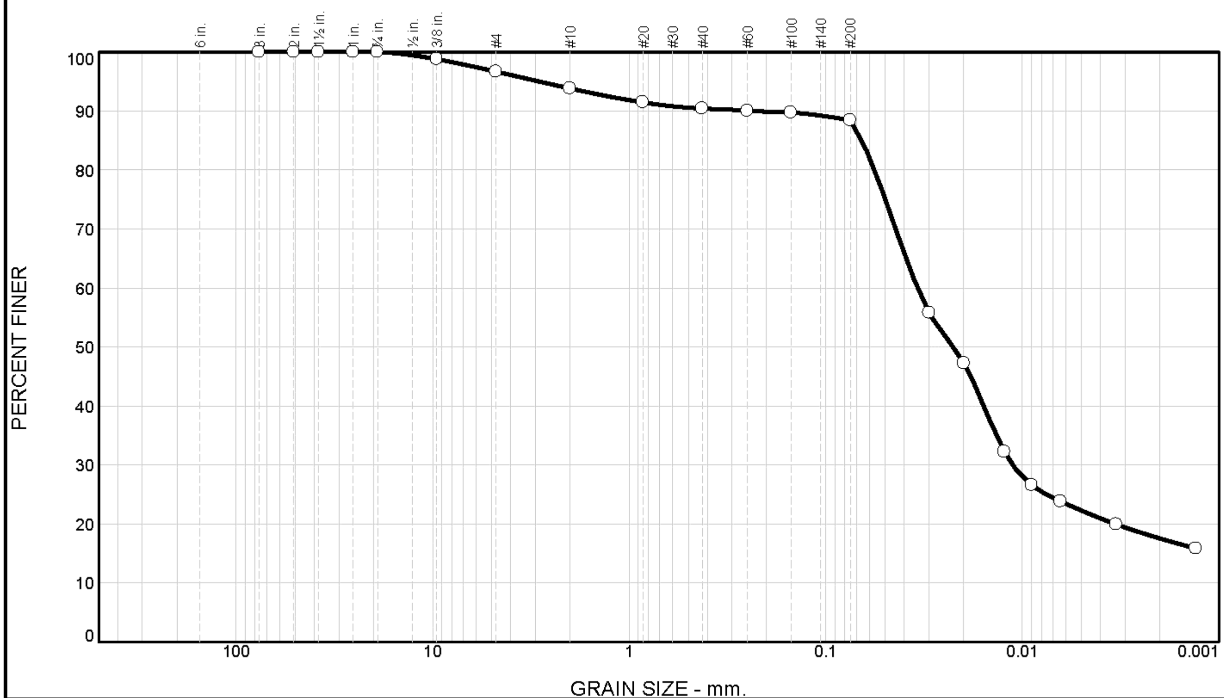
Date Tested: 2-5-13 **Tested By:** LK

Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-26-12
Location: Valley View Dr Council Bluffs, IA **Elev./Depth:** 9"-15"
Checked By: PV **Title:**

Iowa State University **Civil, Construction and Environmental Engineering Department**	**Client:** Iowa DOT **Project:** TR 640 **Project No:** **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	3	4	2	70	18

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	99		
# 4	97		
# 10	94		
#20	91		
#40	90		
#60	90		
#100	90		
#200	88		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 23 LL= 36 PI= 13

Classification

USCS= CL AASHTO= A-6(12)

Coefficients

D_{85}= 0.0654 D_{60}= 0.0342 D_{50}= 0.0224
D_{30}= 0.0112 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

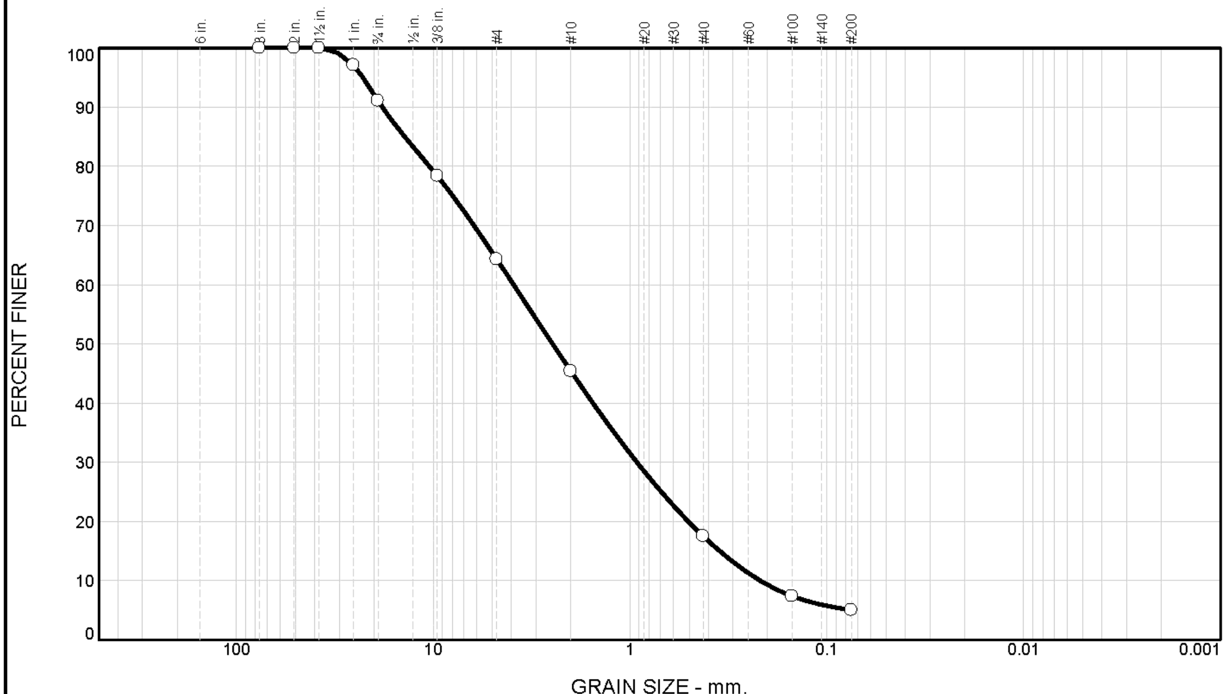
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-26-12
Location: Valley View Drive, Council Bluffs **Elev./Depth:** 15"18"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	27	19	28	12	5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	97		
3/4 in	91		
3/8 in	78		
# 4	64		
# 10	45		
# 40	17		
# 100	7		
# 200	5.0		

* (no specification provided)

Material Description

Recycled PCC Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= SP-SM AASHTO= A-1-a

Coefficients

D_{85}= 13.9522 D_{60}= 3.9040 D_{50}= 2.4759
D_{30}= 0.9231 D_{15}= 0.3513 D_{10}= 0.2187
C_u= 17.85 C_c= 1.00

Date Tested: 2-5-13 **Tested By:** LK

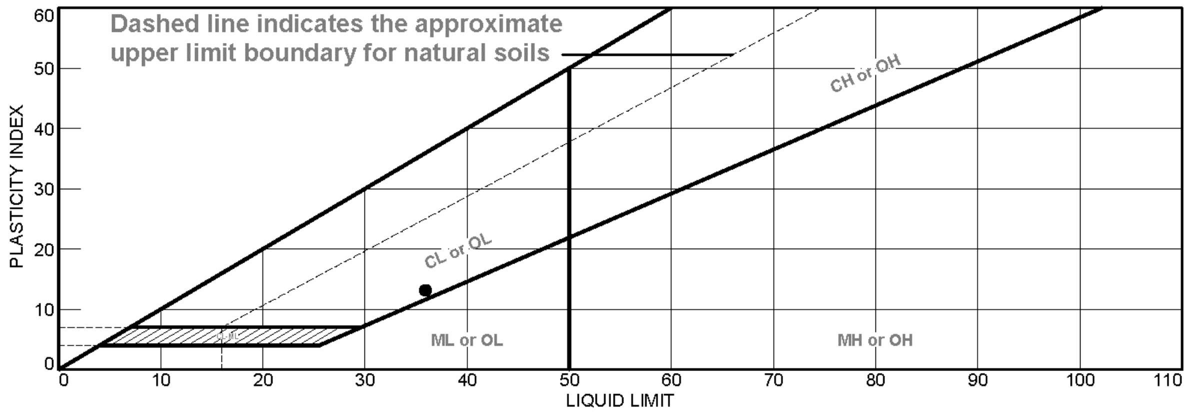
Remarks

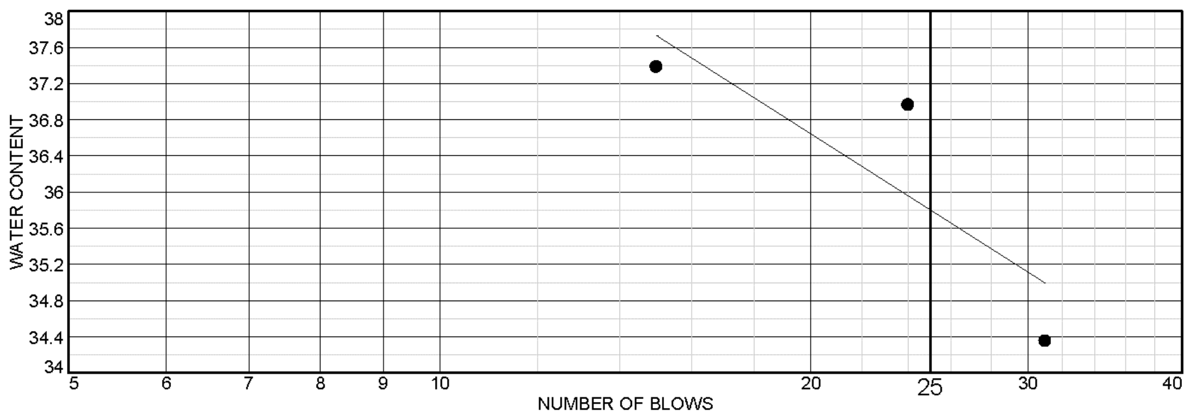
Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 7-26-12
Location: Valley View Dr Council Bluffs, IA **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	36	23	13	90	88	CL

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** Valley View Drive, Council Bluffs **Depth:** 15"18" **Sample No.:** C1

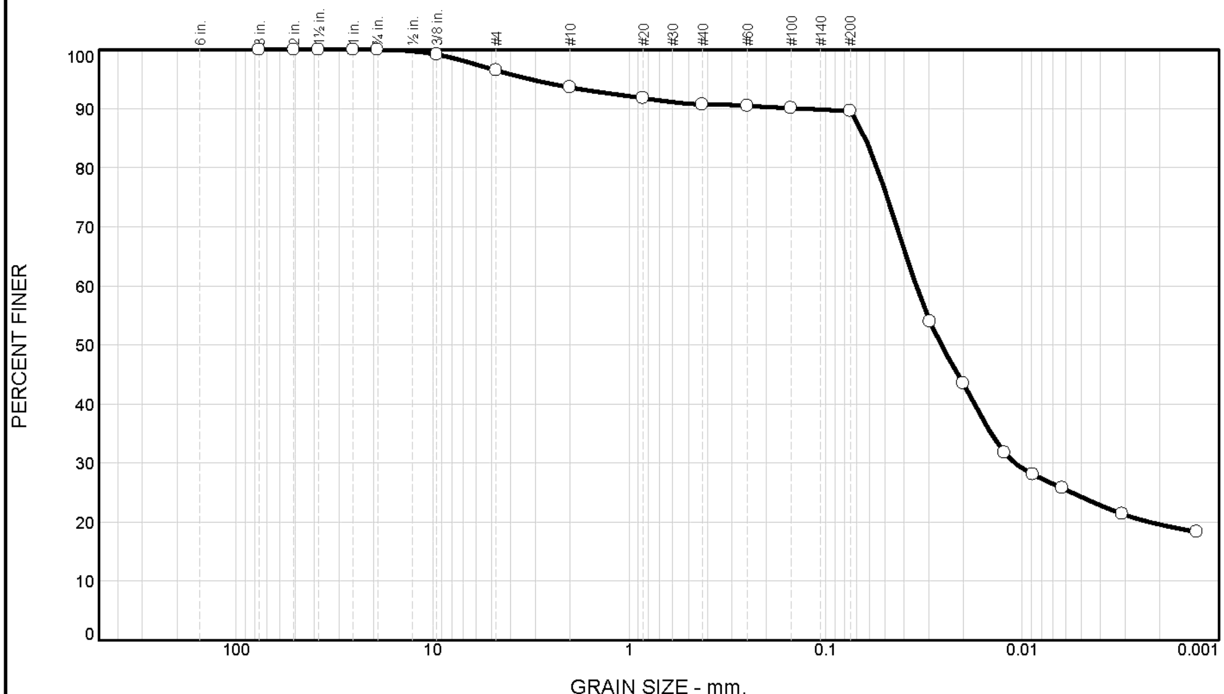
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	2	3	1	70	20

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	99		
# 4	96		
# 10	94		
#20	92		
#40	91		
#60	90		
#100	90		
#200	90		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 25 LL= 34 PI= 9

Classification

USCS= ML AASHTO= A-4(9)

Coefficients

D_{85}= 0.0629 D_{60}= 0.0346 D_{50}= 0.0259
D_{30}= 0.0110 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

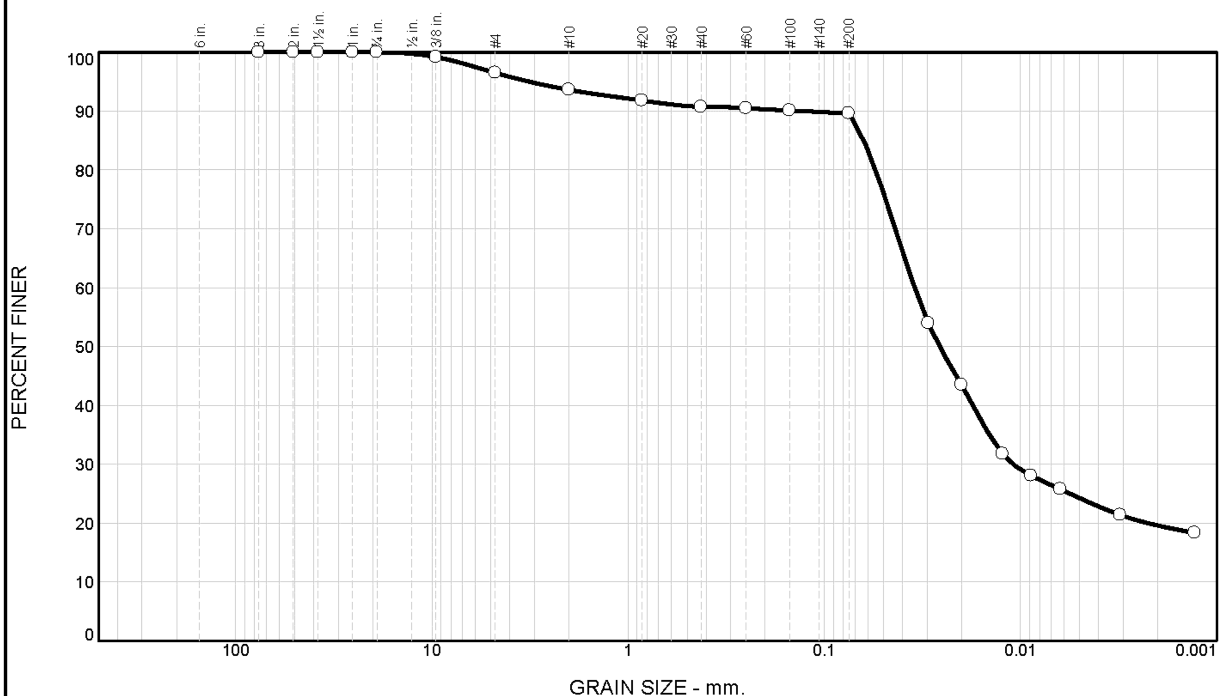
Remarks

Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 7-26-12
Location: Valley View Drive, Council Bluffs **Elev./Depth:** 16"-26"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental
Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	2	3	1	70	20

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	99		
# 4	96		
# 10	94		
#20	92		
#40	91		
#60	90		
#100	90		
#200	90		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 25 LL= 34 PI= 9

Classification

USCS= ML AASHTO= A-4(9)

Coefficients

D_{85}= 0.0629 D_{60}= 0.0346 D_{50}= 0.0259
D_{30}= 0.0110 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-16-13 **Tested By:** LK

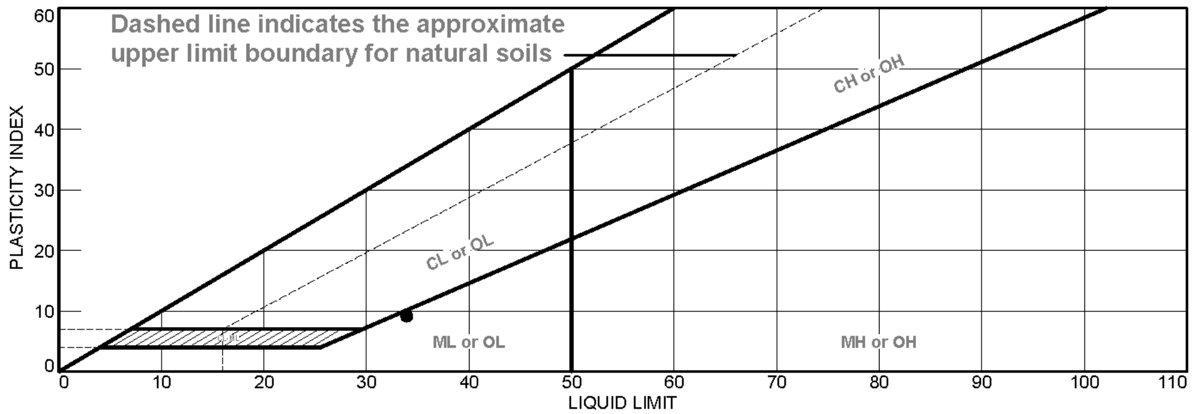
Remarks

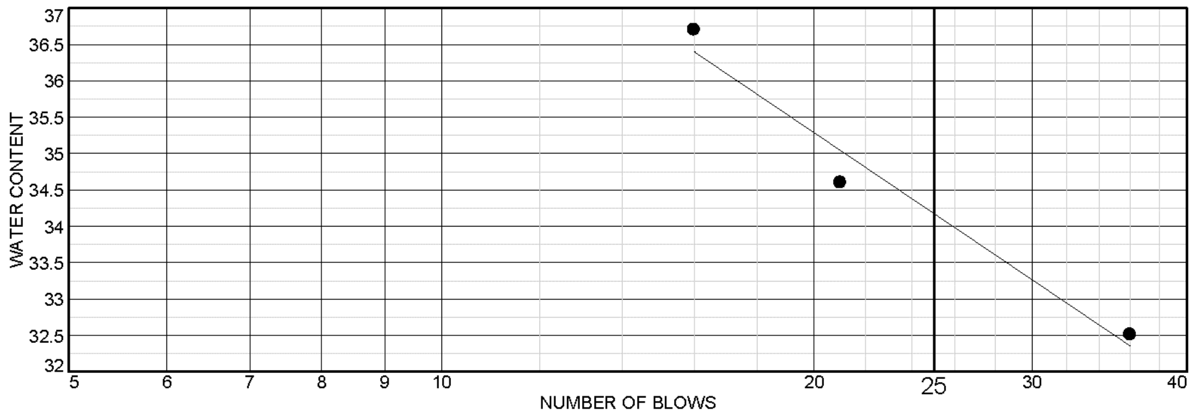
Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 7-26-12
Location: Valley View Drive, Council Bluffs **Elev./Depth:** 16"-26"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	34	25	9	91	90	ML

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** Valley View Drive, Council Bluffs **Depth:** 16"-26" **Sample No.:** C2

Remarks:

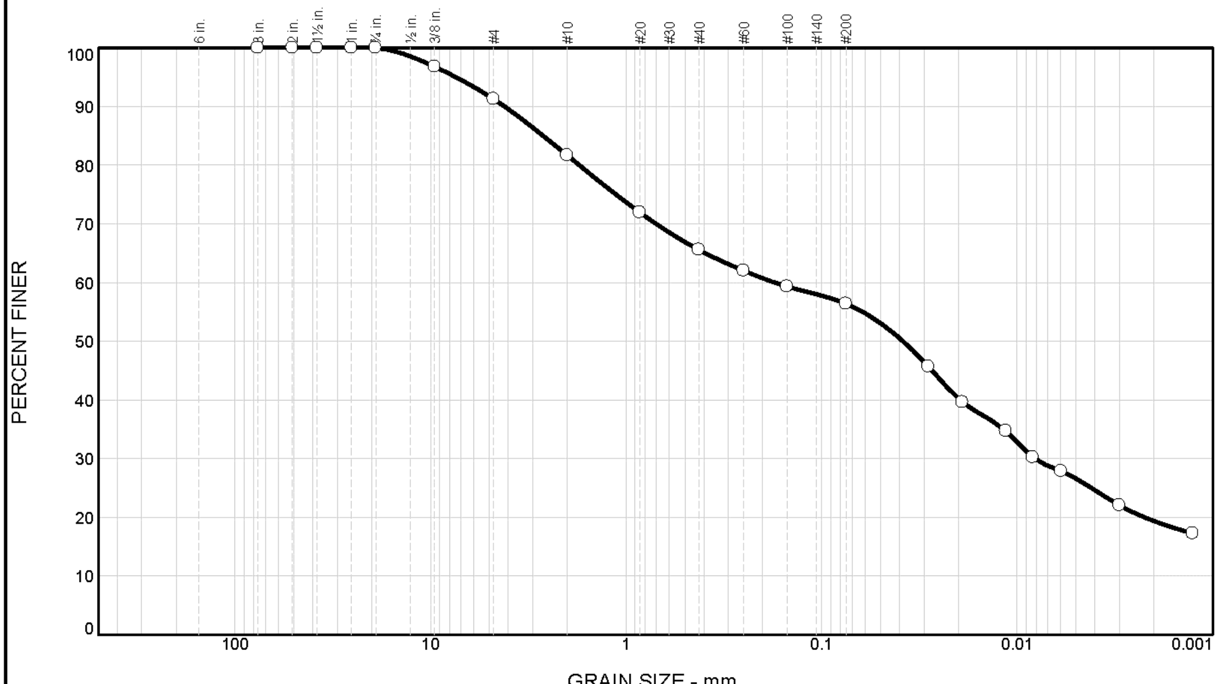
Iowa State University

Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	9	9	16	10	37	19

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	97		
# 4	91		
# 10	82		
#20	72		
#40	66		
#60	62		
#100	59		
#200	56		

* (no specification provided)

Material Description

Fly Ash Stabilized Subgrade

Atterberg Limits (ASTM D 4318)

PL= 36 LL= 45 PI= 9

Classification

USCS= ML AASHTO= A-5(4)

Coefficients

D_{85}= 2.6504 D_{60}= 0.1746 D_{50}= 0.0383
D_{30}= 0.0082 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-21-13 **Tested By:** LK

Remarks

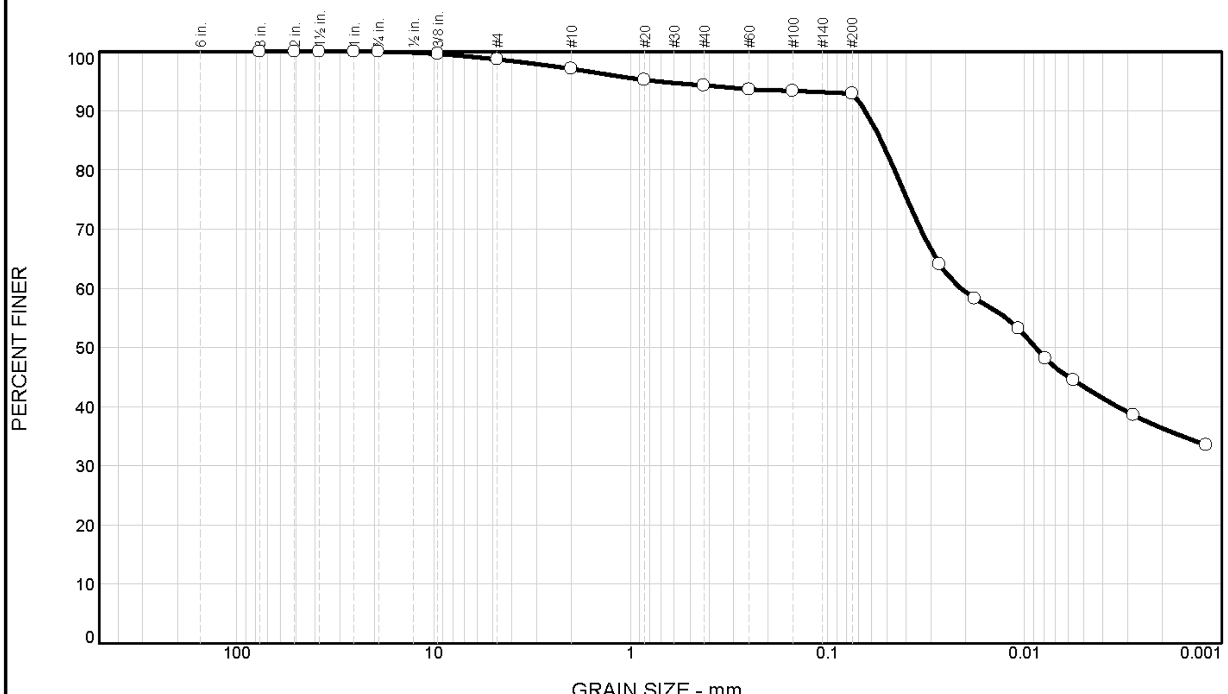
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-26-12
Location: 9th Avenue, Council Bluffs **Elev./Depth:** 8"-17"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	2	3	1	57	36

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	99		
# 10	97		
#20	95		
#40	94		
#60	94		
#100	93		
#200	93		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 30 LL= 68 PI= 38

Classification

USCS= CH AASHTO= A-7-5(42)

Coefficients

D_{85}= 0.0535 D_{60}= 0.0212 D_{50}= 0.0088
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-21-13 **Tested By:** LK

Remarks

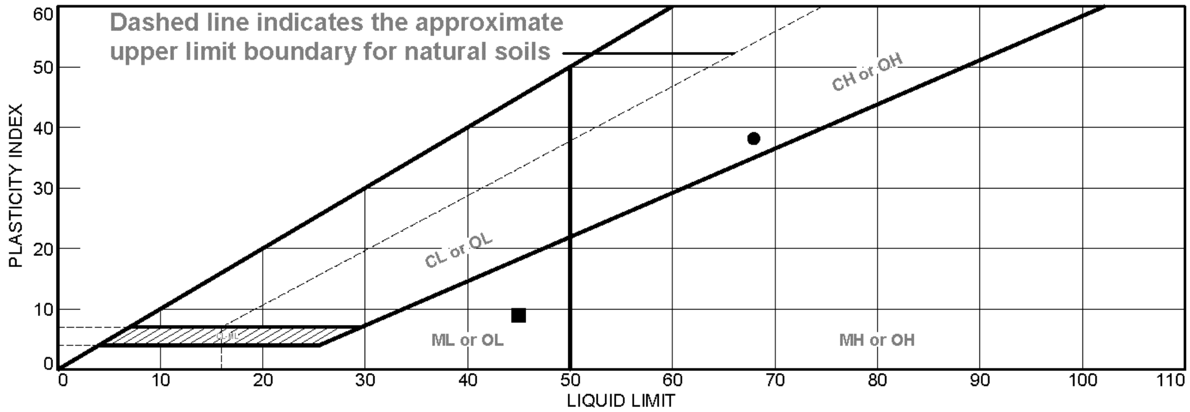
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 7-26-12
Location: 9th Avenue, Council Bluffs **Elev./Depth:** 17"-27"
Checked By: PV **Title:**

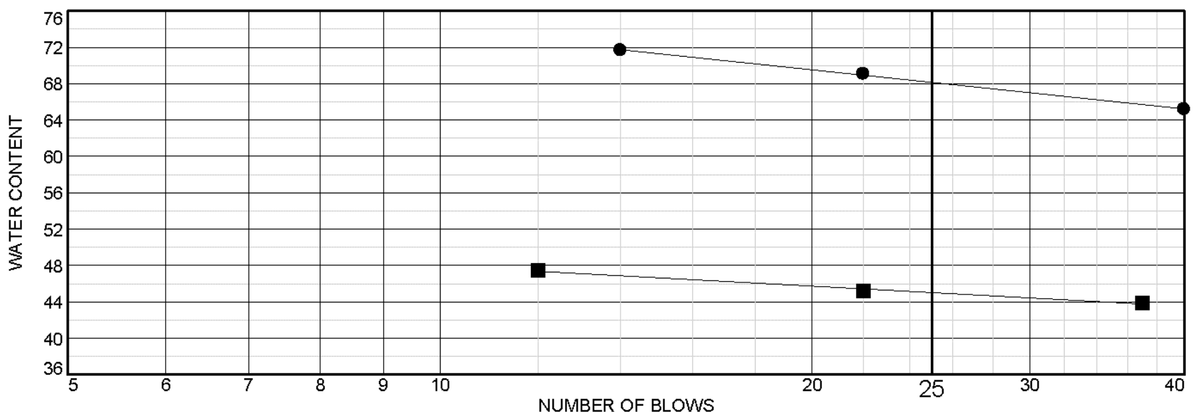
Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ______________________ **Checked By:** ______________________

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	68	30	38	94	93	CH
■	Fly Ash Stabilized Subgrade	45	36	9	66	56	ML

Project No. **Client:** Iowa DOT

Project: TR 640

●**Location:** 9th Avenue, Council Bluffs **Depth:** 17"-27" **Sample Number:** C1

■**Location:** 9th Avenue, Council Bluffs **Depth:** 8"-17" **Sample Number:** C1

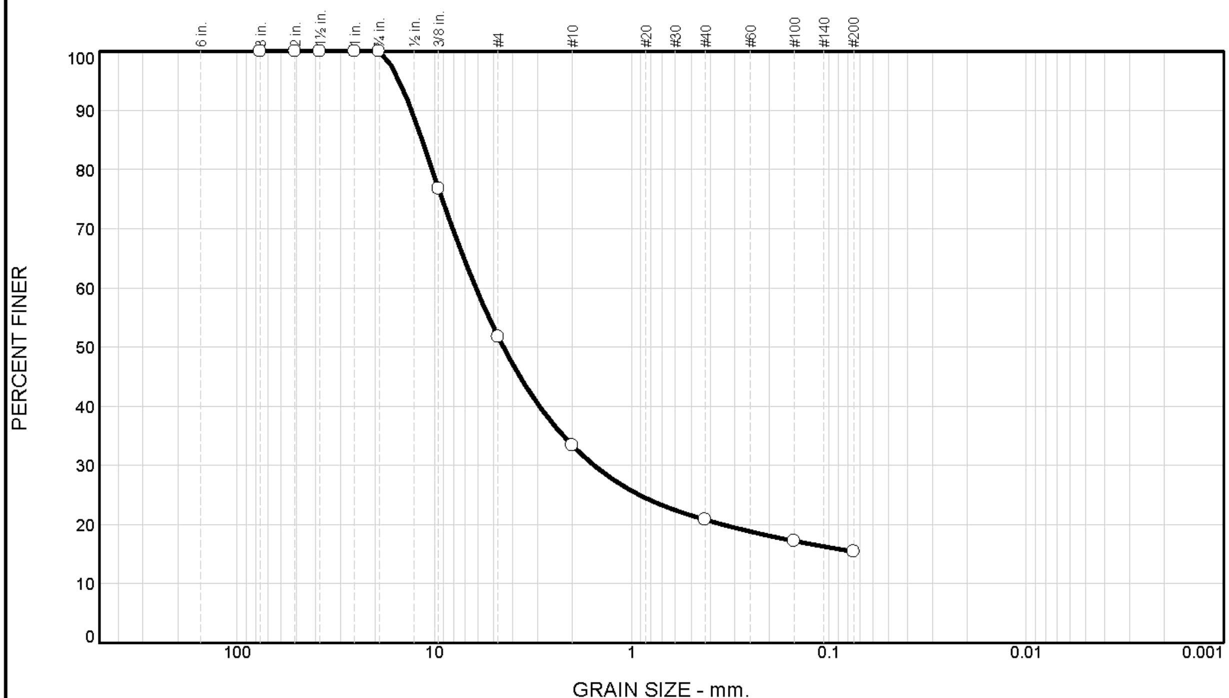
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	48	19	12	6	15	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	77		
# 4	52		
# 10	33		
# 40	21		
# 100	17		
# 200	15		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-a

Coefficients

D_{85}= 11.5358 D_{60}= 6.1654 D_{50}= 4.4722
D_{30}= 1.5547 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

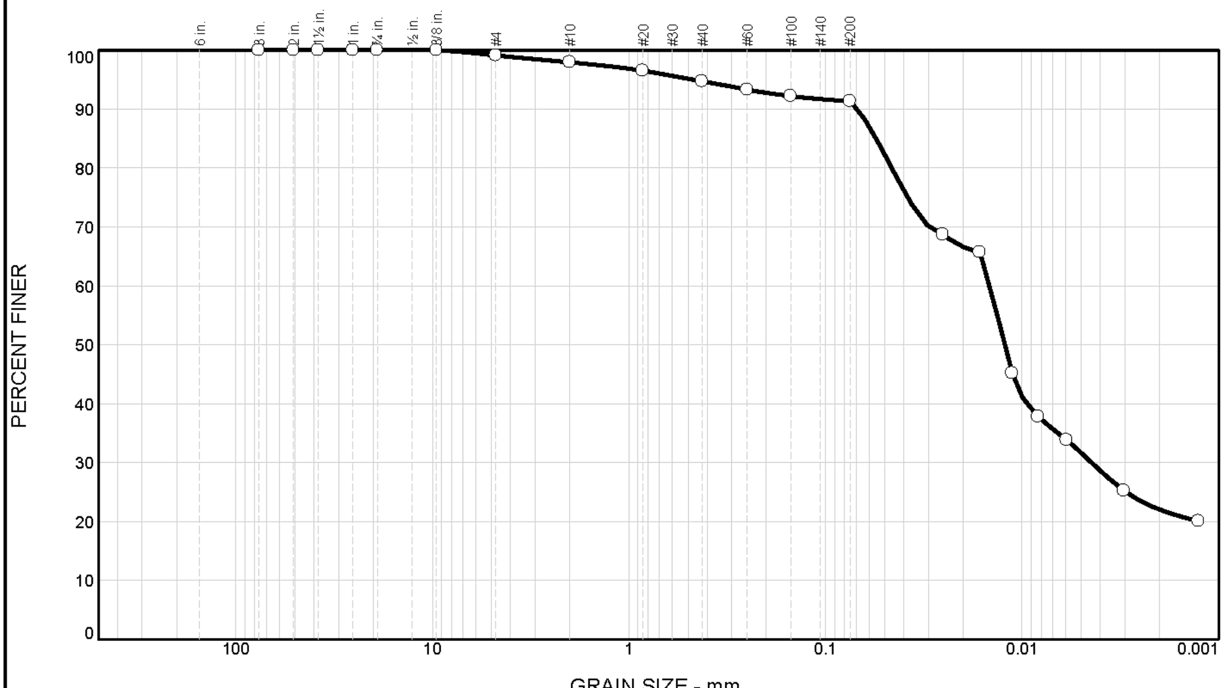
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8/2/12
Location: Cliff Rd Burlington, IA Site A **Elev./Depth:** 6"-11.5"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	1	3	4	69	22

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	99		
# 10	98		
#20	97		
#40	95		
#60	93		
#100	92		
#200	91		

* (no specification provided)

Material Description

Subbgrade

Atterberg Limits (ASTM D 4318)

PL= 25 LL= 35 PI= 10

Classification

USCS= ML AASHTO= A-4(10)

Coefficients

D_{85}= 0.0552 D_{60}= 0.0146 D_{50}= 0.0123
D_{30}= 0.0044 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-21-13 **Tested By:** LK

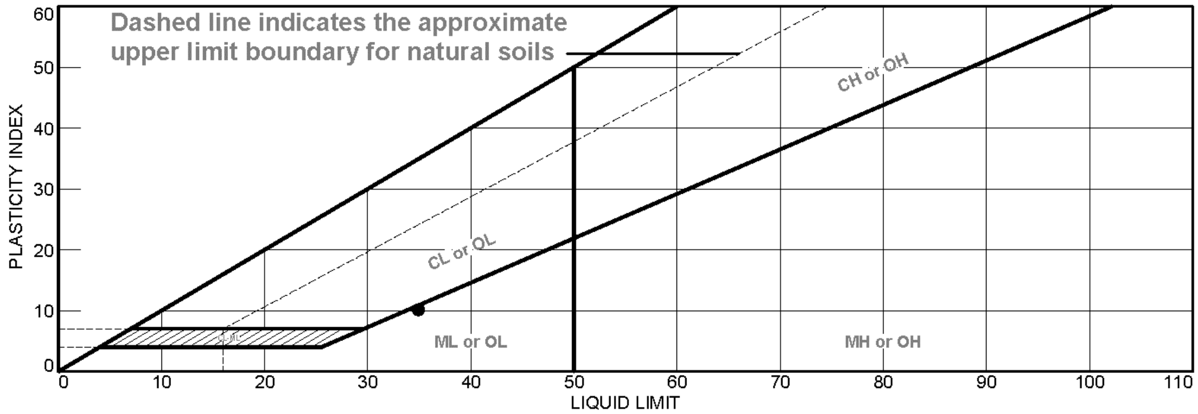
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8/2/12
Location: Cliff Road Site A, Burlington **Elev./Depth:** 11.5"-20"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subbgrade	35	25	10	95	91	ML

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** Cliff Road Site A, Burlington **Depth:** 11.5"-20" **Sample No.:** C1

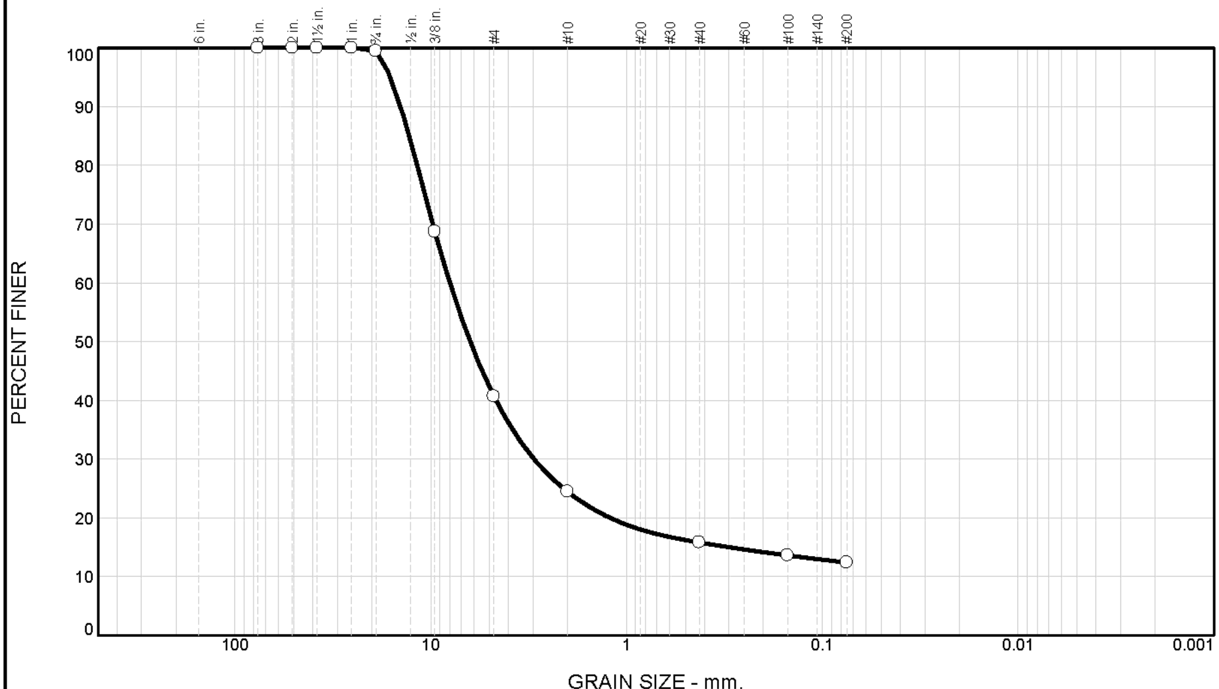
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: Lk **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	58	17	8	4	12	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	99		
3/8 in	69		
# 4	41		
# 10	24		
# 40	16		
# 100	14		
# 200	12		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GP-GM AASHTO= A-1-a

Coefficients

D_{85}= 12.8602 D_{60}= 7.9831 D_{50}= 6.2877
D_{30}= 2.9744 D_{15}= 0.3031 D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

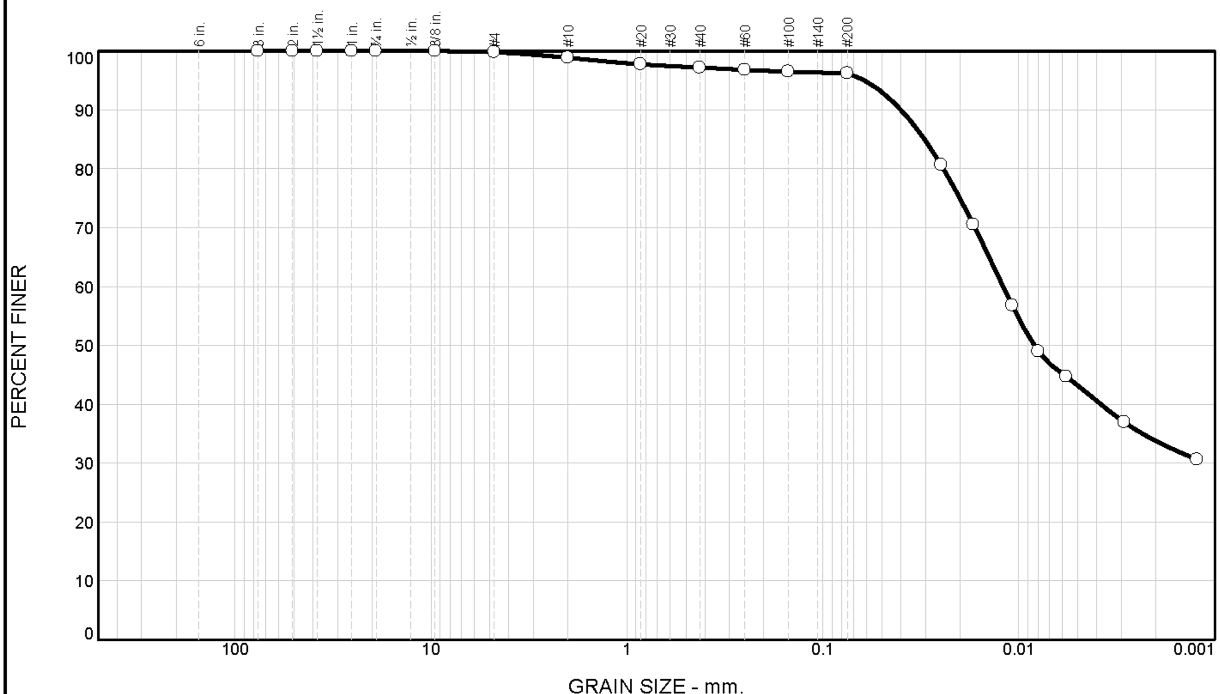
Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-2-12
Location: Cliff Road Site B, Burlington **Elev./Depth:** 8"-11.75"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	2	1	62	34

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	100		
# 10	99		
#20	98		
#40	97		
#60	97		
#100	97		
#200	96		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 24 LL= 52 PI= 28

Classification

USCS= CH AASHTO= A-7-6(30)

Coefficients

D_{85}= 0.0303 D_{60}= 0.0120 D_{50}= 0.0084
D_{30}= D_{15}= D_{10}=
C_u= C_c=

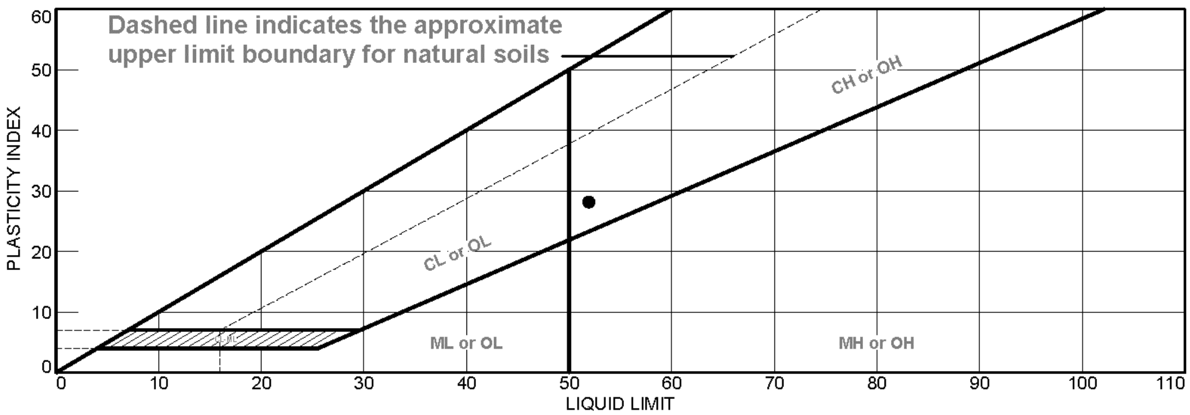
Date Tested: 2-21-13 **Tested By:** LK

Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-2-12
Location: Cliff Road Site B, Burlington **Elev./Depth:** 14.75"-24"
Checked By: PV **Title:**

Iowa State University Civil, Construction and Environmental Engineering Department	**Client:** Iowa DOT **Project:** TR 640 **Project No:** **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	52	24	28	97	96	CH

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** Cliff Road Site B, Burlington **Depth:** 14.75"-24" **Sample No.:** C1

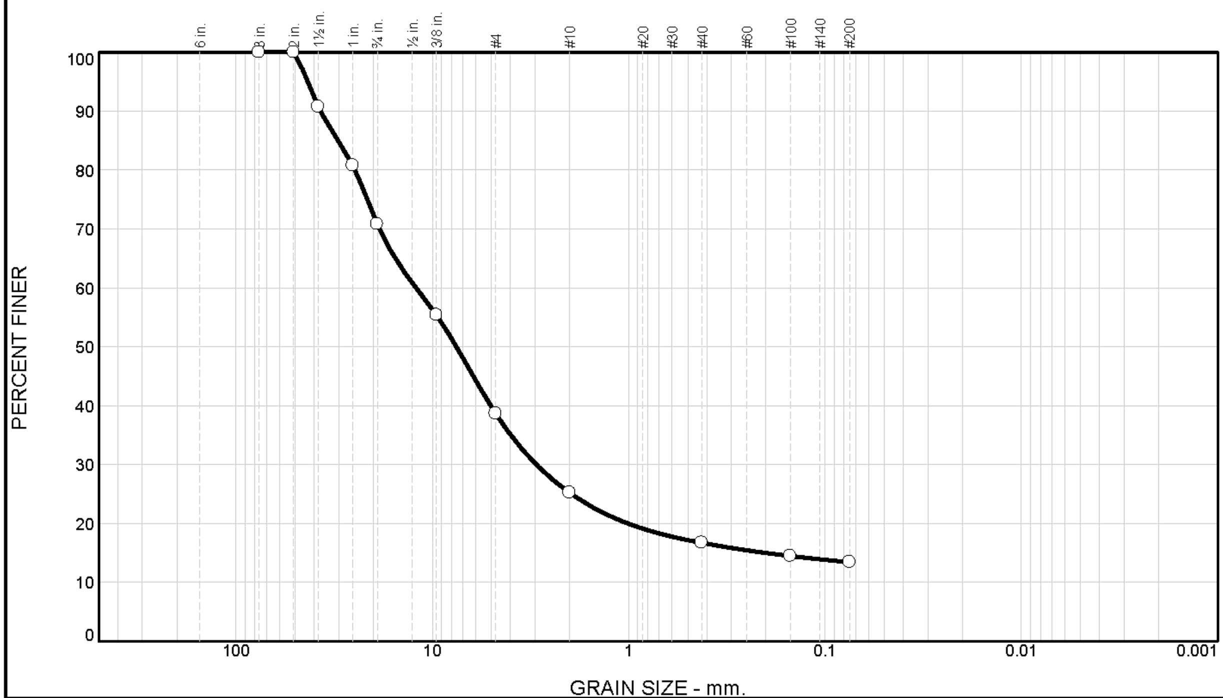
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	29	32	14	8	4	13	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	91		
1 in	81		
3/4 in	71		
3/8 in	55		
# 4	39		
# 10	25		
# 40	17		
# 100	14		
# 200	13		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-a

Coefficients

D_{85}= 30.1306 D_{60}= 12.1126 D_{50}= 7.5436
D_{30}= 2.9607 D_{15}= 0.2038 D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

Remarks

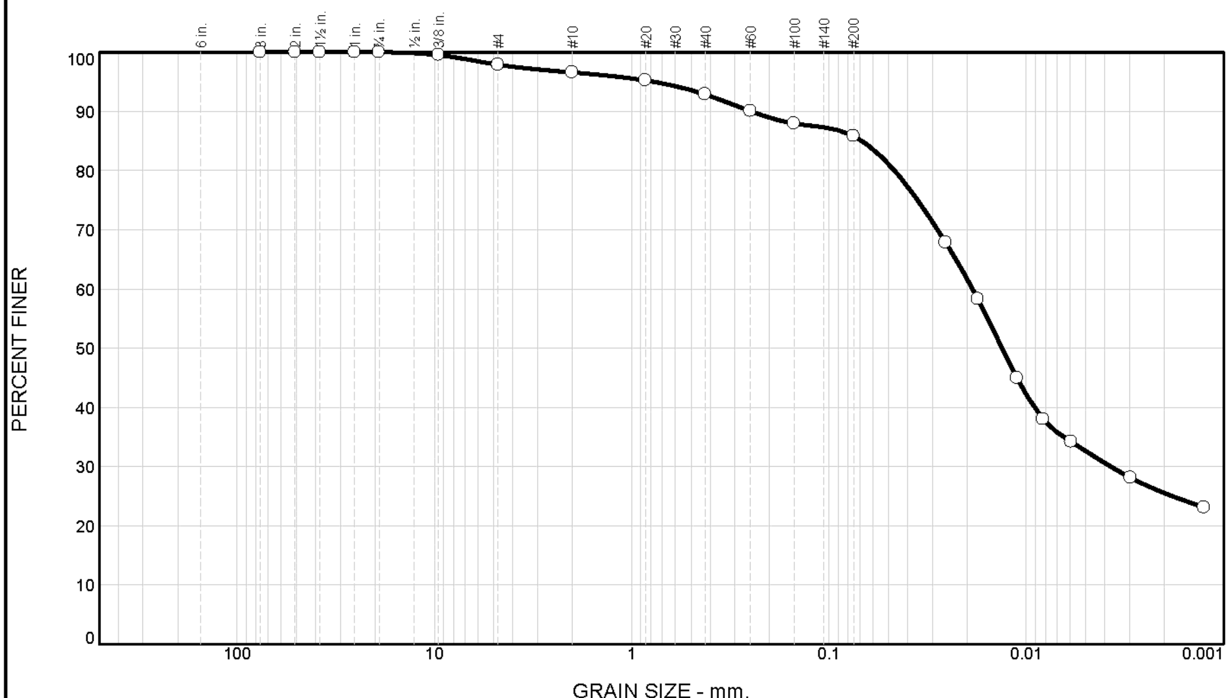
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-2-12
Location: Meadowbrook Dr, Burlington **Elev./Depth:** 6 1/2" - 10 1/2"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	2	1	4	7	60	26

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	100		
# 4	98		
# 10	97		
#20	95		
#40	93		
#60	90		
#100	88		
#200	86		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 24 LL= 39 PI= 15

Classification

USCS= CL AASHTO= A-6(13)

Coefficients

D_{85}= 0.0679 D_{60}= 0.0187 D_{50}= 0.0133

D_{30}= 0.0037 D_{15}= D_{10}=

C_u= C_c=

Date Tested: 3-1-13 **Tested By:** LK

Remarks

Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-2-12

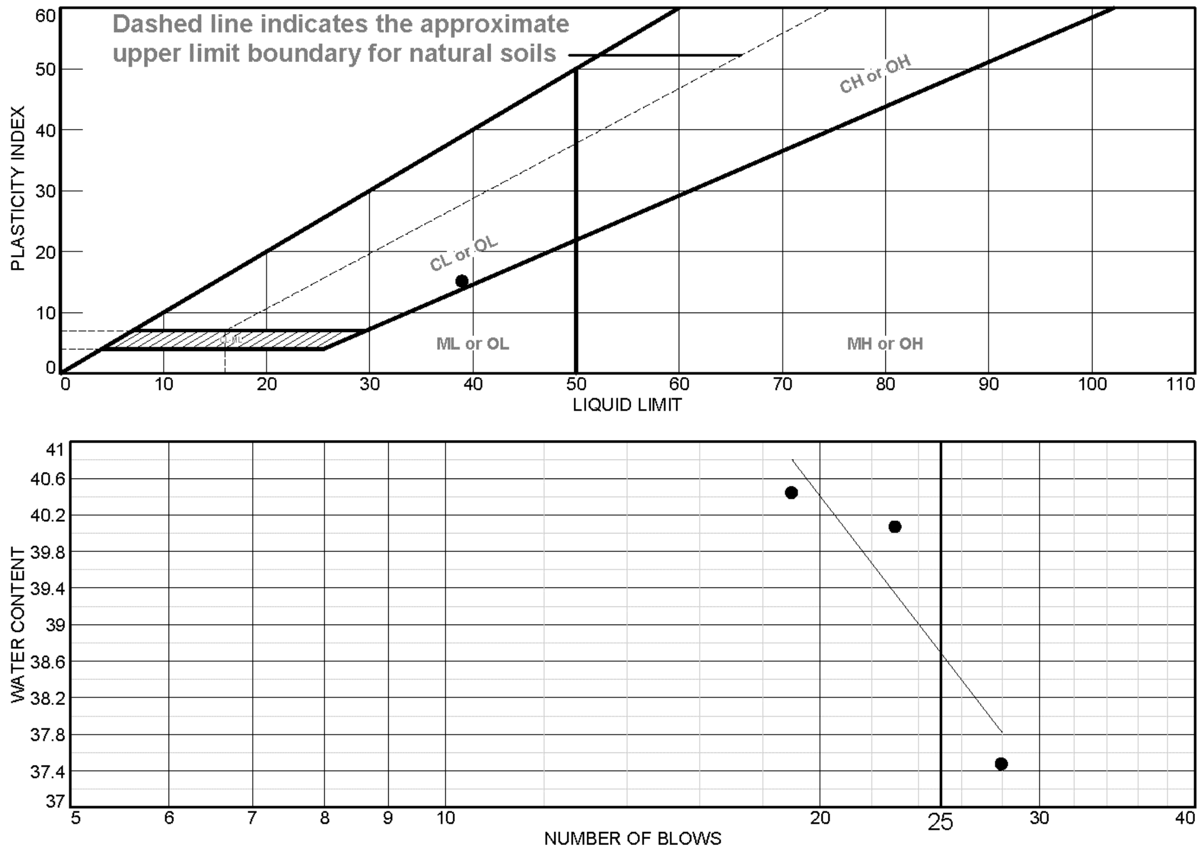
Location: Meadowbrook Dr, Burlington **Elev./Depth:** 10.5"-21"

Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	39	24	15	93	86	CL

Project No. **Client:** Iowa DOT

Project: TR 640

● **Loc.:** Meadowbrook Dr, Burlington **Depth:** 10.5"-21" **Sample No.:** C1

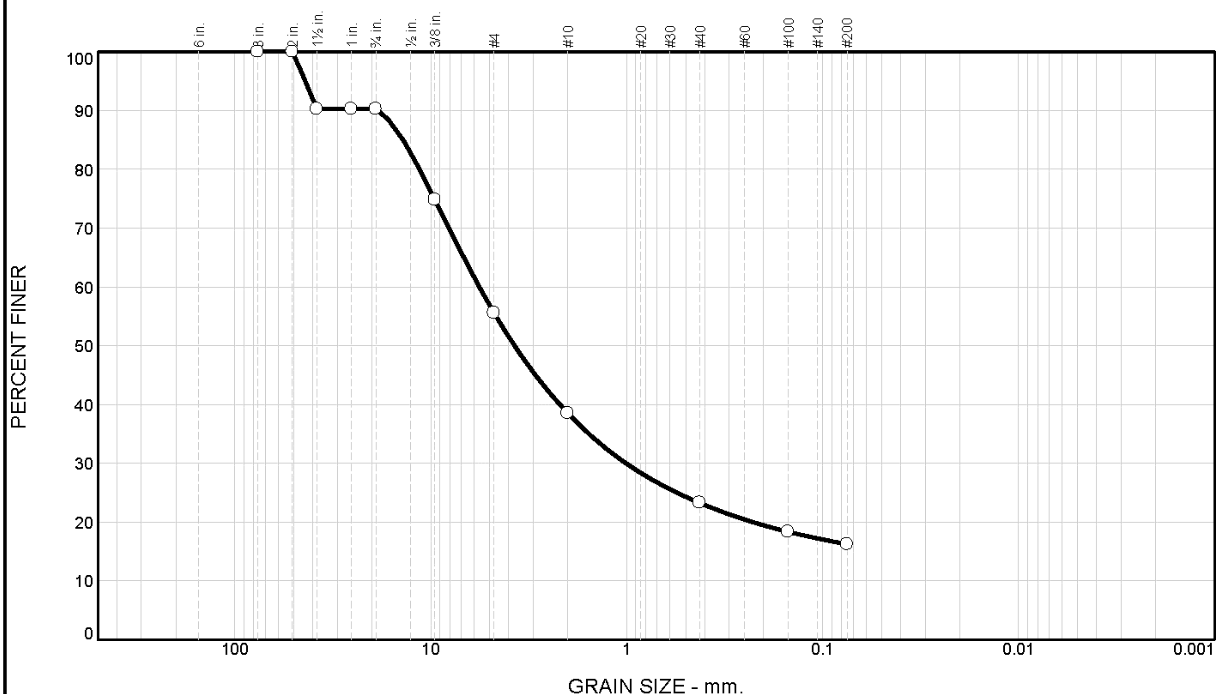
Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	10	34	17	16	7	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	90		
1 in	90		
3/4 in	90		
3/8 in	75		
# 4	56		
# 10	39		
# 40	23		
# 100	18		
# 200	16		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 13.8276 D_{60}= 5.6496 D_{50}= 3.7397
D_{30}= 1.0105 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

Remarks

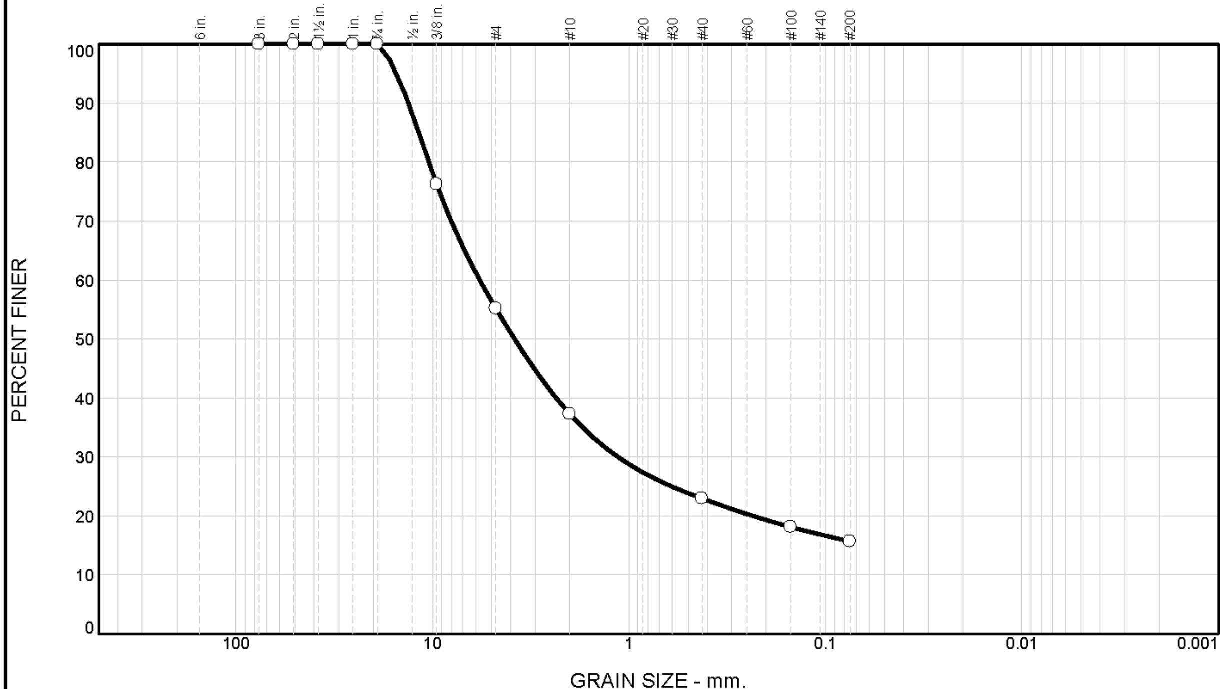
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-9-12
Location: W 38 Locust Rd Winneshiek County **Elev./Depth:** 3" - 12"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ______________________ **Checked By:** ______________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	45	18	14	7	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	76		
# 4	55		
# 10	37		
# 40	23		
# 100	18		
# 200	16		

* (no specification provided)

Material Description

Crushed Limestone Choke Stone

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 11.7322 D_{60}= 5.7516 D_{50}= 3.8220
D_{30}= 1.1411 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

Remarks

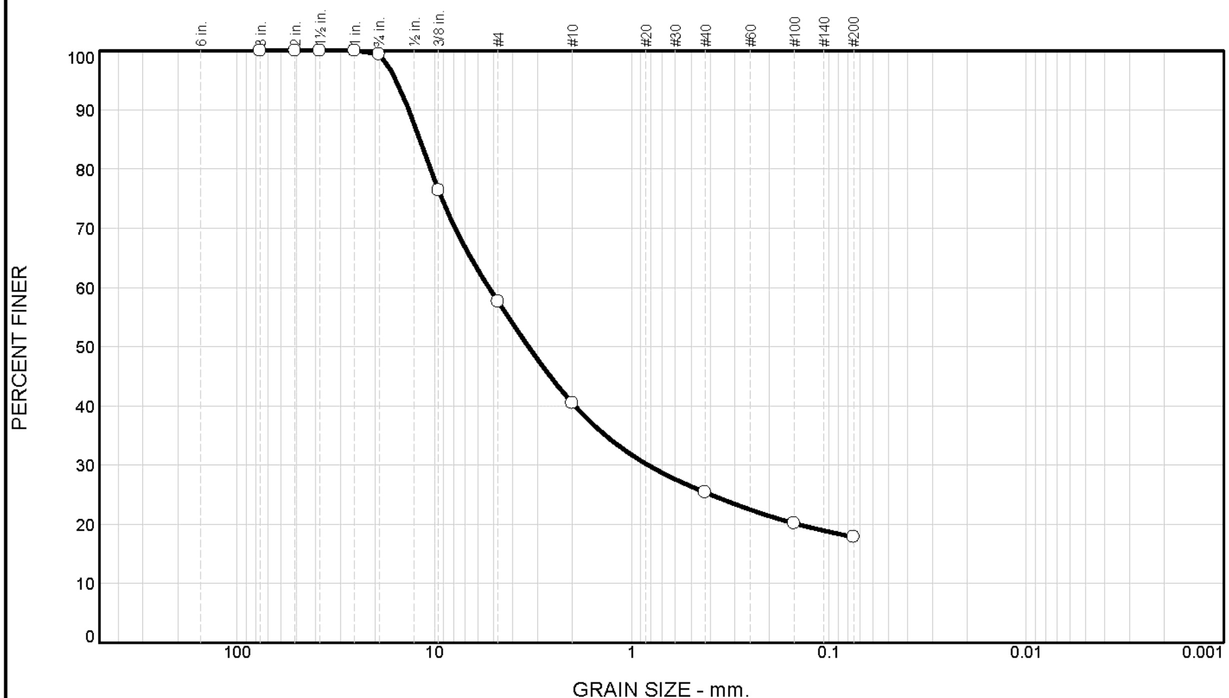
Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 8-9-12
Location: W 38 Locust Rd Winneshiek County **Elev./Depth:** 0 - 2"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	41	18	15	7	18	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	99		
3/8 in	76		
# 4	58		
# 10	40		
# 40	25		
# 100	20		
# 200	18		

* (no specification provided)

Material Description

Crushed Limestone Subbase

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= GM AASHTO= A-1-b

Coefficients

D_{85}= 11.8568 D_{60}= 5.2978 D_{50}= 3.3344
D_{30}= 0.8286 D_{15}= D_{10}=
C_u= C_c=

Date Tested: 2-5-13 **Tested By:** LK

Remarks

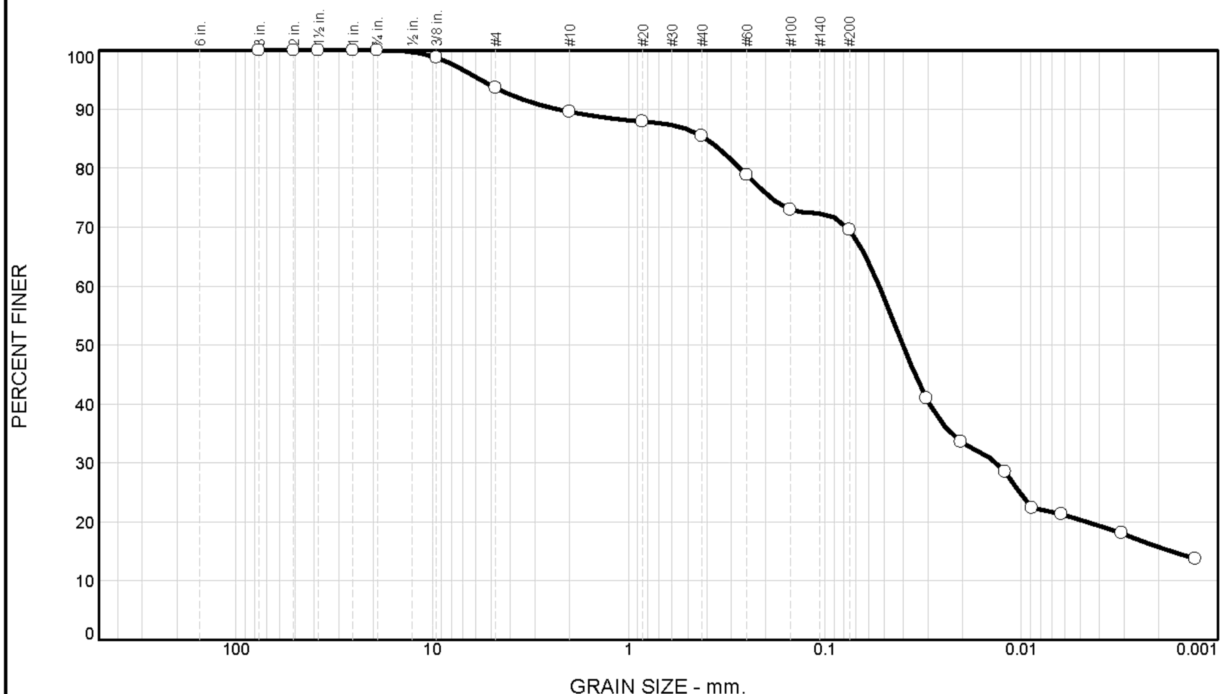
Sample No.: C2 **Source of Sample:** Core 2 **Date Sampled:** 8-9-12
Location: W 38 Locust Rd Winneshiek County **Elev./Depth:** 2" - 7"
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	6	4	5	15	54	16

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in	100		
2 in	100		
1.5 in	100		
1 in	100		
3/4 in	100		
3/8 in	99		
# 4	94		
# 10	90		
#20	88		
#40	85		
#60	79		
#100	73		
#200	70		

* (no specification provided)

Material Description

Subgrade

Atterberg Limits (ASTM D 4318)

PL= 19 LL= 28 PI= 9

Classification

USCS= CL AASHTO= A-4(4)

Coefficients

D_{85}= 0.4032 D_{60}= 0.0530 D_{50}= 0.0402
D_{30}= 0.0134 D_{15}= 0.0017 D_{10}=
C_u= C_c=

Date Tested: 3-1-13 **Tested By:** LK

Remarks

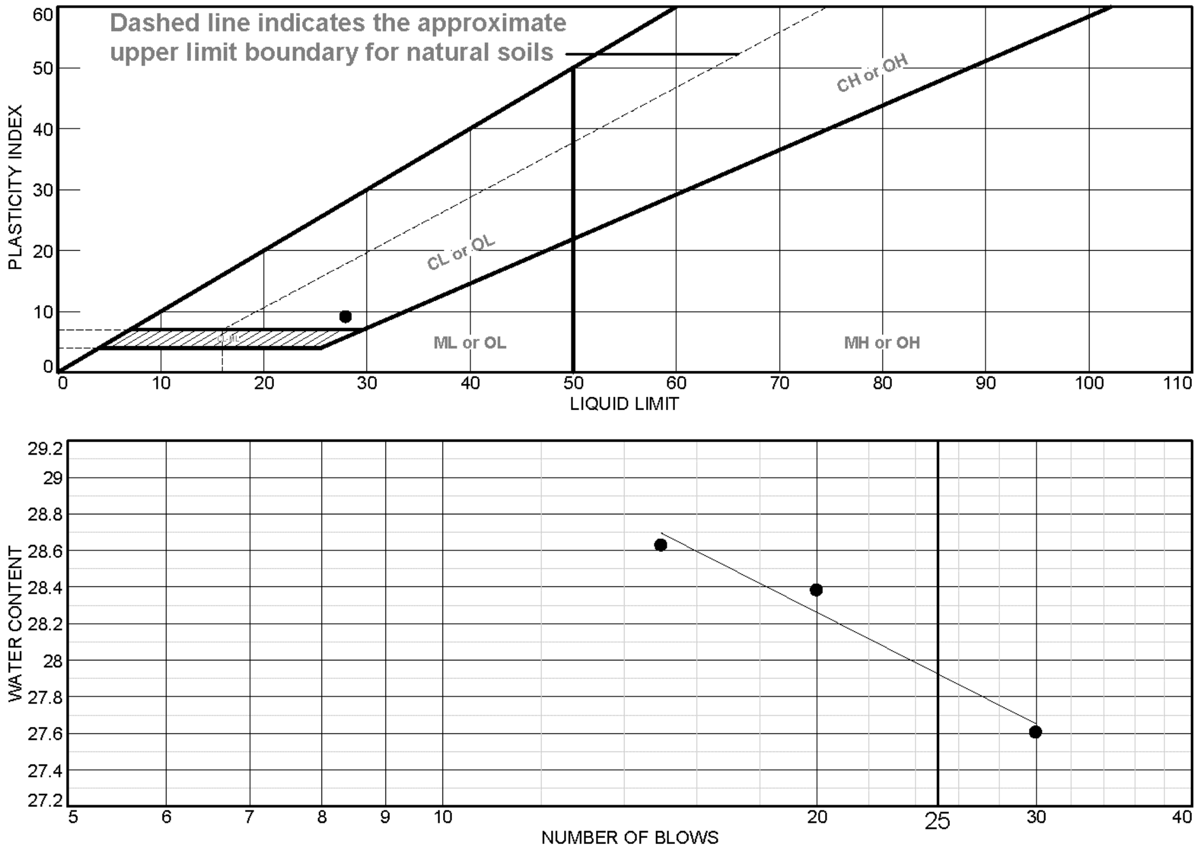
Sample No.: C1 **Source of Sample:** Core 1 **Date Sampled:** 8-9-12
Location: 175th Street, Winneshiek County **Elev./Depth:**
Checked By: PV **Title:**

Iowa State University
Civil, Construction and Environmental Engineering Department

Client: Iowa DOT
Project: TR 640
Project No: **Figure**

Tested By: ____________________ **Checked By:** ____________________

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Subgrade	28	19	9	85	70	CL

Project No. **Client:** Iowa DOT

Project: TR 640

● **Location:** 175th Street, Winneshiek County **Sample Number:** C1

Remarks:

Iowa State University
Civil, Construction and Environmental Engineering Department

Figure

Tested By: LK **Checked By:** PV

APPENDIX B: FIELD NOTES

FWD RESULTS SUMMARY -- NW Greenwood St. and 3rd St., Ankeny									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. .D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9600 lbs)									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	J	19.7	9.17	79.1				-0.48	DCP1
1	C	26.2	7.57		60	6893	41	0.29	
2	J	32.8	7.1	104.9				-0.44	
2	C	42.7	6.36		72	8253	49	-0.1	
3	J	49.2	7.27	104.3				-0.54	
3	J	49.2	7.35	102.6				-0.3	
4	C	59.1	6.13		80	8832	53	-0.02	
4	J	62.3	6.59	100.9				-0.29	
5	C	68.9	6.65		59	7247	43	0.29	DCP2
5	J	78.7	6.42	102.6				-0.2	
6	C	85.3	6.31		64	7739	46	0.08	
6	J	91.9	6.86	105.4				-0.26	
7	C	98.4	6.67		57	7113	42	0.32	
7	J	108.3	7.01	100.6				-0.31	
8	C	114.8	6.04		77	8741	52	0.05	
8	J	121.4	5.55	102.2				-0.24	
9	C	131.2	5.29		76	9213	54	0.04	DCP3
9	C	131.2	5.27		77	9333	54	0.21	
10	J	134.5	5.26	97.1				-0.23	
10	C	144.4	5.75		77	8927	53	0.3	
11	J	150.9	4.82	97.3				-0.31	
11	C	157.5	5.13		107	11220	68	0.19	
12	J	167.3	5.15	100.8				-0.23	
12	C	173.9	5.46		98	10388	63	0.29	
12	J	180.4	5.66	98.8				-0.13	
13	C	190.3	6.42					0.41	DCP4
13	J	196.9	5.38	99.6				-0.22	
14	C	203.4	5.83		90	9666	59	0.22	
14	J	210.0	5.79	101.2				-0.34	
15	C	216.5	7.24		123	10225	70	-0.07	
15	J	223.1	11.56	99.2				-0.78	
16	C	232.9	11.28		55	5461	34	-0.67	
		AVG	6.6	99.8	78.1	8616.7	52.0	-0.1	
		STDEV	1.6	6.0	19.5	1525.9	10.1	0.3	
		COV	24	6	25	18	20	-286	

FWD RESULTS SUMMARY -- 315th Street/E63 Between 570th and 580th Avenue, SE of Huxley, Iowa

NOTES:
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. .D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9600 lbs)

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	0.0	6.26		138	11636	90	0.17	DCP1
1	J	6.6	5.45	96.8				-0.29	Fault = 0 mm
2	C	13.1	5.29		121	11810	88	0	
2	J	19.7	4.94	96.2				-0.34	Fault = 0 mm
3	C	26.2	4.87		143	13368	100	-0.17	CHP1
3	J	32.8	4.79	96.3				-0.35	Fault = 0 mm
4	C	39.4	5.08		139	12928	97	-0.21	
4	J	45.9	6.75	100.0				-1.42	Fault = 3mm, D1 sensor on unloaded slab - stand over crack
5	C	52.5	5.69		124	11535	87	-0.33	DCP2
5	J	62.3	8.12	82.7				-1.79	Fault = 0 mm
6	C	68.9	7.11		73	7866	58	-0.67	
6	J	78.7	6.65	94.1				-1.35	Fault = 1 mm
7	C	85.3	7.25		84	8382	62	-0.76	
7	J	91.9	7.04	93.2				-1.38	Fault = 2 mm
8	C	101.7	6.59		108	10027	75	-0.44	
8	J	108.3	7.24	95.6				-1.27	Fault = 2 mm
9	C	114.8	12.37		71	5954	46	-1.08	DCP3
9	J	121.4	8.37	93.3				-1.24	Fault = 0 mm
10	C	128.0	7.48		85	8302	62	-0.2	
10	J	137.8	9.89	88.5				-1.45	Fault = 0 mm (South side of crack) 6 mm (north side of crack)
11	C	144.4	7.42		65	7240	54	0.07	DCP4
11	J	150.9	7.22	98.6				-0.25	Fault = 0 mm
12	C	157.5	6.61		126	10818	83	-0.12	
12	Cr	157.5	6.85	100.4				-0.09	Fault = 0.5 mm
12	J	167.3	9.12	98.3				-0.26	Fault = 3 mm
13	C	173.9	7.34		67	7402	55	-0.02	DCP5
13	J	183.7	10.41	100.0				-1.94	Fault = 1.5 mm
14	C	190.3	8.06		62	6802	50	-0.44	
14	J	196.9	11.52	53.2				-2.34	Fault = 8 mm, DCP6
15	C	203.4	6.35		122	10858	82	-0.25	
15	J	210.0	7.83	85.8				-1.25	Fault = 0 mm at joint and 1 mm at crack near joint, DCP7
16	C	219.8	6.75		99	9433	71	-0.19	
16	J	226.4	7.94	94.0				-0.97	Fault = 5 mm
17	C	236.2	6.92		85	8632	64	-0.22	
17	J	242.8	8.84	93.0				-1.14	Fault = 6 mm
18	C	252.6	14.32		210	9583	109	-1.81	DCP8, CHP2
18	J	255.9	6.88	96.6				-0.28	Fault = 0 mm
19	C	265.7	6.48		76	8402	62	-0.09	
19	J	272.3	6.5	97.0				-0.35	Fault = 0 mm
20	C	282.2	6.4		106	10028	75	-0.19	
20	J	285.4	6.15	97.1				-0.33	Fault = 3 mm
21	C	295.3	6.7		97	9385	70	0.07	DCP9
21	J	301.8	5.71	97.2				-0.24	Fault = 7 mm
22	C	308.4	5.61		168	13614	107	-0.12	FWD on east side of crack
22	C	311.7	5.82		86	9457	70	-0.05	FWD on west side of crack, DCP10, CHP3
22	J	315.0	6.25	95.2				-0.2	Fault = 14 mm
		AVG	7.2	93.2	106.7	9715.7	74.6	-0.6	
		STDEV	1.9	9.7	36.7	2104.6	18.1	0.6	
		COV	27	10	34	22	24	-105	

FWD RESULTS SUMMARY -- Riverside Road, North East of Ames beteen Hwy 69 and Dakota Avenue									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. D_0 at 9000 lbs applied load									
3. Esg and Dynamic k determined at 9,000 lbs									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	2.97		165	18262	121	-0.06	DCP1
1	J	9.8	4	100.2				-0.14	Fault = 0 mm
2	C	23.0	2.9		146	17310	116	-0.11	
2	J	32.8	3.53	98.43				-0.12	Fault = 0 mm
3	C	42.7	2.95		170	18595	124	-0.07	
3	J	52.5	3.72	105.5				-0.07	Fault = 0 mm
4	Cr	62.3	3.29	97.49	162	17223	115	-0.05	Transverse Crack at Center Panel - Fault = 1 mm - DCP2
4	J	75.5	3.34	100.8				-0.15	Fault = 0 mm
5	C	82.0	2.95		207	20641	140	-0.03	
5	J	95.1	3.44	99.73				-0.09	Fault = 0 mm
6	C	105.0	2.94		182	19328	129	-0.04	
6	J	114.8	3.66	100.3				-0.08	Fault = 0 mm
7	C	124.7	2.95		205	20569	139	-0.03	DCP 3, CHP 1
7	J	134.5	3.68	101.5				-0.06	Fault = 0 mm
8	C	144.4	2.8		204	21021	142	-0.03	
8	J	154.2	3.48	102.1				-0.12	Fault = 0 mm
9	C	164.0	2.78		198	20774	139	-0.04	
9	J	177.2	3.57	101.3				-0.11	Fault = 0 mm
10	C	187.0	2.73		217	21942	149	-0.03	DCP4
10	J	196.9	4.25	103.5				-0.02	Fault = 0 mm - DCP5
11	C	203.4	6.17					0.58	DCP6, CHP2 - CRACKS ON PAVEMENT, Fault = 5 mm to 25 mm at cracks
11	J	216.5	7.15	97.67				0.36	DCP7, Fault = 0 mm
12	C	223.1	5.96		59	7616	51	0.82	DCP8 - CRACKS ON PAVEMENT
12	J	236.2	7.05	102.4				0.77	Fault = 0 mm
13	C	246.1	3.96		56	9015	62	0.15	DCP9 - CRACKS ON PAVEMENT
13	J	255.9	4.55	99.39				-0.09	Fault = 0 mm
14	C	265.7	3.76		93	12074	80	0.13	DCP10
14	J	275.6	5.38	106.4				0.18	Fault = 0 mm
14	J	275.6	5.42	106.1				0.19	Test Redo
15	C	285.4	3.84		64	9832	67	0.21	
15	J	295.3	4.91	103.6				0.12	Fault = 0 mm
16	C	305.1	4.13		55	8737	60	0.2	
16	J	315.0	5.31	103.5				0.17	Fault = 0 mm
		AVG	4.0	101.7	145.5	16196	109.0	0.1	
		STDEV	1.2	2.7	62.3	5186	34.7	0.2	
		COV (%)	30	3	42.8	32	32	348	

FWD RESULTS SUMMARY -- E23 East of US65, Near Zearing, Iowa									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. .D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	7.4		160	11578	100	-0.2	Good Panel
1	J	9.8	8.7	92.4				-0.4	
2	C	16.4	7.6		132	10394	87	0.2	Good Panel, DCP1
2	J	23.0	8.4	92.8				-0.4	
3	C	29.5	8.4		146	10383	90	0.4	Good Panel
3	J	36.1	8.4	92.2				-0.3	
4	C	42.7	7.0		148	11475	97	-0.1	Good Panel, DCP2, CHP1
4	J	52.5	8.0	93.3				-0.3	
5	Cr	59.1	8.1	92.1	162	11159	98	-0.2	Transverse crack at panel center, no faulting at crack, DCP3, LTE at Crack
5	J	65.6	7.9	91.5				-0.5	
6	C	72.2	15.6		89	5956	53	1.8	Longitudinal crack, DCP4
6	J	82.0	12.1	64.8				-0.7	
7	C	91.9	8.7		153	10460	92	0.3	Crack on SW portion of panel
7	J	98.4	9.0	92.1				-0.3	
8	C	105.0	7.8		127	10051	84	0.1	Good Panel
8	J	111.5	8.0	93.3				-0.4	
9	C	118.1	7.6		143	10804	92	-0.1	Good Panel
9	J	124.7	8.2	95.9				-0.4	
10	C	134.5	8.1		117	9477	79	-0.2	Longitudinal crack, DCP5
10	J	141.1	9.9	95.6				-0.5	
11	C	147.6	10.6		81	6829	56	-0.2	Longitudinal crack and corner cracks, DCP6, CHP2 (CHP near crack)
11	J	154.2	14.4	93.0				-2.1	DCP7
12	C	164.0	8.5		61	6577	53	-0.3	Longitudinal crack, DCP8
12	J	170.6	7.9	93.4				-0.3	
13	C	177.2	7.5		132	10412	87	0.1	Good panel
13	J	183.7	7.5	93.9				-0.4	
14	C	190.3	7.4		149	11168	95	0.1	Good panel, DCP9
14	J	196.9	7.5	95.8				-0.3	
16	C	206.7	7.1		144	11224	94	0.0	Good panel
16	J	210.0	7.6	97.2				-0.4	
17	C	219.8	7.2		156	11580	99	-0.1	Corner crack, DCP10
17	J	226.4	7.6	96.7				-0.5	
18	C	232.9	7.6		145	10844	92	0.0	Corner crack
18	J	239.5	7.8	94.9				-0.3	
19	C	246.1	7.9		142	10565	90	-0.1	Corner crack
19	J	255.9	8.6	94.5				-0.5	
20	C	262.5	7.9		134	10269	87	-0.2	Corner crack
20	J	269.0	8.5	97.2				-0.5	
21	C	275.6	8.0		128	9976	84	-0.1	Corner crack
21	J	282.2	8.1	98.0				-0.3	
22	C	288.7	7.6		143	10804	91	-0.1	Good Panel
		AVG	8.5	92.9	133.0	10094.5	85.6	-0.2	
		STDEV	1.8	6.7	26.3	1622.7	14.3	0.5	
		COV	21	7	20	16	17	-230	

FWD RESULTS SUMMARY -- SW WESTLAWN DRIVE, ANKENY, IOWA									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. .D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined at 9,000 lbs									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	48.4	5.3		112	11319	81	0.21	DCP1, Longitudinal Crack
2	C	59.7	5.6		125	11647	85	0.31	DCP2 and CHP1, Longitudinal Crack (3ft from Joint at Old DCP location)
3	C	71.1	5.6		134	12061	89	0.31	DCP3, Longitudinal and Transverse Crack
3	J	76.2	10.4	98				3.37	
4	C	81.4	11.8		64	5785	43	3.41	Longitudinal Crack
5	C	91.7	27.1		23	2293	17	16.01	Longitudinal Crack
5	J	96.8	27.0	94				14.33	OLD DCP Near Joint, Utility Gas Line
6	C	104.0	18.1					6.54	DCP4, Longitudinal Crack
6	J	107.1	18.0	95				5.68	
7	C	114.3	23.7		109	5356	57	-0.42	Longitudinal Crack, FWD plate on crack
7	J	118.4	28.8	97				4.2	
8	C	124.6	21.0		71	4605	40	7.8	Longitudinal Crack
8	J	129.8	32.7	100				12.66	
9	C	134.9	27.5					12.09	DCP5 and Old DCP, Longitudinal Crack
9	J	140.1	20.6	90				3.49	
10	C	146.2	12.2		14	2509	20	0.23	Longitudinal Crack
10	J	151.4	11.0	97				0.26	
11	C	157.6	11.4		63	5828	43	0	
11	J	162.7	12.6	97				0.52	Utility Gas Line
12	C	168.9	12.0		34	4137	29	1.01	Longitudinal Crack
12	J	173.0	9.9	94				0.64	DCP6 at Joint and Old DCP
13	C	179.2	7.5		77	7874	56	-0.11	Geogrid start from Panels 13/14 Interface (near House # 410 Westlawn Drive)
13	J	184.3	6.0	96				0.01	
14	C	190.5	7.0		113	9962	74	0.03	DCP7 and CHP2, Old DCP, Longitudinal Crack
14	J	196.7	11.7	99				1.1	
15	C	203.9	12.1		81	6424	50	1.21	Longitudinal Crack
15	J	209.1	23.0	99				3.99	
16	C	215.2	32.0		12	1504	11	7.88	DCP8, Longitudinal Crack
16	J	221.4	20.7	94				2.01	
17	C	227.6	15.3		21	2868	21	2.06	Longitudinal Crack
17	J	233.8	16.7	96				1.22	
18	C	240.0	16.3		31	3386	24	1.79	DCP9, Longitudinal Crack
18	J	245.1	20.0	97				2.48	
19	C	252.3	23.2		42	3337	26	6.23	Longitudinal Crack
19	J	256.4	26.7	99				10.58	
20	C	262.6	26.1		21	2226	16	8.71	Longitudinal Crack
20	J	268.8	30.9	98				6.17	
21	C	276.0	19.8					3.04	DCP10, Longitudinal Crack
21	J	280.1	17.5	101				2.55	
22	C	286.3	17.4					3.52	Longitudinal Crack
22	J	292.5	11.4	95				0.09	
		AVG	17.4	96.6	63.7	5728.9	43.4	3.8	
		STDEV	7.9	2.6	41.2	3472.7	25.5	4.3	
		COV	46	3	65	61	59	113	

FWD RESULTS SUMMARY -- SW LOGAN DRIVE, ANKENY, IOWA

NOTES:

1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. .D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)
4. 7 in. PCC over think gravel base and fly ash stabilized subgrade
5. Panels varied in length from about 9 ft 8 in. to 14 ft 9 in. New pavement, no cracks or faulting

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	9.3	5.5		149.0	12864	95.9	-0.13	
1	J	14.4	8.3	88.7				-0.32	
2	C	20.6	5.8		119.0	11216	81.4	-0.02	DCP1
2	J	27.8	8.8	97.3				-0.31	
3	C	35.0	5.7		98.0	10245	72.8	-0.06	
3	J	41.2	6.4	99.4				-0.03	
4	C	46.3	6.1		135.0	11697	87.7	0.45	
4	J	52.5	8.0	93.5				-0.02	
5	C	57.7	5.7		145.0	12496	93.1	0.16	DCP2
5	J	65.9	6.1	97.2				-0.32	
6	C	72.1	6.0		164.0	12954	100.4	0.04	
6	J	79.3	7.5	97.2				-0.55	
7	C	85.5	6.8		121.0	10482	78.0	-0.22	
7	J	87.5	7.8	98.1				-0.26	
8	C	93.7	7.8		70.0	7370	52.4	-0.08	DCP3
8	J	96.8	8.6	93.1				-0.4	
9	C	102.0	6.8		110.0	9967	73.4	-0.03	
9	J	106.1	7.8	98.1				-0.39	
10	C	112.3	7.4		88.0	8509	61.4	0.23	
10	J	119.5	7.0	99.1				-0.38	
11	C	125.6	7.3		46.0	6077	43.6	0.12	DCP4
11	J	132.9	6.6	94.4				-0.55	
12	C	140.1	5.7		131.0	11845	87.6	-0.04	
12	J	146.2	7.1	96.8				-0.53	
13	C	153.5	7.0		127.0	10588	80.5	0.09	
13	J	159.6	10.2	99.0				0.45	
14	C	165.8	6.9		117.0	10174	75.5	-0.06	
14	J	173.0	8.1	94.5				-0.16	
15	C	179.2	7.4		94.0	8842	64.4	0.29	DCP5
15	J	183.3	7.1	92.3				-0.03	
16	C	189.5	6.2		165.0	12888	100.5	0.12	
16	J	192.6	9.6	97.5				-0.01	
17	C	196.7	7.8		75.0	7615	54.7	0.27	CHP1
17	J	201.9	7.7	93.3				-0.06	
18	C	209.1	7.2		100.0	9222	67.4	0.04	
18	J	215.2	9.0	94.9				-0.44	
19	C	221.4	6.0		91.0	9537	68.3	0.12	DCP6
19	J	225.5	6.3	94.5				-0.23	
20	C	232.8	7.1		102.0	9387	68.6	0.11	
20	J	240.0	9.0	89.4				-0.27	
		AVG	7.2	95.4	112.4	10198.8	75.4	-0.1	
		STDEV	1.1	3.1	31.2	1945.2	15.9	0.3	
		COV	16	3	28	19	21	-301	

FWD RESULTS SUMMARY -- NEAR 701 WEST MAIN STREET, KNOXVILLE, IOWA									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. .D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)									
4. 7 to 7.5in. PCC over 12 in. modified subbase and 12 in. fly ash stabilized subgrade									
5. No cracks or faulting on the panels tested. Panels varied in length from about 128 in. to 152 in.									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	7.8		62	6918	47	0.41	DCP1 and CHP 1 (Corner cracking). DCP after CHP test
1	J	3.3	11.9	100.3				1.67	
2	C	9.8	7.3		100	9141	65	-0.01	
2	J	16.4	11.0	102.5				0.9	
3	C	23.0	8.1		108	9079	67	0.31	DCP2
3	J	26.2	11.8	98.6				1.62	
4	C	32.8	7.4		127	10329	77	0.15	
4	J	39.4	13.0	102.6				2.3	
5	C	45.9	8.0		108	9135	68	0.18	
5	J	49.2	12.1	100.0				1.72	
6	C	59.1	8.0		108	9125	67	0.15	DCP3
6	J	62.3	13.6	103.7				2.17	
7	C	68.9	8.0		112	9270	69	0.36	
7	J	75.5	12.2	104.0				1.72	
8	C	82.0	7.5		102	9126	66	0.3	
8	J	85.3	11.4	106.5				1.92	
9	C	95.1	6.9		127	10667	79	0.19	DCP4
9	J	98.4	11.0	100.5				1.81	
10	C	105.0	6.7		127	10802	79	0.14	
10	J	111.5	11.3	100.0				1.92	
11	C	118.1	6.8		134	11037	82	0.34	DCP5
11	J	121.4	10.2	100.0				1.27	
12	C	128.0	6.5		111	10194	73	0.24	
12	J	131.2	8.4	101.0				0.63	
13	C	141.1	6.3		132	11363	83	0	DCP6, CHP2. DCP after CHP test
13	J	144.4	8.5	100.4				0.67	
14	C	150.9	6.5		100	9679	68	0.22	
14	J	157.5	8.8	99.9				0.87	
15	C	164.0	6.9		94	9072	64	0.15	DCP7
15	J	167.3	10.3	100.0				0.87	
16	C	173.9	7.7		88	8356	59	0.13	
16	J	180.4	10.5	98.6				1.03	
17	C	187.0	7.9		99	8779	63	0.08	DCP8
17	J	193.6	11.7	100.7				1.33	
18	C	200.1	8.1		96	8555	62	0.37	
18	J	206.7	15.6	102.2				5.09	
19	C	213.3	12.6		28	3584	25	1.77	Utility line passing under Panel 19
19	J	216.5	16.1	87.0				1.51	
		AVG	9.6	100.4	103.3	9169.0	66.5	1.0	
		STDEV	2.6	3.8	25.2	1721.6	13.3	1.0	
		COV	27	4	24	19	20	104	

FWD RESULTS SUMMARY -- NEAR 909 SOUTH 5TH STREET, KNOXVILLE, IOWA

NOTES:
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. .D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)
4. 8in. PCC over 12 in. modified subbase and 12 in. fly ash stabilized subgrade
5. No faultiing. Panels varied in length from about 79 in. to 182 in.

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	0.0	4.6		216	16953	129	0.28	
1	J	6.6	4.1	90.9				-0.11	
2	C	16.4	4.5		240	18262	141	0.18	DCP1
2	J	23.0	4.6	93.7				0.21	
3	C	29.5	3.7		328	23345	188	0.05	
3	J	36.1	4.4	91.8				-0.06	
4	C	45.9	4.8		201	16107	122	-0.02	
4	J	52.5	4.7	92.0				-0.08	
5	C	59.1	4.6		249	18398	144	-0.08	DCP2, CHP1
5	J	65.6	4.7	90.1				-0.10	
6	C	75.5	5.1		230	16662	132	-0.01	Crack on NE corner of panel
6	J	82.0	5.4	93.7				-0.10	
7	C	85.3	6.9		204	13614	114	0.52	DCP3, CHP2. Longitudinal Crack on Panel
7	J	95.1	7.8	92.2				-0.39	
8	C	105.0	5.6		174	13901	105	-0.20	DCP4, Longitudinal Crack on Panel
8	J	111.5	5.5	91.4				-0.25	
9	C	118.1	5.3		181	14491	109	0.18	Longitudinal Crack on Panel
9	J	121.4	5.0	91.8				-0.05	
10	C	128.0	5.5		220	15826	126	0.21	
10	J	134.5	6.1	92.7				0.26	
11	C	137.8	6.5		171	12799	100	0.31	Short panel
11	J	141.1	6.5	90.2				0.34	
12	C	144.4	4.5		105	11792	81	0.10	DCP5, Short panel
12	J	146.4	4.0	90.7				-0.01	
13	C	150.9	5.1		247	17315	141	0.13	Short Panel
13	J	152.9	5.5	93.5				0.17	
14	C	157.5	5.5		159	13317	98	0.28	Short Panel
14	J	160.8	5.0	90.0				0.10	
15	C	167.3	4.5		217	17300	131	0.01	DCP6, Short Panel
15	J	169.3	4.7	92.5				0.00	
16	C	173.9	5.2		209	15824	123	0.14	Short Panel
16	J	175.9	4.9	89.8				0.13	
17	C	180.4	4.7		226	17272	134	0.09	Short Panel
17	J	183.7	4.9	92.9				0.07	
18	C	187.0	5.1		199	15581	119	0.29	DCP7, Short Panel
18	J	190.3	4.9	91.6				0.10	
19	C	193.6	4.3		193	16639	121	0.05	Short Panel
19	J	193.6	4.3	91.2				0.01	
20	C	196.9	4.4		251	18784	147	0.00	Short Panel
20	J	200.1	4.7	94.1				-0.07	
21	C	206.7	5.3		228	16360	131	0.15	DCP8
21	J	210.0	6.6	93.3				0.43	
22	C	219.8	4.9		124	12433	87	0.04	
		AVG	5.1	91.9	207.8	16044.3	123.8	0.1	
		STDEV	0.8	1.3	46.6	2581.5	23.0	0.2	
		COV	16	1	22	16	19	233	

FWD RESULTS SUMMARY -- VALLEY VIEW DRIVE, COUNCIL BLUFFS, IOWA									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)									
4. 9 in. PCC over 6 in. crushed limestone base (near CHP1) or recycled PCC base (near CHP2) and loess subgrade									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	3.63		166	16664	96	0.08	
1	J	6.2	3.86	94.3				0.05	
2	C	18.5	3.7		181	17251	102	0.01	CHP1 (DCP Perfomred after CHP)
2	J	26.8	4.21	92.9				0.01	
3	C	39.1	3.82		175	16707	99	0.03	DCP1
3	J	47.4	4.22	94.3				-0.04	
4	C	58.7	3.62		163	16546	94	-0.02	
4	J	66.9	4.08	92.4				0.09	
5	C	78.3	4.45		132	13422	77	0.3	DCP2, Thin longitudinal crack
5	J	86.5	4.27	91.1				0.2	
6	C	97.8	3.71		147	15458	86	0.09	Thin longitudinal crack
6	J	106.1	3.98	91.7				0.16	
7	C	118.4	3.95		154	15391	87	0.02	DCP3, Thin longitudinal crack
7	J	126.7	4.22	91.7				0.08	
8	C	137.0	3.8		178	16924	101	-0.01	Thin longitudinal crack
8	J	146.2	4.08	93.9				0.04	
9	C	156.5	3.62		190	17885	107	0.08	DCP4
9	J	165.8	4.5	93.8				0.29	
10	C	177.1	3.82		141	14920	83	0.15	
10	J	185.4	4.51	92.2				0.27	
11	C	196.7	4.18		186	16509	102	0.19	
11	J	206.0	4.99	92.4				0.1	
12	C	217.3	4.65		80	10124	52	0.15	DCP5
12	J	225.5	4.57	93.2				0.25	
13	C	236.9	4.88		132	12837	75	0.42	
13	J	245.1	4.73	90.9				0.39	
14	C	255.4	5.15		125	12128	71	0.97	DCP6
14	J	264.7	4.78	91.8				0.37	
15	C	275.0	4.73		106	11610	64	0.32	
15	J	284.2	4.93	93.1				0.21	
16	C	295.6	5.95		107	10451	61	0.74	
16	J	303.8	5.03	92.2				0.13	
17	C	315.1	5.39		140	12623	77	0.5	CHP2 (DCP Performed after CHP)
17	J	323.4	4.97	90.5				0.21	Crack at corner
18	C	335.7	4.05		155	15240	88	0.22	DCP7
18	J	342.9	4.34	91.7				0.26	
19	C	353.2	4.02		162	15657	92	0.18	
19	J	361.5	4.64	94.6				0.13	
20	C	372.8	3.85		97	12251	63	0.15	DCP8
20	J	381.1	3.86	93.0				0.17	
21	C	394.4	3.86		152	15465	88	0.11	
21	J	400.6	4.39	92.3				0.11	
22	C	411.9	3.87		153	15494	89	0.16	
22	J	420.2	4.23	93.9				0.18	
		AVG	4.3	92.6	146.5	14616.2	84.3	0.2	
		STDEV	0.5	1.2	29.7	2289.8	15.2	0.2	
		COV	12	1	20	16	18	99	

FWD RESULTS SUMMARY -- 9th STREET EB LANE, COUNCIL BLUFFS, IOWA

NOTES:

1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	0.0	16.0		39	4189	28.5	0.99	DCP1 (Longitudinal crack on panel - saw cut)
1	J	6.2	13.0	87.5				0.46	
2	C	14.4	14.2		23	3353	23.3	2.43	Longitudinal crack on panel - saw cut
2	J	20.6	9.2	94.5				0.71	
3	C	29.9	10.7		38	5016	34.1	0.93	DCP2 (Longitudinal crack along south edge)
3	J	36.0	7.9	94.1				0.59	
4	C	44.3	7.5		68	8052	54.4	0.66	
4	J	50.5	7.3	97.3				0.46	
5	C	59.7	7.4		65	7970	54.2	0.71	DCP3
5	J	64.9	7.1	96.9				0.56	
6	C	72.1	7.2		77	8745	59.3	0.55	
6	J	79.3	7.0	96.3				0.51	
7	C	86.5	8.2		77	8245	56.2	0.78	DCP4
7	J	94.8	7.4	97.7				0.35	
8	C	102.0	7.9		69	7946	53.8	0.68	
8	J	109.2	7.4	97.3				0.4	
9	C	117.4	9.5		73	7461	51.3	0.72	DCP5, CHP1 (Longitudinal wide crack)
9	J	124.6	17.8	62.7				3.32	
10	C	130.8	12.4		50	5411	36.9	0.54	Longitudinal thin crack
10	J	139.0	11.8	84.9				-0.31	
11	C	147.3	9.3		60	6839	46.4	0.77	Longitudinal wide crack
11	J	154.5	9.6	96.9				0.21	
12	C	162.7	8.9		59	6878	46.5	0.34	
12	J	169.9	9.8	99.3				0.26	
		AVG	9.8	92.1	58.2	6675.4	45.4	0.7	
		STDEV	3.0	10.2	17.2	1763.0	11.9	0.7	
		COV	31	11	30	26	26	98	

FWD RESULTS SUMMARY -- 2500-2505 CLIFF ROAD (SITE A), BURLINGTON, IOWA

NOTES:

1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)
5. Panels varied in length from about 112 to 185 in.Pavement is about 308 in. wide

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	51.49	6.4		126.0	11040	80	-0.12	
1	J	57.67	7.2	96.8				-0.12	
2	C	65.91	6.6		141.0	11502	87	-0.24	
2	J	72.09	7.7	96.1				-0.19	
3	C	80.33	6.5		110.0	10169	73	-0.05	DCP1
3	J	86.51	6.7	96.4				0	
4	C	94.75	8.8		145.0	10129	82	0.29	
4	J	100.93	9.1	90.3				0.06	
5	C	109.16	6.7		152.0	11820	91	-0.13	DCP2
5	J	115.34	7.5	93.2				-0.19	
6	C	123.58	7.8		154.0	11089	89	-0.21	
6	J	130.79	7.7	93.4				-0.26	
7	C	136.97	8.3		172.0	11399	96	-0.23	DCP3, CHP1
7	J	145.21	9.8	92.8				-0.48	
8	C	154.48	12.8		91.0	6647	53	0.67	Longitudinal Crack
8	J	159.63	17.0	92.1				-0.31	
9	C	166.84	13.5		111.0	7181	62	0.24	DCP4, CHP2 (Cracks on pavement - Longitudinal and Transverse)
9	J	175.08	11.3	97.3				0.06	
10	C	185.37	8.7		131.0	9663	76	0.05	Cracks on pavement
10	J	190.52	9.9	95.0				-0.21	
11	C	196.7	10.3		115.0	8340	67	0.1	DCP6 (Corner cracks)
11	J	201.85	11.4	98.5				-0.27	
12	C	207	18.9		97.0	5653	52	0.22	Longitudinal crack and corner cracks
12	J	211.12	13.3	87.4				-0.55	
13	C	216.27	9.0		60.0	6363	44	0.08	DCP7
13	J	220.39	7.4	92.4				-0.06	
14	C	227.6	5.7		134.0	11970	87	0.05	
14	J	231.72	6.0	94.6				-0.08	
15	C	237.9	6.3		163.0	12692	97	0.08	DCP8
15	J	242.02	7.0	91.5				-0.16	
16	C	248.2	5.5		162.0	13517	100	0.05	
16	J	253.34	6.5	93.0				-0.13	
17	C	262.61	6.9		155.0	11818	92	0.11	
17	J	268.79	7.4	93.2				0.11	
18	C	277.03	6.5		125.0	10875	80	0.08	
18	J	284.24	10.0	96.9				-0.29	
		AVG	8.8	93.9	130.2	10103.7	78.2	-0.1	
		STDEV	3.1	2.8	29.2	2318.7	16.6	0.2	
		COV	35	3	22	23	21	-404	

FWD RESULTS SUMMARY -- 2910 CLIFF ROAD (SITE B), BURLINGTON, IOWA									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	16.7		52.0	4389	32.5	-0.56	DCP1, Longitudinal Crack
1	J	6.2	17.2	93.9				0.31	Longitudinal Crack
2	C	13.4	15.0		36.0	3815	26.5	0.07	Longitudinal Crack
2	J	20.6	10.6	95.5				-0.6	Longitudinal Crack
3	C	28.8	12.5		47.0	4775	33.4	0.07	Longitudinal Crack
3	J	35.0	10.4	96.5				0.07	Longitudinal Crack
4	C	42.2	12.2		48.0	4864	34.0	0.5	DCP2, CHP1, Longitudinal Crack
4	J	48.4	13.6	96.5				0.88	Longitudinal Crack
5	C	56.6	11.5		41.0	4643	32.0	-0.03	Longitudinal Crack
5	J	63.9	12.3	96.5				0.4	Longitudinal Crack
6	C	72.1	13.4		50.0	4772	33.9	-0.41	Longitudinal Crack
6	J	78.3	11.7	94.1				0.04	Longitudinal Crack
7	C	86.5	11.2		51.0	5249	36.7	0.05	DCP3, Longitudinal Crack
7	J	92.7	7.4	90.9				-0.2	Longitudinal Crack
8	C	100.9	7.4		110.0	9566	70.1	0.15	
8	J	106.1	7.5	96.3				-0.04	
9	C	115.3	9.2		87.0	7611	55.5	0.74	
9	J	121.5	8.2	90.8				0	
10	C	129.8	8.8		124.0	9379	73.4	0.05	DCP4
10	J	135.9	9.0	93.3				-0.34	
11	C	145.2	8.4		120.0	9399	71.7	-0.01	
11	J	150.4	9.1	93.2				-0.08	
12	C	163.8	6.6		103.0	9709	69.1	0.11	DCP5
12	J	168.9	6.8	97.2				-0.1	
13	C	177.1	7.7		132.0	10318	78.9	0.3	
13	J	184.3	9.5	93.0				-0.49	
14	C	192.6	9.2		126.0	9204	73.1	-0.08	
14	J	197.7	10.9	96.7				-0.55	
15	C	206.0	18.9		12.0	1954	14.2	2.93	DCP6, Longitudinal Crack
15	J	213.2	11.7	93.8				-0.86	Longitudinal Crack
16	C	220.4	14.2		63.0	5225	38.8	2.73	Longitudinal Crack
16	J	227.6	10.0	89.3				-0.39	Longitudinal Crack
		AVG	10.9	94.2	75.1	6554.5	48.4	0.1	
		STDEV	3.1	2.4	38.7	2671.8	21.1	0.8	
		COV	29	3	52	41	44	549	

FWD RESULTS SUMMARY -- MEADOWBROOK DRIVE, BURLINGTON, IOWA

NOTES:
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	71.1	9.4		161.0	11304	87.9	0.89	DCP1, cracks on panel
1	J	77.2	11.8	87.7				0.57	
2	C	85.5	8.1		148.0	11618	83.7	0.25	Cracks on panel
2	J	91.7	7.9	92.4				-0.16	
3	C	99.9	7.6		122.0	10853	73.2	0.11	
3	J	106.1	7.0	92.0				0.02	
4	C	114.3	5.9		149.0	13617	90.5	0.1	
4	J	120.5	6.1	93.7				-0.02	
5	C	128.7	8.3		135.0	10966	77.2	1.01	
5	J	134.9	9.7	98.4				1.55	
6	C	143.2	11.8		55.0	5823	36.6	1.18	DCP2
6	J	149.3	8.3	92.9				0.03	
7	C	156.5	9.0		96.0	8817	58.2	0.71	
7	J	162.7	7.6	90.6				-0.07	
8	C	172.0	6.8		157.0	13114	91.1	0.05	
8	J	178.2	7.5	90.8				-0.19	
9	C	187.4	6.8		170.0	13575	97.3	0.07	
9	J	192.6	7.5	91.5				-0.26	
10	C	201.9	7.5		174.0	13081	96.9	-0.09	DCP3
10	J	207.0	6.5	91.0				-0.24	
11	C	215.2	6.4		200.0	15203	111.6	-0.06	
11	J	221.4	6.6	91.4				-0.3	
12	C	229.7	7.5		178.0	13287	99.1	-0.1	
12	J	235.8	8.0	91.0				-0.39	
13	C	244.1	5.8		167.0	14506	98.7	-0.09	DCP4
13	J	250.3	6.8	93.2				-0.24	
14	C	259.5	7.0		196.0	14422	108.3	-0.15	
14	J	264.7	7.4	92.3				-0.33	
15	C	273.9	6.9		100.0	10280	65.1	-0.11	
15	J	280.1	5.8	93.3				-0.07	
16	C	288.4	6.6		167.0	13653	95.9	0.03	DCP5
16	J	295.6	7.2	90.8				-0.21	
17	C	303.8	6.2		163.0	13918	95.7	-0.12	
17	J	310.0	7.4	91.7				-0.41	
18	C	319.3	8.9		87.0	8437	54.6	0.06	DCP6
18	J	325.4	8.3	92.0				-0.03	
19	C	333.7	6.6		152.0	13035	89.6	0.02	
19	J	338.8	9.0	94.1				-0.17	
20	C	347.1	7.2		85.0	9256	57.7	-0.08	DCP7
20	J	354.3	8.5	94.0				-0.45	
21	C	362.5	6.8		160.0	13142	92.5	-0.24	
21	J	368.7	7.2	90.3				-0.3	
22	C	376.9	4.1		390.0	26722	211.0	-0.21	
22	J	384.1	4.7	90.6				-0.29	
23	C	392.4	4.9		384.0	24138	203.6	-0.22	
23	J	397.5	11.0	94.0				0.64	
24	C	404.7	5.6		138.0	13365	86.0	-0.61	DCP8
24	J	411.9	6.8	92.2				-0.57	
25	C	420.2	5.6		300.0	19932	160.7	-0.53	
25	J	426.4	7.1	90.0				-0.84	
26	C	434.6	6.0		230.0	16835	127.2	-0.56	
26	J	440.8	6.7	92.5				-0.88	
27	C	450.05	5.7		237.0	17570	132.0	-0.56	
27	J	456.23	7.1	100.4				-0.71	Crack at joint
28	C	463.44	8.9					-0.17	DCP9, CHP1, cracks on panel
28	J	471.67	6.6	87.3				-0.63	
29	C	478.88	5.0		305.0	21420	167.2	-0.24	
29	J	486.09	5.1	92.2				-0.4	
30	C	493.3	5.03		286	20531	156.4	-0.24	
30	J	501.54	5.32	89.7				-0.51	
		AVG	7.2	92.1	182.5	14221.4	103.6	-0.1	
		STDEV	1.6	2.6	82.8	4692.3	41.9	0.5	
		COV	22	3	45	33	40	-478	

FWD RESULTS SUMMARY -- W38/LOCUSE ROAD, DECORAH, IOWA									
NOTES:									
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL									
2. D0 at 9000 lbs applied load									
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)									
PANEL	**J/C/Cr**	**Dist (ft)**	**D0 (mils)**	**LTE(%)**	**Dynamic k (pci)**	**Esg (psi)**	**Static k (pci)**	**Intercept**	**NOTES**
1	C	0.0	4.5		198.0	17898	136.9	-0.3	
1	J	6.2	9.5	36.1				0.9	
2	C	14.4	4.4		200.0	18301	139.7	-0.1	DCP1, CHP1
2	J	20.6	10.3	24.2				1.5	
3	C	28.8	4.2		214.0	19386	148.7	-0.1	
3	J	35.0	11.3	25.5				2.5	
4	C	43.3	4.3		222.0	19443	149.9	-0.1	DCP2
4	J	49.4	8.8	31.6				0.1	
5	C	57.7	4.5		213.0	18571	143.6	-0.1	
5	J	63.9	8.9	30.9				0.9	
6	C	72.1	4.4		210.0	18812	143.9	-0.1	DCP3, CHP2
6	J	79.3	9.3	30.9				1.0	
7	C	87.5	4.2		216.0	19453	149.1	-0.1	
7	J	93.7	7.7	38.1				0.2	
8	C	103.0	4.3		211.0	18957	144.8	-0.1	
8	J	109.2	8.8	35.6				1.0	
9	C	116.4	4.3		217.0	19366	148.8	-0.1	DCP4
9	J	122.6	7.3	42.0				0.0	
10	C	130.8	4.3		225.0	19632	151.3	-0.1	
10	J	137.0	7.5	48.1				0.5	
11	C	145.2	4.2		225.0	19820	153.4	-0.1	DCP5
11	J	151.4	7.2	68.4				0.5	
12	C	160.7	4.3		239.0	20180	158.3	-0.1	
12	J	166.8	7.2	51.7				0.7	
13	C	174.1	4.3		231.0	19993	155.2	0.0	
13	J	181.3	7.0	59.1				0.5	
14	C	189.5	4.3		229.0	19767	154.1	-0.1	DCP6
14	J	195.7	7.6	38.4				0.7	
15	C	203.9	4.1		240.0	20684	160.5	-0.1	
15	J	210.1	7.4	40.5				0.1	
16	C	218.3	4.1		240.0	20704	160.2	-0.1	
16	J	224.5	8.0	37.8				0.8	
17	C	234.8	4.1		230.0	20241	156.7	-0.1	DCP7
17	J	238.9	6.9	51.2				-0.3	
18	C	247.2	4.2		221.0	19563	151.3	-0.1	
18	J	254.4	8.6	36.6				0.8	
19	C	260.6	4.1		218.0	19645	150.1	-0.1	
19	J	267.8	6.5	59.7				0.2	
20	C	273.9	4.3		236.0	20189	157.0	0.0	DCP8
20	J	281.2	6.4	48.6				-0.4	
		AVG	6.2	41.7	221.8	19530.3	150.7	0.3	
		STDEV	2.2	11.8	12.3	741.6	6.5	0.6	
		COV	35	28	6	4	4	229	

FWD RESULTS SUMMARY -- 175TH STREET, CALMER, IOWA

NOTES:
1. J - JOINT, C - CENTER, Cr - TRANSVERSE CRACK OVER MIDPANEL
2. D0 at 9000 lbs applied load
3. Esg and Dynamic k determined for three loading pulse (~9690 lbs)

PANEL	J/C/Cr	Dist (ft)	D0 (mils)	LTE(%)	Dynamic k (pci)	Esg (psi)	Static k (pci)	Intercept	NOTES
1	C	0.0	8.8		135.0	10659	84.2	-0.38	DCP1
1	J	20.6	18.1	39.3				-0.94	
2	C	44.3	10.4		35.0	4847	36.9	-0.33	DCP2, cracks on panel
2	J	60.8	36.5	14.5				-0.6	cracks at joint (FWD plate on crack)
3	C	81.4	25.4		45.0	3617	28.4	-0.22	DCP3, CHP1, cracks on panel
3	J	99.9	38.8	29.4				-4.7	
4	C	121.5	8.8		123.0	10116	78.4	-0.36	DCP4, CHP2, Transverse crack near w est end of panel
4	J	140.1	22.1	27.0				0.73	
5	C	160.7	13.0		123.0	8382	71.1	-0.83	Logitudinal crack
5	J	180.2	25.8	27.6				-2.31	
6	C	199.8	9.5		120.0	9650	75.8	-0.24	DCP5
6	J	220.4	16.8	49.3				-0.33	
7	C	242.0	12.2		60.0	6001	44.4	-0.18	Longitudinal crack
7	J	264.7	28.6	62.5				-1.87	
8	C	287.3	14.4		60.0	5536	41.6	-0.54	
8	J	311.0	16.5	30.3				-0.42	
9	C	331.6	8.2		140.0	11255	88.5	-0.39	
9	J	350.2	15.4	87.1				-0.53	
10	C	371.8	8.3		124.0	10486	80.7	-0.31	
10	J	390.3	16.4	39.5				-0.63	
11	Cr	410.9	17.2	20.8	147.0	7986	79.0	-0.15	Mid panel crack - LTE taken across crack
11	J	421.2	14.2	47.6				0.32	
11	J	430.5	21.0	54.6				-0.86	Patched Joint - LTE taken across crack (patched)
12	C	450.1	9.9		144.0	10374	85.3	-0.31	Cracks on panel
12	J	470.6	18.8	84.6				-3.16	
13	C	489.2	13.7		118.0	7993	68.1	-0.85	DCP6, Longitudinal cracks, patching, and rutting on panel
13	J	509.8	16.6	52.7				-0.82	
14	C	531.4	11.2		133.0	9417	78.4	-0.43	DCP7, Transverse cracks on panel, half of the panel is new patch
14	J	548.9	18.9	50.7				0.47	
15	Cr	570.5	38.2	19.9	50.0	3123	28.0	-5	DCP8, new patch, Longitudinal and transverse cracks - LTE across midpanel
15	J	595.3	14.3	92.8				-0.47	
16	C	615.9	10.8		91.0	7885	60.1	-0.4	Cracks on panel
16	J	629.2	23.4	55.5				-2.38	Joint patched
17	C	647.8	10.4		91.0	8003	60.8	-0.28	Transverse cracks
		AVG	17.4	46.6	102.3	7960.6	64.1	-0.9	
		STDEV	8.4	23.0	38.3	2522.7	20.6	1.3	
		COV	48	49	37	32	32	-146	

APPENDIX C: DCP RAW DATA

Project: NW 3rd and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP 1

Blows	Depth	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
0	324	0	8.3		5.0	0.0
1	362	38	9.7	38.0	5.0	1.0
1	399	75	11.2	37.0	5.1	2.0
1	440	116	12.8	41.0	4.6	3.0
1	496	172	15.0	56.0	3.2	4.0
1	562	238	17.6	66.0	2.7	5.0
1	622	298	20.0	60.0	3.0	6.0
1	672	348	22.0	50.0	3.7	7.0
1	713	389	23.6	41.0	4.6	8.0
1	764	440	25.6	51.0	3.6	9.0
1	808	484	27.3	44.0	4.2	10.0
1	852	528	29.0	44.0	4.2	11.0
1	909	585	31.3	57.0	3.2	12.0

Project: NW 3rd and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #3

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
251	0	0.0	8.3		4.3	0.0
294	1	43.0	9.9	43.0	4.3	1.0
323	1	72.0	11.1	29.0	6.7	2.0
345	1	94.0	12.0	22.0	9.2	3.0
367	1	116.0	12.8	22.0	7.1	4.0
390	1	139.0	13.7	23.0	6.5	5.0
415	1	164.0	14.7	25.0	5.5	6.0
442	1	191.0	15.8	27.0	4.7	7.0
469	1	218.0	16.8	27.0	4.7	8.0
501	1	250.0	18.1	32.0	3.4	9.0
542	1	291.0	19.7	41.0	2.1	10.0
578	1	327.0	21.1	36.0	2.7	11.0
614	1	363.0	22.5	36.0	2.7	12.0
639	1	388.0	23.5	25.0	5.5	13.0
658	1	407.0	24.3	19.0	9.6	14.0
678	1	427.0	25.1	20.0	8.6	15.0
714	2	463.0	26.5	18.0	10.7	17.0
739	2	488.0	27.5	12.5	22.1	19.0
768	2	517.0	28.6	14.5	16.4	21.0
797	2	546.0	29.7	14.5	16.4	23.0
834	2	583.0	31.2	18.5	10.1	25.0
859	1	608.0	32.2	25.0	5.5	26.0
883	1	632.0	33.1	24.0	6.0	27.0
909	1	658.0	34.2	26.0	5.1	28.0
936	1	685.0	35.2	27.0	4.7	29.0

Project: NW 3rd and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #4

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
278	0	0.0	8.3		7.0	0.0
306	1	28.0	9.4	28.0	7.0	1.0
318	1	40.0	9.8	12.0	18.1	2.0
331	1	53.0	10.3	13.0	16.5	3.0
345	1	67.0	10.9	14.0	17.6	4.0
362	1	84.0	11.6	17.0	11.9	5.0
378	1	100.0	12.2	16.0	13.5	6.0
408	1	130.0	13.4	30.0	3.8	7.0
442	1	164.0	14.7	34.0	3.0	8.0
484	1	206.0	16.4	42.0	2.0	9.0
536	1	258.0	18.4	52.0	1.3	10.0
583	1	305.0	20.3	47.0	1.6	11.0
606	1	328.0	21.2	23.0	6.5	12.0
626	1	348.0	22.0	20.0	8.6	13.0
646	1	368.0	22.7	20.0	8.6	14.0
668	1	390.0	23.6	22.0	7.1	15.0
689	1	411.0	24.4	21.0	7.8	16.0
709	1	431.0	25.2	20.0	8.6	17.0
729	1	451.0	26.0	20.0	8.6	18.0
750	1	472.0	26.8	21.0	7.8	19.0
772	1	494.0	27.7	22.0	7.1	20.0
793	1	515.0	28.5	21.0	7.8	21.0
818	1	540.0	29.5	25.0	5.5	22.0
839	1	561.0	30.3	21.0	7.8	23.0
864	1	586.0	31.3	25.0	5.5	24.0
890	1	612.0	32.3	26.0	5.1	25.0
916	1	638.0	33.4	26.0	5.1	26.0
939	1	661.0	34.3	23.0	6.5	27.0

Project: NW 3rd and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #5 Note: observe water in hole about 4 inches below top of pavement.

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
260	0	0.0	8.3		3.0	0.0
319	1	59.0	10.6	59.0	3.0	1.0
364	1	104.0	12.3	45.0	4.1	2.0
413	1	153.0	14.3	49.0	3.7	3.0
453	1	193.0	15.8	40.0	2.2	4.0
499	1	239.0	17.7	46.0	1.6	5.0
523	1	263.0	18.6	24.0	6.0	6.0
537	1	277.0	19.2	14.0	17.6	7.0
549	1	289.0	19.6	12.0	24.0	8.0
565	1	305.0	20.3	16.0	13.5	9.0
593	2	333.0	21.4	14.0	17.6	11.0
624	2	364.0	22.6	15.5	14.4	13.0
652	2	392.0	23.7	14.0	17.6	15.0
681	2	421.0	24.8	14.5	16.4	17.0
707	2	447.0	25.8	13.0	20.4	19.0
734	2	474.0	26.9	13.5	18.9	21.0
765	2	505.0	28.1	15.5	14.4	23.0
801	2	541.0	29.5	18.0	10.7	25.0
839	2	579.0	31.0	19.0	9.6	27.0
880	2	620.0	32.7	20.5	8.2	29.0
903	2	643.0	33.6	11.5	26.1	31.0
932	2	672.0	34.7	14.5	16.4	33.0

Project: NW 5th and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #1

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
209	0	0	8.25		0.4	0
305	1	96	12.02953	96	0.4	1.0
404	1	195	15.92717	99	0.4	2.0
483	1	274	19.0374	79	0.6	3.0
559	1	350	22.02953	76	0.6	4.0
630	1	421	24.8248	71	0.7	5.0
709	1	500	27.93504	79	0.6	6.0
791	1	582	31.16339	82	0.5	7.0
859	1	650	33.84055	68	0.7	8.0
923	1	714	36.36024	64	0.8	9.0

Project: NW 5th and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #2

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
220	0	0	8.25		1.0	0
278	1	58	10.53346	58	1.0	1.0
329	1	109	12.54134	51	1.3	2.0
374	1	154	14.31299	45	1.7	3.0
427	1	207	16.39961	53	1.2	4.0
491	1	271	18.91929	64	0.8	5.0
569	1	349	21.99016	78	0.6	6.0
644	1	424	24.94291	75	0.6	7.0
697	1	477	27.02953	53	1.2	8.0
763	1	543	29.62795	66	0.8	9.0
827	1	607	32.14764	64	0.8	10.0
889	1	669	34.58858	62	0.9	11.0
940	1	720	36.59646	51	1.3	12.0

Project: NW 5th and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #3

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
205	0	0	8.25		4.4	0
233	1	28	9.352362	28	4.4	1.0
260	1	55	10.41535	27	4.7	2.0
284	1	79	11.36024	24	6.0	3.0
315	1	110	12.58071	31	3.6	4.0
347	1	142	13.84055	32	3.4	5.0
383	1	178	15.25787	36	2.7	6.0
431	1	226	17.14764	48	1.5	7.0
481	1	276	19.11614	50	1.4	8.0
525	1	320	20.84843	44	1.8	9.0
566	1	361	22.4626	41	2.1	10.0
613	1	408	24.31299	47	1.6	11.0
659	1	454	26.12402	46	1.6	12.0
704	1	499	27.89567	45	1.7	13.0
752	1	547	29.78543	48	1.5	14.0
799	1	594	31.63583	47	1.6	15.0
848	1	643	33.56496	49	1.4	16.0
892	1	687	35.29724	44	1.8	17.0
937	1	732	37.0689	45	1.7	18.0

Project: NW 5th and Greenwood, Ankeny

Test Performed by DW/BZ/JM

Test Date 2-May-12

DCP #4

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
208	0	0	8.25		1.0	0
268	1	60	10.6122	60	1.0	1.0
316	1	108	12.50197	48	1.5	2.0
345	1	137	13.6437	29	4.1	3.0
394	1	186	15.57283	49	1.4	4.0
440	1	232	17.38386	46	1.6	5.0
487	1	279	19.23425	47	1.6	6.0
528	1	320	20.84843	41	2.1	7.0
559	1	351	22.0689	31	3.6	8.0
582	1	374	22.97441	23	6.5	9.0
602	1	394	23.76181	20	8.6	10.0
622	1	414	24.54921	20	8.6	11.0
640	1	432	25.25787	18	10.7	12.0
655	1	447	25.84843	15	15.3	13.0
671	1	463	26.47835	16	13.5	14.0
686	1	478	27.0689	15	15.3	15.0
714	2	506	28.17126	14	17.6	17.0
742	2	534	29.27362	14	17.6	19.0
767	2	559	30.25787	12.5	22.1	21.0
794	2	586	31.32087	13.5	18.9	23.0
820	2	612	32.34449	13	20.4	25.0
846	2	638	33.36811	13	20.4	27.0
872	2	664	34.39173	13	20.4	29.0
897	2	689	35.37598	12.5	22.1	31.0
924	2	716	36.43898	13.5	18.9	33.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #1 P1

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
362	0	0	8.3			0.0
373	1	11	8.7	11.0	19.9	1.0
389	2	27	9.3	8.0	28.4	3.0
403	2	41	9.9	7.0	33.0	5.0
422	2	60	10.6	9.5	23.5	7.0
442	2	80	11.4	10.0	22.2	9.0
464	2	102	12.3	11.0	19.9	11.0
486	2	124	13.1	11.0	19.9	13.0
510	2	148	14.1	12.0	18.1	15.0
540	2	178	15.3	15.0	14.1	17.0
572	1	210	16.5	32.0	6.0	18.0
604	1	242	17.8	32.0	6.0	19.0
637	1	275	19.1	33.0	5.8	20.0
665	2	303	20.2	14.0	15.2	22.0
690	2	328	21.2	12.5	17.3	24.0
714	2	352	22.1	12.0	18.1	26.0
740	2	378	23.1	13.0	16.5	28.0
767	2	405	24.2	13.5	15.8	30.0
795	2	433	25.3	14.0	15.2	32.0
821	2	459	26.3	13.0	16.5	34.0
848	2	486	27.4	13.5	15.8	36.0
874	2	512	28.4	13.0	16.5	38.0
899	2	537	29.4	12.5	17.3	40.0
924	2	562	30.4	12.5	17.3	42.0
960	2	598	31.8	18.0	11.5	44.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #2 P5

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
360	0	0	8.3		6.7	0.0
389	1	29	9.4	29.0	6.7	1.0
412	1	52	10.3	23.0	8.7	2.0
434	1	74	11.2	22.0	9.2	3.0
454	1	94	12.0	20.0	10.2	4.0
473	1	113	12.7	19.0	10.8	5.0
493	1	133	13.5	20.0	10.2	6.0
516	1	156	14.4	23.0	8.7	7.0
550	1	190	15.7	34.0	5.6	8.0
605	1	245	17.9	55.0	3.3	9.0
645	1	285	19.5	40.0	4.7	10.0
677	1	317	20.7	32.0	6.0	11.0
697	1	337	21.5	20.0	10.2	12.0
728	2	368	22.7	15.5	13.6	14.0
756	2	396	23.8	14.0	15.2	16.0
795	2	435	25.4	19.5	10.5	18.0
838	2	478	27.1	21.5	9.4	20.0
884	2	524	28.9	23.0	8.7	22.0
937	2	577	31.0	26.5	7.4	24.0
980	2	620	32.7	21.5	9.4	26.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #3 P9

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
346	0	0	8.3		13.1	0.0
362	1	16	8.9	16.0	13.1	1.0
380	1	34	9.6	18.0	11.5	2.0
397	2	51	10.3	8.5	26.6	4.0
430	2	84	11.6	16.5	12.6	6.0
459	2	113	12.7	14.5	14.6	8.0
485	2	139	13.7	13.0	16.5	10.0
519	2	173	15.1	17.0	12.2	12.0
559	2	213	16.6	20.0	10.2	14.0
591	2	245	17.9	16.0	13.1	16.0
619	1	273	19.0	28.0	7.0	17.0
625	1	279	19.2	6.0	39.3	18.0
643	1	297	19.9	18.0	11.5	19.0
679	2	333	21.4	18.0	11.5	21.0
710	2	364	22.6	15.5	13.6	23.0
739	2	393	23.7	14.5	14.6	25.0
763	2	417	24.7	12.0	18.1	27.0
790	2	444	25.7	13.5	15.8	29.0
813	2	467	26.6	11.5	18.9	31.0
839	2	493	27.7	13.0	16.5	33.0
860	2	514	28.5	10.5	21.0	35.0
889	2	543	29.6	14.5	14.6	37.0
932	2	586	31.3	21.5	9.4	39.0
959	2	613	32.4	13.5	15.8	41.0
985	2	639	33.4	13.0	16.5	43.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #4 P11

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
323	0	0	8.3		22.2	0.0
333	1	10	8.6	10.0	22.2	1.0
350	2	27	9.3	8.5	26.6	3.0
370	2	47	10.1	10.0	22.2	5.0
392	2	69	11.0	11.0	19.9	7.0
416	2	93	11.9	12.0	18.1	9.0
438	2	115	12.8	11.0	19.9	11.0
462	2	139	13.7	12.0	18.1	13.0
510	2	187	15.6	24.0	8.3	15.0
535	2	212	16.6	12.5	17.3	17.0
565	2	242	17.8	15.0	14.1	19.0
595	2	272	19.0	15.0	14.1	21.0
622	2	299	20.0	13.5	15.8	23.0
650	2	327	21.1	14.0	15.2	25.0
680	2	357	22.3	15.0	14.1	27.0
710	2	387	23.5	15.0	14.1	29.0
740	2	417	24.7	15.0	14.1	31.0
777	2	454	26.1	18.5	11.1	33.0
813	2	490	27.5	18.0	11.5	35.0
835	1	512	28.4	22.0	9.2	36.0
853	1	530	29.1	18.0	11.5	37.0
872	1	549	29.9	19.0	10.8	38.0
890	1	567	30.6	18.0	11.5	39.0
915	1	592	31.6	25.0	7.9	40.0
920	1	597	31.8	5.0	48.1	41.0
935	1	612	32.3	15.0	14.1	42.0
950	1	627	32.9	15.0	14.1	43.0
970	1	647	33.7	20.0	10.2	44.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Test Date: 31-May-12

DCP #5	P13					
Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
318	0	0	8.3		22.2	0.0
328	1	10	8.6	10.0	22.2	1.0
330	1	12	8.7	2.0	134.3	2.0
351	3	33	9.5	7.0	33.0	5.0
370	2	52	10.3	9.5	23.5	7.0
393	2	75	11.2	11.5	18.9	9.0
420	2	102	12.3	13.5	15.8	11.0
452	2	134	13.5	16.0	13.1	13.0
485	2	167	14.8	16.5	12.6	15.0
515	2	197	16.0	15.0	14.1	17.0
539	2	221	17.0	12.0	18.1	19.0
560	2	242	17.8	10.5	21.0	21.0
580	2	262	18.6	10.0	22.2	23.0
604	2	286	19.5	12.0	18.1	25.0
624	2	306	20.3	10.0	22.2	27.0
645	2	327	21.1	10.5	21.0	29.0
669	2	351	22.1	12.0	18.1	31.0
690	2	372	22.9	10.5	21.0	33.0
711	2	393	23.7	10.5	21.0	35.0
730	2	412	24.5	9.5	23.5	37.0
746	2	428	25.1	8.0	28.4	39.0
762	2	444	25.7	8.0	28.4	41.0
784	3	466	26.6	7.3	31.4	44.0
805	3	487	27.4	7.0	33.0	47.0
823	3	505	28.1	6.0	39.3	50.0
842	3	524	28.9	6.3	36.9	53.0
862	3	544	29.7	6.7	34.9	56.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #6	P14 Joint		Note: Void under pavement and water in hole			
Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
310	0	0	8.3		18.1	0.0
322	1	12	8.7	12.0	18.1	1.0
335	2	25	9.2	6.5	35.9	3.0
350	1	40	9.8	15.0	14.1	4.0
412	1	102	12.3	62.0	2.9	5.0
455	1	145	14.0	43.0	4.3	6.0
490	1	180	15.3	35.0	5.4	7.0
520	1	210	16.5	30.0	6.5	8.0
541	1	231	17.3	21.0	9.6	9.0
588	2	278	19.2	23.5	8.5	11.0
630	2	320	20.8	21.0	9.6	13.0
672	2	362	22.5	21.0	9.6	15.0
700	2	390	23.6	14.0	15.2	17.0
759	2	449	25.9	29.5	6.6	19.0
795	1	485	27.3	36.0	5.3	20.0
847	1	537	29.4	52.0	3.5	21.0
885	1	575	30.9	38.0	5.0	22.0
915	1	605	32.1	30.0	6.5	23.0
940	1	630	33.1	25.0	7.9	24.0
962	1	652	33.9	22.0	9.2	25.0
985	1	675	34.8	23.0	8.7	26.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #7	P15 Joint					
Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
310	0	0	8.3		22.2	0.0
320	1	10	8.6	10.0	22.2	1.0
360	3	50	10.2	13.3	16.0	4.0
398	1	88	11.7	38.0	5.0	5.0
448	2	138	13.7	25.0	7.9	7.0
500	2	190	15.7	26.0	7.6	9.0
550	2	240	17.7	25.0	7.9	11.0
600	2	290	19.7	25.0	7.9	13.0
658	2	348	22.0	29.0	6.7	15.0
691	1	381	23.3	33.0	5.8	16.0
722	1	412	24.5	31.0	6.2	17.0
761	1	451	26.0	39.0	4.8	18.0
802	1	492	27.6	41.0	4.6	19.0
845	1	535	29.3	43.0	4.3	20.0
882	1	572	30.8	37.0	5.1	21.0
935	1	625	32.9	53.0	3.4	22.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #8	P18 CHP2					
Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
399	0	0	8.3		4.0	0.0
445	1	46	10.1	46.0	4.0	1.0
475	1	76	11.2	30.0	6.5	2.0
518	1	119	12.9	43.0	4.3	3.0
528	1	129	13.3	10.0	22.2	4.0
573	2	174	15.1	22.5	8.9	6.0
625	2	226	17.1	26.0	7.6	8.0
690	2	291	19.7	32.5	5.9	10.0
725	1	326	21.1	35.0	5.4	11.0
760	1	361	22.5	35.0	5.4	12.0
792	1	393	23.7	32.0	6.0	13.0
825	1	426	25.0	33.0	5.8	14.0
865	1	466	26.6	40.0	4.7	15.0
916	1	517	28.6	51.0	3.6	16.0
953	1	554	30.1	37.0	5.1	17.0
972	1	573	30.8	19.0	10.8	18.0
994	1	595	31.7	22.0	9.2	19.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #9 P21

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
336	0	0	8.3		15.2	0.0
350	1	14	8.8	14.0	15.2	1.0
365	1	29	9.4	15.0	14.1	2.0
442	2	106	12.4	38.5	4.9	4.0
480	1	144	13.9	38.0	5.0	5.0
511	1	175	15.1	31.0	6.2	6.0
542	1	206	16.4	31.0	6.2	7.0
570	1	234	17.5	28.0	7.0	8.0
599	1	263	18.6	29.0	6.7	9.0
633	1	297	19.9	34.0	5.6	10.0
669	1	333	21.4	36.0	5.3	11.0
702	1	366	22.7	33.0	5.8	12.0
739	1	403	24.1	37.0	5.1	13.0
775	1	439	25.5	36.0	5.3	14.0
800	1	464	26.5	25.0	7.9	15.0
819	1	483	27.3	19.0	10.8	16.0
833	1	497	27.8	14.0	15.2	17.0
860	1	524	28.9	27.0	7.3	18.0
895	1	559	30.3	35.0	5.4	19.0
932	1	596	31.7	37.0	5.1	20.0
975	1	639	33.4	43.0	4.3	21.0

Project: E63, Story County
Note: E63 Going from East to West in the West bound lane

Tests Performed by: HG/BZ

Test Date: 31-May-12

DCP #10 P22 CHP3

Depth	Blows	Penetration	inches	DPI (mm/blow)	CBR (%)	Cumulative Blows
345	0	0	8.3		2.5	0.0
415	1	70	11.0	70.0	2.5	1.0
490	1	145	14.0	75.0	2.3	2.0
511	1	166	14.8	21.0	9.6	3.0
525	1	180	15.3	14.0	15.2	4.0
562	3	217	16.8	12.3	17.5	7.0
600	3	255	18.3	12.7	17.0	10.0
634	3	289	19.6	11.3	19.3	13.0
672	3	327	21.1	12.7	17.0	16.0
711	3	366	22.7	13.0	16.5	19.0
750	3	405	24.2	13.0	16.5	22.0
772	2	427	25.1	11.0	19.9	24.0
800	2	455	26.2	14.0	15.2	26.0
829	2	484	27.3	14.5	14.6	28.0
852	2	507	28.2	11.5	18.9	30.0
876	2	531	29.2	12.0	18.1	32.0
900	2	555	30.1	12.0	18.1	34.0
922	2	577	31.0	11.0	19.9	36.0
942	2	597	31.8	10.0	22.2	38.0
962	2	617	32.5	10.0	22.2	40.0
971	1	626	32.9	9.0	24.9	41.0

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
455	0	279.4	11.0	7.0	33.0	0
462	1	286.4	11.3	7.0	33.0	1
482	5	306.4	12.1	4.0	61.8	6
512	5	336.4	13.2	6.0	39.3	11
550	3	374.4	14.7	12.7	17.0	14
581	3	405.4	16.0	10.3	21.4	17
600	2	424.4	16.7	9.5	23.5	19
620	2	444.4	17.5	10.0	22.2	21
640	2	464.4	18.3	10.0	22.2	23
664	2	488.4	19.2	12.0	18.1	25
685	2	509.4	20.1	10.5	21.0	27
706	2	530.4	20.9	10.5	21.0	29
740	2	564.4	22.2	17.0	12.2	31
750	2	574.4	22.6	5.0	48.1	33
780	3	604.4	23.8	10.0	22.2	36
800	2	624.4	24.6	10.0	22.2	38
822	2	646.4	25.4	11.0	19.9	40
846	2	670.4	26.4	12.0	18.1	42
880	2	704.4	27.7	17.0	12.2	44
896	1	720.4	28.4	16.0	13.1	45
922	1	746.4	29.4	26.0	5.1	46
954	1	778.4	30.6	32.0	3.4	47
990	1	814.4	32.1	36.0	2.7	48

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
400	0	279.4	11.0	5.0	48.1	0
405	1	284.4	11.2	5.0	48.1	1
418	5	297.4	11.7	2.6	100.1	6
422	5	301.4	11.9	0.8	374.9	11
430	5	309.4	12.2	1.6	172.5	16
435	5	314.4	12.4	1.0	292.0	21
442	5	321.4	12.7	1.4	200.3	26
452	5	331.4	13.0	2.0	134.3	31
462	5	341.4	13.4	2.0	134.3	36
475	5	354.4	14.0	2.6	100.1	41
485	5	364.4	14.3	2.0	134.3	46
495	5	374.4	14.7	2.0	134.3	51
510	5	389.4	15.3	3.0	85.3	56
522	5	401.4	15.8	2.4	109.5	61
541	4	420.4	16.6	4.8	51.0	65
555	2	434.4	17.1	7.0	33.0	67
575	2	454.4	17.9	10.0	22.2	69
590	1	469.4	18.5	15.0	14.1	70
605	1	484.4	19.1	15.0	14.1	71
620	1	499.4	19.7	15.0	14.1	72
630	1	509.4	20.1	10.0	22.2	73
640	1	519.4	20.4	10.0	22.2	74
650	1	529.4	20.8	10.0	22.2	75
670	2	549.4	21.6	10.0	22.2	77
690	2	569.4	22.4	10.0	22.2	79
711	2	590.4	23.2	10.5	21.0	81
740	2	619.4	24.4	14.5	14.6	83
765	2	644.4	25.4	12.5	17.3	85
785	2	664.4	26.2	10.0	22.2	87
805	2	684.4	26.9	10.0	22.2	89
822	2	701.4	27.6	8.5	26.6	91
840	2	719.4	28.3	9.0	24.9	93
860	2	739.4	29.1	10.0	22.2	95
870	2	749.4	29.5	5.0	48.1	97
910	1	789.4	31.1	40.0	2.2	98
940	1	819.4	32.3	30.0	3.8	99
975	1	854.4	33.6	35.0	2.8	100

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
430	0	279.4	11.0	12.0	18.1	0
442	1	291.4	11.5	12.0	18.1	1
450	2	299.4	11.8	4.0	61.8	3
460	2	309.4	12.2	5.0	48.1	5
465	2	314.4	12.4	2.5	104.6	7
490	5	339.4	13.4	5.0	48.1	12
500	5	349.4	13.8	2.0	134.3	17
518	5	367.4	14.5	3.6	69.6	22
540	5	389.4	15.3	4.4	55.6	27
553	2	402.4	15.8	6.5	35.9	29
570	2	419.4	16.5	8.5	26.6	31
600	2	449.4	17.7	15.0	14.1	33
622	2	471.4	18.6	11.0	19.9	35
642	2	491.4	19.3	10.0	22.2	37
668	2	517.4	20.4	13.0	16.5	39
690	2	539.4	21.2	11.0	19.9	41
713	2	562.4	22.1	11.5	18.9	43
740	2	589.4	23.2	13.5	15.8	45
763	2	612.4	24.1	11.5	18.9	47
790	2	639.4	25.2	13.5	15.8	49
814	2	663.4	26.1	12.0	18.1	51
840	2	689.4	27.1	13.0	16.5	53
866	2	715.4	28.2	13.0	16.5	55
908	2	757.4	29.8	21.0	7.8	57
960	2	809.4	31.9	26.0	5.1	59
990	1	839.4	33.0	30.0	3.8	60

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
400	0	279.4	11.0	5.0	48.1	0
410	2	289.4	11.4	5.0	48.1	2
411	2	290.4	11.4	0.5	634.7	4
420	2	299.4	11.8	4.5	54.2	6
422	2	301.4	11.9	1.0	292.0	8
432	5	311.4	12.3	2.0	134.3	13
448	5	327.4	12.9	3.2	79.4	18
460	5	339.4	13.4	2.4	109.5	23
470	5	349.4	13.8	2.0	134.3	28
480	5	359.4	14.1	2.0	134.3	33
490	5	369.4	14.5	2.0	134.3	38
500	5	379.4	14.9	2.0	134.3	43
510	5	389.4	15.3	2.0	134.3	48
525	5	404.4	15.9	3.0	85.3	53
545	5	424.4	16.7	4.0	61.8	58
570	5	449.4	17.7	5.0	48.1	63
590	3	469.4	18.5	6.7	34.9	66
625	3	504.4	19.9	11.7	18.6	69
655	2	534.4	21.0	15.0	14.1	71
680	2	559.4	22.0	12.5	17.3	73
705	2	584.4	23.0	12.5	17.3	75
732	2	611.4	24.1	13.5	15.8	77
760	2	639.4	25.2	14.0	15.2	79
790	2	669.4	26.4	15.0	14.1	81
820	2	699.4	27.5	15.0	14.1	83
850	2	729.4	28.7	15.0	14.1	85
880	2	759.4	29.9	15.0	14.1	87
910	2	789.4	31.1	15.0	14.1	89
940	2	819.4	32.3	15.0	14.1	91
970	2	849.4	33.4	15.0	14.1	93

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
413	0	279.4	11.0	6.0	39.3	0
425	2	291.4	11.5	6.0	39.3	2
430	2	296.4	11.7	2.5	104.6	4
432	2	298.4	11.7	1.0	292.0	6
450	5	316.4	12.5	3.6	69.6	11
472	5	338.4	13.3	4.4	55.6	16
490	4	356.4	14.0	4.5	54.2	20
510	3	376.4	14.8	6.7	34.9	23
530	3	396.4	15.6	6.7	34.9	26
555	3	421.4	16.6	8.3	27.2	29
600	2	466.4	18.4	22.5	6.8	31
650	2	516.4	20.3	25.0	5.5	33
688	2	554.4	21.8	19.0	9.6	35
720	2	586.4	23.1	16.0	13.1	37
760	2	626.4	24.7	20.0	8.6	39
800	2	666.4	26.2	20.0	8.6	41
848	2	714.4	28.1	24.0	6.0	43
880	2	746.4	29.4	16.0	13.1	45
922	2	788.4	31.0	21.0	7.8	47
960	2	826.4	32.5	19.0	9.6	49
992	2	858.4	33.8	16.0	13.1	51

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
440	0	279.4	11.0	10.0	22.2	0
460	2	299.4	11.8	10.0	22.2	2
480	2	319.4	12.6	10.0	22.2	4
490	2	329.4	13.0	5.0	48.1	6
520	5	359.4	14.1	6.0	39.3	11
560	5	399.4	15.7	8.0	28.4	16
598	3	437.4	17.2	12.7	17.0	19
630	3	469.4	18.5	10.7	20.6	22
660	3	499.4	19.7	10.0	22.2	25
690	3	529.4	20.8	10.0	22.2	28
730	3	569.4	22.4	13.3	16.0	31
765	3	604.4	23.8	11.7	18.6	34
805	3	644.4	25.4	13.3	16.0	37
830	2	669.4	26.4	12.5	17.3	39
855	2	694.4	27.3	12.5	17.3	41
882	2	721.4	28.4	13.5	15.8	43
910	2	749.4	29.5	14.0	15.2	45
935	2	774.4	30.5	12.5	17.3	47
960	2	799.4	31.5	12.5	17.3	49
990	2	829.4	32.7	15.0	14.1	51

Project: Riverside Road, Ames

Tests Performed by: HG/BZ
Test Date 7-Jun-12

Riverside Road WB Lane

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
410	0	279.4	11.0	10.0	22.2	0
430	2	299.4	11.8	10.0	22.2	2
435	2	304.4	12.0	2.5	104.6	4
440	2	309.4	12.2	2.5	104.6	6
460	5	329.4	13.0	4.0	61.8	11
480	5	349.4	13.8	4.0	61.8	16
500	5	369.4	14.5	4.0	61.8	21
520	5	389.4	15.3	4.0	61.8	26
545	5	414.4	16.3	5.0	48.1	31
575	5	444.4	17.5	6.0	39.3	36
600	3	469.4	18.5	8.3	27.2	39
635	3	504.4	19.9	11.7	18.6	42
680	2	549.4	21.6	22.5	6.8	44
710	2	579.4	22.8	15.0	14.1	46
735	2	604.4	23.8	12.5	17.3	48
760	2	629.4	24.8	12.5	17.3	50
790	2	659.4	26.0	15.0	14.1	52
815	2	684.4	26.9	12.5	17.3	54
845	2	714.4	28.1	15.0	14.1	56
870	2	739.4	29.1	12.5	17.3	58
900	2	769.4	30.3	15.0	14.1	60
930	2	799.4	31.5	15.0	14.1	62
960	2	829.4	32.7	15.0	14.1	64
980	1	849.4	33.4	20.0	8.6	65

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
400	0	279.4	11.0	4.0	61.8	0
408	2	287.4	11.3	4.0	61.8	2
411	2	290.4	11.4	1.5	185.4	4
415	2	294.4	11.6	2.0	134.3	6
430	5	309.4	12.2	3.0	85.3	11
450	5	329.4	13.0	4.0	61.8	16
465	5	344.4	13.6	3.0	85.3	21
490	5	369.4	14.5	5.0	48.1	26
511	5	390.4	15.4	4.2	58.5	31
540	5	419.4	16.5	5.8	40.8	36
573	5	452.4	17.8	6.6	35.3	41
600	3	479.4	18.9	9.0	24.9	44
620	2	499.4	19.7	10.0	22.2	46
648	2	527.4	20.8	14.0	15.2	48
670	2	549.4	21.6	11.0	19.9	50
700	2	579.4	22.8	15.0	14.1	52
722	2	601.4	23.7	11.0	19.9	54
770	2	649.4	25.6	24.0	6.0	56
780	2	659.4	26.0	5.0	48.1	58
805	2	684.4	26.9	12.5	17.3	60
830	2	709.4	27.9	12.5	17.3	62
860	2	739.4	29.1	15.0	14.1	64
888	2	767.4	30.2	14.0	15.2	66
915	2	794.4	31.3	13.5	15.8	68
940	2	819.4	32.3	12.5	17.3	70

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP9

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
440	0	279.4	11.0	4.0	61.8	0
448	2	287.4	11.3	4.0	61.8	2
450	2	289.4	11.4	1.0	292.0	4
455	5	294.4	11.6	1.0	292.0	9
463	5	302.4	11.9	1.6	172.5	14
472	5	311.4	12.3	1.8	151.2	19
480	5	319.4	12.6	1.6	172.5	24
490	5	329.4	13.0	2.0	134.3	29
500	5	339.4	13.4	2.0	134.3	34
510	5	349.4	13.8	2.0	134.3	39
520	5	359.4	14.1	2.0	134.3	44
530	5	369.4	14.5	2.0	134.3	49
540	5	379.4	14.9	2.0	134.3	54
555	5	394.4	15.5	3.0	85.3	59
570	5	409.4	16.1	3.0	85.3	64
585	5	424.4	16.7	3.0	85.3	69
610	5	449.4	17.7	5.0	48.1	74
640	2	479.4	18.9	15.0	14.1	76
655	2	494.4	19.5	7.5	30.6	78
665	2	504.4	19.9	5.0	48.1	80
680	2	519.4	20.4	7.5	30.6	82
690	2	529.4	20.8	5.0	48.1	84
700	2	539.4	21.2	5.0	48.1	86
710	2	549.4	21.6	5.0	48.1	88
725	2	564.4	22.2	7.5	30.6	90
740	2	579.4	22.8	7.5	30.6	92
755	2	594.4	23.4	7.5	30.6	94
770	2	609.4	24.0	7.5	30.6	96
790	2	629.4	24.8	10.0	22.2	98
802	2	641.4	25.3	6.0	39.3	100
820	2	659.4	26.0	9.0	24.9	102
840	2	679.4	26.7	10.0	22.2	104
860	2	699.4	27.5	10.0	22.2	106
890	2	729.4	28.7	15.0	14.1	108
920	2	759.4	29.9	15.0	14.1	110
950	2	789.4	31.1	15.0	14.1	112
970	2	809.4	31.9	10.0	22.2	114
995	2	834.4	32.9	12.5	17.3	116

Project: Riverside Road, Ames

Tests Performed by: HG/BZ

Test Date: 7-Jun-12

Riverside Road WB Lane

DCP10

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
390	0	279.4	11.0	2.0	134.3	0
392	1	281.4	11.1	2.0	134.3	1
400	5	289.4	11.4	1.6	172.5	6
410	5	299.4	11.8	2.0	134.3	11
420	5	309.4	12.2	2.0	134.3	16
432	5	321.4	12.7	2.4	109.5	21
443	5	332.4	13.1	2.2	120.7	26
453	5	342.4	13.5	2.0	134.3	31
463	5	352.4	13.9	2.0	134.3	36
470	5	359.4	14.1	1.4	200.3	41
480	5	369.4	14.5	2.0	134.3	46
488	5	377.4	14.9	1.6	172.5	51
493	5	382.4	15.1	1.0	292.0	56
502	5	391.4	15.4	1.8	151.2	61
510	5	399.4	15.7	1.6	172.5	66
520	5	409.4	16.1	2.0	134.3	71
528	5	417.4	16.4	1.6	172.5	76
538	5	427.4	16.8	2.0	134.3	81
545	5	434.4	17.1	1.4	200.3	86
555	5	444.4	17.5	2.0	134.3	91
565	5	454.4	17.9	2.0	134.3	96
580	5	469.4	18.5	3.0	85.3	101
590	5	479.4	18.9	2.0	134.3	106
610	5	499.4	19.7	4.0	61.8	111
625	3	514.4	20.3	5.0	48.1	114
650	3	539.4	21.2	8.3	27.2	117
680	3	569.4	22.4	10.0	22.2	120
700	2	589.4	23.2	10.0	22.2	122
720	2	609.4	24.0	10.0	22.2	124
748	2	637.4	25.1	14.0	15.2	126
770	2	659.4	26.0	11.0	19.9	128
802	2	691.4	27.2	16.0	13.1	130
825	1	714.4	28.1	23.0	6.5	131
852	1	741.4	29.2	27.0	4.7	132
888	1	777.4	30.6	36.0	2.7	133
926	1	815.4	32.1	38.0	2.4	134
970	1	859.4	33.8	44.0	1.8	135

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
309	0	171.45	6.8	14.0	15.2	0
323	1	185.45	7.3	14.0	15.2	1
361	2	223.45	8.8	19.0	9.6	3
391	2	253.45	10.0	15.0	14.1	5
420	2	282.45	11.1	14.5	14.6	7
447	2	309.45	12.2	13.5	15.8	9
477	2	339.45	13.4	15.0	14.1	11
512	2	374.45	14.7	17.5	11.8	13
546	2	408.45	16.1	17.0	12.2	15
580	2	442.45	17.4	17.0	12.2	17
610	2	472.45	18.6	15.0	14.1	19
640	2	502.45	19.8	15.0	14.1	21
670	2	532.45	21.0	15.0	14.1	23
703	2	565.45	22.3	16.5	12.6	25
737	2	599.45	23.6	17.0	12.2	27
815	2	677.45	26.7	39.0	2.3	29
860	2	722.45	28.4	22.5	6.8	31
897	2	759.45	29.9	18.5	11.1	33
945	2	807.45	31.8	24.0	6.0	35
993	2	855.45	33.7	24.0	6.0	37

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
331	0	171.45	6.8	25.0	5.5	0
356	1	196.45	7.7	25.0	5.5	1
373	1	213.45	8.4	17.0	12.2	2
406	2	246.45	9.7	16.5	12.6	4
443	2	283.45	11.2	18.5	11.1	6
481	2	321.45	12.7	19.0	9.6	8
519	2	359.45	14.2	19.0	9.6	10
556	2	396.45	15.6	18.5	11.1	12
601	2	441.45	17.4	22.5	6.8	14
646	2	486.45	19.2	22.5	6.8	16
684	2	524.45	20.6	19.0	9.6	18
706	2	546.45	21.5	11.0	19.9	20
724	2	564.45	22.2	9.0	24.9	22
732	2	572.45	22.5	4.0	61.8	24
765	2	605.45	23.8	16.5	12.6	26
790	2	630.45	24.8	12.5	17.3	28
810	2	650.45	25.6	10.0	22.2	30
842	3	682.45	26.9	10.7	20.6	33
880	3	720.45	28.4	12.7	17.0	36
907	2	747.45	29.4	13.5	15.8	38
934	2	774.45	30.5	13.5	15.8	40
983	1	823.45	32.4	49.0	1.4	41

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
303	0	171.45	6.8	17.0	12.2	0
320	1	188.45	7.4	17.0	12.2	1
363	3	231.45	9.1	14.3	14.8	4
401	2	269.45	10.6	19.0	9.6	6
434	2	302.45	11.9	16.5	12.6	8
470	2	338.45	13.3	18.0	11.5	10
511	2	379.45	14.9	20.5	8.2	12
539	3	407.45	16.0	9.3	23.9	15
576	5	444.45	17.5	7.4	31.0	20
621	5	489.45	19.3	9.0	24.9	25
677	5	545.45	21.5	11.2	19.5	30
718	2	586.45	23.1	20.5	8.2	32
731	1	599.45	23.6	13.0	16.5	33
772	1	640.45	25.2	41.0	2.1	34
809	1	677.45	26.7	37.0	2.5	35
841	1	709.45	27.9	32.0	3.4	36
863	1	731.45	28.8	22.0	7.1	37
883	1	751.45	29.6	20.0	8.6	38
901	1	769.45	30.3	18.0	11.5	39
920	1	788.45	31.0	19.0	9.6	40
939	1	807.45	31.8	19.0	9.6	41
960	1	828.45	32.6	21.0	7.8	42
979	1	847.45	33.4	19.0	9.6	43
995	1	863.45	34.0	16.0	13.1	44

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
303	0	171.45	6.8	17.0	12.2	0
320	1	188.45	7.4	17.0	12.2	1
340	1	208.45	8.2	20.0	8.6	2
363	1	231.45	9.1	23.0	6.5	3
383	1	251.45	9.9	20.0	8.6	4
437	2	305.45	12.0	27.0	4.7	6
480	2	348.45	13.7	21.5	7.5	8
514	2	382.45	15.1	17.0	12.2	10
551	2	419.45	16.5	18.5	11.1	12
595	2	463.45	18.2	22.0	7.1	14
632	2	500.45	19.7	18.5	11.1	16
655	2	523.45	20.6	11.5	18.9	18
694	5	562.45	22.1	7.8	29.3	23
730	5	598.45	23.6	7.2	32.0	28
765	5	633.45	24.9	7.0	33.0	33
800	5	668.45	26.3	7.0	33.0	38
832	5	700.45	27.6	6.4	36.5	43
861	5	729.45	28.7	5.8	40.8	48
892	5	760.45	29.9	6.2	37.8	53
923	5	791.45	31.2	6.2	37.8	58
950	5	818.45	32.2	5.4	44.2	63
980	7	848.45	33.4	4.3	57.2	70

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP5						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
295	0	171.45	6.8	6.0	39.3	0
301	1	177.45	7.0	6.0	39.3	1
309	1	185.45	7.3	8.0	28.4	2
355	5	231.45	9.1	9.2	24.3	7
392	3	268.45	10.6	12.3	17.5	10
431	3	307.45	12.1	13.0	16.5	13
479	3	355.45	14.0	16.0	13.1	16
517	2	393.45	15.5	19.0	9.6	18
554	2	430.45	16.9	18.5	11.1	20
590	2	466.45	18.4	18.0	11.5	22
627	2	503.45	19.8	18.5	11.1	24
668	2	544.45	21.4	20.5	8.2	26
723	2	599.45	23.6	27.5	4.6	28
759	1	635.45	25.0	36.0	2.7	29
786	1	662.45	26.1	27.0	4.7	30
817	1	693.45	27.3	31.0	3.6	31
852	1	728.45	28.7	35.0	2.8	32
899	1	775.45	30.5	47.0	1.6	33
951	1	827.45	32.6	52.0	1.3	34

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
330	0	171.45	6.8	33.0	3.2	0
363	1	204.45	8.0	33.0	3.2	1
390	1	231.45	9.1	27.0	4.7	2
414	1	255.45	10.1	24.0	6.0	3
440	1	281.45	11.1	26.0	5.1	4
462	1	303.45	11.9	22.0	7.1	5
489	1	330.45	13.0	27.0	4.7	6
515	1	356.45	14.0	26.0	5.1	7
543	1	384.45	15.1	28.0	4.4	8
575	1	416.45	16.4	32.0	3.4	9
607	1	448.45	17.7	32.0	3.4	10
641	1	482.45	19.0	34.0	3.0	11
673	1	514.45	20.3	32.0	3.4	12
709	1	550.45	21.7	36.0	2.7	13
741	1	582.45	22.9	32.0	3.4	14
772	1	613.45	24.2	31.0	3.6	15
819	1	660.45	26.0	47.0	1.6	16
845	1	686.45	27.0	26.0	5.1	17
883	1	724.45	28.5	38.0	2.4	18
923	1	764.45	30.1	40.0	2.2	19

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP7						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
313	0	171.45	6.8	28.0	4.4	0
341	1	199.45	7.9	28.0	4.4	1
373	1	231.45	9.1	32.0	3.4	2
402	1	260.45	10.3	29.0	4.1	3
440	1	298.45	11.8	38.0	2.4	4
479	1	337.45	13.3	39.0	2.3	5
522	1	380.45	15.0	43.0	1.9	6
566	1	424.45	16.7	44.0	1.8	7
602	1	460.45	18.1	36.0	2.7	8
637	1	495.45	19.5	35.0	2.8	9
677	1	535.45	21.1	40.0	2.2	10
711	1	569.45	22.4	34.0	3.0	11
741	1	599.45	23.6	30.0	3.8	12
782	1	640.45	25.2	41.0	2.1	13
825	1	683.45	26.9	43.0	1.9	14
864	1	722.45	28.4	39.0	2.3	15
905	1	763.45	30.1	41.0	2.1	16
941	1	799.45	31.5	36.0	2.7	17
977	1	835.45	32.9	36.0	2.7	18

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
297	0	171.45	6.8	6.0	39.3	0
303	1	177.45	7.0	6.0	39.3	1
330	3	204.45	8.0	9.0	24.9	4
363	2	237.45	9.3	16.5	12.6	6
403	2	277.45	10.9	20.0	8.6	8
440	2	314.45	12.4	18.5	11.1	10
475	2	349.45	13.8	17.5	11.8	12
507	2	381.45	15.0	16.0	13.1	14
545	2	419.45	16.5	19.0	9.6	16
595	2	469.45	18.5	25.0	5.5	18
623	1	497.45	19.6	28.0	4.4	19
652	1	526.45	20.7	29.0	4.1	20
683	1	557.45	21.9	31.0	3.6	21
717	1	591.45	23.3	34.0	3.0	22
749	1	623.45	24.5	32.0	3.4	23
782	1	656.45	25.8	33.0	3.2	24
816	1	690.45	27.2	34.0	3.0	25
851	1	725.45	28.6	35.0	2.8	26
887	1	761.45	30.0	36.0	2.7	27
923	1	797.45	31.4	36.0	2.7	28
956	1	830.45	32.7	33.0	3.2	29
989	1	863.45	34.0	33.0	3.2	30

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP9

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
309	0	171.45	6.8	11.0	19.9	0
320	1	182.45	7.2	11.0	19.9	1
349	3	211.45	8.3	9.7	23.0	4
382	3	244.45	9.6	11.0	19.9	7
410	2	272.45	10.7	14.0	15.2	9
441	2	303.45	11.9	15.5	13.6	11
477	2	339.45	13.4	18.0	11.5	13
523	2	385.45	15.2	23.0	6.5	15
551	1	413.45	16.3	28.0	4.4	16
573	1	435.45	17.1	22.0	7.1	17
597	1	459.45	18.1	24.0	6.0	18
615	1	477.45	18.8	18.0	11.5	19
650	2	512.45	20.2	17.5	11.8	21
687	2	549.45	21.6	18.5	11.1	23
715	2	577.45	22.7	14.0	15.2	25
739	2	601.45	23.7	12.0	18.1	27
762	2	624.45	24.6	11.5	18.9	29
785	2	647.45	25.5	11.5	18.9	31
815	2	677.45	26.7	15.0	14.1	33
854	2	716.45	28.2	19.5	9.1	35
877	1	739.45	29.1	23.0	6.5	36
907	1	769.45	30.3	30.0	3.8	37
937	1	799.45	31.5	30.0	3.8	38
965	1	827.45	32.6	28.0	4.4	39
995	1	857.45	33.8	30.0	3.8	40

Project: E23, Story County

Tests Performed by: HG/BZ

Test Date: 21-Jun-12

E23, Zearing

DCP10

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
299	0	171.45	6.8	1.0	292.0	0
300	1	172.45	6.8	1.0	292.0	1
332	5	204.45	8.0	6.4	36.5	6
355	2	227.45	9.0	11.5	18.9	8
380	2	252.45	9.9	12.5	17.3	10
395	1	267.45	10.5	15.0	14.1	11
413	1	285.45	11.2	18.0	11.5	12
440	1	312.45	12.3	27.0	4.7	13
470	1	342.45	13.5	30.0	3.8	14
499	1	371.45	14.6	29.0	4.1	15
520	1	392.45	15.5	21.0	7.8	16
563	2	435.45	17.1	21.5	7.5	18
583	2	455.45	17.9	10.0	22.2	20
621	5	493.45	19.4	7.6	30.1	25
637	1	509.45	20.1	16.0	13.1	26
660	1	532.45	21.0	23.0	6.5	27
681	1	553.45	21.8	21.0	7.8	28
700	1	572.45	22.5	19.0	9.6	29
715	1	587.45	23.1	15.0	14.1	30
730	1	602.45	23.7	15.0	14.1	31
762	2	634.45	25.0	16.0	13.1	33
800	2	672.45	26.5	19.0	9.6	35
847	2	719.45	28.3	23.5	6.3	37
899	2	771.45	30.4	26.0	5.1	39
936	2	808.45	31.8	18.5	11.1	41
962	2	834.45	32.9	13.0	16.5	43

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
258	0	228.6	9.0	3.1	82.2	0
320	20	290.6	11.4	3.1	82.2	20
366	15	336.6	13.3	3.1	83.2	35
398	10	368.6	14.5	3.2	79.4	45
436	10	406.6	16.0	3.8	65.5	55
463	5	433.6	17.1	5.4	44.2	60
501	5	471.6	18.6	7.6	30.1	65
514	1	484.6	19.1	13.0	16.5	66
551	1	521.6	20.5	37.0	2.5	67
584	1	554.6	21.8	33.0	3.2	68
610	1	580.6	22.9	26.0	5.1	69
659	2	629.6	24.8	24.5	5.8	71
703	1	673.6	26.5	44.0	1.8	72
742	1	712.6	28.1	39.0	2.3	73
772	1	742.6	29.2	30.0	3.8	74
796	1	766.6	30.2	24.0	6.0	75
809	1	779.6	30.7	13.0	16.5	76
833	1	803.6	31.6	24.0	6.0	77
859	1	829.6	32.7	26.0	5.1	78
908	1	878.6	34.6	49.0	1.4	79

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
242	0	228.6	9.0	2.9	90.4	0
299	20	285.6	11.2	2.9	90.4	20
341	15	327.6	12.9	2.8	92.2	35
368	15	354.6	14.0	1.8	151.2	50
392	10	378.6	14.9	2.4	109.5	60
432	10	418.6	16.5	4.0	61.8	70
481	10	467.6	18.4	4.9	49.2	80
518	5	504.6	19.9	7.4	31.0	85
540	1	526.6	20.7	22.0	7.1	86
578	2	564.6	22.2	19.0	9.6	88
610	1	596.6	23.5	32.0	3.4	89
658	1	644.6	25.4	48.0	1.5	90
692	1	678.6	26.7	34.0	3.0	91
722	1	708.6	27.9	30.0	3.8	92
739	2	725.6	28.6	8.5	26.6	94
760	3	746.6	29.4	7.0	33.0	97
798	5	784.6	30.9	7.6	30.1	102
824	3	810.6	31.9	8.7	26.0	105
845	3	831.6	32.7	7.0	33.0	108
850	3	836.6	32.9	1.7	164.8	111

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
216	0	228.6	9.0	3.5	73.0	0
285	20	297.6	11.7	3.5	73.0	20
322	10	334.6	13.2	3.7	67.5	30
371	10	383.6	15.1	4.9	49.2	40
407	5	419.6	16.5	7.2	32.0	45
435	2	447.6	17.6	14.0	15.2	47
472	1	484.6	19.1	37.0	2.5	48
506	1	518.6	20.4	34.0	3.0	49
535	1	547.6	21.6	29.0	4.1	50
561	1	573.6	22.6	26.0	5.1	51
598	1	610.6	24.0	37.0	2.5	52
635	1	647.6	25.5	37.0	2.5	53
664	1	676.6	26.6	29.0	4.1	54
697	1	709.6	27.9	33.0	3.2	55
747	1	759.6	29.9	50.0	1.4	56
794	1	806.6	31.8	47.0	1.6	57
841	1	853.6	33.6	47.0	1.6	58
884	1	896.6	35.3	43.0	1.9	59

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
235	0	228.6	9.0	3.8	65.5	0
311	20	304.6	12.0	3.8	65.5	20
342	10	335.6	13.2	3.1	82.2	30
365	8	358.6	14.1	2.9	89.5	38
411	10	404.6	15.9	4.6	52.9	48
449	5	442.6	17.4	7.6	30.1	53
485	3	478.6	18.8	12.0	18.1	56
530	4	523.6	20.6	11.3	19.4	60
554	1	547.6	21.6	24.0	6.0	61
597	1	590.6	23.3	43.0	1.9	62
635	1	628.6	24.7	38.0	2.4	63
670	1	663.6	26.1	35.0	2.8	64
702	1	695.6	27.4	32.0	3.4	65
741	1	734.6	28.9	39.0	2.3	66
782	1	775.6	30.5	41.0	2.1	67
816	1	809.6	31.9	34.0	3.0	68
847	1	840.6	33.1	31.0	3.6	69
876	1	869.6	34.2	29.0	4.1	70
904	1	897.6	35.3	28.0	4.4	71
936	1	929.6	36.6	32.0	3.4	72

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
205	0	228.6	9.0	8.4	26.9	0
247	5	270.6	10.7	8.4	26.9	5
276	5	299.6	11.8	5.8	40.8	10
301	5	324.6	12.8	5.0	48.1	15
319	5	342.6	13.5	3.6	69.6	20
343	5	366.6	14.4	4.8	50.4	25
365	5	388.6	15.3	4.4	55.6	30
418	10	441.6	17.4	5.3	45.1	40
476	7	499.6	19.7	8.3	27.3	47
532	10	555.6	21.9	5.6	42.4	57
631	10	654.6	25.8	9.9	22.4	67
650	1	673.6	26.5	19.0	9.6	68
675	1	698.6	27.5	25.0	5.5	69
704	1	727.6	28.6	29.0	4.1	70
731	1	754.6	29.7	27.0	4.7	71
755	1	778.6	30.7	24.0	6.0	72
776	1	799.6	31.5	21.0	7.8	73
799	1	822.6	32.4	23.0	6.5	74
826	1	849.6	33.4	27.0	4.7	75
851	1	874.6	34.4	25.0	5.5	76
875	1	898.6	35.4	24.0	6.0	77
900	1	923.6	36.4	25.0	5.5	78
923	1	946.6	37.3	23.0	6.5	79

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
222	0	184.15	7.3	6.7	34.9	0
262	6	224.15	8.8	6.7	34.9	6
337	10	299.15	11.8	7.5	30.6	16
411	10	373.15	14.7	7.4	31.0	26
506	8	468.15	18.4	11.9	18.3	34
572	1	534.15	21.0	66.0	0.8	35
653	1	615.15	24.2	81.0	0.5	36
710	1	672.15	26.5	57.0	1.1	37
740	1	702.15	27.6	30.0	3.8	38
773	1	735.15	28.9	33.0	3.2	39
795	1	757.15	29.8	22.0	7.1	40
841	1	803.15	31.6	46.0	1.6	41
892	1	854.15	33.6	51.0	1.3	42
944	1	906.15	35.7	52.0	1.3	43

Project: SW Westlawn, Ankeny

Tests Performed by: DW/DW2

Test Date: 19-Jul-12

Riverside Road WB Lane

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
216	0	184.15	7.3	4.0	61.8	0
236	5	204.15	8.0	4.0	61.8	5
257	5	225.15	8.9	4.2	58.5	10
281	5	249.15	9.8	4.8	50.4	15
305	5	273.15	10.8	4.8	50.4	20
334	5	302.15	11.9	5.8	40.8	25
360	5	328.15	12.9	5.2	46.1	30
383	5	351.15	13.8	4.6	52.9	35
407	3	375.15	14.8	8.0	28.4	38
430	3	398.15	15.7	7.7	29.8	41
452	3	420.15	16.5	7.3	31.4	44
537	2	505.15	19.9	42.5	1.9	46
580	1	548.15	21.6	43.0	1.9	47
621	1	589.15	23.2	41.0	2.1	48
670	1	638.15	25.1	49.0	1.4	49
719	1	687.15	27.1	49.0	1.4	50
778	1	746.15	29.4	59.0	1.0	51
875	2	843.15	33.2	48.5	1.5	53
925	1	893.15	35.2	50.0	1.4	54

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
263	0	190.5	7.5	7.8	29.3	0
302	5	229.5	9.0	7.8	29.3	5
326	2	253.5	10.0	12.0	18.1	7
353	1	280.5	11.0	27.0	7.3	8
390	1	317.5	12.5	37.0	5.1	9
427	1	354.5	14.0	37.0	5.1	10
452	1	379.5	14.9	25.0	7.9	11
504	2	431.5	17.0	26.0	7.6	13
558	2	485.5	19.1	27.0	7.3	15
625	3	552.5	21.8	22.3	9.0	18
727	3	654.5	25.8	34.0	5.6	21
820	3	747.5	29.4	31.0	6.2	24
864	3	791.5	31.2	14.7	14.4	27
904	2	831.5	32.7	20.0	10.2	29
930	1	857.5	33.8	26.0	7.6	30

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
199	0	190.5	7.5	3.3	76.7	0
232	10	223.5	8.8	3.3	76.7	10
256	10	247.5	9.7	2.4	109.5	20
289	10	280.5	11.0	3.3	76.7	30
315	10	306.5	12.1	2.6	100.1	40
343	5	334.5	13.2	5.6	42.4	45
391	5	382.5	15.1	9.6	23.2	50
475	5	466.5	18.4	16.8	12.4	55
540	3	531.5	20.9	21.7	9.3	58
601	2	592.5	23.3	30.5	6.4	60
658	2	649.5	25.6	28.5	6.9	62
731	2	722.5	28.4	36.5	5.2	64
795	2	786.5	31.0	32.0	6.0	66
861	2	852.5	33.6	33.0	5.8	68
897	1	888.5	35.0	36.0	5.3	69

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
224	0	190.5	7.5	2.4	109.5	0
248	10	214.5	8.4	2.4	109.5	10
272	10	238.5	9.4	2.4	109.5	20
300	10	266.5	10.5	2.8	92.2	30
329	10	295.5	11.6	2.9	88.6	40
357	10	323.5	12.7	2.8	92.2	50
384	10	350.5	13.8	2.7	96.0	60
419	10	385.5	15.2	3.5	71.8	70
457	8	423.5	16.7	4.8	51.0	78
473	2	439.5	17.3	8.0	28.4	80
498	2	464.5	18.3	12.5	17.3	82
610	5	576.5	22.7	22.4	9.0	87
713	2	679.5	26.8	51.5	3.5	89
819	1	785.5	30.9	106.0	1.6	90
937	1	903.5	35.6	118.0	1.4	91

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
259	0	190.5	7.5	7.8	29.3	0
298	5	229.5	9.0	7.8	29.3	5
350	5	281.5	11.1	10.4	21.2	10
419	5	350.5	13.8	13.8	15.4	15
485	4	416.5	16.4	16.5	12.6	19
608	3	539.5	21.2	41.0	4.6	22
760	1	691.5	27.2	152.0	1.1	23
943	1	874.5	34.4	183.0	0.9	24

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
246	0	190.5	7.5	7.4	31.0	0
283	5	227.5	9.0	7.4	31.0	5
338	5	282.5	11.1	11.0	19.9	10
391	5	335.5	13.2	10.6	20.8	15
446	5	390.5	15.4	11.0	19.9	20
483	2	427.5	16.8	18.5	11.1	22
537	1	481.5	19.0	54.0	3.4	23
593	1	537.5	21.2	56.0	3.2	24
667	1	611.5	24.1	74.0	2.4	25
762	1	706.5	27.8	95.0	1.8	26
847	1	791.5	31.2	85.0	2.0	27
947	1	891.5	35.1	100.0	1.7	28

Project: SW Logan, Ankeny

Tests Performed by: PV/DW

Test Date: 19-Jul-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
220	0	190.5	7.5	3.0	85.3	0
250	10	220.5	8.7	3.0	85.3	10
270	10	240.5	9.5	2.0	134.3	20
300	10	270.5	10.6	3.0	85.3	30
336	10	306.5	12.1	3.6	69.6	40
392	10	362.5	14.3	5.6	42.4	50
429	5	399.5	15.7	7.4	31.0	55
467	5	437.5	17.2	7.6	30.1	60
520	3	490.5	19.3	17.7	11.7	63
579	3	549.5	21.6	19.7	10.4	66
635	2	605.5	23.8	28.0	7.0	68
714	2	684.5	26.9	39.5	4.8	70
830	3	800.5	31.5	38.7	4.9	73
877	1	847.5	33.4	47.0	3.9	74
926	1	896.5	35.3	49.0	3.7	75

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
350	0	190.5	7.5	15.0	14.1	0
365	1	205.5	8.1	15.0	14.1	1
398	3	238.5	9.4	11.0	19.9	4
420	3	260.5	10.3	7.3	31.4	7
445	3	285.5	11.2	8.3	27.2	10
466	3	306.5	12.1	7.0	33.0	13
488	3	328.5	12.9	7.3	31.4	16
511	3	351.5	13.8	7.7	29.8	19
532	3	372.5	14.7	7.0	33.0	22
550	3	390.5	15.4	6.0	39.3	25
570	3	410.5	16.2	6.7	34.9	28
584	3	424.5	16.7	4.7	52.0	31
601	3	441.5	17.4	5.7	41.8	34
623	3	463.5	18.2	7.3	31.4	37
654	3	494.5	19.5	10.3	21.4	40
690	3	530.5	20.9	12.0	18.1	43
772	4	612.5	24.1	20.5	9.9	47
835	1	675.5	26.6	63.0	2.8	48
906	1	746.5	29.4	71.0	2.5	49
957	1	797.5	31.4	51.0	3.6	50
992	1	832.5	32.8	35.0	5.4	51

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
325	0	190.5	7.5	10.0	22.2	0
335	1	200.5	7.9	10.0	22.2	1
360	5	225.5	8.9	5.0	48.1	6
373	3	238.5	9.4	4.3	56.5	9
392	3	257.5	10.1	6.3	36.9	12
416	3	281.5	11.1	8.0	28.4	15
430	3	295.5	11.6	4.7	52.0	18
445	3	310.5	12.2	5.0	48.1	21
460	3	325.5	12.8	5.0	48.1	24
480	3	345.5	13.6	6.7	34.9	27
492	3	357.5	14.1	4.0	61.8	30
510	3	375.5	14.8	6.0	39.3	33
527	3	392.5	15.5	5.7	41.8	36
550	3	415.5	16.4	7.7	29.8	39
570	3	435.5	17.1	6.7	34.9	42
600	3	465.5	18.3	10.0	22.2	45
650	3	515.5	20.3	16.7	12.5	48
690	1	555.5	21.9	40.0	4.7	49
730	1	595.5	23.4	40.0	4.7	50
775	1	640.5	25.2	45.0	4.1	51
820	1	685.5	27.0	45.0	4.1	52
880	1	745.5	29.4	60.0	3.0	53
915	1	780.5	30.7	35.0	5.4	54
945	1	810.5	31.9	30.0	6.5	55

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
309	0	190.5	7.5	8.0	28.4	0
317	1	198.5	7.8	8.0	28.4	1
329	3	210.5	8.3	4.0	61.8	4
343	3	224.5	8.8	4.7	52.0	7
360	3	241.5	9.5	5.7	41.8	10
373	3	254.5	10.0	4.3	56.5	13
390	3	271.5	10.7	5.7	41.8	16
409	3	290.5	11.4	6.3	36.9	19
426	3	307.5	12.1	5.7	41.8	22
444	3	325.5	12.8	6.0	39.3	25
465	3	346.5	13.6	7.0	33.0	28
482	3	363.5	14.3	5.7	41.8	31
500	3	381.5	15.0	6.0	39.3	34
517	3	398.5	15.7	5.7	41.8	37
536	3	417.5	16.4	6.3	36.9	40
553	3	434.5	17.1	5.7	41.8	43
578	3	459.5	18.1	8.3	27.2	46
605	3	486.5	19.2	9.0	24.9	49
636	3	517.5	20.4	10.3	21.4	52
663	2	544.5	21.4	13.5	15.8	54
691	2	572.5	22.5	14.0	15.2	56
720	2	601.5	23.7	14.5	14.6	58
740	2	621.5	24.5	10.0	22.2	60
757	2	638.5	25.1	8.5	26.6	62
777	2	658.5	25.9	10.0	22.2	64
801	2	682.5	26.9	12.0	18.1	66
842	2	723.5	28.5	20.5	9.9	68
870	2	751.5	29.6	14.0	15.2	70
916	2	797.5	31.4	23.0	8.7	72
966	2	847.5	33.4	25.0	7.9	74

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
312	0	190.5	7.5	8.0	28.4	0
320	1	198.5	7.8	8.0	28.4	1
330	3	208.5	8.2	3.3	75.8	4
348	3	226.5	8.9	6.0	39.3	7
362	3	240.5	9.5	4.7	52.0	10
382	3	260.5	10.3	6.7	34.9	13
408	3	286.5	11.3	8.7	26.0	16
430	3	308.5	12.1	7.3	31.4	19
460	3	338.5	13.3	10.0	22.2	22
480	3	358.5	14.1	6.7	34.9	25
500	3	378.5	14.9	6.7	34.9	28
520	3	398.5	15.7	6.7	34.9	31
540	3	418.5	16.5	6.7	34.9	34
560	3	438.5	17.3	6.7	34.9	37
580	3	458.5	18.1	6.7	34.9	40
606	3	484.5	19.1	8.7	26.0	43
632	3	510.5	20.1	8.7	26.0	46
670	3	548.5	21.6	12.7	17.0	49
685	2	563.5	22.2	7.5	30.6	51
705	2	583.5	23.0	10.0	22.2	53
727	2	605.5	23.8	11.0	19.9	55
750	2	628.5	24.7	11.5	18.9	57
780	2	658.5	25.9	15.0	14.1	59
804	1	682.5	26.9	24.0	8.3	60
835	1	713.5	28.1	31.0	6.2	61
870	1	748.5	29.5	35.0	5.4	62
905	1	783.5	30.8	35.0	5.4	63
950	1	828.5	32.6	45.0	4.1	64

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
319	0	190.5	7.5	7.0	33.0	0
326	1	197.5	7.8	7.0	33.0	1
334	3	205.5	8.1	2.7	97.3	4
350	3	221.5	8.7	5.3	44.8	7
362	3	233.5	9.2	4.0	61.8	10
377	3	248.5	9.8	5.0	48.1	13
398	3	269.5	10.6	7.0	33.0	16
416	3	287.5	11.3	6.0	39.3	19
440	3	311.5	12.3	8.0	28.4	22
465	3	336.5	13.2	8.3	27.2	25
483	3	354.5	14.0	6.0	39.3	28
505	3	376.5	14.8	7.3	31.4	31
525	3	396.5	15.6	6.7	34.9	34
545	3	416.5	16.4	6.7	34.9	37
563	3	434.5	17.1	6.0	39.3	40
580	3	451.5	17.8	5.7	41.8	43
604	3	475.5	18.7	8.0	28.4	46
626	3	497.5	19.6	7.3	31.4	49
646	3	517.5	20.4	6.7	34.9	52
667	3	538.5	21.2	7.0	33.0	55
693	3	564.5	22.2	8.7	26.0	58
723	3	594.5	23.4	10.0	22.2	61
754	3	625.5	24.6	10.3	21.4	64
785	2	656.5	25.8	15.5	13.6	66
837	2	708.5	27.9	26.0	7.6	68
876	1	747.5	29.4	39.0	4.8	69
922	1	793.5	31.2	46.0	4.0	70
968	1	839.5	33.1	46.0	4.0	71

Project: West Main, Knoxville
Tests Performed by: Jermey/DW2
Test Date: 12-Jul-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
342	0	190.5	7.5	19.0	10.8	0
361	1	209.5	8.2	19.0	10.8	1
399	3	247.5	9.7	12.7	17.0	4
423	3	271.5	10.7	8.0	28.4	7
454	3	302.5	11.9	10.3	21.4	10
486	3	334.5	13.2	10.7	20.6	13
515	3	363.5	14.3	9.7	23.0	16
533	3	381.5	15.0	6.0	39.3	19
557	3	405.5	16.0	8.0	28.4	22
581	3	429.5	16.9	8.0	28.4	25
608	3	456.5	18.0	9.0	24.9	28
636	3	484.5	19.1	9.3	23.9	31
675	3	523.5	20.6	13.0	16.5	34
720	3	568.5	22.4	15.0	14.1	37
755	2	603.5	23.8	17.5	11.8	39
795	2	643.5	25.3	20.0	10.2	41
869	2	717.5	28.2	37.0	5.1	43
929	1	777.5	30.6	60.0	3.0	44
988	1	836.5	32.9	59.0	3.0	45

Project: West Main, Knoxville

Tests Performed by: Jermey/DW2

Test Date: 12-Jul-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
340	0	190.5	7.5	5.0	48.1	0
345	1	195.5	7.7	5.0	48.1	1
350	3	200.5	7.9	1.7	164.8	4
355	3	205.5	8.1	1.7	164.8	7
360	3	210.5	8.3	1.7	164.8	10
365	5	215.5	8.5	1.0	292.0	15
372	5	222.5	8.8	1.4	200.3	20
380	5	230.5	9.1	1.6	172.5	25
395	5	245.5	9.7	3.0	85.3	30
405	3	255.5	10.1	3.3	75.8	33
411	3	261.5	10.3	2.0	134.3	36
420	3	270.5	10.6	3.0	85.3	39
425	3	275.5	10.8	1.7	164.8	42
433	3	283.5	11.2	2.7	97.3	45
445	3	295.5	11.6	4.0	61.8	48
450	3	300.5	11.8	1.7	164.8	51
460	3	310.5	12.2	3.3	75.8	54
471	3	321.5	12.7	3.7	68.1	57
482	3	332.5	13.1	3.7	68.1	60
491	3	341.5	13.4	3.0	85.3	63
505	3	355.5	14.0	4.7	52.0	66
512	3	362.5	14.3	2.3	113.0	69
522	3	372.5	14.7	3.3	75.8	72
535	3	385.5	15.2	4.3	56.5	75
550	3	400.5	15.8	5.0	48.1	78
560	3	410.5	16.2	3.3	75.8	81
578	3	428.5	16.9	6.0	39.3	84
590	2	440.5	17.3	6.0	39.3	86
608	2	458.5	18.1	9.0	24.9	88
620	2	470.5	18.5	6.0	39.3	90
635	2	485.5	19.1	7.5	30.6	92
655	2	505.5	19.9	10.0	22.2	94
672	2	522.5	20.6	8.5	26.6	96
690	2	540.5	21.3	9.0	24.9	98
710	2	560.5	22.1	10.0	22.2	100
730	2	580.5	22.9	10.0	22.2	102
745	2	595.5	23.4	7.5	30.6	104
765	2	615.5	24.2	10.0	22.2	106
790	2	640.5	25.2	12.5	17.3	108
822	2	672.5	26.5	16.0	13.1	110
844	1	694.5	27.3	22.0	9.2	111
860	1	710.5	28.0	16.0	13.1	112
885	1	735.5	29.0	25.0	7.9	113
915	1	765.5	30.1	30.0	6.5	114
950	1	800.5	31.5	35.0	5.4	115

Project: West Main, Knoxville
Tests Performed by: Jermey/DW2
Test Date: 12-Jul-12

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
325	0	190.5	7.5	5.0	48.1	0
330	1	195.5	7.7	5.0	48.1	1
336	5	201.5	7.9	1.2	238.1	6
346	5	211.5	8.3	2.0	134.3	11
358	5	223.5	8.8	2.4	109.5	16
369	5	234.5	9.2	2.2	120.7	21
385	5	250.5	9.9	3.2	79.4	26
400	5	265.5	10.5	3.0	85.3	31
414	5	279.5	11.0	2.8	92.2	36
426	5	291.5	11.5	2.4	109.5	41
436	5	301.5	11.9	2.0	134.3	46
446	5	311.5	12.3	2.0	134.3	51
460	5	325.5	12.8	2.8	92.2	56
476	5	341.5	13.4	3.2	79.4	61
492	5	357.5	14.1	3.2	79.4	66
510	5	375.5	14.8	3.6	69.6	71
530	5	395.5	15.6	4.0	61.8	76
559	5	424.5	16.7	5.8	40.8	81
580	5	445.5	17.5	4.2	58.5	86
602	5	467.5	18.4	4.4	55.6	91
631	5	496.5	19.5	5.8	40.8	96
661	3	526.5	20.7	10.0	22.2	99
676	3	541.5	21.3	5.0	48.1	102
703	3	568.5	22.4	9.0	24.9	105
730	3	595.5	23.4	9.0	24.9	108
772	3	637.5	25.1	14.0	15.2	111
815	2	680.5	26.8	21.5	9.4	113
884	2	749.5	29.5	34.5	5.5	115
920	1	785.5	30.9	36.0	5.3	116
956	1	821.5	32.3	36.0	5.3	117
997	1	862.5	34.0	41.0	4.6	118

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP1 - Panel 2						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
353	0	213	8.4	5.6	42.4	0
381	5	241	9.5	5.6	42.4	5
409	5	269	10.6	5.6	42.4	10
439	5	299	11.8	6.0	39.3	15
470	5	330	13.0	6.2	37.8	20
501	5	361	14.2	6.2	37.8	25
532	5	392	15.4	6.2	37.8	30
558	5	418	16.5	5.2	46.1	35
589	5	449	17.7	6.2	37.8	40
627	5	487	19.2	7.6	30.1	45
671	5	531	20.9	8.8	25.6	50
710	5	570	22.4	7.8	29.3	55
732	5	592	23.3	4.4	55.6	60
756	5	616	24.3	4.8	50.4	65
788	6	648	25.5	5.3	44.8	71
853	10	713	28.1	6.5	35.9	81
921	3	781	30.7	22.7	8.9	84
957	2	817	32.2	18.0	11.5	86
983	2	843	33.2	13.0	16.5	88

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
358	0	218.44	8.6	11.6	18.8	0
416	5	276.44	10.9	11.6	18.8	5
453	5	313.44	12.3	7.4	31.0	10
487	5	347.44	13.7	6.8	34.1	15
520	5	380.44	15.0	6.6	35.3	20
551	5	411.44	16.2	6.2	37.8	25
573	5	433.44	17.1	4.4	55.6	30
589	5	449.44	17.7	3.2	79.4	35
615	10	475.44	18.7	2.6	100.1	45
655	10	515.44	20.3	4.0	61.8	55
687	10	547.44	21.6	3.2	79.4	65
720	10	580.44	22.9	3.3	76.7	75
755	10	615.44	24.2	3.5	71.8	85
790	10	650.44	25.6	3.5	71.8	95
820	10	680.44	26.8	3.0	85.3	105
877	10	737.44	29.0	5.7	41.6	115
905	2	765.44	30.1	14.0	15.2	117
982	2	842.44	33.2	38.5	4.9	119

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
356	0	215.9	8.5	10.8	20.3	0
410	5	269.9	10.6	10.8	20.3	5
443	5	302.9	11.9	6.6	35.3	10
479	5	338.9	13.3	7.2	32.0	15
511	5	370.9	14.6	6.4	36.5	20
546	5	405.9	16.0	7.0	33.0	25
575	5	434.9	17.1	5.8	40.8	30
607	5	466.9	18.4	6.4	36.5	35
661	10	520.9	20.5	5.4	44.2	45
710	10	569.9	22.4	4.9	49.2	55
751	10	610.9	24.1	4.1	60.1	65
772	5	631.9	24.9	4.2	58.5	70
787	5	646.9	25.5	3.0	85.3	75
800	5	659.9	26.0	2.6	100.1	80
817	5	676.9	26.6	3.4	74.2	85
841	5	700.9	27.6	4.8	50.4	90
873	3	732.9	28.9	10.7	20.6	93
929	2	788.9	31.1	28.0	7.0	95
966	1	825.9	32.5	37.0	5.1	96

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
354	0	213.36	8.4	3.6	69.6	0
372	5	231.36	9.1	3.6	69.6	5
391	5	250.36	9.9	3.8	65.5	10
417	5	276.36	10.9	5.2	46.1	15
440	5	299.36	11.8	4.6	52.9	20
469	5	328.36	12.9	5.8	40.8	25
502	5	361.36	14.2	6.6	35.3	30
533	5	392.36	15.4	6.2	37.8	35
562	5	421.36	16.6	5.8	40.8	40
588	5	447.36	17.6	5.2	46.1	45
617	5	476.36	18.8	5.8	40.8	50
665	5	524.36	20.6	9.6	23.2	55
710	5	569.36	22.4	9.0	24.9	60
753	5	612.36	24.1	8.6	26.2	65
803	5	662.36	26.1	10.0	22.2	70
854	5	713.36	28.1	10.2	21.7	75
919	5	778.36	30.6	13.0	16.5	80
957	2	816.36	32.1	19.0	10.8	82
999	2	858.36	33.8	21.0	9.6	84

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
375	0	236.22	9.3	3.5	71.8	0
410	10	271.22	10.7	3.5	71.8	10
433	5	294.22	11.6	4.6	52.9	15
460	5	321.22	12.6	5.4	44.2	20
482	5	343.22	13.5	4.4	55.6	25
508	5	369.22	14.5	5.2	46.1	30
531	5	392.22	15.4	4.6	52.9	35
550	5	411.22	16.2	3.8	65.5	40
569	5	430.22	16.9	3.8	65.5	45
583	5	444.22	17.5	2.8	92.2	50
625	10	486.22	19.1	4.2	58.5	60
691	3	552.22	21.7	22.0	9.2	63
731	1	592.22	23.3	40.0	4.7	64
789	2	650.22	25.6	29.0	6.7	66
835	3	696.22	27.4	15.3	13.7	69
874	3	735.22	28.9	13.0	16.5	72
919	3	780.22	30.7	15.0	14.1	75

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
365	0	226.06	8.9	4.6	52.9	0
388	5	249.06	9.8	4.6	52.9	5
401	5	262.06	10.3	2.6	100.1	10
427	5	288.06	11.3	5.2	46.1	15
452	5	313.06	12.3	5.0	48.1	20
477	5	338.06	13.3	5.0	48.1	25
505	5	366.06	14.4	5.6	42.4	30
530	5	391.06	15.4	5.0	48.1	35
553	5	414.06	16.3	4.6	52.9	40
575	5	436.06	17.2	4.4	55.6	45
602	5	463.06	18.2	5.4	44.2	50
638	5	499.06	19.6	7.2	32.0	55
680	5	541.06	21.3	8.4	26.9	60
710	5	571.06	22.5	6.0	39.3	65
747	5	608.06	23.9	7.4	31.0	70
795	5	656.06	25.8	9.6	23.2	75
844	5	705.06	27.8	9.8	22.7	80
900	5	761.06	30.0	11.2	19.5	85
964	3	825.06	32.5	21.3	9.5	88
984	1	845.06	33.3	20.0	10.2	89

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
341	0	200.66	7.9	4.9	49.2	0
390	10	249.66	9.8	4.9	49.2	10
416	5	275.66	10.9	5.2	46.1	15
448	5	307.66	12.1	6.4	36.5	20
483	5	342.66	13.5	7.0	33.0	25
518	5	377.66	14.9	7.0	33.0	30
552	5	411.66	16.2	6.8	34.1	35
583	5	442.66	17.4	6.2	37.8	40
620	5	479.66	18.9	7.4	31.0	45
666	5	525.66	20.7	9.2	24.3	50
702	3	561.66	22.1	12.0	18.1	53
744	3	603.66	23.8	14.0	15.2	56
825	6	684.66	27.0	13.5	15.8	62
875	3	734.66	28.9	16.7	12.5	65
927	3	786.66	31.0	17.3	12.0	68
977	2	836.66	32.9	25.0	7.9	70

Project: South 5th, Knoxville

Tests Performed by: DW/PV

Test Date: 12-Jul-12

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
361	0	220.98	8.7	6.0	39.3	0
391	5	250.98	9.9	6.0	39.3	5
424	5	283.98	11.2	6.6	35.3	10
460	5	319.98	12.6	7.2	32.0	15
493	5	352.98	13.9	6.6	35.3	20
521	5	380.98	15.0	5.6	42.4	25
547	5	406.98	16.0	5.2	46.1	30
572	5	431.98	17.0	5.0	48.1	35
597	5	456.98	18.0	5.0	48.1	40
624	5	483.98	19.1	5.4	44.2	45
688	5	547.98	21.6	12.8	16.8	50
721	1	580.98	22.9	33.0	5.8	51
765	1	624.98	24.6	44.0	4.2	52
793	1	652.98	25.7	28.0	7.0	53
818	1	677.98	26.7	25.0	7.9	54
845	1	704.98	27.8	27.0	7.3	55
866	1	725.98	28.6	21.0	9.6	56
906	6	765.98	30.2	6.7	34.9	62
943	3	802.98	31.6	12.3	17.5	65
975	3	834.98	32.9	10.7	20.6	68

Project: Valley View Dr, Council Bluffs

Tests Performed by: PV/BS

Test Date: 26-Jul-12

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
280	0	239.776	9.4	8.4	26.9	0
322	5	281.776	11.1	8.4	26.9	5
350	5	309.776	12.2	5.6	42.4	10
381	5	340.776	13.4	6.2	37.8	15
415	5	374.776	14.8	6.8	34.1	20
461	5	420.776	16.6	9.2	24.3	25
528	5	487.776	19.2	13.4	16.0	30
574	5	533.776	21.0	9.2	24.3	35
607	5	566.776	22.3	6.6	35.3	40
664	10	623.776	24.6	5.7	41.6	50
714	10	673.776	26.5	5.0	48.1	60
791	10	750.776	29.6	7.7	29.7	70
880	10	839.776	33.1	8.9	25.2	80
975	5	934.776	36.8	19.0	10.8	85

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
299	0	259.08	10.2	0.6	517.4	0
305	10	265.08	10.4	0.6	517.4	10
	Terminated	REFUSAL				

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
284	0	244.08	9.6	0.6	517.4	0
290	10	250.08	9.8	0.6	517.4	10
	Terminated	REFUSAL				

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
279	0	238.76	9.4	0.5	685.6	0
286	15	245.76	9.7	0.5	685.6	15
	Terminated	REFUSAL				

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
276	2	236.22	9.3	1.8	151.2	0
285	5	245.22	9.7	1.8	151.2	5
295	20	255.22	10.0	0.5	634.7	25
311	10	271.22	10.7	1.6	172.5	35
334	10	294.22	11.6	2.3	114.9	45
377	10	337.22	13.3	4.3	57.0	55
445	10	405.22	16.0	6.8	34.1	65
479	2	439.22	17.3	17.0	12.2	67
522	2	482.22	19.0	21.5	9.4	69
597	4	557.22	21.9	18.8	11.0	73
656	5	616.22	24.3	11.8	18.4	78
723	5	683.22	26.9	13.4	16.0	83
796	5	756.22	29.8	14.6	14.5	88
850	5	810.22	31.9	10.8	20.3	93
933	8	893.22	35.2	10.4	21.3	101

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
281	0	241.3	9.5	0.7	435.4	0
288	10	248.3	9.8	0.7	435.4	10
290	10	250.3	9.9	0.2	1771.0	20
293	20	253.3	10.0	0.2	2444.3	40
Crushed PCC terminated		REFUSAL				

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
364	0	325.12	12.8	1.1	262.4	0
375	10	336.12	13.2	1.1	262.4	10
378	10	339.12	13.4	0.3	1124.6	20
380	10	341.12	13.4	0.2	1771.0	30
402	10	363.12	14.3	2.2	120.7	40
418	10	379.12	14.9	1.6	172.5	50
420	10	381.12	15.0	0.2	1771.0	60
Crushed PCC terminated		REFUSAL				

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
279	0	238.76	9.4	4.0	61.8	0
283	1	242.76	9.6	4.0	61.8	1
288	10	247.76	9.8	0.5	634.7	11
Crushed PCC terminated		REFUSAL				

DCP9

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
284	0	243.84	9.6	8.0	28.4	0
324	5	283.84	11.2	8.0	28.4	5
356	5	315.84	12.4	6.4	36.5	10
385	5	344.84	13.6	5.8	40.8	15
419	5	378.84	14.9	6.8	34.1	20
448	3	407.84	16.1	9.7	23.0	23
479	3	438.84	17.3	10.3	21.4	26
509	3	468.84	18.5	10.0	22.2	29
550	5	509.84	20.1	8.2	27.7	34
589	5	548.84	21.6	7.8	29.3	39
625	5	584.84	23.0	7.2	32.0	44
667	5	626.84	24.7	8.4	26.9	49
710	5	669.84	26.4	8.6	26.2	54
759	5	718.84	28.3	9.8	22.7	59
811	5	770.84	30.3	10.4	21.2	64
862	5	821.84	32.4	10.2	21.7	69
912	5	871.84	34.3	10.0	22.2	74

Valley View Dr, Council Bluffs

Tests Performed by: HG/BZ

Test Date: 26-Jul-12

DCP10

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
279	0	238.76	9.4	3.6	69.6	0
297	5	256.76	10.1	3.6	69.6	5
312	10	271.76	10.7	1.5	185.4	15
315	10	274.76	10.8	0.3	1124.6	25
321	10	280.76	11.1	0.6	517.4	35
327	10	286.76	11.3	0.6	517.4	45
330	10	289.76	11.4	0.3	1124.6	55
340	20	299.76	11.8	0.5	634.7	75
341	10	300.76	11.8	0.1	3849.3	85
343	10	302.76	11.9	0.2	1771.0	95
350	20	309.76	12.2	0.4	946.3	115
351	10	310.76	12.2	0.1	3849.3	125
353	10	312.76	12.3	0.2	1771.0	135
	Terminated	REFUSAL				

Project: 9th Avenue, Council Bluffs

Tests Performed by: DW/PV

Test Date: 26-Jul-12

DCP1 - Panel 2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
238	0	207.772	8.2	19.5	10.5	0
270	2	239.772	9.4	19.5	10.5	0
309	2	278.772	11.0	19.5	10.5	2
370	2	339.772	13.4	30.5	6.4	4
415	1	384.772	15.1	45.0	4.1	5
458	1	427.772	16.8	43.0	4.3	6
487	1	456.772	18.0	29.0	12.0	7
542	2	511.772	20.1	27.5	12.7	9
638	2	607.772	23.9	48.0	7.3	11
733	2	702.772	27.7	47.5	7.3	13
785	1	754.772	29.7	52.0	6.7	14
846	1	815.772	32.1	61.0	5.7	15
909	1	878.772	34.6	63.0	5.5	16

Project: 9th Avenue, Council Bluffs

Tests Performed by: DW/PV

Test Date: 26-Jul-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
228	0	198.12	7.8	8.5	26.6	0
245	2	215.12	8.5	8.5	26.6	2
275	5	245.12	9.7	6.0	39.3	7
304	5	274.12	10.8	5.8	40.8	12
329	5	299.12	11.8	5.0	48.1	17
353	5	323.12	12.7	4.8	50.4	22
381	5	351.12	13.8	5.6	42.4	27
427	4	397.12	15.6	11.5	18.9	31
504	2	474.12	18.7	38.5	9.0	33
624	2	594.12	23.4	60.0	5.8	35
706	2	676.12	26.6	41.0	8.5	37
766	2	736.12	29.0	30.0	11.6	39
819	2	789.12	31.1	26.5	13.1	41
878	2	848.12	33.4	29.5	11.8	43
931	2	901.12	35.5	26.5	13.1	45

Project: 9th Avenue, Council Bluffs

Tests Performed by: DW/PV

Test Date: 26-Jul-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
254	0	223.52	8.8	9.0	24.9	0
272	2	241.52	9.5	9.0	24.9	2
310	5	279.52	11.0	7.6	30.1	7
345	5	314.52	12.4	7.0	33.0	12
394	5	363.52	14.3	9.8	22.7	17
428	2	397.52	15.7	17.0	12.2	19
475	2	444.52	17.5	23.5	14.8	21
536	2	505.52	19.9	30.5	11.4	23
610	5	579.52	22.8	14.8	23.5	28
670	2	639.52	25.2	30.0	11.6	30
748	2	717.52	28.2	39.0	8.9	32
841	2	810.52	31.9	46.5	7.5	34
893	1	862.52	34.0	52.0	6.7	35

Project: 9th Avenue, Council Bluffs

Tests Performed by: DW/PV

Test Date: 26-Jul-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
278	0	248.92	9.8	11.0	19.9	0
300	2	270.92	10.7	11.0	19.9	2
320	2	290.92	11.5	10.0	22.2	4
333	2	303.92	12.0	6.5	35.9	6
382	5	352.92	13.9	9.8	22.7	11
403	1	373.92	14.7	21.0	9.6	12
477	1	447.92	17.6	74.0	4.7	13
617	1	587.92	23.1	140.0	2.5	14
707	1	677.92	26.7	90.0	3.9	15
770	1	740.92	29.2	63.0	5.5	16
815	1	785.92	30.9	45.0	7.7	17
850	1	820.92	32.3	35.0	10.0	18
880	1	850.92	33.5	30.0	11.6	19
909	1	879.92	34.6	29.0	12.0	20

Project: 9th Avenue, Council Bluffs

Tests Performed by: DW/PV

Test Date: 26-Jul-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
266	0	236.22	9.3	20.5	9.9	0
307	2	277.22	10.9	20.5	9.9	2
332	2	302.22	11.9	12.5	17.3	4
350	2	320.22	12.6	9.0	24.9	6
369	2	339.22	13.4	9.5	23.5	8
388	2	358.22	14.1	9.5	23.5	10
416	2	386.22	15.2	14.0	15.2	12
457	2	427.22	16.8	20.5	9.9	14
492	2	462.22	18.2	17.5	19.9	16
549	2	519.22	20.4	28.5	12.2	18
640	2	610.22	24.0	45.5	7.7	20
695	1	665.22	26.2	55.0	6.3	21
752	1	722.22	28.4	57.0	6.1	22
815	1	785.22	30.9	63.0	5.5	23
891	1	861.22	33.9	76.0	4.6	24

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
255	0	165.1	6.5	8.0	28.4	0
295	5	205.1	8.1	8.0	28.4	5
320	3	230.1	9.1	8.3	27.2	8
359	3	269.1	10.6	13.0	16.5	11
395	2	305.1	12.0	18.0	11.5	13
432	2	342.1	13.5	18.5	11.1	15
472	2	382.1	15.0	20.0	10.2	17
503	2	413.1	16.3	15.5	13.6	19
534	2	444.1	17.5	15.5	13.6	21
645	5	555.1	21.9	22.2	9.1	26
730	2	640.1	25.2	42.5	4.4	28
843	2	753.1	29.6	56.5	3.2	30
897	1	807.1	31.8	54.0	3.4	31
949	1	859.1	33.8	52.0	3.5	32

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
240	0	165.1	6.5	4.7	52.0	0
254	3	179.1	7.1	4.7	52.0	3
281	3	206.1	8.1	9.0	24.9	6
321	3	246.1	9.7	13.3	16.0	9
373	3	298.1	11.7	17.3	12.0	12
407	3	332.1	13.1	11.3	19.3	15
429	3	354.1	13.9	7.3	31.4	18
481	3	406.1	16.0	17.3	12.0	21
542	3	467.1	18.4	20.3	10.0	24
593	3	518.1	20.4	17.0	12.2	27
657	3	582.1	22.9	21.3	9.5	30
753	3	678.1	26.7	32.0	6.0	33
885	3	810.1	31.9	44.0	4.2	36
931	1	856.1	33.7	46.0	4.0	37

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP3						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
198	0	165.1	6.5	24.0	8.3	0
246	2	213.1	8.4	24.0	8.3	2
274	2	241.1	9.5	14.0	15.2	4
320	2	287.1	11.3	23.0	8.7	6
374	2	341.1	13.4	27.0	7.3	8
424	2	391.1	15.4	25.0	7.9	10
466	2	433.1	17.1	21.0	9.6	12
523	2	490.1	19.3	28.5	6.9	14
564	2	531.1	20.9	20.5	9.9	16
618	2	585.1	23.0	27.0	7.3	18
718	2	685.1	27.0	50.0	3.7	20
823	2	790.1	31.1	52.5	3.5	22
912	2	879.1	34.6	44.5	4.2	24

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
220	0	165.1	6.5	36.0	5.3	0
256	1	201.1	7.9	36.0	5.3	1
265	1	210.1	8.3	9.0	24.9	2
291	2	236.1	9.3	13.0	16.5	4
318	2	263.1	10.4	13.5	15.8	6
361	2	306.1	12.1	21.5	9.4	8
483	1	428.1	16.9	122.0	1.3	9
521	1	466.1	18.4	38.0	5.0	10
560	1	505.1	19.9	39.0	4.8	11
602	1	547.1	21.5	42.0	4.4	12
650	1	595.1	23.4	48.0	3.8	13
691	1	636.1	25.0	41.0	4.6	14
732	1	677.1	26.7	41.0	4.6	15
774	1	719.1	28.3	42.0	4.4	16
811	1	756.1	29.8	37.0	5.1	17
848	1	793.1	31.2	37.0	5.1	18
880	1	825.1	32.5	32.0	6.0	19
940	2	885.1	34.8	30.0	6.5	21

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
197	0	165.1	6.5	10.7	20.6	0
229	3	197.1	7.8	10.7	20.6	3
260	3	228.1	9.0	10.3	21.4	6
287	3	255.1	10.0	9.0	24.9	9
317	2	285.1	11.2	15.0	14.1	11
342	2	310.1	12.2	12.5	17.3	13
398	4	366.1	14.4	14.0	15.2	17
425	2	393.1	15.5	13.5	15.8	19
452	2	420.1	16.5	13.5	15.8	21
481	2	449.1	17.7	14.5	14.6	23
576	2	544.1	21.4	47.5	3.9	25
748	4	716.1	28.2	43.0	4.3	29
805	2	773.1	30.4	28.5	6.9	31
855	2	823.1	32.4	25.0	7.9	33
902	2	870.1	34.3	23.5	8.5	35
923	1	891.1	35.1	21.0	9.6	36

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
256	0	165.1	6.5	7.7	29.8	0
279	3	188.1	7.4	7.7	29.8	3
283	3	192.1	7.6	1.3	211.6	6
330	3	239.1	9.4	15.7	13.4	9
389	3	298.1	11.7	19.7	10.4	12
462	1	371.1	14.6	73.0	2.4	13
504	1	413.1	16.3	42.0	4.4	14
599	2	508.1	20.0	47.5	3.9	16
676	2	585.1	23.0	38.5	4.9	18
743	2	652.1	25.7	33.5	5.7	20
835	3	744.1	29.3	30.7	6.3	23
884	2	793.1	31.2	24.5	8.1	25
943	3	852.1	33.5	19.7	10.4	28

Project: Cliff Road (Site A), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site A 2500-2505 Cliff Road, Burlington

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
260	0	165.1	6.5	6.0	39.3	0
290	5	195.1	7.7	6.0	39.3	5
326	5	231.1	9.1	7.2	32.0	10
358	5	263.1	10.4	6.4	36.5	15
393	5	298.1	11.7	7.0	33.0	20
439	5	344.1	13.5	9.2	24.3	25
493	3	398.1	15.7	18.0	11.5	28
554	2	459.1	18.1	30.5	6.4	30
610	2	515.1	20.3	28.0	7.0	32
665	2	570.1	22.4	27.5	7.1	34
725	2	630.1	24.8	30.0	6.5	36
796	2	701.1	27.6	35.5	5.4	38
860	2	765.1	30.1	32.0	6.0	40
927	2	832.1	32.8	33.5	5.7	42

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
239	0	190.5	7.5	7.2	32.0	0
275	5	226.5	8.9	7.2	32.0	5
310	3	261.5	10.3	11.7	18.6	8
348	2	299.5	11.8	19.0	10.8	10
382	1	333.5	13.1	34.0	5.6	11
444	1	395.5	15.6	62.0	2.9	12
517	1	468.5	18.4	73.0	4.8	13
597	1	548.5	21.6	80.0	4.4	14
672	1	623.5	24.5	75.0	4.6	15
735	1	686.5	27.0	63.0	5.5	16
784	1	735.5	29.0	49.0	7.1	17
842	1	793.5	31.2	58.0	6.0	18
908	1	859.5	33.8	66.0	5.3	19

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
240	0	190.5	7.5	18.5	11.1	0
277	2	227.5	9.0	18.5	11.1	2
303	2	253.5	10.0	13.0	16.5	4
342	2	292.5	11.5	19.5	10.5	6
401	2	351.5	13.8	29.5	6.6	8
453	1	403.5	15.9	52.0	3.5	9
515	1	465.5	18.3	62.0	5.6	10
589	1	539.5	21.2	74.0	4.7	11
657	1	607.5	23.9	68.0	5.1	12
719	1	669.5	26.4	62.0	5.6	13
771	1	721.5	28.4	52.0	6.7	14
818	1	768.5	30.3	47.0	7.4	15
858	1	808.5	31.8	40.0	8.7	16
926	2	876.5	34.5	34.0	10.2	18

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
264	0	190.5	7.5	6.6	35.3	0
297	5	223.5	8.8	6.6	35.3	5
328	3	254.5	10.0	10.3	21.4	8
363	2	289.5	11.4	17.5	11.8	10
392	1	318.5	12.5	29.0	6.7	11
420	1	346.5	13.6	28.0	7.0	12
456	1	382.5	15.1	36.0	5.3	13
507	1	433.5	17.1	51.0	6.8	14
571	1	497.5	19.6	64.0	5.4	15
645	1	571.5	22.5	74.0	4.7	16
722	1	648.5	25.5	77.0	4.5	17
788	1	714.5	28.1	66.0	5.3	18
843	1	769.5	30.3	55.0	6.3	19
910	1	836.5	32.9	67.0	5.2	20

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
215	0	190.5	7.5	6.2	37.8	0
246	5	221.5	8.7	6.2	37.8	5
285	5	260.5	10.3	7.8	29.3	10
318	3	293.5	11.6	11.0	19.9	13
355	2	330.5	13.0	18.5	11.1	15
390	1	365.5	14.4	35.0	5.4	16
433	1	408.5	16.1	43.0	4.3	17
480	1	455.5	17.9	47.0	7.4	18
526	1	501.5	19.7	46.0	7.6	19
572	1	547.5	21.6	46.0	7.6	20
614	1	589.5	23.2	42.0	8.3	21
653	1	628.5	24.7	39.0	8.9	22
691	1	666.5	26.2	38.0	9.2	23
765	2	740.5	29.2	37.0	9.4	25
833	2	808.5	31.8	34.0	10.2	27
895	2	870.5	34.3	31.0	11.2	29
922	1	897.5	35.3	27.0	12.9	30

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
266	0	190.5	7.5	6.3	37.5	0
291	4	215.5	8.5	6.3	37.5	4
318	2	242.5	9.5	13.5	15.8	6
334	1	258.5	10.2	16.0	13.1	7
362	1	286.5	11.3	28.0	7.0	8
380	1	304.5	12.0	18.0	11.5	9
396	1	320.5	12.6	16.0	13.1	10
425	2	349.5	13.8	14.5	14.6	12
455	2	379.5	14.9	15.0	14.1	14
515	2	439.5	17.3	30.0	11.6	16
605	2	529.5	20.8	45.0	7.7	18
692	2	616.5	24.3	43.5	8.0	20
777	2	701.5	27.6	42.5	8.2	22
853	2	777.5	30.6	38.0	9.2	24
928	2	852.5	33.6	37.5	9.3	26

Project: Cliff Road (Site B), Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

Cliff Road Site B 2910 Cliff Road, Burlington

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
242	0	190.5	7.5	4.8	50.4	0
266	5	214.5	8.4	4.8	50.4	5
304	5	252.5	9.9	7.6	30.1	10
347	3	295.5	11.6	14.3	14.8	13
376	1	324.5	12.8	29.0	6.7	14
435	2	383.5	15.1	29.5	6.6	16
551	4	499.5	19.7	29.0	12.0	20
608	2	556.5	21.9	28.5	12.2	22
673	2	621.5	24.5	32.5	10.7	24
741	2	689.5	27.1	34.0	10.2	26
816	2	764.5	30.1	37.5	9.3	28
892	2	840.5	33.1	38.0	9.2	30
925	1	873.5	34.4	33.0	10.6	31

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP1

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
225	0	165.1	6.5	18.5	11.1	0
262	2	202.1	8.0	18.5	11.1	2
316	2	256.1	10.1	27.0	7.3	4
367	2	307.1	12.1	25.5	5.3	6
428	2	368.1	14.5	30.5	3.7	8
533	2	473.1	18.6	52.5	1.3	10
655	2	595.1	23.4	61.0	0.9	12
721	1	661.1	26.0	66.0	0.8	13
786	1	726.1	28.6	65.0	0.8	14
835	1	775.1	30.5	49.0	1.4	15
871	1	811.1	31.9	36.0	2.7	16
904	1	844.1	33.2	33.0	3.2	17
933	1	873.1	34.4	29.0	4.1	18

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
227	0	165.1	6.5	17.5	11.8	0
262	2	200.1	7.9	17.5	11.8	2
300	2	238.1	9.4	19.0	10.8	4
330	2	268.1	10.6	15.0	14.1	6
361	2	299.1	11.8	15.5	13.6	8
397	2	335.1	13.2	18.0	11.5	10
436	1	374.1	14.7	39.0	2.3	11
497	1	435.1	17.1	61.0	0.9	12
549	1	487.1	19.2	52.0	1.3	13
597	1	535.1	21.1	48.0	1.5	14
637	1	575.1	22.6	40.0	2.2	15
723	2	661.1	26.0	43.0	1.9	17
820	2	758.1	29.8	48.5	1.5	19
900	1	838.1	33.0	80.0	0.5	20

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
197	0	165.1	6.5	6.6	35.3	0
230	5	198.1	7.8	6.6	35.3	5
270	5	238.1	9.4	8.0	28.4	10
299	5	267.1	10.5	5.8	40.8	15
331	5	299.1	11.8	6.4	36.5	20
365	5	333.1	13.1	6.8	34.1	25
393	3	361.1	14.2	9.3	23.9	28
469	3	437.1	17.2	25.3	5.4	31
490	5	458.1	18.0	4.2	58.5	36
533	6	501.1	19.7	7.2	32.2	42
571	2	539.1	21.2	19.0	9.6	44
612	2	580.1	22.8	20.5	8.2	46
654	2	622.1	24.5	21.0	7.8	48
698	2	666.1	26.2	22.0	7.1	50
756	2	724.1	28.5	29.0	4.1	52
813	2	781.1	30.8	28.5	4.3	54
859	2	827.1	32.6	23.0	6.5	56
923	3	891.1	35.1	21.3	7.6	59

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
231	0	165.1	6.5	4.4	55.6	0
253	5	187.1	7.4	4.4	55.6	5
285	5	219.1	8.6	6.4	36.5	10
310	3	244.1	9.6	8.3	27.2	13
340	3	274.1	10.8	10.0	22.2	16
367	3	301.1	11.9	9.0	24.9	19
417	2	351.1	13.8	25.0	5.5	21
487	1	421.1	16.6	70.0	0.7	22
536	1	470.1	18.5	49.0	1.4	23
576	1	510.1	20.1	40.0	2.2	24
610	1	544.1	21.4	34.0	3.0	25
680	1	614.1	24.2	70.0	0.7	26
745	2	679.1	26.7	32.5	3.3	28
792	1	726.1	28.6	47.0	1.6	29
838	1	772.1	30.4	46.0	1.6	30
875	1	809.1	31.9	37.0	2.5	31
937	2	871.1	34.3	31.0	3.6	33

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP5						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
225	0	165.1	6.5	9.8	22.7	0
274	5	214.1	8.4	9.8	22.7	5
338	5	278.1	10.9	12.8	16.8	10
362	1	302.1	11.9	24.0	6.0	11
400	1	340.1	13.4	38.0	2.4	12
446	1	386.1	15.2	46.0	1.6	13
490	1	430.1	16.9	44.0	1.8	14
524	1	464.1	18.3	34.0	3.0	15
563	1	503.1	19.8	39.0	2.3	16
619	1	559.1	22.0	56.0	1.1	17
686	1	626.1	24.6	67.0	0.8	18
742	1	682.1	26.9	56.0	1.1	19
792	1	732.1	28.8	50.0	1.4	20
825	1	765.1	30.1	33.0	3.2	21
858	1	798.1	31.4	33.0	3.2	22
892	1	832.1	32.8	34.0	3.0	23
922	1	862.1	33.9	30.0	3.8	24

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP6						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
260	0	165.1	6.5	15.0	14.1	0
290	2	195.1	7.7	15.0	14.1	2
319	2	224.1	8.8	14.5	14.6	4
352	2	257.1	10.1	16.5	12.6	6
384	2	289.1	11.4	16.0	13.1	8
418	2	323.1	12.7	17.0	12.2	10
457	2	362.1	14.3	19.5	9.1	12
490	2	395.1	15.6	16.5	12.6	14
525	2	430.1	16.9	17.5	11.8	16
591	3	496.1	19.5	22.0	7.1	19
649	2	554.1	21.8	29.0	4.1	21
724	2	629.1	24.8	37.5	2.5	23
779	2	684.1	26.9	27.5	4.6	25
829	2	734.1	28.9	25.0	5.5	27
878	2	783.1	30.8	24.5	5.8	29
930	2	835.1	32.9	26.0	5.1	31

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
228	0	165.1	6.5	12.5	17.3	0
253	2	190.1	7.5	12.5	17.3	2
286	5	223.1	8.8	6.6	35.3	7
318	5	255.1	10.0	6.4	36.5	12
359	5	296.1	11.7	8.2	27.7	17
390	2	327.1	12.9	15.5	13.6	19
428	2	365.1	14.4	19.0	9.6	21
470	2	407.1	16.0	21.0	7.8	23
512	2	449.1	17.7	21.0	7.8	25
549	2	486.1	19.1	18.5	11.1	27
585	2	522.1	20.6	18.0	11.5	29
630	2	567.1	22.3	22.5	6.8	31
680	2	617.1	24.3	25.0	5.5	33
721	2	658.1	25.9	20.5	8.2	35
755	2	692.1	27.2	17.0	12.2	37
815	5	752.1	29.6	12.0	18.1	42
876	3	813.1	32.0	20.3	8.4	45
926	2	863.1	34.0	25.0	5.5	47

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
207	0	165.1	6.5	10.8	20.3	0
261	5	219.1	8.6	10.8	20.3	5
300	2	258.1	10.2	19.5	10.5	7
330	2	288.1	11.3	15.0	14.1	9
363	2	321.1	12.6	16.5	12.6	11
393	2	351.1	13.8	15.0	14.1	13
430	2	388.1	15.3	18.5	11.1	15
464	2	422.1	16.6	17.0	12.2	17
494	2	452.1	17.8	15.0	14.1	19
524	2	482.1	19.0	15.0	14.1	21
557	2	515.1	20.3	16.5	12.6	23
587	2	545.1	21.5	15.0	14.1	25
612	2	570.1	22.4	12.5	17.3	27
674	5	632.1	24.9	12.4	17.4	32
727	3	685.1	27.0	17.7	11.7	35
771	2	729.1	28.7	22.0	7.1	37
815	2	773.1	30.4	22.0	7.1	39
862	2	820.1	32.3	23.5	6.3	41
924	2	882.1	34.7	31.0	3.6	43

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP9

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
207	0	165.1	6.5	17.0	12.2	0
241	2	199.1	7.8	17.0	12.2	2
272	2	230.1	9.1	15.5	13.6	4
305	2	263.1	10.4	16.5	12.6	6
382	2	340.1	13.4	38.5	2.3	8
425	1	383.1	15.1	43.0	1.9	9
471	1	429.1	16.9	46.0	1.6	10
515	1	473.1	18.6	44.0	1.8	11
558	1	516.1	20.3	43.0	1.9	12
595	1	553.1	21.8	37.0	2.5	13
635	1	593.1	23.4	40.0	2.2	14
654	1	612.1	24.1	19.0	9.6	15
702	5	660.1	26.0	9.6	23.2	20
800	4	758.1	29.8	24.5	5.8	24
893	3	851.1	33.5	31.0	3.6	27
940	2	898.1	35.4	23.5	6.3	29

Project: Meadowbrook Dr., Burlington

Tests Performed by: PV/DW2

Test Date: 2-Aug-12

DCP10

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
220	0	165.1	6.5	5.8	40.8	0
249	5	194.1	7.6	5.8	40.8	5
280	5	225.1	8.9	6.2	37.8	10
324	5	269.1	10.6	8.8	25.6	15
350	2	295.1	11.6	13.0	16.5	17
374	1	319.1	12.6	24.0	6.0	18
416	1	361.1	14.2	42.0	2.0	19
461	1	406.1	16.0	45.0	1.7	20
511	1	456.1	18.0	50.0	1.4	21
550	1	495.1	19.5	39.0	2.3	22
575	1	520.1	20.5	25.0	5.5	23
628	2	573.1	22.6	26.5	4.9	25
687	2	632.1	24.9	29.5	4.0	27
752	2	697.1	27.4	32.5	3.3	29
824	2	769.1	30.3	36.0	2.7	31
897	2	842.1	33.2	36.5	2.6	33
923	1	868.1	34.2	26.0	5.1	34

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
212	0	177.8	7.0	5.0	48.1	0
222	2	187.8	7.4	5.0	48.1	2
225	3	190.8	7.5	1.0	292.0	5
241	5	206.8	8.1	3.2	79.4	10
262	5	227.8	9.0	4.2	58.5	15
286	5	251.8	9.9	4.8	50.4	20
305	5	270.8	10.7	3.8	65.5	25
323	5	288.8	11.4	3.6	69.6	30
339	5	304.8	12.0	3.2	79.4	35
354	5	319.8	12.6	3.0	85.3	40
366	5	331.8	13.1	2.4	109.5	45
405	10	370.8	14.6	3.9	63.6	55
419	5	384.8	15.1	2.8	92.2	60
430	5	395.8	15.6	2.2	120.7	65
441	5	406.8	16.0	2.2	120.7	70
455	5	420.8	16.6	2.8	92.2	75
479	10	444.8	17.5	2.4	109.5	85
501	10	466.8	18.4	2.2	120.7	95
525	10	490.8	19.3	2.4	109.5	105
545	10	510.8	20.1	2.0	134.3	115
569	10	534.8	21.1	2.4	109.5	125
600	10	565.8	22.3	3.1	82.2	135
628	10	593.8	23.4	2.8	92.2	145
657	10	622.8	24.5	2.9	88.6	155
675	5	640.8	25.2	3.6	69.6	160
693	5	658.8	25.9	3.6	69.6	165
714	5	679.8	26.8	4.2	58.5	170
745	10	710.8	28.0	3.1	82.2	180
775	10	740.8	29.2	3.0	85.3	190
807	5	772.8	30.4	6.4	36.5	195
843	4	808.8	31.8	9.0	24.9	199
869	2	834.8	32.9	13.0	16.5	201
894	2	859.8	33.9	12.5	17.3	203

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
243	0	208.28	8.2	15.4	13.7	0
320	5	285.28	11.2	15.4	13.7	5
348	5	313.28	12.3	5.6	42.4	10
366	5	331.28	13.0	3.6	69.6	15
384	5	349.28	13.8	3.6	69.6	20
397	5	362.28	14.3	2.6	100.1	25
405	5	370.28	14.6	1.6	172.5	30
430	10	395.28	15.6	2.5	104.6	40
460	10	425.28	16.7	3.0	85.3	50
485	10	450.28	17.7	2.5	104.6	60
509	10	474.28	18.7	2.4	109.5	70
532	10	497.28	19.6	2.3	114.9	80
565	10	530.28	20.9	3.3	76.7	90
585	10	550.28	21.7	2.0	134.3	100
603	10	568.28	22.4	1.8	151.2	110
628	10	593.28	23.4	2.5	104.6	120
646	10	611.28	24.1	1.8	151.2	130
668	10	633.28	24.9	2.2	120.7	140
697	10	662.28	26.1	2.9	88.6	150
740	10	705.28	27.8	4.3	57.0	160
787	3	752.28	29.6	15.7	13.4	163
835	2	800.28	31.5	24.0	8.3	165
897	2	862.28	33.9	31.0	6.2	167
922	1	887.28	34.9	25.0	7.9	168

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
230	0	195.58	7.7	2.4	109.5	0
242	5	207.58	8.2	2.4	109.5	5
251	5	216.58	8.5	1.8	151.2	10
262	5	227.58	9.0	2.2	120.7	15
271	5	236.58	9.3	1.8	151.2	20
294	10	259.58	10.2	2.3	114.9	30
313	10	278.58	11.0	1.9	142.3	40
331	10	296.58	11.7	1.8	151.2	50
352	10	317.58	12.5	2.1	127.2	60
374	10	339.58	13.4	2.2	120.7	70
397	10	362.58	14.3	2.3	114.9	80
420	10	385.58	15.2	2.3	114.9	90
446	10	411.58	16.2	2.6	100.1	100
474	10	439.58	17.3	2.8	92.2	110
500	10	465.58	18.3	2.6	100.1	120
531	10	496.58	19.6	3.1	82.2	130
563	10	528.58	20.8	3.2	79.4	140
590	10	555.58	21.9	2.7	96.0	150
623	10	588.58	23.2	3.3	76.7	160
657	10	622.58	24.5	3.4	74.2	170
704	10	669.58	26.4	4.7	51.6	180
757	7	722.58	28.4	7.6	30.2	187
788	3	753.58	29.7	10.3	21.4	190
821	3	786.58	31.0	11.0	19.9	193
851	3	816.58	32.1	10.0	22.2	196
884	3	849.58	33.4	11.0	19.9	199
909	3	874.58	34.4	8.3	27.2	202
949	5	914.58	36.0	8.0	28.4	207

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
219	0	182.88	7.2	2.6	100.1	0
232	5	195.88	7.7	2.6	100.1	5
237	5	200.88	7.9	1.0	292.0	10
246	5	209.88	8.3	1.8	151.2	15
259	5	222.88	8.8	2.6	100.1	20
264	5	227.88	9.0	1.0	292.0	25
269	5	232.88	9.2	1.0	292.0	30
278	5	241.88	9.5	1.8	151.2	35
284	5	247.88	9.8	1.2	238.1	40
290	5	253.88	10.0	1.2	238.1	45
296	5	259.88	10.2	1.2	238.1	50
301	5	264.88	10.4	1.0	292.0	55
309	5	272.88	10.7	1.6	172.5	60
316	5	279.88	11.0	1.4	200.3	65
323	5	286.88	11.3	1.4	200.3	70
337	10	300.88	11.8	1.4	200.3	80
356	10	319.88	12.6	1.9	142.3	90
374	10	337.88	13.3	1.8	151.2	100
397	10	360.88	14.2	2.3	114.9	110
412	5	375.88	14.8	3.0	85.3	115
424	5	387.88	15.3	2.4	109.5	120
453	10	416.88	16.4	2.9	88.6	130
480	10	443.88	17.5	2.7	96.0	140
501	10	464.88	18.3	2.1	127.2	150
520	10	483.88	19.1	1.9	142.3	160
540	5	503.88	19.8	4.0	61.8	165
562	5	525.88	20.7	4.4	55.6	170
576	2	539.88	21.3	7.0	33.0	172
588	2	551.88	21.7	6.0	39.3	174
600	2	563.88	22.2	6.0	39.3	176
614	2	577.88	22.8	7.0	33.0	178
628	5	591.88	23.3	2.8	92.2	183
638	5	601.88	23.7	2.0	134.3	188
648	5	611.88	24.1	2.0	134.3	193
663	5	626.88	24.7	3.0	85.3	198
680	5	643.88	25.3	3.4	74.2	203
705	5	668.88	26.3	5.0	48.1	208
733	3	696.88	27.4	9.3	23.9	211
757	2	720.88	28.4	12.0	18.1	213
778	2	741.88	29.2	10.5	21.0	215
800	2	763.88	30.1	11.0	19.9	217
821	2	784.88	30.9	10.5	21.0	219
844	2	807.88	31.8	11.5	18.9	221
866	2	829.88	32.7	11.0	19.9	223
890	2	853.88	33.6	12.0	18.1	225
935	4	898.88	35.4	11.3	19.4	229

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
222	0	187.96	7.4	2.6	100.1	0
235	5	200.96	7.9	2.6	100.1	5
250	5	215.96	8.5	3.0	85.3	10
260	5	225.96	8.9	2.0	134.3	15
280	5	245.96	9.7	4.0	61.8	20
290	5	255.96	10.1	2.0	134.3	25
304	5	269.96	10.6	2.8	92.2	30
317	5	282.96	11.1	2.6	100.1	35
332	5	297.96	11.7	3.0	85.3	40
344	5	309.96	12.2	2.4	109.5	45
359	5	324.96	12.8	3.0	85.3	50
367	5	332.96	13.1	1.6	172.5	55
374	5	339.96	13.4	1.4	200.3	60
384	5	349.96	13.8	2.0	134.3	65
394	5	359.96	14.2	2.0	134.3	70
404	5	369.96	14.6	2.0	134.3	75
412	5	377.96	14.9	1.6	172.5	80
421	5	386.96	15.2	1.8	151.2	85
443	10	408.96	16.1	2.2	120.7	95
464	10	429.96	16.9	2.1	127.2	105
492	10	457.96	18.0	2.8	92.2	115
514	10	479.96	18.9	2.2	120.7	125
532	10	497.96	19.6	1.8	151.2	135
550	10	515.96	20.3	1.8	151.2	145
581	10	546.96	21.5	3.1	82.2	155
600	10	565.96	22.3	1.9	142.3	165
619	10	584.96	23.0	1.9	142.3	175
645	5	610.96	24.1	5.2	46.1	180
713	8	678.96	26.7	8.5	26.6	188
762	3	727.96	28.7	16.3	12.8	191
810	3	775.96	30.5	16.0	13.1	194
855	3	820.96	32.3	15.0	14.1	197
900	3	865.96	34.1	15.0	14.1	200
935	2	900.96	35.5	17.5	11.8	202

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
249	0	177.8	7.0	2.2	120.7	0
260	5	188.8	7.4	2.2	120.7	5
271	5	199.8	7.9	2.2	120.7	10
284	5	212.8	8.4	2.6	100.1	15
300	5	228.8	9.0	3.2	79.4	20
311	5	239.8	9.4	2.2	120.7	25
321	5	249.8	9.8	2.0	134.3	30
334	5	262.8	10.3	2.6	100.1	35
356	10	284.8	11.2	2.2	120.7	45
370	10	298.8	11.8	1.4	200.3	55
387	10	315.8	12.4	1.7	161.2	65
401	10	329.8	13.0	1.4	200.3	75
411	10	339.8	13.4	1.0	292.0	85
429	10	357.8	14.1	1.8	151.2	95
442	10	370.8	14.6	1.3	217.7	105
459	10	387.8	15.3	1.7	161.2	115
474	10	402.8	15.9	1.5	185.4	125
499	10	427.8	16.8	2.5	104.6	135
516	10	444.8	17.5	1.7	161.2	145
539	6	467.8	18.4	3.8	64.8	151
575	11	503.8	19.8	3.3	77.4	162
609	10	537.8	21.2	3.4	74.2	172
662	10	590.8	23.3	5.3	45.1	182
679	3	607.8	23.9	5.7	41.8	185
730	5	658.8	25.9	10.2	21.7	190
782	5	710.8	28.0	10.4	21.2	195
819	3	747.8	29.4	12.3	17.5	198
886	5	814.8	32.1	13.4	16.0	203
951	5	879.8	34.6	13.0	16.5	208

Project: W38 Locust Rd, Winneshiek County

Tests Performed by: HG./PV/BS

Test Date: 9-Aug-12

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
211	0	177.8	7.0	4.0	61.8	0
231	5	197.8	7.8	4.0	61.8	5
255	10	221.8	8.7	2.4	109.5	15
276	10	242.8	9.6	2.1	127.2	25
305	10	271.8	10.7	2.9	88.6	35
325	10	291.8	11.5	2.0	134.3	45
343	10	309.8	12.2	1.8	151.2	55
363	10	329.8	13.0	2.0	134.3	65
383	10	349.8	13.8	2.0	134.3	75
397	10	363.8	14.3	1.4	200.3	85
413	10	379.8	15.0	1.6	172.5	95
431	10	397.8	15.7	1.8	151.2	105
449	10	415.8	16.4	1.8	151.2	115
471	10	437.8	17.2	2.2	120.7	125
493	5	459.8	18.1	4.4	55.6	130
520	5	486.8	19.2	5.4	44.2	135
529	5	495.8	19.5	1.8	151.2	140
536	5	502.8	19.8	1.4	200.3	145
550	10	516.8	20.3	1.4	200.3	155
589	10	555.8	21.9	3.9	63.6	165
639	6	605.8	23.9	8.3	27.2	171
691	5	657.8	25.9	10.4	21.2	176
734	5	700.8	27.6	8.6	26.2	181
779	5	745.8	29.4	9.0	24.9	186
834	5	800.8	31.5	11.0	19.9	191
903	5	869.8	34.2	13.8	15.4	196
930	2	896.8	35.3	13.5	15.8	198

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP1						
Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
242	0	152.4	6.0	14.5	14.6	0
271	2	181.4	7.1	14.5	14.6	2
299	2	209.4	8.2	14.0	15.2	4
331	2	241.4	9.5	16.0	13.1	6
374	2	284.4	11.2	21.5	7.5	8
423	2	333.4	13.1	24.5	5.8	10
467	2	377.4	14.9	22.0	7.1	12
525	2	435.4	17.1	29.0	4.1	14
561	1	471.4	18.6	36.0	2.7	15
600	1	510.4	20.1	39.0	2.3	16
632	1	542.4	21.4	32.0	3.4	17
663	1	573.4	22.6	31.0	3.6	18
686	1	596.4	23.5	23.0	6.5	19
711	1	621.4	24.5	25.0	5.5	20
732	1	642.4	25.3	21.0	7.8	21
762	1	672.4	26.5	30.0	3.8	22
826	1	736.4	29.0	64.0	0.8	23
876	1	786.4	31.0	50.0	1.4	24
907	1	817.4	32.2	31.0	3.6	25
932	1	842.4	33.2	25.0	5.5	26

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP2

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
195	0	152.4	6.0	11.0	19.9	0
217	2	174.4	6.9	11.0	19.9	2
242	2	199.4	7.9	12.5	17.3	4
283	2	240.4	9.5	20.5	8.2	6
326	2	283.4	11.2	21.5	7.5	8
368	2	325.4	12.8	21.0	7.8	10
426	2	383.4	15.1	29.0	4.1	12
461	1	418.4	16.5	35.0	2.8	13
492	1	449.4	17.7	31.0	3.6	14
522	1	479.4	18.9	30.0	3.8	15
574	1	531.4	20.9	52.0	1.3	16
626	1	583.4	23.0	52.0	1.3	17
663	1	620.4	24.4	37.0	2.5	18
708	1	665.4	26.2	45.0	1.7	19
759	1	716.4	28.2	51.0	1.3	20
814	1	771.4	30.4	55.0	1.1	21
854	1	811.4	31.9	40.0	2.2	22
891	1	848.4	33.4	37.0	2.5	23
919	1	876.4	34.5	28.0	4.4	24

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP3

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
195	0	152.4	6.0	56.0	1.1	0
251	1	208.4	8.2	56.0	1.1	1
305	1	262.4	10.3	54.0	1.2	2
339	1	296.4	11.7	34.0	3.0	3
360	1	317.4	12.5	21.0	7.8	4
391	1	348.4	13.7	31.0	3.6	5
415	1	372.4	14.7	24.0	6.0	6
435	1	392.4	15.4	20.0	8.6	7
481	2	438.4	17.3	23.0	6.5	9
543	2	500.4	19.7	31.0	3.6	11
597	1	554.4	21.8	54.0	1.2	12
661	1	618.4	24.3	64.0	0.8	13
729	1	686.4	27.0	68.0	0.7	14
774	1	731.4	28.8	45.0	1.7	15
800	1	757.4	29.8	26.0	5.1	16
832	1	789.4	31.1	32.0	3.4	17
862	1	819.4	32.3	30.0	3.8	18
893	1	850.4	33.5	31.0	3.6	19
915	1	872.4	34.3	22.0	7.1	20
932	1	889.4	35.0	17.0	12.2	21

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP4

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
195	0	152.4	6.0	65.0	0.8	0
260	1	217.4	8.6	65.0	0.8	1
285	1	242.4	9.5	25.0	5.5	2
311	1	268.4	10.6	26.0	5.1	3
341	1	298.4	11.7	30.0	3.8	4
383	1	340.4	13.4	42.0	2.0	5
424	1	381.4	15.0	41.0	2.1	6
468	1	425.4	16.7	44.0	1.8	7
510	1	467.4	18.4	42.0	2.0	8
550	1	507.4	20.0	40.0	2.2	9
594	1	551.4	21.7	44.0	1.8	10
637	1	594.4	23.4	43.0	1.9	11
677	1	634.4	25.0	40.0	2.2	12
726	1	683.4	26.9	49.0	1.4	13
772	1	729.4	28.7	46.0	1.6	14
812	1	769.4	30.3	40.0	2.2	15
847	1	804.4	31.7	35.0	2.8	16
880	1	837.4	33.0	33.0	3.2	17
909	1	866.4	34.1	29.0	4.1	18
929	1	886.4	34.9	20.0	8.6	19

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP5

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
200	0	152.4	6.0	7.7	29.8	0
223	3	175.4	6.9	7.7	29.8	3
254	2	206.4	8.1	15.5	13.6	5
295	2	247.4	9.7	20.5	8.2	7
331	2	283.4	11.2	18.0	11.5	9
370	2	322.4	12.7	19.5	9.1	11
406	2	358.4	14.1	18.0	11.5	13
459	2	411.4	16.2	26.5	4.9	15
520	2	472.4	18.6	30.5	3.7	17
560	1	512.4	20.2	40.0	2.2	18
608	1	560.4	22.1	48.0	1.5	19
652	1	604.4	23.8	44.0	1.8	20
722	1	674.4	26.6	70.0	0.7	21
759	1	711.4	28.0	37.0	2.5	22
800	1	752.4	29.6	41.0	2.1	23
849	1	801.4	31.6	49.0	1.4	24
881	1	833.4	32.8	32.0	3.4	25
902	1	854.4	33.6	21.0	7.8	26
919	1	871.4	34.3	17.0	12.2	27

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP6

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
236	0	152.4	6.0	6.5	35.9	0
249	2	165.4	6.5	6.5	35.9	2
262	2	178.4	7.0	6.5	35.9	4
283	2	199.4	7.9	10.5	21.0	6
309	2	225.4	8.9	13.0	16.5	8
350	2	266.4	10.5	20.5	8.2	10
405	2	321.4	12.7	27.5	4.6	12
431	1	347.4	13.7	26.0	5.1	13
451	1	367.4	14.5	20.0	8.6	14
470	1	386.4	15.2	19.0	9.6	15
485	1	401.4	15.8	15.0	14.1	16
503	1	419.4	16.5	18.0	11.5	17
521	1	437.4	17.2	18.0	11.5	18
550	1	466.4	18.4	29.0	4.1	19
601	1	517.4	20.4	51.0	1.3	20
645	1	561.4	22.1	44.0	1.8	21
682	1	598.4	23.6	37.0	2.5	22
713	1	629.4	24.8	31.0	3.6	23
740	1	656.4	25.8	27.0	4.7	24
767	1	683.4	26.9	27.0	4.7	25
793	1	709.4	27.9	26.0	5.1	26
815	1	731.4	28.8	22.0	7.1	27
839	1	755.4	29.7	24.0	6.0	28
864	1	780.4	30.7	25.0	5.5	29
893	1	809.4	31.9	29.0	4.1	30
940	1	856.4	33.7	47.0	1.6	31

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP7

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
205	0	152.4	6.0	14.0	15.2	0
219	1	166.4	6.6	14.0	15.2	1
236	1	183.4	7.2	17.0	12.2	2
281	2	228.4	9.0	22.5	6.8	4
325	2	272.4	10.7	22.0	7.1	6
394	1	341.4	13.4	69.0	0.7	7
504	1	451.4	17.8	110.0	0.3	8
566	1	513.4	20.2	62.0	0.9	9
602	1	549.4	21.6	36.0	2.7	10
634	1	581.4	22.9	32.0	3.4	11
685	1	632.4	24.9	51.0	1.3	12
749	1	696.4	27.4	64.0	0.8	13
786	1	733.4	28.9	37.0	2.5	14
829	1	776.4	30.6	43.0	1.9	15
859	1	806.4	31.7	30.0	3.8	16
879	1	826.4	32.5	20.0	8.6	17
901	1	848.4	33.4	22.0	7.1	18
924	1	871.4	34.3	23.0	6.5	19
947	1	894.4	35.2	23.0	6.5	20

Project: 175th Street, Winneshiek County

Tests Performed by: DW/PV

Test Date: 9-Aug-12

DCP8

Depth	Blows	Corrected depth (mm)	Depth (in)	DPI (mm/blow)	CBR (%)	Cumulative Blows
234	0	152.4	6.0	3.0	85.3	0
237	1	155.4	6.1	3.0	85.3	1
239	1	157.4	6.2	2.0	134.3	2
242	1	160.4	6.3	3.0	85.3	3
250	3	168.4	6.6	2.7	97.3	6
257	2	175.4	6.9	3.5	71.8	8
263	2	181.4	7.1	3.0	85.3	10
272	2	190.4	7.5	4.5	54.2	12
284	4	202.4	8.0	3.0	85.3	16
304	4	222.4	8.8	5.0	48.1	20
332	4	250.4	9.9	7.0	33.0	24
374	4	292.4	11.5	10.5	21.0	28
434	3	352.4	13.9	20.0	8.6	31
479	1	397.4	15.6	45.0	1.7	32
537	1	455.4	17.9	58.0	1.0	33
605	1	523.4	20.6	68.0	0.7	34
661	1	579.4	22.8	56.0	1.1	35
737	1	655.4	25.8	76.0	0.6	36
833	1	751.4	29.6	96.0	0.4	37
882	1	800.4	31.5	49.0	1.4	38
910	1	828.4	32.6	28.0	4.4	39
942	1	860.4	33.9	32.0	3.4	40

APPENDIX D: FWD RAW DATA

Project: NW 3rd and Greenwood, Ankeny

```
IKUAB FWD FILE    : greenwood.fwd
HProject No.      : TR 640
HLocation         : Greenwood and 3rd
HClient           : IDOT
HStart Station    : 0
HDirection        :
HEnd Station      :
HWeather          : overcast 65
HOperator         : bz

IDate Created     : 5/2/2012
IVersion          : 2.3.11
ILoad Mode        : 1       (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91     (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7     8
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00   0.00 (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND ??????

IReference Offset :      0 m
ITestpoint spacing:      0 m

J Distance Imp   Load  D0     D1     D2     D3     D4     D5     D6     D7    Air Pave      Time       Pavement Pavement  Pavement  Pavement Surface
J       m Num     lbf   mils   mils   mils   mils   mils   mils   mils   mils  °F  °F                 Location Type    Condition  Distress     Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D      6  2    6765   6.66   5.45   5.31   4.58   3.98   3.10   2.30   1.65  72   71 09:35:10 CTR      PCC      Good      None       578
D      6  3    9893  10.08   8.26   7.97   6.85   5.99   4.69   3.46   2.50  72   71 09:35:16 CTR      PCC      Good      None       558
D      6  4 13053  13.38  10.96  10.35   9.22   7.99   6.27   4.66   3.34  72   71 09:35:24 CTR      PCC      Good      None       555
D      6  5 17642  18.23  14.94  14.07  12.44  10.91   8.55   6.34   4.55  72   71 09:35:34 CTR      PCC      Good      None       550
C  Comment at 8 m  Time: 09:36:26 :midpanel dcp 1
D      8  2    6742   5.60   5.40   5.51   5.15   4.79   4.08   3.17   2.38  72   72 09:36:56 CTR      PCC      Good      None       685
D      8  3    9832   8.27   7.94   8.13   7.59   7.07   6.03   4.70   3.51  72   72 09:37:03 CTR      PCC      Good      None       676
D      8  4 13038  10.82  10.37  10.67  10.01   9.24   7.90   6.17   4.59  72   72 09:37:11 CTR      PCC      Good      None       685
D      8  5 17834  14.53  13.86  14.28  13.38  12.42  10.62   8.30   6.18  72   72 09:37:21 CTR  PCC      Good      None       698
C  Comment at 10 m  Time: 09:38:17 :joint
D     10  2 6717   5.13   4.61   5.37   4.68   4.20   3.29   2.42   1.80  73   72 09:38:47 CTR      PCC      Good      None       745
C  Comment at 10 m  Time: 09:38:54 :Deflection is not decreasing
D     10  3 9825   7.75   6.93   8.13   7.17   6.38   5.02   3.69   2.70  73   72 09:39:07 CTR      PCC      Good      None       720
C  Comment at 10 m  Time: 09:39:15 :Deflection is not decreasing
D     10  4 13025  10.40   9.21  10.88   9.65   8.49   6.72   4.97   3.61  73   72 09:39:21 CTR      PCC      Good      None       712
C  Comment at 10 m  Time: 09:39:31 :Deflection is not decreasing
D     10  5 17783  14.34  12.65  14.98  13.25  11.72   9.26   6.82   4.97  73   72 09:39:33 CTR  PCC      Good      None       705
C  Comment at 13 m  Time: 09:40:11 :midpanel
D     13  2 6703   4.63   4.47   4.52   4.19   3.93   3.38   2.66   2.10  73   74 09:40:38 CTR      PCC      Good      None       824
D     13  3 9832   6.95   6.70   6.82   6.37   5.93   5.08   4.05   3.14  73   74 09:40:45 CTR      PCC      Good      None       804
D     13  4 13066   9.23   8.86   9.04   8.45   7.81   6.74   5.39   4.13  73   74 09:40:53 CTR      PCC      Good      None       805
D     13  5 17848  12.59  12.05  12.33  11.47  10.62   9.22   7.33   5.61  73   74 09:41:03 CTR  PCC      Good      None       806
C  Comment at 15 m  Time: 09:41:40 :joint
C  Comment at 15 m  Time: 09:42:05 :Deflection is not decreasing
D     15  2 6711   5.25   4.69   5.46   4.77   4.28   3.34   2.42   1.77  73   73 09:43:29 CTR      PCC      Good      None       727
C  Comment at 15 m  Time: 09:43:36 :Deflection is not decreasing
D     15  3 9816   7.93   7.06   8.27   7.27   6.45   5.05   3.71   2.66  73   73 09:43:50 CTR      PCC      Good      None       704
D     15  2 6680   5.32   4.69   5.45   4.81   4.30   3.31   2.44   1.77  72   73 09:45:10 CTR      PCC      Good      None       715
D     15  3 9823   8.02   7.08   8.23   7.31   6.47   5.03   3.71   2.67  72   73 09:45:16 CTR      PCC      Good      None       696
C  Comment at 15 m  Time: 09:45:24 :Deflection is not decreasing
D     15  4 13057  10.70   9.42  11.00   9.80   8.63   6.74   5.00   3.57  72   73 09:45:28 CTR      PCC      Good      None       694
C  Comment at 15 m  Time: 09:45:38 :Deflection is not decreasing
D     15  5 17759  14.68  12.87  15.03  13.35  11.82   9.25   6.83   4.91  72   73 09:45:40 CTR  PCC      Good      None       688
C  Comment at 18 m  Time: 09:46:24 :midpanel
D     18  2 6700   4.48   4.32   4.38   4.08   3.82   3.25   2.58   2.03  73   72 09:46:49 CTR      PCC      Good      None       851
```

D 18 3 9829 6.69 6.42 6.51 6.10 5.69 4.87 3.88 3.00 73 72 09:46:55 CTR PCC Good None 835
D 18 4 13010 8.83 8.45 8.61 8.11 7.50 6.48 5.16 3.98 73 72 09:47:03 CTR PCC Good None 838
D 18 5 17830 12.04 11.49 11.74 11.00 10.21 8.81 7.03 5.44 73 72 09:47:13 CTR PCC Good None 842
C Comment at 19 m Time: 09:47:54 :joint
D 19 2 6713 4.73 4.40 4.76 4.25 3.85 3.13 2.39 1.83 72 73 09:48:19 CTR PCC Good None 807
D 19 3 9809 7.18 6.64 7.25 6.53 5.86 4.79 3.66 2.75 72 73 09:48:25 CTR PCC Good None 777
D 19 4 12996 9.57 8.80 9.67 8.77 7.81 6.39 4.91 3.69 72 73 09:48:33 CTR PCC Good None 772
D 19 5 17807 13.14 12.03 13.34 12.02 10.78 8.78 6.73 5.08 72 73 09:48:43 CTR PCC Good None 771
C Comment at 21 m Time: 09:49:33 :midpanel chp 1 dcp 2
D 21 2 6669 4.89 4.77 4.84 4.54 4.24 3.69 2.94 2.32 73 72 09:49:58 CTR PCC Good None 775
D 21 3 9804 7.24 7.04 7.16 6.72 6.28 5.46 4.36 3.44 73 72 09:50:05 CTR PCC Good None 770
D 21 4 13008 9.44 9.14 9.34 8.82 8.19 7.16 5.76 4.47 73 72 09:50:13 CTR PCC Good None 783
D 21 5 17794 12.72 12.23 12.53 11.80 10.98 9.58 7.72 6.02 73 72 09:50:23 CTR PCC Good None 796
C Comment at 24 m Time: 09:51:07 :joint
D 24 2 6669 4.63 4.30 4.73 4.26 3.87 3.21 2.49 1.94 73 72 09:51:34 CTR PCC Good None 819
D 24 3 9792 6.98 6.51 7.17 6.49 5.85 4.86 3.79 2.92 73 72 09:51:40 CTR PCC Good None 798
D 24 4 13035 9.33 8.63 9.59 8.71 7.83 6.52 5.10 3.91 73 72 09:51:48 CTR PCC Good None 794
D 24 5 17815 12.78 11.78 13.15 11.88 10.73 8.88 6.96 5.35 73 72 09:51:58 CTR PCC Good None 793
C Comment at 26 m Time: 09:52:34 :midpanel
D 26 2 6674 4.64 4.50 4.54 4.25 4.02 3.48 2.81 2.22 72 72 09:52:59 CTR PCC Good None 819
D 26 3 9804 6.87 6.68 6.78 6.39 5.94 5.18 4.17 3.28 72 72 09:53:06 CTR PCC Good None 812
D 26 4 13017 9.05 8.75 8.94 8.46 7.86 6.86 5.54 4.32 72 72 09:53:14 CTR PCC Good None 818
D 26 5 17790 12.31 11.83 12.08 11.39 10.66 9.29 7.52 5.87 72 72 09:53:24 CTR PCC Good None 822
C Comment at 28 m Time: 09:54:00 :joint
D 28 2 6624 4.90 4.51 5.15 4.57 4.08 3.31 2.48 1.90 71 73 09:54:27 CTR PCC Good None 768
C Comment at 28 m Time: 09:54:34 :Deflection is not decreasing
D 28 3 9739 7.42 6.83 7.82 6.99 6.23 5.00 3.82 2.86 71 73 09:54:37 CTR PCC Good None 746
C Comment at 28 m Time: 09:54:44 :Deflection is not decreasing
D 28 4 12934 9.89 9.06 10.43 9.39 8.33 6.74 5.15 3.83 71 73 09:54:46 CTR PCC Good None 744
C Comment at 28 m Time: 09:54:56 :Deflection is not decreasing
D 28 5 17701 13.60 12.42 14.36 12.86 11.46 9.26 7.07 5.28 71 73 09:54:57 CTR PCC Good None 740
C Comment at 30 m Time: 09:55:45 :midpanel
D 30 2 6646 4.92 4.79 4.84 4.53 4.27 3.70 2.92 2.28 72 73 09:56:11 CTR PCC Good None 768
D 30 3 9798 7.26 7.09 7.18 6.78 6.33 5.49 4.37 3.36 72 73 09:56:17 CTR PCC Good None 767
D 30 4 13038 9.53 9.29 9.41 8.91 8.31 7.18 5.79 4.41 72 73 09:56:25 CTR PCC Good None 778
D 30 5 17862 12.82 12.44 12.66 11.97 11.20 9.68 7.79 5.98 72 73 09:56:35 CTR PCC Good None 792
C Comment at 33 m Time: 09:57:29 :joint
D 33 2 6639 4.99 4.57 5.03 4.49 4.12 3.37 2.59 2.01 72 73 09:57:53 CTR PCC Good None 757
D 33 3 9749 7.59 6.93 7.64 6.89 6.26 5.14 3.97 3.05 72 73 09:58:00 CTR PCC Good None 730
D 33 4 12960 10.13 9.23 10.20 9.28 8.36 6.89 5.37 4.07 72 73 09:58:08 CTR PCC Good None 727
D 33 5 17765 13.97 12.69 14.11 12.75 11.56 9.50 7.36 5.63 72 73 09:58:18 CTR PCC Good None 723
C Comment at 35 m Time: 09:58:49 :midpanel
D 35 2 6665 4.42 4.27 4.30 3.98 3.72 3.18 2.49 1.93 72 75 09:59:13 CTR PCC Good None 858
D 35 3 9792 6.57 6.36 6.45 6.03 5.59 4.80 3.77 2.89 72 75 09:59:20 CTR PCC Good None 848
D 35 4 13019 8.70 8.40 8.54 8.02 7.43 6.37 5.06 3.85 72 75 09:59:28 CTR PCC Good None 851
D 35 5 17868 11.85 11.39 11.65 10.89 10.13 8.73 6.91 5.25 72 75 09:59:38 CTR PCC Good None 858
C Comment at 37 m Time: 10:00:12 :joint
D 37 2 6639 3.97 3.62 4.04 3.56 3.18 2.51 1.86 1.42 72 75 10:00:37 CTR PCC Good None 950
D 37 3 9789 6.04 5.51 6.17 5.52 4.85 3.85 2.89 2.15 72 75 10:00:43 CTR PCC Good None 922
D 37 4 13019 8.08 7.33 8.26 7.37 6.51 5.17 3.90 2.89 72 75 10:00:51 CTR PCC Good None 916
D 37 5 17876 11.15 10.04 11.41 10.15 9.02 7.15 5.37 3.97 72 75 10:01:01 CTR PCC Good None 911
C Comment at 40 m Time: 10:01:38 :midpanel
D 40 2 6673 3.87 3.73 3.84 3.52 3.35 2.89 2.32 1.82 72 74 10:02:03 CTR PCC Good None 981
D 40 3 9803 5.76 5.53 5.70 5.35 4.98 4.32 3.48 2.71 72 74 10:02:09 CTR PCC Good None 968
D 40 4 13050 7.56 7.24 7.49 7.04 6.52 5.69 4.60 3.61 72 74 10:02:17 CTR PCC Good None 982
C Comment at 40 m Time: 10:03:10 :repeat midpanel
D 40 2 6651 3.90 3.73 3.85 3.56 3.35 2.93 2.32 1.85 72 73 10:03:35 CTR PCC Good None 970
D 40 3 9846 5.77 5.53 5.70 5.37 4.97 4.34 3.48 2.73 72 73 10:03:41 CTR PCC Good None 970
D 40 4 13094 7.55 7.22 7.47 7.02 6.51 5.67 4.59 3.60 72 73 10:03:49 CTR PCC Good None 986
D 40 5 17901 10.22 9.69 10.04 9.39 8.78 7.63 6.17 4.83 72 73 10:03:59 CTR PCC Good None 996
C Comment at 41 m Time: 10:04:48 :joint chp2 dcp 3
D 41 2 6660 3.77 3.46 3.64 3.24 2.95 2.42 1.85 1.45 72 74 10:05:16 CTR PCC Good None 1005
D 41 3 9797 5.73 5.27 5.56 5.04 4.50 3.71 2.86 2.19 72 74 10:05:22 CTR PCC Good None 973
D 41 4 13028 7.68 7.01 7.43 6.71 6.01 4.94 3.85 2.95 72 74 10:05:30 CTR PCC Good None 965
D 41 5 17908 10.59 9.60 10.21 9.17 8.27 6.78 5.26 4.04 72 74 10:05:40 CTR PCC Good None 961
C Comment at 44 m Time: 10:06:21 :midpanel
D 44 2 6660 4.23 4.05 4.17 3.86 3.63 3.11 2.42 1.87 72 73 10:06:45 CTR PCC Good None 895
D 44 3 9837 6.28 6.00 6.18 5.82 5.38 4.63 3.63 2.78 72 73 10:06:51 CTR PCC Good None 890
D 44 4 13094 8.21 7.81 8.07 7.62 7.02 6.06 4.79 3.67 72 73 10:06:59 CTR PCC Good None 907
D 44 5 17931 11.02 10.41 10.81 10.15 9.43 8.11 6.40 4.92 72 73 10:07:09 CTR PCC Good None 925

C Comment at 46 m Time: 10:07:58 :joint
D 46 2 6645 3.43 3.25 3.33 2.96 2.71 2.22 1.70 1.36 71 73 10:08:21 CTR PCC Good None 1103
D 46 3 9784 5.24 4.95 5.10 4.61 4.14 3.43 2.65 2.07 71 73 10:08:27 CTR PCC Good None 1061
D 46 4 13023 7.06 6.61 6.87 6.22 5.59 4.63 3.61 2.78 71 73 10:08:34 CTR PCC Good None 1048
D 46 5 17906 9.80 9.11 9.51 8.57 7.76 6.39 4.95 3.84 71 73 10:08:44 CTR PCC Good None 1039
C Comment at 48 m Time: 10:09:17 :mid panel
D 48 2 6644 3.78 3.64 3.65 3.39 3.14 2.67 2.05 1.60 71 72 10:09:41 CTR PCC Good None 999
D 48 3 9799 5.59 5.40 5.43 5.09 4.67 3.95 3.08 2.37 71 72 10:09:48 CTR PCC Good None 996
D 48 4 13061 7.37 7.09 7.14 6.70 6.12 5.21 4.08 3.12 71 72 10:09:56 CTR PCC Good None 1007
D 48 5 17969 9.99 9.53 9.64 9.01 8.28 7.03 5.52 4.21 71 72 10:10:06 CTR PCC Good None 1022
C Comment at 51 m Time: 10:10:49 :joint
D 51 2 6642 3.68 3.43 3.72 3.24 2.96 2.42 1.83 1.44 70 69 10:11:15 CTR PCC Good None 1027
D 51 3 9819 5.62 5.22 5.66 5.08 4.51 3.68 2.83 2.18 70 69 10:11:21 CTR PCC Good None 993
D 51 4 13067 7.54 6.95 7.59 6.81 6.05 4.94 3.84 2.94 70 69 10:11:29 CTR PCC Good None 986
D 51 5 17917 10.38 9.48 10.42 9.29 8.32 6.79 5.22 4.03 70 69 10:11:39 CTR PCC Good None 981
C Comment at 53 m Time: 10:12:14 :midpanel
D 53 2 6655 4.07 3.91 3.96 3.63 3.40 2.89 2.26 1.78 70 70 10:12:41 CTR PCC Good None 929
D 53 3 9860 5.98 5.76 5.81 5.44 5.00 4.30 3.37 2.63 70 70 10:12:47 CTR PCC Good None 937
D 53 4 13114 7.83 7.52 7.60 7.13 6.55 5.62 4.46 3.46 70 70 10:12:55 CTR PCC Good None 953
D 53 5 17945 10.56 10.10 10.24 9.52 8.81 7.55 5.98 4.66 70 70 10:13:05 CTR PCC Good None 966
C Comment at 55 m Time: 10:13:49 :joint
C Comment at 55 m Time: 10:15:07 :back tests equals utlity
D 55 2 6655 4.08 3.92 4.02 3.58 3.23 2.69 2.07 1.64 69 69 10:15:41 CTR PCC Good None 928
D 55 3 9837 6.19 5.91 6.11 5.53 4.98 4.10 3.18 2.48 69 69 10:15:47 CTR PCC Good None 904
D 55 4 13083 8.20 7.79 8.11 7.38 6.62 5.49 4.25 3.31 69 69 10:15:55 CTR PCC Good None 907
D 55 5 17903 11.27 10.60 11.14 10.08 9.10 7.50 5.82 4.53 69 69 10:16:05 CTR PCC Good None 904
C Comment at 58 m Time: 10:17:21 :midpanel dcp 4
D 58 2 6645 4.71 4.48 4.71 4.41 4.21 3.72 3.03 2.43 70 73 10:17:48 CTR PCC Good None 801
D 58 3 9823 7.01 6.66 7.05 6.66 6.26 5.56 4.54 3.61 70 73 10:17:55 CTR PCC Good None 797
D 58 4 13082 9.15 8.67 9.22 8.79 8.22 7.28 5.99 4.74 70 73 10:18:03 CTR PCC Good None 813
D 58 5 17915 12.20 11.49 12.27 11.64 10.95 9.67 7.95 6.29 70 73 10:18:13 CTR PCC Good None 835
C Comment at 60 m Time: 10:18:52 :joint
D 60 2 6630 3.84 3.56 3.81 3.39 3.09 2.55 1.98 1.57 69 74 10:19:19 CTR PCC Good None 981
D 60 3 9797 5.86 5.43 5.83 5.29 4.72 3.93 3.06 2.39 69 74 10:19:25 CTR PCC Good None 950
D 60 4 13067 7.85 7.25 7.83 7.11 6.36 5.28 4.12 3.21 69 74 10:19:33 CTR PCC Good None 946
D 60 5 17874 10.79 9.90 10.79 9.72 8.78 7.25 5.66 4.40 69 74 10:19:43 CTR PCC Good None 942
C Comment at 62 m Time: 10:20:12 :midpanel
D 62 2 6613 4.26 4.10 4.15 3.82 3.55 3.02 2.33 1.78 69 76 10:20:38 CTR PCC Good None 883
D 62 3 9769 6.33 6.11 6.18 5.78 5.29 4.53 3.52 2.65 69 76 10:20:45 CTR PCC Good None 877
D 62 4 13008 8.32 8.01 8.13 7.62 7.01 5.96 4.67 3.49 69 76 10:20:53 CTR PCC Good None 889
D 62 5 17888 11.27 10.79 10.96 10.19 9.45 8.03 6.29 4.71 69 76 10:21:03 CTR PCC Good None 902
C Comment at 64 m Time: 10:21:43 :joint
D 64 2 6633 4.13 3.71 4.16 3.62 3.25 2.54 1.86 1.40 69 76 10:22:09 CTR PCC Good None 913
D 64 3 9785 6.30 5.67 6.37 5.66 4.98 3.91 2.89 2.12 69 76 10:22:16 CTR PCC Good None 883
D 64 4 13044 8.47 7.59 8.57 7.65 6.69 5.29 3.92 2.85 69 76 10:22:24 CTR PCC Good None 876
D 64 5 17865 11.74 10.43 11.88 10.51 9.30 7.30 5.38 3.94 69 76 10:22:34 CTR PCC Good None 865
C Comment at 66 m Time: 10:23:19 :midpanel crack curbside of plate
D 66 2 6623 5.26 5.36 4.85 4.39 4.05 3.34 2.52 1.84 70 76 10:23:55 CTR PCC Good None 716
D 66 3 9790 7.88 8.04 7.34 6.76 6.11 5.05 3.85 2.80 70 76 10:24:01 CTR PCC Good None 707
D 66 4 13035 10.46 10.66 9.79 9.05 8.21 6.81 5.19 3.79 70 76 10:24:09 CTR PCC Good None 708
D 66 5 17821 14.33 14.52 13.44 12.37 11.33 9.39 7.18 5.23 70 76 10:24:19 CTR PCC Good None 707
C Comment at 68 m Time: 10:25:07 :joint crack curbside of plate
D 68 2 6569 8.12 7.34 8.14 7.19 6.48 5.22 3.91 2.95 70 75 10:25:51 CTR PCC Good None 460
D 68 3 9709 12.47 11.31 12.37 11.03 9.87 7.93 5.96 4.43 70 75 10:25:57 CTR PCC Good None 443
D 68 4 12907 16.75 15.20 16.44 14.71 13.19 10.59 7.96 5.92 70 75 10:26:05 CTR PCC Good None 438
D 68 5 17560 23.09 20.98 22.45 19.98 17.96 14.41 10.84 8.07 70 75 10:26:15 CTR PCC Good None 432
C Comment at 71 m Time: 10:27:16 :midpanel crack under plate dcp 5
D 71 2 6573 7.98 7.96 7.65 7.01 6.50 5.49 4.31 3.40 70 71 10:27:44 CTR PCC Good None 468
D 71 3 9721 12.18 12.12 11.69 10.81 10.01 8.45 6.68 5.27 70 71 10:27:51 CTR PCC Good None 454
D 71 4 12922 16.35 16.13 15.69 14.54 13.46 11.41 9.06 7.13 70 71 10:27:58 CTR PCC Good None 449
D 71 5 17638 22.58 22.44 21.67 20.03 18.64 15.86 12.61 9.95 70 71 10:28:09 CTR PCC Good None 444

Project: NW 5th and Greenwood, Ankeny

```
IKUAB FWD FILE    : greenwood and 5th.fwd
HProject No.      : TR 640
HLocation         : greenwood and 5th
HClient           : IDOT
HStart Station    : 0
HDirection        :
HEnd Station      :
HWeather          : overcast 65
HOperator         : bz

IDate Created     : 5/2/2012
IVersion          : 2.3.11
ILoad Mode        : 1       (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91     (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7     8
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00   0.00 (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND ??????

IReference Offset :      0 m
ITestpoint spacing:      0 m

J Dist. Imp Load  D0    D1    D2    D3    D4    D5    D6    D7    Air Pave    Time              Pavement Pavement Pavement  Pavement Surface
J   m Num   lbf  mils  mils  mils  mils  mils  mils  mils  mils   °F  °F            Location    Type     Condition Distress    Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
C  Comment at 2 m  Time: 11:43:27 :joint
C  Comment at 2 m  Time: 11:44:30 :Deflection is not decreasing
D      2  2  6505  21.84   5.53  17.75  15.17  13.23   9.56   6.40   4.36   70   72 11:44:36 CTR      PCC     Poor     Long.Cr.     169
C  Comment at 2 m  Time: 11:44:43 :Deflection is not decreasing
D      2  3  9522  33.03   8.09  26.87  23.06  20.08  14.58   9.84   6.69   70   72 11:44:45 CTR      PCC     Poor     Long.Cr.     164
C  Comment at 2 m  Time: 11:44:53 :Deflection is not decreasing
D      2  4 12569  44.79  10.65  36.46  31.32  27.29  19.83  13.52   9.17   70   72 11:44:55 CTR      PCC     Poor     Long.Cr.     160
C  Comment at 2 m  Time: 11:45:05 :Deflection is not decreasing
D      2  5 16731  61.44  14.12  49.88  42.87  37.33  27.18  18.69  12.73   70   72 11:45:07 CTR      PCC     Poor     Long.Cr.     155
C  Comment at 5 m  Time: 11:46:18 :mid panel crack under plate dcp 1
D      5  2  6506  18.39  14.10  14.82  12.46  10.78   7.76   5.22   3.71   71   73 11:46:49 CTR      PCC     Poor     Long.Cr.     201
D      5  3  9543  27.64  21.27  22.27  18.86  16.24  11.68   7.98   5.66   71   73 11:46:56 CTR      PCC     Poor     Long.Cr.     196
D      5  4 12631  36.90  28.50  29.78  25.31  21.79  15.65  10.77   7.65   71   73 11:47:04 CTR      PCC     Poor     Long.Cr.     195
D      5  5 17055  50.31  38.82  40.60  34.50  29.73  21.40  14.74  10.48   71   73 11:47:14 CTR      PCC     Poor     Long.Cr.     193
C  Comment at 8 m  Time: 11:48:12 :joint
C  Comment at 8 m  Time: 11:48:38 :Deflection is not decreasing
D      8  2  6435  22.31   8.05  18.46  15.85  13.88  10.23   6.96   4.94   71   73 11:48:44 CTR      PCC     Poor     Long.Cr.     164
C  Comment at 8 m  Time: 11:48:51 :Deflection is not decreasing
D      8  3  9446  33.58  11.89  27.79  23.97  21.00  15.55  10.69   7.57   71   73 11:48:53 CTR      PCC     Poor     Long.Cr.     160
C  Comment at 8 m  Time: 11:49:01 :Deflection is not decreasing
D      8  4 12464  45.00  15.70  37.23  32.24  28.20  20.91  14.53  10.27   71   73 11:49:03 CTR      PCC     Poor     Long.Cr.     157
C  Comment at 8 m  Time: 11:49:14 :Deflection is not decreasing
D      8  5 16733  61.72  21.06  50.81  43.93  38.46  28.60  20.00  14.13   71   73 11:49:15 CTR      PCC     Poor     Long.Cr.     154
C  Comment at 11 m  Time: 11:50:14 :mid panel
D     11  2  6586   9.43   9.04   9.22   8.46   7.77   6.40   4.80   3.67   71   76 11:50:47 CTR      PCC     Poor     Long.Cr.     397
D     11  3  9721  14.42  13.83  14.12  13.04  11.91   9.79   7.35   5.59   71   76 11:50:53 CTR      PCC     Poor     Long.Cr.     383
D     11  4 12891  19.32  18.45  19.01  17.58  15.99  13.14   9.91   7.56   71   76 11:51:02 CTR      PCC     Poor     Long.Cr.     379
D     11  5 17554  26.46  25.21  26.10  24.15  21.95  18.03  13.67  10.41   71   76 11:51:12 CTR      PCC     Poor     Long.Cr.     377
C  Comment at 14 m  Time: 11:52:11 :joint
C  Comment at 14 m  Time: 11:52:37 :Deflection is not decreasing
D     14  2  6439  21.63   6.92  18.18  11.76  12.23   9.56   7.20   5.04   72   80 11:52:41 CTR      PCC     Poor     Long.Cr.     169
C  Comment at 14 m  Time: 11:52:48 :Deflection is not decreasing
D     14  3  9463  33.14  10.00  27.81  17.94  18.67  14.60  11.05   7.77   72   80 11:52:50 CTR      PCC     Poor     Long.Cr.     162
C  Comment at 14 m  Time: 11:52:58 :Deflection is not decreasing
D     14  4 12497  45.03  12.95  37.72  24.14  25.26  19.77  15.04  10.58   72   80 11:53:00 CTR      PCC     Poor     Long.Cr.     158
C  Comment at 14 m  Time: 11:53:11 :Deflection is not decreasing
D     14  5 16784  62.61  16.96  52.25  32.69  34.93  27.15  20.84  14.61   72   80 11:53:12 CTR      PCC     Poor     Long.Cr.     152
C  Comment at 17 m  Time: 11:54:06 :mid panel chp 1 dcp 2
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D 17 2 6598 8.19 7.87 8.18 7.64 7.29 6.42 5.13 4.12 73 81 11:54:32 CTR PCC Poor Long.Cr. 458
D 17 3 9717 12.25 11.70 12.24 11.55 10.89 9.59 7.69 6.16 73 81 11:54:38 CTR PCC Poor Long.Cr. 451
D 17 4 12932 16.22 15.50 16.24 15.41 14.48 12.71 10.27 8.22 73 81 11:54:46 CTR PCC Poor Long.Cr. 453
D 17 5 17626 21.93 20.91 21.98 20.76 19.58 17.16 13.94 11.11 73 81 11:54:57 CTR PCC Poor Long.Cr. 457
C Comment at 20 m Time: 11:55:35 :joint
C Comment at 20 m Time: 11:56:02 :Deflection is not decreasing
D 20 2 6529 12.87 5.63 10.66 9.21 8.20 6.25 4.48 3.20 74 81 11:56:06 CTR PCC Poor Long.Cr. 289
C Comment at 20 m Time: 11:56:12 :Deflection is not decreasing
D 20 3 9619 19.54 8.27 16.18 14.09 12.38 9.39 6.74 4.79 74 81 11:56:14 CTR PCC Poor Long.Cr. 280
C Comment at 20 m Time: 11:56:22 :Deflection is not decreasing
D 20 4 12740 26.43 10.77 21.83 19.06 16.69 12.57 9.04 6.39 74 81 11:56:23 CTR PCC Poor Long.Cr. 274
C Comment at 20 m Time: 11:56:34 :Deflection is not decreasing
D 20 5 17299 36.84 14.13 30.32 26.32 23.06 17.23 12.36 8.67 74 81 11:56:35 CTR PCC Poor Long.Cr. 267
C Comment at 23 m Time: 11:57:15 :mid panel gas line
D 23 2 6590 8.39 7.79 7.33 6.45 5.90 4.77 3.58 2.66 74 75 11:57:42 CTR PCC Poor Long.Cr. 446
D 23 3 9712 12.66 11.66 11.00 9.86 8.87 7.13 5.36 3.93 74 75 11:57:48 CTR PCC Poor Long.Cr. 436
D 23 4 12906 16.85 15.39 14.62 13.15 11.73 9.39 7.10 5.18 74 75 11:57:57 CTR PCC Poor Long.Cr. 436
D 23 5 17613 23.09 20.88 19.95 17.77 15.89 12.69 9.56 6.95 74 75 11:58:07 CTR PCC Poor Long.Cr. 434
C Comment at 26 m Time: 11:58:44 :joint
C Comment at 26 m Time: 11:59:09 :Deflection is not decreasing
D 26 2 6533 11.11 5.47 9.22 7.96 7.03 5.41 3.90 2.89 74 72 11:59:12 CTR PCC Poor Long.Cr. 334
C Comment at 26 m Time: 11:59:19 :Deflection is not decreasing
D 26 3 9639 16.75 7.96 13.83 12.08 10.55 8.11 5.88 4.29 74 72 11:59:21 CTR PCC Poor Long.Cr. 327
C Comment at 26 m Time: 11:59:29 :Deflection is not decreasing
D 26 4 12793 22.40 10.31 18.46 16.19 14.06 10.77 7.86 5.72 74 72 11:59:30 CTR PCC Poor Long.Cr. 325
C Comment at 26 m Time: 11:59:40 :Deflection is not decreasing
D 26 5 17390 30.73 13.52 25.18 21.91 19.07 14.54 10.59 7.70 74 72 11:59:42 CTR PCC Poor Long.Cr. 322
C Comment at 29 m Time: 12:00:17 :mid panel dcp 3
D 29 2 6566 7.03 6.97 6.88 6.31 5.94 5.10 3.95 3.10 73 74 12:00:43 CTR PCC Poor Long.Cr. 531
D 29 3 9703 10.40 10.29 10.16 9.49 8.83 7.54 5.89 4.59 73 74 12:00:50 CTR PCC Poor Long.Cr. 530
D 29 4 12938 13.79 13.52 13.44 12.60 11.63 9.93 7.81 6.03 73 74 12:00:58 CTR PCC Poor Long.Cr. 534
D 29 5 17727 18.63 18.14 18.13 16.89 15.65 13.33 10.50 8.10 73 74 12:01:08 CTR PCC Poor Long.Cr. 541
C Comment at 32 m Time: 12:01:48 :joint
C Comment at 32 m Time: 12:02:20 :Deflection is not decreasing
D 32 2 6500 12.61 5.61 10.25 8.75 7.78 5.86 4.15 3.02 73 82 12:02:22 293
C Comment at 32 m Time: 12:02:29 :Deflection is not decreasing
D 32 3 9598 19.09 8.11 15.44 13.40 11.70 8.75 6.22 4.51 73 82 12:02:30 286
C Comment at 32 m Time: 12:02:39 :Deflection is not decreasing
D 32 4 12753 25.50 10.47 20.61 17.89 15.56 11.60 8.31 5.94 73 82 12:02:40 284
C Comment at 32 m Time: 12:02:51 :Deflection is not decreasing
D 32 5 17317 34.97 13.66 28.12 24.23 21.10 15.65 11.15 7.97 73 82 12:02:53 282
C Comment at 32 m Time: 12:03:02 :dcp 4
C Comment at 35 m Time: 12:03:48 :mid panel chp 2 dcp 5
D 35 2 6610 7.59 7.50 7.36 6.70 6.25 5.25 4.06 3.09 73 77 12:04:25 RWP AC Excel. Long.Cr. 495
D 35 3 9749 11.24 11.05 10.86 10.03 9.24 7.76 6.03 4.55 73 77 12:04:32 RWP AC Excel. Long.Cr. 493
D 35 4 12976 14.73 14.46 14.27 13.26 12.11 10.16 7.96 5.98 73 77 12:04:40 RWP AC Excel. Long.Cr. 501
D 35 5 17708 19.77 19.33 19.12 17.69 16.24 13.56 10.61 7.98 73 77 12:04:51 RWP AC Excel. Long.Cr. 509

Project: E63, Story County

IKUAB FWD FILE : 315th street_1STJUNE2012.fwd
HProject No. : TR640
HLocation : 315TH STREET
HClient : IOWA DOT
HStart Station : 0
HDirection : WB
HEnd Station :
HWeather : cloudy 70
HOperator : PV

IDate Created : 6/1/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0 m
ITestpoint spacing: 0 m

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D 0 2 6466 4.41 4.34 4.17 3.75 3.45 2.73 2.00 1.41 75 92 15:08:46 CTR PCC Excel. None 833
D 0 3 9658 6.72 6.59 6.33 5.81 5.26 4.20 3.10 2.19 75 92 15:08:53 CTR PCC Excel. None 817
D 0 4 12892 8.88 8.71 8.40 7.73 6.98 5.61 4.14 2.90 75 92 15:09:02 CTR PCC Excel. None 825
D 0 5 17768 12.01 11.78 11.40 10.45 9.46 7.65 5.64 3.98 75 92 15:09:12 CTR PCC Excel. None 841
C Comment at -1 m Time: 15:09:23 :PANEL#1 Center - No cracks - DCP1
D 2 2 6508 3.79 3.66 3.53 3.23 2.99 2.54 2.03 1.60 75 90 15:11:41 CTR PCC Excel. None 976
D 2 3 9723 5.89 5.70 5.51 5.12 4.69 3.97 3.18 2.49 75 90 15:11:48 CTR PCC Excel. None 938
D 2 4 12953 7.93 7.66 7.43 6.87 6.30 5.35 4.30 3.39 75 90 15:11:56 CTR PCC Excel. None 929
D 2 5 17810 10.95 10.61 10.29 9.45 8.69 7.38 5.90 4.65 75 90 15:12:06 CTR PCC Excel. None 925
C Comment at 1 m Time: 15:13:13 :PANEL#1 JOINT - NO CRACKS - D1 ON UNLOADED SLAB
D 4 2 6478 3.72 3.60 3.58 3.27 3.02 2.51 1.94 1.47 75 89 15:14:56 CTR PCC Excel. None 991
D 4 3 9691 5.70 5.50 5.48 5.09 4.66 3.90 3.02 2.27 75 89 15:15:02 CTR PCC Excel. None 966
D 4 4 12918 7.57 7.30 7.28 6.78 6.24 5.23 4.08 3.05 75 89 15:15:11 CTR PCC Excel. None 970
D 4 5 17821 10.35 9.95 9.98 9.25 8.53 7.16 5.58 4.18 75 89 15:15:21 CTR PCC Excel. None 979
C Comment at 4 m Time: 15:15:31 :PANEL#2 CENTER - NO CRACKS
D 6 2 6459 3.37 3.25 3.15 2.85 2.61 2.17 1.71 1.32 74 89 15:16:35 CTR PCC Excel. None 1088
D 6 3 9671 5.31 5.11 4.95 4.53 4.13 3.45 2.72 2.12 74 89 15:16:41 CTR PCC Excel. None 1035
D 6 4 12906 7.15 6.89 6.69 6.12 5.59 4.68 3.69 2.88 74 89 15:16:49 CTR PCC Excel. None 1026
D 6 5 17811 9.97 9.60 9.32 8.49 7.76 6.50 5.13 3.99 74 89 15:16:59 CTR PCC Excel. None 1016
C Comment at 6 m Time: 15:17:09 :PANEL#2 JOINT - NO CRACKS - D1 ON UNLOADED SAB
D 8 2 6456 3.38 3.25 3.20 2.92 2.73 2.26 1.74 1.32 74 88 15:18:14 CTR PCC Excel. None 1087
D 8 3 9667 5.23 5.07 4.98 4.62 4.24 3.53 2.74 2.08 74 88 15:18:21 CTR PCC Excel. None 1051
D 8 4 12898 7.01 6.78 6.70 6.21 5.69 4.78 3.71 2.81 74 88 15:18:29 CTR PCC Excel. None 1046
D 8 5 17788 9.68 9.35 9.28 8.57 7.89 6.62 5.14 3.89 74 88 15:18:39 CTR PCC Excel. None 1044
C Comment at 8 m Time: 15:18:49 :PANEL#3 CENTER - NO CRACKS - CHP#1
D 10 2 6448 3.30 3.17 3.07 2.79 2.54 2.10 1.63 1.27 75 89 15:19:45 CTR PCC Excel. None 1112
D 10 3 9652 5.14 4.95 4.76 4.37 3.99 3.31 2.60 2.01 75 89 15:19:51 CTR PCC Excel. None 1069
D 10 4 12920 6.97 6.71 6.49 5.94 5.43 4.51 3.55 2.72 75 89 15:19:59 CTR PCC Excel. None 1054
C Comment at 10 m Time: 15:20:27 :PANEL#3 JOINT - NO CRACKS
D 12 2 6442 3.50 3.36 3.33 3.04 2.79 2.31 1.77 1.30 76 89 15:21:57 CTR PCC Excel. None 1046
D 12 3 9622 5.43 5.22 5.18 4.79 4.38 3.64 2.79 2.07 76 89 15:22:04 CTR PCC Excel. None 1007
D 12 4 12877 7.31 7.02 6.99 6.47 5.91 4.94 3.78 2.80 76 89 15:22:11 CTR PCC Excel. None 1001
D 12 5 17829 10.14 9.73 9.75 8.98 8.24 6.88 5.28 3.92 76 89 15:22:21 CTR PCC Excel. None 1000
C Comment at 12 m Time: 15:22:32 :PANEL#4 CENTER - NO CRACKS
C Comment at 14 m Time: 15:24:00 :Deflection is not decreasing
D 14 2 6421 4.43 4.73 3.84 3.45 3.06 2.45 1.79 1.32 77 89 15:24:05 CTR PCC Excel. None 824
C Comment at 14 m Time: 15:24:11 :Deflection is not decreasing
D 14 3 9625 7.22 7.83 6.25 5.62 4.99 3.92 2.91 2.12 77 89 15:24:13 CTR PCC Excel. None 758

C Comment at 14 m Time: 15:24:21 :Deflection is not decreasing
D 14 4 12852 10.08 11.02 8.70 7.80 6.90 5.45 4.02 2.93 77 89 15:24:22 CTR PCC Excel. None 725
C Comment at 14 m Time: 15:24:32 :Deflection is not decreasing
D 14 5 17670 14.57 16.05 12.51 11.13 9.85 7.73 5.67 4.16 77 89 15:24:35 CTR PCC Excel. None 690
C Comment at 14 m Time: 15:26:52 :PANEL#4 JOINT - CRACK NEAR JOINT ON BOTH LOADED AND UNLOADED SLABS - D1 ON UNLOADED SLAB
C Comment at 14 m Time: 15:27:20 :Deflection is not decreasing
C Comment at 14 m Time: 15:27:31 :Deflection is not decreasing
D 14 3 9629 7.65 8.48 6.56 5.81 5.18 4.04 2.98 2.16 77 87 15:27:40 CTR PCC Excel. None 716
C Comment at 14 m Time: 15:27:48 :Deflection is not decreasing
D 14 4 12861 10.40 11.53 8.94 7.92 7.04 5.52 4.06 2.96 77 87 15:27:55 CTR PCC Excel. None 703
C Comment at 14 m Time: 15:28:04 :Deflection is not decreasing
D 14 5 17708 14.70 16.29 12.59 11.08 9.89 7.74 5.66 4.15 77 87 15:28:08 CTR PCC Excel. None 685
C Comment at 14 m Time: 15:28:40 :PANLE#4 JOINT REPEAT
C Comment at 14 m Time: 15:28:58 :SENSOR SUPPORT LEGS ON CRACK.
C Comment at 14 m Time: 15:29:57 :Deflection is not decreasing
D 14 2 6450 5.24 5.76 4.45 3.87 3.46 2.68 1.93 1.43 76 86 15:29:59 CTR PCC Excel. None 700
C Comment at 14 m Time: 15:30:06 :Deflection is not decreasing
D 14 3 9640 8.18 8.98 6.94 6.12 5.41 4.18 3.05 2.21 76 86 15:30:08 CTR PCC Excel. None 670
C Comment at 14 m Time: 15:30:16 :Deflection is not decreasing
D 14 4 12879 11.06 12.09 9.38 8.27 7.32 5.67 4.15 3.01 76 86 15:30:18 CTR PCC Excel. None 662
C Comment at 14 m Time: 15:30:28 :Deflection is not decreasing
D 14 5 17708 15.42 16.83 13.05 11.49 10.19 7.89 5.76 4.19 76 86 15:30:34 CTR PCC Excel. None 653
C Comment at 14 m Time: 15:31:14 :PANEL# 4 JOINT - TEST REDONE. D1 GREATER THAN D0
D 16 2 6433 3.93 3.86 3.72 3.42 3.15 2.61 1.99 1.40 75 86 15:32:19 CTR PCC Excel. None 930
D 16 3 9647 6.10 5.97 5.80 5.39 4.93 4.11 3.17 2.27 75 86 15:32:25 CTR PCC Excel. None 899
D 16 4 12845 8.23 8.02 7.87 7.34 6.71 5.64 4.40 3.06 75 86 15:32:34 CTR PCC Excel. None 888
D 16 5 17700 11.43 11.08 11.04 10.30 9.48 8.00 6.26 4.24 75 86 15:32:44 CTR PCC Excel. None 880
C Comment at 16 m Time: 15:32:54 :PANEL#5 CENTER - CRACKS ON PANEL - DCP#2
D 19 2 6430 5.29 4.66 5.06 4.34 3.65 2.87 2.16 1.63 75 85 15:34:09 CTR PCC Excel. None 692
D 19 3 9626 8.69 7.19 8.30 7.20 5.92 4.63 3.49 2.61 75 85 15:34:15 CTR PCC Excel. None 630
D 19 4 12891 12.15 9.67 11.57 10.01 8.20 6.40 4.81 3.57 75 85 15:34:23 CTR PCC Excel. None 604
C Comment at 19 m Time: 15:34:33 :Deflection is not decreasing
D 19 5 17683 17.58 13.33 16.65 14.33 11.69 9.06 6.78 4.99 75 85 15:34:35 CTR PCC Excel. None 572
C Comment at 19 m Time: 15:34:48 :PANEL#5 JOINT- TEST ON A PATCHED AREA
D 21 2 6432 4.80 4.64 4.68 4.31 4.00 3.40 2.64 1.97 76 87 15:35:45 CTR PCC Excel. None 762
D 21 3 9599 7.58 7.32 7.39 6.93 6.39 5.39 4.23 3.14 76 87 15:35:51 CTR PCC Excel. None 720
D 21 4 12828 10.33 10.00 10.12 9.48 8.76 7.42 5.85 4.30 76 87 15:35:59 CTR PCC Excel. None 706
D 21 5 17702 14.46 13.97 14.18 13.26 12.30 10.44 8.20 6.05 76 87 15:36:09 CTR PCC Excel. None 696
C Comment at 21 m Time: 15:37:31 :PANEL#6 CENTER - LONGITUDINAL CRACK ALONG LEFT WHEEL PATH OF FWD
D 24 2 6433 4.42 4.27 3.92 3.49 3.15 2.62 2.01 1.58 78 88 15:38:24 CTR PCC Excel. None 827
D 24 3 9615 7.10 6.68 6.28 5.66 5.07 4.16 3.22 2.45 78 88 15:38:30 CTR PCC Excel. None 770
D 24 4 12821 9.90 9.08 8.71 7.85 7.03 5.73 4.42 3.37 78 88 15:38:38 CTR PCC Excel. None 737
D 24 5 17699 14.37 12.74 12.55 11.27 10.08 8.11 6.24 4.74 78 88 15:38:48 CTR PCC Excel. None 700
C Comment at 24 m Time: 15:38:58 :PANEL#6 JOINT
D 26 2 6425 4.93 4.74 4.78 4.40 4.02 3.33 2.52 1.91 78 90 15:39:52 CTR PCC Excel. None 742
D 26 3 9600 7.73 7.43 7.51 6.96 6.37 5.25 4.03 3.05 78 90 15:39:59 CTR PCC Excel. None 706
D 26 4 12836 10.55 10.15 10.30 9.54 8.73 7.27 5.60 4.11 78 90 15:40:07 CTR PCC Excel. None 692
D 26 5 17700 14.90 14.33 14.52 13.46 12.31 10.26 7.92 5.83 78 90 15:40:18 CTR PCC Excel. None 675
C Comment at 26 m Time: 15:40:28 :PANEL#7 CENTER
D 28 2 6408 4.66 4.38 4.22 3.79 3.45 2.79 2.08 1.57 78 91 15:41:51 CTR PCC Excel. None 782
D 28 3 9597 7.51 7.00 6.80 6.18 5.51 4.43 3.38 2.50 78 91 15:41:58 CTR PCC Excel. None 727
D 28 4 12823 10.44 9.66 9.43 8.59 7.64 6.15 4.66 3.47 78 91 15:42:06 CTR PCC Excel. None 698
D 28 5 17653 15.12 13.71 13.58 12.25 10.94 8.75 6.58 4.87 78 91 15:42:16 CTR PCC Excel. None 664
C Comment at 28 m Time: 15:42:27 :PANEL#7 JOINT
D 31 2 6410 4.49 4.30 4.28 3.92 3.60 2.97 2.24 1.67 79 91 15:43:36 CTR PCC Excel. None 812
D 31 3 9624 7.05 6.76 6.72 6.26 5.70 4.66 3.55 2.60 79 91 15:43:43 CTR PCC Excel. None 776
D 31 4 12836 9.49 9.12 9.10 8.47 7.70 6.38 4.87 3.53 79 91 15:43:51 CTR PCC Excel. None 769
D 31 5 17684 13.23 12.70 12.74 11.77 10.77 8.91 6.81 4.94 79 91 15:44:02 CTR PCC Excel. None 760
C Comment at 31 m Time: 15:44:12 :PANEL#8 CENTER
D 33 2 6366 4.76 4.59 4.16 3.68 3.32 2.61 1.94 1.44 76 91 15:45:15 CTR PCC Excel. None 760
D 33 3 9577 7.70 7.36 6.69 6.01 5.34 4.20 3.12 2.27 76 91 15:45:22 CTR PCC Excel. None 708
D 33 4 12809 10.64 10.06 9.25 8.27 7.35 5.78 4.28 3.11 76 91 15:45:30 CTR PCC Excel. None 685
D 33 5 17644 15.35 14.22 13.28 11.79 10.49 8.20 6.04 4.35 76 91 15:45:41 CTR PCC Excel. None 654
C Comment at 33 m Time: 15:45:51 :PANEL#8 JOINT
D 35 2 6335 8.35 8.61 7.82 7.15 6.44 5.20 3.85 2.73 76 91 15:47:47 CTR PCC Excel. None 431
D 35 3 9507 13.07 13.47 12.28 11.25 10.15 8.22 6.14 4.34 76 91 15:47:54 CTR PCC Excel. None 414
C Comment at 35 m Time: 15:48:02 :Deflection is not decreasing
D 35 4 12707 17.79 18.32 16.73 15.37 13.87 11.27 8.47 5.98 76 91 15:48:04 CTR PCC Excel. None 406
C Comment at 35 m Time: 15:48:14 :Deflection is not decreasing

D 35 5 17457 24.90 25.62 23.43 21.57 19.47 15.89 11.98 8.51 76 91 15:48:15 CTR PCC Excel. None 399
C Comment at 35 m Time: 15:48:33 :PANEL#9 CENTER - LONGITUDINAL CRACK - DCP3 SOUTH OF CRACK, FWD NORTH OF CRACK
D 37 2 6390 5.57 5.17 5.66 5.40 5.15 3.52 2.53 2.03 76 91 15:49:46 CTR PCC Excel. None 653
C Comment at 37 m Time: 15:49:52 :Deflection is not decreasing
D 37 3 9583 8.91 8.31 9.06 8.68 8.27 5.46 3.89 3.11 76 91 15:50:25 CTR PCC Excel. None 612
C Comment at 37 m Time: 15:50:33 :Deflection is not decreasing
D 37 4 12735 12.17 11.34 12.38 11.87 11.31 7.29 5.15 4.11 76 91 15:50:34 CTR PCC Excel. None 595
C Comment at 37 m Time: 15:50:45 :Deflection is not decreasing
D 37 5 17588 17.44 16.23 17.65 16.90 16.14 10.00 6.90 5.51 76 91 15:50:54 CTR PCC Excel. None 573
C Comment at 37 m Time: 15:51:23 :PANEL# 9 JOINT
D 39 2 6407 5.16 5.12 4.95 4.56 4.22 3.49 2.62 1.93 75 91 15:52:25 CTR PCC Excel. None 706
D 39 3 9616 7.99 7.90 7.69 7.13 6.56 5.45 4.14 3.03 75 91 15:52:32 CTR PCC Excel. None 685
D 39 4 12856 10.70 10.57 10.32 9.63 8.81 7.37 5.63 4.07 75 91 15:52:40 CTR PCC Excel. None 683
D 39 5 17743 14.76 14.54 14.29 13.27 12.20 10.20 7.77 5.69 75 91 15:52:51 CTR PCC Excel. None 684
C Comment at 39 m Time: 15:53:01 :PANEL#10 CENTER
D 42 2 6397 6.50 5.99 6.01 5.44 5.03 4.15 3.21 2.49 74 90 15:53:55 CTR PCC Excel. None 560
D 42 3 9578 10.53 9.32 9.71 8.86 8.10 6.68 5.19 3.99 74 90 15:54:02 CTR PCC Excel. None 517
D 42 4 12788 14.66 12.44 13.45 12.25 11.17 9.21 7.14 5.42 74 90 15:54:10 CTR PCC Excel. None 496
D 42 5 17569 20.46 17.06 18.75 16.98 15.53 12.75 9.84 7.47 74 90 15:54:21 CTR PCC Excel. None 488
C Comment at 42 m Time: 15:54:31 :PANEL #10 JOINT
D 44 2 6410 5.19 5.02 5.07 4.68 4.37 3.76 2.92 2.23 73 91 15:55:30 CTR PCC Excel. None 702
D 44 3 9609 7.92 7.72 7.75 7.29 6.72 5.76 4.53 3.45 73 91 15:55:37 CTR PCC Excel. None 690
D 44 4 12857 10.56 10.26 10.35 9.74 8.99 7.69 6.12 4.61 73 91 15:55:46 CTR PCC Excel. None 693
D 44 5 17729 14.38 13.96 14.13 13.21 12.29 10.48 8.31 6.26 73 91 15:55:56 CTR PCC Excel. None 701
C Comment at 44 m Time: 15:56:06 :PANEL#11 CENTER - DCP#4
D 46 2 6424 4.98 4.91 4.67 4.30 3.97 3.40 2.69 2.13 72 90 15:57:14 CTR PCC Excel. None 734
D 46 3 9614 7.71 7.60 7.23 6.68 6.14 5.25 4.17 3.31 72 90 15:57:21 CTR PCC Excel. None 709
D 46 4 12815 10.34 10.20 9.69 9.00 8.21 7.00 5.61 4.42 72 90 15:57:29 CTR PCC Excel. None 705
D 46 5 17666 14.25 14.05 13.33 12.28 11.25 9.53 7.60 6.00 72 90 15:57:40 CTR PCC Excel. None 705
C Comment at 46 m Time: 15:57:50 :PANEL#11 JOINT
D 48 2 6433 4.57 4.67 4.28 3.90 3.61 3.00 2.32 1.78 72 90 15:59:05 CTR PCC Excel. None 801
D 48 3 9635 7.08 7.24 6.61 6.10 5.57 4.64 3.59 2.71 72 90 15:59:12 CTR PCC Excel. None 773
D 48 4 12883 9.46 9.70 8.84 8.19 7.50 6.21 4.82 3.61 72 90 15:59:20 CTR PCC Excel. None 774
D 48 5 17755 12.97 13.31 12.15 11.17 10.23 8.47 6.53 4.89 72 90 15:59:31 CTR PCC Excel. None 779
C Comment at 48 m Time: 16:00:49 :PANEL #12 CENTER - TRANSVERSE CRACK - D1 ON TOP OF CRACK.
D 48 2 6457 4.78 4.78 4.37 3.98 3.65 3.00 2.33 1.78 72 89 16:01:30 CTR PCC Excel. None 769
D 48 3 9647 7.34 7.37 6.74 6.21 5.59 4.63 3.61 2.70 72 89 16:01:37 CTR PCC Excel. None 747
D 48 4 12902 9.82 9.87 9.03 8.33 7.49 6.21 4.84 3.58 72 89 16:01:46 CTR PCC Excel. None 747
D 48 5 17800 13.47 13.52 12.37 11.31 10.24 8.45 6.53 4.82 72 89 16:01:56 CTR PCC Excel. None 751
C Comment at 48 m Time: 16:02:09 :PANEL #12 CENTER (REDO) - TRANSVERSE CRACK - D1 ON WEST SIDE OF CRACK AND DO EAST OF CRACK.
D 51 2 6418 6.35 6.26 5.86 5.30 4.86 4.02 3.04 2.25 72 89 16:03:35 CTR PCC Excel. None 575
D 51 3 9608 9.74 9.57 8.96 8.17 7.42 6.17 4.70 3.44 72 89 16:03:42 CTR PCC Excel. None 561
D 51 4 12860 13.09 12.78 12.03 11.01 9.96 8.25 6.32 4.60 72 89 16:03:50 CTR PCC Excel. None 559
D 51 5 17719 18.08 17.46 16.57 15.08 13.68 11.28 8.60 6.27 72 89 16:04:01 CTR PCC Excel. None 557
C Comment at 51 m Time: 16:04:11 :PANEL#12 JOINT
D 53 2 6436 5.16 4.96 5.02 4.62 4.35 3.74 2.95 2.32 72 89 16:05:17 CTR PCC Excel. None 710
D 53 3 9630 7.85 7.59 7.68 7.18 6.63 5.70 4.55 3.53 72 89 16:05:23 CTR PCC Excel. None 697
D 53 4 12870 10.51 10.17 10.30 9.67 8.89 7.67 6.12 4.71 72 89 16:05:32 CTR PCC Excel. None 696
D 53 5 17715 14.34 13.87 14.10 13.13 12.15 10.47 8.34 6.42 72 89 16:05:43 CTR PCC Excel. None 702
C Comment at 53 m Time: 16:05:53 :PANEL#13 CENTER - DCP# 5
C Comment at 56 m Time: 16:09:59 :Deflection is not decreasing
D 56 2 6428 6.91 7.37 5.91 5.13 4.50 3.48 2.49 1.83 72 87 16:10:03 CTR PCC Excel. None 529
C Comment at 56 m Time: 16:10:12 :Deflection is not decreasing
D 56 3 9597 11.10 11.89 9.50 8.32 7.28 5.55 4.03 2.92 72 87 16:10:17 CTR PCC Excel. None 492
C Comment at 56 m Time: 16:10:25 :Deflection is not decreasing
D 56 4 12754 15.41 16.45 13.13 11.48 10.08 7.68 5.56 4.01 72 87 16:10:27 CTR PCC Excel. None 471
C Comment at 56 m Time: 16:10:38 :Deflection is not decreasing
D 56 5 17489 22.00 23.46 18.68 16.30 14.33 10.88 7.86 5.69 72 87 16:10:57 CTR PCC Excel. None 452
C Comment at 56 m Time: 16:13:20 :PANEL 13 JOINT - CRACK NEAR JOINT
D 58 2 6449 5.58 5.33 5.47 5.12 4.66 3.87 3.01 2.27 73 87 16:14:18 CTR PCC Excel. None 657
D 58 3 9604 8.60 8.21 8.46 7.96 7.26 6.09 4.75 3.56 73 87 16:14:24 CTR PCC Excel. None 635
D 58 4 12893 11.62 11.09 11.44 10.77 9.84 8.29 6.49 4.85 73 87 16:14:32 CTR PCC Excel. None 631
C Comment at 58 m Time: 16:15:44 :PANEL#14 - CENTER
C Comment at 60 m Time: 16:18:07 :Deflection is not decreasing
D 60 2 6413 7.60 4.31 6.24 5.36 4.71 3.55 2.44 1.68 74 86 16:18:08 CTR PCC Excel. None 480
C Comment at 60 m Time: 16:18:16 :Deflection is not decreasing
D 60 3 9585 12.27 6.53 10.06 8.75 7.61 5.67 3.94 2.65 74 86 16:18:21 CTR PCC Excel. None 444
C Comment at 60 m Time: 16:18:30 :Deflection is not decreasing
D 60 4 12762 17.03 8.56 14.00 12.15 10.51 7.83 5.44 3.62 74 86 16:18:31 CTR PCC Excel. None 426

C Comment at 60 m Time: 16:18:42 :Deflection is not decreasing
D 60 5 17481 24.55 11.44 20.10 17.35 15.04 11.11 7.65 5.06 74 86 16:18:43 CTR PCC Excel. None 405
C Comment at 60 m Time: 16:18:53 :PANEL#14 JOINT- DCP#6
D 62 2 6450 4.41 4.24 4.17 3.79 3.49 2.82 2.05 1.42 74 86 16:19:52 CTR PCC Excel. None 832
D 62 3 9662 6.82 6.57 6.47 5.99 5.44 4.40 3.25 2.19 74 86 16:19:59 CTR PCC Excel. None 806
D 62 4 12884 9.17 8.87 8.76 8.09 7.36 5.98 4.42 2.96 74 86 16:20:07 CTR PCC Excel. None 799
D 62 5 17792 12.68 12.24 12.14 11.17 10.21 8.29 6.11 4.07 74 86 16:20:17 CTR PCC Excel. None 798
C Comment at 62 m Time: 16:20:27 :PANEL 15 CENTER
D 64 2 6448 5.27 4.55 4.91 4.21 3.69 2.74 1.91 1.34 74 86 16:22:09 CTR PCC Excel. None 696
D 64 3 9644 8.39 7.20 7.55 6.55 5.69 4.24 2.96 2.04 74 86 16:22:16 CTR PCC Excel. None 654
D 64 4 12882 11.59 9.87 10.17 8.84 7.65 5.71 4.02 2.73 74 86 16:22:24 CTR PCC Excel. None 632
D 64 5 17693 16.54 13.97 13.94 12.06 10.51 7.84 5.47 3.71 74 86 16:22:35 CTR PCC Excel. None 608
C Comment at 64 m Time: 16:22:45 :PANEL 15 JOINT - PLATE BETWEEN CRACK AND JOINT - DCP7
D 67 2 6459 4.71 4.56 4.51 4.13 3.81 3.15 2.37 1.78 73 86 16:24:48 CTR PCC Excel. None 781
D 67 3 9655 7.24 7.04 6.97 6.45 5.88 4.88 3.74 2.76 73 86 16:24:55 CTR PCC Excel. None 758
D 67 4 12886 9.71 9.43 9.37 8.70 7.93 6.58 5.08 3.71 73 86 16:25:03 CTR PCC Excel. None 755
D 67 5 17723 13.35 12.95 12.90 11.91 10.91 9.05 6.98 5.15 73 86 16:25:13 CTR PCC Excel. None 755
C Comment at 67 m Time: 16:25:23 :PANEL 16 CENTER
D 69 2 6412 5.34 5.14 4.56 3.96 3.53 2.75 1.97 1.43 72 87 16:26:10 CTR PCC Excel. None 683
D 69 3 9582 8.45 7.94 7.20 6.36 5.56 4.31 3.12 2.21 72 87 16:26:16 CTR PCC Excel. None 645
D 69 4 12829 11.60 10.63 9.87 8.72 7.60 5.90 4.28 3.00 72 87 16:26:25 CTR PCC Excel. None 629
D 69 5 17667 16.41 14.49 13.91 12.18 10.67 8.21 5.90 4.09 72 87 16:26:35 CTR PCC Excel. None 612
C Comment at 69 m Time: 16:26:45 :PANEL 16 JOINT
D 72 2 6417 4.78 4.64 4.63 4.23 3.89 3.26 2.47 1.80 73 88 16:27:59 CTR PCC Excel. None 763
D 72 3 9624 7.40 7.20 7.20 6.69 6.10 5.12 3.91 2.81 73 88 16:28:06 CTR PCC Excel. None 739
D 72 4 12883 9.96 9.67 9.72 9.02 8.27 6.94 5.32 3.79 73 88 16:28:14 CTR PCC Excel. None 735
D 72 5 17715 13.69 13.28 13.36 12.36 11.37 9.55 7.29 5.18 73 88 16:28:24 CTR PCC Excel. None 736
C Comment at 72 m Time: 16:28:35 :PANEL17 CENTER
D 74 2 6425 5.92 5.67 5.04 4.43 3.88 3.05 2.15 1.53 73 88 16:29:20 CTR PCC Excel. None 617
D 74 3 9587 9.42 8.76 7.96 7.07 6.18 4.76 3.39 2.37 73 88 16:29:27 CTR PCC Excel. None 579
D 74 4 12827 12.92 11.79 10.94 9.70 8.53 6.50 4.67 3.19 73 88 16:29:35 CTR PCC Excel. None 564
D 74 5 17626 18.25 16.26 15.41 13.59 11.90 9.06 6.42 4.38 73 88 16:29:46 CTR PCC Excel. None 549
C Comment at 74 m Time: 16:30:18 :PANEL17 JOINT
D 77 2 6372 9.63 8.59 7.09 6.12 5.28 3.98 2.75 1.88 71 87 16:32:38 CTR PCC Excel. None 376
D 77 3 9540 15.18 13.58 11.10 9.61 8.34 6.26 4.39 2.97 71 87 16:32:45 CTR PCC Excel. None 357
D 77 4 12672 20.79 18.68 15.20 13.18 11.46 8.62 6.08 4.09 71 87 16:32:53 CTR PCC Excel. None 347
D 77 5 17286 29.11 26.25 21.15 18.37 15.98 12.05 8.53 5.78 71 87 16:33:04 CTR PCC Excel. None 338
C Comment at 77 m Time: 16:33:45 :PANEL18 CENTER - CHP2 AND DCP8 - TEST ON TOP OF PATCH - CRACKS ON PAVEMENT
D 78 2 6504 4.83 4.65 4.70 4.35 4.12 3.59 2.61 1.96 71 89 16:34:53 CTR PCC Excel. None 766
D 78 3 9702 7.42 7.17 7.29 6.89 6.41 5.66 4.07 3.04 71 89 16:35:00 CTR PCC Excel. None 744
D 78 4 12968 9.99 9.63 9.86 9.35 8.74 7.70 5.56 4.15 71 89 16:35:09 CTR PCC Excel. None 738
D 78 5 17856 13.81 13.27 13.70 12.95 12.16 10.75 7.71 5.79 71 89 16:35:19 CTR PCC Excel. None 735
C Comment at 78 m Time: 16:35:29 :PANEL18 JOINT
D 81 2 6442 4.51 4.37 4.37 4.09 3.79 3.29 2.62 2.09 71 88 16:36:08 CTR PCC Excel. None 812
D 81 3 9660 6.96 6.75 6.76 6.38 5.89 5.11 4.10 3.22 71 88 16:36:15 CTR PCC Excel. None 789
D 81 4 12895 9.31 9.05 9.12 8.58 7.91 6.87 5.55 4.33 71 88 16:36:23 CTR PCC Excel. None 788
D 81 5 17840 12.78 12.39 12.53 11.75 10.89 9.44 7.61 5.96 71 88 16:36:34 CTR PCC Excel. None 794
C Comment at 81 m Time: 16:36:44 :PANEL 19 CENTER
D 83 2 6430 4.49 4.34 4.15 3.77 3.46 2.91 2.21 1.73 71 88 16:37:36 CTR PCC Excel. None 814
D 83 3 9646 6.97 6.76 6.46 5.98 5.41 4.49 3.50 2.66 71 88 16:37:43 CTR PCC Excel. None 787
D 83 4 12887 9.38 9.12 8.75 8.05 7.32 6.11 4.76 3.62 71 88 16:37:51 CTR PCC Excel. None 781
D 83 5 17757 13.06 12.69 12.18 11.19 10.19 8.47 6.60 5.01 71 88 16:38:02 CTR PCC Excel. None 773
C Comment at 83 m Time: 16:38:12 :PANEL 19 JOINT
D 86 2 6439 4.44 4.22 4.23 3.87 3.59 3.00 2.29 1.75 72 87 16:39:30 CTR PCC Excel. None 824
D 86 3 9661 6.87 6.55 6.56 6.12 5.59 4.66 3.60 2.72 72 87 16:39:37 CTR PCC Excel. None 799
D 86 4 12913 9.22 8.76 8.86 8.23 7.50 6.26 4.89 3.68 72 87 16:39:45 CTR PCC Excel. None 796
D 86 5 17790 12.70 12.04 12.22 11.32 10.35 8.66 6.75 5.08 72 87 16:39:56 CTR PCC Excel. None 796
C Comment at 86 m Time: 16:40:06 :PANEL 20 CENTER
D 87 2 6406 4.23 4.11 3.89 3.53 3.24 2.67 2.04 1.58 73 87 16:41:18 CTR PCC Excel. None 861
D 87 3 9632 6.58 6.39 6.05 5.53 5.03 4.17 3.22 2.45 73 87 16:41:25 CTR PCC Excel. None 832
D 87 4 12882 8.88 8.64 8.20 7.55 6.85 5.65 4.39 3.32 73 87 16:41:33 CTR PCC Excel. None 825
D 87 5 17757 12.35 12.02 11.44 10.47 9.53 7.87 6.12 4.62 73 87 16:41:43 CTR PCC Excel. None 818
C Comment at 87 m Time: 16:41:53 :PANEL20 JOINT
D 90 2 6396 4.66 4.54 4.42 4.06 3.79 3.17 2.44 1.85 73 87 16:42:46 CTR PCC Excel. None 781
D 90 3 9616 7.16 6.98 6.82 6.36 5.87 4.95 3.85 2.88 73 87 16:42:53 CTR PCC Excel. None 764
D 90 4 12872 9.49 9.25 9.09 8.50 7.79 6.60 5.19 3.85 73 87 16:43:01 CTR PCC Excel. None 771
D 90 5 17794 13.00 12.65 12.52 11.66 10.76 9.09 7.14 5.35 73 87 16:43:12 CTR PCC Excel. None 778
C Comment at 90 m Time: 16:43:22 :PANEL21 CENTER - DCP9
D 92 2 6402 3.93 3.82 3.63 3.31 3.08 2.65 2.09 1.68 73 86 16:44:22 CTR PCC Excel. None 926
D 92 3 9634 6.11 5.94 5.63 5.23 4.81 4.11 3.31 2.60 73 86 16:44:29 CTR PCC Excel. None 896

D 92 4 12882 8.25 8.03 7.60 7.07 6.46 5.54 4.47 3.51 73 86 16:44:37 CTR PCC Excel. None 888
D 92 5 17768 11.40 11.10 10.54 9.76 8.96 7.66 6.15 4.82 73 86 16:44:46 CTR PCC Excel. None 886
C Comment at 92 m Time: 16:44:57 :PANEL21 JOINT
D 94 2 6397 3.88 3.95 3.59 3.23 2.96 2.46 1.75 1.26 75 85 16:48:15 CTR PCC Excel. None 937
D 94 3 9657 6.02 6.16 5.58 5.11 4.62 3.78 2.78 1.95 75 85 16:48:22 CTR PCC Excel. None 912
D 94 4 12933 8.07 8.27 7.49 6.86 6.21 5.09 3.76 2.65 75 85 16:48:31 CTR PCC Excel. None 911
D 94 5 17815 11.11 11.40 10.34 9.43 8.58 6.98 5.13 3.62 75 85 16:48:40 CTR PCC Excel. None 911
C Comment at 94 m Time: 16:48:51 :PANEL22 CENTER - CRACKS - PLATE ON EAST SIDE OF CRACKS
D 95 2 6407 4.03 3.88 3.93 3.68 3.40 2.82 2.10 1.62 76 84 16:49:31 CTR PCC Excel. None 904
D 95 3 9641 6.23 6.01 6.07 5.76 5.32 4.39 3.35 2.51 76 84 16:49:38 CTR PCC Excel. None 880
D 95 4 12914 8.32 8.04 8.17 7.77 7.17 5.93 4.52 3.40 76 84 16:49:46 CTR PCC Excel. None 882
D 95 5 17806 11.41 11.03 11.26 10.67 9.87 8.19 6.24 4.68 76 84 16:49:56 CTR PCC Excel. None 887
C Comment at 95 m Time: 16:50:06 :PANEL22 CENTER - CRACKS - PLATE WEST OF CRACKS - CHP3 DCP10
D 96 2 6425 4.33 4.15 3.91 3.56 3.18 2.62 1.97 1.48 77 84 16:51:04 CTR PCC Excel. None 843
D 96 3 9669 6.71 6.39 6.06 5.55 4.96 4.06 3.07 2.26 77 84 16:51:11 CTR PCC Excel. None 819
D 96 4 12909 9.02 8.53 8.14 7.46 6.66 5.44 4.16 3.04 77 84 16:51:19 CTR PCC Excel. None 814
D 96 5 17817 12.44 11.74 11.26 10.28 9.19 7.49 5.71 4.16 77 84 16:51:30 CTR PCC Excel. None 814
C Comment at 96 m Time: 16:51:40 :PANEL22 JOINT - CRACKS

Project: Riverside Road, Ames

IKUAB FWD FILE : RIVERSIDE ROAD_AMES.fwd
HProject No. : TR640
HLocation : RIVERSIDE RD
HClient : IOWA DOT
HStart Station : 0
HDirection : WB
HEnd Station :
HWeather : cloudy 70
HOperator : PV

IDate Created : 6/7/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND
IReference Offset : 0 m
ITestpoint spacing: 0 m

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D 0 2 6588 2.14 2.09 2.05 1.92 1.79 1.57 1.25 1.02 70 75 10:45:22 CTR PCC Excel. None 1751
D 0 3 9823 3.24 3.16 3.13 2.97 2.75 2.41 1.94 1.55 70 75 10:45:28 CTR PCC Excel. None 1727
D 0 4 13092 4.31 4.22 4.20 3.94 3.68 3.19 2.61 2.09 70 75 10:45:36 CTR PCC Excel. None 1727
D 0 5 17847 5.92 5.75 5.74 5.39 5.06 4.41 3.60 2.87 70 75 10:45:46 CTR PCC Excel. None 1716
C Comment at 0 m Time: 10:46:04 :PANEL1 CENTER - DCP1
D 3 2 6560 2.81 2.82 2.51 2.26 2.08 1.75 1.36 1.09 71 75 10:47:03 CTR PCC Excel. None 1326
D 3 3 9749 4.33 4.34 3.87 3.52 3.22 2.70 2.13 1.65 71 75 10:47:09 CTR PCC Excel. None 1280
D 3 4 12994 5.77 5.83 5.18 4.74 4.32 3.62 2.85 2.22 71 75 10:47:17 CTR PCC Excel. None 1281
D 3 5 17736 7.90 7.98 7.13 6.48 5.95 4.97 3.94 3.08 71 75 10:47:27 CTR PCC Excel. None 1277
C Comment at 3 m Time: 10:47:37 :PANEL1 JOINT
D 7 2 6587 2.07 2.00 2.00 1.86 1.76 1.57 1.26 1.04 71 75 10:50:54 CTR PCC Excel. None 1814
D 7 3 9820 3.16 3.09 3.08 2.92 2.73 2.40 1.98 1.62 71 75 10:51:00 CTR PCC Excel. None 1765
D 7 4 13037 4.24 4.12 4.13 3.90 3.63 3.22 2.68 2.19 71 75 10:51:07 CTR PCC Excel. None 1748
D 7 5 17837 5.81 5.61 5.67 5.33 5.00 4.43 3.68 3.00 71 75 10:51:18 CTR PCC Excel. None 1746
C Comment at 7 m Time: 10:51:28 :PANEL2 CENTER
D 10 2 6534 2.49 2.45 2.24 2.01 1.87 1.56 1.22 0.98 71 76 10:52:19 CTR PCC Excel. None 1490
D 10 3 9737 3.82 3.76 3.43 3.17 2.87 2.40 1.90 1.50 71 76 10:52:25 CTR PCC Excel. None 1448
D 10 4 12944 5.12 5.02 4.60 4.22 3.86 3.24 2.58 2.01 71 76 10:52:32 CTR PCC Excel. None 1437
D 10 5 17709 7.00 6.86 6.34 5.78 5.31 4.46 3.54 2.77 71 76 10:52:42 CTR PCC Excel. None 1439
C Comment at 13 m Time: 10:53:34 :PANEL2 JOINT
D 13 2 6591 2.11 2.03 2.02 1.88 1.78 1.54 1.26 1.03 71 75 10:54:11 CTR PCC Excel. None 1778
D 13 3 9823 3.22 3.10 3.10 2.95 2.73 2.39 1.95 1.60 71 75 10:54:17 CTR PCC Excel. None 1734
D 13 4 13080 4.27 4.11 4.15 3.92 3.64 3.20 2.63 2.10 71 75 10:54:25 CTR PCC Excel. None 1742
D 13 5 17910 5.89 5.65 5.70 5.37 5.03 4.40 3.62 2.92 71 75 10:54:35 CTR PCC Excel. None 1729
C Comment at 13 m Time: 10:54:45 :PANEL3 CENTER
D 16 2 6543 2.64 2.76 2.30 2.06 1.91 1.56 1.20 0.91 71 76 10:55:42 CTR PCC Excel. None 1409
D 16 3 9756 4.03 4.25 3.55 3.24 2.92 2.39 1.85 1.41 71 76 10:55:48 CTR PCC Excel. None 1377
C Comment at 16 m Time: 10:55:56 :Deflection is not decreasing
D 16 4 12964 5.38 5.65 4.74 4.32 3.89 3.20 2.49 1.87 71 76 10:56:01 CTR PCC Excel. None 1371
C Comment at 16 m Time: 10:56:11 :Deflection is not decreasing
D 16 5 17733 7.33 7.69 6.48 5.84 5.27 4.34 3.35 2.53 71 76 10:56:22 CTR PCC Excel. None 1375
C Comment at 16 m Time: 10:56:32 :PANEL3 JOINT
D 19 2 6544 2.33 2.28 2.24 2.07 1.96 1.70 1.36 1.09 71 76 10:57:53 CTR PCC Excel. None 1594
D 19 3 9812 3.59 3.50 3.44 3.26 3.03 2.62 2.13 1.68 71 76 10:57:59 CTR PCC Excel. None 1552
D 19 4 13060 4.76 4.63 4.61 4.34 4.01 3.50 2.86 2.22 71 76 10:58:07 CTR PCC Excel. None 1560
D 19 5 17884 6.51 6.33 6.30 5.89 5.50 4.80 3.88 3.05 71 76 10:58:17 CTR PCC Excel. None 1562
C Comment at 19 m Time: 10:58:27 :PANEL4 CENTER - TRANSVERSE CRACK - LTE AT CRACK - DCP2
D 23 2 6536 2.34 2.36 2.14 1.94 1.79 1.52 1.18 0.93 71 76 10:59:22 CTR PCC Excel. None 1585
D 23 3 9743 3.62 3.65 3.30 3.03 2.77 2.33 1.86 1.45 71 76 10:59:28 CTR PCC Excel. None 1530

D 23 4 12967 4.82 4.82 4.41 4.03 3.69 3.12 2.49 1.96 71 76 10:59:36 CTR PCC Excel. None 1531
D 23 5 17757 6.66 6.65 6.08 5.52 5.08 4.28 3.40 2.70 71 76 10:59:46 CTR PCC Excel. None 1515
C Comment at 23 m Time: 10:59:56 :PANEL4 JOINT
D 25 2 6559 2.10 2.03 1.99 1.83 1.74 1.47 1.18 0.97 71 76 11:00:56 CTR PCC Excel. None 1773
D 25 3 9792 3.21 3.09 3.05 2.87 2.65 2.30 1.86 1.48 71 76 11:01:02 CTR PCC Excel. None 1737
D 25 4 12997 4.24 4.11 4.09 3.83 3.54 3.09 2.51 2.00 71 76 11:01:10 CTR PCC Excel. None 1743
D 25 5 17876 5.83 5.64 5.62 5.23 4.87 4.21 3.43 2.74 71 76 11:01:20 CTR PCC Excel. None 1745
C Comment at 25 m Time: 11:01:30 :PANEL5 CENTER
D 29 2 6549 2.43 2.41 2.18 1.96 1.85 1.53 1.20 0.97 71 76 11:02:16 CTR PCC Excel. None 1534
D 29 3 9766 3.73 3.72 3.37 3.11 2.84 2.38 1.90 1.50 71 76 11:02:22 CTR PCC Excel. None 1491
D 29 4 12965 4.98 4.95 4.53 4.16 3.80 3.21 2.56 2.00 71 76 11:02:30 CTR PCC Excel. None 1479
D 29 5 17874 6.84 6.81 6.24 5.70 5.22 4.41 3.51 2.75 71 76 11:02:40 CTR PCC Excel. None 1486
C Comment at 29 m Time: 11:02:50 :PANEL5 JOINT
D 32 2 6577 2.07 2.00 1.98 1.81 1.71 1.52 1.18 0.96 71 76 11:03:48 CTR PCC Excel. None 1805
D 32 3 9763 3.19 3.09 3.07 2.88 2.68 2.32 1.89 1.47 71 76 11:03:54 CTR PCC Excel. None 1739
D 32 4 12987 4.24 4.11 4.10 3.85 3.59 3.14 2.56 2.01 71 76 11:04:01 CTR PCC Excel. None 1743
D 32 5 17881 5.78 5.61 5.62 5.26 4.90 4.27 3.45 2.73 71 76 11:04:11 CTR PCC Excel. None 1758
C Comment at 32 m Time: 11:04:21 :PANEL 6 CENTER
D 35 2 6552 2.62 2.63 2.37 2.12 1.98 1.67 1.30 1.03 71 76 11:05:18 CTR PCC Excel. None 1424
D 35 3 9755 3.97 3.98 3.60 3.31 3.03 2.52 2.00 1.55 71 76 11:05:24 CTR PCC Excel. None 1399
D 35 4 12971 5.36 5.35 4.86 4.49 4.09 3.39 2.71 2.08 71 76 11:05:32 CTR PCC Excel. None 1376
D 35 5 17825 7.29 7.31 6.64 6.07 5.57 4.68 3.69 2.87 71 76 11:05:42 CTR PCC Excel. None 1391
C Comment at 35 m Time: 11:05:52 :PANEL6 JOINT
D 38 2 6537 2.08 2.03 1.98 1.85 1.73 1.51 1.19 0.97 71 76 11:06:41 CTR PCC Excel. None 1788
D 38 3 9723 3.15 3.07 3.01 2.82 2.61 2.26 1.81 1.44 71 76 11:06:47 CTR PCC Excel. None 1753
C Comment at 38 m Time: 11:07:09 :PANEL7 CENTER - DCP3 CHP1
D 38 2 6537 2.10 2.02 1.99 1.82 1.72 1.49 1.18 0.95 71 76 11:07:36 CTR PCC Excel. None 1771
D 38 3 9745 3.19 3.10 3.04 2.85 2.63 2.29 1.85 1.46 71 76 11:07:42 CTR PCC Excel. None 1735
D 38 4 12924 4.27 4.14 4.10 3.85 3.56 3.09 2.52 1.99 71 76 11:07:50 CTR PCC Excel. None 1719
D 38 5 17814 5.81 5.61 5.57 5.21 4.85 4.21 3.41 2.72 71 76 11:08:00 CTR PCC Excel. None 1742
C Comment at 38 m Time: 11:08:10 :PANEL7 CENTER - DCP3 CHP1 REDO
D 41 2 6566 2.58 2.62 2.32 2.10 1.94 1.61 1.27 0.99 71 76 11:09:02 CTR PCC Excel. None 1444
D 41 3 9766 3.99 4.05 3.55 3.25 2.94 2.45 1.93 1.50 71 76 11:09:09 CTR PCC Excel. None 1391
D 41 4 12994 5.29 5.33 4.72 4.32 3.93 3.28 2.59 1.98 71 76 11:09:16 CTR PCC Excel. None 1397
D 41 5 17863 7.22 7.32 6.49 5.91 5.40 4.47 3.53 2.73 71 76 11:09:26 CTR PCC Excel. None 1407
C Comment at 41 m Time: 11:09:36 :PANEL7 JOINT
D 44 2 6568 1.99 1.90 1.89 1.77 1.65 1.45 1.15 0.95 71 76 11:10:33 CTR PCC Excel. None 1877
D 44 3 9739 3.03 2.89 2.90 2.71 2.52 2.19 1.79 1.42 71 76 11:10:39 CTR PCC Excel. None 1830
D 44 4 12971 4.02 3.85 3.88 3.63 3.37 2.95 2.42 1.93 71 76 11:10:47 CTR PCC Excel. None 1835
D 44 5 17824 5.51 5.27 5.34 4.99 4.66 4.07 3.33 2.68 71 76 11:10:57 CTR PCC Excel. None 1839
C Comment at 44 m Time: 11:11:07 :PANEL8 CENTER
D 47 2 6571 2.48 2.52 2.18 1.99 1.80 1.50 1.15 0.90 72 76 11:11:49 CTR PCC Excel. None 1506
D 47 3 9792 3.79 3.87 3.36 3.05 2.77 2.29 1.76 1.35 72 76 11:11:56 CTR PCC Excel. None 1469
D 47 4 13004 5.06 5.14 4.50 4.09 3.69 3.06 2.38 1.83 72 76 11:12:03 CTR PCC Excel. None 1461
D 47 5 17870 6.98 7.09 6.21 5.63 5.12 4.22 3.27 2.53 72 76 11:12:13 CTR PCC Excel. None 1455
C Comment at 47 m Time: 11:12:23 :PANEL8 JOINT
D 50 2 6554 2.00 1.91 1.89 1.72 1.62 1.43 1.13 0.92 72 76 11:13:07 CTR PCC Excel. None 1866
D 50 3 9777 3.02 2.91 2.89 2.73 2.53 2.20 1.77 1.41 72 76 11:13:13 CTR PCC Excel. None 1842
D 50 4 13024 4.03 3.88 3.88 3.64 3.39 2.94 2.40 1.89 72 76 11:13:20 CTR PCC Excel. None 1839
D 50 5 17927 5.55 5.34 5.36 5.01 4.67 4.05 3.29 2.63 72 76 11:13:30 CTR PCC Excel. None 1836
C Comment at 50 m Time: 11:13:40 :PANEL9 CENTER
D 54 2 6590 2.56 2.57 2.31 2.10 1.91 1.62 1.27 1.01 72 76 11:14:27 CTR PCC Excel. None 1463
D 54 3 9814 3.89 3.94 3.53 3.25 2.95 2.48 1.95 1.50 72 76 11:14:33 CTR PCC Excel. None 1434
D 54 4 13073 5.20 5.24 4.74 4.33 3.93 3.32 2.63 2.01 72 76 11:14:41 CTR PCC Excel. None 1429
D 54 5 17911 7.16 7.24 6.53 5.92 5.41 4.56 3.59 2.79 72 76 11:14:51 CTR PCC Excel. None 1422
C Comment at 54 m Time: 11:15:01 :PANEL9 JOINT
D 57 2 6551 1.93 1.88 1.85 1.72 1.61 1.38 1.12 0.90 72 77 11:15:49 CTR PCC Excel. None 1928
D 57 3 9781 2.97 2.85 2.82 2.65 2.46 2.16 1.76 1.43 72 77 11:15:55 CTR PCC Excel. None 1874
D 57 4 13032 3.94 3.78 3.77 3.55 3.30 2.90 2.38 1.87 72 77 11:16:03 CTR PCC Excel. None 1882
D 57 5 17933 5.39 5.19 5.20 4.86 4.54 3.99 3.26 2.62 72 77 11:16:13 CTR PCC Excel. None 1893
C Comment at 57 m Time: 11:16:23 :PANEL10 CENTER - DCP4
D 60 2 6566 3.03 3.13 2.63 2.37 2.17 1.78 1.32 1.05 72 77 11:17:15 CTR PCC Excel. None 1232
D 60 3 9768 4.61 4.77 4.03 3.67 3.29 2.71 2.08 1.58 72 77 11:17:22 CTR PCC Excel. None 1205
D 60 4 12993 6.09 6.32 5.36 4.89 4.40 3.59 2.78 2.09 72 77 11:17:30 CTR PCC Excel. None 1214
D 60 5 17816 8.33 8.65 7.37 6.69 6.06 4.96 3.84 2.92 72 77 11:17:40 CTR PCC Excel. None 1216
C Comment at 60 m Time: 11:17:50 :PANEL10 JOINT DCP5
D 62 2 6551 4.56 3.61 2.82 2.53 2.33 1.95 1.47 1.13 72 76 11:19:03 CTR PCC Excel. None 818
D 62 3 9784 6.71 5.51 4.38 3.97 3.61 3.01 2.31 1.71 72 76 11:19:09 CTR PCC Excel. None 829
D 62 4 12983 8.69 7.32 5.89 5.35 4.86 4.04 3.13 2.32 72 76 11:19:17 CTR PCC Excel. None 850
D 62 5 17784 11.54 9.92 8.06 7.29 6.65 5.52 4.26 3.15 72 76 11:19:27 CTR PCC Excel. None 877

C Comment at 62 m Time: 11:21:29 :PANEL11 CENTER - DCP6 - CHP2 - CRACKS (D1 RIGHT ON TOP OF CRACK) SEE PICTURES
D 66 2 6547 5.11 4.99 4.53 4.11 3.80 3.17 2.53 1.98 73 77 11:22:33 CTR PCC Excel. None 728
D 66 3 9729 7.73 7.55 6.90 6.32 5.74 4.84 3.86 3.00 73 77 11:22:39 CTR PCC Excel. None 715
D 66 4 12947 10.09 9.86 9.04 8.31 7.57 6.36 5.11 3.94 73 77 11:22:47 CTR PCC Excel. None 729
D 66 5 17663 13.43 13.06 12.08 11.06 10.10 8.51 6.81 5.30 73 77 11:22:58 CTR PCC Excel. None 748
C Comment at 66 m Time: 11:23:08 :PANEL 11 JOINT - DCP7
C Comment at 65 m Time: 11:24:21 :PLATE IS CLOSE OR ON TOP OF LONGITUDINAL CRACK - SEE PICTURE
D 68 2 6549 4.39 4.56 4.31 4.11 3.84 3.43 2.85 2.31 73 77 11:25:06 CTR PCC Excel. None 848
D 68 3 9761 6.46 6.68 6.37 6.06 5.67 5.05 4.25 3.38 73 77 11:25:12 CTR PCC Excel. None 859
D 68 4 12960 8.27 8.51 8.18 7.80 7.30 6.51 5.48 4.38 73 77 11:25:19 CTR PCC Excel. None 891
D 68 5 17762 10.77 11.04 10.68 10.18 9.53 8.51 7.15 5.71 73 77 11:25:29 CTR PCC Excel. None 937
C Comment at 68 m Time: 11:25:39 :PANEL12 CENTER - DCP8
D 72 2 6520 5.17 5.30 4.70 4.33 4.03 3.55 2.92 2.42 73 78 11:26:34 CTR PCC Excel. None 717
D 72 3 9680 7.58 7.76 6.89 6.41 5.91 5.17 4.30 3.54 73 78 11:26:40 CTR PCC Excel. None 726
D 72 4 12898 9.78 10.03 8.91 8.27 7.62 6.65 5.54 4.54 73 78 11:26:48 CTR PCC Excel. None 750
D 72 5 17703 12.95 13.21 11.77 10.83 10.00 8.69 7.21 5.95 73 78 11:26:59 CTR PCC Excel. None 778
C Comment at 72 m Time: 11:27:43 :PANEL 12 JOINT
D 75 2 6567 2.87 2.79 2.84 2.72 2.62 2.40 2.05 1.76 73 78 11:29:03 CTR PCC Excel. None 1300
D 75 3 9779 4.30 4.17 4.28 4.13 3.92 3.60 3.10 2.63 73 78 11:29:09 CTR PCC Excel. None 1294
D 75 4 13068 5.63 5.51 5.67 5.46 5.21 4.77 4.12 3.45 73 78 11:29:17 CTR PCC Excel. None 1320
D 75 5 17897 7.64 7.45 7.70 7.39 7.06 6.50 5.61 4.71 73 78 11:29:27 CTR PCC Excel. None 1332
C Comment at 75 m Time: 11:29:45 :PANEL13 CENTER - DCP9
D 78 2 6563 3.17 3.15 2.82 2.54 2.37 2.05 1.65 1.38 73 78 11:31:11 CTR PCC Excel. None 1177
D 78 3 9761 4.93 4.90 4.38 4.01 3.67 3.12 2.56 2.06 73 78 11:31:18 CTR PCC Excel. None 1126
D 78 4 12965 6.54 6.53 5.84 5.35 4.90 4.17 3.44 2.76 73 78 11:31:26 CTR PCC Excel. None 1127
D 78 5 17834 8.91 8.86 7.94 7.22 6.62 5.63 4.60 3.71 73 78 11:31:35 CTR PCC Excel. None 1139
C Comment at 78 m Time: 11:31:45 :PANEL13 JOINT
D 81 2 6558 2.68 2.67 2.61 2.44 2.33 2.13 1.77 1.52 73 78 11:32:29 CTR PCC Excel. None 1393
D 81 3 9787 4.09 4.10 3.99 3.80 3.60 3.26 2.75 2.29 73 78 11:32:35 CTR PCC Excel. None 1362
D 81 4 13044 5.37 5.41 5.31 5.06 4.78 4.34 3.69 3.06 73 78 11:32:43 CTR PCC Excel. None 1382
D 81 5 17946 7.24 7.28 7.20 6.82 6.49 5.86 4.98 4.14 73 78 11:32:52 CTR PCC Excel. None 1410
C Comment at 81 m Time: 11:33:02 :PANEL 14 CENTER - DCP10
D 84 2 6542 3.86 4.09 3.55 3.27 3.12 2.75 2.24 1.91 73 78 11:33:49 CTR PCC Excel. None 963
C Comment at 84 m Time: 11:33:55 :Deflection is not decreasing
D 84 3 9716 5.81 6.18 5.36 5.02 4.71 4.16 3.44 2.87 73 78 11:34:02 CTR PCC Excel. None 951
C Comment at 84 m Time: 11:34:10 :Deflection is not decreasing
D 84 4 12941 7.66 8.14 7.12 6.68 6.22 5.46 4.57 3.78 73 78 11:34:12 CTR PCC Excel. None 961
C Comment at 84 m Time: 11:34:22 :Deflection is not decreasing
D 84 5 17765 10.31 10.98 9.58 8.94 8.36 7.36 6.10 5.09 73 78 11:34:25 CTR PCC Excel. None 979
C Comment at 84 m Time: 11:34:35 :PANEL14 JOINT
D 84 2 6553 3.91 4.14 3.61 3.34 3.16 2.76 2.27 1.93 73 78 11:35:33 CTR PCC Excel. None 952
C Comment at 84 m Time: 11:35:39 :Deflection is not decreasing
D 84 3 9742 5.87 6.23 5.41 5.11 4.76 4.18 3.47 2.90 73 78 11:35:43 CTR PCC Excel. None 943
C Comment at 84 m Time: 11:35:51 :Deflection is not decreasing
D 84 4 12976 7.73 8.20 7.16 6.74 6.26 5.50 4.60 3.81 73 78 11:35:55 CTR PCC Excel. None 955
C Comment at 84 m Time: 11:36:06 :Deflection is not decreasing
D 84 5 17755 10.39 11.01 9.63 8.97 8.35 7.35 6.10 5.08 73 78 11:36:07 CTR PCC Excel. None 972
C Comment at 84 m Time: 11:36:17 :PANEL14 JOINT REDO
D 87 2 6549 2.81 2.80 2.77 2.62 2.53 2.31 1.94 1.68 74 78 11:36:59 CTR PCC Excel. None 1327
D 87 3 9767 4.17 4.16 4.14 3.96 3.77 3.45 2.96 2.51 74 78 11:37:05 CTR PCC Excel. None 1331
D 87 4 13028 5.52 5.49 5.51 5.27 5.00 4.57 3.95 3.28 74 78 11:37:12 CTR PCC Excel. None 1343
D 87 5 17898 7.39 7.35 7.39 7.03 6.70 6.12 5.24 4.40 74 78 11:37:22 CTR PCC Excel. None 1377
C Comment at 87 m Time: 11:37:32 :PANEL15 CENTER
D 90 2 6537 3.52 3.62 3.28 3.02 2.89 2.53 2.04 1.73 74 78 11:38:23 CTR PCC Excel. None 1056
D 90 3 9716 5.30 5.49 4.96 4.64 4.34 3.80 3.15 2.56 74 78 11:38:30 CTR PCC Excel. None 1042
D 90 4 12952 7.05 7.32 6.62 6.20 5.77 5.07 4.24 3.43 74 78 11:38:38 CTR PCC Excel. None 1044
C Comment at 90 m Time: 11:38:48 :Deflection is not decreasing
D 90 5 17814 9.49 9.85 8.89 8.28 7.72 6.77 5.60 4.55 74 78 11:39:16 CTR PCC Excel. None 1068
C Comment at 90 m Time: 11:39:26 :PANEL15 JOINT
D 93 2 6576 3.01 3.01 2.98 2.79 2.74 2.48 2.08 1.78 75 78 11:40:38 CTR PCC Excel. None 1244
D 93 3 9794 4.49 4.49 4.48 4.31 4.09 3.72 3.17 2.67 75 78 11:40:44 CTR PCC Excel. None 1241
D 93 4 13062 5.93 5.92 5.93 5.67 5.39 4.95 4.24 3.51 75 78 11:40:52 CTR PCC Excel. None 1252
D 93 5 17912 7.94 7.94 7.95 7.58 7.23 6.62 5.65 4.73 75 78 11:41:02 CTR PCC Excel. None 1283
C Comment at 93 m Time: 11:41:12 :PANEL16 CENTER
D 96 2 6532 3.81 3.92 3.47 3.17 3.00 2.61 2.13 1.79 75 79 11:41:57 CTR PCC Excel. None 976
D 96 3 9737 5.74 5.94 5.23 4.89 4.53 3.92 3.24 2.65 75 79 11:42:03 CTR PCC Excel. None 965
D 96 4 12959 7.62 7.88 6.95 6.51 6.00 5.23 4.34 3.52 75 79 11:42:11 CTR PCC Excel. None 966
C Comment at 96 m Time: 11:42:21 :Deflection is not decreasing
D 96 5 17770 10.20 10.59 9.38 8.69 8.06 7.01 5.79 4.72 75 79 11:42:24 CTR PCC Excel. None 990
C Comment at 96 m Time: 11:42:34 :PANEL16 JOINT

Project: E23, Story County

```
IKUAB FWD FILE    : E23 or 160TH ST_ZEARING.fwd
HProject No.      : TR640
HLocation         : E23, E. of US65
HClient           : IOWA DOT
HStart Station    : 0
HDirection        : WB
HEnd Station      :
HWeather          : cloudy 75
HOperator         : PV

IDate Created     : 6/21/2012
IVersion          : 2.3.11
ILoad Mode        : 1        (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91     (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00  (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset :      0 m
ITestpoint spacing:      0 m

J Dist. Imp Load  D0     D1     D2     D3     D4     D5     D6     D7    Air Pave      Time           Pavement Pavement Pavement  Pavement Surface
J    m Num   lbf  mils   mils   mils   mils   mils   mils   mils   mils   °F  °F           Location  Type      Condition Distress     Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D     0  2  6632   5.33   4.86   4.75   4.27   3.90   3.17   2.33   1.67   78   75 09:28:46 CTR      PCC      Excel.    None      708
D     0  3  9820   8.11   7.39   7.26   6.56   5.97   4.81   3.58   2.55   78   75 09:28:52 CTR      PCC      Excel.    None      689
D     0  4 13036  10.78   9.80   9.71   8.82   7.99   6.47   4.82   3.40   78   75 09:29:01 CTR      PCC      Excel.    None      687
D     0  5 17707  14.66  13.32  13.25  12.00  10.90   8.83   6.55   4.62   78   75 09:29:11 CTR      PCC      Excel.    None      687
C  Comment at 3 m  Time: 09:30:39 :PANEL1 CENTER
D     3  2  6625   6.15   5.68   4.99   4.37   3.98   3.12   2.29   1.72   77   75 09:32:15 CTR      PCC      Excel.    None      613
D     3  3  9805   9.45   8.73   7.70   6.82   6.10   4.76   3.53   2.62   77   75 09:32:21 CTR      PCC      Excel.    None      590
D     3  4 13027  12.59  11.63  10.33   9.19   8.16   6.39   4.74   3.48   77   75 09:32:30 CTR      PCC      Excel.    None      588
D     3  5 17647  17.15  15.88  14.08  12.43  11.10   8.67   6.38   4.68   77   75 09:32:40 CTR      PCC      Excel.    None      585
C  Comment at 3 m  Time: 09:34:54 :NOTE: PANEL1 JOINT
D     5  2  6581   5.45   4.98   4.94   4.47   4.15   3.43   2.61   1.98   77   75 09:33:44 CTR      PCC      Excel.    None      687
D     5  3  9785   8.21   7.50   7.48   6.86   6.26   5.21   4.01   3.00   77   75 09:33:51 CTR      PCC      Excel.    None      678
D     5  4 12957  10.82   9.87   9.92   9.16   8.29   6.95   5.38   4.02   77   75 09:33:59 CTR      PCC      Excel.    None      681
D     5  5 17699  14.55  13.29  13.38  12.27  11.20   9.40   7.26   5.45   77   75 09:34:09 CTR      PCC      Excel.    None      692
C  Comment at 5 m  Time: 09:34:30 :PANEL2 CENTER - DCP1
D     7  2  6593   5.95   5.53   4.97   4.37   3.97   3.24   2.46   1.91   76   75 09:35:45 CTR      PCC      Excel.    None      630
D     7  3  9760   9.10   8.44   7.59   6.73   6.04   4.89   3.78   2.90   76   75 09:35:52 CTR      PCC      Excel.    None      610
D     7  4 12921  12.18  11.30  10.20   9.07   8.10   6.58   5.09   3.90   76   75 09:36:00 CTR      PCC      Excel.    None      603
D     7  5 17578  16.57  15.35  13.88  12.25  10.99   8.89   6.85   5.23   76   75 09:36:10 CTR      PCC      Excel.    None      603
C  Comment at 7 m  Time: 09:36:21 :PANEL2 JOINT
D     9  2  6537   6.09   5.70   5.41   4.84   4.41   3.55   2.64   1.95   77   73 09:37:05 CTR      PCC      Excel.    None      610
D     9  3  9725   9.11   8.53   8.14   7.34   6.62   5.38   4.04   2.94   77   73 09:37:11 CTR      PCC      Excel.    None      607
D     9  4 12940  11.95  11.17  10.72   9.71   8.75   7.14   5.38   3.92   77   73 09:37:20 CTR      PCC      Excel.    None      616
D     9  5 17622  15.97  14.88  14.42  13.03  11.78   9.61   7.24   5.26   77   73 09:37:30 CTR      PCC      Excel.    None      628
C  Comment at 9 m  Time: 09:37:40 :PANEL3 CENTER
D    11  2  6545   5.94   5.46   5.11   4.57   4.17   3.47   2.66   2.01   79   77 09:38:24 CTR      PCC      Excel.    None      627
D    11  3  9712   9.09   8.38   7.80   6.99   6.39   5.27   4.05   3.02   79   77 09:38:30 CTR      PCC      Excel.    None      608
D    11  4 12923  12.14  11.20  10.44   9.43   8.53   7.04   5.45   4.05   79   77 09:38:38 CTR      PCC      Excel.    None      605
D    11  5 17625  16.56  15.29  14.24  12.78  11.58   9.54   7.36   5.47   79   77 09:38:49 CTR      PCC      Excel.    None      605
C  Comment at 11 m  Time: 09:38:59 :PANEL3 JOINT
D    13  2  6571   4.98   4.52   4.51   4.07   3.80   3.06   2.31   1.73   80   77 09:39:48 CTR      PCC      Excel.    None      751
D    13  3  9763   7.55   6.85   6.85   6.27   5.75   4.69   3.56   2.64   80   77 09:39:55 CTR      PCC      Excel.    None      736
D    13  4 12969  10.05   9.12   9.13   8.40   7.65   6.31   4.79   3.53   80   77 09:40:03 CTR      PCC      Excel.    None      734
D    13  5 17691  13.60  12.34  12.40  11.38  10.36   8.52   6.47   4.77   80   77 09:40:13 CTR      PCC      Excel.    None      740
C  Comment at 13 m  Time: 09:40:23 :PANEL4 CENTER - CHP1 - DCP2
D    16  2  6558   5.65   5.27   4.66   4.06   3.67   2.93   2.16   1.62   80   77 09:41:09 CTR      PCC      Excel.    None      659
D    16  3  9734   8.66   8.08   7.14   6.32   5.64   4.47   3.33   2.48   80   77 09:41:16 CTR      PCC      Excel.    None      639
D    16  4 12957  11.58  10.80   9.56   8.49   7.56   6.00   4.50   3.33   80   77 09:41:24 CTR      PCC      Excel.    None      636
```

D 16 5 17649 15.78 14.72 13.07 11.54 10.28 8.19 6.10 4.51 80 77 09:41:34 CTR PCC Excel. None 636
C Comment at 16 m Time: 09:41:44 :PANEL4 JOINT
D 18 2 6516 5.70 5.26 5.01 4.52 4.13 3.35 2.48 1.78 79 77 09:42:29 CTR PCC Excel. None 649
D 18 3 9681 8.73 8.04 7.65 6.93 6.30 5.10 3.79 2.70 79 77 09:42:36 CTR PCC Excel. None 630
D 18 4 12888 11.67 10.75 10.22 9.31 8.43 6.83 5.09 3.57 79 77 09:42:44 CTR PCC Excel. None 628
D 18 5 17577 15.89 14.62 13.89 12.59 11.41 9.23 6.88 4.81 79 77 09:42:55 CTR PCC Excel. None 629
C Comment at 18 m Time: 09:43:04 :PANEL5 CENTER - TRANSVERSE CRACK LTE - DCP3
D 20 2 6549 5.49 5.00 4.20 3.58 3.23 2.51 1.81 1.36 79 78 09:44:43 CTR PCC Excel. None 678
D 20 3 9718 8.54 7.81 6.55 5.68 4.97 3.88 2.82 2.08 79 78 09:44:50 CTR PCC Excel. None 647
D 20 4 12882 11.47 10.51 8.84 7.65 6.73 5.19 3.81 2.77 79 78 09:44:58 CTR PCC Excel. None 639
D 20 5 17570 15.70 14.41 12.13 10.41 9.16 7.03 5.12 3.74 79 78 09:45:08 CTR PCC Excel. None 636
C Comment at 20 m Time: 09:45:18 :PANEL5 JOINT
D 22 2 6434 11.20 10.66 9.96 8.88 7.85 5.96 4.08 2.65 79 78 09:46:00 CTR PCC Excel. None 327
D 22 3 9589 16.63 15.82 14.84 13.35 11.77 8.97 6.22 4.09 79 78 09:46:07 CTR PCC Excel. None 328
D 22 4 12763 21.46 20.35 19.16 17.33 15.22 11.65 8.16 5.37 79 78 09:46:15 CTR PCC Excel. None 338
D 22 5 17379 27.91 26.38 25.04 22.55 19.93 15.26 10.75 7.15 79 78 09:46:25 CTR PCC Excel. None 354
C Comment at 22 m Time: 09:46:35 :PANEL6 CENTER - DCP4 - LONGITUDINAL CRACK
C Comment at 25 m Time: 09:47:34 :Deflection is not decreasing
D 25 2 6452 8.58 5.44 7.40 4.38 4.70 3.48 2.76 2.20 80 77 09:47:50 CTR PCC Excel. None 428
D 25 3 9643 12.97 8.41 11.21 7.06 7.27 5.46 4.32 3.43 80 77 09:47:56 CTR PCC Excel. None 423
D 25 4 12830 17.39 11.30 15.09 9.64 9.87 7.41 5.89 4.67 80 77 09:48:04 CTR PCC Excel. None 419
D 25 5 17401 24.12 15.48 20.79 13.26 13.49 10.14 8.04 6.39 80 77 09:48:15 CTR PCC Excel. None 410
C Comment at 25 m Time: 09:49:11 :PANEL6 JOINT - A SMALL PORTION OF THE PLATE ON NORTH SIDE ON TOP OF LONG. CR.
D 28 2 6552 6.27 6.01 5.52 4.92 4.47 3.57 2.63 1.92 80 77 09:49:55 CTR PCC Excel. None 594
D 28 3 9687 9.37 8.95 8.24 7.46 6.73 5.40 4.02 2.92 80 77 09:50:01 CTR PCC Excel. None 588
D 28 4 12867 12.28 11.71 10.86 9.87 8.85 7.14 5.35 3.87 80 77 09:50:09 CTR PCC Excel. None 596
D 28 5 17545 16.45 15.63 14.61 13.22 11.93 9.61 7.22 5.25 80 77 09:50:20 CTR PCC Excel. None 607
C Comment at 28 m Time: 09:50:30 :PANEL7 CENTER
D 30 2 6524 6.35 5.85 5.63 5.06 4.75 4.07 3.19 2.43 79 77 09:51:26 CTR PCC Excel. None 584
D 30 3 9659 9.70 8.93 8.54 7.83 7.22 6.20 4.85 3.68 79 77 09:51:32 CTR PCC Excel. None 566
D 30 4 12814 12.93 11.92 11.36 10.48 9.57 8.19 6.43 4.87 79 77 09:51:40 CTR PCC Excel. None 564
D 30 5 17483 17.64 16.27 15.48 14.12 12.99 11.11 8.67 6.54 79 77 09:51:51 CTR PCC Excel. None 563
C Comment at 30 m Time: 09:52:01 :PANEL7 JOINT
D 32 2 6548 5.55 5.05 5.07 4.57 4.25 3.49 2.65 1.97 80 78 09:53:01 CTR PCC Excel. None 670
D 32 3 9714 8.38 7.60 7.65 6.96 6.41 5.31 4.05 3.00 80 78 09:53:07 CTR PCC Excel. None 659
D 32 4 12903 11.06 10.02 10.11 9.31 8.47 7.04 5.40 3.98 80 78 09:53:15 CTR PCC Excel. None 664
D 32 5 17570 14.92 13.51 13.67 12.52 11.44 9.49 7.28 5.38 80 78 09:53:26 CTR PCC Excel. None 670
C Comment at 32 m Time: 09:53:36 :PANEL8 CENTER
D 34 2 6546 5.63 5.25 4.63 4.05 3.68 2.96 2.19 1.65 81 78 09:54:14 CTR PCC Excel. None 661
D 34 3 9698 8.66 8.08 7.14 6.30 5.66 4.52 3.40 2.54 81 78 09:54:21 CTR PCC Excel. None 636
D 34 4 12883 11.55 10.79 9.53 8.47 7.54 6.04 4.55 3.40 81 78 09:54:29 CTR PCC Excel. None 634
D 34 5 17587 15.88 14.82 13.07 11.57 10.34 8.24 6.18 4.64 81 78 09:54:39 CTR PCC Excel. None 630
C Comment at 34 m Time: 09:54:49 :PANEL8 JOINT
D 36 2 6543 5.39 4.88 4.86 4.40 4.05 3.31 2.46 1.83 81 78 09:55:35 CTR PCC Excel. None 690
D 36 3 9689 8.16 7.39 7.37 6.74 6.13 5.03 3.78 2.80 81 78 09:55:42 CTR PCC Excel. None 675
D 36 4 12883 10.86 9.83 9.82 9.08 8.19 6.74 5.12 3.74 81 78 09:55:50 CTR PCC Excel. None 675
D 36 5 17542 14.74 13.33 13.37 12.28 11.16 9.17 6.96 5.12 81 78 09:56:00 CTR PCC Excel. None 677
C Comment at 36 m Time: 09:56:10 :PANEL9 CENTER
D 38 2 6548 5.72 5.48 4.78 4.21 3.81 3.03 2.26 1.71 80 79 09:56:54 CTR PCC Excel. None 650
D 38 3 9681 8.80 8.44 7.34 6.57 5.91 4.67 3.50 2.60 80 79 09:57:00 CTR PCC Excel. None 626
D 38 4 12838 11.77 11.31 9.87 8.85 7.88 6.24 4.72 3.46 80 79 09:57:08 CTR PCC Excel. None 620
D 38 5 17557 16.17 15.57 13.60 12.10 10.81 8.59 6.46 4.77 80 79 09:57:18 CTR PCC Excel. None 618
C Comment at 38 m Time: 09:57:28 :PANEL9 JOINT
D 41 2 6539 5.67 5.21 5.18 4.71 4.39 3.60 2.73 1.99 80 79 09:58:16 CTR PCC Excel. None 656
D 41 3 9683 8.69 7.96 7.95 7.33 6.73 5.52 4.23 3.06 80 79 09:58:23 CTR PCC Excel. None 634
D 41 4 12894 11.59 10.61 10.64 9.85 8.98 7.44 5.71 4.10 80 79 09:58:31 CTR PCC Excel. None 633
D 41 5 17590 15.80 14.43 14.49 13.37 12.25 10.18 7.81 5.63 80 79 09:58:41 CTR PCC Excel. None 633
C Comment at 41 m Time: 09:58:51 :PANEL10 CENTER - LONGITUDINAL CRACK - DCP5
D 43 2 6522 6.90 6.58 5.75 5.05 4.60 3.59 2.63 1.99 80 79 09:59:37 CTR PCC Excel. None 537
D 43 3 9659 10.62 10.15 8.86 7.89 7.06 5.55 4.09 3.07 80 79 09:59:43 CTR PCC Excel. None 517
D 43 4 12841 14.23 13.64 11.94 10.67 9.48 7.50 5.57 4.14 80 79 09:59:51 CTR PCC Excel. None 513
D 43 5 17451 19.46 18.67 16.32 14.50 12.94 10.21 7.57 5.63 80 79 10:00:02 CTR PCC Excel. None 510
C Comment at 43 m Time: 10:00:11 :PANEL10 JOINT
D 45 2 6511 7.42 6.96 6.86 6.31 5.85 4.85 3.70 2.76 79 78 10:01:00 CTR PCC Excel. None 499
D 45 3 9629 11.37 10.66 10.50 9.69 8.96 7.46 5.73 4.26 79 78 10:01:06 CTR PCC Excel. None 482
D 45 4 12791 15.11 14.21 14.01 13.00 11.98 10.02 7.76 5.71 79 78 10:01:14 CTR PCC Excel. None 481
D 45 5 17457 20.52 19.33 19.07 17.70 16.32 13.68 10.60 7.82 79 78 10:01:25 CTR PCC Excel. None 484
C Comment at 45 m Time: 10:01:35 :PANEL11 CENTER - DCP6 - CHP2 - LONGITUDINAL AND CORNER CRACKS
D 47 2 6491 9.80 9.12 8.36 7.42 6.77 5.41 4.03 2.96 79 79 10:02:45 CTR PCC Excel. None 377
D 47 3 9600 15.32 14.25 13.06 11.71 10.60 8.44 6.35 4.65 79 79 10:02:52 CTR PCC Excel. None 356

D 47 4 12718 20.87 19.45 17.84 16.04 14.48 11.58 8.71 6.35 79 79 10:03:00 CTR PCC Excel. None 347
D 47 5 17198 29.27 27.24 25.06 22.56 20.28 16.23 12.21 8.89 79 79 10:03:11 CTR PCC Excel. None 334
C Comment at 47 m Time: 10:03:21 :PANEL11 JOINT
D 50 2 6541 6.02 5.31 5.74 5.34 5.04 4.31 3.39 2.57 81 78 10:05:18 CTR PCC Excel. None 618
D 50 3 9702 9.18 8.11 8.82 8.33 7.80 6.65 5.31 3.99 81 78 10:05:25 CTR PCC Excel. None 601
C Comment at 50 m Time: 10:05:33 :Deflection is not decreasing
D 50 4 12832 12.25 10.80 11.81 11.21 10.46 9.00 7.19 5.42 81 78 10:05:34 CTR PCC Excel. None 596
C Comment at 50 m Time: 10:05:45 :Deflection is not decreasing
D 50 5 17542 16.78 14.78 16.25 15.37 14.39 12.43 9.98 7.52 81 78 10:05:46 CTR PCC Excel. None 594
C Comment at 50 m Time: 10:06:09 :PANEL12 CENTER - LONGITUDINAL CRACK
D 52 2 6535 5.55 5.18 4.60 4.03 3.66 2.96 2.20 1.66 81 78 10:07:05 CTR PCC Excel. None 669
D 52 3 9695 8.51 7.95 7.07 6.31 5.63 4.50 3.37 2.53 81 78 10:07:12 CTR PCC Excel. None 648
D 52 4 12900 11.39 10.68 9.51 8.51 7.59 6.04 4.55 3.41 81 78 10:07:20 CTR PCC Excel. None 644
D 52 5 17631 15.63 14.63 13.07 11.58 10.37 8.23 6.18 4.64 81 78 10:07:30 CTR PCC Excel. None 642
C Comment at 52 m Time: 10:07:40 :PANEL12 JOINT
D 54 2 6573 5.39 4.95 4.93 4.47 4.13 3.44 2.59 1.94 82 79 10:08:38 CTR PCC Excel. None 693
D 54 3 9715 8.10 7.39 7.39 6.78 6.19 5.14 3.93 2.91 82 79 10:08:44 CTR PCC Excel. None 682
D 54 4 12886 10.68 9.73 9.75 9.01 8.22 6.80 5.25 3.86 82 79 10:08:52 CTR PCC Excel. None 686
D 54 5 17658 14.46 13.15 13.23 12.17 11.13 9.22 7.08 5.23 82 79 10:09:03 CTR PCC Excel. None 695
C Comment at 54 m Time: 10:09:13 :PANEL13 CENTER
D 56 2 6565 5.30 4.97 4.39 3.87 3.52 2.84 2.13 1.65 81 79 10:09:55 CTR PCC Excel. None 704
D 56 3 9731 8.13 7.63 6.77 6.06 5.44 4.34 3.31 2.51 81 79 10:10:01 CTR PCC Excel. None 681
D 56 4 12924 10.88 10.23 9.04 8.14 7.27 5.82 4.44 3.33 81 79 10:10:09 CTR PCC Excel. None 675
D 56 5 17605 14.91 14.04 12.42 11.10 9.95 7.96 6.04 4.53 81 79 10:10:20 CTR PCC Excel. None 671
C Comment at 56 m Time: 10:10:30 :PANEL13 JOINT
D 58 2 6551 5.32 4.91 4.78 4.29 3.99 3.24 2.40 1.79 82 79 10:11:17 CTR PCC Excel. None 700
D 58 3 9697 7.99 7.35 7.21 6.57 5.98 4.86 3.65 2.65 82 79 10:11:24 CTR PCC Excel. None 690
D 58 4 12906 10.53 9.67 9.51 8.75 7.91 6.44 4.87 3.51 82 79 10:11:32 CTR PCC Excel. None 697
D 58 5 17650 14.31 13.07 12.92 11.80 10.72 8.70 6.56 4.74 82 79 10:11:42 CTR PCC Excel. None 701
C Comment at 58 m Time: 10:12:11 :PANEL14 CENTER - DCP9
D 60 2 6560 5.34 5.08 4.51 3.97 3.61 2.91 2.19 1.70 83 80 10:13:08 CTR PCC Excel. None 699
D 60 3 9724 8.12 7.78 6.87 6.11 5.49 4.39 3.33 2.53 83 80 10:13:14 CTR PCC Excel. None 681
D 60 4 12924 10.88 10.44 9.24 8.22 7.39 5.91 4.50 3.39 83 80 10:13:22 CTR PCC Excel. None 675
D 60 5 17601 14.89 14.30 12.65 11.18 10.08 8.04 6.10 4.60 83 80 10:13:33 CTR PCC Excel. None 672
C Comment at 60 m Time: 10:13:43 :PANEL14 JOINT
D 63 2 6555 5.04 4.52 4.57 4.12 3.81 3.16 2.37 1.80 83 79 10:15:26 CTR PCC Excel. None 740
D 63 3 9705 7.64 6.87 6.94 6.36 5.79 4.83 3.65 2.75 83 79 10:15:32 CTR PCC Excel. None 722
D 63 4 12939 10.12 9.09 9.22 8.51 7.72 6.40 4.90 3.67 83 79 10:15:40 CTR PCC Excel. None 727
D 63 5 17637 13.75 12.35 12.57 11.49 10.46 8.66 6.63 4.99 83 79 10:15:51 CTR PCC Excel. None 730
C Comment at 63 m Time: 10:16:01 :PANEL 16 CENTER (NOTE: THERE IS NO PANEL 15)
D 64 2 6520 5.31 5.14 4.41 3.88 3.49 2.78 2.05 1.57 84 80 10:16:43 CTR PCC Excel. None 698
D 64 3 9668 8.14 7.91 6.77 6.00 5.38 4.23 3.19 2.38 84 80 10:16:49 CTR PCC Excel. None 675
D 64 4 12858 10.89 10.59 9.12 8.09 7.21 5.70 4.29 3.18 84 80 10:16:57 CTR PCC Excel. None 671
D 64 5 17538 15.02 14.63 12.56 11.08 9.95 7.78 5.84 4.34 84 80 10:17:08 CTR PCC Excel. None 664
C Comment at 64 m Time: 10:17:18 :PANEL16 JOINT
D 67 2 6549 5.14 4.67 4.60 4.12 3.79 3.11 2.30 1.70 83 80 10:20:03 CTR PCC Excel. None 725
D 67 3 9688 7.77 7.07 6.99 6.38 5.80 4.70 3.55 2.57 83 80 10:20:10 CTR PCC Excel. None 709
D 67 4 12912 10.32 9.39 9.31 8.55 7.73 6.30 4.77 3.43 83 80 10:20:18 CTR PCC Excel. None 712
D 67 5 17614 14.08 12.80 12.76 11.64 10.58 8.62 6.50 4.71 83 80 10:20:29 CTR PCC Excel. None 711
C Comment at 67 m Time: 10:20:39 :PANEL17 CENTER - DCP10 - CORNER CRACK
D 69 2 6553 5.35 5.15 4.46 3.91 3.56 2.83 2.05 1.54 84 78 10:21:39 CTR PCC Excel. None 697
D 69 3 9685 8.22 7.95 6.86 6.11 5.45 4.29 3.19 2.35 84 78 10:21:45 CTR PCC Excel. None 670
D 69 4 12920 11.02 10.68 9.23 8.21 7.33 5.76 4.29 3.14 84 78 10:21:53 CTR PCC Excel. None 667
D 69 5 17597 15.21 14.77 12.76 11.25 10.08 7.91 5.82 4.28 84 78 10:22:04 CTR PCC Excel. None 658
C Comment at 69 m Time: 10:22:13 :PANEL17 JOINT
D 71 2 6512 5.44 4.94 4.87 4.45 4.10 3.35 2.46 1.78 83 80 10:22:51 CTR PCC Excel. None 681
D 71 3 9671 8.20 7.44 7.36 6.74 6.16 5.03 3.75 2.71 83 80 10:22:57 CTR PCC Excel. None 670
D 71 4 12845 10.83 9.82 9.77 9.00 8.20 6.66 5.03 3.61 83 80 10:23:05 CTR PCC Excel. None 674
D 71 5 17541 14.70 13.32 13.31 12.20 11.15 9.06 6.81 4.90 83 80 10:23:16 CTR PCC Excel. None 679
C Comment at 71 m Time: 10:23:26 :PANEL18 CENTER - CORNER CRACK
D 73 2 6541 5.60 5.31 4.71 4.15 3.78 3.04 2.29 1.74 83 81 10:24:09 CTR PCC Excel. None 664
D 73 3 9689 8.44 8.01 7.05 6.29 5.63 4.51 3.36 2.51 83 81 10:24:15 CTR PCC Excel. None 652
D 73 4 12867 11.28 10.73 9.49 8.49 7.59 6.02 4.56 3.36 83 81 10:24:23 CTR PCC Excel. None 648
D 73 5 17541 15.57 14.84 13.13 11.63 10.45 8.27 6.22 4.62 83 81 10:24:34 CTR PCC Excel. None 640
C Comment at 73 m Time: 10:24:44 :PANEL18 JOINT
D 75 2 6525 5.60 5.07 5.04 4.52 4.18 3.42 2.52 1.83 83 80 10:25:37 CTR PCC Excel. None 663
D 75 3 9674 8.46 7.67 7.63 6.93 6.32 5.13 3.81 2.77 83 80 10:25:44 CTR PCC Excel. None 650
D 75 4 12879 11.26 10.22 10.19 9.31 8.46 6.85 5.14 3.68 83 80 10:25:52 CTR PCC Excel. None 651
D 75 5 17621 15.39 13.97 13.93 12.72 11.59 9.38 7.00 5.02 83 80 10:26:02 CTR PCC Excel. None 651
C Comment at 75 m Time: 10:26:12 :PANEL19 CENTER - CORNER CRACK

D 78 2 6491 5.97 5.64 4.97 4.32 3.91 3.09 2.28 1.73 83 81 10:26:56 CTR PCC Excel. None 618
D 78 3 9647 9.20 8.69 7.63 6.72 6.01 4.73 3.48 2.58 83 81 10:27:03 CTR PCC Excel. None 596
D 78 4 12845 12.34 11.67 10.25 9.07 8.09 6.34 4.72 3.48 83 81 10:27:11 CTR PCC Excel. None 592
D 78 5 17556 17.01 16.11 14.12 12.42 11.08 8.64 6.40 4.71 83 81 10:27:22 CTR PCC Excel. None 587
C Comment at 78 m Time: 10:27:31 :PANEL19 JOINT
D 80 2 6519 5.56 5.07 5.02 4.54 4.21 3.44 2.53 1.86 83 81 10:28:13 CTR PCC Excel. None 666
D 80 3 9653 8.47 7.73 7.65 7.04 6.41 5.24 3.90 2.82 83 81 10:28:20 CTR PCC Excel. None 648
D 80 4 12861 11.28 10.27 10.22 9.47 8.56 6.99 5.24 3.75 83 81 10:28:28 CTR PCC Excel. None 648
D 80 5 17562 15.43 14.05 13.99 12.86 11.74 9.56 7.15 5.11 83 81 10:28:38 CTR PCC Excel. None 647
C Comment at 79 m Time: 10:28:48 :PANEL20 CENTER - CORNER CRACK
D 82 2 6493 5.95 5.76 4.98 4.38 3.98 3.19 2.34 1.80 83 82 10:29:41 CTR PCC Excel. None 621
D 82 3 9637 9.14 8.88 7.68 6.84 6.12 4.92 3.61 2.70 83 82 10:29:48 CTR PCC Excel. None 599
D 82 4 12743 12.28 11.95 10.37 9.28 8.25 6.62 4.90 3.61 83 82 10:29:56 CTR PCC Excel. None 590
D 82 5 17476 16.95 16.55 14.33 12.75 11.37 9.09 6.69 4.93 83 82 10:30:06 CTR PCC Excel. None 586
C Comment at 82 m Time: 10:30:16 :PANEL20 JOINT
D 84 2 6466 5.59 5.13 5.08 4.59 4.21 3.49 2.60 1.94 84 82 10:30:58 CTR PCC Excel. None 658
D 84 3 9609 8.51 7.81 7.76 7.08 6.45 5.32 4.01 2.94 84 82 10:31:04 CTR PCC Excel. None 642
D 84 4 12833 11.33 10.38 10.34 9.50 8.63 7.12 5.42 3.91 84 82 10:31:12 CTR PCC Excel. None 644
D 84 5 17586 15.49 14.20 14.21 12.97 11.84 9.76 7.38 5.33 84 82 10:31:23 CTR PCC Excel. None 646
C Comment at 84 m Time: 10:31:33 :PANEL21 CENTER - CORNER CRACK
D 86 2 6490 5.68 5.54 4.82 4.26 3.89 3.19 2.39 1.84 83 82 10:32:17 CTR PCC Excel. None 650
D 86 3 9655 8.69 8.52 7.38 6.64 6.00 4.84 3.67 2.78 83 82 10:32:24 CTR PCC Excel. None 632
D 86 4 12832 11.59 11.40 9.87 8.92 8.01 6.51 4.95 3.71 83 82 10:32:32 CTR PCC Excel. None 629
D 86 5 17570 15.91 15.71 13.62 12.17 10.99 8.88 6.72 5.04 83 82 10:32:42 CTR PCC Excel. None 628
C Comment at 86 m Time: 10:32:52 :PANEL21 JOINT
D 88 2 6474 5.37 4.95 4.81 4.35 4.03 3.34 2.48 1.85 82 82 10:33:43 CTR PCC Excel. None 685
D 88 3 9659 8.15 7.50 7.32 6.72 6.14 5.05 3.78 2.78 82 82 10:33:50 CTR PCC Excel. None 674
D 88 4 12860 10.82 9.94 9.77 9.00 8.15 6.72 5.05 3.66 82 82 10:33:58 CTR PCC Excel. None 676
D 88 5 17572 14.77 13.56 13.35 12.27 11.15 9.15 6.85 4.96 82 82 10:34:08 CTR PCC Excel. None 677
C Comment at 88 m Time: 10:34:18 :PANEL22 CENTER

Project: SW Westlawn, Ankeny

IKUAB FWD FILE : SW WEST LAWN DRIVE.fwd
HProject No. : TR640
HLocation : SW WESTLAWN DR, ANKENY
HClient : IOWA DOT
HStart Station : SW WESTLAWN DR
HDirection :
HEnd Station :
HWeather : SUNNY 90
HOperator : PV

IDate Created : 7/19/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0.00 ft
ITestpoint spacing: 0.00 ft

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D 48.40 2 6753 3.91 3.77 3.63 3.45 3.27 2.97 2.55 2.23 87 84 09:08:59 CTR PCC Excel. None 981
D 48.40 3 9954 5.84 5.62 5.43 5.18 4.88 4.41 3.83 3.32 87 84 09:09:05 CTR PCC Excel. None 970
D 48.40 4 13226 7.67 7.39 7.19 6.87 6.42 5.81 5.04 4.32 87 84 09:09:12 CTR PCC Excel. None 981
D 48.40 5 18184 10.32 9.95 9.67 9.20 8.62 7.76 6.70 5.71 87 84 09:09:21 CTR PCC Excel. None 1002
C Comment at 48.40 ft Time: 09:09:30 :PANEL1 CENTER - DCP1 - LONGITUDINAL CRACK
D 59.73 2 6720 4.18 4.23 3.88 3.63 3.41 2.98 2.45 2.04 84 83 09:12:31 CTR PCC Excel. None 913
D 59.73 3 9930 6.21 6.24 5.76 5.40 5.04 4.44 3.63 3.00 84 83 09:12:36 CTR PCC Excel. None 909
D 59.73 4 13179 8.19 8.12 7.54 7.07 6.60 5.79 4.78 3.93 84 83 09:12:43 CTR PCC Excel. None 915
D 59.73 5 18202 10.95 10.74 10.03 9.42 8.77 7.72 6.40 5.28 84 83 09:12:52 CTR PCC Excel. None 945
C Comment at 59.73 ft Time: 09:13:33 :PANEL2 CENTER - DCP2 - CHP1 (~3FT FROM JOINT) - OLD DCP AT THAT LOCATION - LONGITUDINAL CRACK
D 71.06 2 6675 4.15 4.15 3.78 3.54 3.32 2.93 2.44 2.05 85 82 09:14:19 CTR PCC Excel. None 914
D 71.06 3 9879 6.19 6.16 5.69 5.35 4.97 4.39 3.65 3.05 85 82 09:14:24 CTR PCC Excel. None 908
D 71.06 4 13182 8.13 8.00 7.48 7.05 6.54 5.79 4.87 4.04 85 82 09:14:31 CTR PCC Excel. None 922
D 71.06 5 18116 10.90 10.52 9.97 9.41 8.72 7.75 6.50 5.37 85 82 09:14:41 CTR PCC Excel. None 945
C Comment at 71.06 ft Time: 09:14:49 :PANEL3 CENTER - DCP3 - TRANSVERSE CRACK AT MID PANEL AND LONGITUDINAL CRACK
D 76.21 2 6621 8.48 8.28 7.88 7.41 6.88 5.83 4.44 3.30 85 82 09:15:44 CTR PCC Excel. None 444
D 76.21 3 9807 11.38 11.14 10.51 9.92 9.14 7.73 5.90 4.39 85 82 09:15:49 CTR PCC Excel. None 490
D 76.21 4 13050 14.00 13.62 12.88 12.17 11.23 9.41 7.23 5.39 85 82 09:15:56 CTR PCC Excel. None 530
D 76.21 5 18030 17.66 17.12 16.22 15.26 14.11 11.80 9.08 6.75 85 82 09:16:06 CTR PCC Excel. None 581
C Comment at 75.18 ft Time: 09:16:14 :PANEL3 JOINT
D 81.36 2 6649 9.40 9.44 8.64 8.13 7.74 6.94 5.87 5.00 84 82 09:17:59 CTR PCC Excel. None 402
D 81.36 3 9762 12.74 12.79 11.59 10.89 10.27 9.21 7.77 6.60 84 82 09:18:05 CTR PCC Excel. None 436
D 81.36 4 13020 15.85 15.86 14.30 13.40 12.66 11.26 9.56 8.06 84 82 09:18:12 CTR PCC Excel. None 467
D 81.36 5 17930 20.02 20.02 17.93 16.83 15.83 14.07 11.99 10.11 84 82 09:18:21 CTR PCC Excel. None 509
C Comment at 81.36 ft Time: 09:18:30 :PANEL4 CENTER - LONGITUDINAL CRACK
D 91.66 2 6405 23.82 23.92 22.19 20.88 19.70 17.39 14.22 11.52 84 85 09:19:20 CTR PCC Excel. None 153
D 91.66 3 9667 29.05 28.98 27.07 25.45 24.07 21.18 17.22 13.93 84 85 09:19:26 CTR PCC Excel. None 189
D 91.66 4 12614 33.06 32.79 30.69 28.90 27.20 23.97 19.56 15.80 84 85 09:19:34 CTR PCC Excel. None 217
D 91.66 5 17574 38.51 37.68 35.64 33.39 31.50 27.57 22.45 18.10 84 85 09:19:43 CTR PCC Excel. None 259
C Comment at 91.66 ft Time: 09:19:52 :PANEL5 CENTER - LONGITUDINAL CRACK
C Comment at 91.66 ft Time: 09:21:05 :NOTE: D7 IS ON THE SOUTH PANEL
D 96.81 2 6541 23.19 21.96 22.98 22.39 21.91 20.84 18.65 16.38 86 88 09:21:54 CTR PCC Excel. None 160
D 96.81 3 9471 28.43 26.74 28.13 27.35 26.68 25.22 22.51 19.69 86 88 09:21:59 CTR PCC Excel. None 189
D 96.81 4 12787 33.00 31.00 32.55 31.53 30.75 29.05 25.81 22.50 86 88 09:22:07 CTR PCC Excel. None 220
D 96.81 5 17622 39.28 36.59 38.32 37.13 36.07 33.71 29.89 25.96 86 88 09:22:16 CTR PCC Excel. None 255
C Comment at 96.81 ft Time: 09:22:25 :PANEL5 JOINT - GAS UTILITY - OLD DCP
C Comment at 104.02 ft Time: 09:23:17 :Deflection is not decreasing

D 104.02 2 6516 14.84 13.57 14.97 14.60 14.27 13.77 12.51 11.45 86 85 09:23:20 CTR PCC Excel. None 250
C Comment at 104.02 ft Time: 09:23:26 :Deflection is not decreasing
D 104.02 3 9690 19.52 17.82 19.59 19.08 18.63 17.82 16.13 14.66 86 85 09:23:28 CTR PCC Excel. None 282
C Comment at 104.02 ft Time: 09:23:36 :Deflection is not decreasing
D 104.02 4 12946 23.82 21.73 23.71 23.00 22.42 21.33 19.24 17.40 86 85 09:23:38 CTR PCC Excel. None 309
C Comment at 104.02 ft Time: 09:23:48 :Deflection is not decreasing
D 104.02 5 17765 29.70 27.13 29.22 28.27 27.40 25.88 23.37 20.97 86 85 09:23:50 CTR PCC Excel. None 340
C Comment at 102.99 ft Time: 09:24:09 :PANEL6 CENTER - DCP4
D 107.11 2 6542 14.56 13.88 13.75 12.87 12.24 10.94 9.25 7.91 86 84 09:25:47 CTR PCC Excel. None 255
D 107.11 3 9746 19.52 18.63 18.16 17.00 15.97 14.23 12.02 10.26 86 84 09:25:52 CTR PCC Excel. None 284
D 107.11 4 12986 24.01 22.86 22.21 20.64 19.46 17.20 14.51 12.36 86 84 09:25:59 CTR PCC Excel. None 308
D 107.11 5 17766 30.30 28.80 27.85 25.79 24.23 21.28 17.97 15.22 86 84 09:26:09 CTR PCC Excel. None 333
C Comment at 107.11 ft Time: 09:26:17 :PANEL6 JOINT
D 114.31 2 6569 16.62 15.13 16.19 15.39 8.04 7.18 3.94 3.30 85 84 09:28:17 CTR PCC Excel. None 225
D 114.31 3 9683 25.52 23.53 24.69 23.40 10.53 10.02 5.66 4.77 85 84 09:28:22 CTR PCC Excel. None 216
D 114.31 4 12835 34.14 31.53 32.78 30.87 12.93 12.09 7.21 6.11 85 84 09:28:30 CTR PCC Excel. None 214
D 114.31 5 17477 45.60 42.14 43.43 40.53 15.76 14.60 9.52 8.04 85 84 09:28:39 CTR PCC Excel. None 218
C Comment at 113.28 ft Time: 09:28:48 :PANEL7 CENTER - LONG. CRACK - PLATE ON CRACK SEE PICTURE
D 118.43 2 6460 20.75 20.50 19.61 18.47 17.18 14.99 12.40 10.05 85 83 09:29:30 CTR PCC Excel. None 177
D 118.43 3 9539 30.47 29.68 29.01 27.52 25.65 22.73 18.98 15.48 85 83 09:29:36 CTR PCC Excel. None 178
D 118.43 4 12662 38.97 37.42 37.17 35.36 33.04 29.25 24.49 20.03 85 83 09:29:43 CTR PCC Excel. None 185
D 118.43 5 17219 49.80 47.34 47.69 45.47 42.64 37.77 31.84 25.76 85 83 09:29:52 CTR PCC Excel. None 197
C Comment at 118.43 ft Time: 09:30:01 :PANEL7 JOINT
D 124.61 2 6502 17.22 16.99 15.67 14.49 10.89 8.44 6.76 5.80 85 84 09:31:37 CTR PCC Excel. None 215
D 124.61 3 9724 22.65 22.16 20.66 19.26 14.86 12.29 9.99 8.39 85 84 09:31:43 CTR PCC Excel. None 244
D 124.61 4 12958 27.38 26.50 25.06 23.33 19.13 16.04 12.91 10.69 85 84 09:31:50 CTR PCC Excel. None 269
D 124.61 5 17758 34.15 32.55 31.22 29.05 24.31 20.83 16.94 13.87 85 84 09:32:00 CTR PCC Excel. None 296
C Comment at 124.61 ft Time: 09:32:08 :PANEL8 CENTER - LONGITUDINAL CRACK
D 129.76 2 6376 25.74 25.56 24.10 22.78 21.56 19.14 15.75 12.89 85 83 09:33:00 CTR PCC Excel. None 141
D 129.76 3 9521 34.58 34.44 32.05 29.98 28.21 24.56 19.80 15.97 85 83 09:33:05 CTR PCC Excel. None 157
D 129.76 4 12662 41.37 41.14 38.11 35.54 33.39 28.65 22.99 18.39 85 83 09:33:12 CTR PCC Excel. None 174
D 129.76 5 17088 49.60 49.10 45.38 42.37 39.78 33.85 27.19 21.75 85 83 09:33:22 CTR PCC Excel. None 196
C Comment at 129.76 ft Time: 09:33:30 :PANEL8 JOINT
C Comment at 134.91 ft Time: 09:36:09 :Deflection is not decreasing
D 134.91 2 6430 22.48 21.24 22.48 21.87 21.42 20.41 18.25 16.26 85 84 09:36:12 CTR PCC Excel. None 163
C Comment at 134.91 ft Time: 09:36:17 :Deflection is not decreasing
D 134.91 3 9603 29.39 27.66 29.40 28.60 27.95 26.59 23.71 20.91 85 84 09:36:19 CTR PCC Excel. None 186
C Comment at 134.91 ft Time: 09:36:26 :Deflection is not decreasing
D 134.91 4 12636 34.88 32.80 34.63 33.66 32.94 31.10 27.69 24.23 85 84 09:36:27 CTR PCC Excel. None 206
D 134.91 5 17442 41.78 39.21 41.10 39.85 38.92 36.40 32.42 28.40 85 84 09:36:36 CTR PCC Excel. None 237
C Comment at 133.88 ft Time: 09:36:45 :PANEL9 CENTER - DCP5 - OLD DCP - LONGITUDINAL CRACK
D 140.06 2 6542 15.51 14.13 14.43 13.58 12.90 11.52 9.70 8.17 85 93 09:37:26 CTR PCC Excel. None 240
D 140.06 3 9665 22.14 19.95 20.71 19.63 18.62 16.73 14.20 12.03 85 93 09:37:32 CTR PCC Excel. None 248
D 140.06 4 12854 28.27 25.42 26.33 25.04 23.69 21.30 18.22 15.44 85 93 09:37:39 CTR PCC Excel. None 259
D 140.06 5 17606 36.58 32.97 33.83 32.07 30.29 27.17 23.34 19.77 85 93 09:37:48 CTR PCC Excel. None 274
C Comment at 140.06 ft Time: 09:37:57 :PANEL9 JOINT
D 146.24 2 6597 8.83 8.41 8.77 8.48 8.21 7.85 7.11 6.32 84 93 09:38:46 CTR PCC Excel. None 425
D 146.24 3 9735 13.22 12.53 13.08 12.73 12.26 11.73 10.64 9.44 84 93 09:38:52 CTR PCC Excel. None 419
D 146.24 4 12947 17.52 16.47 17.27 16.80 16.21 15.44 14.05 12.44 84 93 09:38:59 CTR PCC Excel. None 420
D 146.24 5 17834 23.74 22.21 23.35 22.71 21.89 20.88 19.04 16.81 84 93 09:39:08 CTR PCC Excel. None 427
C Comment at 146.24 ft Time: 09:39:17 :PANEL10 CENTER - LONGITUDINAL CRACK
D 151.39 2 6627 8.00 7.77 7.67 7.35 6.98 6.50 5.80 5.14 85 93 09:40:07 CTR PCC Excel. None 471
D 151.39 3 9775 11.94 11.54 11.38 10.91 10.38 9.67 8.62 7.67 85 93 09:40:12 CTR PCC Excel. None 466
D 151.39 4 12965 15.81 15.16 15.00 14.40 13.70 12.75 11.42 10.04 85 93 09:40:19 CTR PCC Excel. None 466
D 151.39 5 17917 21.41 20.46 20.27 19.48 18.50 17.22 15.45 13.64 85 93 09:40:29 CTR PCC Excel. None 476
C Comment at 151.39 ft Time: 09:40:37 :PANEL10 JOINT
D 157.57 2 6583 8.17 8.19 7.55 7.02 6.56 5.93 5.04 4.36 87 93 09:41:29 CTR PCC Excel. None 458
D 157.57 3 9738 12.32 12.37 11.35 10.63 9.92 8.96 7.66 6.47 87 93 09:41:34 CTR PCC Excel. None 450
D 157.57 4 12938 16.37 16.35 15.01 14.15 13.18 11.90 10.19 8.60 87 93 09:41:41 CTR PCC Excel. None 449
D 157.57 5 17871 22.38 22.23 20.45 19.26 17.98 16.21 13.90 11.71 87 93 09:41:50 CTR PCC Excel. None 454
C Comment at 156.54 ft Time: 09:41:59 :PANEL11 CENTER
D 162.72 2 6562 9.23 8.93 8.78 8.34 7.92 7.27 6.14 5.06 88 94 09:42:49 CTR PCC Excel. None 404
D 162.72 3 9708 13.63 13.22 12.99 12.38 11.81 10.83 9.19 7.55 88 94 09:42:55 CTR PCC Excel. None 405
D 162.72 4 12960 17.97 17.32 17.06 16.31 15.51 14.27 12.14 9.94 88 94 09:43:02 CTR PCC Excel. None 410
D 162.72 5 17826 24.37 23.31 22.97 21.98 20.95 19.27 16.41 13.45 88 94 09:43:11 CTR PCC Excel. None 416
C Comment at 162.72 ft Time: 09:43:27 :PANEL11 JOINT - GASLINE
D 168.90 2 6614 8.89 8.17 8.65 8.24 7.71 6.95 5.92 5.05 87 90 09:45:46 CTR PCC Excel. None 423
D 168.90 3 9756 13.00 11.85 12.60 12.03 11.22 10.14 8.69 7.43 87 90 09:45:51 CTR PCC Excel. None 427
D 168.90 4 13026 16.93 15.32 16.36 15.62 14.58 13.21 11.34 9.67 87 90 09:45:58 CTR PCC Excel. None 437
D 168.90 5 17904 22.65 20.37 21.81 20.82 19.46 17.65 15.20 12.92 87 90 09:46:08 CTR PCC Excel. None 449

C Comment at 167.87 ft Time: 09:46:16 :PANEL12 CENTER - LONGITUDINAL CRACK
D 173.02 2 6582 7.21 6.78 6.81 6.43 6.06 5.55 4.76 4.05 87 86 09:46:55 CTR PCC Excel. None 519
D 173.02 3 9773 10.72 10.05 10.10 9.55 8.96 8.17 7.04 6.00 87 86 09:47:00 CTR PCC Excel. None 518
D 173.02 4 13042 14.08 13.07 13.13 12.41 11.62 10.54 9.12 7.70 87 86 09:47:07 CTR PCC Excel. None 527
D 173.02 5 17980 18.87 17.40 17.52 16.49 15.40 13.89 12.00 10.10 87 86 09:47:16 CTR PCC Excel. None 542
C Comment at 173.02 ft Time: 09:47:25 :PANEL12 JOINT - DCP6 - OLD DCP AT THIS LOCATION
D 179.20 2 6652 5.47 5.00 5.21 4.85 4.58 4.00 3.29 2.68 87 84 09:48:09 CTR PCC Excel. None 691
D 179.20 3 9840 8.18 7.45 7.78 7.32 6.81 5.99 4.93 3.99 87 84 09:48:15 CTR PCC Excel. None 684
D 179.20 4 13109 10.93 9.86 10.30 9.73 9.06 7.95 6.56 5.28 87 84 09:48:22 CTR PCC Excel. None 682
D 179.20 5 18132 15.13 13.52 14.24 13.43 12.52 10.94 9.06 7.31 87 84 09:48:31 CTR PCC Excel. None 681
C Comment at 179.20 ft Time: 09:48:40 :PANEL13 CENTER - GEOGRID START FROM PANELS 13/14 INTERFACE
D 184.34 2 6639 4.43 4.27 4.08 3.84 3.56 3.15 2.57 2.09 87 83 09:49:18 CTR PCC Excel. None 852
D 184.34 3 9828 6.60 6.32 6.09 5.72 5.32 4.69 3.85 3.10 87 83 09:49:24 CTR PCC Excel. None 847
D 184.34 4 13099 8.78 8.35 8.05 7.58 7.03 6.19 5.14 4.11 87 83 09:49:31 CTR PCC Excel. None 848
D 184.34 5 18107 12.11 11.45 11.07 10.41 9.66 8.47 7.01 5.61 87 83 09:49:40 CTR PCC Excel. None 850
C Comment at 184.34 ft Time: 09:49:48 :PANEL13 JOINT
D 190.52 2 6633 5.05 4.85 4.74 4.39 4.03 3.45 2.69 2.07 87 83 09:50:34 CTR PCC Excel. None 746
D 190.52 3 9767 7.60 7.19 7.06 6.61 6.04 5.15 4.02 3.10 87 83 09:50:39 CTR PCC Excel. None 731
D 190.52 4 13083 10.09 9.52 9.33 8.75 8.00 6.82 5.34 4.07 87 83 09:50:46 CTR PCC Excel. None 737
D 190.52 5 18113 13.89 12.96 12.78 11.95 10.95 9.27 7.27 5.52 87 83 09:50:55 CTR PCC Excel. None 742
C Comment at 190.52 ft Time: 09:51:24 :PANEL14 CENTER - DCP7 - CHP2 - OLD DCP - LONGITUDINAL CRACK
D 196.70 2 6599 8.84 8.80 7.68 6.93 6.24 5.02 3.78 2.83 87 84 09:52:11 CTR PCC Excel. None 424
D 196.70 3 9770 12.70 12.64 11.11 10.07 9.02 7.30 5.55 4.13 87 84 09:52:17 CTR PCC Excel. None 437
D 196.70 4 13025 16.59 16.23 14.31 12.97 11.64 9.46 7.22 5.34 87 84 09:52:24 CTR PCC Excel. None 446
D 196.70 5 17902 22.22 21.47 19.00 17.25 15.45 12.58 9.63 7.19 87 84 09:52:34 CTR PCC Excel. None 458
C Comment at 196.70 ft Time: 09:52:42 :PANEL14 JOINT
C Comment at 0.00 ft Time: 09:55:38 :NOTE: DISTANCE ZEROED AGAIN AT PANEL14 JOINT
D 7.21 2 6644 9.10 9.40 8.14 7.45 6.95 6.01 4.80 3.83 84 84 09:56:31 CTR PCC Excel. None 415
D 7.21 3 9791 13.19 13.53 11.85 10.93 10.09 8.77 7.03 5.54 84 84 09:56:36 CTR PCC Excel. None 422
D 7.21 4 13032 17.22 17.40 15.35 14.20 13.10 11.37 9.21 7.18 84 84 09:56:43 CTR PCC Excel. None 430
D 7.21 5 17846 22.70 22.76 20.19 18.75 17.26 15.04 12.18 9.55 84 84 09:56:52 CTR PCC Excel. None 447
C Comment at 7.21 ft Time: 09:57:01 :PANEL15 CENTER - LONGITUDINAL CRACK
D 12.36 2 6451 17.13 16.85 16.05 15.02 14.10 12.33 9.89 7.77 85 83 09:57:59 CTR PCC Excel. None 214
D 12.36 3 9595 24.51 24.23 22.80 21.30 19.91 17.21 13.80 10.80 85 83 09:58:04 CTR PCC Excel. None 223
D 12.36 4 12772 31.23 30.83 28.79 26.91 25.00 21.62 17.29 13.50 85 83 09:58:12 CTR PCC Excel. None 233
D 12.36 5 17448 40.34 39.72 36.81 34.31 31.89 27.36 21.94 17.03 85 83 09:58:21 CTR PCC Excel. None 246
C Comment at 12.36 ft Time: 09:58:31 :PANEL15 JOINT
D 18.54 2 6443 24.20 22.87 23.60 22.93 21.97 16.84 13.25 10.84 84 84 09:59:52 CTR PCC Excel. None 151
D 18.54 3 9528 33.88 32.09 33.02 32.08 30.78 23.75 19.14 15.69 84 84 09:59:58 CTR PCC Excel. None 160
D 18.54 4 12641 42.55 40.21 41.27 40.16 38.49 29.92 24.49 20.05 84 84 10:00:05 CTR PCC Excel. None 169
D 18.54 5 17332 53.35 50.46 51.61 50.22 48.11 37.74 31.44 25.93 84 84 10:00:15 CTR PCC Excel. None 185
C Comment at 18.54 ft Time: 10:00:23 :PANEL16 CENTER - DCP8 - LONGITUDINAL CRACK
D 24.72 2 6483 15.01 14.13 14.58 14.24 13.61 12.46 10.80 9.19 84 84 10:01:07 CTR PCC Excel. None 246
D 24.72 3 9577 21.97 20.62 21.39 20.86 19.93 18.28 15.89 13.47 84 84 10:01:13 CTR PCC Excel. None 248
D 24.72 4 12802 28.52 26.63 27.71 27.04 25.81 23.70 20.63 17.50 84 84 10:01:20 CTR PCC Excel. None 255
D 24.72 5 17505 37.74 34.95 36.53 35.62 34.00 31.19 27.22 23.12 84 84 10:01:29 CTR PCC Excel. None 264
C Comment at 23.69 ft Time: 10:01:38 :PANELL16 JOINT
D 30.90 2 6572 11.46 10.74 11.16 10.61 10.20 9.41 8.12 7.15 84 85 10:03:39 CTR PCC Excel. None 326
D 30.90 3 9708 16.52 15.40 16.07 15.29 14.64 13.43 11.68 10.24 84 85 10:03:45 CTR PCC Excel. None 334
D 30.90 4 12946 21.40 19.69 20.54 19.60 18.70 17.17 14.97 13.01 84 85 10:03:52 CTR PCC Excel. None 344
D 30.90 5 17790 27.99 25.61 26.70 25.46 24.28 22.23 19.43 16.84 84 85 10:04:01 CTR PCC Excel. None 361
C Comment at 30.90 ft Time: 10:04:10 :PANEL17 CENTER - LONGITUDINAL CRACK
D 37.07 2 6570 12.22 11.76 11.52 10.82 10.07 8.83 7.13 5.93 84 87 10:05:16 CTR PCC Excel. None 306
D 37.07 3 9696 18.00 17.22 16.87 15.82 14.77 12.86 10.44 8.62 84 87 10:05:22 CTR PCC Excel. None 306
D 37.07 4 12895 23.65 22.44 22.01 20.68 19.17 16.68 13.61 11.17 84 87 10:05:29 CTR PCC Excel. None 310
D 37.07 5 17695 31.31 29.51 28.92 27.12 25.12 21.76 17.76 14.56 84 87 10:05:38 CTR PCC Excel. None 321
C Comment at 37.07 ft Time: 10:05:47 :PANEL17 JOINT
D 43.25 2 6537 12.03 11.43 11.45 10.82 10.28 9.34 7.77 6.42 85 92 10:06:39 CTR PCC Excel. None 309
D 43.25 3 9687 17.57 16.65 16.63 15.78 14.92 13.45 11.24 9.20 85 92 10:06:45 CTR PCC Excel. None 313
D 43.25 4 12891 22.74 21.46 21.43 20.37 19.14 17.31 14.43 11.78 85 92 10:06:52 CTR PCC Excel. None 322
D 43.25 5 17713 30.04 28.22 28.15 26.71 25.15 22.64 18.87 15.38 85 92 10:07:01 CTR PCC Excel. None 335
C Comment at 43.25 ft Time: 10:07:10 :PANEL18 CENTER - DCP9 - LONGITUDINAL CRACK
D 48.40 2 6509 14.63 14.21 13.46 12.61 11.96 10.55 8.78 7.30 85 90 10:07:50 CTR PCC Excel. None 253
D 48.40 3 9653 21.41 20.80 19.71 18.46 17.40 15.38 12.78 10.63 85 90 10:07:55 CTR PCC Excel. None 256
D 48.40 4 12860 27.59 26.81 25.43 23.82 22.40 19.70 16.45 13.60 85 90 10:08:03 CTR PCC Excel. None 265
D 48.40 5 17600 36.09 34.82 32.91 30.79 28.92 25.35 21.15 17.42 85 90 10:08:12 CTR PCC Excel. None 277
C Comment at 48.40 ft Time: 10:08:21 :PANEL18 JOINT
D 55.61 2 6442 18.13 17.29 17.34 16.34 12.05 11.15 8.97 6.93 84 87 10:08:56 CTR PCC Excel. None 202
D 55.61 3 9630 24.81 23.62 23.71 22.36 17.86 16.10 13.10 10.43 84 87 10:09:02 CTR PCC Excel. None 221
D 55.61 4 12893 31.10 29.42 29.61 27.91 22.36 20.97 17.01 13.54 84 87 10:09:09 CTR PCC Excel. None 236

D 55.61 5 17649 39.50 37.04 37.69 35.50 29.09 26.96 22.31 17.82 84 87 10:09:18 CTR PCC Excel. None 254
C Comment at 55.61 ft Time: 10:09:27 :PANEL19 CENTER - LONGITUDINAL CRACK
D 59.73 2 6516 21.63 21.26 20.36 19.39 18.19 16.38 13.90 11.40 84 86 10:10:14 CTR PCC Excel. None 171
D 59.73 3 9540 28.32 27.91 26.28 24.88 23.17 20.71 17.36 14.23 84 86 10:10:20 CTR PCC Excel. None 192
D 59.73 4 12570 34.18 33.64 31.32 29.58 27.45 24.52 20.50 16.63 84 86 10:10:27 CTR PCC Excel. None 209
D 59.73 5 17627 41.87 41.07 37.97 35.58 32.85 29.16 24.33 19.67 84 86 10:10:37 CTR PCC Excel. None 239
C Comment at 59.73 ft Time: 10:10:45 :PANEL19 JOINT
D 65.91 2 6374 20.97 20.33 19.97 18.87 17.56 15.31 12.69 10.17 84 86 10:13:13 CTR PCC Excel. None 173
D 65.91 3 9612 27.87 27.18 26.56 25.06 23.33 20.41 16.85 13.38 84 86 10:13:19 CTR PCC Excel. None 196
D 65.91 4 12940 34.47 33.48 32.62 30.70 28.19 24.92 20.59 16.50 84 86 10:13:26 CTR PCC Excel. None 213
D 65.91 5 17683 43.29 41.77 40.73 38.28 35.36 30.75 25.45 20.39 84 86 10:13:35 CTR PCC Excel. None 232
C Comment at 65.91 ft Time: 10:13:44 :PANEL20 CENTER - LONGITUDINAL CRACK
D 72.09 2 6479 23.75 23.26 21.65 20.25 18.68 15.98 13.09 10.55 84 86 10:14:22 CTR PCC Excel. None 155
D 72.09 3 9595 32.96 32.20 30.06 28.17 25.83 22.18 18.28 14.75 84 86 10:14:28 CTR PCC Excel. None 166
D 72.09 4 12732 41.87 40.85 38.00 35.56 32.58 28.11 23.14 18.61 84 86 10:14:36 CTR PCC Excel. None 173
D 72.09 5 17173 53.37 52.22 48.77 45.49 41.82 35.78 29.53 23.70 84 86 10:14:45 CTR PCC Excel. None 183
C Comment at 72.09 ft Time: 10:14:54 :PANEL20 JOINT
C Comment at 79.30 ft Time: 10:15:32 :Deflection is not decreasing
D 79.30 2 6501 14.77 13.55 15.45 15.40 15.14 14.98 13.97 12.60 84 87 10:15:34 CTR PCC Excel. None 250
C Comment at 79.30 ft Time: 10:15:39 :Deflection is not decreasing
D 79.30 3 9623 21.14 19.53 21.96 21.85 21.43 21.15 19.66 17.72 84 87 10:15:40 CTR PCC Excel. None 259
C Comment at 79.30 ft Time: 10:15:47 :Deflection is not decreasing
D 79.30 4 12820 27.08 24.97 27.90 27.82 27.22 26.76 24.96 22.41 84 87 10:15:49 CTR PCC Excel. None 269
C Comment at 79.30 ft Time: 10:15:59 :Deflection is not decreasing
D 79.30 5 17614 35.44 32.62 36.19 36.00 35.13 34.35 31.98 28.74 84 87 10:16:00 CTR PCC Excel. None 283
C Comment at 79.30 ft Time: 10:16:09 :PANEL21 CENTER - DCP10 - LONGITUDINAL CRACK
D 83.42 2 6538 13.00 13.00 12.69 12.34 11.94 11.63 10.87 10.11 85 87 10:16:49 CTR PCC Excel. None 286
D 83.42 3 9658 18.77 19.01 18.33 17.85 17.16 16.63 15.57 14.42 85 87 10:16:55 CTR PCC Excel. None 293
D 83.42 4 12858 24.14 24.42 23.37 22.83 21.85 21.12 19.76 18.23 85 87 10:17:02 CTR PCC Excel. None 303
D 83.42 5 17699 31.51 31.72 30.36 29.48 28.23 27.10 25.31 23.22 85 87 10:17:11 CTR PCC Excel. None 319
C Comment at 83.42 ft Time: 10:17:20 :PANEL21 JOINT
C Comment at 89.60 ft Time: 10:18:00 :Deflection is not decreasing
D 89.60 2 6526 13.20 11.55 13.52 13.24 13.03 12.27 10.57 8.20 85 86 10:18:03 CTR PCC Excel. None 281
C Comment at 89.60 ft Time: 10:18:08 :Deflection is not decreasing
D 89.60 3 9670 18.65 16.40 19.16 18.91 18.54 17.69 15.10 11.88 85 86 10:18:09 CTR PCC Excel. None 295
C Comment at 89.60 ft Time: 10:18:16 :Deflection is not decreasing
D 89.60 4 12912 23.67 20.90 24.15 23.91 23.38 22.36 19.09 15.16 85 86 10:18:16 CTR PCC Excel. None 310
C Comment at 89.60 ft Time: 10:18:26 :Deflection is not decreasing
D 89.60 5 17770 30.55 27.11 30.82 30.39 29.74 28.46 24.34 19.56 85 86 10:18:27 CTR PCC Excel. None 331
C Comment at 89.60 ft Time: 10:18:35 :PANEL22 CENTER - LONGITUDINAL CRACK
D 95.78 2 6559 8.20 7.75 7.92 7.61 7.33 6.98 6.27 5.70 85 87 10:19:31 CTR PCC Excel. None 455
D 95.78 3 9726 12.29 11.62 11.92 11.52 11.03 10.48 9.48 8.53 85 87 10:19:37 CTR PCC Excel. None 450
D 95.78 4 12961 16.35 15.33 15.72 15.25 14.56 13.82 12.56 11.25 85 87 10:19:44 CTR PCC Excel. None 451
D 95.78 5 17845 22.30 20.77 21.32 20.63 19.73 18.69 16.99 15.18 85 87 10:19:53 CTR PCC Excel. None 455
C Comment at 95.78 ft Time: 10:20:02 :PANEL22 JOINT
CComment: Testing in this file was continued again on 7/19/2012 at 1:36:18 PM

Project: SW Logan, Ankeny

IKUAB FWD FILE : SWLOGAN STREET.fwd
HProject No. : TR640
HLocation : SW LOGAN STREET DR, ANKENY
HClient : IOWA DOT
HStart Station : SW LOGAN STREET
HDirection :
HEnd Station :
HWeather : SUNNY 90
HOperator : PV

IDate Created : 7/19/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0.00 ft
ITestpoint spacing: 0.00 ft

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
C Comment at 9.27 ft Time: 11:56:59 :START ZERO AT MANHOLE
D 9.27 2 6676 4.02 3.76 3.66 3.40 3.17 2.76 2.17 1.70 90 107 11:57:26 CTR PCC Excel. None 944
D 9.27 3 9904 6.09 5.72 5.60 5.22 4.82 4.14 3.32 2.56 90 107 11:57:31 CTR PCC Excel. None 924
D 9.27 4 13218 8.13 7.60 7.46 7.00 6.42 5.55 4.46 3.40 90 107 11:57:38 CTR PCC Excel. None 925
D 9.27 5 18168 11.22 10.40 10.27 9.57 8.83 7.63 6.12 4.65 90 107 11:57:48 CTR PCC Excel. None 921
C Comment at 9.27 ft Time: 11:57:57 :PANEL1 CENTER
D 14.42 2 6593 5.99 5.35 4.91 4.32 3.91 3.15 2.40 1.87 93 106 11:59:41 CTR PCC Excel. None 626
D 14.42 3 9818 9.08 8.05 7.46 6.67 5.92 4.76 3.62 2.76 93 106 11:59:47 CTR PCC Excel. None 615
D 14.42 4 13082 12.22 10.68 9.98 8.95 7.92 6.37 4.85 3.67 93 106 11:59:54 CTR PCC Excel. None 609
D 14.42 5 17983 16.89 14.66 13.71 12.17 10.83 8.66 6.58 4.93 93 106 12:00:04 CTR PCC Excel. None 605
C Comment at 20.60 ft Time: 12:01:23 :PANEL1 JOINT
D 20.60 2 6582 4.18 3.94 3.88 3.61 3.38 2.99 2.43 1.97 92 104 12:01:47 CTR PCC Excel. None 895
D 20.60 3 9808 6.30 5.94 5.88 5.55 5.12 4.49 3.65 2.95 92 104 12:01:53 CTR PCC Excel. None 885
D 20.60 4 13111 8.41 7.86 7.84 7.41 6.81 5.94 4.89 3.93 92 104 12:02:00 CTR PCC Excel. None 886
D 20.60 5 18149 11.61 10.75 10.76 10.09 9.33 8.11 6.63 5.31 92 104 12:02:10 CTR PCC Excel. None 889
C Comment at 20.60 ft Time: 12:02:29 :PANEL2 CENTER - DCP1
D 27.81 2 6569 6.37 6.18 5.17 4.58 4.09 3.27 2.50 1.96 92 104 12:03:38 CTR PCC Excel. None 586
D 27.81 3 9774 9.60 9.34 7.82 6.98 6.13 4.90 3.73 2.87 92 104 12:03:44 CTR PCC Excel. None 579
D 27.81 4 13046 12.92 12.50 10.50 9.40 8.22 6.56 5.01 3.85 92 104 12:03:51 CTR PCC Excel. None 574
D 27.81 5 17972 17.94 17.29 14.49 12.86 11.27 8.98 6.79 5.21 92 104 12:04:01 CTR PCC Excel. None 570
C Comment at 27.81 ft Time: 12:04:10 :PANEL2 JOINT
D 35.02 2 6593 4.09 3.73 3.89 3.68 3.44 2.97 2.37 1.87 94 102 12:05:06 CTR PCC Excel. None 916
D 35.02 3 9835 6.19 5.62 5.91 5.59 5.18 4.52 3.63 2.82 94 102 12:05:12 CTR PCC Excel. None 904
D 35.02 4 13155 8.28 7.45 7.87 7.47 6.92 6.02 4.84 3.75 94 102 12:05:19 CTR PCC Excel. None 903
D 35.02 5 18108 11.39 10.16 10.81 10.21 9.46 8.24 6.60 5.10 94 102 12:05:28 CTR PCC Excel. None 904
C Comment at 35.02 ft Time: 12:05:37 :PANEL3 CENTER
D 41.19 2 6619 4.68 4.63 3.91 3.47 3.17 2.60 2.07 1.65 93 97 12:07:06 CTR PCC Excel. None 804
D 41.19 3 9863 7.04 6.99 5.90 5.31 4.72 3.95 3.09 2.46 93 97 12:07:12 CTR PCC Excel. None 797
D 41.19 4 13183 9.38 9.30 7.83 7.07 6.29 5.22 4.13 3.27 93 97 12:07:19 CTR PCC Excel. None 799
D 41.19 5 18171 12.94 12.81 10.73 9.60 8.53 7.03 5.53 4.40 93 97 12:07:28 CTR PCC Excel. None 799
C Comment at 41.19 ft Time: 12:07:37 :PANEL3 JOINT
D 46.34 2 6605 4.56 4.25 4.21 3.90 3.62 3.11 2.42 1.84 94 98 12:08:30 CTR PCC Excel. None 824
D 46.34 3 9878 6.68 6.26 6.17 5.77 5.28 4.50 3.57 2.71 94 98 12:08:35 CTR PCC Excel. None 840
D 46.34 4 13172 8.74 8.11 8.07 7.57 6.89 5.84 4.62 3.55 94 98 12:08:42 CTR PCC Excel. None 857
D 46.34 5 18153 11.81 10.84 10.83 10.06 9.21 7.79 6.13 4.69 94 98 12:08:52 CTR PCC Excel. None 874
C Comment at 45.31 ft Time: 12:09:01 :PANEL4 CENTER
D 52.52 2 6605 5.85 5.53 4.72 4.15 3.71 2.96 2.26 1.79 96 103 12:09:59 CTR PCC Excel. None 642
D 52.52 3 9815 8.77 8.20 7.08 6.28 5.50 4.43 3.39 2.62 96 103 12:10:04 CTR PCC Excel. None 636

D 52.52 4 13081 11.67 10.84 9.42 8.38 7.32 5.85 4.50 3.47 96 103 12:10:11 CTR PCC Excel. None 637
D 52.52 5 18050 16.08 14.93 12.94 11.41 10.03 7.99 6.11 4.70 96 103 12:10:21 CTR PCC Excel. None 638
C Comment at 51.49 ft Time: 12:10:29 :PANEL4 JOINT
D 57.67 2 6602 4.20 3.78 3.87 3.57 3.31 2.83 2.22 1.74 95 94 12:11:15 CTR PCC Excel. None 893
D 57.67 3 9850 6.23 5.60 5.77 5.40 4.91 4.20 3.31 2.58 95 94 12:11:21 CTR PCC Excel. None 899
D 57.67 4 13158 8.25 7.35 7.60 7.14 6.49 5.53 4.39 3.42 95 94 12:11:28 CTR PCC Excel. None 907
D 57.67 5 18211 11.34 10.02 10.41 9.67 8.81 7.48 5.94 4.64 95 94 12:11:37 CTR PCC Excel. None 913
C Comment at 57.67 ft Time: 12:11:46 :PANEL5 CENTER - DCP2
D 65.91 2 6594 4.39 4.25 3.74 3.33 2.99 2.47 1.94 1.53 96 101 12:13:03 CTR PCC Excel. None 854
D 65.91 3 9827 6.66 6.48 5.68 5.11 4.52 3.70 2.93 2.29 96 101 12:13:08 CTR PCC Excel. None 839
D 65.91 4 13137 8.94 8.70 7.62 6.86 6.08 4.97 3.90 3.06 96 101 12:13:15 CTR PCC Excel. None 836
D 65.91 5 18074 12.55 12.19 10.61 9.48 8.39 6.84 5.33 4.18 96 101 12:13:24 CTR PCC Excel. None 819
C Comment at 65.91 ft Time: 12:13:33 :PANEL5 JOINT
D 72.09 2 6604 4.39 3.99 3.99 3.61 3.32 2.78 2.16 1.64 97 103 12:14:36 CTR PCC Excel. None 856
D 72.09 3 9812 6.59 6.03 6.01 5.61 5.02 4.20 3.25 2.46 97 103 12:14:42 CTR PCC Excel. None 846
D 72.09 4 13126 8.75 8.00 8.03 7.45 6.73 5.60 4.37 3.30 97 103 12:14:49 CTR PCC Excel. None 853
D 72.09 5 18180 12.09 10.95 11.07 10.20 9.24 7.69 5.98 4.51 97 103 12:14:58 CTR PCC Excel. None 855
C Comment at 72.09 ft Time: 12:15:07 :PANEL6 CENTER
D 79.30 2 6578 5.33 5.24 4.36 3.84 3.44 2.77 2.13 1.66 98 105 12:16:06 CTR PCC Excel. None 702
D 79.30 3 9806 8.19 7.96 6.71 5.96 5.22 4.22 3.23 2.48 98 105 12:16:11 CTR PCC Excel. None 680
D 79.30 4 13089 11.12 10.65 9.06 8.05 7.09 5.68 4.36 3.35 98 105 12:16:18 CTR PCC Excel. None 669
D 79.30 5 18041 15.56 14.76 12.61 11.14 9.81 7.83 5.98 4.59 98 105 12:16:27 CTR PCC Excel. None 659
C Comment at 79.30 ft Time: 12:16:36 :PANEL6 JOINT
D 85.48 2 6585 4.87 4.63 4.49 4.14 3.82 3.25 2.55 1.94 98 105 12:17:44 CTR PCC Excel. None 768
D 85.48 3 9812 7.37 7.01 6.82 6.37 5.85 4.93 3.90 2.95 98 105 12:17:49 CTR PCC Excel. None 757
D 85.48 4 13109 9.93 9.41 9.20 8.62 7.88 6.69 5.26 3.99 98 105 12:17:56 CTR PCC Excel. None 750
D 85.48 5 18109 13.78 12.96 12.72 11.86 10.88 9.26 7.26 5.51 98 105 12:18:05 CTR PCC Excel. None 747
C Comment at 84.45 ft Time: 12:18:14 :PANEL7 CENTER
D 87.54 2 6575 5.59 5.48 5.09 4.66 4.33 3.75 2.99 2.37 97 96 12:18:57 CTR PCC Excel. None 669
D 87.54 3 9783 8.46 8.29 7.70 7.16 6.58 5.66 4.51 3.52 97 96 12:19:03 CTR PCC Excel. None 658
D 87.54 4 13078 11.41 11.11 10.35 9.67 8.86 7.59 6.10 4.72 97 96 12:19:10 CTR PCC Excel. None 652
D 87.54 5 18002 15.77 15.27 14.23 13.19 12.14 10.45 8.39 6.52 97 96 12:19:19 CTR PCC Excel. None 649
C Comment at 87.54 ft Time: 12:19:28 :PANEL7 JOINT
D 93.72 2 6607 5.61 5.26 5.30 4.98 4.70 4.16 3.42 2.80 99 105 12:21:24 CTR PCC Excel. None 670
D 93.72 3 9803 8.49 8.00 8.06 7.63 7.12 6.34 5.24 4.23 99 105 12:21:30 CTR PCC Excel. None 657
D 93.72 4 13079 11.36 10.66 10.76 10.22 9.55 8.48 7.04 5.69 99 105 12:21:37 CTR PCC Excel. None 654
D 93.72 5 18058 15.58 14.55 14.73 13.96 13.03 11.60 9.66 7.83 99 105 12:21:46 CTR PCC Excel. None 659
C Comment at 92.69 ft Time: 12:21:59 :PANEL8 CENTER - DCP3
D 96.81 2 6602 6.08 5.67 5.44 5.00 4.69 4.11 3.37 2.75 99 104 12:22:47 CTR PCC Excel. None 618
D 96.81 3 9794 9.33 8.68 8.31 7.76 7.11 6.18 5.13 4.16 99 104 12:22:53 CTR PCC Excel. None 597
D 96.81 4 13072 12.59 11.66 11.17 10.45 9.56 8.34 6.91 5.62 99 104 12:23:00 CTR PCC Excel. None 590
D 96.81 5 18073 17.44 16.09 15.40 14.31 13.13 11.47 9.46 7.73 99 104 12:23:09 CTR PCC Excel. None 589
C Comment at 96.81 ft Time: 12:23:31 :PANEL8 JOINT
D 101.96 2 6630 4.91 4.55 4.56 4.22 3.92 3.42 2.79 2.31 99 105 12:24:37 CTR PCC Excel. None 767
D 101.96 3 9825 7.40 6.88 6.89 6.45 5.93 5.15 4.23 3.45 99 105 12:24:42 CTR PCC Excel. None 755
D 101.96 4 13144 9.86 9.17 9.24 8.70 7.96 6.96 5.70 4.64 99 105 12:24:49 CTR PCC Excel. None 758
D 101.96 5 18162 13.59 12.57 12.70 11.85 10.92 9.51 7.79 6.38 99 105 12:24:59 CTR PCC Excel. None 760
C Comment at 100.93 ft Time: 12:25:07 :PANEL9 CENTER
D 106.08 2 6597 5.56 5.42 4.92 4.52 4.14 3.55 2.84 2.26 100 105 12:25:50 CTR PCC Excel. None 675
D 106.08 3 9800 8.46 8.30 7.47 6.92 6.27 5.30 4.29 3.39 100 105 12:25:56 CTR PCC Excel. None 658
D 106.08 4 13097 11.39 11.17 10.06 9.31 8.45 7.18 5.80 4.55 100 105 12:26:03 CTR PCC Excel. None 654
D 106.08 5 18048 15.89 15.59 13.92 12.79 11.62 9.85 7.93 6.25 100 105 12:26:12 CTR PCC Excel. None 646
C Comment at 106.08 ft Time: 12:26:21 :PANEL9 JOINT
D 112.25 2 6616 5.43 4.97 5.14 4.79 4.45 3.76 2.97 2.32 99 106 12:28:18 CTR PCC Excel. None 693
D 112.25 3 9836 8.10 7.40 7.67 7.21 6.64 5.67 4.48 3.49 99 106 12:28:23 CTR PCC Excel. None 691
D 112.25 4 13132 10.78 9.76 10.16 9.59 8.79 7.53 5.99 4.65 99 106 12:28:30 CTR PCC Excel. None 693
D 112.25 5 18141 14.61 13.12 13.71 12.88 11.84 10.13 8.05 6.29 99 106 12:28:39 CTR PCC Excel. None 706
C Comment at 112.25 ft Time: 12:28:48 :PANEL10 CENTER
D 119.46 2 6590 5.03 5.00 4.22 3.83 3.38 2.76 2.13 1.70 99 107 12:30:08 CTR PCC Excel. None 745
D 119.46 3 9832 7.68 7.61 6.47 5.85 5.14 4.19 3.27 2.55 99 107 12:30:14 CTR PCC Excel. None 728
D 119.46 4 13103 10.36 10.25 8.72 7.86 6.91 5.67 4.41 3.44 99 107 12:30:21 CTR PCC Excel. None 719
D 119.46 5 18126 14.49 14.27 12.07 10.84 9.51 7.78 6.05 4.72 99 107 12:30:31 CTR PCC Excel. None 711
C Comment at 119.46 ft Time: 12:30:39 :PANEL10 JOINT
D 125.64 2 6579 5.31 4.96 5.17 4.95 4.73 4.28 3.48 2.81 100 108 12:31:32 CTR PCC Excel. None 705
D 125.64 3 9799 7.93 7.41 7.74 7.45 7.02 6.37 5.25 4.18 100 108 12:31:38 CTR PCC Excel. None 702
D 125.64 4 13070 10.61 9.80 10.30 9.94 9.31 8.44 7.03 5.58 100 108 12:31:45 CTR PCC Excel. None 700
D 125.64 5 18095 14.47 13.26 14.01 13.45 12.63 11.45 9.52 7.59 100 108 12:31:54 CTR PCC Excel. None 711
C Comment at 125.64 ft Time: 12:32:03 :PANEL11 CENTER - DCP4
D 132.85 2 6577 4.66 4.41 4.12 3.77 3.52 3.02 2.49 2.05 102 104 12:33:01 CTR PCC Excel. None 803
D 132.85 3 9820 7.22 6.82 6.35 5.88 5.35 4.59 3.78 3.12 102 104 12:33:07 CTR PCC Excel. None 773

D 132.85 4 13092 9.84 9.23 8.60 7.96 7.19 6.22 5.14 4.18 102 104 12:33:14 CTR PCC Excel. None 756
D 132.85 5 18168 13.84 12.94 11.97 10.98 9.94 8.55 7.02 5.74 102 104 12:33:23 CTR PCC Excel. None 747
C Comment at 132.85 ft Time: 12:33:32 :PANEL11 JOINT
D 140.06 2 6597 4.14 3.85 3.88 3.60 3.36 2.84 2.24 1.77 102 110 12:35:28 CTR PCC Excel. None 907
D 140.06 3 9840 6.25 5.81 5.83 5.47 5.02 4.29 3.37 2.64 102 110 12:35:34 CTR PCC Excel. None 895
D 140.06 4 13111 8.37 7.70 7.77 7.33 6.68 5.69 4.54 3.48 102 110 12:35:41 CTR PCC Excel. None 891
D 140.06 5 18172 11.53 10.52 10.69 9.98 9.13 7.81 6.20 4.79 102 110 12:35:50 CTR PCC Excel. None 896
C Comment at 140.06 ft Time: 12:35:59 :PANEL12 CENTER
D 146.24 2 6584 4.96 4.83 4.32 3.91 3.58 2.99 2.36 1.86 102 109 12:37:28 CTR PCC Excel. None 754
D 146.24 3 9793 7.72 7.46 6.64 6.08 5.46 4.55 3.58 2.80 102 109 12:37:33 CTR PCC Excel. None 721
D 146.24 4 13053 10.48 10.08 8.95 8.19 7.34 6.12 4.83 3.73 102 109 12:37:40 CTR PCC Excel. None 708
D 146.24 5 18126 14.66 14.03 12.43 11.34 10.13 8.45 6.65 5.16 102 109 12:37:50 CTR PCC Excel. None 703
C Comment at 146.24 ft Time: 12:37:58 :PANEL12 JOINT
D 153.45 2 6552 5.03 4.82 4.61 4.24 3.92 3.33 2.58 2.06 102 111 12:39:19 CTR PCC Excel. None 740
D 153.45 3 9798 7.63 7.24 6.97 6.53 5.96 5.06 3.99 3.10 102 111 12:39:24 CTR PCC Excel. None 731
D 153.45 4 13087 10.15 9.59 9.28 8.72 7.90 6.76 5.38 4.15 102 111 12:39:31 CTR PCC Excel. None 733
D 153.45 5 18117 13.88 12.99 12.71 11.87 10.81 9.19 7.34 5.66 102 111 12:39:41 CTR PCC Excel. None 742
C Comment at 153.45 ft Time: 12:39:49 :PANEL13 CENTER
D 159.63 2 6552 7.39 7.30 6.21 5.59 5.03 4.03 3.03 2.26 102 111 12:40:38 CTR PCC Excel. None 504
D 159.63 3 9775 11.02 10.92 9.23 8.33 7.39 5.92 4.44 3.27 102 111 12:40:44 CTR PCC Excel. None 504
D 159.63 4 13025 14.51 14.33 12.13 10.96 9.68 7.78 5.86 4.26 102 111 12:40:51 CTR PCC Excel. None 510
D 159.63 5 18051 19.76 19.37 16.41 14.78 13.08 10.42 7.85 5.70 102 111 12:41:01 CTR PCC Excel. None 520
C Comment at 159.63 ft Time: 12:41:09 :PANEL13 JOINT
D 165.81 2 6554 4.92 4.60 4.54 4.19 3.96 3.45 2.80 2.34 102 106 12:42:48 CTR PCC Excel. None 758
D 165.81 3 9778 7.51 6.97 6.90 6.46 5.96 5.19 4.30 3.53 102 106 12:42:54 CTR PCC Excel. None 741
D 165.81 4 13037 10.05 9.25 9.21 8.63 7.96 6.94 5.79 4.71 102 106 12:43:01 CTR PCC Excel. None 738
D 165.81 5 18043 13.77 12.60 12.64 11.79 10.85 9.49 7.89 6.45 102 106 12:43:10 CTR PCC Excel. None 745
C Comment at 165.81 ft Time: 12:43:19 :PANEL14 CENTER
D 173.02 2 6593 5.82 5.47 5.19 4.72 4.34 3.65 2.77 2.21 102 111 12:45:03 CTR PCC Excel. None 644
D 173.02 3 9803 8.86 8.36 7.86 7.26 6.58 5.47 4.27 3.30 102 111 12:45:09 CTR PCC Excel. None 629
D 173.02 4 13130 11.91 11.22 10.55 9.75 8.77 7.31 5.71 4.37 102 111 12:45:16 CTR PCC Excel. None 627
D 173.02 5 18120 16.39 15.42 14.45 13.24 11.92 9.89 7.75 5.93 102 111 12:45:25 CTR PCC Excel. None 629
C Comment at 173.02 ft Time: 12:45:34 :PANEL14 JOINT
D 179.20 2 6510 5.30 4.98 4.94 4.59 4.31 3.75 2.97 2.39 101 110 12:46:59 CTR PCC Excel. None 699
D 179.20 3 9803 8.03 7.52 7.49 7.01 6.55 5.64 4.54 3.62 101 110 12:47:05 CTR PCC Excel. None 694
D 179.20 4 13114 10.63 9.94 9.91 9.42 8.68 7.56 6.11 4.86 101 110 12:47:12 CTR PCC Excel. None 702
D 179.20 5 18087 14.38 13.44 13.42 12.68 11.74 10.22 8.28 6.59 101 110 12:47:21 CTR PCC Excel. None 715
C Comment at 179.20 ft Time: 12:47:30 :PANEL15 CENTER - DCP5
D 183.31 2 6563 5.05 4.68 4.67 4.34 4.14 3.64 2.89 2.36 101 111 12:48:35 CTR PCC Excel. None 739
D 183.31 3 9798 7.77 7.17 7.12 6.71 6.27 5.50 4.44 3.59 101 111 12:48:40 CTR PCC Excel. None 717
D 183.31 4 13109 10.39 9.58 9.53 9.01 8.38 7.32 5.97 4.74 101 111 12:48:47 CTR PCC Excel. None 718
D 183.31 5 18190 14.24 13.19 13.10 12.32 11.46 9.97 8.15 6.44 101 111 12:48:57 CTR PCC Excel. None 726
C Comment at 183.31 ft Time: 12:49:05 :PANEL15 JOINT
D 189.49 2 6589 4.47 4.24 4.03 3.62 3.41 2.89 2.29 1.85 101 112 12:50:05 CTR PCC Excel. None 839
D 189.49 3 9836 6.73 6.40 6.07 5.58 5.11 4.34 3.46 2.79 101 112 12:50:11 CTR PCC Excel. None 830
D 189.49 4 13145 8.96 8.50 8.08 7.51 6.84 5.79 4.66 3.70 101 112 12:50:18 CTR PCC Excel. None 834
D 189.49 5 18213 12.24 11.56 11.05 10.21 9.35 7.89 6.32 5.03 101 112 12:50:27 CTR PCC Excel. None 846
C Comment at 189.49 ft Time: 12:50:37 :PANEL16 CENTTER
D 192.58 2 6577 6.86 6.73 5.77 5.12 4.69 3.79 2.83 2.16 101 110 12:52:20 CTR PCC Excel. None 545
D 192.58 3 9803 10.46 10.19 8.72 7.86 7.09 5.70 4.30 3.26 101 110 12:52:26 CTR PCC Excel. None 533
D 192.58 4 13082 13.97 13.59 11.64 10.54 9.44 7.61 5.78 4.32 101 110 12:52:33 CTR PCC Excel. None 532
D 192.58 5 18061 19.05 18.56 15.91 14.34 12.84 10.36 7.86 5.85 101 110 12:52:42 CTR PCC Excel. None 539
C Comment at 191.55 ft Time: 12:52:51 :PANEL16 JOINT
D 196.70 2 6564 5.64 5.28 5.29 4.96 4.72 4.21 3.52 2.93 102 103 12:53:50 CTR PCC Excel. None 661
D 196.70 3 9807 8.53 7.94 7.98 7.58 7.14 6.34 5.38 4.46 102 103 12:53:56 CTR PCC Excel. None 654
D 196.70 4 13098 11.33 10.54 10.62 10.10 9.45 8.47 7.21 5.93 102 103 12:54:03 CTR PCC Excel. None 657
D 196.70 5 18108 15.29 14.25 14.39 13.65 12.78 11.43 9.83 8.09 102 103 12:54:12 CTR PCC Excel. None 673
C Comment at 196.70 ft Time: 12:54:42 :PANEL17 CENTER - CHP1
D 201.85 2 6571 5.48 5.15 5.08 4.65 4.43 3.91 3.16 2.63 102 110 12:55:33 CTR PCC Excel. None 682
D 201.85 3 9809 8.42 7.86 7.69 7.19 6.72 5.90 4.85 3.97 102 110 12:55:38 CTR PCC Excel. None 663
D 201.85 4 13112 11.27 10.54 10.30 9.67 8.98 7.87 6.54 5.30 102 110 12:55:45 CTR PCC Excel. None 662
D 201.85 5 18179 15.45 14.50 14.11 13.18 12.26 10.72 8.89 7.21 102 110 12:55:55 CTR PCC Excel. None 669
C Comment at 200.82 ft Time: 12:56:03 :PANEL17 JOINT
D 209.06 2 6548 5.12 4.86 4.81 4.40 4.18 3.65 2.91 2.35 102 106 12:56:47 CTR PCC Excel. None 728
D 209.06 3 9757 7.83 7.38 7.26 6.80 6.32 5.54 4.45 3.58 102 106 12:56:52 CTR PCC Excel. None 709
D 209.06 4 13046 10.46 9.83 9.70 9.17 8.48 7.40 6.02 4.74 102 106 12:56:59 CTR PCC Excel. None 709
D 209.06 5 18054 14.24 13.36 13.26 12.49 11.63 10.10 8.24 6.50 102 106 12:57:08 CTR PCC Excel. None 721
C Comment at 209.06 ft Time: 12:57:17 :PANEL18 CENTER
D 215.24 2 6548 6.25 5.96 5.49 4.97 4.68 3.93 3.13 2.52 102 112 12:58:02 CTR PCC Excel. None 595
D 215.24 3 9744 9.73 9.23 8.44 7.72 7.09 5.99 4.75 3.75 102 112 12:58:08 CTR PCC Excel. None 570

D 215.24 4 13018 13.21 12.54 11.41 10.48 9.53 8.02 6.41 5.03 102 112 12:58:15 CTR PCC Excel. None 560
D 215.24 5 18085 18.23 17.30 15.68 14.33 13.06 10.92 8.74 6.88 102 112 12:58:24 CTR PCC Excel. None 564
C Comment at 215.24 ft Time: 12:58:32 :PANEL18 JOINT
D 221.42 2 6584 4.33 3.99 4.16 3.85 3.65 3.28 2.67 2.24 103 112 12:59:28 CTR PCC Excel. None 865
D 221.42 3 9843 6.58 6.00 6.25 5.89 5.51 4.93 4.10 3.38 103 112 12:59:33 CTR PCC Excel. None 851
D 221.42 4 13129 8.75 7.95 8.27 7.89 7.33 6.57 5.50 4.45 103 112 12:59:40 CTR PCC Excel. None 853
D 221.42 5 18150 11.87 10.75 11.22 10.66 10.00 8.95 7.46 6.05 103 112 12:59:49 CTR PCC Excel. None 869
C Comment at 220.39 ft Time: 12:59:58 :PANEL19 CENTER - DCP6
D 225.54 2 6577 4.44 4.23 3.97 3.61 3.39 2.91 2.31 1.93 101 111 13:00:38 CTR PCC Excel. None 841
D 225.54 3 9807 6.88 6.49 6.04 5.62 5.13 4.38 3.54 2.87 101 111 13:00:44 CTR PCC Excel. None 810
D 225.54 4 13126 9.27 8.72 8.11 7.53 6.84 5.84 4.76 3.80 101 111 13:00:51 CTR PCC Excel. None 805
D 225.54 5 18221 12.84 12.06 11.17 10.25 9.33 7.96 6.46 5.13 101 111 13:01:00 CTR PCC Excel. None 807
C Comment at 225.54 ft Time: 13:01:09 :PANEL19 JOINT
D 232.75 2 6569 5.11 4.86 4.71 4.38 4.13 3.54 2.84 2.26 97 112 13:02:03 CTR PCC Excel. None 731
D 232.75 3 9783 7.69 7.35 7.12 6.68 6.26 5.38 4.32 3.40 97 112 13:02:08 CTR PCC Excel. None 724
D 232.75 4 13124 10.28 9.78 9.53 9.01 8.35 7.21 5.81 4.56 97 112 13:02:15 CTR PCC Excel. None 726
D 232.75 5 18191 14.08 13.37 13.07 12.26 11.39 9.87 7.97 6.26 97 112 13:02:24 CTR PCC Excel. None 735
C Comment at 232.75 ft Time: 13:02:33 :PANEL20 CENTER
D 239.96 2 6528 6.29 5.73 5.48 4.99 4.65 3.98 3.21 2.61 100 113 13:03:24 CTR PCC Excel. None 590
D 239.96 3 9722 9.75 8.72 8.41 7.74 7.12 6.08 4.90 3.91 100 113 13:03:30 CTR PCC Excel. None 567
D 239.96 4 13027 13.11 11.74 11.30 10.45 9.54 8.16 6.62 5.23 100 113 13:03:37 CTR PCC Excel. None 565
D 239.96 5 18068 18.10 16.18 15.60 14.37 13.10 11.22 9.06 7.19 100 113 13:03:46 CTR PCC Excel. None 568
C Comment at 238.93 ft Time: 13:03:55 :PANEL20 JOINT

Project: West Main, Knoxville

IKUAB FWD FILE : 701 W MAIN ST_KNOXVILLE.fwd
HProject No. : TR640
HLocation : W. MAIN ST
HClient : IOWA DOT
HStart Station : 0
HDirection : EB LANE - DRIVING W
HEnd Station :
HWeather : SUNNY 75
HOperator : PV

IDate Created : 7/12/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0 m
ITestpoint spacing: 0 m

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D 0 2 6587 5.65 5.22 5.30 4.99 4.84 4.44 3.82 3.22 78 87 09:19:51 CTR PCC Excel. None 663
D 0 3 9803 8.51 7.84 8.03 7.68 7.27 6.64 5.74 4.82 78 87 09:19:58 CTR PCC Excel. None 655
D 0 4 13100 11.18 10.29 10.57 10.09 9.50 8.68 7.48 6.23 78 87 09:20:06 CTR PCC Excel. None 666
D 0 5 17955 14.94 13.76 14.13 13.41 12.63 11.46 9.80 8.13 78 87 09:20:16 CTR PCC Excel. None 683
C Comment at 0 m Time: 09:21:01 :PANEL 1 CENTER - CHP1 - DCP1 - CORNER CRACK
D 1 2 6526 8.72 8.79 6.78 5.86 5.12 3.89 2.80 2.13 78 85 09:21:39 CTR PCC Excel. None 426
D 1 3 9712 12.82 12.85 10.00 8.72 7.52 5.73 4.17 3.12 78 85 09:21:46 CTR PCC Excel. None 431
D 1 4 12969 16.46 16.47 12.96 11.43 9.78 7.51 5.54 4.19 78 85 09:21:54 CTR PCC Excel. None 448
D 1 5 17829 21.48 21.34 17.00 14.96 12.85 9.91 7.37 5.61 78 85 09:22:05 CTR PCC Excel. None 472
C Comment at 1 m Time: 09:22:41 :PANEL 1 JOINT
D 3 2 6603 5.20 4.73 4.82 4.49 4.24 3.71 2.98 2.43 79 86 09:24:57 CTR PCC Excel. None 723
D 3 3 9764 7.92 7.20 7.33 6.92 6.43 5.54 4.49 3.61 79 86 09:25:03 CTR PCC Excel. None 701
D 3 4 13037 10.52 9.60 9.77 9.22 8.50 7.38 5.98 4.73 79 86 09:25:11 CTR PCC Excel. None 704
D 3 5 17874 14.28 13.00 13.32 12.45 11.55 9.99 8.05 6.34 79 86 09:25:22 CTR PCC Excel. None 712
C Comment at 3 m Time: 09:25:32 :PANEL2 CENTER
D 5 2 6533 7.98 8.19 6.29 5.44 4.85 3.77 2.82 2.22 79 86 09:26:36 CTR PCC Excel. None 466
D 5 3 9710 11.87 12.16 9.39 8.20 7.20 5.61 4.20 3.25 79 86 09:26:43 CTR PCC Excel. None 465
D 5 4 12926 15.43 15.74 12.29 10.78 9.44 7.40 5.57 4.29 79 86 09:26:51 CTR PCC Excel. None 476
D 5 5 17748 20.51 20.76 16.41 14.37 12.64 9.92 7.45 5.72 79 86 09:27:02 CTR PCC Excel. None 492
C Comment at 5 m Time: 09:27:12 :PANEL2 JOINT
D 7 2 6547 5.79 5.30 5.29 4.87 4.52 3.86 3.07 2.39 79 87 09:27:53 CTR PCC Excel. None 643
D 7 3 9763 8.74 7.99 8.02 7.44 6.85 5.83 4.60 3.54 79 87 09:28:00 CTR PCC Excel. None 635
D 7 4 13021 11.52 10.53 10.65 9.91 9.07 7.68 6.08 4.66 79 87 09:28:08 CTR PCC Excel. None 643
D 7 5 17979 15.58 14.24 14.45 13.37 12.27 10.35 8.15 6.24 79 87 09:28:19 CTR PCC Excel. None 656
C Comment at 7 m Time: 09:28:29 :PANEL3 CENTER - DCP2
D 8 2 6517 8.74 8.63 6.92 5.97 5.26 4.07 2.96 2.25 79 88 09:29:12 CTR PCC Excel. None 424
D 8 3 9708 12.72 12.53 10.10 8.82 7.68 5.95 4.36 3.28 79 88 09:29:18 CTR PCC Excel. None 434
D 8 4 12933 16.38 16.10 13.10 11.50 9.95 7.72 5.71 4.29 79 88 09:29:27 CTR PCC Excel. None 449
D 8 5 17782 21.46 21.07 17.29 15.11 13.13 10.19 7.53 5.63 79 88 09:29:37 CTR PCC Excel. None 471
C Comment at 8 m Time: 09:29:47 :PANEL3 JOINT
D 10 2 6572 5.25 4.88 4.77 4.38 4.08 3.49 2.75 2.18 80 89 09:30:52 CTR PCC Excel. None 712
D 10 3 9768 7.98 7.40 7.25 6.72 6.18 5.25 4.15 3.22 80 89 09:30:58 CTR PCC Excel. None 696
D 10 4 13051 10.55 9.75 9.62 8.96 8.16 6.95 5.49 4.27 80 89 09:31:06 CTR PCC Excel. None 703
D 10 5 18000 14.33 13.25 13.12 12.12 11.08 9.40 7.39 5.71 80 89 09:31:17 CTR PCC Excel. None 714
C Comment at 10 m Time: 09:31:27 :PANEL4 CENTER
D 12 2 6529 9.75 10.06 7.57 6.49 5.62 4.20 2.99 2.24 80 88 09:32:54 CTR PCC Excel. None 381
D 12 3 9720 13.99 14.35 10.91 9.38 8.14 6.10 4.40 3.22 80 88 09:33:01 CTR PCC Excel. None 395
D 12 4 12975 17.79 18.18 13.95 12.07 10.42 7.87 5.73 4.22 80 88 09:33:09 CTR PCC Excel. None 415

D 12 5 17775 23.08 23.42 18.23 15.77 13.60 10.34 7.53 5.61 80 88 09:33:20 CTR PCC Excel. None 438
C Comment at 12 m Time: 09:33:30 :PANEL4 JOINT
D 14 2 6582 5.72 5.22 5.25 4.85 4.53 3.92 3.06 2.44 80 89 09:34:27 CTR PCC Excel. None 655
D 14 3 9759 8.67 7.89 7.95 7.40 6.79 5.82 4.57 3.60 80 89 09:34:33 CTR PCC Excel. None 640
D 14 4 13011 11.45 10.42 10.54 9.82 9.01 7.65 6.06 4.73 80 89 09:34:41 CTR PCC Excel. None 646
D 14 5 17950 15.52 14.09 14.30 13.27 12.17 10.34 8.09 6.28 80 89 09:34:51 CTR PCC Excel. None 658
C Comment at 14 m Time: 09:35:01 :PANEL5 CENTER
C Comment at 15 m Time: 09:36:09 :Deflection is not decreasing
D 15 2 6546 8.97 9.78 7.05 6.08 5.33 4.11 2.99 2.29 79 88 09:36:16 CTR PCC Excel. None 415
C Comment at 15 m Time: 09:36:23 :Deflection is not decreasing
D 15 3 9694 13.01 14.08 10.30 9.01 7.81 6.03 4.41 3.31 79 88 09:36:31 CTR PCC Excel. None 424
C Comment at 15 m Time: 09:36:39 :Deflection is not decreasing
D 15 4 12877 16.67 17.94 13.32 11.77 10.15 7.89 5.84 4.41 79 88 09:36:40 CTR PCC Excel. None 439
C Comment at 15 m Time: 09:36:51 :Deflection is not decreasing
D 15 5 17698 21.79 23.27 17.59 15.50 13.45 10.53 7.79 5.88 79 88 09:36:53 CTR PCC Excel. None 462
C Comment at 15 m Time: 09:37:03 :PANEL5 JOINT
C Comment at 15 m Time: 09:37:34 :Deflection is not decreasing
D 15 2 6531 9.57 10.14 7.56 6.47 5.61 4.24 3.05 2.30 79 88 09:37:35 CTR PCC Excel. None 388
C Comment at 15 m Time: 09:37:41 :Deflection is not decreasing
D 15 3 9675 13.68 14.34 10.86 9.38 8.15 6.20 4.50 3.42 79 88 09:37:43 CTR PCC Excel. None 402
C Comment at 15 m Time: 09:37:52 :Deflection is not decreasing
D 15 4 12870 17.33 18.03 13.89 12.03 10.47 8.05 5.91 4.43 79 88 09:37:56 CTR PCC Excel. None 422
C Comment at 15 m Time: 09:38:06 :Deflection is not decreasing
D 15 5 17696 22.40 23.08 18.16 15.73 13.73 10.64 7.82 5.87 79 88 09:38:08 CTR PCC Excel. None 449
C Comment at 15 m Time: 09:38:18 :PANEL5 JOINT REPEAT D1> DO ON LAST TEST
D 18 2 6583 5.75 5.30 5.25 4.82 4.50 3.90 3.05 2.42 79 89 09:40:26 CTR PCC Excel. None 651
D 18 3 9731 8.68 7.98 7.94 7.38 6.83 5.83 4.60 3.57 79 89 09:40:33 CTR PCC Excel. None 638
C Comment at 18 m Time: 09:40:57 :PANEL6 CENTER - DCP3
D 18 2 6576 5.75 5.28 5.26 4.83 4.54 3.94 3.09 2.43 79 88 09:41:24 CTR PCC Excel. None 650
D 18 3 9764 8.64 7.93 7.90 7.35 6.79 5.85 4.62 3.57 79 88 09:41:30 CTR PCC Excel. None 642
D 18 4 13004 11.46 10.50 10.53 9.85 9.03 7.75 6.14 4.71 79 88 09:41:38 CTR PCC Excel. None 645
D 18 5 17845 15.49 14.20 14.32 13.33 12.25 10.50 8.27 6.29 79 88 09:41:49 CTR PCC Excel. None 655
C Comment at 18 m Time: 09:41:59 :PANEL6 CENTER - DCP3 REPEAT
C Comment at 19 m Time: 09:42:31 :Deflection is not decreasing
D 19 2 6516 10.04 10.48 7.91 6.76 5.91 4.51 3.26 2.40 79 88 09:42:35 CTR PCC Excel. None 369
C Comment at 19 m Time: 09:42:41 :Deflection is not decreasing
D 19 3 9637 14.52 15.06 11.49 9.95 8.62 6.56 4.81 3.51 79 88 09:43:12 CTR PCC Excel. None 378
C Comment at 19 m Time: 09:43:20 :Deflection is not decreasing
D 19 4 12866 18.50 19.13 14.77 12.89 11.13 8.54 6.30 4.62 79 88 09:43:21 CTR PCC Excel. None 395
C Comment at 19 m Time: 09:43:32 :Deflection is not decreasing
D 19 5 17704 24.15 24.83 19.52 16.97 14.72 11.38 8.42 6.20 79 88 09:43:33 CTR PCC Excel. None 417
C Comment at 19 m Time: 09:43:43 :PANEL6 JOINT
D 21 2 6554 5.74 5.23 5.25 4.81 4.48 3.85 3.02 2.37 79 88 09:44:36 CTR PCC Excel. None 649
D 21 3 9713 8.65 7.88 7.92 7.31 6.72 5.76 4.53 3.48 79 88 09:44:43 CTR PCC Excel. None 639
D 21 4 12957 11.36 10.35 10.44 9.69 8.88 7.57 5.98 4.57 79 88 09:44:51 CTR PCC Excel. None 649
D 21 5 17869 15.30 13.97 14.11 13.05 11.94 10.17 7.98 6.09 79 88 09:45:01 CTR PCC Excel. None 664
C Comment at 21 m Time: 09:45:11 :PANEL7 CENTER
C Comment at 23 m Time: 09:45:56 :Deflection is not decreasing
D 23 2 6491 9.04 9.44 7.09 6.18 5.42 4.06 2.96 2.17 79 88 09:46:02 CTR PCC Excel. None 408
C Comment at 23 m Time: 09:46:08 :Deflection is not decreasing
D 23 3 9623 13.09 13.61 10.34 9.13 7.92 5.99 4.37 3.24 79 88 09:46:17 CTR PCC Excel. None 418
C Comment at 23 m Time: 09:46:25 :Deflection is not decreasing
D 23 4 12863 16.83 17.41 13.41 11.93 10.29 7.83 5.77 4.30 79 88 09:46:45 CTR PCC Excel. None 435
C Comment at 23 m Time: 09:46:56 :Deflection is not decreasing
D 23 5 17645 22.05 22.75 17.73 15.70 13.61 10.43 7.67 5.74 79 88 09:47:00 CTR PCC Excel. None 455
C Comment at 23 m Time: 09:47:10 :PANEL7 JOINT
D 25 2 6549 5.40 4.90 4.98 4.55 4.31 3.72 2.97 2.33 81 90 09:49:04 CTR PCC Excel. None 690
D 25 3 9712 8.12 7.36 7.52 6.98 6.49 5.62 4.51 3.50 81 90 09:49:11 CTR PCC Excel. None 680
D 25 4 13003 10.71 9.70 9.96 9.30 8.56 7.45 5.98 4.62 81 90 09:49:19 CTR PCC Excel. None 691
D 25 5 17926 14.48 13.08 13.53 12.54 11.61 10.07 8.06 6.21 81 90 09:49:29 CTR PCC Excel. None 704
C Comment at 25 m Time: 09:49:39 :PANEL8 CENTER
C Comment at 26 m Time: 09:50:17 :Deflection is not decreasing
D 26 2 6525 8.52 9.11 6.68 5.77 5.05 3.83 2.78 2.11 82 90 09:50:21 CTR PCC Excel. None 436
C Comment at 26 m Time: 09:50:28 :Deflection is not decreasing
D 26 3 9684 12.28 13.07 9.67 8.44 7.29 5.58 4.08 3.07 82 90 09:50:28 CTR PCC Excel. None 449
C Comment at 26 m Time: 09:50:37 :Deflection is not decreasing
D 26 4 12954 15.66 16.60 12.47 10.95 9.45 7.29 5.37 4.05 82 90 09:50:41 CTR PCC Excel. None 470
C Comment at 26 m Time: 09:50:51 :Deflection is not decreasing
D 26 5 17796 20.39 21.40 16.35 14.38 12.45 9.66 7.11 5.38 82 90 09:51:05 CTR PCC Excel. None 496
C Comment at 26 m Time: 09:51:15 :PANEL8 JOINT

D 29 2 6584 4.95 4.50 4.52 4.11 3.85 3.32 2.64 2.14 82 90 09:51:51 CTR PCC Excel. None 757
D 29 3 9769 7.46 6.77 6.84 6.36 5.84 4.98 3.99 3.16 82 90 09:51:58 CTR PCC Excel. None 745
D 29 4 13017 9.86 8.96 9.08 8.44 7.76 6.63 5.32 4.15 82 90 09:52:06 CTR PCC Excel. None 751
D 29 5 18019 13.39 12.15 12.33 11.43 10.49 8.96 7.13 5.51 82 90 09:52:16 CTR PCC Excel. None 765
C Comment at 29 m Time: 09:52:39 :PANEL9 CENTER - DCP4
D 30 2 6515 8.22 8.29 6.50 5.58 4.91 3.79 2.77 2.07 83 89 09:53:15 CTR PCC Excel. None 451
D 30 3 9680 11.84 11.90 9.40 8.20 7.08 5.49 4.02 3.05 83 89 09:53:21 CTR PCC Excel. None 465
D 30 4 12917 15.11 15.14 12.07 10.58 9.13 7.11 5.25 3.96 83 89 09:53:30 CTR PCC Excel. None 486
D 30 5 17794 19.75 19.68 15.89 13.85 12.03 9.37 6.92 5.19 83 89 09:53:40 CTR PCC Excel. None 512
C Comment at 30 m Time: 09:53:59 :PANEL9 JOINT
D 32 2 6579 4.80 4.37 4.42 4.05 3.78 3.25 2.60 2.10 84 89 09:54:40 CTR PCC Excel. None 779
D 32 3 9779 7.28 6.62 6.69 6.26 5.71 4.92 3.90 3.12 84 89 09:54:47 CTR PCC Excel. None 764
D 32 4 12999 9.62 8.74 8.86 8.31 7.56 6.48 5.18 4.11 84 89 09:54:55 CTR PCC Excel. None 769
D 32 5 17988 13.07 11.88 12.10 11.24 10.25 8.79 6.96 5.51 84 89 09:55:05 CTR PCC Excel. None 783
C Comment at 32 m Time: 09:55:15 :PANEL10 CENTER
C Comment at 34 m Time: 09:55:58 :Deflection is not decreasing
D 34 2 6504 8.49 8.93 6.60 5.61 4.89 3.69 2.64 1.98 84 89 09:56:03 CTR PCC Excel. None 436
C Comment at 34 m Time: 09:56:10 :Deflection is not decreasing
D 34 3 9667 12.14 12.73 9.50 8.24 7.06 5.38 3.89 2.90 84 89 09:56:11 CTR PCC Excel. None 453
C Comment at 34 m Time: 09:56:19 :Deflection is not decreasing
D 34 4 12878 15.55 16.21 12.26 10.71 9.18 7.02 5.14 3.84 84 89 09:56:21 CTR PCC Excel. None 471
C Comment at 34 m Time: 09:56:31 :Deflection is not decreasing
D 34 5 17738 20.23 21.01 16.09 14.02 12.07 9.29 6.79 5.09 84 89 09:56:32 CTR PCC Excel. None 499
C Comment at 34 m Time: 09:56:42 :PANEL10 JOINT
D 36 2 6513 4.88 4.49 4.41 4.11 3.80 3.29 2.61 2.05 84 89 09:57:21 CTR PCC Excel. None 759
D 36 3 9710 7.33 6.74 6.66 6.20 5.71 4.87 3.90 3.00 84 89 09:57:27 CTR PCC Excel. None 753
D 36 4 12999 9.67 8.89 8.83 8.26 7.55 6.46 5.15 3.96 84 89 09:57:35 CTR PCC Excel. None 765
D 36 5 17992 13.07 12.02 11.99 11.13 10.19 8.74 6.91 5.31 84 89 09:57:45 CTR PCC Excel. None 783
C Comment at 36 m Time: 09:57:55 :PANEL11 CENTER
C Comment at 37 m Time: 09:59:09 :Deflection is not decreasing
D 37 2 6520 7.50 7.85 6.04 5.35 4.73 3.76 2.78 2.13 83 88 09:59:13 CTR PCC Excel. None 494
C Comment at 37 m Time: 09:59:19 :Deflection is not decreasing
D 37 3 9708 10.96 11.44 8.88 7.95 6.93 5.53 4.11 3.13 83 88 09:59:20 CTR PCC Excel. None 503
C Comment at 37 m Time: 09:59:28 :Deflection is not decreasing
D 37 4 12973 14.19 14.76 11.61 10.41 9.04 7.22 5.44 4.11 83 88 09:59:33 CTR PCC Excel. None 520
C Comment at 37 m Time: 09:59:43 :Deflection is not decreasing
D 37 5 17843 18.67 19.37 15.42 13.75 12.01 9.60 7.18 5.45 83 88 09:59:45 CTR PCC Excel. None 544
C Comment at 37 m Time: 09:59:55 :PANEL11 JOINT
D 39 2 6537 4.68 4.24 4.36 4.05 3.78 3.35 2.75 2.29 84 89 10:01:01 CTR PCC Excel. None 794
D 39 3 9743 7.07 6.38 6.58 6.19 5.69 4.99 4.13 3.38 84 89 10:01:08 CTR PCC Excel. None 784
D 39 4 13052 9.35 8.42 8.75 8.21 7.53 6.61 5.49 4.49 84 89 10:01:16 CTR PCC Excel. None 793
D 39 5 18013 12.66 11.39 11.86 11.05 10.17 8.89 7.34 5.99 84 89 10:01:26 CTR PCC Excel. None 809
C Comment at 40 m Time: 10:03:42 :PANEL12 CENTER
D 40 2 6528 6.06 6.12 4.93 4.32 3.84 3.10 2.37 1.88 82 86 10:04:16 CTR PCC Excel. None 612
D 40 3 9720 9.03 9.11 7.35 6.52 5.72 4.55 3.53 2.79 82 86 10:04:22 CTR PCC Excel. None 612
D 40 4 13015 11.80 11.93 9.69 8.61 7.57 6.05 4.67 3.69 82 86 10:04:31 CTR PCC Excel. None 627
D 40 5 17870 15.76 15.90 13.04 11.52 10.15 8.09 6.23 4.92 82 86 10:04:41 CTR PCC Excel. None 645
C Comment at 40 m Time: 10:04:51 :PANEL12 JOINT
D 43 2 6534 4.53 4.11 4.14 3.81 3.59 3.09 2.44 1.96 80 87 10:08:00 CTR PCC Excel. None 820
D 43 3 9781 6.84 6.24 6.28 5.84 5.42 4.62 3.70 2.92 80 87 10:08:06 CTR PCC Excel. None 813
D 43 4 13058 9.07 8.27 8.36 7.81 7.17 6.14 4.91 3.85 80 87 10:08:14 CTR PCC Excel. None 819
C Comment at 43 m Time: 10:08:41 :PANEL 13CENTER - DCP6 - CHP2
D 44 2 6529 6.19 6.22 5.06 4.49 4.03 3.26 2.49 2.02 81 86 10:09:24 CTR PCC Excel. None 600
D 44 3 9731 9.22 9.26 7.57 6.82 6.05 4.85 3.76 2.98 81 86 10:09:31 CTR PCC Excel. None 600
D 44 4 13000 12.06 12.11 9.98 9.01 7.98 6.45 5.01 3.94 81 86 10:09:39 CTR PCC Excel. None 613
D 44 5 17958 16.13 16.11 13.40 11.99 10.65 8.65 6.67 5.24 81 86 10:09:49 CTR PCC Excel. None 633
C Comment at 44 m Time: 10:09:59 :PANEL13 JOINT
D 46 2 6548 4.66 4.25 4.34 4.06 3.85 3.40 2.76 2.24 81 87 10:11:16 CTR PCC Excel. None 799
D 46 3 9738 7.03 6.43 6.57 6.19 5.79 5.06 4.15 3.37 81 87 10:11:22 CTR PCC Excel. None 787
D 46 4 13046 9.31 8.54 8.73 8.28 7.68 6.78 5.54 4.45 81 87 10:11:30 CTR PCC Excel. None 797
D 46 5 17976 12.59 11.51 11.85 11.16 10.40 9.17 7.45 6.00 81 87 10:11:41 CTR PCC Excel. None 812
C Comment at 46 m Time: 10:11:50 :PANEL14 CENTER
D 48 2 6552 6.44 6.46 5.27 4.66 4.25 3.51 2.71 2.18 80 88 10:12:31 CTR PCC Excel. None 579
D 48 3 9732 9.46 9.45 7.77 6.95 6.23 5.15 4.02 3.22 80 88 10:12:38 CTR PCC Excel. None 585
D 48 4 13011 12.30 12.30 10.16 9.17 8.17 6.77 5.34 4.24 80 88 10:12:46 CTR PCC Excel. None 601
D 48 5 17935 16.39 16.24 13.62 12.21 10.93 9.04 7.11 5.66 80 88 10:12:57 CTR PCC Excel. None 622
C Comment at 48 m Time: 10:13:06 :PANEL14 JOINT
D 50 2 6561 4.95 4.54 4.58 4.27 4.08 3.64 2.95 2.39 80 88 10:13:49 CTR PCC Excel. None 754
D 50 3 9733 7.51 6.88 6.98 6.58 6.18 5.48 4.46 3.60 80 88 10:13:56 CTR PCC Excel. None 737
D 50 4 13006 9.96 9.13 9.33 8.82 8.23 7.28 5.98 4.76 80 88 10:14:04 CTR PCC Excel. None 743

D 50 5 17981 13.51 12.38 12.69 11.94 11.18 9.89 8.11 6.45 80 88 10:14:15 CTR PCC Excel. None 757
C Comment at 50 m Time: 10:14:24 :PANEL15 CENTER - DCP7
D 51 2 6506 7.40 7.66 5.91 5.22 4.68 3.79 2.87 2.28 80 87 10:15:07 CTR PCC Excel. None 500
D 51 3 9658 11.05 11.43 8.90 7.92 7.02 5.66 4.35 3.40 80 87 10:15:14 CTR PCC Excel. None 497
C Comment at 51 m Time: 10:15:22 :Deflection is not decreasing
D 51 4 12934 14.39 14.85 11.71 10.44 9.21 7.45 5.75 4.49 80 87 10:15:33 CTR PCC Excel. None 511
D 51 5 17770 19.11 19.64 15.68 13.94 12.31 10.00 7.73 6.01 80 87 10:15:44 CTR PCC Excel. None 529
C Comment at 51 m Time: 10:15:53 :PANEL 15 JOINT
D 53 2 6580 5.46 4.99 5.04 4.71 4.49 3.94 3.24 2.68 79 87 10:19:24 CTR PCC Excel. None 685
D 53 3 9724 8.32 7.61 7.70 7.29 6.83 5.99 4.95 4.03 79 87 10:19:30 CTR PCC Excel. None 665
D 53 4 12979 11.01 10.07 10.26 9.71 9.09 7.99 6.56 5.34 79 87 10:19:39 CTR PCC Excel. None 670
D 53 5 17884 14.88 13.60 13.92 13.14 12.27 10.75 8.84 7.16 79 87 10:19:49 CTR PCC Excel. None 683
C Comment at 53 m Time: 10:19:59 :PANEL16 CENTER
D 55 2 6538 7.63 7.51 6.09 5.38 4.85 3.90 2.98 2.29 80 88 10:20:39 CTR PCC Excel. None 487
D 55 3 9736 11.34 11.17 9.12 8.10 7.20 5.80 4.47 3.43 80 88 10:20:46 CTR PCC Excel. None 488
D 55 4 12999 14.71 14.47 11.97 10.68 9.50 7.64 5.93 4.56 80 88 10:20:54 CTR PCC Excel. None 502
D 55 5 17863 19.47 19.03 15.99 14.22 12.68 10.25 7.98 6.12 80 88 10:21:04 CTR PCC Excel. None 522
C Comment at 55 m Time: 10:21:14 :PANEL16 JOINT
D 57 2 6572 5.55 5.15 5.08 4.71 4.45 3.88 3.11 2.52 79 89 10:21:58 CTR PCC Excel. None 673
D 57 3 9745 8.50 7.89 7.81 7.30 6.82 5.92 4.75 3.83 79 89 10:22:05 CTR PCC Excel. None 652
D 57 4 13019 11.30 10.50 10.45 9.78 9.10 7.87 6.39 5.09 79 89 10:22:12 CTR PCC Excel. None 655
D 57 5 17964 15.29 14.17 14.16 13.25 12.37 10.65 8.66 6.88 79 89 10:22:23 CTR PCC Excel. None 668
C Comment at 57 m Time: 10:22:33 :PANEL17 CENTER - DCP8
D 59 2 6531 8.57 8.69 6.93 6.06 5.48 4.36 3.26 2.51 80 90 10:23:36 CTR PCC Excel. None 434
D 59 3 9726 12.62 12.71 10.24 9.09 8.13 6.50 4.90 3.76 80 90 10:23:43 CTR PCC Excel. None 438
D 59 4 12983 16.33 16.43 13.35 11.93 10.64 8.50 6.53 5.01 80 90 10:23:51 CTR PCC Excel. None 452
D 59 5 17857 21.55 21.50 17.66 15.80 14.11 11.40 8.73 6.71 80 90 10:24:01 CTR PCC Excel. None 471
C Comment at 59 m Time: 10:24:11 :PANEL17 JOINT
D 61 2 6519 5.74 5.39 5.28 4.85 4.54 4.04 3.20 2.63 80 91 10:25:08 CTR PCC Excel. None 646
D 61 3 9742 8.71 8.15 8.01 7.47 6.97 6.10 4.94 3.98 80 91 10:25:14 CTR PCC Excel. None 636
D 61 4 12993 11.44 10.69 10.58 9.94 9.27 8.06 6.62 5.33 80 91 10:25:23 CTR PCC Excel. None 646
D 61 5 17969 15.44 14.40 14.32 13.44 12.58 10.93 8.95 7.21 80 91 10:25:33 CTR PCC Excel. None 662
C Comment at 61 m Time: 10:25:43 :PANEL18 CENTER
C Comment at 63 m Time: 10:26:46 :Deflection is not decreasing
D 63 2 6528 11.18 12.31 9.00 7.84 7.07 5.48 3.96 2.97 79 91 10:26:54 CTR PCC Excel. None 332
C Comment at 63 m Time: 10:27:00 :Deflection is not decreasing
D 63 3 9663 15.36 16.67 12.44 10.99 9.89 7.73 5.70 4.31 79 91 10:27:01 CTR PCC Excel. None 358
C Comment at 63 m Time: 10:27:09 :Deflection is not decreasing
D 63 4 12901 19.27 20.71 15.79 14.08 12.62 9.94 7.48 5.65 79 91 10:27:11 CTR PCC Excel. None 381
C Comment at 63 m Time: 10:27:21 :Deflection is not decreasing
D 63 5 17887 24.72 26.25 20.49 18.34 16.48 13.02 9.93 7.55 79 91 10:27:27 CTR PCC Excel. None 411
C Comment at 63 m Time: 10:27:36 :PANEL18 JOINT
C Comment at 63 m Time: 10:28:08 :Deflection is not decreasing
D 63 2 6483 12.43 12.87 10.06 8.67 7.79 5.95 4.24 3.11 79 91 10:28:11 CTR PCC Excel. None 297
D 63 3 9621 16.71 17.07 13.57 11.87 10.59 8.25 5.98 4.46 79 91 10:28:18 CTR PCC Excel. None 327
D 63 4 12881 20.52 20.83 16.86 14.86 13.28 10.42 7.74 5.80 79 91 10:28:27 CTR PCC Excel. None 357
D 63 5 17860 25.94 26.03 21.50 19.05 17.03 13.42 10.15 7.63 79 91 10:28:37 CTR PCC Excel. None 391
C Comment at 63 m Time: 10:28:47 :PANEL18 JOINT REPEAT
C Comment at 65 m Time: 10:29:32 :Deflection is not decreasing
D 65 2 6493 9.44 8.40 9.19 8.75 8.53 7.87 6.75 5.66 79 90 10:29:34 CTR PCC Excel. None 391
D 65 3 9684 13.60 12.17 13.09 12.54 12.06 11.04 9.36 7.81 79 90 10:29:41 CTR PCC Excel. None 405
D 65 4 12941 17.60 15.79 16.94 16.19 15.45 14.06 11.90 9.90 79 90 10:29:49 CTR PCC Excel. None 418
D 65 5 17770 23.10 20.77 22.17 21.08 20.02 18.03 15.21 12.56 79 90 10:29:59 CTR PCC Excel. None 437
C Comment at 64 m Time: 10:30:09 :PANEL19 CENTER (UTILITIES ACROSS PANEL)
D 66 2 6476 11.46 10.24 8.99 7.81 6.91 5.47 4.02 3.08 79 91 10:31:18 CTR PCC Excel. None 321
D 66 3 9614 17.14 14.92 13.47 11.70 10.35 8.13 6.02 4.56 79 91 10:31:25 CTR PCC Excel. None 319
D 66 4 12859 22.32 19.38 17.62 15.39 13.60 10.65 8.01 6.02 79 91 10:31:33 CTR PCC Excel. None 328
D 66 5 17605 29.28 25.44 23.21 20.24 17.81 13.99 10.62 8.00 79 91 10:31:43 CTR PCC Excel. None 342
C Comment at 66 m Time: 10:31:53 :PANEL19 JOINT

Project: South 5th, Knoxville

IKUAB FWD FILE : 909 S 5TH ST- KNOXVILLE_1.fwd
HProject No. : TR640
HLocation : S 5TH ST
HClient : IOWA DOT
HStart Station : 0
HDirection : NB LANE
HEnd Station :
HWeather : SUNNY 90
HOperator : PV

IDate Created : 7/12/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0 m
ITestpoint spacing: 0 m

J	Dist. m	Imp Num	Load lbf	D0 mils	D1 mils	D2 mils	D3 mils	D4 mils	D5 mils	D6 mils	D7 mils	Air °F	Pave °F	Time	Location	Pavement Type	Pavement Condition	Pavement Distress	Pavement Surface Modulus
D	0	2	6559	3.37	2.96	3.05	2.77	2.53	2.11	1.63	1.23	101	115	13:55:09	CTR	PCC	Excel.	None	1106
D	0	3	9810	5.06	4.44	4.60	4.28	3.87	3.19	2.48	1.86	101	115	13:55:15	CTR	PCC	Excel.	None	1102
D	0	4	13122	6.66	5.84	6.06	5.66	5.10	4.22	3.28	2.45	101	115	13:55:23	CTR	PCC	Excel.	None	1120
D	0	5	18206	9.00	7.91	8.21	7.58	6.88	5.67	4.40	3.27	101	115	13:55:33	CTR	PCC	Excel.	None	1151
C	Comment at 2 m Time: 13:56:25 :PANEL1 CENTER																		
D	2	2	6560	2.86	2.58	2.51	2.23	2.04	1.65	1.33	1.07	100	112	13:56:57	CTR	PCC	Excel.	None	1306
D	2	3	9805	4.43	4.03	3.90	3.54	3.19	2.59	2.05	1.62	100	112	13:57:03	CTR	PCC	Excel.	None	1257
D	2	4	13073	5.92	5.38	5.21	4.72	4.26	3.49	2.75	2.16	100	112	13:57:11	CTR	PCC	Excel.	None	1255
D	2	5	18165	8.20	7.47	7.20	6.50	5.83	4.77	3.74	2.93	100	112	13:57:21	CTR	PCC	Excel.	None	1259
C	Comment at 2 m Time: 13:57:31 :PANEL1 JOINT																		
D	5	2	6535	3.20	2.82	2.89	2.63	2.43	1.95	1.53	1.19	102	110	13:58:18	CTR	PCC	Excel.	None	1162
D	5	3	9782	4.85	4.28	4.37	4.07	3.65	3.03	2.33	1.74	102	110	13:58:25	CTR	PCC	Excel.	None	1146
D	5	4	13100	6.42	5.67	5.81	5.37	4.84	4.02	3.14	2.31	102	110	13:58:32	CTR	PCC	Excel.	None	1160
D	5	5	18182	8.71	7.70	7.91	7.27	6.60	5.49	4.22	3.17	102	110	13:58:42	CTR	PCC	Excel.	None	1187
C	Comment at 4 m Time: 13:58:52 :PANEL2 CENTER - DCP1																		
D	7	2	6528	3.30	3.11	2.86	2.54	2.31	1.81	1.43	1.10	98	109	13:59:50	CTR	PCC	Excel.	None	1125
D	7	3	9783	5.02	4.71	4.37	3.92	3.51	2.86	2.20	1.66	98	109	13:59:56	CTR	PCC	Excel.	None	1108
D	7	4	13086	6.62	6.20	5.77	5.21	4.65	3.77	2.93	2.23	98	109	14:00:04	CTR	PCC	Excel.	None	1125
D	7	5	18169	8.96	8.39	7.86	7.07	6.33	5.11	3.97	3.06	98	109	14:00:14	CTR	PCC	Excel.	None	1153
C	Comment at 6 m Time: 14:00:23 :PANEL2 JOINT																		
D	9	2	6533	2.67	2.39	2.35	2.14	1.96	1.59	1.27	0.99	97	108	14:01:05	CTR	PCC	Excel.	None	1390
D	9	3	9782	4.07	3.69	3.59	3.32	2.99	2.44	1.94	1.49	97	108	14:01:11	CTR	PCC	Excel.	None	1365
D	9	4	13092	5.41	4.91	4.77	4.40	3.96	3.29	2.60	1.98	97	108	14:01:18	CTR	PCC	Excel.	None	1375
D	9	5	18202	7.44	6.80	6.58	6.03	5.44	4.52	3.55	2.71	97	108	14:01:28	CTR	PCC	Excel.	None	1391
C	Comment at 9 m Time: 14:01:55 :PANEL3 CENTER																		
D	11	2	6510	3.08	2.84	2.75	2.47	2.31	1.88	1.52	1.19	97	108	14:03:02	CTR	PCC	Excel.	None	1201
D	11	3	9773	4.78	4.39	4.26	3.94	3.53	2.98	2.35	1.82	97	108	14:03:08	CTR	PCC	Excel.	None	1162
D	11	4	13090	6.39	5.92	5.72	5.26	4.74	4.04	3.18	2.47	97	108	14:03:16	CTR	PCC	Excel.	None	1164
D	11	5	18212	8.84	8.20	7.92	7.22	6.57	5.53	4.38	3.40	97	108	14:03:26	CTR	PCC	Excel.	None	1172
C	Comment at 11 m Time: 14:03:36 :PANEL3 JOINT																		
D	14	2	6532	3.39	3.03	3.06	2.81	2.61	2.18	1.75	1.40	97	106	14:05:47	CTR	PCC	Excel.	None	1095
D	14	3	9793	5.22	4.67	4.72	4.39	4.00	3.45	2.74	2.17	97	106	14:05:53	CTR	PCC	Excel.	None	1066
D	14	4	13115	6.96	6.21	6.30	5.87	5.37	4.57	3.67	2.88	97	106	14:06:00	CTR	PCC	Excel.	None	1072
D	14	5	18173	9.57	8.57	8.69	8.06	7.38	6.29	5.06	3.98	97	106	14:06:10	CTR	PCC	Excel.	None	1079
C	Comment at 14 m Time: 14:06:20 :PANEL4 CENTER																		
D	16	2	6531	3.32	3.06	2.92	2.64	2.45	2.02	1.59	1.28	98	100	14:07:45	CTR	PCC	Excel.	None	1117
D	16	3	9804	5.15	4.74	4.54	4.18	3.78	3.15	2.49	1.95	98	100	14:07:51	CTR	PCC	Excel.	None	1083
D	16	4	13110	6.88	6.34	6.08	5.62	5.06	4.29	3.38	2.64	98	100	14:07:59	CTR	PCC	Excel.	None	1084

D 16 5 18167 9.48 8.81 8.44 7.74 7.02 5.93 4.67 3.66 98 100 14:08:08 CTR PCC Excel. None 1090
C Comment at 16 m Time: 14:08:18 :PANEL4 JOINT
D 18 2 6550 3.22 2.90 2.85 2.60 2.41 1.98 1.56 1.22 97 106 14:09:03 CTR PCC Excel. None 1158
D 18 3 9784 4.96 4.49 4.42 4.07 3.69 3.08 2.41 1.86 97 106 14:09:10 CTR PCC Excel. None 1121
D 18 4 13106 6.65 6.02 5.95 5.50 4.97 4.17 3.27 2.53 97 106 14:09:17 CTR PCC Excel. None 1120
D 18 5 18234 9.20 8.34 8.25 7.58 6.89 5.76 4.52 3.49 97 106 14:09:27 CTR PCC Excel. None 1126
C Comment at 18 m Time: 14:10:22 :PANEL5 CENTER - DCP2 - CHP1
D 20 2 6560 3.29 2.95 2.89 2.59 2.36 1.93 1.49 1.16 100 106 14:11:36 CTR PCC Excel. None 1133
D 20 3 9817 5.08 4.58 4.48 4.08 3.65 3.03 2.34 1.79 100 106 14:11:42 CTR PCC Excel. None 1098
D 20 4 13145 6.81 6.14 5.97 5.47 4.93 4.05 3.17 2.43 100 106 14:11:50 CTR PCC Excel. None 1098
D 20 5 18208 9.40 8.57 8.28 7.54 6.82 5.63 4.37 3.35 100 106 14:12:00 CTR PCC Excel. None 1101
C Comment at 20 m Time: 14:12:10 :PANEL5 JOINT
D 23 2 6564 3.62 3.21 3.23 2.90 2.66 2.20 1.66 1.26 97 105 14:13:00 CTR PCC Excel. None 1032
D 23 3 9766 5.58 4.95 4.96 4.57 4.13 3.37 2.61 1.95 97 105 14:13:06 CTR PCC Excel. None 995
D 23 4 13039 7.43 6.63 6.64 6.13 5.53 4.55 3.54 2.64 97 105 14:13:14 CTR PCC Excel. None 998
D 23 5 18100 10.16 9.12 9.18 8.41 7.65 6.35 4.91 3.66 97 105 14:13:24 CTR PCC Excel. None 1013
C Comment at 23 m Time: 14:13:51 :PANEL6 CENTER - CRACK ON NE PORTION OF SLAB
D 25 2 6553 3.81 3.55 3.26 2.89 2.58 2.10 1.63 1.28 98 104 14:14:33 CTR PCC Excel. None 979
D 25 3 9749 5.87 5.50 5.04 4.56 4.05 3.34 2.57 1.98 98 104 14:14:39 CTR PCC Excel. None 945
D 25 4 13066 7.88 7.40 6.78 6.16 5.46 4.49 3.49 2.68 98 104 14:14:47 CTR PCC Excel. None 943
D 25 5 18090 10.82 10.19 9.36 8.43 7.57 6.19 4.81 3.73 98 104 14:14:57 CTR PCC Excel. None 951
C Comment at 25 m Time: 14:15:06 :PANEL6 JOINT
D 26 2 6541 5.03 4.64 4.35 3.90 3.56 2.84 2.12 1.56 100 97 14:16:14 CTR PCC Excel. None 739
D 26 3 9786 7.45 6.92 6.47 5.91 5.29 4.30 3.20 2.35 100 97 14:16:20 CTR PCC Excel. None 746
D 26 4 13123 9.76 9.07 8.51 7.74 6.96 5.68 4.26 3.12 100 97 14:16:27 CTR PCC Excel. None 765
D 26 5 18130 13.17 12.26 11.55 10.49 9.47 7.72 5.84 4.31 100 97 14:16:37 CTR PCC Excel. None 782
C Comment at 26 m Time: 14:16:57 :PANEL7 - DCP3 - CHP2 - LONGITUDINAL CRACK
D 29 2 6489 5.34 4.89 4.68 4.20 3.75 3.00 2.29 1.76 97 107 14:17:42 CTR PCC Excel. None 691
D 29 3 9712 8.40 7.74 7.41 6.74 5.97 4.79 3.70 2.79 97 107 14:17:48 CTR PCC Excel. None 657
D 29 4 13024 11.28 10.43 9.98 9.09 8.01 6.52 5.00 3.79 97 107 14:17:56 CTR PCC Excel. None 657
D 29 5 17999 15.68 14.52 13.91 12.65 11.21 9.04 6.98 5.31 97 107 14:18:05 CTR PCC Excel. None 653
C Comment at 29 m Time: 14:18:15 :PANEL7 - JOINT
D 32 2 6564 3.89 3.46 3.52 3.24 2.96 2.51 1.97 1.59 98 107 14:23:12 CTR PCC Excel. None 960
D 32 3 9804 6.08 5.43 5.52 5.13 4.64 3.98 3.17 2.51 98 107 14:23:18 CTR PCC Excel. None 917
D 32 4 13090 8.16 7.29 7.43 6.92 6.29 5.37 4.30 3.39 98 107 14:23:25 CTR PCC Excel. None 912
D 32 5 18119 11.24 10.11 10.31 9.57 8.72 7.47 5.99 4.73 98 107 14:23:35 CTR PCC Excel. None 917
C Comment at 32 m Time: 14:23:45 :PANEL8 CENTER - DCP4 - LONGITUDINAL CRACK
D 34 2 6532 3.80 3.44 3.39 3.10 2.81 2.35 1.86 1.48 94 106 14:25:01 CTR PCC Excel. None 977
D 34 3 9753 5.91 5.40 5.29 4.85 4.39 3.70 2.92 2.31 94 106 14:25:07 CTR PCC Excel. None 938
D 34 4 13063 7.97 7.28 7.15 6.59 5.94 5.00 3.98 3.09 94 106 14:25:14 CTR PCC Excel. None 932
D 34 5 18141 11.10 10.17 9.99 9.13 8.30 6.96 5.52 4.33 94 106 14:25:24 CTR PCC Excel. None 929
C Comment at 34 m Time: 14:25:34 :PANEL8 JOINT
D 36 2 6512 3.79 3.37 3.46 3.13 2.91 2.45 1.93 1.50 95 109 14:26:46 CTR PCC Excel. None 976
D 36 3 9754 5.78 5.12 5.24 4.85 4.45 3.75 2.97 2.30 95 109 14:26:52 CTR PCC Excel. None 960
D 36 4 13072 7.67 6.78 6.96 6.49 5.91 5.01 3.96 3.06 95 109 14:27:00 CTR PCC Excel. None 969
D 36 5 18195 10.43 9.30 9.54 8.85 8.10 6.83 5.41 4.17 95 109 14:27:09 CTR PCC Excel. None 992
C Comment at 36 m Time: 14:27:40 :PANEL9 CENTER - LONGITUDINAL CRACK
D 37 2 6513 3.53 3.22 3.14 2.85 2.63 2.22 1.74 1.42 96 110 14:28:31 CTR PCC Excel. None 1050
D 37 3 9765 5.41 4.97 4.83 4.45 4.07 3.42 2.74 2.15 96 110 14:28:37 CTR PCC Excel. None 1026
D 37 4 13080 7.27 6.69 6.47 5.96 5.43 4.60 3.68 2.87 96 110 14:28:44 CTR PCC Excel. None 1023
D 37 5 18137 10.00 9.25 8.93 8.19 7.48 6.32 5.02 3.94 96 110 14:28:54 CTR PCC Excel. None 1031
C Comment at 37 m Time: 14:29:04 :PANEL9 JOINT
D 39 2 6525 3.89 3.57 3.48 3.12 2.84 2.32 1.76 1.35 101 111 14:32:20 CTR PCC Excel. None 954
D 39 3 9775 5.93 5.42 5.30 4.83 4.33 3.57 2.73 2.06 101 111 14:32:26 CTR PCC Excel. None 937
D 39 4 13067 7.83 7.16 7.03 6.42 5.77 4.77 3.66 2.74 101 111 14:32:34 CTR PCC Excel. None 949
D 39 5 18171 10.64 9.72 9.63 8.73 7.91 6.49 4.99 3.79 101 111 14:32:43 CTR PCC Excel. None 971
C Comment at 39 m Time: 14:32:53 :PANEL10 CENTER - AT INTERSECTION
D 41 2 6509 4.34 4.02 3.89 3.54 3.25 2.67 2.08 1.58 98 111 14:33:36 CTR PCC Excel. None 853
D 41 3 9723 6.55 6.07 5.85 5.38 4.87 4.06 3.17 2.38 98 111 14:33:43 CTR PCC Excel. None 844
D 41 4 13032 8.65 8.02 7.73 7.15 6.46 5.38 4.20 3.14 98 111 14:33:51 CTR PCC Excel. None 856
D 41 5 18109 11.78 10.94 10.53 9.65 8.76 7.23 5.64 4.22 98 111 14:34:02 CTR PCC Excel. None 874
C Comment at 42 m Time: 14:36:21 :PANEL10 JOINT
D 42 2 6558 4.69 4.32 4.18 3.86 3.49 2.91 2.27 1.78 97 111 14:36:51 CTR PCC Excel. None 796
D 42 3 9782 7.03 6.49 6.29 5.82 5.24 4.43 3.47 2.68 97 111 14:36:58 CTR PCC Excel. None 791
D 42 4 13088 9.28 8.57 8.33 7.75 6.99 5.85 4.64 3.57 97 111 14:37:06 CTR PCC Excel. None 802
D 42 5 18106 12.57 11.58 11.28 10.44 9.43 7.89 6.26 4.84 97 111 14:37:16 CTR PCC Excel. None 819
C Comment at 42 m Time: 14:37:26 :PANEL11 CENTER - SHORT PANEL
D 43 2 6533 4.67 4.21 4.27 3.92 3.64 3.07 2.40 1.85 97 111 14:38:14 CTR PCC Excel. None 796
D 43 3 9757 6.99 6.31 6.42 6.00 5.47 4.66 3.66 2.78 97 111 14:38:20 CTR PCC Excel. None 793
D 43 4 13093 9.25 8.34 8.53 7.98 7.30 6.16 4.90 3.66 97 111 14:38:29 CTR PCC Excel. None 805

D 43 5 18149 12.53 11.28 11.58 10.75 9.85 8.31 6.57 4.93 97 111 14:38:39 CTR PCC Excel. None 823
C Comment at 43 m Time: 14:38:49 :PANEL11 JOINT
D 44 2 6553 3.24 2.78 3.10 2.94 2.78 2.49 2.08 1.68 99 111 14:39:29 CTR PCC Excel. None 1149
C Comment at 44 m Time: 14:39:35 :Deflection is not decreasing
D 44 3 9803 4.92 4.19 4.71 4.48 4.19 3.79 3.14 2.52 99 111 14:39:40 CTR PCC Excel. None 1133
C Comment at 44 m Time: 14:39:47 :Deflection is not decreasing
D 44 4 13098 6.51 5.55 6.29 5.98 5.57 5.03 4.20 3.34 99 111 14:39:49 CTR PCC Excel. None 1144
C Comment at 44 m Time: 14:39:58 :Deflection is not decreasing
D 44 5 18275 8.96 7.64 8.61 8.17 7.66 6.89 5.72 4.57 99 111 14:40:01 CTR PCC Excel. None 1160
C Comment at 44 m Time: 14:40:35 :PANEL 12 CENTER - DCP5 - SHORT PANEL
D 44 2 6582 2.84 2.56 2.49 2.26 2.07 1.77 1.40 1.15 98 112 14:41:42 CTR PCC Excel. None 1316
D 44 3 9817 4.34 3.94 3.82 3.52 3.19 2.71 2.18 1.73 98 112 14:41:48 CTR PCC Excel. None 1285
D 44 4 13132 5.79 5.26 5.12 4.68 4.26 3.61 2.91 2.29 98 112 14:41:56 CTR PCC Excel. None 1290
D 44 5 18270 7.99 7.29 7.06 6.44 5.85 4.96 3.96 3.13 98 112 14:42:05 CTR PCC Excel. None 1301
C Comment at 44 m Time: 14:42:15 :PANEL12 JOINT
D 46 2 6533 3.66 3.39 3.24 2.90 2.61 2.17 1.62 1.24 99 111 14:43:13 CTR PCC Excel. None 1015
D 46 3 9743 5.56 5.14 4.92 4.50 4.01 3.31 2.55 1.89 99 111 14:43:19 CTR PCC Excel. None 996
D 46 4 13081 7.42 6.86 6.60 6.06 5.44 4.44 3.45 2.56 99 111 14:43:26 CTR PCC Excel. None 1002
D 46 5 18190 10.11 9.40 9.05 8.25 7.45 6.15 4.74 3.54 99 111 14:43:36 CTR PCC Excel. None 1023
C Comment at 46 m Time: 14:43:46 :PANEL13 CENTER - SHORT PANEL
D 46 2 6529 3.99 3.72 3.50 3.21 2.90 2.39 1.85 1.40 99 111 14:44:19 CTR PCC Excel. None 930
D 46 3 9747 5.98 5.59 5.28 4.90 4.38 3.60 2.83 2.11 99 111 14:44:26 CTR PCC Excel. None 927
D 46 4 13081 7.99 7.46 7.07 6.55 5.88 4.86 3.80 2.85 99 111 14:44:33 CTR PCC Excel. None 931
D 46 5 18148 10.89 10.19 9.67 8.88 7.97 6.64 5.18 3.90 99 111 14:44:43 CTR PCC Excel. None 947
C Comment at 46 m Time: 14:44:53 :PANEL13 JOINT
D 48 2 6554 4.00 3.59 3.66 3.37 3.12 2.62 2.07 1.63 98 110 14:45:29 CTR PCC Excel. None 931
D 48 3 9779 6.00 5.39 5.51 5.17 4.70 3.96 3.15 2.43 98 110 14:45:35 CTR PCC Excel. None 926
D 48 4 13095 7.94 7.11 7.31 6.86 6.24 5.31 4.20 3.23 98 110 14:45:43 CTR PCC Excel. None 937
D 48 5 18213 10.77 9.59 9.93 9.21 8.47 7.19 5.72 4.43 98 110 14:45:53 CTR PCC Excel. None 961
C Comment at 48 m Time: 14:46:03 :PANEL14 CENTER - SHORT PANEL
D 49 2 6546 3.58 3.22 3.25 3.02 2.82 2.46 1.94 1.53 97 111 14:46:36 CTR PCC Excel. None 1040
D 49 3 9778 5.43 4.89 4.95 4.65 4.29 3.69 2.99 2.36 97 111 14:46:42 CTR PCC Excel. None 1024
D 49 4 13081 7.22 6.53 6.62 6.24 5.71 4.93 4.00 3.09 97 111 14:46:50 CTR PCC Excel. None 1030
D 49 5 18204 9.89 8.96 9.06 8.47 7.78 6.76 5.43 4.21 97 111 14:47:00 CTR PCC Excel. None 1047
C Comment at 49 m Time: 14:47:09 :PANEL14 JOINT
D 51 2 6562 3.19 2.87 2.87 2.63 2.45 2.08 1.64 1.32 101 112 14:47:46 CTR PCC Excel. None 1171
D 51 3 9767 4.87 4.39 4.40 4.10 3.74 3.18 2.57 2.03 101 112 14:47:52 CTR PCC Excel. None 1141
D 51 4 13108 6.51 5.88 5.88 5.49 5.01 4.28 3.46 2.72 101 112 14:47:59 CTR PCC Excel. None 1145
D 51 5 18247 8.96 8.10 8.13 7.54 6.91 5.92 4.76 3.78 101 112 14:48:09 CTR PCC Excel. None 1158
C Comment at 51 m Time: 14:48:19 :PANEL15 CENTER - DCP6 - SHORT PANEL
D 51 2 6526 3.33 3.08 2.92 2.68 2.46 2.06 1.62 1.27 103 112 14:49:30 CTR PCC Excel. None 1116
D 51 3 9758 5.09 4.71 4.50 4.12 3.72 3.17 2.48 1.95 103 112 14:49:36 CTR PCC Excel. None 1090
D 51 4 13080 6.82 6.31 6.04 5.55 5.01 4.23 3.35 2.60 103 112 14:49:43 CTR PCC Excel. None 1091
D 51 5 18219 9.40 8.77 8.35 7.62 6.95 5.85 4.61 3.56 103 112 14:49:53 CTR PCC Excel. None 1102
C Comment at 51 m Time: 14:50:03 :PANEL15 JOINT
D 53 2 6553 3.73 3.31 3.35 3.08 2.82 2.29 1.69 1.33 103 111 14:50:49 CTR PCC Excel. None 1000
D 53 3 9785 5.64 5.01 5.09 4.73 4.23 3.48 2.63 2.01 103 111 14:50:55 CTR PCC Excel. None 987
D 53 4 13081 7.48 6.67 6.78 6.31 5.65 4.64 3.54 2.67 103 111 14:51:02 CTR PCC Excel. None 994
D 53 5 18214 10.24 9.10 9.33 8.61 7.74 6.37 4.83 3.67 103 111 14:51:12 CTR PCC Excel. None 1012
C Comment at 53 m Time: 14:51:22 :PANEL16 CENTER - SHORT PANEL - END OF INTERSECTION PANEL
D 53 2 6528 3.51 3.14 3.21 2.98 2.77 2.35 1.80 1.39 103 111 14:52:00 CTR PCC Excel. None 1058
D 53 3 9781 5.32 4.78 4.88 4.55 4.19 3.55 2.78 2.10 103 111 14:52:06 CTR PCC Excel. None 1046
D 53 4 13093 7.07 6.37 6.52 6.09 5.60 4.73 3.73 2.80 103 111 14:52:13 CTR PCC Excel. None 1053
D 53 5 18236 9.68 8.74 8.94 8.32 7.65 6.51 5.04 3.79 103 111 14:52:23 CTR PCC Excel. None 1071
C Comment at 53 m Time: 14:52:33 :PANEL16 JOINT
D 55 2 6536 3.35 3.04 3.01 2.78 2.51 2.14 1.69 1.38 97 110 14:53:11 CTR PCC Excel. None 1109
D 55 3 9767 5.10 4.61 4.58 4.24 3.83 3.26 2.60 2.09 97 110 14:53:17 CTR PCC Excel. None 1090
D 55 4 13080 6.80 6.13 6.11 5.68 5.13 4.36 3.48 2.78 97 110 14:53:25 CTR PCC Excel. None 1094
D 55 5 18285 9.34 8.42 8.41 7.79 7.07 6.02 4.81 3.82 97 110 14:53:35 CTR PCC Excel. None 1114
C Comment at 55 m Time: 14:53:44 :PANEL17 CENTER - SHORT PANEL
D 56 2 6539 3.54 3.29 3.14 2.86 2.62 2.21 1.69 1.33 100 109 14:54:35 CTR PCC Excel. None 1050
D 56 3 9781 5.37 4.99 4.74 4.36 3.94 3.34 2.61 2.03 100 109 14:54:41 CTR PCC Excel. None 1036
D 56 4 13112 7.15 6.64 6.33 5.84 5.30 4.41 3.52 2.70 100 109 14:54:48 CTR PCC Excel. None 1043
D 56 5 18236 9.84 9.16 8.73 8.00 7.24 6.08 4.81 3.70 100 109 14:54:58 CTR PCC Excel. None 1054
C Comment at 56 m Time: 14:55:08 :PANEL17 JOINT
D 57 2 6556 3.67 3.33 3.32 3.02 2.81 2.35 1.80 1.43 102 110 14:55:50 CTR PCC Excel. None 1015
D 57 3 9808 5.52 4.99 4.99 4.63 4.22 3.52 2.78 2.17 102 110 14:55:56 CTR PCC Excel. None 1010
D 57 4 13151 7.28 6.57 6.62 6.15 5.59 4.70 3.72 2.89 102 110 14:56:03 CTR PCC Excel. None 1027
D 57 5 18250 9.85 8.91 9.01 8.31 7.60 6.40 5.07 3.94 102 110 14:56:13 CTR PCC Excel. None 1053
C Comment at 56 m Time: 14:56:23 :PANEL18 CENTER - DCP7

D 58 2 6581 3.53 3.22 3.17 2.93 2.71 2.34 1.82 1.43 102 109 14:57:02 CTR PCC Excel. None 1061
D 58 3 9828 5.33 4.88 4.79 4.49 4.07 3.48 2.78 2.15 102 109 14:57:08 CTR PCC Excel. None 1048
D 58 4 13146 7.09 6.49 6.39 5.98 5.45 4.63 3.72 2.85 102 109 14:57:16 CTR PCC Excel. None 1054
D 58 5 18270 9.72 8.93 8.79 8.13 7.42 6.34 5.03 3.86 102 109 14:57:26 CTR PCC Excel. None 1069
C Comment at 58 m Time: 14:57:35 :PANEL18 JOINT
D 59 2 6584 3.07 2.75 2.80 2.60 2.45 2.15 1.70 1.37 100 109 14:58:14 CTR PCC Excel. None 1218
D 59 3 9833 4.68 4.20 4.28 4.01 3.69 3.25 2.60 2.07 100 109 14:58:20 CTR PCC Excel. None 1193
D 59 4 13153 6.24 5.61 5.72 5.37 4.94 4.34 3.51 2.77 100 109 14:58:28 CTR PCC Excel. None 1199
D 59 5 18293 8.55 7.70 7.85 7.36 6.77 5.93 4.79 3.78 100 109 14:58:37 CTR PCC Excel. None 1217
C Comment at 58 m Time: 14:58:47 :PANEL19 CENTER - SHORT PANEL
D 59 2 6576 3.09 2.81 2.76 2.53 2.32 2.03 1.60 1.31 101 109 15:00:03 CTR PCC Excel. None 1210
D 59 3 9821 4.73 4.31 4.23 3.93 3.56 3.08 2.47 1.96 101 109 15:00:09 CTR PCC Excel. None 1180
D 59 4 13157 6.33 5.77 5.68 5.29 4.80 4.11 3.33 2.61 101 109 15:00:16 CTR PCC Excel. None 1182
D 59 5 18296 8.68 7.94 7.81 7.20 6.58 5.64 4.53 3.59 101 109 15:00:26 CTR PCC Excel. None 1198
C Comment at 59 m Time: 15:00:36 :PANEL19 JOINT
D 60 2 6563 3.15 2.87 2.81 2.53 2.34 1.98 1.54 1.25 98 108 15:01:16 CTR PCC Excel. None 1184
D 60 3 9824 4.81 4.39 4.31 3.99 3.58 3.03 2.39 1.91 98 108 15:01:22 CTR PCC Excel. None 1161
D 60 4 13147 6.43 5.87 5.78 5.35 4.81 4.03 3.25 2.55 98 108 15:01:29 CTR PCC Excel. None 1162
D 60 5 18296 8.86 8.08 8.00 7.33 6.65 5.59 4.46 3.50 98 108 15:01:39 CTR PCC Excel. None 1175
C Comment at 60 m Time: 15:01:49 :PANEL20 CENTER - SHORT PANEL
D 61 2 6567 3.38 3.16 2.99 2.74 2.48 2.09 1.59 1.22 100 108 15:02:24 CTR PCC Excel. None 1105
D 61 3 9827 5.17 4.86 4.56 4.18 3.78 3.12 2.42 1.85 100 108 15:02:30 CTR PCC Excel. None 1080
D 61 4 13169 6.93 6.51 6.12 5.67 5.06 4.22 3.27 2.48 100 108 15:02:38 CTR PCC Excel. None 1080
D 61 5 18296 9.61 9.03 8.49 7.81 6.99 5.83 4.50 3.41 100 108 15:02:47 CTR PCC Excel. None 1082
C Comment at 61 m Time: 15:02:57 :PANEL20 JOINT
D 63 2 6579 3.81 3.64 3.37 3.03 2.79 2.34 1.78 1.35 98 110 15:04:49 CTR PCC Excel. None 983
D 63 3 9800 5.78 5.50 5.11 4.70 4.22 3.55 2.73 2.06 98 110 15:04:55 CTR PCC Excel. None 964
D 63 4 13145 7.70 7.32 6.86 6.34 5.71 4.78 3.72 2.77 98 110 15:05:02 CTR PCC Excel. None 971
D 63 5 18260 10.47 9.91 9.39 8.63 7.81 6.55 5.09 3.84 98 110 15:05:12 CTR PCC Excel. None 992
C Comment at 63 m Time: 15:05:22 :PANEL21 CENTER - DCP8
D 64 2 6563 4.82 4.49 4.44 4.09 3.78 3.23 2.50 1.89 102 112 15:05:58 CTR PCC Excel. None 774
D 64 3 9769 7.13 6.65 6.53 6.05 5.53 4.77 3.71 2.79 102 112 15:06:05 CTR PCC Excel. None 779
D 64 4 13108 9.40 8.74 8.63 8.05 7.31 6.24 4.93 3.70 102 112 15:06:13 CTR PCC Excel. None 793
D 64 5 18184 12.74 11.84 11.75 10.89 9.95 8.49 6.66 5.01 102 112 15:06:23 CTR PCC Excel. None 812
C Comment at 64 m Time: 15:06:33 :PANEL21 JOINT
D 67 2 6544 3.46 3.14 3.23 3.02 2.86 2.57 2.10 1.77 103 112 15:07:15 CTR PCC Excel. None 1077
D 67 3 9775 5.27 4.81 4.94 4.68 4.37 3.92 3.27 2.74 103 112 15:07:21 CTR PCC Excel. None 1055
D 67 4 13079 7.03 6.39 6.59 6.30 5.82 5.20 4.39 3.64 103 112 15:07:28 CTR PCC Excel. None 1058
D 67 5 18202 9.66 8.77 9.11 8.64 8.02 7.19 6.07 5.03 103 112 15:07:38 CTR PCC Excel. None 1072
C Comment at 66 m Time: 15:07:48 :PANEL 22 CENTER

Project: Valley View Dr, Council Bluffs

```
IKUAB FWD FILE    : VALLEY VIEW DRIVE_7JULY12.fwd
HProject No.      : TR640
HLocation         : COUNCIL BLUFFS VALLEY VIEW DRIVE
HClient           : IOWA DOT
HStart Station    : NEAR 15345 VALLEY VIEW DRIVE
HDirection        : SB
HEnd Station      :
HWeather          : SUNNY 90
HOperator         : PV

IDate Created     : 7/26/2012
IVersion          : 2.3.11
ILoad Mode        : 1      (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91     (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00 (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset :   0.00 ft
ITestpoint spacing:   0.00 ft

J Dist. Imp Load  D0    D1    D2    D3    D4    D5    D6    D7   Air Pave     Time             Pavement Pavement Pavement  Pavement Surface
J   m Num  lbf  mils  mils  mils  mils  mils  mils  mils  mils  °F  °F             Location    Type     Condition Distress    Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
C  Comment at 0.00 ft  Time: 10:50:10 :ALL TESTS ON SOUTH BOUND LANE ALONG CENTER - TESTS START JUST SOUTH OF 15345 VALLEY
VIEW DRIVE ENTRY DRIVE(FAWN PARK DRIVE)
D   0.00  2  6697  2.64  2.48  2.44  2.27  2.19  1.97  1.62  1.36  91  102 10:50:36 CTR    PCC    Excel.   None    1442
D   0.00  3  9923  4.00  3.77  3.75  3.55  3.31  2.98  2.51  2.08  91  102 10:50:43 CTR    PCC    Excel.   None    1411
D   0.00  4 13210  5.25  4.93  4.92  4.66  4.36  3.91  3.32  2.71  91  102 10:50:51 CTR    PCC    Excel.   None    1431
D   0.00  5 18131  7.12  6.64  6.67  6.29  5.89  5.26  4.43  3.65  91  102 10:51:01 CTR    PCC    Excel.   None    1448
C  Comment at 0.00 ft  Time: 10:51:11 :PANEL1 CENTER
D   6.18  2  6652  2.81  2.65  2.55  2.35  2.26  2.04  1.70  1.40  89  105 10:51:55 CTR    PCC    Excel.   None    1347
D   6.18  3  9887  4.24  4.00  3.87  3.71  3.40  3.07  2.55  2.11  89  105 10:52:02 CTR    PCC    Excel.   None    1325
D   6.18  4 13156  5.54  5.20  5.06  4.77  4.43  3.93  3.29  2.69  89  105 10:52:10 CTR    PCC    Excel.   None    1349
D   6.18  5 18107  7.63  7.08  6.96  6.53  6.10  5.40  4.52  3.70  89  105 10:52:20 CTR    PCC    Excel.   None    1350
C  Comment at 6.18 ft  Time: 10:52:30 :PANEL1 JOINT
D  18.54  2  6649  2.70  2.58  2.52  2.33  2.23  1.98  1.64  1.37  91  102 10:53:39 CTR    PCC    Excel.   None    1399
D  18.54  3  9882  4.06  3.85  3.78  3.62  3.31  2.96  2.45  2.03  91  102 10:53:46 CTR    PCC    Excel.   None    1383
D  18.54  4 13119  5.41  5.04  5.00  4.71  4.37  3.88  3.24  2.69  91  102 10:53:54 CTR    PCC    Excel.   None    1378
D  18.54  5 18141  7.39  6.82  6.82  6.38  5.95  5.26  4.39  3.60  91  102 10:54:04 CTR    PCC    Excel.   None    1396
C  Comment at 18.54 ft  Time: 10:54:14 :PANEL2 CENTER -  CHP1 (DCP PERFORMED AFTER CHP)
D  26.78  2  6638  3.05  2.85  2.77  2.54  2.39  2.10  1.73  1.44  91  101 10:54:58 CTR    PCC    Excel.   None    1239
D  26.78  3  9845  4.61  4.28  4.17  3.93  3.61  3.17  2.61  2.12  91  101 10:55:05 CTR    PCC    Excel.   None    1215
D  26.78  4 13126  6.09  5.60  5.52  5.17  4.77  4.16  3.42  2.76  91  101 10:55:13 CTR    PCC    Excel.   None    1226
D  26.78  5 17978  8.32  7.62  7.54  7.02  6.48  5.64  4.64  3.72  91  101 10:55:23 CTR    PCC    Excel.   None    1229
C  Comment at 26.78 ft  Time: 10:55:33 :PANEL2 JOINT
D  39.13  2  6651  2.81  2.63  2.59  2.41  2.28  2.02  1.66  1.39  90  100 10:56:24 CTR    PCC    Excel.   None    1347
D  39.13  3  9879  4.19  3.94  3.89  3.74  3.44  3.03  2.53  2.09  90  100 10:56:31 CTR    PCC    Excel.   None    1339
D  39.13  4 13174  5.54  5.15  5.14  4.86  4.51  3.98  3.31  2.71  90  100 10:56:39 CTR    PCC    Excel.   None    1352
D  39.13  5 18063  7.60  7.04  7.06  6.63  6.18  5.45  4.52  3.71  90  100 10:56:49 CTR    PCC    Excel.   None    1352
C  Comment at 38.10 ft  Time: 10:56:59 :PANEL3 CENTER - DCP1
D  47.37  2  6654  3.06  2.94  2.85  2.60  2.49  2.20  1.80  1.48  90  102 10:58:41 CTR    PCC    Excel.   None    1236
D  47.37  3  9876  4.63  4.37  4.27  4.08  3.72  3.31  2.73  2.20  90  102 10:58:47 CTR    PCC    Excel.   None    1212
D  47.37  4 13172  6.17  5.75  5.65  5.29  4.91  4.33  3.59  2.88  90  102 10:58:56 CTR    PCC    Excel.   None    1213
D  47.37  5 18027  8.42  7.82  7.72  7.21  6.71  5.90  4.86  3.93  90  102 10:59:06 CTR    PCC    Excel.   None    1217
C  Comment at 47.37 ft  Time: 10:59:16 :PANEL3 JOINT
D  58.70  2  6640  2.63  2.45  2.45  2.24  2.21  1.99  1.69  1.44  91  102 11:00:12 CTR    PCC    Excel.   None    1436
D  58.70  3  9878  3.97  3.67  3.69  3.54  3.31  3.01  2.56  2.17  91  102 11:00:19 CTR    PCC    Excel.   None    1414
D  58.70  4 13176  5.24  4.86  4.89  4.65  4.39  3.98  3.41  2.84  91  102 11:00:26 CTR    PCC    Excel.   None    1429
D  58.70  5 18078  7.23  6.64  6.73  6.39  6.03  5.48  4.66  3.88  91  102 11:00:36 CTR    PCC    Excel.   None    1423
C  Comment at 58.70 ft  Time: 11:00:46 :PANEL4 CENTER
D  66.94  2  6658  3.01  2.79  2.70  2.47  2.33  2.06  1.66  1.35  92  102 11:02:42 CTR    PCC    Excel.   None    1257
```

D 66.94 3 9891 4.48 4.14 4.06 3.81 3.55 3.11 2.61 2.15 92 102 11:02:49 CTR PCC Excel. None 1255
D 66.94 4 13123 5.86 5.43 5.33 5.01 4.62 4.11 3.40 2.77 92 102 11:02:57 CTR PCC Excel. None 1274
D 66.94 5 18058 8.05 7.42 7.32 6.83 6.34 5.61 4.65 3.81 92 102 11:03:07 CTR PCC Excel. None 1275
C Comment at 66.94 ft Time: 11:03:17 :PANEL 4 JOINT
D 78.27 2 6647 3.25 3.04 3.02 2.80 2.69 2.41 2.04 1.72 92 101 11:05:01 CTR PCC Excel. None 1164
D 78.27 3 9859 4.87 4.57 4.56 4.33 4.06 3.64 3.09 2.60 92 101 11:05:07 CTR PCC Excel. None 1151
D 78.27 4 13126 6.28 5.91 5.91 5.62 5.30 4.75 4.05 3.38 92 101 11:05:15 CTR PCC Excel. None 1189
D 78.27 5 18059 8.47 7.96 8.02 7.60 7.15 6.46 5.49 4.61 92 101 11:05:26 CTR PCC Excel. None 1213
C Comment at 78.27 ft Time: 11:08:21 :PANEL 5 CENTER - DCP2 - THIN LONGITUDINAL CRACK
D 86.51 2 6590 3.13 2.85 2.89 2.69 2.63 2.40 2.01 1.69 92 103 11:09:04 CTR PCC Excel. None 1196
D 86.51 3 9869 4.68 4.27 4.35 4.19 3.92 3.57 3.03 2.54 92 103 11:09:11 CTR PCC Excel. None 1198
D 86.51 4 13135 6.11 5.58 5.69 5.46 5.10 4.65 3.94 3.26 92 103 11:09:19 CTR PCC Excel. None 1222
D 86.51 5 18062 8.30 7.56 7.73 7.34 6.92 6.28 5.32 4.44 92 103 11:09:30 CTR PCC Excel. None 1238
C Comment at 86.51 ft Time: 11:09:39 :PANEL 5 JOINT
D 97.84 2 6630 2.70 2.52 2.53 2.35 2.26 2.06 1.75 1.55 92 101 11:10:27 CTR PCC Excel. None 1398
D 97.84 3 9859 4.06 3.78 3.81 3.63 3.41 3.12 2.67 2.26 92 101 11:10:33 CTR PCC Excel. None 1380
D 97.84 4 13161 5.41 5.04 5.09 4.86 4.55 4.13 3.55 3.00 92 101 11:10:41 CTR PCC Excel. None 1384
D 97.84 5 18047 7.27 6.75 6.90 6.52 6.15 5.58 4.79 4.05 92 101 11:10:51 CTR PCC Excel. None 1412
C Comment at 97.84 ft Time: 11:11:01 :PANEL6 CENTER - THIN LONGITUDINAL CRACK
D 106.08 2 6622 2.92 2.68 2.67 2.50 2.35 2.09 1.73 1.47 91 102 11:11:41 CTR PCC Excel. None 1291
D 106.08 3 9863 4.36 4.00 4.00 3.78 3.52 3.17 2.61 2.15 91 102 11:11:48 CTR PCC Excel. None 1287
D 106.08 4 13150 5.73 5.25 5.30 5.03 4.67 4.16 3.48 2.84 91 102 11:11:56 CTR PCC Excel. None 1306
D 106.08 5 18123 7.79 7.16 7.24 6.82 6.39 5.68 4.71 3.85 91 102 11:12:06 CTR PCC Excel. None 1323
C Comment at 106.08 ft Time: 11:12:16 :PANEL6 JOINT
D 118.43 2 6650 2.90 2.71 2.68 2.50 2.41 2.18 1.84 1.52 92 104 11:13:47 CTR PCC Excel. None 1306
D 118.43 3 9832 4.32 4.05 4.03 3.84 3.57 3.24 2.71 2.29 92 104 11:13:54 CTR PCC Excel. None 1294
D 118.43 4 13157 5.74 5.34 5.33 5.09 4.75 4.26 3.61 2.95 92 104 11:14:02 CTR PCC Excel. None 1304
D 118.43 5 18058 7.88 7.28 7.33 6.94 6.52 5.83 4.93 4.06 92 104 11:14:12 CTR PCC Excel. None 1303
C Comment at 117.40 ft Time: 11:14:22 :PANEL7 CENTER - DCP3 - THIN LONGITUDINAL CRACK
D 126.67 2 6634 3.08 2.83 2.83 2.61 2.51 2.25 1.89 1.52 93 104 11:15:04 CTR PCC Excel. None 1224
D 126.67 3 9831 4.61 4.23 4.22 4.04 3.75 3.33 2.81 2.29 93 104 11:15:11 CTR PCC Excel. None 1213
D 126.67 4 13114 6.05 5.56 5.61 5.29 4.98 4.45 3.70 2.98 93 104 11:15:19 CTR PCC Excel. None 1233
D 126.67 5 18078 8.32 7.59 7.70 7.26 6.82 6.09 5.09 4.13 93 104 11:15:29 CTR PCC Excel. None 1236
C Comment at 125.64 ft Time: 11:15:39 :PANEL7 JOINT
D 136.97 2 6635 2.75 2.59 2.53 2.37 2.25 2.03 1.72 1.44 94 103 11:16:32 CTR PCC Excel. None 1370
D 136.97 3 9840 4.15 3.90 3.83 3.65 3.38 3.07 2.60 2.19 94 103 11:16:38 CTR PCC Excel. None 1349
D 136.97 4 13115 5.47 5.15 5.07 4.84 4.48 4.02 3.42 2.81 94 103 11:16:45 CTR PCC Excel. None 1364
D 136.97 5 18090 7.57 7.03 6.96 6.58 6.16 5.52 4.67 3.88 94 103 11:16:56 CTR PCC Excel. None 1359
C Comment at 136.97 ft Time: 11:17:06 :PANEL8 CENTER - THIN LONGITUDINAL CRACK
D 146.24 2 6634 3.00 2.81 2.77 2.57 2.43 2.14 1.75 1.47 93 103 11:17:51 CTR PCC Excel. None 1256
D 146.24 3 9833 4.46 4.18 4.11 3.88 3.57 3.19 2.61 2.17 93 103 11:17:58 CTR PCC Excel. None 1255
D 146.24 4 13109 5.93 5.50 5.45 5.15 4.80 4.18 3.47 2.85 93 103 11:18:06 CTR PCC Excel. None 1256
D 146.24 5 18033 8.12 7.45 7.43 6.97 6.49 5.70 4.72 3.87 93 103 11:18:17 CTR PCC Excel. None 1263
C Comment at 146.24 ft Time: 11:18:26 :PANEL8 JOINT
D 156.54 2 6633 2.63 2.42 2.43 2.25 2.13 1.93 1.63 1.38 91 103 11:19:05 CTR PCC Excel. None 1432
D 156.54 3 9852 3.96 3.64 3.66 3.46 3.22 2.90 2.46 2.04 91 103 11:19:11 CTR PCC Excel. None 1416
D 156.54 4 13153 5.19 4.77 4.84 4.58 4.26 3.82 3.24 2.68 91 103 11:19:19 CTR PCC Excel. None 1442
D 156.54 5 18071 7.10 6.52 6.64 6.27 5.87 5.25 4.43 3.65 91 103 11:19:29 CTR PCC Excel. None 1447
C Comment at 156.54 ft Time: 11:19:39 :PANEL9 CENTER - DCP4
D 165.81 2 6614 3.32 3.12 2.99 2.74 2.58 2.23 1.83 1.54 91 103 11:21:40 CTR PCC Excel. None 1132
D 165.81 3 9837 4.92 4.61 4.45 4.15 3.82 3.34 2.73 2.24 91 103 11:21:46 CTR PCC Excel. None 1137
D 165.81 4 13123 6.42 6.04 5.82 5.45 5.04 4.39 3.61 2.93 91 103 11:21:55 CTR PCC Excel. None 1162
D 165.81 5 18001 8.64 8.10 7.86 7.34 6.81 5.91 4.89 3.94 91 103 11:22:05 CTR PCC Excel. None 1185
C Comment at 165.81 ft Time: 11:22:15 :PANEL9 JOINT
D 177.14 2 6623 2.79 2.57 2.60 2.45 2.33 2.17 1.86 1.63 93 103 11:22:59 CTR PCC Excel. None 1350
D 177.14 3 9852 4.18 3.85 3.91 3.74 3.53 3.22 2.80 2.39 93 103 11:23:06 CTR PCC Excel. None 1339
D 177.14 4 13158 5.47 5.02 5.14 4.93 4.64 4.27 3.68 3.14 93 103 11:23:13 CTR PCC Excel. None 1367
D 177.14 5 18051 7.43 6.81 7.02 6.69 6.32 5.81 5.02 4.26 93 103 11:23:23 CTR PCC Excel. None 1381
C Comment at 177.14 ft Time: 11:23:33 :PANEL10 CENTER
D 185.37 2 6617 3.34 3.08 3.03 2.82 2.62 2.30 1.85 1.53 92 98 11:24:16 CTR PCC Excel. None 1128
D 185.37 3 9840 4.93 4.55 4.48 4.23 3.91 3.42 2.78 2.24 92 98 11:24:22 CTR PCC Excel. None 1135
D 185.37 4 13115 6.46 5.95 5.88 5.58 5.14 4.48 3.67 2.95 92 98 11:24:31 CTR PCC Excel. None 1155
D 185.37 5 18058 8.73 8.03 8.01 7.54 6.97 6.10 4.99 4.03 92 98 11:24:41 CTR PCC Excel. None 1176
C Comment at 185.37 ft Time: 11:24:51 :PANEL10 JOINT
D 196.70 2 6624 3.07 2.92 2.80 2.59 2.42 2.18 1.80 1.53 91 97 11:25:43 CTR PCC Excel. None 1227
D 196.70 3 9844 4.57 4.36 4.18 3.94 3.65 3.25 2.73 2.28 91 97 11:25:50 CTR PCC Excel. None 1224
D 196.70 4 13169 6.00 5.72 5.52 5.19 4.82 4.29 3.61 2.97 91 97 11:25:58 CTR PCC Excel. None 1249
D 196.70 5 17998 8.10 7.69 7.47 6.99 6.51 5.80 4.87 4.01 91 97 11:26:08 CTR PCC Excel. None 1263
C Comment at 196.70 ft Time: 11:26:18 :PANEL11 CENTER
D 205.97 2 6619 3.63 3.36 3.34 3.10 2.95 2.64 2.19 1.80 90 101 11:27:02 CTR PCC Excel. None 1037

D 205.97 3 9842 5.46 5.04 5.01 4.77 4.42 4.00 3.31 2.72 90 101 11:27:09 CTR PCC Excel. None 1024
D 205.97 4 13096 7.19 6.61 6.60 6.26 5.85 5.19 4.36 3.51 90 101 11:27:17 CTR PCC Excel. None 1036
D 205.97 5 18058 9.82 9.04 9.04 8.53 7.96 7.10 5.90 4.75 90 101 11:27:27 CTR PCC Excel. None 1045
C Comment at 205.97 ft Time: 11:27:37 :PANEL11 JOINT
D 217.30 2 6647 3.38 3.17 3.29 3.13 2.99 2.79 2.38 2.05 90 101 11:28:42 CTR PCC Excel. None 1119
D 217.30 3 9811 5.07 4.74 4.88 4.67 4.44 4.09 3.56 2.97 90 101 11:28:49 CTR PCC Excel. None 1101
D 217.30 4 13112 6.70 6.20 6.40 6.15 5.85 5.38 4.68 3.89 90 101 11:28:57 CTR PCC Excel. None 1113
D 217.30 5 18010 9.03 8.35 8.64 8.27 7.85 7.27 6.29 5.26 90 101 11:29:07 CTR PCC Excel. None 1134
C Comment at 217.30 ft Time: 11:29:17 :PANEL12 CENTER - DCP5
D 225.54 2 6593 3.33 3.12 3.04 2.83 2.66 2.36 1.98 1.65 91 103 11:29:54 CTR PCC Excel. None 1125
D 225.54 3 9804 4.98 4.64 4.53 4.28 3.99 3.55 2.96 2.44 91 103 11:30:00 CTR PCC Excel. None 1120
D 225.54 4 13074 6.48 6.06 5.95 5.63 5.25 4.63 3.91 3.22 91 103 11:30:08 CTR PCC Excel. None 1148
D 225.54 5 17987 8.78 8.19 8.09 7.61 7.08 6.28 5.29 4.37 91 103 11:30:19 CTR PCC Excel. None 1165
C Comment at 225.54 ft Time: 11:30:29 :PANEL12 JOINT
D 236.87 2 6556 3.63 3.47 3.36 3.18 2.96 2.64 2.21 1.83 91 104 11:31:31 CTR PCC Excel. None 1027
D 236.87 3 9831 5.33 5.07 4.95 4.70 4.39 3.92 3.27 2.70 91 104 11:31:37 CTR PCC Excel. None 1048
D 236.87 4 13099 6.94 6.59 6.49 6.17 5.73 5.12 4.30 3.51 91 104 11:31:45 CTR PCC Excel. None 1074
D 236.87 5 18010 9.32 8.82 8.76 8.28 7.74 6.92 5.79 4.73 91 104 11:31:56 CTR PCC Excel. None 1099
C Comment at 236.87 ft Time: 11:32:05 :PANEL13 CENTER
D 245.11 2 6622 3.50 3.19 3.30 3.13 3.02 2.81 2.41 2.06 92 103 11:32:45 CTR PCC Excel. None 1076
D 245.11 3 9831 5.17 4.70 4.86 4.69 4.43 4.13 3.54 3.01 92 103 11:32:52 CTR PCC Excel. None 1082
D 245.11 4 13125 6.73 6.13 6.37 6.14 5.83 5.31 4.63 3.87 92 103 11:33:00 CTR PCC Excel. None 1109
D 245.11 5 18046 9.00 8.17 8.51 8.14 7.74 7.10 6.09 5.12 92 103 11:33:10 CTR PCC Excel. None 1140
C Comment at 245.11 ft Time: 11:33:20 :PANEL13 JOINT
D 255.40 2 6562 3.95 3.77 3.67 3.41 3.27 2.96 2.45 2.04 92 104 11:33:56 CTR PCC Excel. None 944
D 255.40 3 9785 5.60 5.32 5.18 4.94 4.61 4.18 3.48 2.88 92 104 11:34:02 CTR PCC Excel. None 993
D 255.40 4 13106 7.08 6.74 6.61 6.30 5.92 5.31 4.47 3.70 92 104 11:34:10 CTR PCC Excel. None 1052
D 255.40 5 18057 9.33 8.79 8.70 8.24 7.78 6.98 5.89 4.85 92 104 11:34:21 CTR PCC Excel. None 1101
C Comment at 255.40 ft Time: 11:34:39 :PANEL14 CENTER - DCP6
D 264.67 2 6648 3.56 3.27 3.41 3.27 3.14 2.96 2.56 2.21 96 103 11:43:26 CTR PCC Excel. None 1062
D 264.67 3 9888 5.25 4.82 5.04 4.85 4.65 4.31 3.79 3.23 96 103 11:43:33 CTR PCC Excel. None 1071
D 264.67 4 13184 6.84 6.28 6.57 6.36 6.02 5.60 4.91 4.16 96 103 11:43:41 CTR PCC Excel. None 1095
D 264.67 5 18044 9.14 8.37 8.75 8.42 8.01 7.42 6.43 5.50 96 103 11:43:51 CTR PCC Excel. None 1122
C Comment at 264.67 ft Time: 11:44:01 :PANEL14 JOINT
D 274.97 2 6604 3.46 3.28 3.26 3.07 2.93 2.68 2.26 1.92 95 104 11:44:40 CTR PCC Excel. None 1086
D 274.97 3 9806 5.15 4.87 4.86 4.64 4.37 4.01 3.38 2.81 95 104 11:44:47 CTR PCC Excel. None 1083
D 274.97 4 13085 6.71 6.34 6.33 6.08 5.71 5.17 4.40 3.63 95 104 11:44:55 CTR PCC Excel. None 1109
D 274.97 5 18020 9.03 8.49 8.52 8.12 7.68 6.96 5.89 4.88 95 104 11:45:06 CTR PCC Excel. None 1135
C Comment at 274.97 ft Time: 11:45:15 :PANEL15 CENTER
D 284.24 2 6619 3.60 3.38 3.39 3.24 3.09 2.84 2.41 2.08 92 102 11:45:59 CTR PCC Excel. None 1046
D 284.24 3 9847 5.39 5.02 5.06 4.87 4.59 4.20 3.60 3.05 92 102 11:46:05 CTR PCC Excel. None 1039
D 284.24 4 13117 7.08 6.59 6.66 6.40 6.08 5.51 4.75 3.97 92 102 11:46:13 CTR PCC Excel. None 1053
D 284.24 5 18078 9.59 8.86 9.00 8.63 8.19 7.44 6.37 5.35 92 102 11:46:24 CTR PCC Excel. None 1072
C Comment at 284.24 ft Time: 11:46:38 :PANEL15 JOINT
D 295.57 2 6590 4.50 4.34 4.17 3.89 3.69 3.27 2.72 2.27 94 97 11:47:19 CTR PCC Excel. None 832
D 295.57 3 9857 6.52 6.29 6.07 5.76 5.37 4.81 4.03 3.34 94 97 11:47:25 CTR PCC Excel. None 860
D 295.57 4 13109 8.39 8.07 7.83 7.47 6.98 6.24 5.24 4.31 94 97 11:47:33 CTR PCC Excel. None 888
D 295.57 5 17893 11.07 10.51 10.30 9.81 9.18 8.21 6.93 5.70 94 97 11:47:44 CTR PCC Excel. None 919
C Comment at 295.57 ft Time: 11:47:54 :PANEL16 CENTER
D 303.81 2 6618 3.69 3.41 3.53 3.38 3.30 3.08 2.73 2.37 95 99 11:49:02 CTR PCC Excel. None 1020
D 303.81 3 9834 5.50 5.07 5.27 5.11 4.91 4.62 4.06 3.51 95 99 11:49:09 CTR PCC Excel. None 1017
D 303.81 4 13104 7.25 6.65 6.97 6.77 6.47 6.09 5.35 4.61 95 99 11:49:17 CTR PCC Excel. None 1027
D 303.81 5 17995 9.87 8.99 9.45 9.17 8.80 8.27 7.26 6.24 95 99 11:49:27 CTR PCC Excel. None 1037
C Comment at 303.81 ft Time: 11:49:37 :PANEL16 JOINT
D 315.14 2 6607 4.00 3.91 3.65 3.36 3.19 2.86 2.41 2.04 95 93 11:50:21 CTR PCC Excel. None 938
D 315.14 3 9832 5.89 5.76 5.38 5.02 4.72 4.26 3.59 2.97 95 93 11:50:28 CTR PCC Excel. None 949
D 315.14 4 13104 7.63 7.46 7.00 6.62 6.19 5.54 4.71 3.91 95 93 11:50:36 CTR PCC Excel. None 976
D 315.14 5 18086 10.23 9.97 9.45 8.90 8.35 7.52 6.38 5.32 95 93 11:50:46 CTR PCC Excel. None 1005
C Comment at 315.14 ft Time: 11:50:56 :PANEL17 CENTER - CHP2 (DCP PERFORMED AFTER CHP)
D 323.37 2 6624 3.67 3.32 3.54 3.38 3.35 3.12 2.70 2.33 95 92 11:52:09 CTR PCC Excel. None 1027
D 323.37 3 9844 5.44 4.92 5.25 5.09 4.93 4.61 4.00 3.43 95 92 11:52:15 CTR PCC Excel. None 1029
C Comment at 323.37 ft Time: 11:52:24 :Deflection is not decreasing
D 323.37 4 13110 7.14 6.44 6.94 6.75 6.49 6.08 5.32 4.50 95 92 11:52:27 CTR PCC Excel. None 1044
C Comment at 323.37 ft Time: 11:52:38 :Deflection is not decreasing
D 323.37 5 17960 9.66 8.64 9.38 9.11 8.78 8.23 7.18 6.10 95 92 11:52:52 CTR PCC Excel. None 1057
C Comment at 323.37 ft Time: 11:53:02 :PANEL17 JOINT - CORNER CRACK
D 335.73 2 6654 2.99 2.93 2.73 2.53 2.45 2.27 1.98 1.75 94 92 11:53:47 CTR PCC Excel. None 1267
D 335.73 3 9864 4.44 4.35 4.07 3.86 3.69 3.37 2.98 2.60 94 92 11:53:54 CTR PCC Excel. None 1264
D 335.73 4 13181 5.82 5.70 5.37 5.13 4.85 4.47 3.95 3.41 94 92 11:54:02 CTR PCC Excel. None 1287
D 335.73 5 18124 7.86 7.67 7.28 6.91 6.55 6.05 5.34 4.64 94 92 11:54:12 CTR PCC Excel. None 1311

C Comment at 335.73 ft Time: 11:54:21 :PANEL18 CENTER - DCP7
D 342.94 2 6664 3.24 2.98 3.10 2.93 2.83 2.67 2.24 1.92 92 94 11:55:09 CTR PCC Excel. None 1171
D 342.94 3 9884 4.77 4.37 4.56 4.40 4.24 3.91 3.36 2.79 92 94 11:55:16 CTR PCC Excel. None 1178
D 342.94 4 13179 6.26 5.74 6.00 5.83 5.54 5.13 4.43 3.65 92 94 11:55:24 CTR PCC Excel. None 1198
D 342.94 5 18024 8.39 7.67 8.09 7.80 7.46 6.92 5.92 4.90 92 94 11:55:34 CTR PCC Excel. None 1221
C Comment at 353.24 ft Time: 11:57:02 :PANEL18 JOINT
D 353.24 2 6649 2.96 2.80 2.72 2.53 2.41 2.20 1.88 1.59 91 90 11:57:28 CTR PCC Excel. None 1278
D 353.24 3 9913 4.43 4.20 4.11 3.88 3.64 3.26 2.82 2.42 91 90 11:57:35 CTR PCC Excel. None 1272
D 353.24 4 13206 5.84 5.53 5.42 5.14 4.79 4.35 3.73 3.14 91 90 11:57:43 CTR PCC Excel. None 1286
D 353.24 5 18166 7.86 7.44 7.34 6.92 6.51 5.85 5.03 4.23 91 90 11:57:52 CTR PCC Excel. None 1314
C Comment at 352.21 ft Time: 11:58:02 :PANEL19 CENTER
D 361.48 2 6664 3.41 3.23 3.19 2.99 2.86 2.55 2.13 1.75 90 88 11:58:46 CTR PCC Excel. None 1110
D 361.48 3 9880 5.09 4.82 4.75 4.50 4.26 3.79 3.18 2.65 90 88 11:58:52 CTR PCC Excel. None 1103
D 361.48 4 13141 6.73 6.32 6.25 5.94 5.60 5.01 4.23 3.46 90 88 11:59:01 CTR PCC Excel. None 1110
D 361.48 5 17967 9.06 8.46 8.39 7.94 7.49 6.68 5.64 4.63 90 88 11:59:11 CTR PCC Excel. None 1128
C Comment at 361.48 ft Time: 11:59:21 :PANEL19 JOINT
D 372.81 2 6661 2.85 2.64 2.70 2.57 2.46 2.33 2.00 1.75 89 88 12:00:08 CTR PCC Excel. None 1328
D 372.81 3 9892 4.23 3.93 4.03 3.87 3.73 3.44 3.01 2.61 89 88 12:00:14 CTR PCC Excel. None 1330
D 372.81 4 13169 5.59 5.19 5.35 5.16 4.90 4.57 4.01 3.45 89 88 12:00:22 CTR PCC Excel. None 1340
D 372.81 5 18114 7.55 7.00 7.26 6.96 6.64 6.18 5.41 4.63 89 88 12:00:32 CTR PCC Excel. None 1365
C Comment at 372.81 ft Time: 12:00:42 :PANEL20 CENTER - DCP8
D 381.05 2 6661 2.85 2.66 2.63 2.44 2.34 2.07 1.78 1.49 89 90 12:01:59 CTR PCC Excel. None 1327
D 381.05 3 9896 4.24 3.95 3.89 3.69 3.42 3.07 2.62 2.26 89 90 12:02:05 CTR PCC Excel. None 1329
D 381.05 4 13172 5.57 5.18 5.16 4.86 4.54 4.10 3.49 2.96 89 90 12:02:13 CTR PCC Excel. None 1344
D 381.05 5 18075 7.51 6.97 6.96 6.53 6.16 5.52 4.71 3.98 89 90 12:02:24 CTR PCC Excel. None 1368
C Comment at 380.02 ft Time: 12:03:10 :PANE 20 JOINT
D 394.43 2 6642 2.83 2.72 2.63 2.45 2.33 2.14 1.84 1.60 88 89 12:04:16 CTR PCC Excel. None 1336
D 394.43 3 9893 4.24 4.06 3.94 3.71 3.53 3.24 2.78 2.38 88 89 12:04:23 CTR PCC Excel. None 1326
D 394.43 4 13184 5.60 5.33 5.21 4.95 4.65 4.28 3.69 3.14 88 89 12:04:31 CTR PCC Excel. None 1339
D 394.43 5 18144 7.60 7.20 7.06 6.70 6.32 5.79 4.99 4.27 88 89 12:04:41 CTR PCC Excel. None 1357
C Comment at 394.43 ft Time: 12:04:51 :PANEL21 CENTER
D 400.61 2 6631 3.23 2.99 3.00 2.79 2.66 2.36 1.94 1.62 88 91 12:05:28 CTR PCC Excel. None 1166
D 400.61 3 9850 4.81 4.45 4.45 4.20 3.96 3.50 2.93 2.39 88 91 12:05:35 CTR PCC Excel. None 1164
C Comment at 400.61 ft Time: 12:05:57 :PANEL21 JOINT
D 400.61 2 6634 3.23 3.00 3.00 2.77 2.67 2.37 1.97 1.63 88 91 12:06:20 CTR PCC Excel. None 1167
D 400.61 3 9876 4.82 4.44 4.45 4.21 3.94 3.51 2.93 2.40 88 91 12:06:27 CTR PCC Excel. None 1166
D 400.61 4 13153 6.37 5.84 5.86 5.55 5.21 4.59 3.87 3.14 88 91 12:06:35 CTR PCC Excel. None 1175
D 400.61 5 18025 8.64 7.90 7.92 7.48 7.04 6.23 5.18 4.23 88 91 12:06:45 CTR PCC Excel. None 1186
C Comment at 400.61 ft Time: 12:06:55 :PANEL21 JOINT REDO
D 411.94 2 6650 2.83 2.67 2.62 2.45 2.35 2.18 1.83 1.66 89 90 12:07:47 CTR PCC Excel. None 1338
D 411.94 3 9846 4.23 3.98 3.92 3.72 3.52 3.24 2.77 2.44 89 90 12:07:53 CTR PCC Excel. None 1324
D 411.94 4 13159 5.57 5.26 5.18 4.94 4.65 4.27 3.71 3.15 89 90 12:08:01 CTR PCC Excel. None 1343
D 411.94 5 18123 7.54 7.10 7.04 6.68 6.28 5.79 5.01 4.27 89 90 12:08:11 CTR PCC Excel. None 1367
C Comment at 411.94 ft Time: 12:08:21 :PANEL22 CENTER
D 420.18 2 6652 3.13 2.96 2.90 2.71 2.59 2.32 1.96 1.69 89 99 12:09:00 CTR PCC Excel. None 1207
D 420.18 3 9871 4.64 4.35 4.30 4.07 3.84 3.45 2.94 2.46 89 99 12:09:06 CTR PCC Excel. None 1211
D 420.18 4 13183 6.12 5.73 5.68 5.39 5.06 4.57 3.86 3.21 89 99 12:09:14 CTR PCC Excel. None 1224
D 420.18 5 18055 8.25 7.74 7.68 7.24 6.83 6.13 5.16 4.27 89 99 12:09:25 CTR PCC Excel. None 1244
C Comment at 420.18 ft Time: 12:09:34 :PANEL22 JOINT

Project: 9th Avenue, Council Bluffs

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IKUAB FWD FILE    : 9thstreet_7july12.fwd
HProject No.      : TR640
HLocation         : COUNCIL BLUFFS 9th STREET
HClient           : IOWA DOT
HStart Station    : FRONT OF 3113 9TH STREET
HDirection        : WB SOUTH SIDE LANE
HEnd Station      :
HWeather          : SUNNY 90
HOperator         : PV

IDate Created     : 7/26/2012
IVersion          : 2.3.11
ILoad Mode        : 1       (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91      (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00  (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset :   0.00 ft
ITestpoint spacing:   0.00 ft

J Dist. Imp Load  D0    D1    D2    D3    D4    D5    D6    D7   Air Pave    Time               Pavement Pavement Pavement  Pavement Surface
J    m Num  lbf  mils  mils  mils  mils  mils  mils  mils  mils  °F  °F              Location     Type     Condition Distress    Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D   0.00  2  6615  11.69  11.30  11.00  10.27   9.66   8.44   6.73   5.25  102  120 16:47:56 CTR   PCC   Excel.   None    322
D   0.00  3  9818  17.42  16.81  16.38  15.49  14.44  12.59  10.06   7.78  102  120 16:48:03 CTR   PCC   Excel.   None    320
D   0.00  4 13082  22.71  21.86  21.39  20.30  18.85  16.45  13.17  10.17  102  120 16:48:12 CTR   PCC   Excel.   None    328
D   0.00  5 17699  30.05  28.80  28.29  26.93  24.93  21.76  17.45  13.44  102  120 16:48:28 CTR   PCC   Excel.   None    335
C  Comment at 0.00 ft  Time: 16:52:51 :PANEL1 CENTER - D1 - LONG. CRACK AND SAW CUT
D   6.18  2  6554   9.41   8.15   8.37   8.00   7.68   7.01   6.09   5.11  101  117 16:53:37 CTR   PCC   Excel.   None    396
D   6.18  3  9809  14.18  12.40  12.70  12.20  11.64  10.62   9.17   7.69  101  117 16:53:44 CTR   PCC   Excel.   None    393
D   6.18  4 13051  18.65  16.43  16.87  16.26  15.37  14.03  12.15  10.15  101  117 16:53:52 CTR   PCC   Excel.   None    398
D   6.18  5 17876  25.14  22.21  22.83  21.96  20.74  18.89  16.35  13.62  101  117 16:54:03 CTR   PCC   Excel.   None    404
C  Comment at 6.18 ft  Time: 16:54:13 :PANEL1 JOINT
D  14.42  2  6491  10.60  10.06  10.30   9.89   9.47   8.49   6.93   5.42  100  118 16:55:19 CTR   PCC   Excel.   None    348
D  14.42  3  9731  15.31  14.56  14.94  14.35  13.65  12.28  10.05   7.88  100  118 16:55:26 CTR   PCC   Excel.   None    361
D  14.42  4 13022  19.63  18.58  19.03  18.42  17.43  15.68  12.89  10.10  100  118 16:55:35 CTR   PCC   Excel.   None    377
D  14.42  5 17879  25.47  24.08  24.75  23.89  22.63  20.36  16.78  13.19  100  118 16:55:46 CTR   PCC   Excel.   None    399
C  Comment at 14.42 ft  Time: 16:55:56 :PANEL2 CENTER - LONG. CRACK AND SAW CUT
D  20.60  2  6568   6.67   6.30   6.45   6.20   6.05   5.64   4.94   4.31  101  117 16:56:34 CTR   PCC   Excel.   None    560
D  20.60  3  9782   9.97   9.42   9.65   9.39   9.03   8.43   7.41   6.41  101  117 16:56:41 CTR   PCC   Excel.   None    558
D  20.60  4 13052  13.04  12.26  12.67  12.39  11.81  11.00   9.69   8.35  101  117 16:56:50 CTR   PCC   Excel.   None    569
D  20.60  5 18065  17.44  16.35  16.97  16.42  15.74  14.65  12.85  11.05  101  117 16:57:00 CTR   PCC   Excel.   None    589
C  Comment at 20.60 ft  Time: 16:57:12 :PANEL2 JOINT
D  29.87  2  6551   7.80   7.40   7.45   7.11   6.81   6.14   5.22   4.24  100  106 16:58:48 CTR   PCC   Excel.   None    477
D  29.87  3  9795  11.62  11.00  11.11  10.73  10.16   9.20   7.78   6.33  100  106 16:58:55 CTR   PCC   Excel.   None    479
D  29.87  4 13080  15.03  14.23  14.43  13.92  13.12  11.90  10.06   8.16  100  106 16:59:04 CTR   PCC   Excel.   None    495
D  29.87  5 17962  20.11  18.99  19.38  18.66  17.61  16.02  13.59  11.07  100  106 16:59:15 CTR   PCC   Excel.   None    508
C  Comment at 29.87 ft  Time: 16:59:25 :PANEL3 CENTER - LONG. CRACK
D  36.04  2  6537   5.74   5.39   5.45   5.19   5.05   4.59   4.01   3.44  100  119 17:00:03 CTR   PCC   Excel.   None    647
D  36.04  3  9779   8.59   8.08   8.18   7.87   7.50   6.89   5.98   5.08  100  119 17:00:10 CTR   PCC   Excel.   None    647
D  36.04  4 13082  11.17  10.48  10.73  10.35   9.82   9.08   7.89   6.71  100  119 17:00:20 CTR   PCC   Excel.   None    666
D  36.04  5 18009  15.02  14.07  14.48  13.94  13.16  12.16  10.55   8.93  100  119 17:00:30 CTR   PCC   Excel.   None    682
C  Comment at 36.04 ft  Time: 17:00:46 :PANEL3 JOINT
D  44.28  2  6562   5.47   5.15   5.13   4.81   4.64   4.17   3.50   2.88  101  121 17:02:00 CTR   PCC   Excel.   None    682
D  44.28  3  9804   8.14   7.68   7.70   7.32   6.93   6.22   5.22   4.26  101  121 17:02:07 CTR   PCC   Excel.   None    685
D  44.28  4 13057  10.61  10.01  10.11   9.68   9.07   8.16   6.89   5.61  101  121 17:02:15 CTR   PCC   Excel.   None    700
D  44.28  5 18099  14.18  13.33  13.53  12.94  12.11  10.90   9.13   7.42  101  121 17:02:26 CTR   PCC   Excel.   None    726
C  Comment at 44.28 ft  Time: 17:02:36 :PANEL4 CENTER - GOOD PAVEMENT
D  50.46  2  6346   5.12   4.98   4.71   4.38   4.24   3.77   3.17   2.68  101  121 17:03:15 CTR   PCC   Excel.   None    704
D  50.46  3  9800   7.94   7.72   7.35   6.95   6.57   5.88   4.96   4.18  101  121 17:03:22 CTR   PCC   Excel.   None    702
D  50.46  4 13103  10.43  10.13   9.69   9.28   8.65   7.77   6.61   5.48  101  121 17:03:31 CTR   PCC   Excel.   None    714
```

D 50.46 5 18107 14.00 13.56 13.03 12.39 11.60 10.40 8.83 7.34 101 121 17:03:42 CTR PCC Excel. None 735
C Comment at 50.46 ft Time: 17:03:51 :PANEL4 JOINT
D 59.73 2 6565 5.40 5.09 5.08 4.78 4.59 4.08 3.48 2.91 101 121 17:05:04 CTR PCC Excel. None 691
D 59.73 3 9834 8.04 7.64 7.61 7.27 6.90 6.20 5.25 4.38 101 121 17:05:11 CTR PCC Excel. None 695
D 59.73 4 13126 10.42 9.86 9.89 9.48 8.93 8.06 6.79 5.59 101 121 17:05:19 CTR PCC Excel. None 716
D 59.73 5 18136 13.93 13.12 13.25 12.68 11.91 10.74 9.04 7.44 101 121 17:05:30 CTR PCC Excel. None 740
C Comment at 59.73 ft Time: 17:05:40 :PANEL5 CENTER - GOOD PAVEMENT
D 64.88 2 6575 5.19 5.03 4.82 4.55 4.36 3.90 3.31 2.79 102 120 17:06:49 CTR PCC Excel. None 720
D 64.88 3 9803 7.73 7.49 7.17 6.89 6.47 5.82 4.95 4.11 102 120 17:06:56 CTR PCC Excel. None 721
D 64.88 4 13132 10.02 9.73 9.36 8.94 8.36 7.52 6.38 5.21 102 120 17:07:04 CTR PCC Excel. None 745
D 64.88 5 18060 13.50 13.03 12.64 12.06 11.31 10.21 8.70 7.13 102 120 17:07:15 CTR PCC Excel. None 761
C Comment at 63.85 ft Time: 17:07:25 :PANEL5 JOINT
C Comment at 72.09 ft Time: 17:08:28 :DCP3 AT PANEL5 CENTER
C Comment at 72.09 ft Time: 17:08:46 :PANEL6 CENTER - GOOD PAVEMENT
D 72.09 2 6461 5.22 4.98 4.89 4.57 4.39 3.96 3.26 2.69 102 120 17:09:14 CTR PCC Excel. None 703
D 72.09 3 9816 7.87 7.49 7.38 7.00 6.63 5.95 4.94 4.04 102 120 17:09:20 CTR PCC Excel. None 709
D 72.09 4 13139 10.29 9.77 9.71 9.28 8.68 7.77 6.48 5.27 102 120 17:09:29 CTR PCC Excel. None 726
D 72.09 5 18152 13.86 13.09 13.10 12.39 11.66 10.40 8.66 7.02 102 120 17:09:40 CTR PCC Excel. None 745
C Comment at 72.09 ft Time: 17:10:02 :PANEL6 CENTER - GOOD PAVEMENT
D 79.30 2 6526 5.13 4.96 4.66 4.33 4.14 3.68 3.09 2.60 102 120 17:10:39 CTR PCC Excel. None 724
D 79.30 3 9759 7.60 7.32 6.95 6.53 6.11 5.45 4.61 3.86 102 120 17:10:46 CTR PCC Excel. None 730
D 79.30 4 13110 9.96 9.60 9.11 8.63 8.04 7.17 6.08 5.03 102 120 17:10:55 CTR PCC Excel. None 749
D 79.30 5 18081 13.46 12.94 12.34 11.62 10.82 9.63 8.17 6.74 102 120 17:11:05 CTR PCC Excel. None 764
C Comment at 79.30 ft Time: 17:11:15 :PANEL6 JOINT
D 86.51 2 6538 5.97 5.71 5.58 5.22 4.97 4.33 3.51 2.78 101 121 17:12:01 CTR PCC Excel. None 623
D 86.51 3 9813 8.93 8.54 8.34 7.89 7.40 6.49 5.30 4.18 101 121 17:12:08 CTR PCC Excel. None 625
D 86.51 4 13127 11.59 11.06 10.84 10.33 9.59 8.40 6.84 5.41 101 121 17:12:17 CTR PCC Excel. None 644
D 86.51 5 18140 15.48 14.69 14.49 13.72 12.73 11.20 9.12 7.19 101 121 17:12:27 CTR PCC Excel. None 666
C Comment at 86.51 ft Time: 17:12:37 :PANEL7 CENTER - GOOD PAVEMENT- DCP4
D 94.75 2 6529 5.19 5.08 4.81 4.50 4.33 3.91 3.29 2.81 101 121 17:13:31 CTR PCC Excel. None 716
D 94.75 3 9734 8.03 7.84 7.45 7.05 6.70 6.04 5.17 4.40 101 121 17:13:38 CTR PCC Excel. None 690
D 94.75 4 13129 10.55 10.28 9.77 9.42 8.81 7.95 6.82 5.71 101 121 17:13:46 CTR PCC Excel. None 708
D 94.75 5 18177 14.23 13.82 13.19 12.52 11.83 10.70 9.17 7.70 101 121 17:13:57 CTR PCC Excel. None 726
C Comment at 94.75 ft Time: 17:14:07 :PANEL7 JOINT
D 101.96 2 6525 5.80 5.49 5.45 5.11 4.90 4.38 3.63 2.98 101 122 17:14:45 CTR PCC Excel. None 640
D 101.96 3 9812 8.59 8.16 8.07 7.66 7.27 6.46 5.39 4.43 101 122 17:14:52 CTR PCC Excel. None 649
D 101.96 4 13107 11.25 10.69 10.60 10.18 9.51 8.48 7.08 5.73 101 122 17:15:00 CTR PCC Excel. None 662
D 101.96 5 18087 15.05 14.22 14.19 13.53 12.73 11.33 9.44 7.64 101 122 17:15:11 CTR PCC Excel. None 683
C Comment at 101.96 ft Time: 17:15:21 :PANEL8 CENTER - GOOD PAVEMENT
D 109.16 2 6552 5.35 5.20 4.85 4.43 4.29 3.86 3.25 2.76 101 121 17:16:23 CTR PCC Excel. None 696
D 109.16 3 9815 8.05 7.83 7.29 6.86 6.46 5.73 4.90 4.09 101 121 17:16:30 CTR PCC Excel. None 694
D 109.16 4 13121 10.59 10.30 9.65 9.14 8.54 7.61 6.51 5.44 101 121 17:16:38 CTR PCC Excel. None 704
D 109.16 5 18126 14.29 13.86 13.02 12.31 11.50 10.23 8.76 7.31 101 121 17:16:49 CTR PCC Excel. None 721
C Comment at 109.16 ft Time: 17:16:59 :PANEL8 JOINT
D 117.40 2 6525 6.91 6.74 6.44 5.94 5.66 4.89 3.99 3.20 102 121 17:17:55 CTR PCC Excel. None 537
D 117.40 3 9814 10.37 10.08 9.63 9.05 8.46 7.39 5.99 4.72 102 121 17:18:02 CTR PCC Excel. None 538
D 117.40 4 13119 13.58 13.18 12.62 12.01 11.10 9.70 7.87 6.19 102 121 17:18:10 CTR PCC Excel. None 550
D 117.40 5 18086 18.17 17.58 16.91 15.96 14.84 12.96 10.54 8.26 102 121 17:18:21 CTR PCC Excel. None 566
C Comment at 117.40 ft Time: 17:18:31 :PANEL9 CENTER - LONG. CRACK - DCP5-CHP1
D 124.61 2 6514 13.50 7.95 7.65 7.08 6.77 5.97 5.07 4.24 102 121 17:19:11 CTR PCC Excel. None 274
D 124.61 3 9684 19.17 12.02 11.60 10.92 10.22 9.03 7.63 6.32 102 121 17:19:18 CTR PCC Excel. None 287
D 124.61 4 12825 24.19 15.86 15.39 14.57 13.55 12.03 10.16 8.36 102 121 17:19:26 CTR PCC Excel. None 302
D 124.61 5 17702 31.58 21.55 21.00 19.79 18.42 16.37 13.87 11.37 102 121 17:19:37 CTR PCC Excel. None 319
C Comment at 124.61 ft Time: 17:19:47 :PANEL9 JOINT - CRACK AT JOINT
D 130.79 2 6585 8.97 8.63 8.35 7.86 7.42 6.57 5.44 4.31 102 121 17:21:37 CTR PCC Excel. None 417
D 130.79 3 9824 13.57 13.04 12.62 12.02 11.28 9.95 8.31 6.57 102 121 17:21:45 CTR PCC Excel. None 412
D 130.79 4 13123 17.82 17.06 16.62 15.91 14.79 13.11 10.95 8.67 102 121 17:21:53 CTR PCC Excel. None 419
D 130.79 5 18036 24.01 22.89 22.50 21.36 19.93 17.67 14.76 11.69 102 121 17:22:04 CTR PCC Excel. None 427
C Comment at 133.88 ft Time: 17:22:14 :PANEL10 CENTER - LONG. CRACK
D 139.03 2 6585 8.42 7.21 7.85 7.25 6.88 6.02 5.03 4.16 101 121 17:22:51 CTR PCC Excel. None 445
D 139.03 3 9793 12.80 10.87 11.86 11.17 10.42 9.15 7.64 6.31 101 121 17:22:58 CTR PCC Excel. None 435
C Comment at 139.03 ft Time: 17:23:06 :Deflection is not decreasing
D 139.03 4 13072 17.05 14.35 15.80 14.99 13.87 12.11 10.15 8.30 101 121 17:23:08 CTR PCC Excel. None 436
C Comment at 139.03 ft Time: 17:23:18 :Deflection is not decreasing
D 139.03 5 17926 23.56 19.52 21.82 20.49 19.00 16.61 13.86 11.29 101 121 17:23:19 CTR PCC Excel. None 433
C Comment at 139.03 ft Time: 17:23:36 :NOTE: PLATE ON TOP OF CRACK
C Comment at 139.03 ft Time: 17:23:41 :PANEL10 JOINT
D 147.27 2 6581 6.76 6.43 6.38 6.01 5.70 5.02 4.09 3.18 102 121 17:24:23 CTR PCC Excel. None 554
D 147.27 3 9830 10.11 9.59 9.53 9.08 8.53 7.49 6.09 4.76 102 121 17:24:30 CTR PCC Excel. None 553
D 147.27 4 13097 13.06 12.32 12.30 11.75 10.96 9.61 7.79 5.99 102 121 17:24:38 CTR PCC Excel. None 570

D 147.27 5 18094 17.56 16.50 16.55 15.78 14.68 12.88 10.42 7.96 102 121 17:24:50 CTR PCC Excel. None 586
C Comment at 147.27 ft Time: 17:24:59 :PANEL11 CENTTER - LONG. CRACK
D 154.48 2 6569 6.98 6.76 6.18 5.71 5.33 4.59 3.75 3.03 102 121 17:25:53 CTR PCC Excel. None 535
D 154.48 3 9834 10.53 10.21 9.29 8.65 8.00 6.85 5.59 4.50 102 121 17:26:00 CTR PCC Excel. None 531
D 154.48 4 13133 13.95 13.48 12.31 11.51 10.52 9.09 7.39 5.89 102 121 17:26:09 CTR PCC Excel. None 535
D 154.48 5 18000 18.92 18.23 16.70 15.52 14.21 12.27 9.95 7.96 102 121 17:26:19 CTR PCC Excel. None 541
C Comment at 154.48 ft Time: 17:26:29 :PANEL11 JOINT
D 162.72 2 6602 6.44 6.09 6.10 5.74 5.44 4.84 3.98 3.22 103 121 17:27:21 CTR PCC Excel. None 583
D 162.72 3 9780 9.66 9.15 9.16 8.65 8.18 7.29 6.00 4.81 103 121 17:27:28 CTR PCC Excel. None 576
D 162.72 4 13156 12.79 12.08 12.15 11.62 10.84 9.69 8.00 6.35 103 121 17:27:36 CTR PCC Excel. None 585
D 162.72 5 18105 17.31 16.32 16.46 15.66 14.70 13.13 10.84 8.61 103 121 17:27:47 CTR PCC Excel. None 595
C Comment at 162.72 ft Time: 17:27:57 :PANEL12 CENTER - LONG. CRACK
D 169.93 2 6571 7.08 7.03 6.08 5.53 5.16 4.31 3.49 2.82 103 121 17:28:40 CTR PCC Excel. None 527
D 169.93 3 9815 10.67 10.59 9.15 8.39 7.72 6.54 5.27 4.20 103 121 17:28:47 CTR PCC Excel. None 523
D 169.93 4 13125 14.11 13.96 12.11 11.19 10.21 8.71 7.01 5.53 103 121 17:28:55 CTR PCC Excel. None 529
D 169.93 5 18036 19.17 18.91 16.41 15.15 13.77 11.73 9.43 7.43 103 121 17:29:06 CTR PCC Excel. None 535
C Comment at 169.93 ft Time: 17:29:16 :PANEL12 JOINT
C Comment at 169.93 ft Time: 17:30:11 :NOTE: ALL TESTS ON EB LANE (ON SOUTH SIDE OF 9TH STREET)

Project: Cliff Road, Burlington

IKUAB FWD FILE : Cliff Road_NB_2AUG2012.fwd
HProject No. : TR640
HLocation : BURLINGTON - CLIFF ROAD
HClient : IOWA DOT
HStart Station : FRONT OF 2500 CLIFF ROAD DRIVE WAY
HDirection : NB LANE
HEnd Station :
HWeather : SUNNY 90
HOperator : PV

IDate Created : 8/2/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0.00 ft
ITestpoint spacing: 0.00 ft

J	Dist. m	Imp Num	Load lbf	D0 mils	D1 mils	D2 mils	D3 mils	D4 mils	D5 mils	D6 mils	D7 mils	Air °F	Pave °F	Time	Pavement Location	Pavement Type	Pavement Condition	Pavement Distress	Surface Modulus
D	51.49	2	6674	4.60	4.21	4.24	3.91	3.67	3.09	2.41	1.87	85	90	10:15:12	CTR	PCC	Excel.	None	826
D	51.49	3	9875	6.98	6.39	6.46	6.02	5.56	4.70	3.67	2.80	85	90	10:15:19	CTR	PCC	Excel.	None	804
D	51.49	4	13059	9.26	8.47	8.64	8.07	7.40	6.24	4.92	3.72	85	90	10:15:27	CTR	PCC	Excel.	None	802
D	51.49	5	17948	12.67	11.56	11.86	11.01	10.16	8.60	6.74	5.09	85	90	10:15:38	CTR	PCC	Excel.	None	806
C	Comment at 50.46 ft Time: 10:15:48 :PANEL1 CENTER - START IN FRONT OF 2500 CLIFF ROAD HOUSE DRIVEWAY																		
D	57.67	2	6694	5.18	5.01	4.49	4.04	3.76	3.10	2.42	1.90	86	88	10:18:53	CTR	PCC	Excel.	None	735
D	57.67	3	9865	7.86	7.61	6.83	6.25	5.67	4.69	3.66	2.84	86	88	10:18:59	CTR	PCC	Excel.	None	714
D	57.67	4	13091	10.43	10.10	9.12	8.39	7.54	6.25	4.91	3.79	86	88	10:19:08	CTR	PCC	Excel.	None	714
D	57.67	5	17990	14.26	13.81	12.54	11.46	10.33	8.62	6.74	5.19	86	88	10:19:18	CTR	PCC	Excel.	None	718
C	Comment at 57.67 ft Time: 10:19:28 :PANEL1 JOINT																		
D	65.91	2	6628	4.72	4.33	4.28	3.90	3.66	3.09	2.38	1.86	86	88	10:20:13	CTR	PCC	Excel.	None	798
D	65.91	3	9810	7.19	6.60	6.55	6.08	5.57	4.70	3.66	2.83	86	88	10:20:19	CTR	PCC	Excel.	None	776
D	65.91	4	13000	9.58	8.80	8.80	8.15	7.41	6.26	4.92	3.73	86	88	10:20:27	CTR	PCC	Excel.	None	772
D	65.91	5	17807	13.16	12.08	12.12	11.17	10.20	8.61	6.74	5.10	86	88	10:20:38	CTR	PCC	Excel.	None	770
C	Comment at 64.88 ft Time: 10:20:48 :PANEL2 CENTER																		
D	72.09	2	6608	5.45	5.24	4.64	4.17	3.83	3.13	2.40	1.86	85	88	10:21:32	CTR	PCC	Excel.	None	689
D	72.09	3	9790	8.33	8.01	7.09	6.43	5.83	4.77	3.65	2.81	85	88	10:21:39	CTR	PCC	Excel.	None	668
D	72.09	4	12979	11.09	10.67	9.51	8.67	7.77	6.38	4.92	3.74	85	88	10:21:47	CTR	PCC	Excel.	None	665
D	72.09	5	17902	15.23	14.65	13.16	11.89	10.71	8.77	6.75	5.12	85	88	10:21:57	CTR	PCC	Excel.	None	669
C	Comment at 80.33 ft Time: 10:23:05 :PANEL2 JOINT																		
D	80.33	2	6633	4.69	4.24	4.33	4.02	3.81	3.31	2.60	2.08	86	87	10:23:31	RWP	AC	Excel.	None	804
D	80.33	3	9823	7.07	6.39	6.58	6.17	5.73	4.99	3.97	3.12	86	87	10:23:37	RWP	AC	Excel.	None	790
D	80.33	4	13020	9.38	8.46	8.79	8.29	7.63	6.61	5.29	4.14	86	87	10:23:46	RWP	AC	Excel.	None	789
D	80.33	5	17941	12.86	11.58	12.10	11.33	10.48	9.09	7.27	5.65	86	87	10:23:56	RWP	AC	Excel.	None	793
C	Comment at 80.33 ft Time: 10:24:06 :PANEL3 CENTER - DCP1																		
D	86.51	2	6611	4.84	4.67	4.18	3.79	3.52	2.94	2.30	1.86	86	87	10:24:48	RWP	AC	Excel.	None	777
D	86.51	3	9806	7.33	7.07	6.38	5.88	5.34	4.44	3.53	2.81	86	87	10:24:55	RWP	AC	Excel.	None	761
D	86.51	4	13007	9.71	9.37	8.52	7.86	7.09	5.91	4.71	3.71	86	87	10:25:03	RWP	AC	Excel.	None	762
D	86.51	5	17961	13.28	12.80	11.73	10.72	9.75	8.14	6.41	5.04	86	87	10:25:14	RWP	AC	Excel.	None	769
C	Comment at 86.51 ft Time: 10:25:23 :PANEL3 JOINT																		
D	94.75	2	6608	6.40	6.25	5.58	5.03	4.67	3.79	2.84	2.18	86	87	10:27:03	RWP	PCC	Excel.	None	587
D	94.75	3	9765	9.53	9.29	8.35	7.61	6.96	5.66	4.28	3.23	86	87	10:27:10	RWP	PCC	Excel.	None	583
D	94.75	4	12973	12.50	12.18	11.03	10.11	9.15	7.48	5.68	4.25	86	87	10:27:18	RWP	PCC	Excel.	None	590
D	94.75	5	17856	16.98	16.47	15.10	13.79	12.50	10.20	7.77	5.76	86	87	10:27:28	RWP	PCC	Excel.	None	598
C	Comment at 94.75 ft Time: 10:27:44 :PANEL4 CENTER																		
D	100.93	2	6595	6.55	5.89	6.27	5.97	5.68	5.10	4.21	3.38	87	88	10:28:36	RWP	PCC	Excel.	None	573
D	100.93	3	9758	9.82	8.87	9.42	9.01	8.49	7.60	6.26	5.02	87	88	10:28:42	RWP	PCC	Excel.	None	565
D	100.93	4	12939	12.98	11.72	12.48	11.93	11.16	9.97	8.21	6.53	87	88	10:28:50	RWP	PCC	Excel.	None	567

D 100.93 5 17823 17.73 16.00 17.09 16.26 15.21 13.54 11.15 8.81 87 8810:29:01RWP PCC Excel. None 572
C Comment at 100.93 ft Time: 10:29:11 :PANEL4 JOINT
D 109.16 2 6639 4.85 4.42 4.39 4.01 3.68 3.08 2.39 1.86 87 88 10:29:58 RWP PCC Excel. None 778
D 109.16 3 9829 7.34 6.69 6.65 6.14 5.58 4.65 3.62 2.78 87 88 10:30:04 RWP PCC Excel. None 761
D 109.16 4 13044 9.76 8.87 8.87 8.21 7.46 6.21 4.84 3.68 87 88 10:30:12 RWP PCC Excel. None 760
D 109.16 5 18004 13.45 12.23 12.29 11.32 10.29 8.56 6.66 5.02 87 88 10:30:23 RWP PCC Excel. None 761
C Comment at 108.13 ft Time: 10:30:33 :PANEL5 CENTER - DCP2
D 115.34 2 6625 5.36 4.98 4.66 4.20 3.81 3.08 2.34 1.79 86 88 10:31:29 RWP PCC Excel. None 702
D 115.34 3 9813 8.12 7.57 7.07 6.40 5.72 4.65 3.53 2.69 86 88 10:31:35 RWP PCC Excel. None 687
D 115.34 4 13060 10.82 10.07 9.47 8.62 7.69 6.21 4.74 3.57 86 88 10:31:43 RWP PCC Excel. None 687
D 115.34 5 17999 14.96 13.95 13.12 11.89 10.64 8.59 6.52 4.87 86 88 10:31:54 RWP PCC Excel. None 684
C Comment at 115.34 ft Time: 10:32:12 :PANEL5 JOINT
D 123.58 2 6635 5.61 4.98 5.03 4.54 4.14 3.31 2.43 1.83 87 89 10:32:51 RWP PCC Excel. None 673
D 123.58 3 9848 8.52 7.55 7.66 6.96 6.25 4.99 3.70 2.75 87 89 10:32:57 RWP PCC Excel. None 658
D 123.58 4 13065 11.33 10.04 10.22 9.34 8.33 6.69 4.97 3.64 87 89 10:33:05 RWP PCC Excel. None 656
D 123.58 5 17997 15.65 13.88 14.21 12.93 11.59 9.25 6.86 5.00 87 89 10:33:16 RWP PCC Excel. None 654
C Comment at 123.58 ft Time: 10:33:26 :PANEL6 CENTER
D 130.79 2 6639 5.52 5.12 4.76 4.25 3.83 3.08 2.30 1.78 87 91 10:34:27 CTR PCC Excel. None 684
D 130.79 3 9823 8.37 7.81 7.27 6.55 5.83 4.69 3.53 2.67 87 91 10:34:34 CTR PCC Excel. None 668
D 130.79 4 13056 11.14 10.40 9.74 8.84 7.80 6.27 4.75 3.56 87 91 10:34:42 CTR PCC Excel. None 666
D 130.79 5 17923 15.40 14.37 13.50 12.17 10.79 8.68 6.55 4.88 87 91 10:34:52 CTR PCC Excel. None 662
C Comment at 130.79 ft Time: 10:35:11 :PANEL6 JOINT
D 136.97 2 6606 5.90 5.43 5.15 4.61 4.14 3.34 2.47 1.87 87 91 10:35:58 CTR PCC Excel. None 637
D 136.97 3 9785 8.97 8.24 7.84 7.08 6.30 5.10 3.78 2.78 87 91 10:36:04 CTR PCC Excel. None 621
D 136.97 4 12986 11.90 10.95 10.47 9.48 8.40 6.79 5.06 3.66 87 91 10:36:12 CTR PCC Excel. None 620
D 136.97 5 17893 16.47 15.15 14.57 13.15 11.69 9.40 6.99 5.05 87 91 10:36:23 CTR PCC Excel. None 618
C Comment at 136.97 ft Time: 10:36:32 :PANEL7 CENTER - CHP1 - DCP3
C Comment at 145.21 ft Time: 10:37:49 :PANEL7 JOINT
D 145.21 2 6586 6.92 6.45 5.97 5.39 4.84 3.88 2.89 2.13 87 93 10:38:12 CTR PCC Excel. None 541
D 145.21 3 9745 10.56 9.80 9.08 8.22 7.32 5.87 4.37 3.19 87 93 10:38:19 CTR PCC Excel. None 525
D 145.21 4 12932 14.13 13.12 12.16 11.03 9.78 7.81 5.83 4.24 87 93 10:38:27 CTR PCC Excel. None 521
D 145.21 5 17693 19.47 18.02 16.74 15.11 13.39 10.67 7.94 5.74 87 93 10:38:38 CTR PCC Excel. None 517
C Comment at 145.21 ft Time: 10:38:47 :PANEL7 JOINT
D 154.48 2 6634 9.44 8.94 8.50 7.75 7.07 5.67 4.06 2.89 88 96 10:40:42 CTR PCC Excel. None 400
D 154.48 3 9813 13.92 13.20 12.51 11.39 10.35 8.23 5.93 4.28 88 96 10:40:49 CTR PCC Excel. None 401
D 154.48 4 12942 18.14 17.20 16.29 14.85 13.48 10.68 7.72 5.53 88 96 10:40:57 CTR PCC Excel. None 406
D 154.48 5 17778 24.40 23.16 21.88 19.91 18.02 4.28 10.28 7.37 88 96 10:41:07 CTR PCC Excel. None 414
C Comment at 154.48 ft Time: 10:41:17 :PANEL8 CENTER
D 159.63 2 6478 11.98 10.96 10.83 10.08 9.44 8.01 6.24 4.79 88 95 10:41:56 CTR PCC Excel. None 307
D 159.63 3 9599 18.12 16.69 16.23 15.08 14.10 11.82 9.12 6.94 88 95 10:42:03 CTR PCC Excel. None 301
D 159.63 4 12708 23.86 22.10 21.29 19.73 18.34 15.29 11.75 8.88 88 95 10:42:11 CTR PCC Excel. None 303
C Comment at 158.60 ft Time: 10:42:38 :PANEL8 JOINT - NOTE LONGITUDINAL CRACK ALONG PANEL 8
D 166.84 2 6612 9.75 9.66 8.45 7.57 6.76 5.25 3.57 2.40 89 97 10:46:12 CTR PCC Excel. None 386
D 166.84 3 9757 14.62 14.48 12.70 11.44 10.19 7.93 5.44 3.73 89 97 10:46:19 CTR PCC Excel. None 380
D 166.84 4 12853 19.23 19.02 16.77 15.14 13.45 10.49 7.21 5.05 89 97 10:46:27 CTR PCC Excel. None 380
D 166.84 5 17529 25.74 25.43 22.52 20.31 18.06 14.08 9.71 6.74 89 97 10:46:37 CTR PCC Excel. None 387
C Comment at 166.84 ft Time: 10:49:24 :PANEL9 CENTER - CRACKS ON PAVEMENT - MIDPANEL CRACK BETWEEN D0 AND D1
C Comment at 175.08 ft Time: 10:53:11 :CHP2 - DCP4 AT PANEL9 CENTTER
D 175.08 2 6620 8.14 7.91 7.07 6.36 5.86 4.88 3.66 2.67 89 98 10:53:48 CTR PCC Excel. None 463
D 175.08 3 9783 12.26 11.93 10.62 9.72 8.84 7.31 5.48 4.03 89 98 10:53:55 CTR PCC Excel. None 454
D 175.08 4 12931 16.22 15.81 14.09 12.97 11.70 9.65 7.26 5.31 89 98 10:54:03 CTR PCC Excel. None 453
D 175.08 5 17741 21.93 21.42 19.07 17.43 15.75 12.91 9.71 7.06 89 98 10:54:13 CTR PCC Excel. None 460
C Comment at 175.08 ft Time: 10:54:23 :PANEL10 JOINT
D 185.37 2 6589 6.27 5.75 5.63 5.09 4.64 3.82 2.82 2.09 89 99 10:55:04 CTR PCC Excel. None 598
D 185.37 3 9757 9.46 8.70 8.49 7.78 6.99 5.79 4.27 3.10 89 99 10:55:10 CTR PCC Excel. None 587
D 185.37 4 12937 12.52 11.49 11.30 10.39 9.30 7.63 5.67 4.11 89 99 10:55:18 CTR PCC Excel. None 587
D 185.37 5 17810 17.03 15.63 15.45 14.15 12.69 10.41 7.73 5.64 89 99 10:55:29 CTR PCC Excel. None 595
C Comment at 185.37 ft Time: 10:55:39 :PANEL11 CENTER - CRACKS ON PAVEMENT
D 190.52 2 6574 7.02 6.65 6.07 5.47 4.88 3.96 2.98 2.22 89 98 10:57:27 CTR PCC Excel. None 532
D 190.52 3 9697 10.63 10.11 9.17 8.34 7.38 5.96 4.51 3.36 89 98 10:57:34 CTR PCC Excel. None 519
D 190.52 4 12865 14.12 13.42 12.21 11.10 9.79 7.95 6.03 4.46 89 98 10:57:42 CTR PCC Excel. None 518
D 190.52 5 17497 19.17 18.27 16.62 15.08 13.28 10.74 8.16 6.04 89 98 10:57:52 CTR PCC Excel. None 519
C Comment at 190.52 ft Time: 10:58:02 :PANEL11 JOINT
C Comment at 196.70 ft Time: 10:59:01 :PANEL12 CENTER - DCP5 - CRACKS
D 196.70 2 6565 7.39 6.70 6.62 6.01 5.43 4.34 3.22 2.41 89 101 10:59:27 CTR PCC Excel. None 505
D 196.70 3 9749 11.17 10.13 10.03 9.17 8.21 6.60 4.90 3.63 89 101 10:59:34 CTR PCC Excel. None 496
D 196.70 4 12938 14.75 13.35 13.28 12.17 10.87 8.73 6.53 4.77 89 101 10:59:42 CTR PCC Excel. None 499
D 196.70 5 17748 20.01 18.10 18.14 16.57 14.82 11.92 8.87 6.42 89 101 10:59:52 CTR PCC Excel. None 504
C Comment at 196.70 ft Time: 11:00:19 :PANEL11 CENTER - DCP6 - CRACKS (NOTE: THERE IS NO DCP5)
C Comment at 196.70 ft Time: 11:01:03 :NOTE ERROR IN NOTES ABOVE. PANEL 10 JOINT SHOULD BE PANEL 9 JOINT, PANEL 11 CENTER

SHOULD BE PANEL 10 CENTER, PANEL 11 JOINT SHOULD BE PANEL 10 JOINT
D 201.85 2 6547 8.02 7.88 6.80 6.06 5.47 4.37 3.25 2.40 89 99 11:02:10 CTR PCC Excel. None 464
D 201.85 3 9709 12.25 12.07 10.38 9.31 8.30 6.63 4.92 3.63 89 99 11:02:16 CTR PCC Excel. None 451
D 201.85 4 12865 16.27 16.09 13.80 12.42 10.97 8.77 6.54 4.78 89 99 11:02:24 CTR PCC Excel. None 450
D 201.85 5 17606 22.21 22.04 18.84 16.90 14.95 11.85 8.85 6.45 89 99 11:02:35 CTR PCC Excel. None 451
C Comment at 201.85 ft Time: 11:02:44 :PANEL11 JOINT
D 207.00 2 6500 13.70 12.98 11.69 10.34 8.94 6.54 4.22 2.89 91 99 11:10:54 CTR PCC Excel. None 270
D 207.00 3 9667 20.34 19.26 17.37 15.40 13.31 9.82 6.45 4.39 91 99 11:11:01 CTR PCC Excel. None 270
D 207.00 4 12773 26.71 25.33 22.82 20.27 17.51 13.00 8.60 5.84 91 99 11:11:09 CTR PCC Excel. None 272
D 207.00 5 17351 36.26 34.44 31.00 27.58 23.82 17.75 11.78 7.99 91 99 11:11:19 CTR PCC Excel. None 272
C Comment at 207.00 ft Time: 11:11:29 :PANEL12 CENTER - LONGITUDINAL CRACK
D 211.12 2 6561 9.49 8.30 7.91 6.95 6.11 4.71 3.41 2.45 90 104 11:13:32 CTR PCC Excel. None 393
D 211.12 3 9720 14.40 12.58 12.02 10.60 9.27 7.11 5.16 3.68 90 104 11:13:39 CTR PCC Excel. None 384
D 211.12 4 12907 19.16 16.69 16.08 14.18 12.32 9.46 6.88 4.91 90 104 11:13:47 CTR PCC Excel. None 383
D 211.12 5 17638 26.49 22.96 22.26 19.61 16.97 12.94 9.42 6.75 90 104 11:13:58 CTR PCC Excel. None 379
C Comment at 211.12 ft Time: 11:14:08 :PANEL12 JOINT
D 219.36 2 6614 5.26 4.76 5.00 4.66 4.40 3.88 3.13 2.49 90 102 11:15:04 CTR PCC Excel. None 714
D 219.36 3 9838 7.94 7.21 7.56 7.13 6.63 5.86 4.76 3.77 90 102 11:15:10 CTR PCC Excel. None 705
D 219.36 4 13074 10.52 9.58 10.03 9.53 8.80 7.76 6.37 4.97 90 102 11:15:18 CTR PCC Excel. None 706
D 219.36 5 17991 14.42 13.13 13.80 13.06 12.07 10.67 8.72 6.85 90 102 11:15:29 CTR PCC Excel. None 709
C Comment at 219.36 ft Time: 11:15:39 :PANEL13 CENTER
D 216.27 2 6576 6.48 5.76 6.24 5.89 5.43 4.66 3.60 2.75 90 102 11:16:51 CTR PCC Excel. None 577
D 216.27 3 9778 9.73 8.66 9.39 8.85 8.18 6.99 5.46 4.16 90 102 11:16:58 CTR PCC Excel. None 571
D 216.27 4 13013 12.86 11.44 12.45 11.76 10.83 9.30 7.27 5.55 90 102 11:17:06 CTR PCC Excel. None 575
C Comment at 216.27 ft Time: 11:17:16 :Deflection is not decreasing
D 216.27 5 17788 17.50 15.59 17.03 16.09 14.79 12.64 9.92 7.57 90 102 11:18:22 CTR PCC Excel. None 578
C Comment at 216.27 ft Time: 11:18:32 :PANEL13 CENTER - TEST REDO ADJUST DISTUSTANCE - DCP7
D 220.39 2 6624 5.35 4.93 4.84 4.45 4.15 3.59 2.87 2.29 90 102 11:19:13 CTR PCC Excel. None 704
D 220.39 3 9826 8.06 7.45 7.31 6.79 6.23 5.43 4.37 3.45 90 102 11:19:20 CTR PCC Excel. None 693
D 220.39 4 13093 10.69 9.88 9.73 9.08 8.29 7.18 5.85 4.65 90 102 11:19:28 CTR PCC Excel. None 696
D 220.39 5 17955 14.68 13.62 13.40 12.44 11.35 9.86 7.99 6.35 90 102 11:19:38 CTR PCC Excel. None 696
C Comment at 220.39 ft Time: 11:19:48 :PANEL13 JOINT
D 227.60 2 6579 4.15 3.79 3.85 3.54 3.29 2.87 2.23 1.79 90 103 11:20:51 CTR PCC Excel. None 901
D 227.60 3 9802 6.24 5.70 5.80 5.40 4.98 4.30 3.46 2.72 90 103 11:20:57 CTR PCC Excel. None 893
D 227.60 4 13031 8.27 7.56 7.70 7.21 6.62 5.70 4.61 3.60 90 103 11:21:06 CTR PCC Excel. None 896
D 227.60 5 17933 11.29 10.32 10.58 9.86 9.09 7.81 6.27 4.92 90 103 11:21:15 CTR PCC Excel. None 903
C Comment at 226.57 ft Time: 11:21:25 :PANEL14 CENTER
D 231.72 2 6569 4.26 4.02 3.73 3.37 3.13 2.63 2.06 1.62 90 101 11:22:02 CTR PCC Excel. None 876
D 231.72 3 9725 6.43 6.08 5.63 5.15 4.72 3.98 3.11 2.44 90 101 11:22:08 CTR PCC Excel. None 860
D 231.72 4 12926 8.57 8.12 7.53 6.93 6.28 5.24 4.17 3.22 90 101 11:22:16 CTR PCC Excel. None 857
D 231.72 5 17813 11.76 11.13 10.35 9.47 8.60 7.20 5.66 4.39 90 101 11:22:27 CTR PCC Excel. None 862
C Comment at 231.72 ft Time: 11:22:36 :PANEL14 JOINT
D 237.90 2 6568 4.47 4.17 4.04 3.68 3.37 2.87 2.19 1.66 91 100 11:23:18 CTR PCC Excel. None 835
D 237.90 3 9720 6.76 6.29 6.11 5.64 5.12 4.35 3.33 2.53 91 100 11:23:24 CTR PCC Excel. None 818
D 237.90 4 12993 8.97 8.35 8.16 7.55 6.81 5.76 4.48 3.34 91 100 11:23:32 CTR PCC Excel. None 823
D 237.90 5 17904 12.20 11.39 11.14 10.28 9.30 7.83 6.04 4.51 91 100 11:23:43 CTR PCC Excel. None 834
C Comment at 236.87 ft Time: 11:23:52 :PANEL15 CENTER - DCP8
D 242.02 2 6545 5.02 4.58 4.41 4.00 3.65 3.02 2.33 1.80 91 101 11:24:29 CTR PCC Excel. None 741
D 242.02 3 9733 7.61 6.96 6.70 6.11 5.49 4.58 3.56 2.71 91 101 11:24:35 CTR PCC Excel. None 727
D 242.02 4 12935 10.17 9.32 8.98 8.21 7.35 6.09 4.77 3.60 91 101 11:24:44 CTR PCC Excel. None 724
D 242.02 5 17766 13.96 12.79 12.35 11.21 10.08 8.30 6.46 4.89 91 101 11:24:54 CTR PCC Excel. None 724
C Comment at 242.02 ft Time: 11:25:04 :PANEL15 JOINT
D 248.20 2 6613 3.96 3.71 3.60 3.30 3.11 2.70 2.16 1.71 91 101 11:25:42 CTR PCC Excel. None 950
D 248.20 3 9840 5.98 5.60 5.44 5.04 4.68 4.02 3.27 2.56 91 101 11:25:49 CTR PCC Excel. None 935
D 248.20 4 13096 7.90 7.38 7.21 6.72 6.15 5.33 4.33 3.40 91 101 11:25:56 CTR PCC Excel. None 943
D 248.20 5 18099 10.84 10.16 9.96 9.25 8.49 7.35 5.93 4.64 91 101 11:26:06 CTR PCC Excel. None 949
C Comment at 248.20 ft Time: 11:26:16 :PANEL16 CENTER
D 253.34 2 6558 4.69 4.35 4.14 3.75 3.41 2.80 2.15 1.69 91 102 11:26:59 CTR PCC Excel. None 796
D 253.34 3 9767 7.10 6.60 6.27 5.71 5.17 4.24 3.30 2.54 91 102 11:27:06 CTR PCC Excel. None 782
D 253.34 4 12966 9.47 8.79 8.39 7.66 6.89 5.69 4.43 3.39 91 102 11:27:14 CTR PCC Excel. None 779
D 253.34 5 17860 13.04 12.11 11.58 10.52 9.51 7.80 6.05 4.62 91 102 11:27:24 CTR PCC Excel. None 779
C Comment at 253.34 ft Time: 11:27:34 :PANEL16 JOINT
D 262.61 2 6551 4.92 4.56 4.39 4.00 3.67 3.13 2.39 1.91 92 103 11:28:13 CTR PCC Excel. None 757
D 262.61 3 9726 7.44 6.90 6.67 6.11 5.59 4.75 3.72 2.87 92 103 11:28:19 CTR PCC Excel. None 743
D 262.61 4 12956 9.82 9.11 8.84 8.14 7.38 6.26 4.94 3.76 92 103 11:28:27 CTR PCC Excel. None 750
D 262.61 5 17744 13.29 12.32 12.01 11.02 10.01 8.47 6.67 5.10 92 103 11:28:38 CTR PCC Excel. None 759
C Comment at 262.61 ft Time: 11:28:48 :PANEL17 CENTER
D 268.79 2 6587 5.35 4.99 4.82 4.39 4.08 3.40 2.62 2.02 92 102 11:30:07 CTR PCC Excel. None 700
D 268.79 3 9738 8.01 7.47 7.21 6.64 6.09 5.04 3.91 3.02 92 102 11:30:13 CTR PCC Excel. None 692
D 268.79 4 12908 10.59 9.89 9.57 8.83 8.01 6.66 5.23 3.96 92 102 11:30:21 CTR PCC Excel. None 693

D 268.79 5 17720 14.34 13.38 12.93 11.89 10.80 8.95 7.02 5.29 92 102 11:30:32 CTR PCC Excel. None 703
C Comment at 268.79 ft Time: 11:30:49 :PANEL17 JOINT
D 277.03 2 6618 4.72 4.43 4.34 4.02 3.76 3.23 2.54 2.02 92 103 11:32:34 CTR PCC Excel. None 797
D 277.03 3 9830 7.10 6.65 6.52 6.08 5.65 4.84 3.87 3.05 92 103 11:32:40 CTR PCC Excel. None 787
D 277.03 4 13082 9.38 8.79 8.67 8.10 7.46 6.40 5.17 4.02 92 103 11:32:49 CTR PCC Excel. None 793
D 277.03 5 17991 12.80 12.00 11.87 11.06 10.19 8.74 7.01 5.46 92 103 11:32:59 CTR PCC Excel. None 799
C Comment at 277.03 ft Time: 11:33:09 :PANEL18 CENTER
D 284.24 2 6552 7.10 6.87 6.00 5.29 4.78 3.79 2.81 2.14 92 101 11:35:16 CTR PCC Excel. None 525
D 284.24 3 9758 10.84 10.51 9.14 8.17 7.30 5.76 4.30 3.19 92 101 11:35:23 CTR PCC Excel. None 512
D 284.24 4 12983 14.48 14.08 12.22 11.01 9.76 7.69 5.82 4.26 92 101 11:35:31 CTR PCC Excel. None 510
D 284.24 5 17776 19.86 19.35 16.78 15.02 13.36 10.60 7.90 5.81 92 101 11:35:41 CTR PCC Excel. None 509
C Comment at 284.24 ft Time: 11:36:08 :PANEL18 JOINT - END AT 2505 CLIFF ROAD MAILBOX
C Comment at 1549.93 ft Time: 13:34:26 :SECOND SEGMENT OF CLIFF ROAD SITE
C Comment at 1549.93 ft Time: 13:34:59 :START FROM SOUTH SIDE WALKWAY ENTRANCE OF 2910CLIFF ROAD HOUSE - START PANEL#S
C Comment at 1549.93 ft Time: 13:35:16 :ZERO AT 1549.93FT (CENTER OF PANEL 1)
D 0.00 2 6584 11.95 11.38 10.97 10.16 9.33 7.80 6.28 4.88 99 109 13:35:54 CTR PCC Excel. None 313
D 0.00 3 9761 18.11 17.25 16.69 15.52 14.17 11.94 9.65 7.47 99 109 13:36:01 CTR PCC Excel. None 306
D 0.00 4 12942 24.11 22.94 22.24 20.73 18.86 15.92 12.91 10.00 99 109 13:36:09 CTR PCC Excel. None 305
D 0.00 5 17490 32.77 31.22 30.27 28.23 25.73 21.74 17.66 13.66 99 109 13:36:19 CTR PCC Excel. None 303
C Comment at 0.00 ft Time: 13:36:30 :PANEL1 CENTER - DCP1 - LONGITUDINAL CRACK
D 6.18 2 6489 12.46 11.70 11.55 10.88 10.10 8.69 7.08 5.54 99 109 13:37:13 CTR PCC Excel. None 296
D 6.18 3 9640 18.41 17.29 17.14 16.12 14.94 12.84 10.45 8.21 99 109 13:37:20 CTR PCC Excel. None 298
D 6.18 4 12802 24.30 22.79 22.63 21.31 19.73 16.90 13.78 10.80 99 109 13:37:28 CTR PCC Excel. None 300
D 6.18 5 17489 33.10 31.14 30.87 29.10 26.82 23.08 18.79 14.68 99 109 13:37:39 CTR PCC Excel. None 300
C Comment at 6.18 ft Time: 13:37:49 :PANEL1 JOINT
D 13.39 2 6445 10.73 9.82 10.29 9.71 9.03 7.89 6.54 5.24 100 108 13:38:55 CTR PCC Excel. None 342
D 13.39 3 9611 16.03 14.68 15.36 14.55 13.44 11.74 9.71 7.76 100 108 13:39:01 CTR PCC Excel. None 341
D 13.39 4 12747 21.23 19.48 20.37 19.32 17.76 15.55 12.85 10.24 100 108 13:39:10 CTR PCC Excel. None 341
D 13.39 5 17473 29.02 26.70 27.85 26.34 24.31 21.20 17.54 13.98 100 108 13:39:20 CTR PCC Excel. None 342
C Comment at 13.39 ft Time: 13:39:30 :PANEL2 CENTER
D 20.60 2 6529 7.47 7.14 6.82 6.38 5.89 5.06 4.11 3.27 101 107 13:41:02 CTR PCC Excel. None 497
D 20.60 3 9714 11.48 10.97 10.49 9.87 9.05 7.81 6.36 5.05 101 107 13:41:08 CTR PCC Excel. None 481
D 20.60 4 12933 15.46 14.81 14.15 13.32 12.15 10.51 8.60 6.81 101 107 13:41:16 CTR PCC Excel. None 476
D 20.60 5 17741 21.39 20.50 19.65 18.42 16.83 14.53 11.90 9.46 101 107 13:41:26 CTR PCC Excel. None 472
C Comment at 19.57 ft Time: 13:41:39 :PANEL2 JOINT - (NOTE: LONGITUDINAL CRACK FROM PANELS 1 TO 7)
D 28.84 2 6432 8.86 8.24 8.40 7.96 7.40 6.42 5.11 3.90 101 106 13:42:36 CTR PCC Excel. None 413
D 28.84 3 9665 13.46 12.55 12.75 12.11 11.22 9.73 7.75 5.87 101 106 13:42:43 CTR PCC Excel. None 408
D 28.84 4 12889 17.92 16.73 16.96 16.16 14.89 12.93 10.32 7.77 101 106 13:42:51 CTR PCC Excel. None 409
D 28.84 5 17680 24.39 22.86 23.16 22.00 20.28 17.61 14.11 10.61 101 106 13:43:01 CTR PCC Excel. None 412
C Comment at 28.84 ft Time: 13:43:11 :PANEL3 CENTER
D 35.02 2 6531 7.48 7.21 6.83 6.33 5.94 5.18 4.21 3.43 101 106 13:44:05 CTR PCC Excel. None 496
D 35.02 3 9721 11.19 10.80 10.24 9.59 8.86 7.76 6.39 5.14 101 106 13:44:12 CTR PCC Excel. None 494
D 35.02 4 12969 14.80 14.29 13.60 12.83 11.76 10.29 8.51 6.83 101 106 13:44:20 CTR PCC Excel. None 498
D 35.02 5 17783 20.32 19.64 18.75 17.63 16.16 14.24 11.80 9.50 101 106 13:44:30 CTR PCC Excel. None 498
C Comment at 35.02 ft Time: 13:44:40 :PANEL3 JOINT
D 42.22 2 6472 8.66 8.20 8.19 7.77 7.23 6.35 5.21 4.12 100 105 13:45:31 CTR PCC Excel. None 425
D 42.22 3 9704 13.14 12.44 12.43 11.85 10.95 9.66 7.93 6.26 100 105 13:45:38 CTR PCC Excel. None 420
D 42.22 4 12899 17.27 16.34 16.39 15.62 14.41 12.74 10.48 8.25 100 105 13:45:46 CTR PCC Excel. None 425
D 42.22 5 17837 23.33 22.11 22.20 21.13 19.53 17.25 14.21 11.23 100 105 13:45:56 CTR PCC Excel. None 435
C Comment at 41.19 ft Time: 13:46:06 :PANEL4 CENTER - DCP2 - CHP1
D 48.40 2 6462 9.78 9.43 9.05 8.49 7.81 6.79 5.55 4.42 101 105 13:47:01 CTR PCC Excel. None 376
D 48.40 3 9665 14.62 14.11 13.52 12.72 11.66 10.07 8.28 6.57 101 105 13:47:08 CTR PCC Excel. None 376
D 48.40 4 12908 19.17 18.52 17.70 16.69 15.23 13.17 10.85 8.58 101 105 13:47:16 CTR PCC Excel. None 383
D 48.40 5 17751 25.69 24.82 23.68 22.27 20.35 17.58 14.44 11.41 101 105 13:47:26 CTR PCC Excel. None 393
C Comment at 48.40 ft Time: 13:47:36 :PANEL4 JOINT
D 56.64 2 6477 8.13 7.67 7.75 7.40 6.93 6.21 5.27 4.30 100 105 13:49:01 CTR PCC Excel. None 453
D 56.64 3 9669 12.38 11.70 11.82 11.32 10.58 9.48 8.07 6.59 100 105 13:49:07 CTR PCC Excel. None 444
D 56.64 4 12899 16.44 15.54 15.71 15.06 14.03 12.63 10.74 8.79 100 105 13:49:15 CTR PCC Excel. None 446
D 56.64 5 17776 22.55 21.33 21.57 20.67 19.23 17.32 14.73 12.00 100 105 13:49:25 CTR PCC Excel. None 448
C Comment at 56.64 ft Time: 13:49:35 :PANEL5 CENTER
D 63.85 2 6484 8.86 8.55 8.21 7.70 7.12 6.17 5.09 4.02 100 106 13:50:16 CTR PCC Excel. None 416
D 63.85 3 9699 13.25 12.79 12.28 11.56 10.63 9.25 7.63 6.00 100 106 13:50:22 CTR PCC Excel. None 416
D 63.85 4 12892 17.43 16.83 16.15 15.28 14.00 12.18 10.09 7.93 100 106 13:50:30 CTR PCC Excel. None 421
D 63.85 5 17780 23.76 22.94 22.09 20.84 19.13 16.64 13.78 10.88 100 106 13:50:39 CTR PCC Excel. None 425
C Comment at 63.85 ft Time: 13:50:49 :PANEL5 JOINT
D 72.09 2 6466 9.47 8.97 8.86 8.36 7.71 6.75 5.57 4.45 99 106 13:51:51 CTR PCC Excel. None 388
D 72.09 3 9638 14.37 13.60 13.45 12.72 11.72 10.27 8.51 6.74 99 106 13:51:57 CTR PCC Excel. None 381
D 72.09 4 12800 19.19 18.16 17.99 17.06 15.72 13.78 11.43 9.09 99 106 13:52:05 CTR PCC Excel. None 379
D 72.09 5 17586 26.51 25.11 24.93 23.63 21.76 19.14 15.91 12.61 99 106 13:52:15 CTR PCC Excel. None 377
C Comment at 72.09 ft Time: 13:52:25 :PANEL6 CENTER

D 78.27 2 6504 8.41 7.91 7.96 7.53 6.98 6.17 5.06 4.02 99 105 13:53:20 CTR PCC Excel. None 440
D 78.27 3 9673 12.57 11.83 11.92 11.26 10.46 9.19 7.59 5.99 99 105 13:53:27 CTR PCC Excel. None 438
D 78.27 4 12888 16.70 15.69 15.85 15.01 13.88 12.23 10.12 7.98 99 105 13:53:35 CTR PCC Excel. None 439
D 78.27 5 17724 22.92 21.55 21.82 20.64 19.08 16.85 13.93 11.03 99 105 13:53:45 CTR PCC Excel. None 440
C Comment at 78.27 ft Time: 13:53:55 :PANEL6 JOINT
D 86.51 2 6539 8.06 7.60 7.63 7.23 6.71 5.89 4.84 3.84 100 104 13:57:15 CTR PCC Excel. None 462
D 86.51 3 9742 12.10 11.40 11.49 10.88 10.12 8.85 7.30 5.78 100 104 13:57:22 CTR PCC Excel. None 458
D 86.51 4 12927 15.98 15.06 15.19 14.46 13.38 11.79 9.73 7.69 100 104 13:57:30 CTR PCC Excel. None 460
D 86.51 5 17707 21.83 20.55 20.80 19.79 18.36 16.14 13.36 10.59 100 104 13:57:39 CTR PCC Excel. None 461
C Comment at 85.48 ft Time: 13:57:49 :PANEL7 CENTER - DCP3
D 92.69 2 6506 5.25 4.77 4.85 4.54 4.31 3.78 3.10 2.53 99 104 13:58:35 CTR PCC Excel. None 705
D 92.69 3 9727 8.04 7.31 7.42 7.00 6.53 5.75 4.76 3.83 99 104 13:58:42 CTR PCC Excel. None 688
D 92.69 4 12915 10.72 9.74 9.90 9.38 8.70 7.67 6.34 5.07 99 104 13:58:50 CTR PCC Excel. None 685
D 92.69 5 17890 14.87 13.54 13.76 12.97 12.02 10.66 8.80 7.02 99 104 13:59:01 CTR PCC Excel. None 684
C Comment at 92.69 ft Time: 13:59:11 :END OF LONGITUDINAL CRACK
C Comment at 92.69 ft Time: 13:59:26 :PANEL7 JOINT
D 100.93 2 6549 5.32 4.95 4.89 4.53 4.24 3.60 2.85 2.22 99 104 14:00:12 CTR PCC Excel. None 699
D 100.93 3 9809 8.04 7.48 7.40 6.90 6.39 5.48 4.35 3.41 99 104 14:00:18 CTR PCC Excel. None 694
D 100.93 4 13063 10.61 9.85 9.78 9.17 8.46 7.25 5.80 4.50 99 104 14:00:27 CTR PCC Excel. None 700
D 100.93 5 18029 14.50 13.46 13.42 12.55 11.57 9.99 7.99 6.18 99 104 14:00:37 CTR PCC Excel. None 707
C Comment at 100.93 ft Time: 14:00:47 :PANEL8 CENTER
D 106.08 2 6548 5.35 5.14 4.77 4.42 4.11 3.55 2.86 2.34 100 105 14:01:46 CTR PCC Excel. None 695
D 106.08 3 9801 8.17 7.86 7.26 6.71 6.23 5.34 4.38 3.55 100 105 14:01:52 CTR PCC Excel. None 682
D 106.08 4 13097 10.87 10.48 9.66 8.96 8.24 7.13 5.85 4.70 100 105 14:02:01 CTR PCC Excel. None 685
D 106.08 5 18002 14.90 14.41 13.25 12.27 11.25 9.76 7.99 6.36 100 105 14:02:11 CTR PCC Excel. None 687
C Comment at 105.05 ft Time: 14:02:21 :PANEL8 JOINT
D 115.34 2 6520 6.70 6.20 6.17 5.72 5.30 4.48 3.51 2.72 99 105 14:04:03 CTR PCC Excel. None 554
D 115.34 3 9750 9.99 9.23 9.24 8.64 7.95 6.76 5.33 4.11 99 105 14:04:10 CTR PCC Excel. None 555
D 115.34 4 12981 13.01 12.00 12.05 11.34 10.37 8.80 7.04 5.37 99 105 14:04:18 CTR PCC Excel. None 567
D 115.34 5 17948 17.44 16.07 16.19 15.24 13.95 11.89 9.48 7.22 99 105 14:04:29 CTR PCC Excel. None 585
C Comment at 115.34 ft Time: 14:04:38 :PANEL9 CENTER
D 121.52 2 6533 5.83 5.30 5.31 4.95 4.63 4.01 3.29 2.71 100 106 14:05:29 CTR PCC Excel. None 637
D 121.52 3 9794 8.90 8.09 8.10 7.57 7.00 6.08 5.00 4.08 100 106 14:05:35 CTR PCC Excel. None 626
D 121.52 4 13075 11.83 10.77 10.79 10.13 9.27 8.09 6.66 5.36 100 106 14:05:44 CTR PCC Excel. None 629
D 121.52 5 18021 16.21 14.79 14.80 13.77 12.63 10.96 8.98 7.22 100 106 14:05:54 CTR PCC Excel. None 632
C Comment at 121.52 ft Time: 14:06:04 :PANEL9 JOINT
D 129.76 2 6537 6.31 5.72 5.67 5.25 4.69 3.86 2.91 2.20 100 109 14:06:45 CTR PCC Excel. None 589
D 129.76 3 9761 9.52 8.63 8.59 7.92 7.14 5.84 4.46 3.34 100 109 14:06:52 CTR PCC Excel. None 583
D 129.76 4 13027 12.62 11.45 11.43 10.55 9.44 7.76 5.98 4.42 100 109 14:07:00 CTR PCC Excel. None 587
D 129.76 5 17960 17.35 15.73 15.74 14.48 12.97 10.66 8.22 6.07 100 109 14:07:11 CTR PCC Excel. None 589
C Comment at 129.76 ft Time: 14:07:20 :PANEL10 CENTER - DCP4
D 135.94 2 6509 6.32 5.89 5.57 5.02 4.58 3.69 2.80 2.14 99 109 14:08:05 CTR PCC Excel. None 585
D 135.94 3 9722 9.70 9.05 8.52 7.73 6.96 5.66 4.32 3.26 99 109 14:08:11 CTR PCC Excel. None 570
D 135.94 4 12962 12.95 12.10 11.41 10.42 9.33 7.59 5.79 4.35 99 109 14:08:19 CTR PCC Excel. None 569
D 135.94 5 17746 17.89 16.75 15.78 14.35 12.89 10.43 7.96 5.92 99 109 14:08:30 CTR PCC Excel. None 564
C Comment at 135.94 ft Time: 14:08:40 :PANEL10 JOINT
D 145.21 2 6533 5.97 5.44 5.41 4.96 4.54 3.78 2.90 2.23 100 110 14:10:37 CTR PCC Excel. None 622
D 145.21 3 9749 9.08 8.26 8.25 7.58 6.93 5.75 4.47 3.39 100 110 14:10:44 CTR PCC Excel. None 610
D 145.21 4 13008 12.03 10.94 10.96 10.13 9.19 7.64 5.99 4.52 100 110 14:10:52 CTR PCC Excel. None 615
D 145.21 5 17949 16.56 15.05 15.14 14.00 12.70 10.58 8.28 6.23 100 110 14:11:03 CTR PCC Excel. None 616
C Comment at 145.21 ft Time: 14:11:13 :PANEL11 CENTER
D 150.36 2 6570 6.53 6.08 5.75 5.25 4.75 3.95 3.02 2.34 101 110 14:12:29 CTR PCC Excel. None 572
D 150.36 3 9777 9.87 9.20 8.67 7.94 7.17 5.88 4.59 3.53 101 110 14:12:36 CTR PCC Excel. None 563
D 150.36 4 13069 13.14 12.24 11.59 10.65 9.57 7.89 6.19 4.69 101 110 14:12:44 CTR PCC Excel. None 566
D 150.36 5 17979 18.10 16.90 16.01 14.66 13.17 10.88 8.48 6.41 101 110 14:12:54 CTR PCC Excel. None 565
C Comment at 150.36 ft Time: 14:13:04 :PANEL11 JOINT
D 163.75 2 6583 4.80 4.36 4.48 4.15 3.89 3.39 2.69 2.13 101 109 14:15:07 CTR PCC Excel. None 781
D 163.75 3 9829 7.25 6.57 6.78 6.37 5.92 5.13 4.10 3.22 101 109 14:15:14 CTR PCC Excel. None 771
D 163.75 4 13101 9.60 8.70 9.01 8.49 7.85 6.82 5.47 4.22 101 109 14:15:22 CTR PCC Excel. None 776
D 163.75 5 18076 13.11 11.88 12.36 11.62 10.76 9.34 7.50 5.77 101 109 14:15:33 CTR PCC Excel. None 784
C Comment at 162.72 ft Time: 14:15:42 :PANEL12 CENTER - DCP5
D 168.90 2 6553 4.84 4.69 4.18 3.79 3.52 2.96 2.31 1.84 101 109 14:16:24 CTR PCC Excel. None 770
D 168.90 3 9828 7.39 7.18 6.41 5.87 5.34 4.46 3.54 2.80 101 109 14:16:31 CTR PCC Excel. None 756
D 168.90 4 13075 9.82 9.54 8.53 7.83 7.08 5.96 4.73 3.67 101 109 14:16:39 CTR PCC Excel. None 757
D 168.90 5 18091 13.60 13.25 11.85 10.81 9.78 8.20 6.48 5.02 101 109 14:16:50 CTR PCC Excel. None 756
C Comment at 168.90 ft Time: 14:17:00 :PANEL12 JOINT
D 177.14 2 6530 5.56 5.21 5.00 4.60 4.26 3.56 2.77 2.12 100 109 14:17:39 CTR PCC Excel. None 668
D 177.14 3 9785 8.33 7.80 7.51 6.95 6.38 5.31 4.13 3.17 100 109 14:17:45 CTR PCC Excel. None 668
D 177.14 4 13004 10.96 10.27 9.96 9.23 8.39 7.02 5.50 4.17 100 109 14:17:54 CTR PCC Excel. None 675
D 177.14 5 18007 14.93 13.99 13.63 12.57 11.46 9.59 7.54 5.66 100 109 14:18:04 CTR PCC Excel. None 686

C Comment at 177.14 ft Time: 14:18:14 :PANEL13 CENTER
D 184.34 2 6529 6.68 6.21 5.64 5.04 4.56 3.68 2.80 2.19 99 109 14:18:50 CTR PCC Excel. None 555
D 184.34 3 9747 10.27 9.55 8.66 7.76 6.93 5.58 4.26 3.32 99 109 14:18:57 CTR PCC Excel. None 540
D 184.34 4 12961 13.76 12.84 11.64 10.47 9.30 7.43 5.71 4.38 99 109 14:19:05 CTR PCC Excel. None 535
D 184.34 5 17839 19.14 17.91 16.20 14.48 12.86 10.24 7.79 5.94 99 109 14:19:15 CTR PCC Excel. None 530
C Comment at 184.34 ft Time: 14:19:25 :PANEL13 JOINT
D 192.58 2 6505 6.55 5.92 5.88 5.38 4.82 3.96 2.95 2.18 99 110 14:20:05 CTR PCC Excel. None 565
D 192.58 3 9657 9.90 8.93 8.87 8.14 7.31 6.00 4.52 3.32 99 110 14:20:11 CTR PCC Excel. None 555
D 192.58 4 12896 13.17 11.86 11.82 10.90 9.75 8.01 6.07 4.44 99 110 14:20:19 CTR PCC Excel. None 557
D 192.58 5 17730 18.10 16.31 16.32 15.03 13.47 11.06 8.39 6.12 99 110 14:20:30 CTR PCC Excel. None 557
C Comment at 191.55 ft Time: 14:20:40 :PANEL14 CENTER
D 197.73 2 6515 7.68 7.43 6.38 5.72 4.99 3.93 2.89 2.18 100 109 14:21:15 CTR PCC Excel. None 483
D 197.73 3 9705 11.78 11.39 9.80 8.77 7.63 6.02 4.43 3.28 100 109 14:21:22 CTR PCC Excel. None 468
D 197.73 4 12941 15.74 15.22 13.14 11.83 10.24 8.02 5.95 4.38 100 109 14:21:30 CTR PCC Excel. None 467
D 197.73 5 17649 21.79 21.02 18.25 16.34 14.16 11.12 8.19 6.01 100 109 14:21:41 CTR PCC Excel. None 461
C Comment at 197.73 ft Time: 14:21:50 :PANEL14 JOINT
C Comment at 205.97 ft Time: 14:22:28 :Deflection is not decreasing
D 205.97 2 6446 13.97 12.59 13.93 13.46 12.86 11.61 9.38 7.23 99 107 14:22:35 CTR PCC Excel. None 262
C Comment at 205.97 ft Time: 14:22:41 :Deflection is not decreasing
D 205.97 3 9605 20.12 18.14 19.98 19.29 18.39 16.51 13.33 10.22 99 107 14:22:42 CTR PCC Excel. None 271
C Comment at 205.97 ft Time: 14:22:51 :Deflection is not decreasing
D 205.97 4 12781 25.81 23.27 25.58 24.75 23.46 20.98 16.99 12.95 99 107 14:22:51 CTR PCC Excel. None 282
C Comment at 205.97 ft Time: 14:23:02 :Deflection is not decreasing
D 205.97 5 17505 33.53 30.28 33.22 32.03 30.24 26.90 21.77 16.49 99 107 14:23:03 CTR PCC Excel. None 297
C Comment at 205.97 ft Time: 14:23:14 :PANEL15 CENTER - DCP6 - SMALL CRACK
D 213.18 2 6495 8.12 7.59 7.07 6.50 6.00 5.25 4.30 3.67 98 105 14:23:54 CTR PCC Excel. None 455
D 213.18 3 9710 12.64 11.86 11.00 10.15 9.30 8.06 6.63 5.56 98 105 14:24:00 CTR PCC Excel. None 437
D 213.18 4 12896 17.00 16.00 14.82 13.71 12.49 10.77 8.86 7.38 98 105 14:24:09 CTR PCC Excel. None 431
D 213.18 5 17761 23.76 22.43 20.71 19.05 17.40 14.92 12.26 10.10 98 105 14:24:19 CTR PCC Excel. None 425
C Comment at 213.18 ft Time: 14:24:29 :PANEL15 JOINT
D 220.39 2 6513 10.91 10.21 10.11 9.33 8.53 6.93 5.02 3.50 99 105 14:25:52 CTR PCC Excel. None 339
D 220.39 3 9715 15.30 14.26 14.19 13.10 11.96 9.74 7.12 4.96 99 105 14:25:59 CTR PCC Excel. None 361
D 220.39 4 12978 19.39 18.03 18.00 16.67 15.20 12.46 9.18 6.36 99 105 14:26:07 CTR PCC Excel. None 381
D 220.39 5 17818 25.41 23.51 23.68 21.92 20.00 16.42 12.21 8.51 99 105 14:26:18 CTR PCC Excel. None 399
C Comment at 220.39 ft Time: 14:26:27 :PANEL16CENTER
D 227.60 2 6527 7.05 6.30 6.43 5.99 5.63 4.98 4.15 3.59 100 105 14:27:36 CTR PCC Excel. None 527
D 227.60 3 9743 10.80 9.65 9.82 9.17 8.52 7.48 6.27 5.31 100 105 14:27:42 CTR PCC Excel. None 513
D 227.60 4 12996 14.44 12.93 13.12 12.24 11.32 9.92 8.32 6.96 100 105 14:27:51 CTR PCC Excel. None 512
D 227.60 5 17792 19.96 17.92 18.14 16.83 15.50 13.52 11.26 9.42 100 105 14:28:01 CTR PCC Excel. None 507
C Comment at 227.60 ft Time: 14:28:11 :PANEL16 JOINT

Project: Meadowbrook Dr., Burlington

```
IKUAB FWD FILE    : Meadowcreek_2AUG2012.fwd
HProject No.      : TR640
HLocation         : BURLINGTON - MEADOWCREEK
HClient           : IOWA DOT
HStart Station    : PANEL IN FRONT OF 2729MEADOWCREEK DRIVEWAY
HDirection        : EB LANE
HEnd Station      :
HWeather          : SUNNY 90
HOperator         : PV

IDate Created     : 8/2/2012
IVersion          : 2.3.11
ILoad Mode        : 1      (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91      (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :    0     1     2     3     4     5     6     7
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00  (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset :   0.00 ft
ITestpoint spacing:   0.00 ft

J Dist. Imp Load  D0    D1    D2   D3   D4   D5   D6   D7   Air Pave     Time                Pavement Pavement Pavement  Pavement Surface
J    m Num  lbf  mils  mils  mils  mils  mils  mils  mils  mils  °F  °F              Location     Type    Condition Distress    Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D  71.06  2  6674  7.08  6.76  6.12  5.42  4.85  3.84  2.85  2.08  96  110 16:54:39    CTR    PCC    Excel.   None    536
D  71.06  3  9901 10.32  9.79  8.93  8.02  7.16  5.67  4.25  3.12  96  110 16:54:46    CTR    PCC    Excel.   None    545
D  71.06  4 13076 13.29 12.53 11.56 10.43  9.30  7.39  5.58  4.05  96  110 16:54:54    CTR    PCC    Excel.   None    560
D  71.06  5 17952 17.74 16.61 15.53 14.00 12.49 10.00  7.55  5.50  96 110 16:55:05  CTR    PCC    Excel.   None    575
C  Comment at 70.03 ft  Time: 16:55:15 :PANEL1 CENTER - DCP1 - CRACKS ON PAVEMENT
D  77.24  2  6570  8.65  7.51  8.05  7.48  6.94  5.92  4.59  3.45  95  109 16:56:04    CTR    PCC    Excel.   None    432
D  77.24  3  9778 12.80 11.22 11.82 11.03 10.10  8.52  6.61  4.96  95  109 16:56:11    CTR    PCC    Excel.   None    434
D  77.24  4 13020 16.80 14.82 15.45 14.36 13.11 10.98  8.51  6.30  95  109 16:56:19 CTR    PCC    Excel.   None    441
D  77.24  5 17935 22.80 20.22 20.81 19.18 17.48 14.55 11.13  8.25  95  109 16:56:30 CTR    PCC    Excel.   None    447
C  Comment at 77.24 ft  Time: 16:56:40 :PANEL1 JOINT
D  85.48  2  6566  5.83  5.49  5.16  4.70  4.28  3.56  2.67  2.03  95  109 16:57:21    CTR    PCC    Excel.   None    640
D  85.48  3  9778  8.80  8.26  7.80  7.17  6.46  5.38  4.11  3.08  95  109 16:57:27    CTR    PCC    Excel.   None    632
D  85.48  4 12993 11.60 10.88 10.34  9.53  8.58  7.14  5.48  4.08  95  109 16:57:36    CTR    PCC    Excel.   None    637
D  85.48  5 18011 15.76 14.78 14.14 12.97 11.73  9.74  7.51  5.61  95  109 16:57:46   CTR    PCC    Excel.   None    650
C  Comment at 85.48 ft  Time: 16:57:56 :PANEL2 CENTER - CRACKS ON PAVEMENT
D  91.66  2  6554  5.61  5.16  4.92  4.47  4.10  3.44  2.73  2.10  95  110 17:00:18    CTR    PCC    Excel.   None    665
D  91.66  3  9765  8.53  7.88  7.50  6.88  6.24  5.22  4.14  3.19  95  110 17:00:25    CTR    PCC    Excel.   None    651
D  91.66  4 12987 11.37 10.50 10.01  9.21  8.35  7.02  5.56  4.25  95  110 17:00:33    CTR    PCC    Excel.   None    650
D  91.66  5 17916 15.69 14.51 13.82 12.72 11.55  9.71  7.65  5.84  95  110 17:00:44   CTR    PCC    Excel.   None    649
C  Comment at 90.63 ft  Time: 17:00:54 :PANEL2 JOINT
D  99.90  2  6546  5.48  4.91  5.00  4.64  4.19  3.52  2.75  2.10  96  110 17:01:36    CTR    PCC    Excel.   None    680
D  99.90  3  9802  8.32  7.47  7.60  7.08  6.43  5.41  4.22  3.20  96  110 17:01:43    CTR    PCC    Excel.   None    670
D  99.90  4 13077 11.00  9.88 10.12  9.45  8.56  7.20  5.65  4.29  96  110 17:01:51    CTR    PCC    Excel.   None    676
D  99.90  5 17832 14.87 13.36 13.74 12.77 11.62  9.75  7.67  5.85  96  110 17:02:02   CTR    PCC    Excel.   None    682
C  Comment at 99.90 ft  Time: 17:02:25 :PANEL3 CENTER
D 106.08  2  6555  5.02  4.63  4.54  4.14  3.83  3.20  2.53  1.97  96  110 17:03:12    CTR    PCC    Excel.   None    742
D 106.08  3  9822  7.62  7.01  6.86  6.36  5.80  4.87  3.85  2.96  96  110 17:03:19    CTR    PCC    Excel.   None    733
D 106.08  4 13084 10.12  9.30  9.16  8.50  7.77  6.54  5.17  3.95  96  110 17:03:27    CTR    PCC    Excel.   None    735
D 106.08  5 18069 13.89 12.78 12.64 11.68 10.66  8.99  7.13  5.51  96  110 17:03:38 CTR    PCC    Excel.   None    740
C  Comment at 106.08 ft  Time: 17:03:47 :PANEL3 JOINT
D 114.31  2  6582  4.24  3.87  3.89  3.58  3.33  2.82  2.24  1.73  95  110 17:04:29    CTR    PCC    Excel.   None    882
D 114.31  3  9779  6.38  5.80  5.84  5.44  5.01  4.25  3.39  2.64  95  110 17:04:35    CTR    PCC    Excel.   None    872
D 114.31  4 13059  8.47  7.70  7.79  7.32  6.66  5.71  4.58  3.51  95  110 17:04:44    CTR    PCC    Excel.   None    877
D 114.31  5 18044 11.56 10.57 10.72 10.00  9.18  7.85  6.26  4.83  95  110 17:04:54   CTR    PCC    Excel.   None    887
C  Comment at 114.31 ft  Time: 17:05:03 :PANEL4 CENTER
D 120.49  2  6519  4.33  4.04  3.74  3.38  3.13  2.59  2.03  1.57  95  109 17:05:49    CTR    PCC    Excel.   None    856
D 120.49  3  9826  6.60  6.19  5.75  5.32  4.79  3.95  3.10  2.36  95  109 17:05:56    CTR    PCC    Excel.   None    846
D 120.49  4 13097  8.80  8.23  7.72  7.09  6.39  5.34  4.19  3.16  95  109 17:06:04    CTR    PCC    Excel.   None    846
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D 120.49 5 18160 12.15 11.36 10.69 9.81 8.88 7.41 5.77 4.36 95 109 17:06:14 CTR PCC Excel. None 850
C Comment at 120.49 ft Time: 17:06:24 :PANEL4 JOINT
D 128.73 2 6543 6.10 5.84 5.44 4.99 4.55 3.76 2.86 2.08 95 110 17:07:03 CTR PCC Excel. None 610
D 128.73 3 9758 8.97 8.58 8.02 7.40 6.72 5.54 4.23 3.07 95 110 17:07:10 CTR PCC Excel. None 619
D 128.73 4 12960 11.51 10.97 10.32 9.55 8.66 7.17 5.50 3.98 95 110 17:07:18 CTR PCC Excel. None 640
D 128.73 5 17944 15.28 14.52 13.80 12.75 11.55 9.58 7.37 5.36 95 110 17:07:29 CTR PCC Excel. None 668
C Comment at 127.70 ft Time: 17:07:39 :PANEL5 CENTER
D 134.91 2 6517 7.32 7.22 6.62 6.16 5.79 5.06 4.11 3.31 95 109 17:08:17 CTR PCC Excel. None 506
D 134.91 3 9722 10.51 10.34 9.43 8.86 8.22 7.13 5.83 4.68 95 109 17:08:24 CTR PCC Excel. None 526
D 134.91 4 12930 13.42 13.23 12.06 11.35 10.48 9.07 7.42 5.90 95 109 17:08:32 CTR PCC Excel. None 548
D 134.91 5 17770 17.58 17.32 15.81 14.82 13.67 11.80 9.63 7.64 95 109 17:08:43 CTR PCC Excel. None 575
C Comment at 134.91 ft Time: 17:08:53 :PANEL5 JOINT
D 143.15 2 6559 8.80 8.02 8.26 7.76 7.29 6.38 5.24 4.23 96 110 17:09:29 CTR PCC Excel. None 424
D 143.15 3 9760 12.80 11.66 11.98 11.29 10.51 9.22 7.56 6.05 96 110 17:09:36 CTR PCC Excel. None 434
D 143.15 4 13004 16.37 14.91 15.36 14.53 13.43 11.76 9.64 7.67 96 110 17:09:44 CTR PCC Excel. None 452
C Comment at 143.15 ft Time: 17:10:11 :PANEL6 CENTER
C Comment at 144.18 ft Time: 17:10:27 :DCP2
D 149.33 2 6580 5.97 5.54 5.41 5.00 4.67 4.06 3.31 2.68 96 110 17:11:26 CTR PCC Excel. None 627
D 149.33 3 9807 9.00 8.36 8.14 7.60 7.01 6.12 5.01 4.00 96 110 17:11:33 CTR PCC Excel. None 620
D 149.33 4 13079 11.92 11.09 10.80 10.11 9.31 8.10 6.65 5.29 96 110 17:11:41 CTR PCC Excel. None 624
D 149.33 5 18012 16.38 15.26 14.85 13.81 12.75 11.07 9.05 7.23 96 110 17:11:51 CTR PCC Excel. None 625
C Comment at 148.30 ft Time: 17:12:01 :PANEL6 JOINT
D 156.54 2 6553 6.57 5.91 6.04 5.57 5.15 4.35 3.38 2.55 96 110 17:12:42 CTR PCC Excel. None 567
D 156.54 3 9765 9.78 8.80 8.99 8.35 7.69 6.49 5.08 3.80 96 110 17:12:49 CTR PCC Excel. None 568
D 156.54 4 13006 12.74 11.46 11.77 10.92 10.00 8.49 6.64 4.95 96 110 17:12:57 CTR PCC Excel. None 581
D 156.54 5 17916 17.02 15.27 15.72 14.59 13.33 11.28 8.84 6.60 96 110 17:13:08 CTR PCC Excel. None 599
C Comment at 155.51 ft Time: 17:13:17 :PANEL7 CENTER
D 162.72 2 6544 5.41 4.89 4.82 4.35 3.95 3.20 2.47 1.93 96 110 17:13:57 CTR PCC Excel. None 688
D 162.72 3 9748 8.18 7.41 7.31 6.63 6.00 4.88 3.79 2.88 96 110 17:14:04 CTR PCC Excel. None 678
D 162.72 4 13012 10.89 9.86 9.74 8.86 7.97 6.51 5.07 3.85 96 110 17:14:12 CTR PCC Excel. None 680
D 162.72 5 17974 15.05 13.66 13.47 12.21 10.99 8.98 6.96 5.33 96 110 17:14:22 CTR PCC Excel. None 679
C Comment at 162.72 ft Time: 17:14:32 :PANEL7 JOINT
D 171.99 2 6539 4.85 4.33 4.37 3.96 3.62 2.98 2.28 1.73 96 110 17:15:10 CTR PCC Excel. None 766
D 171.99 3 9770 7.33 6.52 6.64 6.11 5.51 4.56 3.49 2.62 96 110 17:15:17 CTR PCC Excel. None 758
D 171.99 4 12952 9.68 8.62 8.80 8.08 7.32 6.05 4.66 3.47 96 110 17:15:25 CTR PCC Excel. None 761
D 171.99 5 18011 13.36 11.94 12.22 11.20 10.16 8.40 6.41 4.81 96 110 17:15:35 CTR PCC Excel. None 766
C Comment at 171.99 ft Time: 17:15:44 :PANEL8 CENTER
D 178.17 2 6538 5.33 4.83 4.57 4.08 3.64 2.89 2.14 1.59 96 110 17:16:36 CTR PCC Excel. None 697
D 178.17 3 9756 8.13 7.38 6.98 6.29 5.57 4.44 3.32 2.44 96 110 17:16:43 CTR PCC Excel. None 682
D 178.17 4 13008 10.85 9.84 9.37 8.45 7.45 5.96 4.45 3.27 96 110 17:16:51 CTR PCC Excel. None 682
D 178.17 5 17949 15.03 13.64 13.02 11.69 10.33 8.26 6.16 4.51 96 110 17:17:02 CTR PCC Excel. None 679
C Comment at 178.17 ft Time: 17:17:11 :PANEL8 JOINT
D 187.43 2 6514 4.85 4.42 4.34 3.93 3.57 2.92 2.19 1.66 96 110 17:17:50 CTR PCC Excel. None 764
D 187.43 3 9707 7.34 6.69 6.56 6.05 5.44 4.47 3.40 2.51 96 110 17:17:57 CTR PCC Excel. None 752
D 187.43 4 12964 9.73 8.86 8.71 8.07 7.23 5.96 4.55 3.36 96 110 17:18:05 CTR PCC Excel. None 758
D 187.43 5 17940 13.36 12.18 12.03 11.06 9.99 8.18 6.27 4.65 96 110 17:18:16 CTR PCC Excel. None 764
C Comment at 187.43 ft Time: 17:18:25 :PANEL9 CENTER
D 192.58 2 6528 5.29 4.84 4.56 4.12 3.65 2.91 2.11 1.58 95 109 17:20:13 CTR PCC Excel. None 702
D 192.58 3 9736 8.10 7.41 7.00 6.34 5.61 4.45 3.28 2.41 95 109 17:20:20 CTR PCC Excel. None 684
D 192.58 4 12966 10.81 9.89 9.36 8.47 7.47 5.99 4.44 3.21 95 109 17:20:28 CTR PCC Excel. None 682
D 192.58 5 17782 14.92 13.68 12.96 11.71 10.32 8.25 6.07 4.42 95 109 17:20:39 CTR PCC Excel. None 678
C Comment at 192.58 ft Time: 17:20:48 :PANEL9 JOINT
D 201.85 2 6521 5.36 4.71 4.71 4.25 3.84 3.06 2.29 1.64 95 107 17:21:24 CTR PCC Excel. None 692
D 201.85 3 9726 8.13 7.13 7.18 6.53 5.86 4.70 3.54 2.57 95 107 17:21:31 CTR PCC Excel. None 680
D 201.85 4 12983 10.82 9.50 9.61 8.75 7.83 6.31 4.76 3.43 95 107 17:21:39 CTR PCC Excel. None 682
D 201.85 5 17832 14.89 13.09 13.29 12.05 10.82 8.71 6.52 4.72 95 107 17:21:50 CTR PCC Excel. None 681
C Comment at 201.85 ft Time: 17:21:59 :PANEL10 CENTER - DCP3
D 207.00 2 6522 4.63 4.20 4.05 3.66 3.34 2.71 2.03 1.52 95 106 17:22:39 CTR PCC Excel. None 801
D 207.00 3 9719 7.04 6.40 6.17 5.64 5.09 4.13 3.11 2.27 95 106 17:22:46 CTR PCC Excel. None 785
D 207.00 4 12954 9.48 8.61 8.32 7.63 6.87 5.57 4.22 3.04 95 106 17:22:54 CTR PCC Excel. None 777
D 207.00 5 17925 13.16 11.99 11.62 10.60 9.57 7.76 5.82 4.24 95 106 17:23:04 CTR PCC Excel. None 775
C Comment at 205.97 ft Time: 17:23:14 :PANEL10 JOINT
D 215.24 2 6526 4.57 4.06 4.05 3.61 3.31 2.62 1.98 1.44 96 106 17:23:51 CTR PCC Excel. None 812
D 215.24 3 9740 6.93 6.19 6.18 5.60 4.99 4.01 3.03 2.22 96 106 17:23:58 CTR PCC Excel. None 799
D 215.24 4 13011 9.26 8.24 8.28 7.55 6.69 5.41 4.11 2.97 96 106 17:24:05 CTR PCC Excel. None 799
D 215.24 5 17980 12.77 11.39 11.47 10.42 9.28 7.53 5.69 4.12 96 106 17:24:15 CTR PCC Excel. None 801
C Comment at 215.24 ft Time: 17:24:25 :PANEL11 CENTER
D 221.42 2 6532 4.68 4.28 3.96 3.50 3.12 2.45 1.81 1.35 96 109 17:25:01 CTR PCC Excel. None 793
D 221.42 3 9732 7.16 6.54 6.07 5.46 4.81 3.76 2.80 2.08 96 109 17:25:08 CTR PCC Excel. None 773
C Comment at 221.42 ft Time: 17:25:38 :PANEL11 JOINT

D 221.42 2 6542 4.70 4.29 3.98 3.52 3.16 2.48 1.83 1.37 96 109 17:26:01 CTR PCC Excel. None 792
D 221.42 3 9765 7.16 6.54 6.08 5.46 4.81 3.76 2.81 2.09 96 109 17:26:08 CTR PCC Excel. None 775
D 221.42 4 13007 9.59 8.75 8.15 7.33 6.49 5.12 3.83 2.81 96 109 17:26:16 CTR PCC Excel. None 771
D 221.42 5 17977 13.44 12.25 11.44 10.29 9.10 7.18 5.34 3.94 96 109 17:26:26 CTR PCC Excel. None 761
C Comment at 262.61 ft Time: 17:27:42 :PANEL12 CENTER
C Comment at 229.66 ft Time: 17:30:26 :THE LAST TEST WAS PANEL11 JOINT REPEAT
D 229.66 2 6563 5.35 4.83 4.71 4.21 3.83 3.10 2.26 1.70 97 109 17:31:01 CTR PCC Excel. None 698
D 229.66 3 9802 8.16 7.37 7.18 6.51 5.86 4.67 3.49 2.52 97 109 17:31:08 CTR PCC Excel. None 683
D 229.66 4 13035 10.84 9.75 9.61 8.71 7.83 6.25 4.70 3.35 97 109 17:31:16 CTR PCC Excel. None 683
D 229.66 5 17843 14.82 13.35 13.17 11.90 10.68 8.59 6.41 4.59 97 109 17:31:27 CTR PCC Excel. None 685
C Comment at 229.66 ft Time: 17:31:36 :PANEL12 CENTER
D 235.84 2 6543 5.69 5.18 4.80 4.24 3.79 2.97 2.17 1.59 97 109 17:32:50 CTR PCC Excel. None 654
D 235.84 3 9736 8.70 7.92 7.33 6.55 5.80 4.60 3.34 2.41 97 109 17:32:57 CTR PCC Excel. None 637
D 235.84 4 12982 11.65 10.61 9.91 8.85 7.84 6.18 4.52 3.20 97 109 17:33:05 CTR PCC Excel. None 634
D 235.84 5 17696 16.09 14.70 13.73 12.21 10.84 8.49 6.22 4.43 97 109 17:33:16 CTR PCC Excel. None 625
C Comment at 234.81 ft Time: 17:33:25 :PANEL12 JOINT
D 244.08 2 6566 4.17 3.76 3.80 3.50 3.20 2.62 1.99 1.51 97 108 17:34:03 CTR PCC Excel. None 896
D 244.08 3 9789 6.33 5.69 5.78 5.37 4.89 3.98 3.08 2.29 97 108 17:34:10 CTR PCC Excel. None 880
D 244.08 4 13018 8.43 7.55 7.74 7.21 6.51 5.38 4.16 3.09 97 108 17:34:17 CTR PCC Excel. None 878
D 244.08 5 18110 11.72 10.49 10.82 10.01 9.09 7.53 5.79 4.33 97 108 17:34:27 CTR PCC Excel. None 879
C Comment at 244.08 ft Time: 17:34:37 :PANEL13 CENTER - DCP4
D 250.26 2 6564 4.81 4.46 4.10 3.65 3.24 2.61 1.94 1.46 97 108 17:35:13 CTR PCC Excel. None 776
D 250.26 3 9772 7.33 6.83 6.27 5.63 4.99 4.01 2.99 2.20 97 108 17:35:20 CTR PCC Excel. None 758
D 250.26 4 13031 9.82 9.12 8.42 7.59 6.69 5.41 4.05 2.98 97 108 17:35:28 CTR PCC Excel. None 755
D 250.26 5 17973 13.63 12.68 11.73 10.52 9.35 7.48 5.61 4.10 97 108 17:35:39 CTR PCC Excel. None 750
C Comment at 250.26 ft Time: 17:35:48 :PANEL13 JOINT
D 259.52 2 6566 4.96 4.53 4.33 3.85 3.49 2.77 2.01 1.48 97 108 17:36:24 CTR PCC Excel. None 753
D 259.52 3 9781 7.62 6.95 6.69 6.05 5.42 4.31 3.19 2.33 97 108 17:36:31 CTR PCC Excel. None 730
D 259.52 4 13028 10.13 9.21 8.94 8.14 7.22 5.81 4.31 3.12 97 108 17:36:39 CTR PCC Excel. None 732
D 259.52 5 17976 13.97 12.73 12.41 11.22 10.03 8.04 5.95 4.34 97 108 17:36:50 CTR PCC Excel. None 731
C Comment at 259.52 ft Time: 17:37:00 :PANEL14 CENTER
D 264.67 2 6592 5.25 4.84 4.54 4.10 3.67 2.91 2.14 1.60 97 108 17:37:54 CTR PCC Excel. None 714
D 264.67 3 9827 8.05 7.43 6.94 6.26 5.62 4.50 3.32 2.40 97 108 17:38:01 CTR PCC Excel. None 694
D 264.67 4 13105 10.77 9.95 9.34 8.49 7.52 6.06 4.48 3.23 97 108 17:38:09 CTR PCC Excel. None 692
D 264.67 5 18118 15.05 13.93 13.07 11.79 10.51 8.39 6.20 4.49 97 108 17:38:20 CTR PCC Excel. None 685
C Comment at 264.67 ft Time: 17:38:29 :PANEL14 JOINT
D 273.94 2 6509 4.84 4.32 4.57 4.22 3.97 3.36 2.57 1.89 97 107 17:39:12 CTR PCC Excel. None 764
D 273.94 3 9769 7.48 6.65 7.04 6.63 6.09 5.18 4.03 2.99 97 107 17:39:19 CTR PCC Excel. None 743
D 273.94 4 12995 9.96 8.86 9.43 8.91 8.16 6.95 5.47 4.03 97 107 17:39:27 CTR PCC Excel. None 742
D 273.94 5 17845 13.59 12.09 12.86 12.10 11.10 9.52 7.42 5.46 97 107 17:39:37 CTR PCC Excel. None 747
C Comment at 273.94 ft Time: 17:39:47 :PANEL15 CENTER
D 280.12 2 6642 4.20 3.92 3.71 3.38 3.14 2.66 2.13 1.67 97 106 17:40:28 CTR PCC Excel. None 900
D 280.12 3 9864 6.38 5.95 5.65 5.20 4.77 4.05 3.25 2.57 97 106 17:40:35 CTR PCC Excel. None 880
D 280.12 4 13149 8.48 7.93 7.56 6.97 6.37 5.47 4.35 3.42 97 106 17:40:43 CTR PCC Excel. None 881
D 280.12 5 18193 11.71 10.94 10.50 9.67 8.84 7.55 6.03 4.71 97 106 17:40:52 CTR PCC Excel. None 883
C Comment at 280.12 ft Time: 17:41:02 :PANEL15 JOINT
D 288.36 2 6613 4.77 4.48 4.25 3.86 3.56 2.94 2.24 1.70 96 105 17:41:39 CTR PCC Excel. None 789
D 288.36 3 9855 7.23 6.77 6.46 5.95 5.43 4.51 3.47 2.60 96 105 17:41:46 CTR PCC Excel. None 775
D 288.36 4 13097 9.55 8.94 8.59 7.96 7.19 5.99 4.65 3.45 96 105 17:41:54 CTR PCC Excel. None 780
D 288.36 5 18088 13.11 12.22 11.82 10.91 9.92 8.27 6.42 4.77 96 105 17:42:05 CTR PCC Excel. None 785
C Comment at 288.36 ft Time: 17:42:15 :PANEL16 CENTER - DCP5
C Comment at 295.57 ft Time: 17:43:55 :PANEL16 JOINT
D 295.57 2 6626 5.22 4.73 4.52 4.06 3.69 3.06 2.36 1.84 96 104 17:44:21 CTR PCC Excel. None 722
D 295.57 3 9843 7.87 7.15 6.84 6.26 5.60 4.65 3.60 2.75 96 104 17:44:28 CTR PCC Excel. None 711
D 295.57 4 13119 10.57 9.61 9.23 8.48 7.57 6.28 4.88 3.72 96 104 17:44:36 CTR PCC Excel. None 706
D 295.57 5 18098 14.63 13.29 12.80 11.66 10.49 8.69 6.72 5.13 96 104 17:44:47 CTR PCC Excel. None 704
C Comment at 295.57 ft Time: 17:44:56 :PANEL16 JOINT
D 303.81 2 6621 4.44 4.05 4.03 3.67 3.35 2.80 2.15 1.65 95 103 17:48:39 CTR PCC Excel. None 847
D 303.81 3 9863 6.77 6.16 6.14 5.71 5.17 4.30 3.33 2.54 95 103 17:48:46 CTR PCC Excel. None 829
D 303.81 4 13116 9.03 8.22 8.24 7.69 6.96 5.80 4.53 3.39 95 103 17:48:54 CTR PCC Excel. None 826
D 303.81 5 18149 12.46 11.35 11.43 10.63 9.65 8.03 6.26 4.72 95 103 17:49:04 CTR PCC Excel. None 828
C Comment at 303.81 ft Time: 17:49:14 :PANEL17 CENTER
D 309.99 2 6578 5.23 4.78 4.40 3.90 3.53 2.79 2.07 1.63 95 102 17:49:55 CTR PCC Excel. None 715
D 309.99 3 9793 8.02 7.36 6.78 6.06 5.38 4.26 3.18 2.37 95 102 17:50:02 CTR PCC Excel. None 694
D 309.99 4 13010 10.75 9.89 9.15 8.22 7.29 5.82 4.34 3.20 95 102 17:50:10 CTR PCC Excel. None 688
D 309.99 5 18055 15.09 13.88 12.88 11.50 10.26 8.18 6.10 4.49 95 102 17:50:21 CTR PCC Excel. None 681
C Comment at 309.99 ft Time: 17:50:30 :PANEL17 JOINT
D 319.26 2 6555 6.46 6.00 5.95 5.55 5.20 4.44 3.46 2.62 95 101 17:51:14 CTR PCC Excel. None 577
D 319.26 3 9685 9.59 8.90 8.83 8.27 7.72 6.59 5.16 3.90 95 101 17:51:21 CTR PCC Excel. None 574
D 319.26 4 12945 12.82 11.91 11.86 11.16 10.36 8.84 6.97 5.26 95 101 17:51:29 CTR PCC Excel. None 574

D 319.26 5 17882 17.59 16.32 16.33 15.34 14.24 12.17 9.59 7.22 95 101 17:51:40 CTR PCC Excel. None 578
C Comment at 319.26 ft Time: 17:51:49 :PANEL18 CENTER
D 325.43 2 6535 5.96 5.47 5.52 5.18 4.91 4.42 3.69 3.11 95 99 17:52:32 CTR PCC Excel. None 624
D 325.43 3 9769 8.96 8.24 8.27 7.79 7.30 6.54 5.48 4.56 95 99 17:52:38 CTR PCC Excel. None 620
D 325.43 4 13013 11.88 10.93 10.94 10.35 9.64 8.58 7.22 5.93 95 99 17:52:47 CTR PCC Excel. None 623
D 325.43 5 17985 16.48 15.17 15.13 14.27 13.31 11.75 9.85 8.04 95 99 17:52:57 CTR PCC Excel. None 620
C Comment at 325.43 ft Time: 17:53:07 :PANEL18 JOINT
D 333.67 2 6566 4.73 4.41 4.26 3.91 3.59 3.07 2.39 1.93 95 96 17:53:43 CTR PCC Excel. None 790
D 333.67 3 9828 7.18 6.67 6.48 6.01 5.49 4.64 3.70 2.94 95 96 17:53:50 CTR PCC Excel. None 778
D 333.67 4 13107 9.50 8.80 8.63 8.03 7.31 6.25 4.98 3.91 95 96 17:53:58 CTR PCC Excel. None 784
D 333.67 5 18131 13.12 12.15 11.96 11.10 10.17 8.66 6.89 5.45 95 96 17:54:08 CTR PCC Excel. None 786
C Comment at 332.64 ft Time: 17:54:18 :PANEL19 CENTER
D 338.82 2 6552 6.42 6.04 5.66 5.15 4.69 3.85 2.95 2.29 95 95 17:55:12 CTR PCC Excel. None 580
D 338.82 3 9765 9.75 9.18 8.57 7.81 7.11 5.85 4.49 3.41 95 95 17:55:19 CTR PCC Excel. None 570
D 338.82 4 13026 13.01 12.27 11.48 10.49 9.49 7.79 6.00 4.51 95 95 17:55:27 CTR PCC Excel. None 569
D 338.82 5 17995 18.01 16.99 15.91 14.48 13.10 10.77 8.26 6.23 95 95 17:55:37 CTR PCC Excel. None 568
C Comment at 338.82 ft Time: 17:55:47 :PANEL19 JOINT
D 347.06 2 6538 5.16 4.72 4.86 4.53 4.23 3.73 3.06 2.49 95 94 17:56:26 CTR PCC Excel. None 721
D 347.06 3 9777 7.81 7.16 7.31 6.91 6.48 5.74 4.71 3.80 95 94 17:56:33 CTR PCC Excel. None 712
D 347.06 4 13029 10.42 9.53 9.78 9.30 8.69 7.67 6.36 5.09 95 94 17:56:41 CTR PCC Excel. None 711
D 347.06 5 17714 14.16 12.94 13.31 12.67 11.84 10.49 8.67 6.98 95 94 17:56:51 CTR PCC Excel. None 711
C Comment at 347.06 ft Time: 17:57:01 :PANEL20 CENTER - DCP7
C Comment at 347.06 ft Time: 17:57:14 :note: DCP6 ON PANEL18 CENTER
D 354.27 2 6554 6.01 5.63 5.32 4.86 4.49 3.80 3.01 2.39 95 93 17:57:59 CTR PCC Excel. None 620
D 354.27 3 9627 9.05 8.50 8.00 7.36 6.74 5.73 4.56 3.59 95 93 17:58:06 CTR PCC Excel. None 605
D 354.27 4 12984 12.32 11.56 10.95 10.07 9.22 7.80 6.26 4.91 95 93 17:58:14 CTR PCC Excel. None 599
D 354.27 5 17884 17.19 16.16 15.29 14.04 12.83 10.88 8.70 6.86 95 93 17:58:25 CTR PCC Excel. None 592
C Comment at 354.27 ft Time: 17:58:35 :PANEL20 JOINT
D 362.51 2 6565 4.86 4.47 4.35 3.95 3.60 3.01 2.35 1.88 95 92 17:59:16 CTR PCC Excel. None 769
D 362.51 3 9785 7.41 6.83 6.63 6.13 5.56 4.68 3.68 2.88 95 92 17:59:22 CTR PCC Excel. None 751
D 362.51 4 13010 9.92 9.13 8.97 8.26 7.48 6.26 5.00 3.93 95 92 17:59:31 CTR PCC Excel. None 745
D 362.51 5 17759 13.59 12.51 12.34 11.35 10.32 8.68 6.91 5.42 95 92 17:59:40 CTR PCC Excel. None 743
C Comment at 362.51 ft Time: 17:59:50 :PANEL21 CENTER
D 368.69 2 6556 5.09 4.59 4.57 4.18 3.90 3.24 2.46 1.85 94 92 18:00:27 CTR PCC Excel. None 732
D 368.69 3 9782 7.81 7.05 7.02 6.50 5.98 4.93 3.78 2.83 94 92 18:00:33 CTR PCC Excel. None 712
D 368.69 4 12967 10.37 9.37 9.39 8.71 7.91 6.59 5.03 3.73 94 92 18:00:42 CTR PCC Excel. None 711
D 368.69 5 17956 14.51 13.12 13.17 12.19 11.11 9.21 7.04 5.24 94 92 18:00:52 CTR PCC Excel. None 703
C Comment at 368.69 ft Time: 18:01:02 :PANEL21 JOINT
D 376.93 2 6598 2.89 2.59 2.46 2.19 1.94 1.60 1.24 1.02 94 91 18:01:36 CTR PCC Excel. None 1300
D 376.93 3 9836 4.44 3.96 3.82 3.40 3.01 2.45 1.96 1.58 94 91 18:01:42 CTR PCC Excel. None 1259
D 376.93 4 13133 5.96 5.31 5.14 4.62 4.07 3.34 2.68 2.15 94 91 18:01:49 CTR PCC Excel. None 1252
D 376.93 5 18194 8.36 7.45 7.23 6.48 5.77 4.73 3.78 3.04 94 91 18:01:59 CTR PCC Excel. None 1238
C Comment at 376.93 ft Time: 18:02:09 :PANEL22 CENTER
D 384.14 2 6585 3.31 2.98 2.83 2.54 2.27 1.77 1.31 0.98 94 90 18:02:54 CTR PCC Excel. None 1132
D 384.14 3 9807 5.08 4.60 4.35 3.89 3.48 2.73 2.05 1.50 94 90 18:03:00 CTR PCC Excel. None 1098
D 384.14 4 13105 6.84 6.18 5.90 5.30 4.70 3.71 2.78 2.04 94 90 18:03:08 CTR PCC Excel. None 1090
D 384.14 5 17883 9.49 8.59 8.18 7.33 6.54 5.16 3.87 2.83 94 90 18:03:17 CTR PCC Excel. None 1072
C Comment at 384.14 ft Time: 18:03:28 :PANEL22 JOINT
D 392.38 2 6514 3.46 3.33 2.89 2.51 2.26 1.71 1.27 0.96 93 91 18:04:04 CTR PCC Excel. None 1071
D 392.38 3 9787 5.34 5.12 4.48 3.93 3.46 2.66 1.97 1.45 93 91 18:04:10 CTR PCC Excel. None 1042
D 392.38 4 13143 7.16 6.86 6.09 5.33 4.67 3.64 2.69 1.98 93 91 18:04:18 CTR PCC Excel. None 1043
D 392.38 5 18176 10.07 9.62 8.57 7.52 6.62 5.17 3.82 2.80 93 91 18:04:28 CTR PCC Excel. None 1027
C Comment at 391.35 ft Time: 18:04:37 :PANEL23 CENTER
D 397.52 2 6547 8.09 7.59 6.79 5.96 5.28 3.98 2.70 1.80 93 91 18:05:16 CTR PCC Excel. None 460
D 397.52 3 9763 11.97 11.25 10.06 8.92 7.83 5.92 4.06 2.69 93 91 18:05:23 CTR PCC Excel. None 464
D 397.52 4 12981 15.65 14.71 13.17 11.76 10.25 7.76 5.35 3.52 93 91 18:05:32 CTR PCC Excel. None 472
D 397.52 5 17985 21.29 19.94 17.92 15.93 13.92 10.54 7.29 4.82 93 91 18:05:42 CTR PCC Excel. None 480
C Comment at 397.52 ft Time: 18:05:52 :PANEL23 JOINT
D 404.73 2 6577 3.93 3.42 3.61 3.33 3.12 2.69 2.16 1.74 92 91 18:06:38 CTR PCC Excel. None 952
D 404.73 3 9666 6.04 5.25 5.56 5.22 4.85 4.18 3.37 2.69 92 91 18:06:44 CTR PCC Excel. None 910
D 404.73 4 13020 8.31 7.22 7.74 7.32 6.72 5.84 4.72 3.76 92 91 18:06:52 CTR PCC Excel. None 891
D 404.73 5 17989 11.79 10.25 11.05 10.43 9.64 8.36 6.74 5.39 92 91 18:07:02 CTR PCC Excel. None 867
C Comment at 404.73 ft Time: 18:07:11 :PANELL24 CENTER
D 411.94 2 6574 4.80 4.42 4.16 3.73 3.35 2.62 1.92 1.40 92 90 18:07:53 CTR PCC Excel. None 780
D 411.94 3 9747 7.39 6.81 6.41 5.79 5.16 4.07 3.02 2.15 92 90 18:08:00 CTR PCC Excel. None 750
D 411.94 4 12913 9.91 9.18 8.65 7.82 6.95 5.54 4.12 2.92 92 90 18:08:08 CTR PCC Excel. None 741
D 411.94 5 17906 14.05 13.08 12.29 11.10 9.92 7.89 5.84 4.18 92 90 18:08:18 CTR PCC Excel. None 725
C Comment at 410.91 ft Time: 18:08:28 :PANEL24 JOINT
D 420.18 2 6560 3.94 3.61 3.35 2.95 2.62 2.08 1.60 1.26 92 90 18:09:15 CTR PCC Excel. None 947
D 420.18 3 9795 6.11 5.60 5.21 4.66 4.08 3.27 2.53 1.92 92 90 18:09:21 CTR PCC Excel. None 911

D 420.18 4 13006 8.25 7.55 7.08 6.35 5.60 4.47 3.49 2.65 92 90 18:09:29 CTR PCC Excel. None 896
D 420.18 5 17878 11.62 10.64 10.02 8.99 7.94 6.38 4.96 3.79 92 90 18:09:38 CTR PCC Excel. None 875
C Comment at 420.18 ft Time: 18:09:48 :PANEL25 CENTER
D 426.36 2 6562 4.96 4.46 4.24 3.75 3.39 2.63 1.95 1.40 92 90 18:10:30 CTR PCC Excel. None 752
D 426.36 3 9758 7.73 6.96 6.60 5.90 5.21 4.13 3.06 2.19 92 90 18:10:37 CTR PCC Excel. None 718
D 426.36 4 12979 10.51 9.48 9.03 8.09 7.16 5.68 4.23 2.98 92 90 18:10:45 CTR PCC Excel. None 702
D 426.36 5 17971 14.99 13.58 12.91 11.54 10.25 8.17 6.04 4.31 92 90 18:10:55 CTR PCC Excel. None 682
C Comment at 426.36 ft Time: 18:11:05 :PANEL25 JOINT
D 434.60 2 6540 4.21 3.68 3.71 3.32 2.99 2.31 1.65 1.20 92 90 18:11:44 CTR PCC Excel. None 883
D 434.60 3 9782 6.55 5.75 5.79 5.25 4.63 3.65 2.62 1.84 92 90 18:11:50 CTR PCC Excel. None 849
D 434.60 4 13050 8.87 7.78 7.90 7.15 6.32 4.98 3.62 2.55 92 90 18:11:58 CTR PCC Excel. None 836
D 434.60 5 17975 12.53 11.00 11.23 10.17 9.05 7.13 5.19 3.70 92 90 18:12:08 CTR PCC Excel. None 816
C Comment at 434.60 ft Time: 18:12:17 :PANEL26 CENTER
D 440.78 2 6559 4.68 4.32 3.81 3.27 2.87 2.09 1.43 1.00 92 91 18:13:01 CTR PCC Excel. None 797
D 440.78 3 9786 7.30 6.75 5.97 5.19 4.48 3.29 2.27 1.59 92 91 18:13:07 CTR PCC Excel. None 762
D 440.78 4 12978 9.91 9.16 8.19 7.14 6.17 4.52 3.16 2.20 92 91 18:13:14 CTR PCC Excel. None 745
D 440.78 5 17985 14.26 13.22 11.86 10.30 8.96 6.63 4.60 3.23 92 91 18:13:24 CTR PCC Excel. None 717
C Comment at 440.78 ft Time: 18:13:34 :PANEL26 JOINT
D 450.05 2 6566 4.01 3.50 3.52 3.13 2.82 2.22 1.58 1.17 92 93 18:14:12 CTR PCC Excel. None 931
D 450.05 3 9809 6.22 5.46 5.50 4.96 4.43 3.51 2.56 1.82 92 93 18:14:18 CTR PCC Excel. None 896
D 450.05 4 13059 8.43 7.39 7.50 6.78 6.04 4.76 3.53 2.48 92 93 18:14:25 CTR PCC Excel. None 881
D 450.05 5 18059 11.96 10.50 10.71 9.68 8.66 6.86 5.07 3.63 92 93 18:14:35 CTR PCC Excel. None 859
C Comment at 450.05 ft Time: 18:14:45 :PANEL27 CENTER
D 456.23 2 6529 4.94 4.96 3.92 3.42 2.96 2.15 1.48 0.99 92 95 18:15:27 CTR PCC Excel. None 751
D 456.23 3 9774 7.70 7.73 6.16 5.35 4.64 3.44 2.38 1.62 92 95 18:15:33 CTR PCC Excel. None 722
D 456.23 4 13024 10.45 10.49 8.42 7.33 6.35 4.73 3.28 2.22 92 95 18:15:41 CTR PCC Excel. None 709
D 456.23 5 18034 14.85 14.92 12.06 10.50 9.12 6.84 4.78 3.26 92 95 18:15:50 CTR PCC Excel. None 691
C Comment at 456.23 ft Time: 18:16:00 :NOTE CRACK AT JOINT BETWEEN PANELS 27 AND 28
C Comment at 463.44 ft Time: 18:17:06 :Deflection is not decreasing
D 463.44 2 6581 6.43 5.24 6.38 6.05 4.31 2.93 2.31 1.69 92 96 18:17:08 CTR PCC Excel. None 582
C Comment at 463.44 ft Time: 18:17:15 :Deflection is not decreasing
D 463.44 3 9785 9.72 7.87 9.72 9.36 6.54 4.42 3.55 2.62 92 96 18:17:16 CTR PCC Excel. None 573
C Comment at 463.44 ft Time: 18:17:24 :Deflection is not decreasing
D 463.44 4 13038 12.96 10.47 13.06 12.59 8.74 5.90 4.80 3.53 92 96 18:17:26 CTR PCC Excel. None 572
C Comment at 463.44 ft Time: 18:17:36 :Deflection is not decreasing
D 463.44 5 17867 17.81 14.43 18.06 17.38 12.05 8.15 6.68 4.96 92 96 18:17:38 CTR PCC Excel. None 570
C Comment at 463.44 ft Time: 18:17:47 :PANEL28 CENTER - NOTE CRACK ON PAVEMENT
D 471.67 2 6590 4.64 4.04 3.66 3.12 2.65 1.87 1.22 0.81 92 94 18:18:44 CTR PCC Excel. None 808
D 471.67 3 9810 7.15 6.25 5.68 4.91 4.15 2.93 1.96 1.27 92 94 18:18:50 CTR PCC Excel. None 780
D 471.67 4 13048 9.67 8.45 7.73 6.66 5.63 4.01 2.69 1.74 92 94 18:18:58 CTR PCC Excel. None 767
D 471.67 5 18100 13.78 12.01 11.06 9.54 8.09 5.78 3.86 2.51 92 94 18:19:08 CTR PCC Excel. None 747
C Comment at 471.67 ft Time: 18:19:17 :PANEL28 JOINT
D 478.88 2 6589 3.50 3.08 3.06 2.72 2.37 1.83 1.27 0.94 92 98 18:19:57 CTR PCC Excel. None 1072
D 478.88 3 9844 5.41 4.76 4.75 4.26 3.73 2.89 2.06 1.45 92 98 18:20:03 CTR PCC Excel. None 1034
D 478.88 4 13001 7.16 6.29 6.33 5.71 4.98 3.88 2.77 1.92 92 98 18:20:11 CTR PCC Excel. None 1032
D 478.88 5 18094 10.08 8.85 8.95 8.04 7.06 5.47 3.95 2.75 92 98 18:20:21 CTR PCC Excel. None 1020
C Comment at 478.88 ft Time: 18:20:31 :PANEL29 CENTER - DCP10
D 486.09 2 6595 3.61 3.33 3.03 2.66 2.37 1.80 1.27 0.91 92 99 18:21:06 CTR PCC Excel. None 1038
D 486.09 3 9835 5.57 5.14 4.68 4.17 3.66 2.78 2.01 1.42 92 99 18:21:12 CTR PCC Excel. None 1004
D 486.09 4 13080 7.47 6.87 6.31 5.63 4.92 3.77 2.73 1.93 92 99 18:21:19 CTR PCC Excel. None 995
D 486.09 5 18158 10.63 9.77 8.97 8.00 7.02 5.40 3.90 2.77 92 99 18:21:29 CTR PCC Excel. None 972
C Comment at 486.09 ft Time: 18:21:39 :PANEL29 JOINT
D 493.30 2 6614 3.59 3.16 3.15 2.80 2.50 1.93 1.38 0.99 92 98 18:22:19 CTR PCC Excel. None 1048
D 493.30 3 9852 5.51 4.86 4.85 4.39 3.87 3.00 2.19 1.54 92 98 18:22:25 CTR PCC Excel. None 1017
D 493.30 4 13151 7.38 6.50 6.55 5.92 5.22 4.09 2.99 2.10 92 98 18:22:32 CTR PCC Excel. None 1014
D 493.30 5 18088 10.27 9.06 9.15 8.25 7.31 5.76 4.19 2.97 92 98 18:22:42 CTR PCC Excel. None 1001
C Comment at 493.30 ft Time: 18:22:52 :PANEL30 CENTER
D 501.54 2 6591 3.75 3.36 3.10 2.72 2.37 1.78 1.26 0.89 92 98 18:23:42 CTR PCC Excel. None 1000
D 501.54 3 9807 5.80 5.20 4.79 4.24 3.68 2.83 2.01 1.41 92 98 18:23:48 CTR PCC Excel. None 962
D 501.54 4 13096 7.82 7.02 6.50 5.77 5.01 3.82 2.74 1.89 92 98 18:23:55 CTR PCC Excel. None 953
D 501.54 5 17958 11.07 9.92 9.23 8.19 7.12 5.49 3.93 2.74 92 98 18:24:05 CTR PCC Excel. None 922
C Comment at 501.54 ft Time: 18:24:15 :PANEL30 JOIINT
C Comment at 501.54 ft Time: 18:24:41 :END TESTS IN FRONT OF 2705 MEADOWBROOK

Project: W38 Locust Rd, Winneshiek County

```
IKUAB FWD FILE    : W38-Locust Road_9AUG2012.fwd
HProject No.      : TR640
HLocation         : DECORAH - LOCUST ROAD OR W38  SB
HClient           : IOWA DOT
HStart Station    : NEAR 3821 LOCUST ROAD DRIVEWAY
HDirection        : SB LANE
HEnd Station      :
HWeather          : CLOUDY 65
HOperator         : PV

IDate Created     : 8/9/2012
IVersion          : 2.3.11
ILoad Mode        : 1      (SHRP 8+8 buffers, 0 plates)
IPlate Radius     : 5.91      (in)
IExtra Field Set  : Example Road
IDrop Sequence    : 11234
INo of drops      : 11111
IRecord Drop?     : NHHHH
IDrop Height      :    1    2    3    4
IImpact Load      :  6003  9005 12007 16009 lbf
ISensor Number    :     0     1     2     3     4     5     6     7
ISensor Distance  :   0.00  12.00  12.00  18.00  24.00  36.00  48.00  60.00 (in)
ISensor Position  : CENTER  FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset :   0.00 ft
ITestpoint spacing:   0.00 ft

J Dist. Imp Load  D0    D1    D2    D3    D4    D5    D6    D7   Air Pave     Time              Pavement Pavement Pavement  Pavement Surface
J    m Num   lbf  mils  mils  mils  mils  mils  mils  mils  mils  °F  °F               Location     Type     Condition Distress    Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D    0.00  2  6804   3.32   3.08   3.07   2.76   2.57   2.21   1.77   1.48   70   80 12:50:23    CTR      PCC      Excel.   None     1165
D    0.00  3 10041   5.05   4.66   4.67   4.32   3.90   3.32   2.71   2.21   70   80 12:50:30    CTR      PCC      Excel.   None     1130
D    0.00  4 13200   6.73   6.11   6.17   5.65   5.17   4.38   3.58   2.90   70   80 12:50:38    CTR      PCC      Excel.   None     1116
D    0.00  5 17592   9.06   8.21   8.30   7.61   6.97   5.92   4.78   3.90   70   80 12:50:48    CTR      PCC      Excel.   None     1105
C  Comment at 0.00 ft  Time: 12:50:58 :PANEL1 CENTER
C  Comment at 6.18 ft  Time: 12:52:29 :Deflection is not decreasing
D    6.18  2  6713   7.29   2.52   5.56   4.70   4.20   3.19   2.31   1.83   70   79 12:52:32    CTR      PCC      Excel.   None      524
C  Comment at 6.18 ft  Time: 12:52:39 :Deflection is not decreasing
D    6.18  3  9875  10.46   3.77   8.08   7.00   6.17   4.68   3.47   2.55   70   79 12:52:41    CTR      PCC      Excel.   None      537
C  Comment at 6.18 ft  Time: 12:52:49 :Deflection is not decreasing
D    6.18  4 12971  13.47   4.93  10.48   9.11   8.03   6.13   4.58   3.37   70   79 12:52:52    CTR      PCC      Excel.   None      548
C  Comment at 6.18 ft  Time: 12:53:03 :Deflection is not decreasing
D    6.18  5 17619  17.78   6.68  13.84  11.97  10.63   8.11   6.00   4.45   70   79 12:53:04    CTR      PCC      Excel.   None      563
C  Comment at 6.18 ft  Time: 12:53:22 :PANEL1 JOINT
D   14.42  2  6722   3.17   2.96   2.91   2.64   2.46   2.13   1.74   1.50   70   79 12:54:06    CTR      PCC      Excel.   None     1207
D   14.42  3  9921   4.82   4.47   4.42   4.14   3.77   3.22   2.65   2.24   70   79 12:54:12    CTR      PCC      Excel.   None     1172
D   14.42  4 13011   6.37   5.85   5.85   5.39   4.99   4.27   3.49   2.98   70   79 12:54:20    CTR      PCC      Excel.   None     1161
D   14.42  5 17809   8.69   7.97   7.94   7.36   6.79   5.79   4.66   3.94   70   79 12:54:30    CTR      PCC      Excel.   None     1166
C  Comment at 14.42 ft  Time: 12:54:41 :PANEL2 CENTER - DCP1-CHP1
C  Comment at 20.60 ft  Time: 12:55:36 :Deflection is not decreasing
D   20.60  2  6663   7.91   1.87   5.86   4.87   4.31   3.21   2.31   1.89   70   80 12:55:37    CTR      PCC      Excel.   None      479
C  Comment at 20.60 ft  Time: 12:55:44 :Deflection is not decreasing
D   20.60  3  9830  11.29   2.73   8.45   7.22   6.29   4.65   3.43   2.47   70   80 12:55:53    CTR      PCC      Excel.   None      495
C  Comment at 20.60 ft  Time: 12:56:01 :Deflection is not decreasing
D   20.60  4 12910  14.26   3.58  10.78   9.18   8.07   6.03   4.46   3.27   70   80 12:56:02    CTR      PCC      Excel.   None      515
C  Comment at 20.60 ft  Time: 12:56:13 :Deflection is not decreasing
D   20.60  5 17611  18.68   4.78  14.18  12.12  10.65   7.99   5.90   4.33   70   80 12:56:17    CTR      PCC      Excel.   None      536
C  Comment at 19.57 ft  Time: 12:56:27 :PANEL2 JOINT
D   28.84  2  6707   3.03   2.82   2.76   2.53   2.35   2.02   1.63   1.39   70   79 12:57:14    CTR      PCC      Excel.   None     1260
D   28.84  3  9889   4.58   4.23   4.18   3.92   3.59   3.03   2.48   2.01   70   79 12:57:21    CTR      PCC      Excel.   None     1228
D   28.84  4 13090   6.08   5.60   5.57   5.16   4.76   4.04   3.31   2.68   70   79 12:57:28    CTR      PCC      Excel.   None     1223
D   28.84  5 17764   8.29   7.57   7.54   7.00   6.46   5.47   4.44   3.54   70   79 12:57:39    CTR      PCC      Excel.   None     1219
C  Comment at 28.84 ft  Time: 12:57:49 :PANEL3 CENTER
C  Comment at 35.02 ft  Time: 12:58:34 :Deflection is not decreasing
D   35.02  2  6637   8.94   2.09   6.61   5.52   4.77   3.56   2.50   1.81   70   80 12:58:36    CTR      PCC      Excel.   None      422
C  Comment at 35.02 ft  Time: 12:58:43 :Deflection is not decreasing
D   35.02  3  9774  12.30   3.14   9.21   7.82   6.74   5.02   3.59   2.52   70   80 12:58:45    CTR      PCC      Excel.   None      452
C  Comment at 35.02 ft  Time: 12:58:53 :Deflection is not decreasing
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D 35.02 4 12965 15.42 4.17 11.66 9.98 8.59 6.46 4.66 3.28 70 80 12:58:55 CTR PCC Excel. None 478
C Comment at 35.02 ft Time: 12:59:06 :Deflection is not decreasing
D 35.02 5 17415 19.68 5.71 14.93 12.77 11.07 8.37 6.05 4.24 70 80 12:59:11 CTR PCC Excel. None 503
C Comment at 35.02 ft Time: 12:59:21 :PANEL3 JOINT
D 43.25 2 6707 3.14 2.90 2.87 2.58 2.41 2.04 1.67 1.48 70 79 13:00:10 CTR PCC Excel. None 1215
D 43.25 3 9874 4.74 4.34 4.31 3.98 3.65 3.07 2.56 2.14 70 79 13:00:17 CTR PCC Excel. None 1186
D 43.25 4 13059 6.28 5.75 5.72 5.22 4.84 4.07 3.37 2.89 70 79 13:00:25 CTR PCC Excel. None 1183
D 43.25 5 17740 8.57 7.81 7.78 7.13 6.56 5.52 4.54 3.84 70 79 13:00:35 CTR PCC Excel. None 1177
C Comment at 43.25 ft Time: 13:00:45 :PANEL4 CENTER - DCP2
C Comment at 49.43 ft Time: 13:01:59 :Deflection is not decreasing
D 49.43 2 6669 6.48 2.08 5.04 4.26 3.80 2.88 2.10 1.59 70 80 13:02:01 CTR PCC Excel. None 585
C Comment at 49.43 ft Time: 13:02:08 :Deflection is not decreasing
D 49.43 3 9837 9.65 3.05 7.53 6.50 5.68 4.28 3.16 2.35 70 80 13:02:09 CTR PCC Excel. None 580
C Comment at 49.43 ft Time: 13:02:18 :Deflection is not decreasing
D 49.43 4 12950 12.66 3.93 9.85 8.49 7.43 5.60 4.10 3.02 70 80 13:02:37 CTR PCC Excel. None 582
C Comment at 49.43 ft Time: 13:02:48 :Deflection is not decreasing
D 49.43 5 17530 17.03 5.37 13.22 11.38 10.03 7.60 5.61 4.14 70 80 13:02:50 CTR PCC Excel. None 585
C Comment at 48.40 ft Time: 13:03:00 :PANEL4 JOINT
D 57.67 2 6674 3.29 3.02 2.99 2.70 2.51 2.09 1.66 1.35 72 80 13:03:33 CTR PCC Excel. None 1155
D 57.67 3 9871 4.97 4.56 4.54 4.17 3.82 3.18 2.53 1.97 72 80 13:03:40 CTR PCC Excel. None 1130
D 57.67 4 13051 6.59 6.02 6.00 5.53 5.09 4.23 3.38 2.62 72 80 13:03:48 CTR PCC Excel. None 1127
D 57.67 5 17778 8.99 8.18 8.19 7.54 6.95 5.77 4.57 3.53 72 80 13:03:58 CTR PCC Excel. None 1125
C Comment at 57.67 ft Time: 13:04:08 :PANEL5 CENTER
C Comment at 63.85 ft Time: 13:05:05 :Deflection is not decreasing
D 63.85 2 6642 6.71 1.99 5.06 4.25 3.70 2.82 2.05 1.57 72 80 13:05:06 CTR PCC Excel. None 563
C Comment at 63.85 ft Time: 13:05:13 :Deflection is not decreasing
D 63.85 3 9796 9.71 3.00 7.37 6.31 5.48 4.13 3.06 2.29 72 80 13:05:14 CTR PCC Excel. None 574
C Comment at 63.85 ft Time: 13:05:22 :Deflection is not decreasing
D 63.85 4 12983 12.52 3.93 9.56 8.26 7.20 5.41 4.04 3.03 72 80 13:05:24 CTR PCC Excel. None 590
C Comment at 63.85 ft Time: 13:05:35 :Deflection is not decreasing
D 63.85 5 17539 16.49 5.36 12.59 10.87 9.49 7.18 5.36 4.04 72 80 13:05:40 CTR PCC Excel. None 605
C Comment at 63.85 ft Time: 13:05:50 :PANEL5 JOINT
D 72.09 2 6639 3.14 2.90 2.88 2.59 2.41 2.06 1.65 1.39 72 81 13:06:27 CTR PCC Excel. None 1204
D 72.09 3 9861 4.78 4.35 4.37 4.05 3.71 3.13 2.53 2.10 72 81 13:06:34 CTR PCC Excel. None 1172
D 72.09 4 12998 6.34 5.73 5.77 5.34 4.92 4.12 3.38 2.74 72 81 13:06:42 CTR PCC Excel. None 1165
D 72.09 5 17757 8.63 7.76 7.85 7.26 6.69 5.61 4.56 3.68 72 81 13:06:53 CTR PCC Excel. None 1170
C Comment at 72.09 ft Time: 13:07:03 :PANEL6 CENTER - DCP3 - CHP2
C Comment at 79.30 ft Time: 13:07:55 :Deflection is not decreasing
D 79.30 2 6635 7.02 2.09 5.22 4.39 3.77 2.87 2.06 1.63 72 81 13:07:57 CTR PCC Excel. None 538
C Comment at 79.30 ft Time: 13:08:04 :Deflection is not decreasing
D 79.30 3 9801 10.13 3.12 7.60 6.51 5.54 4.21 3.10 2.31 72 81 13:08:06 CTR PCC Excel. None 550
C Comment at 79.30 ft Time: 13:08:15 :Deflection is not decreasing
D 79.30 4 12946 13.00 4.10 9.79 8.43 7.23 5.46 4.05 3.07 72 81 13:08:16 CTR PCC Excel. None 566
C Comment at 79.30 ft Time: 13:08:29 :Deflection is not decreasing
D 79.30 5 17538 17.06 5.64 12.91 11.07 9.54 7.28 5.33 4.07 72 81 13:08:30 CTR PCC Excel. None 585
C Comment at 78.27 ft Time: 13:08:40 :PANEL6 JOINT
D 87.54 2 6667 3.06 2.83 2.81 2.52 2.35 2.00 1.64 1.36 72 81 13:09:22 CTR PCC Excel. None 1237
D 87.54 3 9835 4.58 4.24 4.20 3.86 3.56 3.00 2.46 2.00 72 81 13:09:28 CTR PCC Excel. None 1221
D 87.54 4 13011 6.08 5.60 5.55 5.12 4.74 3.99 3.28 2.67 72 81 13:09:36 CTR PCC Excel. None 1217
D 87.54 5 17790 8.31 7.60 7.57 6.94 6.45 5.43 4.41 3.62 72 81 13:09:46 CTR PCC Excel. None 1217
C Comment at 87.54 ft Time: 13:09:56 :PANEL7 CENTER
C Comment at 93.72 ft Time: 13:10:36 :Deflection is not decreasing
C Comment at 93.72 ft Time: 13:10:48 :PANEL7 JOINT
C Comment at 93.72 ft Time: 13:11:11 :Deflection is not decreasing
D 93.72 2 6660 5.74 2.27 4.48 3.83 3.37 2.63 1.97 1.53 72 81 13:11:18 CTR PCC Excel. None 660
C Comment at 93.72 ft Time: 13:11:24 :Deflection is not decreasing
D 93.72 3 9827 8.45 3.22 6.60 5.76 5.02 3.91 2.95 2.26 72 81 13:11:27 CTR PCC Excel. None 661
C Comment at 93.72 ft Time: 13:11:35 :Deflection is not decreasing
D 93.72 4 12952 11.11 4.21 8.68 7.60 6.66 5.16 3.93 3.02 72 81 13:11:41 CTR PCC Excel. None 663
C Comment at 93.72 ft Time: 13:11:51 :Deflection is not decreasing
D 93.72 5 17644 14.99 5.64 11.70 10.18 8.96 6.95 5.24 4.00 72 81 13:11:54 CTR PCC Excel. None 669
C Comment at 93.72 ft Time: 13:12:04 :PANEL7 JOINT
D 102.99 2 6672 3.13 2.88 2.87 2.58 2.37 2.05 1.66 1.39 71 81 13:12:37 CTR PCC Excel. None 1213
D 102.99 3 9870 4.73 4.34 4.35 4.00 3.65 3.11 2.56 2.08 71 81 13:12:43 CTR PCC Excel. None 1187
D 102.99 4 13047 6.22 5.69 5.70 5.20 4.78 4.07 3.36 2.69 71 81 13:12:51 CTR PCC Excel. None 1193
D 102.99 5 17753 8.47 7.68 7.74 7.06 6.50 5.50 4.48 3.58 71 81 13:13:01 CTR PCC Excel. None 1192
C Comment at 102.99 ft Time: 13:13:11 :PANEL8 CENTER
C Comment at 109.16 ft Time: 13:13:58 :Deflection is not decreasing
D 109.16 2 6644 6.64 2.29 5.06 4.21 3.73 2.83 2.10 1.67 69 82 13:14:00 CTR PCC Excel. None 569
C Comment at 109.16 ft Time: 13:14:06 :Deflection is not decreasing

D 109.16 3 9791 9.53 3.39 7.28 6.22 5.42 4.15 3.13 2.39 69 82 13:14:08 CTR PCC Excel. None 584
C Comment at 109.16 ft Time: 13:14:16 :Deflection is not decreasing
D 109.16 4 12945 12.24 4.43 9.39 8.09 7.07 5.38 4.10 3.13 69 82 13:14:18 CTR PCC Excel. None 601
C Comment at 109.16 ft Time: 13:14:28 :Deflection is not decreasing
D 109.16 5 17557 16.12 5.92 12.37 10.60 9.33 7.16 5.40 4.13 69 82 13:14:30 CTR PCC Excel. None 619
C Comment at 109.16 ft Time: 13:14:40 :PANEL8 JOINT
D 116.37 2 6670 3.08 2.86 2.82 2.53 2.37 2.05 1.67 1.46 69 82 13:15:18 CTR PCC Excel. None 1230
D 116.37 3 9870 4.66 4.29 4.25 3.94 3.61 3.07 2.52 2.02 69 82 13:15:25 CTR PCC Excel. None 1203
D 116.37 4 12952 6.16 5.65 5.63 5.16 4.80 4.04 3.36 2.82 69 82 13:15:33 CTR PCC Excel. None 1195
D 116.37 5 17771 8.38 7.67 7.65 7.01 6.50 5.47 4.50 3.66 69 82 13:15:43 CTR PCC Excel. None 1205
C Comment at 115.34 ft Time: 13:15:53 :PANEL9 CENTER - DCP4
C Comment at 122.55 ft Time: 13:16:41 :Deflection is not decreasing
D 122.55 2 6670 5.38 2.30 4.18 3.55 3.16 2.51 1.93 1.48 69 82 13:16:43 CTR PCC Excel. None 705
C Comment at 122.55 ft Time: 13:16:50 :Deflection is not decreasing
D 122.55 3 9832 8.01 3.37 6.22 5.44 4.73 3.74 2.89 2.23 69 82 13:16:52 CTR PCC Excel. None 698
C Comment at 122.55 ft Time: 13:17:00 :Deflection is not decreasing
D 122.55 4 12987 10.56 4.43 8.18 7.15 6.25 4.93 3.84 3.01 69 82 13:17:07 CTR PCC Excel. None 699
C Comment at 122.55 ft Time: 13:17:17 :Deflection is not decreasing
D 122.55 5 17637 14.28 6.03 11.06 9.63 8.48 6.69 5.16 3.99 69 82 13:17:31 CTR PCC Excel. None 702
C Comment at 122.55 ft Time: 13:17:42 :PANEL9 JOINT
D 130.79 2 6674 3.10 2.86 2.85 2.56 2.35 2.03 1.63 1.29 70 82 13:18:24 CTR PCC Excel. None 1223
D 130.79 3 9853 4.70 4.29 4.31 3.97 3.58 3.03 2.51 2.25 70 82 13:18:31 CTR PCC Excel. None 1191
D 130.79 4 13056 6.24 5.66 5.68 5.24 4.75 4.03 3.32 2.76 70 82 13:18:38 CTR PCC Excel. None 1190
D 130.79 5 17663 8.43 7.62 7.66 7.05 6.41 5.44 4.44 3.63 70 82 13:18:48 CTR PCC Excel. None 1191
C Comment at 130.79 ft Time: 13:18:58 :PANEL10 CENTER
C Comment at 136.97 ft Time: 13:20:04 :Deflection is not decreasing
D 136.97 2 6606 5.53 2.59 4.21 3.55 3.08 2.40 1.81 1.42 69 81 13:20:05 CTR PCC Excel. None 679
C Comment at 136.97 ft Time: 13:20:12 :Deflection is not decreasing
D 136.97 3 9834 8.20 3.94 6.27 5.39 4.66 3.61 2.75 2.14 69 81 13:20:15 CTR PCC Excel. None 682
C Comment at 136.97 ft Time: 13:20:23 :Deflection is not decreasing
D 136.97 4 12946 10.56 5.19 8.12 7.02 6.09 4.72 3.63 2.82 69 81 13:20:26 CTR PCC Excel. None 697
C Comment at 136.97 ft Time: 13:20:36 :Deflection is not decreasing
D 136.97 5 17650 14.13 7.21 10.89 9.40 8.18 6.37 4.88 3.75 69 81 13:20:38 CTR PCC Excel. None 710
C Comment at 136.97 ft Time: 13:20:48 :PANEL10 JOINT
D 145.21 2 6675 3.06 2.80 2.78 2.52 2.35 2.00 1.62 1.38 68 82 13:21:27 CTR PCC Excel. None 1241
D 145.21 3 9862 4.62 4.18 4.21 3.89 3.56 3.00 2.46 2.02 68 82 13:21:33 CTR PCC Excel. None 1213
D 145.21 4 13001 6.13 5.50 5.55 5.10 4.73 3.97 3.27 2.66 68 82 13:21:41 CTR PCC Excel. None 1205
D 145.21 5 17822 8.38 7.47 7.58 6.96 6.41 5.40 4.40 3.62 68 82 13:21:51 CTR PCC Excel. None 1210
C Comment at 145.21 ft Time: 13:22:01 :PANEL11 CENTER - DCP5
D 151.39 2 6645 5.35 3.40 4.10 3.44 3.03 2.35 1.75 1.40 68 81 13:22:43 CTR PCC Excel. None 706
D 151.39 3 9826 7.81 5.34 6.01 5.18 4.50 3.44 2.63 2.01 68 81 13:22:50 CTR PCC Excel. None 715
D 151.39 4 12976 10.11 7.22 7.77 6.73 5.88 4.52 3.47 2.64 68 81 13:22:59 CTR PCC Excel. None 730
D 151.39 5 17666 13.49 10.01 10.36 8.95 7.86 6.04 4.60 3.51 68 81 13:23:09 CTR PCC Excel. None 745
C Comment at 151.39 ft Time: 13:23:19 :PANEL11 JOINT
D 160.66 2 6686 3.15 2.85 2.86 2.55 2.38 2.01 1.61 1.31 68 82 13:24:08 CTR PCC Excel. None 1207
D 160.66 3 9835 4.73 4.28 4.30 3.92 3.55 3.01 2.45 1.97 68 82 13:24:15 CTR PCC Excel. None 1183
D 160.66 4 12976 6.28 5.65 5.66 5.15 4.73 3.97 3.23 2.56 68 82 13:24:23 CTR PCC Excel. None 1175
D 160.66 5 17740 8.59 7.68 7.73 7.03 6.44 5.41 4.36 3.47 68 82 13:24:33 CTR PCC Excel. None 1175
C Comment at 159.63 ft Time: 13:24:43 :PANEL12 CENTER
C Comment at 166.84 ft Time: 13:25:36 :Deflection is not decreasing
D 166.84 2 6650 5.44 2.50 4.13 3.50 3.05 2.37 1.78 1.39 68 81 13:25:38 CTR PCC Excel. None 695
C Comment at 166.84 ft Time: 13:25:45 :Deflection is not decreasing
D 166.84 3 9813 7.81 4.03 5.98 5.16 4.45 3.45 2.65 2.12 68 81 13:25:46 CTR PCC Excel. None 715
C Comment at 166.84 ft Time: 13:25:55 :Deflection is not decreasing
D 166.84 4 12957 10.06 5.69 7.72 6.72 5.86 4.51 3.47 2.70 68 81 13:25:57 CTR PCC Excel. None 732
C Comment at 166.84 ft Time: 13:26:08 :Deflection is not decreasing
D 166.84 5 17571 13.31 8.25 10.25 8.90 7.78 6.01 4.60 3.58 68 81 13:26:10 CTR PCC Excel. None 751
C Comment at 166.84 ft Time: 13:26:20 :PANEL12 JOINT
D 174.05 2 6656 3.17 2.89 2.89 2.63 2.44 2.09 1.73 1.49 69 82 13:26:54 CTR PCC Excel. None 1192
D 174.05 3 9845 4.65 4.22 4.21 3.89 3.56 3.02 2.51 2.10 69 82 13:27:01 CTR PCC Excel. None 1204
D 174.05 4 12999 6.11 5.51 5.51 5.09 4.67 3.97 3.29 2.77 69 82 13:27:09 CTR PCC Excel. None 1209
D 174.05 5 17723 8.38 7.53 7.55 6.95 6.38 5.39 4.46 3.75 69 82 13:27:19 CTR PCC Excel. None 1202
C Comment at 174.05 ft Time: 13:27:29 :PANEL13 CENTER
C Comment at 181.25 ft Time: 13:28:07 :Deflection is not decreasing
D 181.25 2 6663 5.24 2.92 4.00 3.36 2.96 2.27 1.70 1.32 69 82 13:28:09 CTR PCC Excel. None 723
C Comment at 181.25 ft Time: 13:28:16 :Deflection is not decreasing
D 181.25 3 9817 7.59 4.48 5.82 5.01 4.37 3.37 2.56 2.01 69 82 13:28:17 CTR PCC Excel. None 735
C Comment at 181.25 ft Time: 13:28:25 :Deflection is not decreasing
D 181.25 4 12977 9.87 6.09 7.57 6.55 5.73 4.43 3.38 2.63 69 82 13:28:26 CTR PCC Excel. None 748
D 181.25 5 17750 13.16 8.48 10.09 8.70 7.66 5.95 4.51 3.52 69 82 13:28:37 CTR PCC Excel. None 767

C Comment at 181.25 ft Time: 13:28:47 :PANEL13 JOINT
D 189.49 2 6643 3.12 2.84 2.84 2.57 2.36 2.04 1.62 1.40 70 82 13:29:34 CTR PCC Excel. None 1212
D 189.49 3 9844 4.71 4.30 4.28 3.91 3.60 3.03 2.46 2.04 70 82 13:29:41 CTR PCC Excel. None 1188
D 189.49 4 12981 6.25 5.65 5.65 5.18 4.75 4.04 3.26 2.69 70 82 13:29:48 CTR PCC Excel. None 1181
D 189.49 5 17790 8.52 7.67 7.68 7.04 6.45 5.47 4.40 3.63 70 82 13:29:59 CTR PCC Excel. None 1187
C Comment at 189.49 ft Time: 13:30:08 :PANEL14 CENTER - DCP6
C Comment at 195.67 ft Time: 13:30:53 :Deflection is not decreasing
D 195.67 2 6618 5.69 2.11 4.22 3.55 3.10 2.38 1.78 1.49 69 81 13:30:54 CTR PCC Excel. None 662
C Comment at 195.67 ft Time: 13:31:01 :Deflection is not decreasing
D 195.67 3 9783 8.30 3.18 6.20 5.29 4.61 3.49 2.69 2.07 69 81 13:31:03 CTR PCC Excel. None 670
C Comment at 195.67 ft Time: 13:31:11 :Deflection is not decreasing
D 195.67 4 12922 10.76 4.39 8.03 6.92 6.04 4.61 3.54 2.73 69 81 13:31:25 CTR PCC Excel. None 683
C Comment at 195.67 ft Time: 13:31:36 :Deflection is not decreasing
D 195.67 5 17638 14.20 6.40 10.66 9.15 8.02 6.16 4.70 3.64 69 81 13:31:56 CTR PCC Excel. None 706
C Comment at 195.67 ft Time: 13:32:06 :PANEEL14 JOINT
D 203.91 2 6647 3.00 2.72 2.72 2.47 2.28 1.93 1.56 1.36 68 81 13:32:55 CTR PCC Excel. None 1258
D 203.91 3 9848 4.52 4.13 4.11 3.80 3.45 2.89 2.38 1.96 68 81 13:33:01 CTR PCC Excel. None 1239
D 203.91 4 13009 6.00 5.44 5.41 5.00 4.57 3.83 3.15 2.58 68 81 13:33:09 CTR PCC Excel. None 1233
D 203.91 5 17801 8.19 7.36 7.36 6.82 6.22 5.21 4.24 3.52 68 81 13:33:19 CTR PCC Excel. None 1237
C Comment at 203.91 ft Time: 13:33:29 :PANEL15 CENTER
C Comment at 210.09 ft Time: 13:34:10 :Deflection is not decreasing
D 210.09 2 6625 5.41 2.24 4.14 3.49 3.08 2.38 1.81 1.37 68 81 13:34:11 CTR PCC Excel. None 696
C Comment at 210.09 ft Time: 13:34:18 :Deflection is not decreasing
D 210.09 3 9806 8.06 3.27 6.16 5.32 4.61 3.55 2.75 2.11 68 81 13:34:20 CTR PCC Excel. None 692
C Comment at 210.09 ft Time: 13:34:28 :Deflection is not decreasing
D 210.09 4 12942 10.58 4.24 8.05 6.99 6.09 4.70 3.63 2.81 68 81 13:34:30 CTR PCC Excel. None 696
C Comment at 210.09 ft Time: 13:34:40 :Deflection is not decreasing
D 210.09 5 17691 14.38 5.73 10.95 9.47 8.26 6.41 4.92 3.79 68 81 13:34:45 CTR PCC Excel. None 700
C Comment at 210.09 ft Time: 13:34:55 :PANEL15 JOINT
D 211.12 2 6708 5.50 4.27 2.19 1.96 1.82 1.58 1.32 1.13 68 81 13:38:11 CTR PCC Excel. None 693
D 211.12 3 9867 7.99 6.27 3.23 3.00 2.75 2.37 2.01 1.69 68 81 13:38:18 CTR PCC Excel. None 702
D 211.12 4 13006 10.38 8.15 4.29 3.94 3.67 3.15 2.65 2.23 68 81 13:38:27 CTR PCC Excel. None 713
D 211.12 5 17660 13.86 10.85 5.87 5.41 4.99 4.30 3.57 3.00 68 81 13:38:37 CTR PCC Excel. None 724
C Comment at 211.12 ft Time: 13:39:29 :PANEL15 JOINT - WITH D2 ON UNLOADED SLAB...ALL OTHER JOINTS D1 ON UNLOADED SLAB.
TEST PERFORMED TO DOUBLE CHECK LTE BY PLACING PLATE ON BOTH SIDES OF JOINT
D 218.33 2 6677 2.99 2.73 2.71 2.44 2.25 1.94 1.58 1.38 68 81 13:40:13 CTR PCC Excel. None 1268
D 218.33 3 9869 4.51 4.12 4.09 3.77 3.43 2.95 2.44 2.02 68 81 13:40:19 CTR PCC Excel. None 1245
D 218.33 4 13013 5.96 5.43 5.40 4.95 4.54 3.90 3.21 2.69 68 81 13:40:27 CTR PCC Excel. None 1242
D 218.33 5 17771 8.12 7.36 7.35 6.72 6.18 5.29 4.33 3.53 68 81 13:40:37 CTR PCC Excel. None 1244
C Comment at 218.33 ft Time: 13:40:47 :PANEL16 CENTER
C Comment at 224.51 ft Time: 13:41:55 :Deflection is not decreasing
D 224.51 2 6660 6.04 2.24 4.50 3.74 3.28 2.51 1.88 1.47 69 81 13:41:57 CTR PCC Excel. None 627
C Comment at 224.51 ft Time: 13:42:04 :Deflection is not decreasing
D 224.51 3 9811 8.72 3.29 6.52 5.58 4.86 3.72 2.81 2.17 69 81 13:42:11 CTR PCC Excel. None 640
C Comment at 224.51 ft Time: 13:42:19 :Deflection is not decreasing
D 224.51 4 12911 11.23 4.36 8.43 7.25 6.35 4.89 3.71 2.86 69 81 13:42:21 CTR PCC Excel. None 654
C Comment at 224.51 ft Time: 13:42:31 :Deflection is not decreasing
D 224.51 5 17630 14.90 5.96 11.22 9.63 8.45 6.56 4.97 3.82 69 81 13:42:33 CTR PCC Excel. None 673
C Comment at 224.51 ft Time: 13:42:43 :PANEL16 JOINT
D 234.81 2 6666 3.01 2.77 2.73 2.49 2.28 1.97 1.61 1.35 70 82 13:43:20 CTR PCC Excel. None 1259
D 234.81 3 9856 4.52 4.16 4.11 3.80 3.48 2.96 2.44 2.00 70 82 13:43:27 CTR PCC Excel. None 1239
D 234.81 4 13023 6.01 5.52 5.45 5.04 4.62 3.93 3.24 2.63 70 82 13:43:35 CTR PCC Excel. None 1231
D 234.81 5 17766 8.19 7.46 7.41 6.83 6.26 5.33 4.36 3.55 70 82 13:43:45 CTR PCC Excel. None 1233
C Comment at 234.81 ft Time: 13:43:55 :PANEL17 CENTER - DCP7
C Comment at 238.93 ft Time: 13:44:28 :Deflection is not decreasing
D 238.93 2 6649 5.01 2.65 3.92 3.34 2.96 2.33 1.80 1.47 70 81 13:44:29 CTR PCC Excel. None 754
C Comment at 238.93 ft Time: 13:44:36 :Deflection is not decreasing
C Comment at 238.93 ft Time: 13:44:48 :PANEL17 JOINT
C Comment at 238.93 ft Time: 13:45:09 :Deflection is not decreasing
D 238.93 2 6649 5.00 2.69 3.91 3.33 2.92 2.35 1.80 1.38 71 81 13:45:14 CTR PCC Excel. None 757
C Comment at 238.93 ft Time: 13:45:20 :Deflection is not decreasing
D 238.93 3 9847 7.52 3.85 5.87 5.12 4.44 3.51 2.73 2.13 71 81 13:46:01 CTR PCC Excel. None 745
C Comment at 238.93 ft Time: 13:46:10 :Deflection is not decreasing
D 238.93 4 12961 9.99 4.98 7.78 6.74 5.90 4.62 3.61 2.78 71 81 13:46:11 CTR PCC Excel. None 738
C Comment at 238.93 ft Time: 13:46:22 :Deflection is not decreasing
D 238.93 5 17630 13.76 6.53 10.70 9.28 8.12 6.36 4.93 3.77 71 81 13:46:23 CTR PCC Excel. None 729
C Comment at 238.93 ft Time: 13:46:33 :PANEL17 JOINT
D 247.17 2 6689 3.09 2.81 2.83 2.55 2.34 2.04 1.65 1.33 70 81 13:47:13 CTR PCC Excel. None 1233
D 247.17 3 9881 4.65 4.23 4.27 3.90 3.57 3.03 2.51 2.01 70 81 13:47:20 CTR PCC Excel. None 1208
D 247.17 4 13021 6.17 5.57 5.64 5.17 4.75 4.04 3.35 2.68 70 81 13:47:27 CTR PCC Excel. None 1199

D 247.17 5 17870 8.43 7.57 7.70 7.02 6.46 5.50 4.53 3.66 70 81 13:47:37 CTR PCC Excel. None 1205
C Comment at 247.17 ft Time: 13:47:47 :PANEL18 CENTER
C Comment at 254.37 ft Time: 13:48:41 :Deflection is not decreasing
D 254.37 2 6649 6.47 2.32 4.73 3.96 3.43 2.62 1.94 1.53 69 82 13:48:43 CTR PCC Excel. None 585
C Comment at 254.37 ft Time: 13:48:50 :Deflection is not decreasing
D 254.37 3 9828 9.43 3.45 6.90 5.91 5.09 3.85 2.89 2.22 69 82 13:48:52 CTR PCC Excel. None 593
C Comment at 254.37 ft Time: 13:49:00 :Deflection is not decreasing
D 254.37 4 12956 12.20 4.60 8.94 7.68 6.66 5.06 3.83 2.92 69 82 13:49:02 CTR PCC Excel. None 604
C Comment at 254.37 ft Time: 13:49:13 :Deflection is not decreasing
D 254.37 5 17585 15.99 6.45 11.79 10.12 8.82 6.76 5.08 3.89 69 82 13:49:16 CTR PCC Excel. None 625
C Comment at 254.37 ft Time: 13:49:26 :PANEL18 JOINT
C Comment at 267.76 ft Time: 13:52:48 :Deflection is not decreasing
D 267.76 2 6692 4.79 2.67 3.74 3.18 2.84 2.27 1.75 1.41 70 82 13:52:49 CTR PCC Excel. None 794
C Comment at 267.76 ft Time: 13:52:56 :Deflection is not decreasing
D 267.76 3 9878 7.11 4.25 5.60 4.85 4.27 3.36 2.65 2.08 70 82 13:52:59 CTR PCC Excel. None 789
C Comment at 267.76 ft Time: 13:53:07 :Deflection is not decreasing
D 267.76 4 12952 9.27 5.80 7.29 6.34 5.61 4.45 3.47 2.72 70 82 13:53:09 CTR PCC Excel. None 794
D 267.76 5 17649 12.44 8.22 9.82 8.51 7.54 5.98 4.67 3.65 70 82 13:53:20 CTR PCC Excel. None 807
C Comment at 266.73 ft Time: 13:55:11 :PANEL19 JOINT - NOTE MISSED PANLE19 CENTER - SEE NEXT POINT
D 260.55 2 6674 3.01 2.74 2.75 2.51 2.33 2.02 1.67 1.40 70 85 13:56:15 CTR PCC Excel. None 1262
D 260.55 3 9908 4.56 4.17 4.17 3.85 3.53 3.05 2.53 2.15 70 85 13:56:21 CTR PCC Excel. None 1235
D 260.55 4 13058 6.04 5.50 5.51 5.10 4.68 4.02 3.34 2.84 70 85 13:56:29 CTR PCC Excel. None 1229
D 260.55 5 17766 8.23 7.45 7.50 6.93 6.36 5.44 4.54 3.84 70 85 13:56:39 CTR PCC Excel. None 1228
C Comment at 261.58 ft Time: 13:56:49 :PANEL19 CENTER
D 273.94 2 6673 3.11 2.85 2.81 2.55 2.35 2.02 1.67 1.42 70 83 13:57:22 CTR PCC Excel. None 1221
D 273.94 3 9875 4.68 4.27 4.22 3.92 3.55 3.06 2.55 2.12 70 83 13:57:29 CTR PCC Excel. None 1200
D 273.94 4 12981 6.13 5.59 5.55 5.14 4.71 4.04 3.39 2.77 70 83 13:57:36 CTR PCC Excel. None 1204
D 273.94 5 17802 8.36 7.57 7.54 6.97 6.40 5.48 4.60 3.82 70 83 13:57:47 CTR PCC Excel. None 1211
C Comment at 273.94 ft Time: 13:57:57 :PANEL20 CENTER - DCP8
C Comment at 281.15 ft Time: 13:58:29 :Deflection is not decreasing
D 281.15 2 6640 4.55 2.33 3.55 3.04 2.75 2.19 1.67 1.37 69 83 13:58:31 CTR PCC Excel. None 830
C Comment at 281.15 ft Time: 13:58:38 :Deflection is not decreasing
D 281.15 3 9854 7.01 3.41 5.46 4.77 4.20 3.35 2.60 2.07 69 83 13:58:40 CTR PCC Excel. None 799
C Comment at 281.15 ft Time: 13:58:48 :Deflection is not decreasing
D 281.15 4 12967 9.32 4.41 7.25 6.29 5.62 4.42 3.44 2.72 69 83 13:58:50 CTR PCC Excel. None 791
C Comment at 281.15 ft Time: 13:59:00 :Deflection is not decreasing
D 281.15 5 17626 12.80 5.94 9.94 8.62 7.69 6.08 4.67 3.67 69 83 13:59:04 CTR PCC Excel. None 783
C Comment at 281.15 ft Time: 13:59:14 :PANEL20 JOINT

Project: 175th Street, Winneshiek County

IKUAB FWD FILE : 175TH STREEET_8AUG2012.fwd
HProject No. : TR640
HLocation : CALMAR - 175TH STREET
HClient : IOWA DOT
HStart Station : 9TH PANEL WEST OF 2442 175TH STREET
HDirection : EB LANE
HEnd Station :
HWeather : CLOUDY, RAINY 65
HOperator : PV

IDate Created : 8/9/2012
IVersion : 2.3.11
ILoad Mode : 1 (SHRP 8+8 buffers, 0 plates)
IPlate Radius : 5.91 (in)
IExtra Field Set : Example Road
IDrop Sequence : 11234
INo of drops : 11111
IRecord Drop? : NHHHH
IDrop Height : 1 2 3 4
IImpact Load : 6003 9005 12007 16009 lbf
ISensor Number : 0 1 2 3 4 5 6 7
ISensor Distance : 0.00 12.00 12.00 18.00 24.00 36.00 48.00 60.00 (in)
ISensor Position : CENTER FRONT BEHIND BEHIND BEHIND BEHIND BEHIND BEHIND

IReference Offset : 0.00 ft
ITestpoint spacing: 0.00 ft

J Dist. Imp Load D0 D1 D2 D3 D4 D5 D6 D7 Air Pave Time Pavement Pavement Pavement Pavement Surface
J m Num lbf mils mils mils mils mils mils mils mils °F °F Location Type Condition Distress Modulus
J-------- --- ----- ------ ------ ------ ------ ------ ------ ------ ------ ---- ---- -------- -------- -------- --------- -------- -------
D 0.00 2 6821 6.47 5.96 5.85 5.20 4.77 3.86 2.91 2.18 64 69 09:01:08 CTR PCC Excel. None 600
D 0.00 3 10010 9.75 8.92 8.78 7.97 7.16 5.78 4.39 3.23 64 69 09:01:15 CTR PCC Excel. None 584
D 0.00 4 13185 12.95 11.74 11.65 10.58 9.46 7.67 5.83 4.28 64 69 09:01:23 CTR PCC Excel. None 579
D 0.00 5 17917 17.68 16.00 15.88 14.37 12.94 10.47 7.91 5.80 64 69 09:01:34 CTR PCC Excel. None 576
C Comment at -1.03 ft Time: 09:01:44 :#1 PANEL1 CENTER
C Comment at 20.60 ft Time: 09:03:32 :Deflection is not decreasing
D 20.60 2 6735 13.23 5.17 9.98 8.38 7.25 5.31 3.62 2.44 64 69 09:03:36 CTR PCC Excel. None 290
C Comment at 20.60 ft Time: 09:03:42 :Deflection is not decreasing
D 20.60 3 9868 19.82 7.79 14.99 12.77 10.93 7.97 5.48 3.67 64 69 09:03:44 CTR PCC Excel. None 283
C Comment at 20.60 ft Time: 09:03:52 :Deflection is not decreasing
D 20.60 4 13017 26.38 10.23 19.88 17.00 14.46 10.56 7.30 4.88 64 69 09:03:53 CTR PCC Excel. None 281
C Comment at 20.60 ft Time: 09:04:04 :Deflection is not decreasing
D 20.60 5 17477 35.83 13.73 26.96 23.02 19.64 14.29 9.88 6.59 64 69 09:04:10 CTR PCC Excel. None 277
C Comment at 20.60 ft Time: 09:04:42 :#1 PANEL1 JOINT
D 44.28 2 6782 7.63 6.71 7.46 6.99 6.68 6.11 3.90 1.87 64 69 09:06:42 CTR PCC Excel. None 505
C Comment at 44.28 ft Time: 09:06:49 :Deflection is not decreasing
D 44.28 3 9882 11.37 9.95 11.05 10.53 9.96 9.14 5.74 2.71 64 69 09:06:50 CTR PCC Excel. None 494
C Comment at 44.28 ft Time: 09:06:58 :Deflection is not decreasing
D 44.28 4 13163 15.18 13.23 14.77 14.10 13.33 12.18 7.47 3.61 64 69 09:06:59 CTR PCC Excel. None 493
C Comment at 44.28 ft Time: 09:07:09 :Deflection is not decreasing
D 44.28 5 17642 20.46 17.76 19.88 19.00 18.03 16.53 9.94 4.84 64 69 09:07:23 CTR PCC Excel. None 490
C Comment at 44.28 ft Time: 09:07:33 :#3 PANEL2 CENTER - CRACKS ON PAVEMENT - DCP2
C Comment at 60.76 ft Time: 09:09:38 :Deflection is not decreasing
D 60.76 2 6496 26.25 3.56 20.91 18.06 15.73 11.94 8.46 5.78 64 68 09:09:40 CTR PCC Excel. None 141
C Comment at 60.76 ft Time: 09:09:47 :Deflection is not decreasing
D 60.76 3 9538 38.68 5.61 30.81 26.73 23.20 17.66 12.52 8.58 64 68 09:09:50 CTR PCC Excel. None 140
C Comment at 60.76 ft Time: 09:09:58 :Deflection is not decreasing
D 60.76 4 12497 50.70 7.63 40.33 35.11 30.42 23.12 16.49 11.27 64 68 09:10:00 CTR PCC Excel. None 140
C Comment at 60.76 ft Time: 09:10:11 :Deflection is not decreasing
D 60.76 5 16787 68.67 10.85 54.55 47.53 41.28 31.37 22.46 15.39 64 68 09:10:12 CTR PCC Excel. None 139
C Comment at 60.76 ft Time: 09:10:22 :#4 PANEL2 JOINT - PLATE ON CRACK
D 81.36 2 6651 18.74 18.25 16.85 15.34 13.89 11.38 8.83 6.71 64 69 09:11:21 CTR PCC Excel. None 202
D 81.36 3 9762 27.59 26.88 24.82 22.67 20.39 16.75 12.96 9.82 64 69 09:11:27 CTR PCC Excel. None 201
D 81.36 4 12820 36.17 35.15 32.51 29.79 26.79 21.92 16.99 12.86 64 69 09:11:36 CTR PCC Excel. None 202
D 81.36 5 17233 48.89 47.38 43.97 40.21 36.23 29.44 22.84 17.28 64 69 09:11:46 CTR PCC Excel. None 200
C Comment at 81.36 ft Time: 09:13:30 :#4 PANEL3 CENTER - CRACKS ON PANEL - DCP3 - CHP1
C Comment at 99.90 ft Time: 09:14:21 :Deflection is not decreasing
D 99.90 2 6534 27.98 7.19 21.45 18.08 15.41 10.40 6.16 3.52 64 69 09:14:23 CTR PCC Excel. None 133

C Comment at 99.90 ft Time: 09:14:30 :Deflection is not decreasing
D 99.90 3 9569 41.28 12.14 31.82 26.98 22.91 15.52 9.28 5.27 64 69 09:14:32 CTR PCC Excel. None 132
C Comment at 99.90 ft Time: 09:14:40 :Deflection is not decreasing
D 99.90 4 12508 55.51 16.86 42.78 36.33 30.72 20.96 12.50 6.98 64 69 09:14:41 CTR PCC Excel. None 128
C Comment at 99.90 ft Time: 09:14:52 :Deflection is not decreasing
D 99.90 5 16539 76.66 23.74 59.10 50.17 42.50 28.94 17.28 9.59 64 69 09:14:53 CTR PCC Excel. None 123
C Comment at 99.90 ft Time: 09:15:20 :#6 PANEL3 JOINT
D 121.52 2 6810 6.54 5.96 5.88 5.32 4.88 4.01 3.03 2.23 64 69 09:17:07 CTR PCC Excel. None 592
D 121.52 3 10014 9.83 8.92 8.89 8.13 7.37 6.06 4.61 3.37 64 69 09:17:14 CTR PCC Excel. None 580
D 121.52 4 13157 13.04 11.80 11.84 10.87 9.80 8.04 6.19 4.44 64 69 09:17:22 CTR PCC Excel. None 574
D 121.52 5 17901 17.81 16.06 16.14 14.78 13.35 10.95 8.42 6.06 64 69 09:17:33 CTR PCC Excel. None 571
C Comment at 121.52 ft Time: 09:17:43 :#7 PANEL4 CENTER - TRANSVERSE CRACK NEAR WEST END OF PANEL-DCP4-CHP2
C Comment at 140.06 ft Time: 09:19:05 :Deflection is not decreasing
D 140.06 2 6679 16.41 4.13 12.16 10.14 8.79 6.31 4.24 2.93 64 70 09:19:06 CTR PCC Excel. None 231
C Comment at 140.06 ft Time: 09:19:13 :Deflection is not decreasing
D 140.06 3 9801 24.07 6.50 17.91 15.09 12.96 9.32 6.31 4.30 64 70 09:19:14 CTR PCC Excel. None 232
C Comment at 140.06 ft Time: 09:19:23 :Deflection is not decreasing
D 140.06 4 12908 31.26 8.99 23.27 19.76 16.82 12.09 8.27 5.60 64 70 09:19:24 CTR PCC Excel. None 235
C Comment at 140.06 ft Time: 09:19:34 :Deflection is not decreasing
D 140.06 5 17361 41.74 12.91 31.00 26.24 22.38 16.09 10.94 7.41 64 70 09:19:38 CTR PCC Excel. None 236
C Comment at 140.06 ft Time: 09:19:48 :#8 PANEL4 JOINT
D 160.66 2 6725 9.46 9.32 8.16 7.22 6.45 5.03 3.66 2.63 64 69 09:20:46 CTR PCC Excel. None 404
D 160.66 3 9906 14.31 14.11 12.34 11.03 9.77 7.61 5.56 3.95 64 69 09:20:53 CTR PCC Excel. None 394
D 160.66 4 13056 19.09 18.80 16.46 14.85 13.07 10.17 7.45 5.27 64 69 09:21:01 CTR PCC Excel. None 389
D 160.66 5 17640 26.15 25.78 22.62 20.27 17.97 13.97 10.21 7.23 64 69 09:21:12 CTR PCC Excel. None 384
C Comment at 160.66 ft Time: 09:21:22 :#9 PANEL5 CENTER
C Comment at 160.66 ft Time: 09:21:44 :LONGITUDINAL CRACK ON PAVEMENT
C Comment at 180.22 ft Time: 09:22:40 :Deflection is not decreasing
D 180.22 2 6586 18.59 4.99 14.83 12.84 11.33 8.41 5.76 3.96 64 69 09:22:41 CTR PCC Excel. None 201
C Comment at 180.22 ft Time: 09:22:48 :Deflection is not decreasing
D 180.22 3 9703 27.83 7.68 22.32 19.48 17.15 12.78 8.84 6.09 64 69 09:22:50 CTR PCC Excel. None 198
C Comment at 180.22 ft Time: 09:22:58 :Deflection is not decreasing
D 180.22 4 12771 37.21 10.24 29.94 26.18 23.09 17.25 12.05 8.31 64 69 09:22:59 CTR PCC Excel. None 195
C Comment at 180.22 ft Time: 09:23:10 :Deflection is not decreasing
D 180.22 5 17110 51.48 14.08 41.54 36.36 32.11 24.20 17.01 11.77 64 69 09:23:11 CTR PCC Excel. None 189
C Comment at 180.22 ft Time: 09:23:21 :#10 PANEL5 JOINT
D 199.79 2 6764 7.05 6.48 6.34 5.68 5.20 4.18 3.10 2.30 64 69 09:24:10 CTR PCC Excel. None 546
D 199.79 3 9927 10.52 9.65 9.52 8.64 7.78 6.26 4.67 3.44 64 69 09:24:17 CTR PCC Excel. None 537
D 199.79 4 13110 13.99 12.79 12.67 11.55 10.33 8.34 6.26 4.57 64 69 09:24:25 CTR PCC Excel. None 533
D 199.79 5 17861 19.06 17.32 17.25 15.67 14.10 11.36 8.50 6.21 64 69 09:24:36 CTR PCC Excel. None 533
C Comment at 199.79 ft Time: 09:24:47 :#11 PANEL6 CENTER - DCP5
C Comment at 220.39 ft Time: 09:25:40 :Deflection is not decreasing
D 220.39 2 6694 12.29 6.01 9.37 7.99 6.91 5.03 3.42 2.37 64 70 09:25:42 CTR PCC Excel. None 310
C Comment at 220.39 ft Time: 09:25:49 :Deflection is not decreasing
D 220.39 3 9835 18.33 9.03 14.07 12.06 10.35 7.54 5.16 3.50 64 70 09:25:50 CTR PCC Excel. None 305
C Comment at 220.39 ft Time: 09:25:59 :Deflection is not decreasing
D 220.39 4 12962 24.14 11.83 18.57 16.01 13.65 9.97 6.85 4.63 64 70 09:26:00 CTR PCC Excel. None 305
C Comment at 220.39 ft Time: 09:26:11 :Deflection is not decreasing
D 220.39 5 17523 32.79 15.84 25.18 21.66 18.50 13.52 9.23 6.21 64 70 09:26:12 CTR PCC Excel. None 304
C Comment at 220.39 ft Time: 09:26:22 :#12 PANEL6 JOINT
D 242.02 2 6752 9.05 8.35 8.49 7.84 7.30 6.18 4.82 3.68 65 70 09:28:23 CTR PCC Excel. None 424
D 242.02 3 9872 13.35 12.32 12.51 11.69 10.77 9.12 7.15 5.42 65 70 09:28:29 CTR PCC Excel. None 420
D 242.02 4 13055 17.69 16.29 16.60 15.61 14.29 12.12 9.55 7.19 65 70 09:28:38 CTR PCC Excel. None 420
D 242.02 5 17682 24.02 22.08 22.59 21.14 19.42 16.44 12.98 9.80 65 70 09:28:49 CTR PCC Excel. None 419
C Comment at 242.02 ft Time: 09:28:59 :#13 PANEL7 CENTER - LONGITUDINAL CRACK
C Comment at 264.67 ft Time: 09:29:59 :Deflection is not decreasing
D 264.67 2 6557 20.38 12.86 15.78 13.61 11.72 8.62 5.97 3.96 64 69 09:30:01 CTR PCC Excel. None 183
C Comment at 264.67 ft Time: 09:30:08 :Deflection is not decreasing
D 264.67 3 9618 30.59 19.11 23.82 20.64 17.68 13.06 9.10 6.04 64 69 09:30:09 CTR PCC Excel. None 179
C Comment at 264.67 ft Time: 09:30:18 :Deflection is not decreasing
D 264.67 4 12621 40.60 25.03 31.72 27.60 23.58 17.54 12.25 8.15 64 69 09:30:19 CTR PCC Excel. None 177
C Comment at 264.67 ft Time: 09:30:30 :Deflection is not decreasing
D 264.67 5 16926 55.43 33.53 43.40 37.82 32.44 24.19 16.95 11.32 64 69 09:30:31 CTR PCC Excel. None 174
C Comment at 264.67 ft Time: 09:30:41 :#14 PANEL7 JOINT
D 287.33 2 6709 10.57 9.81 9.85 9.05 8.24 6.77 5.18 3.82 65 70 09:32:04 CTR PCC Excel. None 361
D 287.33 3 9883 15.78 14.58 14.72 13.67 12.35 10.14 7.79 5.74 65 70 09:32:10 CTR PCC Excel. None 356
D 287.33 4 13026 20.90 19.23 19.50 18.16 16.37 13.49 10.38 7.62 65 70 09:32:19 CTR PCC Excel. None 354
D 287.33 5 17575 28.53 26.17 26.69 24.70 22.41 18.49 14.24 10.45 65 70 09:32:29 CTR PCC Excel. None 350
C Comment at 287.33 ft Time: 09:32:39 :#15 PANEL8 CENTER
C Comment at 311.02 ft Time: 09:33:41 :Deflection is not decreasing

D 311.02 2 6680 12.02 3.53 8.96 7.56 6.43 4.64 3.12 2.09 65 70 09:33:42 CTR PCC Excel. None 316
C Comment at 311.02 ft Time: 09:33:49 :Deflection is not decreasing
D 311.02 3 9822 17.95 5.44 13.46 11.49 9.70 7.01 4.75 3.16 65 70 09:33:51 CTR PCC Excel. None 311
C Comment at 311.02 ft Time: 09:33:59 :Deflection is not decreasing
D 311.02 4 12958 23.62 7.25 17.74 15.19 12.76 9.25 6.28 4.15 65 70 09:34:00 CTR PCC Excel. None 312
C Comment at 311.02 ft Time: 09:34:11 :Deflection is not decreasing
D 311.02 5 17511 32.25 9.93 24.16 20.61 17.42 12.62 8.54 5.64 65 70 09:34:12 CTR PCC Excel. None 309
C Comment at 311.02 ft Time: 09:34:22 :#16 PANEL8 JOINT
D 331.61 2 6750 6.00 5.46 5.37 4.82 4.42 3.59 2.68 2.02 64 70 09:35:14 CTR PCC Excel. None 640
D 331.61 3 9960 9.05 8.26 8.16 7.48 6.70 5.43 4.12 3.04 64 70 09:35:21 CTR PCC Excel. None 626
D 331.61 4 13123 12.00 10.89 10.84 9.93 8.87 7.21 5.48 4.01 64 70 09:35:29 CTR PCC Excel. None 622
D 331.61 5 17813 16.48 14.89 14.90 13.59 12.22 9.92 7.51 5.51 64 70 09:35:40 CTR PCC Excel. None 615
C Comment at 331.61 ft Time: 09:35:50 :#17 PANEL9 CENTER
D 350.15 2 6693 11.26 9.95 8.61 7.25 6.30 4.60 3.13 2.15 65 70 09:36:53 CTR PCC Excel. None 338
D 350.15 3 9850 16.90 14.72 12.99 11.10 9.49 6.94 4.76 3.22 65 70 09:36:59 CTR PCC Excel. None 331
D 350.15 4 12987 22.25 19.14 17.16 14.77 12.58 9.20 6.33 4.23 65 70 09:37:08 CTR PCC Excel. None 332
D 350.15 5 17461 30.28 25.59 23.34 20.02 17.14 12.52 8.59 5.72 65 70 09:37:18 CTR PCC Excel. None 328
C Comment at 350.15 ft Time: 09:37:36 :#18 PANEL9 JOINT
D 371.78 2 6738 6.11 5.64 5.54 4.99 4.64 3.80 2.85 2.19 65 71 09:38:30 CTR PCC Excel. None 627
D 371.78 3 9944 9.19 8.53 8.37 7.68 6.97 5.69 4.34 3.26 65 71 09:38:36 CTR PCC Excel. None 615
D 371.78 4 13147 12.21 11.29 11.16 10.25 9.26 7.61 5.83 4.33 65 71 09:38:45 CTR PCC Excel. None 612
D 371.78 5 17845 16.71 15.31 15.25 13.95 12.69 10.42 7.94 5.91 65 71 09:38:55 CTR PCC Excel. None 607
C Comment at 371.78 ft Time: 09:39:05 :#19 PANEL10 CENTER
C Comment at 390.32 ft Time: 09:41:47 :Deflection is not decreasing
D 390.32 2 6683 11.86 4.65 9.12 7.74 6.68 4.95 3.41 2.36 65 71 09:41:48 CTR PCC Excel. None 320
C Comment at 390.32 ft Time: 09:41:55 :Deflection is not decreasing
D 390.32 3 9809 17.82 7.04 13.73 11.75 10.06 7.46 5.20 3.52 65 71 09:41:57 CTR PCC Excel. None 313
C Comment at 390.32 ft Time: 09:42:05 :Deflection is not decreasing
D 390.32 4 12935 23.55 9.33 18.17 15.71 13.37 9.90 6.92 4.66 65 71 09:42:07 CTR PCC Excel. None 312
C Comment at 390.32 ft Time: 09:42:17 :Deflection is not decreasing
D 390.32 5 17416 32.01 12.68 24.62 21.21 18.15 13.43 9.31 6.26 65 71 09:42:20 CTR PCC Excel. None 309
C Comment at 390.32 ft Time: 09:42:30 :#20 PANEL10 JOINT
C Comment at 410.91 ft Time: 09:43:42 :Deflection is not decreasing
D 410.91 2 6671 12.64 2.70 9.88 8.48 7.31 5.42 3.72 2.60 66 71 09:43:44 CTR PCC Excel. None 300
C Comment at 410.91 ft Time: 09:43:50 :Deflection is not decreasing
D 410.91 3 9744 18.60 3.88 14.62 12.65 10.87 8.08 5.59 3.85 66 71 09:43:53 CTR PCC Excel. None 298
C Comment at 410.91 ft Time: 09:44:01 :Deflection is not decreasing
D 410.91 4 12854 24.42 5.06 19.22 16.70 14.29 10.63 7.40 5.03 66 71 09:44:02 CTR PCC Excel. None 299
C Comment at 410.91 ft Time: 09:44:12 :Deflection is not decreasing
D 410.91 5 17323 33.11 6.71 26.00 22.51 19.36 14.38 9.97 6.78 66 71 09:44:13 CTR PCC Excel. None 297
C Comment at 410.91 ft Time: 09:44:32 :#21 PANEL11 CENTER - MID PANEL CRACK - LTE TAKEN ACROSS PATCHED CRACK
C Comment at 421.21 ft Time: 09:45:15 :Deflection is not decreasing
D 421.21 2 6690 10.49 4.88 8.14 6.97 6.10 4.53 3.03 1.87 66 72 09:45:16 CTR PCC Excel. None 363
C Comment at 421.21 ft Time: 09:45:23 :Deflection is not decreasing
D 421.21 3 9852 15.55 7.41 12.09 10.44 9.07 6.73 4.52 2.73 66 72 09:45:23 CTR PCC Excel. None 360
C Comment at 421.21 ft Time: 09:45:32 :Deflection is not decreasing
D 421.21 4 13006 20.25 9.79 15.79 13.75 11.88 8.83 5.95 3.53 66 72 09:45:33 CTR PCC Excel. None 365
C Comment at 421.21 ft Time: 09:45:44 :Deflection is not decreasing
D 421.21 5 17593 27.26 13.30 21.27 18.45 16.01 11.93 7.97 4.64 66 72 09:45:45 CTR PCC Excel. None 367
C Comment at 421.21 ft Time: 09:45:55 :#22 PANEL11 JOINT
C Comment at 430.48 ft Time: 09:47:23 :Deflection is not decreasing
D 430.48 2 6644 15.12 8.19 12.20 10.66 9.40 7.15 5.07 3.62 66 72 09:47:24 CTR PCC Excel. None 250
C Comment at 430.48 ft Time: 09:47:31 :Deflection is not decreasing
D 430.48 3 9743 22.68 12.37 18.40 16.21 14.24 10.90 7.86 5.56 66 72 09:47:33 CTR PCC Excel. None 244
C Comment at 430.48 ft Time: 09:47:41 :Deflection is not decreasing
D 430.48 4 12880 30.08 16.33 24.50 21.65 19.06 14.64 10.59 7.49 66 72 09:47:44 CTR PCC Excel. None 243
C Comment at 430.48 ft Time: 09:47:55 :Deflection is not decreasing
D 430.48 5 17324 40.88 22.06 33.31 29.40 26.05 20.10 14.60 10.37 66 72 09:47:56 CTR PCC Excel. None 241
C Comment at 430.48 ft Time: 09:48:06 :#23 PANEL#12 CENTER - MID PANEL CRACK PATCHED - LTE ACROSS CRACK
C Comment at 443.87 ft Time: 09:58:39 :WRONG NOTES ABOVE - CORRECTIONS: #22 PANEL11 JOINT SHOULD BE #21a PATCH JOINT BETWEEN #21 AND #22
C Comment at 443.87 ft Time: 09:58:59 :#23 ABOVE SHOULD BE #22 PANEL11 JOINT
D 450.05 2 6782 7.35 7.20 6.44 5.70 5.15 4.09 2.91 2.06 67 72 10:00:00 CTR PCC Excel. None 524
D 450.05 3 9985 11.01 10.84 9.68 8.67 7.73 6.09 4.38 3.02 67 72 10:00:07 CTR PCC Excel. None 516
D 450.05 4 13169 14.56 14.24 12.82 11.59 10.29 8.12 5.85 4.05 67 72 10:00:15 CTR PCC Excel. None 514
D 450.05 5 17736 19.75 19.17 17.41 15.65 14.00 11.02 7.92 5.44 67 72 10:00:26 CTR PCC Excel. None 511
C Comment at 450.05 ft Time: 10:00:36 :#23 PANEL#12 CENTER - CRACKS ON PAVEMENT
D 470.64 2 6692 13.36 11.25 10.36 8.80 7.62 5.52 3.57 2.07 67 73 10:02:57 CTR PCC Excel. None 285
D 470.64 3 9798 20.51 17.35 15.96 13.72 11.78 8.57 5.52 3.18 67 73 10:03:03 CTR PCC Excel. None 272
D 470.64 4 12891 27.81 23.37 21.65 18.74 16.08 11.67 7.55 4.32 67 73 10:03:12 CTR PCC Excel. None 264

D 470.64 5 17225 38.97 32.32 30.37 26.16 22.59 16.39 10.57 5.98 67 73 10:03:22 CTR PCC Excel. None 251
C Comment at 470.64 ft Time: 10:03:32 :#24 PANEL#12 JOINT
D 489.18 2 6712 9.89 9.67 8.82 7.80 6.98 3.66 2.67 1.94 67 74 10:04:28 CTR PCC Excel. Rutting 386
D 489.18 3 9797 14.96 14.51 13.42 12.05 10.75 5.64 4.17 2.96 67 74 10:04:35 CTR PCC Excel. Rutting 372
D 489.18 4 12878 19.88 19.22 17.89 16.23 14.48 7.66 5.63 3.98 67 74 10:04:43 CTR PCC Excel. Rutting 368
D 489.18 5 17498 27.25 26.22 24.55 22.27 19.99 10.73 7.84 5.53 67 74 10:04:53 CTR PCC Excel. Rutting 365
C Comment at 489.18 ft Time: 10:05:04 :#25 PANEL13 CENTER - LONG. CRACKS AND PATCHING AND RUTTING - DCP6
C Comment at 509.78 ft Time: 10:06:18 :Deflection is not decreasing
D 509.78 2 6672 11.98 6.15 9.18 7.75 6.70 4.87 3.21 2.09 66 73 10:06:20 CTR PCC Excel. None 317
C Comment at 509.78 ft Time: 10:06:26 :Deflection is not decreasing
D 509.78 3 9792 18.07 9.52 13.95 11.90 10.19 7.43 4.97 3.14 66 73 10:06:28 CTR PCC Excel. None 308
C Comment at 509.78 ft Time: 10:06:36 :Deflection is not decreasing
D 509.78 4 12903 23.86 12.66 18.47 15.84 13.52 9.84 6.60 4.11 66 73 10:06:38 CTR PCC Excel. None 308
C Comment at 509.78 ft Time: 10:06:48 :Deflection is not decreasing
D 509.78 5 17351 32.54 17.38 25.19 21.56 18.49 13.50 9.04 5.63 66 73 10:06:51 CTR PCC Excel. None 303
C Comment at 508.75 ft Time: 10:07:01 :#26 PANEL13 JOINT
D 531.41 2 6700 8.12 8.13 7.05 6.25 5.61 4.42 3.23 2.31 66 73 10:07:58 CTR PCC Excel. None 469
D 531.41 3 9855 12.22 12.26 10.66 9.60 8.49 6.70 4.93 3.48 66 73 10:08:05 CTR PCC Excel. None 458
D 531.41 4 13033 16.21 16.27 14.16 12.80 11.33 8.94 6.60 4.66 66 73 10:08:13 CTR PCC Excel. None 457
D 531.41 5 17568 22.05 22.05 19.23 17.34 15.43 12.16 8.95 6.30 66 73 10:08:23 CTR PCC Excel. None 453
C Comment at 531.41 ft Time: 10:09:01 :#27 PANEL14 CENTER - TRANSVERSE CRACKS ON PANEL - HALF OF THE PANEL IS NEW PATCH PCC
C Comment at 548.91 ft Time: 10:09:51 :Deflection is not decreasing
D 548.91 2 6647 13.96 6.43 10.66 8.99 7.74 5.62 3.72 2.34 66 74 10:09:53 CTR PCC Excel. None 271
C Comment at 548.91 ft Time: 10:10:00 :Deflection is not decreasing
D 548.91 3 9784 20.55 10.42 15.79 13.44 11.49 8.35 5.55 3.45 66 74 10:10:01 CTR PCC Excel. None 271
C Comment at 548.91 ft Time: 10:10:09 :Deflection is not decreasing
D 548.91 4 12885 26.83 14.36 20.66 17.71 15.06 10.97 7.35 4.54 66 74 10:10:11 CTR PCC Excel. None 273
C Comment at 548.91 ft Time: 10:10:22 :Deflection is not decreasing
D 548.91 5 17357 35.87 20.03 27.56 23.61 20.15 14.73 9.89 6.12 66 74 10:11:01 CTR PCC Excel. None 275
C Comment at 548.91 ft Time: 10:11:11 :#28 PANEL14 JOINT
C Comment at 570.54 ft Time: 10:11:59 :Deflection is not decreasing
D 570.54 2 6446 26.46 5.67 21.87 19.56 17.25 13.58 9.96 6.50 66 74 10:12:00 CTR PCC Excel. None 139
C Comment at 570.54 ft Time: 10:12:07 :Deflection is not decreasing
D 570.54 3 9484 40.26 8.00 33.27 29.78 26.13 20.49 14.84 9.41 66 74 10:12:09 CTR PCC Excel. None 134
C Comment at 570.54 ft Time: 10:12:18 :Deflection is not decreasing
D 570.54 4 12433 54.88 10.39 45.23 40.54 35.43 27.65 19.86 12.32 66 74 10:12:19 CTR PCC Excel. None 129
C Comment at 570.54 ft Time: 10:12:30 :Deflection is not decreasing
D 570.54 5 16482 74.77 18.37 61.85 55.50 48.86 37.98 27.22 17.33 66 74 10:12:31 CTR PCC Excel. None 125
C Comment at 570.54 ft Time: 10:12:55 :#29 PANEL15 CENTER - LONG. AND TRANSVERSE CRACKS - LTE ACROSS MIDPANEL TRANSVERSE CRACK
D 595.26 2 6685 10.33 9.60 8.19 6.92 6.03 4.37 2.64 1.27 66 75 10:14:42 CTR PCC Excel. None 368
D 595.26 3 9830 15.57 14.46 12.33 10.57 9.07 6.52 3.92 1.71 66 75 10:14:49 CTR PCC Excel. None 359
D 595.26 4 12989 20.62 19.10 16.34 14.11 12.06 8.65 5.19 2.15 66 75 10:14:57 CTR PCC Excel. None 358
D 595.26 5 17526 27.97 25.84 22.18 19.10 16.44 11.80 7.05 2.66 66 75 10:15:08 CTR PCC Excel. None 356
C Comment at 595.26 ft Time: 10:15:18 :#30 PANEL15 JOINT
D 615.85 2 6693 7.85 7.31 7.20 6.50 5.98 4.92 3.62 2.56 66 74 10:16:21 CTR PCC Excel. None 485
D 615.85 3 9875 11.81 11.00 10.84 9.95 9.04 7.40 5.45 3.75 66 74 10:16:27 CTR PCC Excel. None 476
D 615.85 4 13053 15.64 14.49 14.36 13.29 12.00 9.81 7.22 4.92 66 74 10:16:36 CTR PCC Excel. None 474
D 615.85 5 17639 21.37 19.73 19.64 18.08 16.42 13.45 9.86 6.62 66 74 10:16:46 CTR PCC Excel. None 469
C Comment at 615.85 ft Time: 10:17:00 :#31 PANEL16 CENTER - CRACKS ON PAVEMENT
C Comment at 629.24 ft Time: 10:18:11 :Deflection is not decreasing
D 629.24 2 6600 16.59 9.24 13.06 11.24 9.80 7.29 4.87 2.96 66 76 10:18:13 CTR PCC Excel. None 226
C Comment at 629.24 ft Time: 10:18:19 :Deflection is not decreasing
D 629.24 3 9664 25.09 13.93 19.83 17.19 14.91 11.11 7.49 4.45 66 76 10:18:20 CTR PCC Excel. None 219
C Comment at 629.24 ft Time: 10:18:29 :Deflection is not decreasing
D 629.24 4 12722 33.65 18.40 26.66 23.19 20.11 14.95 10.12 5.99 66 76 10:18:30 CTR PCC Excel. None 215
C Comment at 629.24 ft Time: 10:18:41 :Deflection is not decreasing
D 629.24 5 17089 46.50 24.85 36.77 31.96 27.80 20.68 13.95 8.16 66 76 10:18:42 CTR PCC Excel. None 209
C Comment at 629.24 ft Time: 10:18:52 :#32 PANEL16 JOINT - PATCHED
D 647.78 2 6714 7.60 7.10 6.96 6.35 5.81 4.84 3.71 2.81 66 74 10:19:51 CTR PCC Excel. None 502
D 647.78 3 9867 11.39 10.68 10.48 9.64 8.76 7.30 5.65 4.24 66 74 10:19:58 CTR PCC Excel. None 493
D 647.78 4 13071 15.08 14.14 13.87 12.83 11.64 9.68 7.53 5.65 66 74 10:20:06 CTR PCC Excel. None 493
D 647.78 5 17677 20.54 19.22 18.91 17.42 15.90 13.24 10.27 7.68 66 74 10:20:17 CTR PCC Excel. None 489
C Comment at 647.78 ft Time: 10:20:27 :#33 PANEL17 CENTER - TRANSVERSE CRACKS

APPENDIX E: CHP RAW DATA

PROJECT: NW GREENWOOD AND 3RD STREET, ANKENY, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

31-May-12

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	30	(cm)

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0			28.2					
0:00:00	1	60			25.25	19.6	3.461	5.0E-04	1.4
0:00:00	9			28.35					
0:00:00	10	60			27.9	19.6	3.461	7.3E-05	0.2
0:00:00	19			24.5					
0:00:00	20	60			24.15	19.6	3.461	6.5E-05	0.2
0:00:00	39			27.5					
0:00:00	40	60			27.1	19.6	3.461	6.6E-05	0.2
0:00:00	59			27.4					
0:00:00	60	60			27.05	19.6	3.461	5.8E-05	0.2
							MINIMUM	**5.8E-05**	**0.2**

PROJECT: NWGREENWOOD AND 5TH STREET

note: Based on ASTM D6391-06
Version 2 DJW
31-May-12

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	200	(cm)

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0			27.05					
0:00:00	1	60			26	19.6	3.461	1.8E-04	0.5
0:00:00	10			26.75					
0:00:00	11	60			26.4	19.6	3.461	6.0E-05	0.2
0:00:00	19			27.7					
0:00:00	20	60			27.25	19.6	3.461	7.4E-05	0.2
0:00:00	39			26.85					
0:00:00	40	60			25.3	19.6	3.461	2.7E-04	0.8
0:00:00	59			27.6					
0:00:00	59.5	30			22.85	19.6	3.461	1.7E-03	4.9

PROJECT: E63, STORY COUNTY, IOWA											
note:	Based on ASTM D6391-06										
Version 2	DJW										
31-May-12											
Inputs											
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C										
	$= 2.2902(0.9842^T)/T^{0.1702}$										
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)										
D1	ID of bottom casing (12.700 cm)										
a	+1 for impermeable base a b1										
	0 for infinite (+20D1) depth of tested material										
	-1 for permeable base at b1										
b1	thickness of tested layer between bottom of device and top of underlying stratum										
H1	effective head at t1										
H2	effective head at t2										
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$										
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s						1.609437912				
a	0										
b1	30	(cm)									
	Time (min)	**t1-t2 (s)**		**H1 (in)**	**H2 (in)**	**T**	**d (cm)**	**K (cm/s)**	**K (ft/day)**		
	0			28.4							
0:01:00	1	60			24.7	13.4	3.461	3.6E-04	1.0		
0:02:00	2			28.5							
0:03:00	3	60			26.7	13.4	3.461	3.4E-04	1.0		
0:04:00	4			24.95							
0:05:00	5	60			23	13.4	3.461	3.8E-04	1.1		
0:08:00	8			26.8							
0:09:00	9	60			23.85	13.4	3.461	3.7E-04	1.1		
0:15:00	15			27.5							
0:16:00	16	60			24.4	13.2	3.461	3.7E-04	1.0		
0:30:00	30			25.3							
0:31:00	31	60			22.2	13.8	3.461	3.9E-04	1.1		
1:00:00	60			28.9							
1:01:00	61	60			25.6	13.1	3.461	3.6E-04	1.0		

PROJECT: RIVERSIDE RD, STORY COUNTY, IOWA												
note:	Based on ASTM D6391-06											
Version 2	DJW											
7-Jun-12												
Core #1												
Inputs												
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C											
	$= 2.2902(0.9842^T)/T^{0.1702}$											
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)											
D1	ID of bottom casing (12.700 cm)											
a	+1 for impermeable base a b1											
	0 for infinite (+20D1) depth of tested material											
	-1 for permeable base at b1											
b1	thickness of tested layer between bottom of device and top of underlying stratum											
H1	effective head at t1											
H2	effective head at t2											
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$											
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s											
a	1											
b1	15	(cm)										

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0.0			28.9					
	0.5	30			23.9	26.1	3.461	1.8E-03	5.1
	1.0			27.5					
	1.5	30			23.2	26.1	3.461	1.6E-03	4.5
	2.5			26.9					
	3.0	30			22.6	26.1	3.461	1.6E-03	4.7
	5.0			28.3					
	5.5	30			23.9	26	3.461	1.6E-03	4.5
	10.0			27.2					
	10.5	30			23.3	26	3.461	1.5E-03	4.1
	20.0			28.7					
	20.5	30			24.4	26	3.461	1.5E-03	4.4
	40.0			29.5					
	40.5	30			25.4	25.7	3.461	1.4E-03	4.0
	60.0			29.5					
	60.5	30			25.4	26.2	3.461	1.4E-03	4.0

PROJECT: RIVERSIDE RD, STORY COUNTY, IOWA	
note:	Based on ASTM D6391-06
Version 2	DJW
7-Jun-12	
Core #2	

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T	d (cm)	K (cm/s)	K (ft/day)
		30					
0.5	17		21	25.6	3.461	6.0E-03	17.0
		29					
1.0	20		21	25.6	3.461	4.6E-03	13.1
		29					
2.0	16		21	25.6	3.461	5.8E-03	16.4
		29					
3.0	16		21	25.6	3.461	5.8E-03	16.4
		29					
5.0	17		21	25.6	3.461	5.4E-03	15.4
		29					
10.0	19		21	25.6	3.461	4.9E-03	13.8
		29					
15.0	18		21	25.6	3.461	5.1E-03	14.6
		29					
20.0	20		21	25.6	3.461	4.6E-03	13.1
		29					
25	19		21	25.6	3.461	4.9E-03	13.8
		29					
31	21		21	25.6	3.461	4.4E-03	12.5
		29					
40	22		21	25.6	3.461	4.2E-03	11.9
		29					
60	24		21	25.6	3.461	3.9E-03	10.9

PROJECT: E23, ZEARING, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

31-May-12

Good Panel

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	30	(cm)

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0			29					
0:00:00	1	60			27.9	29	3.461	1.4E-04	0.4
0:00:00	2			28.9					
0:00:00	3	60			27.8	30.1	3.461	1.4E-04	0.4
0:00:00	4			28.2					
0:00:00	5	60			27.35	29.4	3.461	1.1E-04	0.3
0:00:00	8			28.45					
0:00:00	9	60			27.3	29.2	3.461	1.5E-04	0.4
0:00:00	15			27.85					
0:00:00	16	60			27.05	28.3	3.461	1.1E-04	0.3
	30			28.45					
	31	60			27.75	30.1	3.461	8.9E-05	0.3
	40			26.9					
	41	60			26.45	30.1	3.461	6.0E-05	0.2
	59			27.2					
	60	60			26.55	30.8	3.461	8.5E-05	0.2
							Minimum	**6.0E-05**	**0.170551**

PROJECT: E23, ZEARING, IOWA

note:	Based on ASTM D6391-06
Version 2	DJW
31-May-12	
Cracked Panel	

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	200	(cm)

	Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0		29.4					
0:00:00	1	60		28.9	28.4	3.461	6.3E-05	0.2
0:00:00	2		28.4					
0:00:00	3	60		28	29	3.461	5.2E-05	0.1
0:00:00	4		27.5					
0:00:00	5	60		27.1	29.4	3.461	5.3E-05	0.2
0:00:00	8		28.85					
0:00:00	9	60		25.45	30.5	3.461	4.4E-04	1.3
0:00:00	15		26.75					
0:00:00	16	60		26.35	30	3.461	5.4E-05	0.2
	30		29.1					
	31	60		28.65	30.6	3.461	5.5E-05	0.2
	40		29.75					
	41	60		29.3	30.1	3.461	5.4E-05	0.2
	60		23.8					
	61	60		22.5	30.7	3.461	2.0E-04	0.6
						Minimum	**5.2E-05**	**0.1**

PROJECT: SWWESTLAWN DR., ANKENY, IOWA	
note:	Based on ASTM D6391-06
Version 2	DJW
31-May-12	
PANEL 2	
Inputs	
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s
a	0
b1	30 (cm)

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0			30					
0:00:00	0.5	30			26.9	26	3.461	8.5E-04	2.4
0:00:00	2.5			28.45					
0:00:00	3	30			25.8	26	3.461	7.6E-04	2.2
0:00:00	5			28.85					
0:00:00	5.5	30			26.35	26	3.461	7.1E-04	2.0
0:00:00	10			27.6					
0:00:00	10.5	30			25.55	26	3.461	6.0E-04	1.7
0:00:00	20			29.9					
0:00:00	20.5	30			27.95	28.9	3.461	4.9E-04	1.4
	33			28.7					
	33.5	30			26.9	26.5	3.461	5.0E-04	1.4
	60			29.9					
	60.5	30			28.3	26.7	3.461	4.2E-04	1.2
							Minimum	**4.2E-04**	**1.198059**

PROJECT: SWWESTLAWN DR., ANKENY, IOWA

note:	Based on ASTM D6391-06						
Version 2	DJW						
31-May-12							
PANEL 14							

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	200	(cm)

	Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	1		16.6					
0:00:00	2	30		14.9	26	32.9816	7.7E-02	217.1
0:00:00	8		16.15					
0:00:00	8.5	30		14.9	26	32.9816	5.7E-02	161.9
0:00:00	40.5		16.45					
0:00:00	41	30		15.15	26	32.9816	5.8E-02	165.4
						Average	**5.7E-02**	**161.9**

PROJECT: SWLOGAN DR., ANKENY, IOWA

note:	Based on ASTM D6391-06
Version 2	DJW
31-May-12	

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	30	(cm)

	Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0			29					
0:00:00	1	60		26.1	26.1	32.6	3.461	3.6E-04	1.0
0:00:00	2			29.45					
0:00:00	3	60		26.6	26.6	32.7	3.461	3.4E-04	1.0
0:00:00	4			28.2					
0:00:00	5	60		25.7	25.7	32.8	3.461	3.1E-04	0.9
0:00:00	9			29.9					
0:00:00	10	60		27.6	27.6	34.3	3.461	2.6E-04	0.7
0:00:00	16			28.7					
0:00:00	17	60		26.5	26.5	33.6	3.461	2.6E-04	0.7
	29			27.4					
	30	60		25.4	25.4	35.8	3.461	2.4E-04	0.7
	44			28.9					
	45	60		26.9	26.9	37	3.461	2.2E-04	0.6
	59			27.9					
	60	60		26.2	26.2	37.4	3.461	1.9E-04	0.5
							MINIMUM	**1.9E-04**	**0.5**

PROJECT: W.MAIN ST., KNOXVILLE, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

PANEL1

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		29					
1.0	60		27.1	31.7	3.461	2.8E-04	0.8
2.0		29					
3.0	60		27.3	31.5	3.461	2.5E-04	0.7
4.0		30					
5.0	60		25.65	31.5	3.461	6.6E-04	1.9
9.0		29.3					
10.0	60		27.85	31.2	3.461	2.1E-04	0.6
14.0		29.2					
15.0	60		28	31.6	3.461	1.8E-04	0.5
32.0		29.7					
33.0	60		28.7	31.6	3.461	1.4E-04	0.4
39.0		28.7					
40.0	60		27.65	32.6	3.461	1.5E-04	0.4
59.0		27.7					
60.0	60		26.9	32.5	3.461	1.2E-04	0.3
					MINIMUM	**1.2E-04**	**0.3**

PROJECT: W.MAIN ST., KNOXVILLE, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

PANEL 13

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		29.1					
1.0	60		28.4	31.6	3.461	1.0E-04	0.3
2.0		29.9					
3.0	60		29	31.6	3.461	1.3E-04	0.4
4.0		28.2					
5.0	60		27.5	31.2	3.461	1.1E-04	0.3
9.0		29					
10.0	60		28.35	30.9	3.461	9.6E-05	0.3
15.0		29					
16.0	60		28.45	31.4	3.461	8.0E-05	0.2
29.0		27.95					
30.0	60		27.4	31.5	3.461	8.3E-05	0.2
39.0		28					
40.0	60		27.5	31.8	3.461	7.5E-05	0.2
59.0		29.25					
60.0	60		28.65	32.8	3.461	8.5E-05	0.2
					MINIMUM	**7.5E-05**	**0.2**

PROJECT: S 5TH STREET, KNOXVILLE, IOWA												
note:	Based on ASTM D6391-06											
Version 2	DJW											
31-May-12												
PANEL#5 GOOD PANEL												
Inputs												
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C											
	$= 2.2902(0.9842^T)/T^{0.1702}$											
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)											
D1	ID of bottom casing (12.700 cm)											
a	+1 for impermeable base a b1											
	0 for infinite (+20D1) depth of tested material											
	-1 for permeable base at b1											
b1	thickness of tested layer between bottom of device and top of underlying stratum											
H1	effective head at t1											
H2	effective head at t2											
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$											
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s											
a	0											
b1	200	(cm)										
	Time (min)	**t1-t2 (s)**		**H1 (in)**	**H2 (in)**	**T ©**	**d (cm)**	**K (cm/s)**	**K (ft/day)**			
	0			29.1								
0:00:00	1	60			28.5	37	3.461	6.4E-05	0.2			
0:00:00	2			29.1								
0:00:00	3	60			28.5	37	3.461	6.4E-05	0.2			
0:00:00	4			29.05								
0:00:00	5	60			28.4	37	3.461	7.0E-05	0.2			
0:00:00	9			29.4								
0:00:00	10	60			28.8	37	3.461	6.4E-05	0.2			
0:00:00	14			29.2								
0:00:00	15	60			28.55	36.7	3.461	7.0E-05	0.2			
	29			29.4								
	30	60			28.85	36.6	3.461	5.9E-05	0.2			
	39			29.15								
	40	60			28.65	37.3	3.461	5.3E-05	0.2			
	59			28.9								
	60	60			28.4	37	3.461	5.4E-05	0.2			
							MINIMUM	**5.3E-05**	**0.2**			

PROJECT: S 5TH STREET, KNOXVILLE, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

31-May-12

PANEL#7 CRACKED PANEL

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	0	
b1	200	(cm)

	Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
	0		29.2					
0:00:00	1	60		27.85	35.5	3.461	1.51E-04	0.4
0:00:00	2		29.5					
0:00:00	3	60		28.1	35.5	3.461	1.55E-04	0.4
0:00:00	4		26.7					
0:00:00	5	60		25.5	35.4	3.461	1.47E-04	0.4
0:00:00	9		28.3					
0:00:00	10	60		27	35.6	3.461	1.49E-04	0.4
0:00:00	14		29.2					
0:00:00	15	60		27.85	35.6	3.461	1.50E-04	0.4
	29		28.8					
	30	60		27.65	35.9	3.461	1.29E-04	0.4
	39		28.6					
	40	60		27.25	35.9	3.461	1.53E-04	0.4
	59		28.5					
	60	60		27.3	35.6	3.461	1.37E-04	0.4
						MINIMUM	**1.3E-04**	**0.4**

PROJECT: VALLEYVIEW DRIVE, COUNCILBLUFFS, IOWA

note:	Based on ASTM D6391-06
Version 2	DJW
7-Jun-12	
PANEL2	

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		28.4					
1.0	60		27.7	34.6	3.461	9.8E-05	0.3
4.0		28.8					
5.0	60		28.1	35.3	3.461	9.5E-05	0.3
9.0		28.2					
10.0	60		27.5	35.5	3.461	9.7E-05	0.3
14.0		28.1					
15.0	60		27.3	36	3.461	1.1E-04	0.3
29.0		27.3					
30.0	60		26.1	36.1	3.461	1.7E-04	0.5
47.0		28.3					
48.0	60		26.8	36	3.461	2.1E-04	0.6
59.0		28.75					
60.0	60		27.35	36.7	3.461	1.9E-04	0.5
					MINIMUM	**9.5E-05**	**0.3**

PROJECT: VALLEY VIEW DRIVE, COUNCILBLUFFS, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

Panel #7 - Good Section

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a 1

b1 15 (cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		28.8					
0.5	30		22.8	34	3.461	1.9E-03	5.3
1.0		28					
1.5	30		22.2	34	3.461	1.8E-03	5.2
2.0		27.9					
2.5	30		22.1	34	3.461	1.9E-03	5.3
4.0		29.8					
4.5	30		23.5	34	3.461	1.9E-03	5.4
9.0		27.7					
9.5	30		21	34.1	3.461	2.2E-03	6.2
14.0		27.4					
14.5	30		20	34.2	3.461	2.5E-03	7.1
30.0		27.2					
30.5	30		20	34.5	3.461	2.4E-03	6.9
45.0		29					
45.2	17		20	35.2	3.461	5.1E-03	14.4
50.0		30					
50.2	20		20	30	3.461	5.3E-03	14.9
60.0		30					
60.3	25		20	30	3.461	4.2E-03	11.9
					Average	**1.8E-03**	**5.2**

PROJECT: S.9TH AVE, COUNCILBLUFFS, IOWA	
note:	Based on ASTM D6391-06
Version 2	DJW
7-Jun-12	
PANEL9	

Inputs	
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		27.9					
1.0	60		24.7	38	3.461	4.5E-04	1.3
2.0		29.3					
3.0	60		26.2	37.9	3.461	4.1E-04	1.2
4.0		27.1					
5.0	60		24.4	37.8	3.461	3.9E-04	1.1
9.0		28.1					
10.0	60		25.4	37.5	3.461	3.7E-04	1.1
14.0		27.5					
15.0	60		25	37.4	3.461	3.5E-04	1.0
29.0		27.2					
30.0	60		25.1	37.2	3.461	3.0E-04	0.8
44.0		28.3					
45.0	60		26.1	37.4	3.461	3.0E-04	0.9
59.0		28.7					
60.0	60		26.4	36.2	3.461	3.2E-04	0.9
					MINIMUM	**3.0E-04**	**0.8**

PROJECT: CLIFF RD (SITEA), BURLINGTON, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

PANEL7 - GOOD PANEL

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11 D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	11	(cm)

Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0			19					
1.0	60			17.5	34.6	32.9816	3.1E-02	88.4
2.0			17.7					
3.0	60			16.6	35.3	32.9816	2.4E-02	68.0
4.0			17.7					
5.0	60			16.4	35.5	32.9816	2.8E-02	80.5
9.0			18.8					
10.0	60			17.3	36	32.9816	3.1E-02	86.9
14.0			19.1					
15.0	60			17.7	36.1	32.9816	2.8E-02	79.4
29.0			16.1					
30.0	60			15	36	32.9816	2.6E-02	73.9
59.0			16.3					
60.0	60			15.4	36.7	32.9816	2.1E-02	58.5
						MINIMUM	**2.1E-02**	**58.5**

PROJECT: CLIFF RD (SITEA), BURLINGTON, IOWA

note:	Based on ASTM D6391-06
Version 2	DJW
7-Jun-12	
PANEL 9 - CRACKED	
Inputs	
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s
a	1
b1	11 (cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		30					
1.0	60		22	28	3.461	1.5E-03	4.2
2.0		29.2					
3.0	60		21.8	28.4	3.461	1.4E-03	4.0
4.0		29.6					
5.0	60		22.2	28.3	3.461	1.4E-03	3.9
9.0		29.6					
10.0	60		23	28.6	3.461	1.2E-03	3.4
14.0		28.6					
15.0	60		22.8	29	3.461	1.1E-03	3.0
29.0		29.1					
30.0	60		24.9	30	3.461	7.2E-04	2.0
44.0		28.8					
45.0	60		25.6	31.1	3.461	5.3E-04	1.5
59.0		28.7					
60.0	60		25.9	31.3	3.461	4.6E-04	1.3

PROJECT: CLIFF RD (SITEB), BURLINGTON, IOWA											
note:	Based on ASTM D6391-06										
Version 2	DJW										
7-Jun-12											
PANEL 4											
Inputs											
R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C										
	$= 2.2902(0.9842^{T})/T^{0.1702}$										
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)										
D1	ID of bottom casing (12.700 cm)										
a	+1 for impermeable base a b1										
	0 for infinite (+20D1) depth of tested material										
	-1 for permeable base at b1										
b1	thickness of tested layer between bottom of device and top of underlying stratum										
H1	effective head at t1										
H2	effective head at t2										
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$										
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s										
a	1										
b1	10	(cm)									
	Time (min)	**t1-t2 (s)**		**H1 (in)**	**H2 (in)**	**T ©**	**d (cm)**	**K (cm/s)**	**K (ft/day)**		
	0.0			19.2							
	1.0	60			18.7	30.7	32.9816	1.1E-02	31.5		
	2.0			18.8							
	3.0	60			18.35	30.8	32.9816	1.0E-02	28.9		
	4.0			19.1							
	5.0	60			18.68	30.6	32.9816	9.4E-03	26.6		
	9.0			18.7							
	10.0	60			18.35	31	32.9816	7.9E-03	22.4		
	16.0			18.7							
	17.0	60			18.35	31.2	32.9816	7.9E-03	22.3		
	29.0			18.2							
	30.0	60			17.8	33.6	32.9816	8.8E-03	25.0		
	59.0			19.1							
	60.0	60			18.75	32.6	32.9816	7.5E-03	21.2		
							MINIMUM	**7.5E-03**	**21.2**		

PROJECT: MEADOWBROOK DR, BURLINGTON, IOWA

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

Panel #7 - Good Section

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	10	(cm)

Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0			30					
0.1	12			20	32	3.461	9.1E-03	25.9
2.0			28					
2.1	10			20	32	3.461	9.1E-03	25.8
3.6			30					
4.1	12			20	32	3.461	9.1E-03	25.9
9.0			28.5					
9.1	11			20	34	3.461	8.4E-03	23.7
14.0			29.5					
14.1	14			20	34.1	3.461	7.2E-03	20.4
29.0			29					
29.1	13			20	34	3.461	7.4E-03	21.0
29.0			29					
59.1	14			20	32.9	3.461	7.0E-03	20.0
						MINIMUM	**7.0E-03**	**20.0**

PROJECT: W38/LOCUST ROAD, WINNESHIEK COUNTY

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

CORE1

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^T)/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	30	(cm)

Time (min)	t1-t2 (s)		H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0			27.7					
1.0	60			26.3	23.1	3.461	2.4E-04	0.7
2.0			25					
3.0	60			23.7	23.1	3.461	2.5E-04	0.7
5.0			27					
6.0	60			25.4	23	3.461	2.8E-04	0.8
9.0			28.3					
10.0	60			26.7	23	3.461	2.7E-04	0.8
14.0			27.9					
15.0	60			26.3	23.6	3.461	2.7E-04	0.8
29.0			27.2					
30.0	60			26.2	23.6	3.461	1.7E-04	0.5
59.0			26.5					
60.0	60			25.2	23.6	3.461	2.3E-04	0.7
						MINIMUM	**1.7E-04**	**0.5**

PROJECT: W38/LOCUST ROAD, WINNESHIEK COUNTY

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

CORE 2

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	30	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		29.8					
1.0	60		27.6	23	3.461	3.5E-04	1.0
2.0		25.7					
3.0	60		24	23	3.461	3.2E-04	0.9
4.0		27.7					
5.0	60		25.8	23	3.461	3.3E-04	0.9
9.0		25.6					
10.0	60		23.9	23	3.461	3.2E-04	0.9
14.0		25.9					
15.0	60		23.8	23	3.461	3.9E-04	1.1
29.0		27.6					
30.0	60		25.5	23	3.461	3.7E-04	1.0
59.0		26.6					
60.0	60		24.9	23	3.461	3.1E-04	0.9
					MINIMUM	**3.1E-04**	**0.9**

PROJECT: 175TH STREET, WINNESHIEK COUNTY

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

PANEL 5

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a	1	
b1	15	(cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		28.1					
1.0	60		25.2	23	3.461	5.5E-04	1.6
2.0		27.6					
3.0	60		25.8	23	3.461	3.4E-04	1.0
4.0		27.8					
5.0	60		25.3	23	3.461	4.8E-04	1.4
9.0		27					
10.0	60		24.8	23	3.461	4.3E-04	1.2
14.0		26.6					
15.0	60		24.6	23	3.461	4.0E-04	1.1
29.0		24.9					
30.0	60		23.5	23	3.461	2.9E-04	0.8
59.0		27.5					
60.0	60		26.2	23	3.461	2.5E-04	0.7
					MINIMUM	**2.5E-04**	**0.7**

PROJECT: 175TH STREET, WINNESHIEK COUNTY

note: Based on ASTM D6391-06

Version 2 DJW

7-Jun-12

PANEL 7

Inputs

R_t	ratio of kinematic viscosity of permeant at temperature of test permeant during time incrment t1 to t2 to that of water at 20C
	$= 2.2902(0.9842^{T})/T^{0.1702}$
d	Effective ID of standpipe (3.461 cm for top and 32.9816 cm for middle)
D1	ID of bottom casing (12.700 cm)
a	+1 for impermeable base a b1
	0 for infinite (+20D1) depth of tested material
	-1 for permeable base at b1
b1	thickness of tested layer between bottom of device and top of underlying stratum
H1	effective head at t1
H2	effective head at t2
G1	$= (\pi d^2/11D1)[1+a(D1/4b1)]$
K	$= R_t G1 Ln(H1/H2)/(t2-t1)$ cm/s

a 1

b1 15 (cm)

Time (min)	t1-t2 (s)	H1 (in)	H2 (in)	T ©	d (cm)	K (cm/s)	K (ft/day)
0.0		28.5					
1.0	60		26.6	20.4	3.461	3.7E-04	1.1
2.0		25.8					
3.0	60		25.2	20.4	3.461	1.3E-04	0.4
4.0		29.1					
5.0	60		28.5	20.8	3.461	1.1E-04	0.3
10.0		27.3					
11.0	60		26.8	21	3.461	9.8E-05	0.3
15.0		25.1					
16.0	60		24.8	21.3	3.461	6.3E-05	0.2
29.0		28.9					
30.0	60		28.4	21.4	3.461	9.2E-05	0.3
59.0		28.9					
60.0	60		28.4	22	3.461	9.1E-05	0.3
					MINIMUM	**6.3E-05**	**0.2**

APPENDIX F: SUMMARY OF LAB AND FIELD TEST RESULTS

Table 1. Summary of laboratory test results

Parameter	NW 3rd and Greenwood, Ankeny	NW 5th and Greenwood, Ankeny	E63, Story County		Riverside Road, Ames	E23, Story County	SW Westlawn, Ankeny		SW Logan, Ankeny		West Main, Knoxville	South 5th, Knoxville	Valley View Drive, Council Bluffs			
Sample ID	Core # 1 8.5 to 19 in. Subgrade	Core # 2 6.9 to 14 in. Subgrade	Core # 1 8.5 to 22 in. Subgrade	Core # 3 8 to 23 in. Subgrade	Core # 1 11 to 17 in. Crushed Limestone Subbase	Core #1 6.75 to 11 in. Subgrade	Core # 1 Crushed Limestone Subbase	Core # 1 Subgrade	Core # 1 Crushed Limestone Subbase	Core # 1 Subgrade	Core # 1 Crushed Limestone Subbase	Core # 1 Crushed Limestone Subbase	Core # 1 9 to 15 in Crushed Limestone Subbase	Core # 2 9 to 16 in. Recycled PCC Subbase	Core # 1 15 to 18 in Subgrade	Core # 2 16 to 18 in Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Dark Yellowish Brown Clayey Sand	Black Lean Clay with Sand	Brown Clayey Sand	Very Dark Brown Lean Clay with Sand	Light Brownish Gray Silty Gravel with Sand	Very Dark Gray Lean Clay with Sand	Light Gray Poorly Graded Gravel with Silt and Sand	Grayish Brown Clayey Sand	Light Gray Well Graded Gravel with Silt and Sand	Pale Yellow Silt (fly ash stabilized)	Light Gray Silty Gravel with Sand	Light Gray Silty Gravel with Sand	Gray Silty Gravel with Sand	Light Brownish Gray Poorly Graded Sand with Silt and Gravel	Olive Brown Lean Clay	Olive Brown Silt
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)																
Gravel Content (%) (> 4.75mm)	3	0	6	1	49	1	56	8	48	2	54	49	51	36	3	4
Sand Content (%) (4.75mm – 75μm)	63	29	52	34	38	35	35	43	43	41	26	30	33	59	9	6
Silt Content (%) (75μm – 2μm)	23	47	27	45	—[a]	41	—[a]	33	—[a]	42	—[a]	—[a]	—[a]	—[a]	70	70
Clay Content (%) (< 2μm)	11	24	15	20		23		16		15					18	20
Fines Content (%) (<75μm)	34	71	42	65	13	64	9	49	9	57	20	21	16	5	88	90
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	0.1062	—[b]	0.0901	—[b]	—[b]	—[b]	—[b]	0.2187	—[b]	—[b]
D_{30} (mm)	0.0532	0.0049	0.0236	0.0047	1.5105	0.0066	2.5415	0.0166	0.8616	0.0103	1.0932	0.7141	1.3838	0.9231	0.0112	0.0110
D_{60} (mm)	0.2370	0.0423	0.02066	0.0440	6.1207	0.0599	8.9820	0.1736	7.4111	0.0943	9.0175	7.4654	7.3655	3.9040	0.0342	0.0346
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	84.61	—[b]	82.26	—[b]	—[b]	—[b]	—[b]	17.85	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	6.77	—[b]	1.11	—[b]	—[b]	—[b]	—[b]	1.00	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)																
Liquid Limit, LL (%)	26	46	24	46	Non Plastic	37	Non Plastic	29	Non Plastic	30	Non Plastic	Non Plastic	Non Plastic	Non Plastic	36	34
Plasticity Index, PI (%)	13	24	8	33		13		14		5					13	9
AASHTO Classification (ASTM D3282-09)	A-2-6(1)	A-7-6(16)	A-4	A-7-6(18)	A-1-a	A-6(7)	A-1-a	A-6(3)	A-1-a	A-4(1)	A-1-b	A-1-b	A-1-b	A-1-a	A-6(12)	A-4(9)
USCS Classification (ASTM D2487-10)	SC	CL	SC	CL	GM	CL	GP-GM	SC	GW-GM	ML	GM	GM	GM	SP-SM	CL	ML
In Situ Moisture Content (%) (ASTM D2216-10)	7.6	20.1	8.7	17.7	Not Performed	16.7	Not Performed	12.0	Not Performed	15.2	Not Performed	Not Performed	Not Performed	Not Performed	14.4	14.1

[a]Hydrometer test not performed
[b]Cannot be determined

Table 1. Summary of laboratory test results (Contd.)

Parameter	9th Avenue, Council Bluffs		Cliff Rd (Site A), Burlington		Cliff Rd (Site B), Burlington		Meadowbrook Dr., Burlington		W38 Locust Rd, Winneshiek County			175th Street, Winneshiek County
Sample ID	Core # 1 8 to 17 in. Fly Ash Stabilized Subgrade	Core # 1 17 to 27 in. Subgrade	Core # 1 6 to 11.5 in. Crushed Limestone Subbase	Core # 1 11.5 to 20 in. Subgrade	Core # 1 8 to 11.75 in Crushed Limestone Subbase	Core # 1 11.75 to 24 in Subgrade	Core # 1 6.5 to 10.5 in Crushed Limestone Subbase	Core # 1 10.5 to 21 in Subgrade	Core #2 0 to 2 in. Crushed Limestone Choke Stone	Core # 1 3 to 12 in. Crushed Limestone Subbase	Core # 2 2 to 7 in. Crushed Limestone Subbase	Core # 1 Subgrade
Material Color and Description (ASTM D1535-12a and ASTM D2487-10)	Core # 1 8 to 17 in. Fly Ash Stabilized Subgrade	Core # 1 17 to 27 in. Subgrade	Core # 1 6 to 11.5 in. Crushed Limestone Subbase	Core # 1 11.5 to 20 in. Subgrade	Gray Poorly Graded Gravel with Silt and Sand	Very Dark Grayish Brown Fat Clay	Pale Yellow Silty Gravel with Sand	Dark Yellowish Brown Lean Clay	Pale Yellow Silty Gravel with Sand	Light Gray Silty Gravel with Sand	Light Gray Silty Gravel withy Sand	Very Dark Grayish Brown Lean Clay with Sand
Particle-Size Analysis Results (ASTM D 422-63 & ASTM C136-06)												
Gravel Content (%) (> 4.75mm)	9	1	48	1	59	0	61	2	45	42	44	6
Sand Content (%) (4.75mm – 75μm)	35	6	37	8	29	4	26	12	39	40	40	24
Silt Content (%) (75μm – 2μm)	37	57	—[a]	69	—[a]	62	—[a]	60	—[a]	—[a]	—[a]	54
Clay Content (%) (< 2μm)	19	36		22		34		26				16
Fines Content (%) (<75μm)	56	93	15	91	12	96	13	86	16	18	16	70
D_{10} (mm)	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]
D_{30} (mm)	0.0082	—	1.5547	0.0044	2.9744	—	2.9607	0.0037	1.1411	0.08286	1.0105	0.0134
D_{60} (mm)	0.1746	0.0212	6.1654	0.0146	7.9831	0.0120	12.1126	0.0187	5.7516	5.2978	5.6496	0.0530
Coefficient of Uniformity, c_u	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]
Coefficient of Curvature, c_c	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]
Atterberg Limits Test Results (ASTM D4318-05)												
Liquid Limit, LL (%)	45	68	Non Plastic	35	Non Plastic	52	Non Plastic	39	Non Plastic	Non Plastic	Non Plastic	28
Plasticity Index, PI (%)	9	38		10		28		15				9
AASHTO Classification (ASTM D3282-09)	A-5(4)	A-7-5(42)	A-1-a	A-4(10)	A-1-a	A-7-6(30)	A-1-a	A-6(13)	A-1-b	A-1-b	A-1-b	A-4(4)
USCS Classification (ASTM D2487-10)	ML	CH	GM	ML	GP-GM	CH	GM	CL	GM	GM	GM	CL
In Situ Moisture Content (%) (ASTM D2216-10)	24.1	26.0	Not Performed	18.6	Not Performed	28.9	Not Performed	14.8	Not Performed	Not Performed	Not Performed	11.3

[a]Hydrometer test not performed
[b]Cannot be determined

Table 2. Summary of field test results

Parameter	NW Greenwood St. and 3rd St., Ankeny 5/2/12	NW Greenwood St. and 5th St., Ankeny 5/2/12	E63, Story County 5/31/12	Riverside Rd., Ames 6/7/12	E23, Story County 6/21/12	SW Westlawn Dr., Ankeny 7/19/12		SW Logan St., Ankeny 7/19/12	West Main St., Knoxville 7/12/12	S 5th St., Knoxville 7/12/12	Valley View Dr., Council Bluffs 7/26/12	9th Ave., Council Bluffs 7/26/12	Cliff Rd. (Site A), Burlington 8/2/12	Cliff Rd. (Site B), Burlington 8/2/12	Meadow-brook Dr., Burlington 8/2/12	W38 Locust Rd., Winneshiek County 8/9/12	175th St., Winneshiek County 8/9/12
PCC Thickness (in.)	8.50	8.25	8.5, 8.0	11.0	6.75, 6.75	9.0	7.25	7.5	7.0, 7.5	8.0, 8.0	9.75, 9.0	7.75	6.5, 6.75	7.5	6.5	7.5, 7.0	6.0, 6.0
Pavement Age (Years)	23	36	22	18	26	4		< 1 (30 days)	5	3	15	23	19	19	18	15	42
Doweled PCC (Yes/No)	No	No	No	Yes	No	No		No	No	No	No	No	No	No	No	No	No
Subbase Type, Classification, Thickness	—	—	—	Limestone, GM, A-1-a, 6 in.	—	Limestone, GP-GM, A-1-a, 8.5 to 10 in.		Limestone, GW-GM, A-1-a, 3.5 in.	Limestone, GM, A-1-a, 12 in.	Limestone, GM, A-1-a, 12 in.	Limestone, GM, A-1-a; RPCC – SP-SM; 6 in.	Sand, 1 in.	Limestone, GM, A-1-a, 5 in	Limestone, GP-GM, A-1-a, 4.5 in	Limestone, GM, A-1-a, 4 in	Limestone, GM, A-1-b, 12 in	—
Subgrade Classification	SC, A-2-6(1)	CL, A-7-6(16)	SC, CL A-4, A-7-6(18)	—	CL, A-6(7)	SC, A-6(3)		ML, A-4(1)	—	—	CL to ML, A-6(12) to A-4(9)	ML to CH, A-5(4) to A-7-5(42)	ML, A-4(10)	CH, A-7-6(30)	CL, A-6(13)	—	CL, A-4(4)
Subgrade Stabilization	None	None	None	None	None	None	Woven Fabric	Fly Ash	Fly Ash	Fly Ash	None	Fly Ash	None	None	None	None	None
PCI	83	38	46	79	55	85		100	99	98	77	61	78	87	97	92	35
AADT, % of Trucks	2000, 1.5%	2000, 1.5%	1040, 5.0%	2910, 20.0%	150, 5.0%	1000, 1.0%		500, 1.0%	500, 3.0%	680, 2.0%	8900, 8.0%	7600, 5.0%	1120, 5.0%	1120, 5.0%	300, 1.5%	660, 6.0%	560, 3.0%
Pavement Width (ft), cross slope	31.2, 2%	31.3, 2%	24.0 , 2%	27.0, 2%	22.0, 2%	25.0, 3%		25.0, 2%	26.0, 2%	26.0, 2%	37.0, 2%	24.0, 2%	25.7, 2%	25.8, 2%	27.0, 2%	21.5, 2%	22.0, 2%
Average and COV (in parenthesis) values of in situ FWD, DCP, and CHP test measurements																	
LTE (%)	100 (6)	37 (23)	94 (10)	100 (3)	93 (7)	96 (3)	97 (2)	95 (3)	100 (4)	92 (1)	93 (1)	92 (11)	94 (3)	94 (3)	92 (3)	42 (28)	47 (49)
D_0 (mils)[1]	6.6 (24)	19.1 (46)	7.2 (27)	4.0 (30)	8.5 (21)	16.8 (50)	18.1 (42)	7.2 (16)	9.6 (27)	5.1 (16)	4.3 (12)	9.8 (31)	8.8 (35)	10.9 (29)	7.2 (22)	6.2 (35)	17.4 (48)
Intercept (mils)	-0.1 (286)	-1.3 (120)	-0.6 (103)	0.1 (348)	-0.2 (230)	4.4 (119)	3.2 (96)	-0.1 (301)	1.0 (104)	0.1 (233)	0.2 (99)	0.7 (98)	-0.1 (404)	0.1 (549)	-0.1 (478)	0.3 (299)	-0.9 (146)
% points with I > 2 mils	0%	0%	0%	0%	0%	45%	45%	0%	11%	0%	0%	8%	0%	6%	0%	3%	0%
Dynamic k_{FWD} (pci)[1]	78 (25)	66 (54)	107 (34)	146 (43)	133 (20)	75 (58)	50 (72)	112 (28)	103 (24)	208 (22)	147 (20)	58 (30)	130 (22)	75 (51)	182 (45)	221 (6)	102 (37)
Static k_{FWD} (pci)[1,2]	39 (25)	33 (54)	53 (34)	73 (43)	66 (20)	38 (58)	25 (72)	56 (28)	52 (24)	104 (22)	74 (20)	29 (30)	65 (22)	38 (51)	91 (45)	111 (6)	51 (37)
Static $k_{FWD\text{-}Corr}$ (pci)[1,2]	52 (20)	39 (41)	75 (24)	109 (32)	86 (17)	50 (53)	35 (65)	75 (21)	67 (20)	124 (19)	84 (18)	45 (26)	78 (21)	48 (44)	104 (40)	151 (4)	64 (32)
E_{SG} (psi)[3]	8,617 (18)	5,417 (28)	9,715 (22)	17,714 (29)	10,095 (16)	6,554 (57)	4,698 (64)	10,199 (19)	9,169 (19)	16,044 (16)	14,616 (16)	6,675 (26)	10,104 (23)	6,554 (41)	14,221 (33)	19,530 (4)	7,961 (32)
CBR_{SB} (%)[4]	None	None	None	78 (58)	None	64 (27)	54 (51)	60 (66)	46 (47)	39 (15)	122* (109)	None	20 (26)	20 (29)	22 (50)	111 (24)	None
CBR_{SG} (%)[4,5]	5.9 (26)	1.5 (68)	9.9 (59)	20 (35)	11 (44)	11 (75)	1.9 (19)	34 (79)	11.3 (38)	26 (55)	24 (35)	8.8 (49)	8.2 (44)	8.7 (35)	7.3 (90)	56 (30)	6.8 (57)
$CBR_{SG\text{-weak layer}}$ (%)[4,6]	2.1 (29)	1.1 (49)	7.3 (64)	8.6 (61)	3.6 (54)	2.6 (18)	1.3 (150)	3.4 (60)	4.6 (40)	7.7 (32)	15 (32)	5.2 (35)	3.6 (29)	5.2 (34)	2.7 (69)	16 (28)	1.4 (50)
$k_{comp\text{-}DCP}$ (pci)[7]	334 (18)	127 (50)	464 (42)	666 (23)	508 (33)	410 (58)	397 (84)	817 (48)	564 (32)	820 (22)	757 (19)	432 (37)	360 (31)	363 (20)	317 (58)	1049 (9)	358 (41)
$k_{comp\text{-}DCP\ Weak}$ (pci)[8]	166 (20)	103 (36)	373 (45)	405 (37)	232 (37)	242 (15)	160 (73)	280 (37)	351 (22)	454 (13)	540 (10)	304 (26)	244 (20)	302 (23)	196 (45)	667 (22)	125 (35)
K_{CHP} (ft/day)	0.2	0.2	0.1, 1.0	4.0, 10.9	0.1, 0.2	1.2	162	0.5	0.3, 0.2	0.2, 0.4	0.3, 5.2	0.8	59, 1.3	21	20	0.5, 0.9	0.7, 0.2
Edge Drains (Yes/No)	No (C/G)	No (C/G)	No (D)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No (C/G)	No (C/G)	No (C/G)	No (C/G)	Yes	No (D)	No (D)
t_{50} (days)	84	85	39, 4	7, 3	34, 17	14	0.1	71	57, 86	86, 43	446, 26	120	1.5, 66	4	3	25, 14	5, 17
C_d (based on K_{CHP})	0.71	0.71	0.77, 0.93	0.88, 0.95	0.78, 0.83	0.84	1.09	0.72	0.74, 0.71	0.71, 0.76	0.70, 0.80	0.70	0.99, 0.73	0.92	0.94	0.80, 0.84	0.91, 0.83
C_d (SUDAS)	1.00	1.00	1.00	1.10	1.00	1.10	1.10	1.10	1.10	1.10	1.10	1.00	1.10	1.10	1.10	1.10	1.00
Drainage Rating (C_d)	VP	VP	VP to F	F	P to F	P to F	E	VP	P	VP	VP	VP	G, VP	G	P to F	P to F	VP to P
Support Rating (CBR)	VP	VP	P to F	VG	F to G	VG	VG	VG	G	G	E	G	P	F to G	VG	E	P to F
Uniformity Rating (COV)[9]	E	F	VG	G	VG	P	P	VG	VG	VG	VG	G	VG	F	F	E	G
LOS Range[10] (Avg.)	1.7-1.9 (1.8)	0.0-1.3 (1.0)	0.8-2.0 (1.6)	1.0-3.0 (1.3)	1.3-1.8 (1.5)	0.7-1.7 (1.3)		1.0-2.0 (1.8)	1.0-1.5 (1.2)	1.0-1.3 (1.1)	1.2 to 1.6 (1.5)	1.1-2.5 (1.9)	1.0-1.5 (1.2)	1.2-3.1 (1.8)	0.0-1.8 (1.0)	1.0-1.1 (1.0)	0.9-2.0 (1.6)
LOS Range[11] (Avg.)	1.4-1.5 (1.3)	0.0-1.2 (1.0)	0.9-2.0 (1.4)	0.4-1.6 (1.0)	0.5-1.6 (1.0)	0.0-1.5 (0.8)		0.9-1.3 (1.1)	0.7-1.1 (1.0)	0.5-1.0 (0.8)	1.1-1.6 (1.3)	1.1-2.0 (1.7)	0.6-1.3 (1.0)	1.2-3.0 (1.6)	0.0-1.3 (0.7)	0.4-1.0 (0.8)	0.0-1.5 (0.7)
LOS (AASHTO 1993)	2.0-3.0	2.0-3.0	2.0-3.0	1.0-3.0	2.0-3.0	1.0-3.0		1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0	2.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0	1.0-3.0	2.0-3.0
LOS (SUDAS)	1.0	1.0	1.0	0.0	1.0	0.0		0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0

Notes:[1]Normalized to 9,000 lb applied loads; [2]AASHTO(1993): Static k_{FWD} = Dynamic $k_{FWD}/2$; [3]From DCP-CBR to E_{SB} correlation per AASHTO (1993); [4]From DCP tests per ASTM D6951; [5]Average of top 12 in. of subgrade; [6]CBR of a minimum 3 in. thick weak layer within the top 16 in. of subgrade; [7]From empirical correlations between CBR_{SG} (average of top 12 in. of SG) and k, E_{SB}, and subbase layer thickness per AASHTO (1993); [8]From empirical correlations between CBR_{SG} (weak layer within top 16 in. of SG) and k, E_{SB}, and thickness subbase layer thickness per AASHTO (1993); [9]Uniformity rating based on COV of $k_{comp\text{-}FWD\text{-}Corr}$: ≤ 10% - Excellent (E), 10 to 25% - Very Good (VG), 25 to 40% - Good (G), 40 to 55% - Fair (F), > 55% Poor; [10]Back-calculated range of LOS by comparing $k_{comp\text{-}DCP}$ and Static $k_{comp\text{-}FWD\text{-}Corr}$; [11]Back-calculated range of LOS by comparing $k_{comp\text{-}DCP\ Weak}$ and Static $k_{comp\text{-}FWD\ Corr}$; C/G – curb and gutter pavement; D – day lighted drainage system; *7 out of 10 DCPs showed refusals within the subbase layer; **CHP tests indicated erosion at the pavement/subgrade interface.