

**Cement Kiln Dust Stabilized Test Section on I-96/I-75 in Wayne County**

**Construction Report**

**CS 82194 JN 37795  
NB I-75 from Vernor Highway to Michigan Avenue  
Detroit, Michigan**

**Stabilization Contractor: Wadel Stabilization, Inc.  
Prime Contractor: Walter Toebe Construction Co.  
Earth Work Contractor: Six-S, Inc.**

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## Technical Report Documentation Page

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<b>16. Abstract</b> <p>In the summer of 2008 two CKD stabilization test sections were constructed on the I-75/I-96 Gateway roadway reconstruction project in Detroit near the Ambassador Bridge.</p> <p>Through observation and testing, CKD adequately stabilized both subgrade test sections. One test section consisted of a predominantly silty clay soil and the other had a mixture of sand over silty clay. Dynamic Cone Penetrometer (DCP) test results showed a substantial increase in subgrade soil strength through CKD stabilization. On average CKD stabilized areas showed an 885% strength gain though stabilization relative to the existing soil strength. Lime stabilized areas showed an average increase of 531%.</p> <p>Based on the test sections it was concluded that CKD has advantages and disadvantages in comparison to Lime stabilization. CKD stabilization did result in higher and quicker soil strength gain which could accelerate construction activities. Also, incorporation has environmental benefit since this “by-product” material has historically been disposed of in a landfill. However, CKD material has more risk in that it is less predictable in nature because it is a ‘by-product’. The material is finer which poses more dusting concerns. And there are tighter construction restrictions due to early set time.</p> <p>Also of concern, previous laboratory work done by others has shown mixed results in long term strength loss of CKD treated soils if it becomes saturated due to capillary rise of ground water. A long term performance monitoring program is in place for the two test sections and Lime stabilized areas to observe strength changes through time.</p>			
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## **1. Executive Summary**

In 2006 Lafarge North America met with the Michigan Department of Transportation (MDOT) about the use of Cement Kiln Dust (CKD) to improve unstable subgrade soil. Following this meeting, the Michigan Technological University (MTU) performed a laboratory study blending Lafarge-Alpena CKD with native Michigan soils. MTU concluded the CKD had a drying effect and a time-dependent strengthening of the soils with minimal detrimental volumetric swelling.

In the summer of 2008 two CKD stabilization test sections were constructed on the I-75/I-96 Gateway roadway reconstruction project in Detroit near the Ambassador Bridge. Inclusion of CKD was made easier since the project already had Lime stabilization items which have very similar construction techniques. This also afforded an opportunity for a side-by-side comparison.

Through observation and testing, CKD adequately stabilized both subgrade test sections. One test section consisted of a predominantly silty clay soil and the other had a mixture of sand over silty clay. Dynamic Cone Penetrometer (DCP) test results showed a substantial increase in subgrade soil strength through CKD stabilization. On average CKD stabilized areas showed an 885% strength gain though stabilization relative to the existing soil strength. Lime stabilized areas showed an average increase of 531%.

Based on the test sections it was concluded that CKD has advantages and disadvantages in comparison to Lime stabilization. CKD stabilization did result in higher and quicker soil strength gain which could accelerate construction activities. Also, incorporation has environmental benefit since this “by-product” material has historically been disposed of in a landfill. However, CKD material has more risk in that it is less predictable in nature because it is a ‘by-product’. The material is finer which poses more dusting concerns. And there are tighter construction restrictions due to early set time.

Also of concern, previous laboratory work done by others has shown mixed results in long term strength loss of CKD treated soils if it becomes saturated due to capillary rise of ground water. A long term performance monitoring program is in place for the two test sections and Lime stabilized areas to observe strength changes through time.

## **2. Background**

MDOT historically uses remove and replace methods to correct unsuitable subgrade material for construction facilitation. Lime stabilization was used successfully in one previous MDOT reconstruction project on I-96 in Detroit (M-39 to Schaefer) in 2005 to improve the strength of weak silty clay soils. Based on the knowledge of the native weak silty clay soil in the area and through geotechnical investigations in the design phase of the I-75/I-96 Gateway project,

a decision was made to include Lime stabilization to improve unstable subgrade areas.

Lafarge North America, Inc. approached MDOT in summer of 2006 to find a suitable project for a test section to demonstrate CKD soil stabilization. Soon after, Lafarge sponsored a research project through Michigan Technological University (MTU) to investigate “The use of CKD as a Soil Additive for Roadway Use in Michigan”.

Four types of soils were selected for the study. A clay soil from M-39 in Dearborn with a liquid limit (LL) of 42 and a plastic limit (PL) of 19 (classified as CL), a silty sand from the MTU campus (classified as SW-SM), a low plasticity clay from the Saxon Harbor area near Lake Superior with LL of 28 and PL of 16 (classified as CL) and a clay from a M-10 reconstruction project in Detroit with LL of 21 and PL of 13 (classified as CL). This work concluded that blending of Lafarge-Alpena CKD with the soils selected provided a drying effect, allowing for proper compaction and a time-dependent strengthening of the soils, most likely due to cementation by both the calcium hydroxide and Portland cement reactions.

The MTU investigation also evaluated the volumetric change (swelling) in CKD modified soils after compaction under field conditions. Swelling was investigated through one-dimensional swell observations and microscopic analyses to examine the chemical components specifically sulfur contents in the form of anhydrite and gypsum. They concluded very modest volumetric swelling can be expected in CKD stabilized soils. Any swelling that did occur would cease within approximately one week of CKD modification. Since hard pavement surfaces are not placed for several days if not weeks after compaction of the treated subgrade in typical construction practice, no detrimental effects are expected due to volumetric swelling.

During the spring of 2007, a reconstruction project on M-10 in Detroit was evaluated for the inclusion of a CKD stabilization test section. However, due to the discovery of competent soils during the preliminary geotechnical investigations, it was decided not to include CKD stabilization for demonstration. This decision was further confirmed during the construction stage where only minimal subgrade correction was required.

During the fall of 2007, the on going I-75/I-96 Gateway reconstruction project was evaluated for possible inclusion of CKD stabilized test sections. An opportunity was seen since Lime stabilization was already included in the project, and both stabilization techniques use the same construction methods. A construction specification was developed from the fall of 2007 through the winter of 2008. Eventually two CKD stabilized test sections were built, one test section consisted of a predominantly silty clay soil and the other had a mixture of sand over silty clay. Actual construction of the demonstration was completed in the summer of 2008.

### **3. Study Objectives**

The specific objectives of this study were;

1. Select appropriate areas on the project for test sections to construct CKD stabilized subgrade including one silty clay area and one sand over silty clay area.
2. Record the limits of the selected areas for future performance investigations.
3. Record the details of specification development and mix design.
4. Record the details of construction and field quality control.
5. Measure and record immediate strength gain through Dynamic Cone Penetrometer (DCP) testing.
6. Compare strength gain of CKD stabilized subgrade and Lime stabilized subgrade.

Long term study objectives are;

1. Measure and record long term characteristics of CKD stabilized subgrade and Lime stabilized subgrade through visual pavement condition surveys, Falling Weight Deflectometer (FWD) testing and DCP testing every 2 years.
2. Characterize short term and long term pavement performance of CKD and Lime stabilized subgrade and potentially recommend changes for future pavement designs.

### **4. Conclusions**

#### **4.1 Mix Design Results**

Per the recently drafted specification the Contractor was required to initiate project specific mix designs. For the two test sections, Lafarge made the arrangements for sampling and laboratory work through Soil and Materials Engineers, Inc. (SME) of Plymouth, Michigan. The construction specification is attached in the Appendix A of this report.

Since the subgrade on the project consisted of varying thickness' of sand fill from the old engineered base underlain by soft to firm silty clay, the following silty clay sand compositions were used to establish mix designs.

1. Silty clay as sampled.
2. 3 inches of sand as sampled and 15 inches of silty clay
3. 6 inches of sand as sampled and 12 inches of silty clay
4. 9 inches of sand as sampled and 9 inches of silty clay

The selected CKD percentage for treatment was based on determining the minimum amount of CKD that resulted in a California Bearing Ratio (CBR) of 10% for the uncured soil-CKD mixture and a minimum unconfined compressive strength of 125 psi. The unconfined compressive strength tests were performed on samples after a 7 day cure.

Based on the strength criteria, it was determined 8% of CKD was required for the silty clay soils and 6% of CKD for sand over clay areas. Although 6% CKD was sufficient for samples with higher sand contents, for consistency purposes 8% CKD was used for both test areas. A summary of mix designs and laboratory test reports are included in Appendix B of this report.

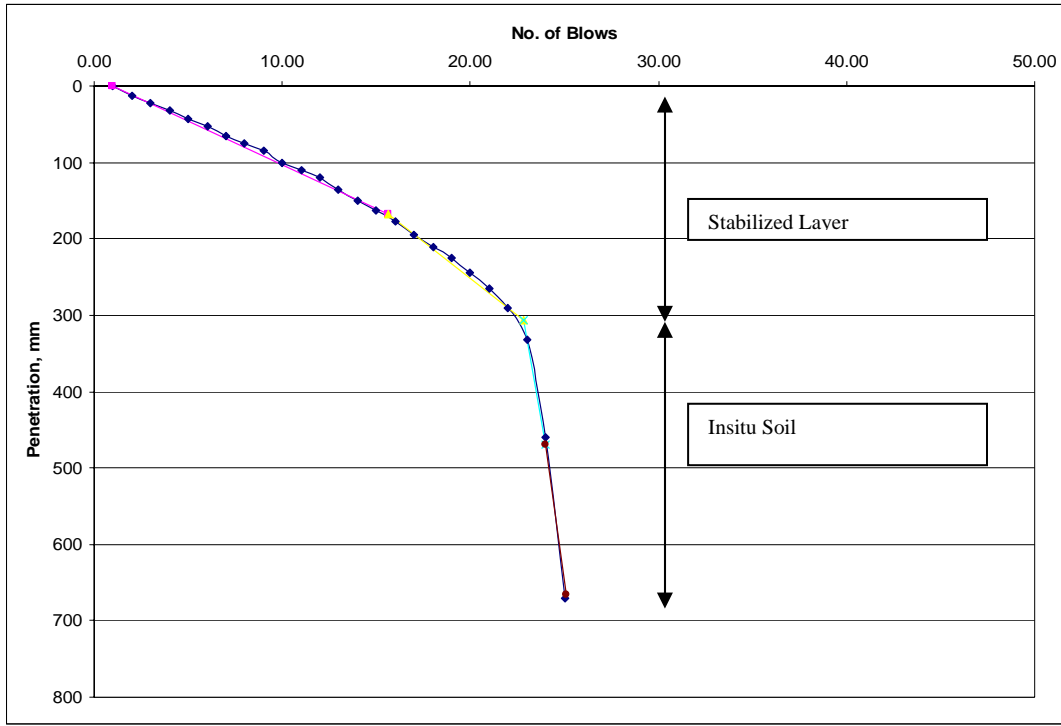
#### **4.2 Field Placement Observations**

The placement of CKD, mixing with subgrade soils and compaction is very similar to constructing Lime stabilized subgrade. The same equipment and tools were used for both operations. However, CKD tends to setup quickly and mixing and compaction needs to be completed within 1 hour after placement. Therefore spreading of the CKD was limited to smaller areas in comparison to Lime stabilized locations because of the one hour constraint.

CKD is a fine powder which poses a dusting concern after spreading. Extra caution needs to be taken during spreading to prevent a potential nuisance for workers and motorists. More details on the construction can be found in Sections 5 and 6 of this document.

#### **4.3 CKD Strength Test Results**

The strength of CKD and Lime stabilized subgrade were quantified using a DCP. This device measures resistance to penetration under an impact load. Based on DCP measurements the strength of the stabilized and insitu soils in terms of CBR, as well as stabilization thickness was obtained. A typical DCP penetration result is shown in the following figure.



**Figure 1: Typical DCP Results plot for a Stabilized Subgrade**

On average CKD stabilized areas showed an 885% strength gain through modification, when compared to insitu soils. Specific location strength gain measurements, using the DCP, are shown in the following table.

**TABLE 1: Average CBR results for CKD stabilized areas**

Tested Area	Description	Stabilized Thickness Based on DCP (inches)	Stabilized Subgrade CBR (%)	Insitu Soil CBR (%)	Strength Gain
Test Area 1 (Clay)	Clay (8% CKD stabilization for 12")	13.9	29.5	2.3	1195 %
	Moist Clay (8% CKD stabilization 12")	12.0	8.0	1.3	513%
	Retest on Moist Areas (After installing underdrains)	12.0	15.6	1.8	789%
Test Area 2 (Sand over Clay)	Sand over Clay (8% CKD stabilization for 12")	17.0	34.7	3.4	915%
	Moist Sand over Clay (8% CKD stabilization for 12")	16.2	16.9	3.3	412%

**4.4 Comparison of Lime and CKD Stabilized Subgrades**

For Lime stabilization the project specification also required Contractor initiated site specific soil sampling and laboratory mix designs. The selected Lime percentage for treatment is determined relative to meeting the same minimum strength parameters, CBR of 10% for uncured soil-CKD mixture and a minimum unconfined compressive strength of 125 psi. Unconfined compressive strength tests are performed on samples after a 7 day cure.

Two mix designs were recommended for stabilizing project subgrade using Lime. These include 5% lime for silty clay subgrades and a mixture of 4% lime plus 8% class F fly ash for sand over silty clay areas. Fly ash was needed for the sand over silty clay areas to provide additional cementation characteristics to the stabilization process.

For comparison purposes, DCP testing was performed on the Lime stabilized areas. On average Lime stabilized areas showed a 531% strength gain through modification when compared to insitu soils. Specific location strength gain measurements for Lime stabilized locations are shown in the following table.

**TABLE 2: Average CBR results for Lime/Lime+Flyash stabilized areas**

Tested Area	Stabilized Thickness Based on DCP (inches)	Stabilized Subgrade CBR (%)	Insitu Soil CBR (%)	Strength Gain
Mostly Clay (5% lime stabilization for 12")	14.6	15.7	2.2	615 %
Mostly Clay (5% lime stabilization for 14")	19.8	15.4	2.9	438%
Mostly Clay (5% lime stabilization for 18")	17.7	18.7	1.0	1838%
Sand over Clay (4% lime and 8% flyash Stabilization for 12")	12.9	15.5	5.2	197%

A higher strength increase was observed for CKD stabilized locations when compared to Lime stabilized areas. This is especially true where standing water did not exist on the stabilized subgrade after grading. Standing moisture had an adverse effect on strength gain in one of the CKD test areas. This finding is consistent with research that has observed significant loss of strength in CKD treated soils due to wetting and drying test cycles. Continuous performance measurements are necessary to establish if the wetting and drying cycles truly exist after the pavement section is in service.

**5. Construction of CKD Stabilized Subgrade at Test Area 1**

Test Area 1 had soil which was mostly silty clay, exists along NB I-75 from Sta. 1250+32 to 1260+40 and is three lanes in width. The test area is generally between the Vernor Highway bridge (Structure No. S17 of 82194) and the Canadian Pacific Rail Road Bridge (X01 of 82194).



The project plan sheets are included in the Appendix C of this report.

Preliminary soil borings and DCP tests performed within Test Area 1 prior to CKD stabilization, identified the subgrade soil to be very soft, silty clay. CBR values determined through DCP testing ranged from 0.5 % to 2.8%.

The construction of the CKD stabilized subgrade in Test Area 1 was started on July 1, 2008 in the following event sequence.

- a. Subgrade preparation – Six-S Inc. (Six-S) completed final grading of in-situ soils. Testing occurred to determine the existing soil moisture content.
- b. CKD application – Wadel Stabilization Inc. (Wadel) placed the CKD with a spreader. CKD application rates were verified by capturing the CKD material in a metal pan of known area after the spreader passed. Spreading was limited to a smaller area compared to Lime stabilized locations in order to mix the soil within one hour of application.
- c. Mixing – Wadel mixed the CKD with the subgrade soil using a rotary pulverizer. Mixing was continued until the CKD was uniformly incorporated into the subgrade to a minimum depth of 12 inches. Water was added in some areas to raise the moisture content of the soil CKD mixture to the required specification level in order to adequately hydrate the CKD.
- d. Compaction – Six-S compacted the stabilized soil using a vibratory sheep foot roller immediately after mixing. Final compaction was performed using a smooth roller. Moisture and Density testing were performed by a representative from MDOT. Six-S completed shaping and fine grading of the stabilized subgrade.
- e. Curing – Six-S added water to cure the compacted surface for the first 24 hours per the specification requirement.

Test Area 1 was completed on July 7, 2008, the Inspector’s Daily Reports (IDRs) are included in the Appendix D of this report.

Dynamic Cone Penetrometer (DCP) tests were performed on Test Area 1 after CKD stabilization. Table 3 lists the summary results of insitu CBR, stabilized thickness and CBR of the stabilized layer values calculated from the DCP measurements. The DCP measurements are included in Appendix E of this report.

**TABLE 3: Average CBR results for Test Area 1**

Description	Stabilized Thickness Based on DCP (inches)	Stabilized Subgrade CBR (%)	Insitu Soil CBR (%)	Strength Gain
Clay (8% CKD stabilization for 12’)	13.9	29.6	2.3	1195 %
Moist Clay (8% CKD stabilization 12’)	12.0	8.0	1.3	513%
Retest on Moist Areas (After installing underdrains)	12.0	15.6	1.6	789%

Standing moisture was observed in some areas of Test Area 1 mostly due to rain events that occurred before underdrain placement. In these locations lower strength values were recorded compared to dry areas. After the moisture was drained away or evaporated repeat tests revealed an increase in strength from the original tests. However, strength values were still below the original measurements in areas that never had standing moisture.

The following pictures show the construction sequence of Test Area 1.



**Figure 2: CKD Spreading**



**Figure 3: CKD Mixing with Rotary Pulverizer**



**Figure 4: Mixing with Rotary Pulverizer**



**Figure 5: Spreader and Mixer working Side-By-Side**



**Figure 6: Initial Rolling with Sheep Foot Roller**



**Figure 7: Grading**



**Figure 8: Finishing Different Areas of Test Area 1**



**Figure 9: Finished Grade of Test Area 1**

**6. Construction of CKD Stabilized Subgrade at Test Area 2**

Test Area 2 soil consisted of fill sand from the previous I-75 engineered base over in-situ silty clay. It is located across all lanes of NB I-75 from Sta. 1263+00 to 1269+71, approximately from the Canadian Pacific Rail Road Bridge (X01 of 82194) to 671 feet north. DCP tests were not performed on Test Area 2 prior to treating the subgrade soil with CKD.

The construction of CKD stabilized subgrade on Test Area 2 was started on July 7, 2008. The event sequence was similar to the construction of Test Area 1. The work was completed on July 9, 2008. Inspector’s Daily Reports (IDRs) are included in the Appendix D of this report.

The strength of the CKD stabilized soil layer, thickness of the stabilized layer and strength of the underlying insitu soil layer were measured using the DCP after treatment. Summary CBR results are listed in Tables 4, actual DCP measurements are included in Appendix E of this report.

**TABLE 4: Average CBR results for Test Area 2**

<b>Description</b>	<b>Stabilized Thickness Based on DCP (inches)</b>	<b>Stabilized Subgrade CBR (%)</b>	<b>Insitu Soil CBR (%)</b>	<b>Strength Gain</b>
Sand over Clay (8% CKD stabilization for 12’)	17.0	34.7	3.4	915%
Moist Sand over Clay (8% CKD stabilization for 12’)	16.2	16.9	3.3	412%

The pictures starting on the following page show the construction sequence of Test Area 2.



**Figure 10: CKD Spreading on the Test Area 2**



**Figure 11: Ruts Caused by the Spreader Truck**



**Figure 12: Mixing**



**Figure 13: Rolling with Sheep Foot Roller**





**Figure 14: Final Rolling with Smooth Roller and Final Grading**



**Figure 15: Finished Grade of Test Area 2**

## **7. Future Monitoring**

A performance monitoring program is underway to investigate the long term strength gain/reduction for both Lime stabilized and CKD stabilized areas. This is extremely important if any of the strength gain results are to be included in future pavement designs. Previous studies have indicated a potential for strength loss of CKD stabilized subgrade due to capillary moisture and saturation. Lime stabilized subgrades are reported to have the same strength loss concerns if the resulting PH levels aren't high enough to achieve long term cementitious properties. The future monitoring objectives are as follows.

1. Measuring and recording long term pavement performance characteristics of CKD stabilized subgrade and lime stabilized subgrade through visual pavement condition surveys, Falling Weight Deflectometer (FWD) testing and DCP testing at selected time intervals (every 2 years).
2. Developing a comprehensive report describing short term and long term pavement performance characteristics of CKD stabilized and Lime stabilized subgrades and recommendations for future pavement designs.

Appendix A  
MDOT Construction Specification for CKD Stabilization

MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
CEMENT KILN DUST STABILIZED SUBGRADE

**A. Description.** This work consists of all the materials, including water, equipment, labor and testing for constructing a cement kiln dust (CKD) stabilized subgrade and designing the CKD percentage in the soil

**B. Materials.**

Furnish CKD conforming to the requirements of ASTM D 5050-96. All CKD shall be certified by "Test Data Certification" method per the MDOT Material Source Guide.

Water. Water for mixing and curing shall meet the requirements of subsection 911.02 of the Standard Specification for Construction.

Soil. Soil for the CKD stabilization as used in this specification is the in-place subgrade soil material. The soil shall be uniform in quality and gradation, be free of roots, sod, weeds, and stones larger than 2-1/2 inches and shall be approved by the engineer.

**C. Contractor Designed CKD and Soil Mix.** The contractor shall develop and submit for approval, a mix design specifying the percent CKD in the soil to be stabilized. The Contractor's qualified representative or geotechnical engineer shall collect representative soil samples under direction of the Engineer. Take one sample for every 20,000 square yards of soil treatment, one per major soil type or a minimum of 5 samples per project, whichever is greater and submit to an AASHTO or ASTM accredited geotechnical laboratory to determine the recommended percentage of CKD for each soil sample taken. The station elevation, offset and the depth of these soil borings shall be recorded and submitted to the Engineer. Prior to sampling, the Contractor shall submit the sampling location plan to the Engineer for review.

The AASHTO or ASTM accredited geotechnical laboratory shall perform the following tests and services for untreated soil and CKD-treated soil. Samples must be prepared with the same stabilizing material that will be supplied for the job.

1. Soil Classification per AASHTO M145 and ASTM D-2487 for the untreated soil and the CKD-treated soil.
2. Moisture and Density testing per AASHTO T-99 for the untreated soil and the CKD-treated soil
3. California Bearing Ratio (CBR) laboratory test result must be above 10% using ASTM D-1883.

4. Perform Liquid, Plastic, and Plasticity Index of soil samples as per ASTM D-4318.
5. Perform unconfined compressive strength test as per ASTM 5102. Perform compressive strength test on samples using 7 day cures. Use a percentage of CKD in the soil samples initially at 0, 10, 15, and 20% for each soil sample. Alternate percentage may be allowed by Engineer. Prepare three samples for each percentage at the optimum moisture of the CKD/soil mix according to ASTM 5102 Procedure B. Cure compacted specimens in a plastic, air tight, moisture proof container at 40° C for seven days.
6. Determine the minimum amount of CKD, using each sample of treated soil that results in a soil-CKD CBR of 10% for uncured soil-CKD mixture. The optimum achieved must also have a minimum unconfined compressive strength of 125 psi.
7. Submit copies of test reports from the geotechnical lab with all of the data to the Engineer for review and approval a minimum of 10 working days prior to the commencement of test strip construction.

Upon the Department's acceptance of the CKD percentages, the contractor shall make moisture-density curves for the chosen percentages of CKD and soil mix according to AASHTO T-99 for each soil sample taken, above. Thoroughly mix the CKD with the soil and immediately make mixtures for testing. Plot the wet and dry weight on a graph. Submit this data to the Engineer a minimum of 10 working days before work begins. Engineer will use these curves or MDOT Typical Density Curves for compaction acceptance.

**D. Equipment, Machines, Tools.** The equipment, machines and tools used in the work shall be subject to approval and shall be maintained in satisfactory condition at all times. Other compacting equipment may be used in lieu of that specified where it could be demonstrated that the results are equivalent. Protective equipment, apparel and barriers shall be provided to protect the eyes, respiratory system and skin of workers who are exposed to CKD.

1. **Sheeps-foot or Vibratory Pad Foot Rollers.** Self propelled type with a minimum weight of 15 tons or greater as needed for compaction.
2. **Steel-Wheeled Smooth Rollers.** Steel-Wheeled rollers shall be self propelled with a total weight of not less than 10 tons and a minimum weight of 300 pounds per inch width of rear wheel. Wheels of the rollers shall be equipped with adjustable scrapers. The use of vibratory rollers is optional.
3. **Pneumatic-Tired Rollers.** Pneumatic-tired rollers shall be self propelled and weigh when ballasted at least 8 tons, but not more than 30 tons. It shall be equipped with a minimum of 7 wheels situated on axels in such a way that the rear group of tires will not follow in the tracks of the forward group of tires.
4. **Mechanical Spreader.** Mechanical Spreader shall be cyclone, screw-type box, pressure manifold, or other approved equipment. A motor grader shall not be used to spread CKD.
5. **Watering Equipment.** Watering equipment shall consist of tank trucks fitted with pressure distributors, or other approved equipment, designed to apply

controlled quantities of water uniformly over various widths of surface without the truck adversely affecting the quality of the subgrade.

6. **Tampers.** Tampers shall be of an approved mechanical type, operated by either pneumatic pressure or internal combustion, and shall have sufficient weight and striking power to produce compaction needed.
7. **Rotary Pulvamixer.** A rotary pulvamixer shall be used for all mixing. Pulvamixer shall utilize a direct hydraulic drive and be capable of mixing the full 12 inch depth in one lift

#### **E. Construction.**

1. **General.** Perform CKD stabilization work when air temperature is 40° F (5° C) or above and rising. Do not apply CKD to frosted subgrade under any circumstances. The depth of the subgrade to be stabilized is 12 (twelve) inches. Uniformly mix the approved portion of the stabilizing material through the entire 12-inch stabilized depth, and compact subgrade to a minimum 95% of required density. The Engineer will verify that a minimum of 12-inches of uniformly stabilized and compacted subgrade is achieved by digging 12-inch test holes at representative intervals. Adequate drainage shall be provided during the entire construction period to prevent water from collecting or standing on the areas to be modified or on pulverized, mixed, or partially mixed material. Finished and completed CKD stabilized subgrade shall conform to the lines, grades, cross sections, and dimensions indicated in the plans.
2. **CKD Stabilization Omission Locations.** If during construction, the Engineer determines that certain locations have soils that are unsuitable for CKD stabilization, the Engineer may request for a modification of the CKD stabilization procedure, or use other methods as necessary or cost effective.
3. **Contractor's Quality Control (QC) Plan.** The Contractor shall submit a QC Plan, for approval by the engineer, a minimum of 5 working days prior to starting construction of the test strip. The QC Plan shall include, but not be limited to, name and description of the equipment to be used, personnel responsible for monitoring application rates, methods of determining and adjusting moisture content.
4. **Test Section.** Upon the Engineer's approval of the Contractor's QC Plan, a 600 linear foot test section comprising of one or more lane widths (depending upon construction staging) will be selected (with the approval of the Engineer) to implement the details of CKD stabilization. The Contractor shall submit a work plan for the test strip a minimum of 5 working days in advance of construction of the test strip. The work for this test section will be in accordance with this special provision. The Contractor can proceed with the stabilization of roadway subgrade if the test section meets the approval of the Engineer. At the Engineer's discretion, the test section may be accepted as part of the total required CKD stabilized area.

5. **Subgrade Preparation.** Prior to adding the stabilizing materials, remove all deleterious materials such as topsoil, roots, organic material, and rock fragments greater than 2-1/2 inches. The subgrade treatment area shall be graded to conform to the lines, grades, and cross sections shown in the plans prior to being processed for stabilization. All the deleterious material removed as part of subgrade preparation will be property of the contractor and its removal and disposal shall be considered included in the payment for CKD stabilized subgrade.
6. **CKD Application.** Apply the Contractor designed CKD rate on a dry weight basis. Submit verification testing to show that the required application rate is utilized, and provide the results to the Engineer at the end of each workday. The Contractor will conduct a rate application test in the field to demonstrate the CKD is being applied at the prescribed rate. The test will incorporate a metal, plastic, canvas or similar material of known area and volume. The spreader will pass over the receptacle and spread CKD at the anticipated rate for the job. It will be weighed in the field and the actual application rate will be determined. Spread CKD uniformly on the scarified subgrade by means of distributors or equipment approved by the Engineer. Place a canvas shroud (or equivalent) on the distribution bar and extend to subgrade. Do not apply CKD when the wind conditions are such that blowing material would become objectionable to the adjacent property owners or create potential hazards to traffic.
7. **Spreading.** The spreading of the stabilizing material shall be limited to an area that can be incorporated and mixed, within one hour of application. While spreading CKD, minimize dusting and impact to traffic by periodic water sprinkling at no cost to Department. Spread the CKD at the approved rate.
8. **Mixing.** Immediately, upon spreading the CKD, mix the CKD and soil using a rotary pulvamer to a depth determined by engineer. Add enough water to raise the moisture content of the soil mixture to -1% below to + 2% above the optimum moisture content. Continue mixing until the CKD has been uniformly incorporated into the subgrade to the required depth with the mixture being homogenous and friable. It is the Contractor's responsibility to determine the in-situ moisture content of the soil or the CKD-soil mixture in order to determine the quantity of water required to raise the moisture content to the required level relative to optimum moisture content. The Engineer may run field gradation testing to determine the adequacy of mixing. In order to determine the adequacy of the mixing, two control sieves, 2-inch and No. 4 shall be used. All of the soil clods during the mixing must pass a 2-inch sieve and at least 60% pass a No. 4 sieve, exclusive of rock particles.
9. **Compaction.** After mixing, shape the subgrade. Start compaction within one hour after the final mixing. Add water or aerate the subgrade to bring the soil-CKD mixture to optimum moisture content, plus or minus 2%. Continue final compaction until the stabilized subgrade has a density of not less than 95% of maximum density established as above for the soil-CKD mixture. Use rollers complying with paragraph D. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one half width of the roller, or as determined by the Engineer based upon

construction staging. At all times, the speed of the roller shall not cause displacement of the mixture to occur. Areas inaccessible to the rollers shall be compacted with mechanical tampers and shall be shaped and finished by hand methods. Final compaction shall be done with steel wheel smooth drum rollers. The Engineer will perform the density and moisture for the compacted subgrade for acceptance as per this special provision.

Complete the mixing, compacting, shaping and fine grading within 3 hours from start to finish.

- 10. Curing.** Immediately, following the fine grading, cure the compacted CKD stabilized subgrade for a minimum of twenty four hours before placement of the overlying course. The surface shall be protected from rapid drying during this period by periodic sprinkling unless covered by subsequent layers of pavement section (sand sub-base or aggregate base). Other suitable methods of curing the compacted soil-CKD mixture may be approved by the Engineer. The Engineer may modify the amount of time required for curing based on site conditions. Protect the CSS. Do not operate construction equipment on the treated soil during the curing period. Do not allow the treated soil to freeze during the cure period.
  - 11. Re-stabilizing.** If an approved stabilized area shows failure, tenderness or damage after curing, the Engineer shall require re-stabilization to be performed, where appropriate, at no additional cost to the Department.
- F. Construction traffic.** Completed portion of CKD stabilized subgrade may be opened immediately to light construction traffic at the Contractor's own risk and option, provided the curing is not impaired. After the curing period has elapsed, completed areas may be opened to construction traffic. Placement of subsequent pavement sections layers may begin the day following completion of CKD stabilization, provided the CKD stabilized completed area has strengthened sufficiently to prevent marring or distorting of the surface by equipment or traffic. CKD and water may be hauled over the completed area with pneumatic-tired equipment if approved by the Engineer. Finished portions of the CKD-modified subgrade that are traveled on by the equipment used in construction of adjoining section shall be protected in a manner to prevent marring and damaging the completed work. The Contractor is responsible for correcting and re-stabilizing the damaged areas at no cost to the Department.
- G. Field Quality Control and Assurance.** Results of field quality control testing shall verify that the materials comply with this special provision and the Standard Specification for Construction. When a material source is changed, the new material shall be tested for compliance. When deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced or repaired, as directed by the Engineer, at no additional cost to the Department.



Completed thickness of the CKD-stabilized soil layer shall be within ½ inch of the specified thickness of 12 inches. When the measured thickness of the CKD-stabilized subgrade soil is more than ½ inch deficient, such areas shall be corrected by scarifying, adding additional CKD, remixing and recompacting as directed by the Engineer. Where the measured thickness of the CKD-stabilized subgrade layer is more than ½ inch thicker than required, it shall be considered conforming to the specified thickness requirement, provided the elevation of the finished subgrade is within the tolerance as per the Standard Specifications for Construction. The thickness of the CKD-stabilized subgrade layer shall be measured for each 4,000 square yards, at least one per day, or as determined by the Engineer. Measurements shall be made in 3 inch diameter or larger test holes penetrating the CKD-stabilized subgrade. At least one field density test shall be performed for each 4,000 square yards of CKD-stabilized subgrade, but at least once a day.

**H. Contractor Warranty and Maintenance.** Perform the following work at no cost to the Department. Repeat this work as often as necessary to keep the CKD-stabilized subgrade intact.

1. Maintain the CKD-stabilized subgrade in good condition until the work is completed and accepted
2. Maintain a smooth surface of the CKD-stabilized subgrade by blading.
3. Immediately repair any defects that occur

**I. Measurement and Payment.** Actual area of the CKD-stabilized subgrade as ordered and completed to the 12 inch thickness and cross sections shown on the plans, and accepted, will be measured in square yards. All calculations of areas measured for payment shall be based on measurements made to the nearest .1 yard with area calculated to the nearest square yard. The length will be measured along the surface of the completed roadbed at its centerline. The width will be the top surface width of the completed roadbed specified on the plans, measured perpendicular to the center line of the roadbed. Additional areas required for tampers, etc, shall be measured by length and width along the surface area stabilized. CKD actually incorporated in the work will be measured by the ton. Certified delivery tickets shall be furnished to the Engineer for CKD used in the construction of the CKD-stabilized subgrade.

**J. Basis of Payment.** The completed work as described shall be paid for at the contract unit price for the following contract items (pay items):

<b>Contract Pay Item</b>	<b>Pay Unit</b>
CKD-stabilized Subgrade.....	square yard
CKD.....	ton

The ordered and accepted area of CKD-stabilized subgrade, measured as noted above, will be paid for at the contract unit price bid per square yard. Said unit price bid shall be full compensation for all the sampling, design of CKD-stabilized soil mix, scarifying, pulverizing, mixing, shaping, water, curing, compacting, and application of CKD, testing;

and for all equipment, tools labor and incidentals needed for completion of the work as described herein.

The accepted quantity of CKD actually incorporated in the work except as noted herein, measured as provided above, will be paid for at the contract unit price per ton of CKD. Said price shall be payment in full for furnishing, transporting, storing, handling, and spreading; and for all equipment, tools, labor and incidentals needed for completion of the work as described herein.

Appendix B  
Mix Design Test Reports



**Soil and Materials Engineers, Inc.**  
The Kramer Building  
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Jeffery M. Krusinga, PE, GE  
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Mark L. Michener, CDT  
Larry W. Shook, PE  
Thomas H. Skotzke  
Michael J. Thelen, PE  
John C. Zarzecki, CWI, CDT

May 15, 2008

Mr. Paul Ruehle  
Lafarge North America  
30600 telegraph Road, Suite 4000  
Bingham Farms MI 48025

RE: CDK Stabilization Testing for Site Clay  
Gateway Project  
MDOT 82194-37795  
Detroit, MI  
SME Project No. PP57419

Dear Mr. Ruehle:

SME visited the referenced site on February 25 through March 4, 2008, to get bulk samples of the exposed subgrade soil at the referenced project. At the time of sampling there were a varying layers of sand (20 to 10 inches) overlying the clay subgrade soil. Bulk composite sample were obtained from 7 locations. The sampling pits were extended to a depth of 18 inches into the clay subgrade and the recovered soil samples were returned to our Plymouth, Michigan laboratory for testing. The CKD content to be added to the subgrade to meet the project criteria was determined by mixing the bulk composite sample with the CKD we received from Lafarge North America.

The project documents require several tests to be performed on the untreated and CKD treated soil. We met with Mr. Mark Grazioli of MDOT on February 28, 2008, regarding the tests to be performed on the samples recovered. MDOT had expressed concerns over the varying thickness of the layer of sand subbase encountered over the clay subgrade. The tests required in the specification were modified to include the following:

Plymouth  
Bay City  
Grand Rapids  
Kalamazoo  
Lansing  
Shelby Township  
Toledo  
Traverse City

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consultants in the geosciences, materials, and the environment

1. Plasticity index tests, ASTM D4318, are to be run on all samples where the soil is plastic enough to test.
2. Standard proctors, ASTM D-698 are to be run on all mixtures and CKD combinations.
3. Unconfined compressive strengths will be performed on each mixture at the optimum water content point for each mixture. The CKD content point where just over 125 PSI is achieved will be considered the optimum CKD.
4. Hydrometer tests will be used to classify all soil combinations along with the Unified Soil Classification methods stated in ASTM D2487.
5. California Bearing Ratios (CBR) tests will be performed on the optimum CKD contents to verify the results are greater than 10%.
6. The PH tests have been eliminated because they are not useful in determining CKD content and were found to be too uniform to be useful in the initial testing. Plotting the wet density was also determined to be of no value and was eliminated.

The attached test results are for clay recovered from the southern portion of the project and are very similar to the samples taken from the northern portion last fall. The clay was mixed with CKD. For this sample the weight of clay was treated with 8, 12 and 16% CKD. The soil sampled at Station 1251+00 on south bound I 75, was classified using ASTM D2487 and a hydrometer grain size analysis. The Plasticity Index testing was performed on materials before and after mixing each CKD content.

The soil is classified as a silty clay with some sand and trace gravel, with a Unified Soil Classification group symbol of CL.

The optimum maximum density was determined using AASHTO T99 (or ASTM D698) for the treated and untreated soil. The reports plotting the dry densities are shown on the attached forms and graphs.

The California Bearing Ratio (CBR), ASTM D1883, test was performed on the uncured sample at 8% CKD. The minimum CBR for the treated soil is specified to be 10%. Our test result was 16.2% for the 8% CKD sample. The test results are on the attached form.

Liquid, Plastic and Plasticity limit tests were performed in compliance with ASTM D4318 on the untreated soil and treated soil at varying CKD contents. The test results are as follows:



Percent CKD	Liquid Limit	Plastic Limit	Plasticity Index
0	32	16	16
8	48	29	18
12	54	33	21
16	57	36	21

A modified unconfined compression test was performed on samples at 8%, 12% and 16% CKD content using the test modification in the specification. The remainder of the test was similar to ASTM D5102. The specified unconfined compression result was to be a minimum of 125 psi. Our test results indicated an unconfined compressive strength of 190 psi @ 8% CKD content, performed after a seven day cure at 40 degrees Celsius. The unconfined compressive strength test results for the three CKD contents of 8, 12 and 16% were 190 psi, 294 psi, and 480+ psi (Maximum for the load cell), respectively and are shown on the attached graph.

Based on the referenced and attached test data, the appropriate CKD content to obtain the specified stabilization results using the soil we sampled is a minimum of 8% CKD based on the weight of the clay.

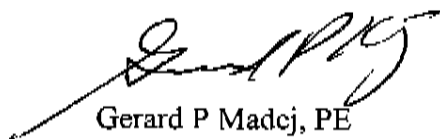
We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this information please do not hesitate to contact us.

Very truly yours,

**SOIL AND MATERIALS ENGINEERS, INC.**



Thomas M. Powell  
Materials Consultant



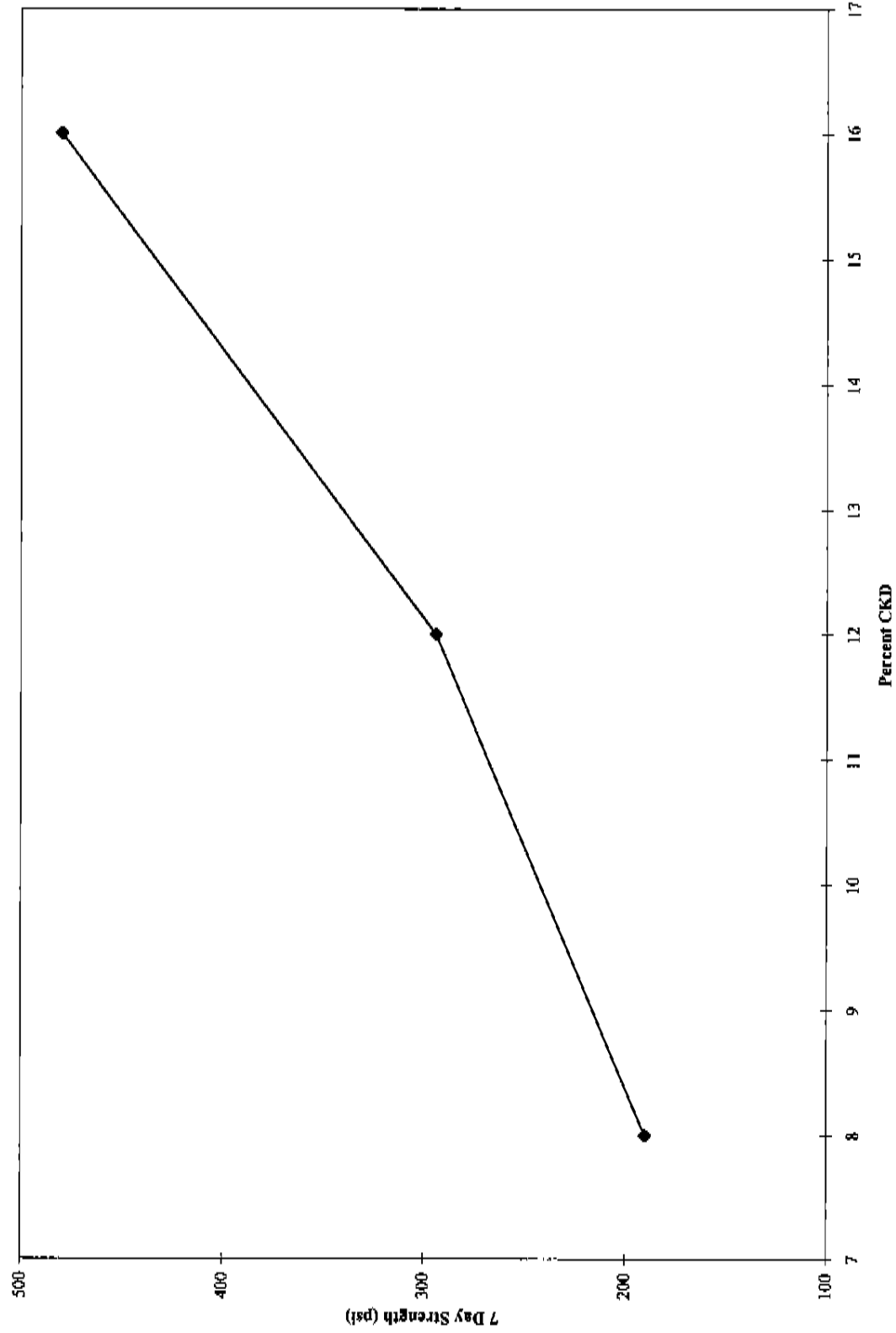
Gerard P Madcj, PE  
Vice President

**Attachments**

T:/proj/57000/PP57419-051608-ltr.doc

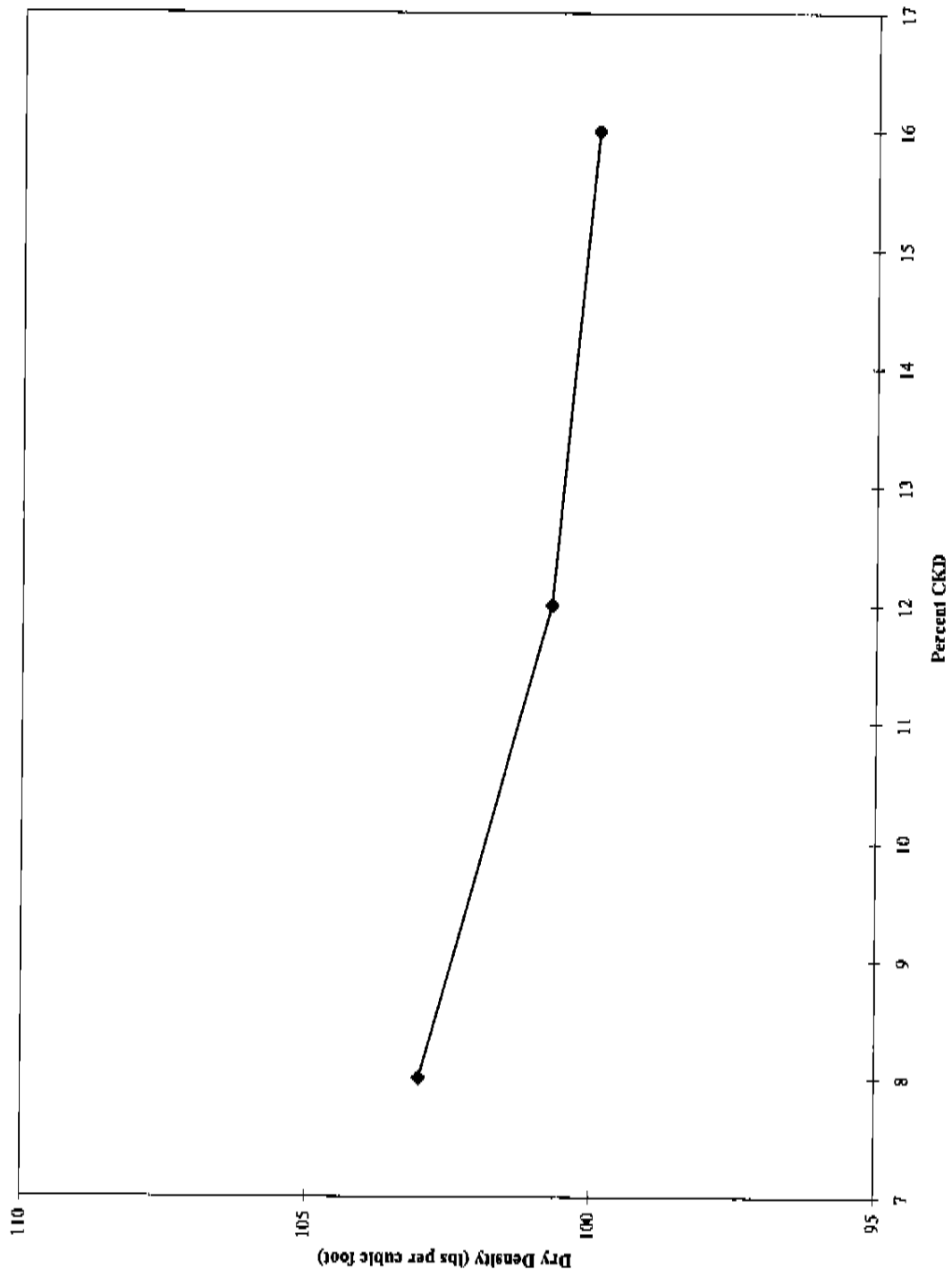


Strength Curve



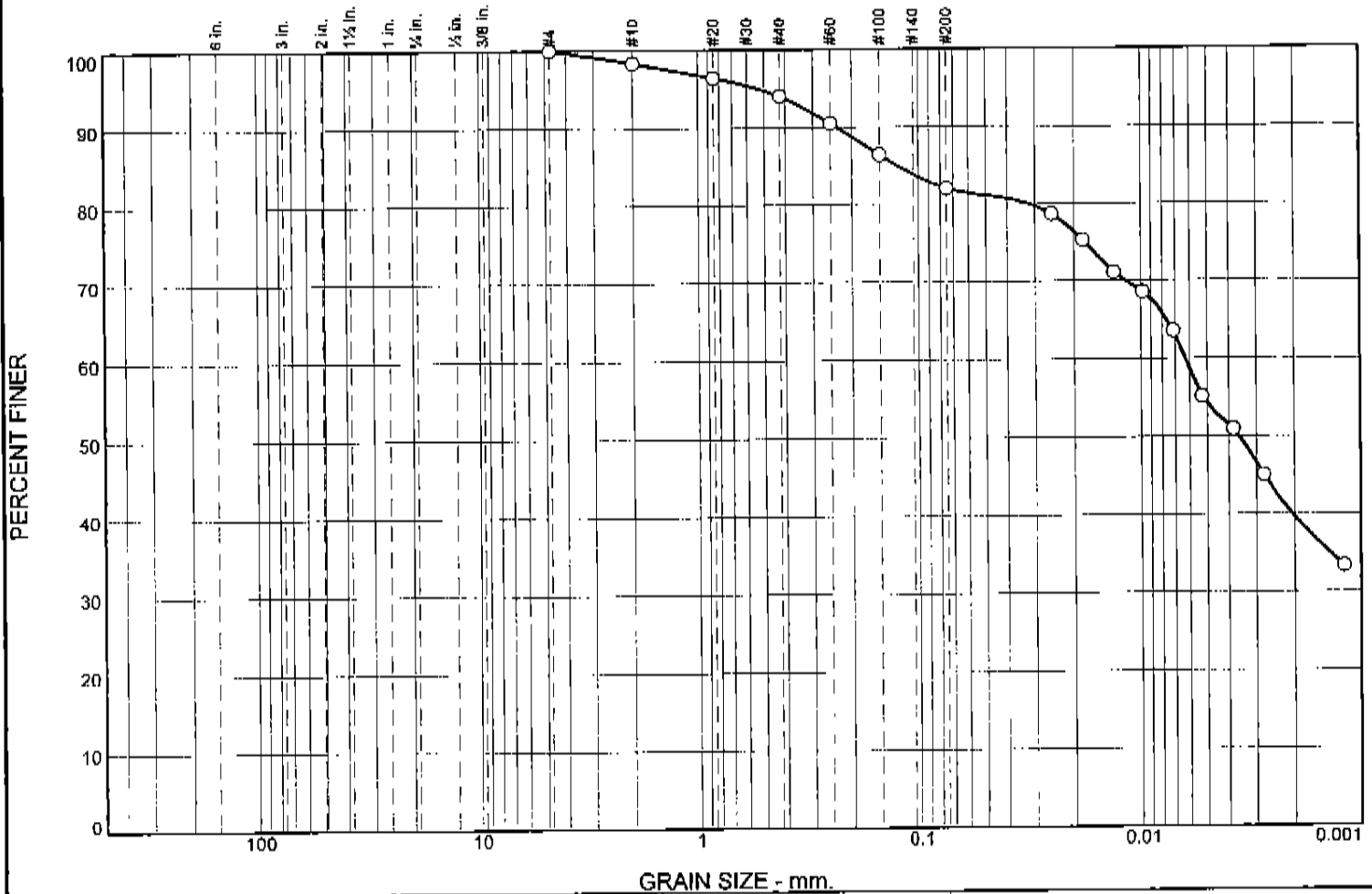
Series1

Density Curve





# Particle Size Distribution Report



% +3"		% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0		0.0	0.0	1.6	4.4	11.9	28.0	54.1

LL	PL	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
32	16	0.1244	0.0063	0.0036					

Material Description	USCS	AASHTO
Silty Clay, Some Sand, Gray	CL	

<p><b>Project No.</b> PP57419      <b>Client:</b> Lafarge</p> <p><b>Project:</b> Gateway Mix Designs</p> <p>Detroit, MI</p>	<p><b>Remarks:</b></p>
<p><b>Soil and Materials Engineers, Inc.</b></p> <p><b>Plymouth, MI</b></p>	

**Tested By:** Susan Brown      **Checked By:** Tom Powell

Figure



# California Bearing Ratio Test

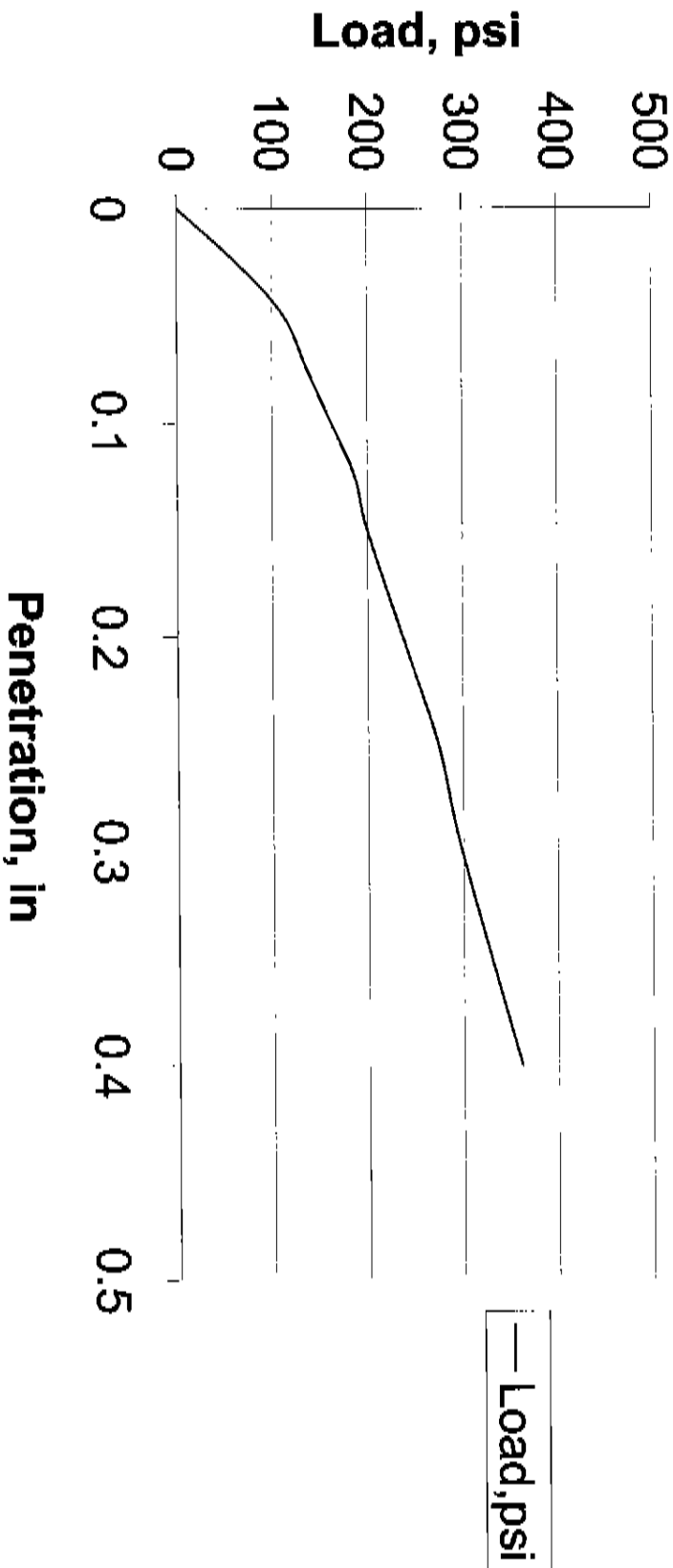
SME Project No. PP57419  
Date Tested: 5/14/08

Project: Gateway Project - MDOT  
Project Location: Detroit, MI

Material Source: I-75 Southbound

Material Description: Mix A Clay - 8% CKD

CBR @ 0.1 = 16.2%  
CBR @ 0.2 = 15.8%



Remarks: Material Tested at a dry density of 103.0 pcf and a moisture content of 22.1 percent.



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 16

ARCHITECT/ENGINEER:

DATE: 05/15/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: THOMAS M. POWELL

RAMMER: Manual

SAMPLE DATE: 4/1/2008

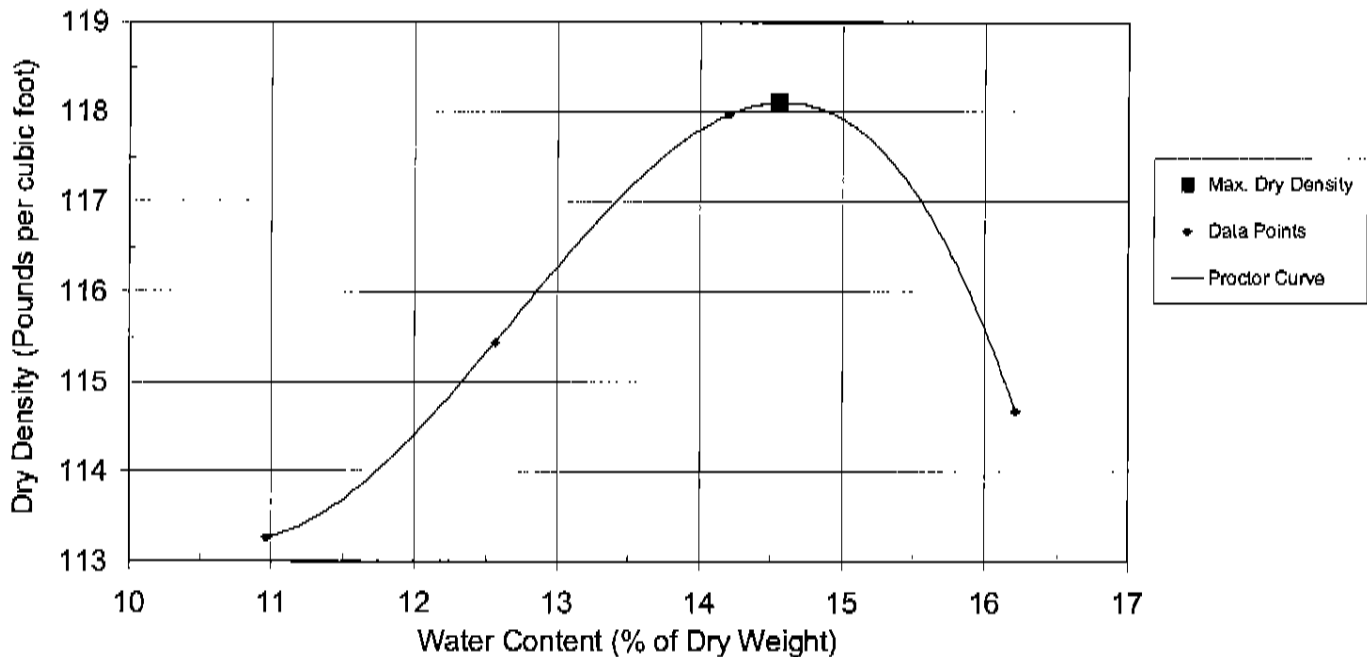
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION: CL

INTENDED USE:

MATERIAL SOURCE: ON SITE

DESCRIPTION OF SOIL: SILTY CLAY-SOME SAND-TRACE GRAVEL-GRAY



## TEST RESULTS

MAX DRY DENSITY: 118.1 pcf

OPT WATER CONT: 14.6 %

## REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 435880



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 13

ARCHITECT/ENGINEER:

DATE: 05/01/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

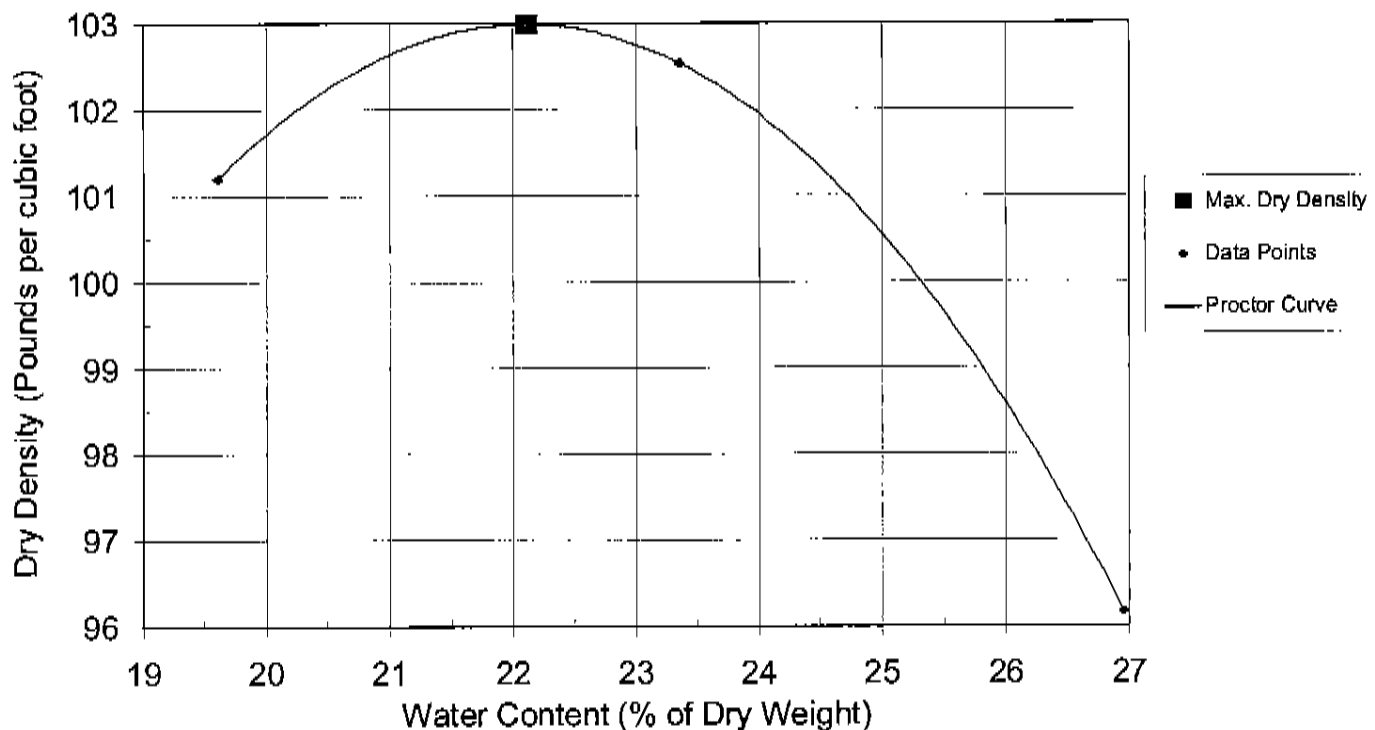
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION: CL

INTENDED USE:

MATERIAL SOURCE: I-75 NORTH BOUND

DESCRIPTION OF SOIL: CLAY 8.0% CKD



## TEST RESULTS

MAX DRY DENSITY: 103.0 pcf

OPT WATER CONT: 22.1 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: KEITH D. TORO, PE

UNK - 434131



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

LOCATION: BINGHAM FARMS, MI

ARCHITECT/ENGINEER:

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

RAMMER: Manual

MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION: CL

INTENDED USE:

MATERIAL SOURCE: I-75 NORTH BOUND

DESCRIPTION OF SOIL: CLAY 12.0% CKD

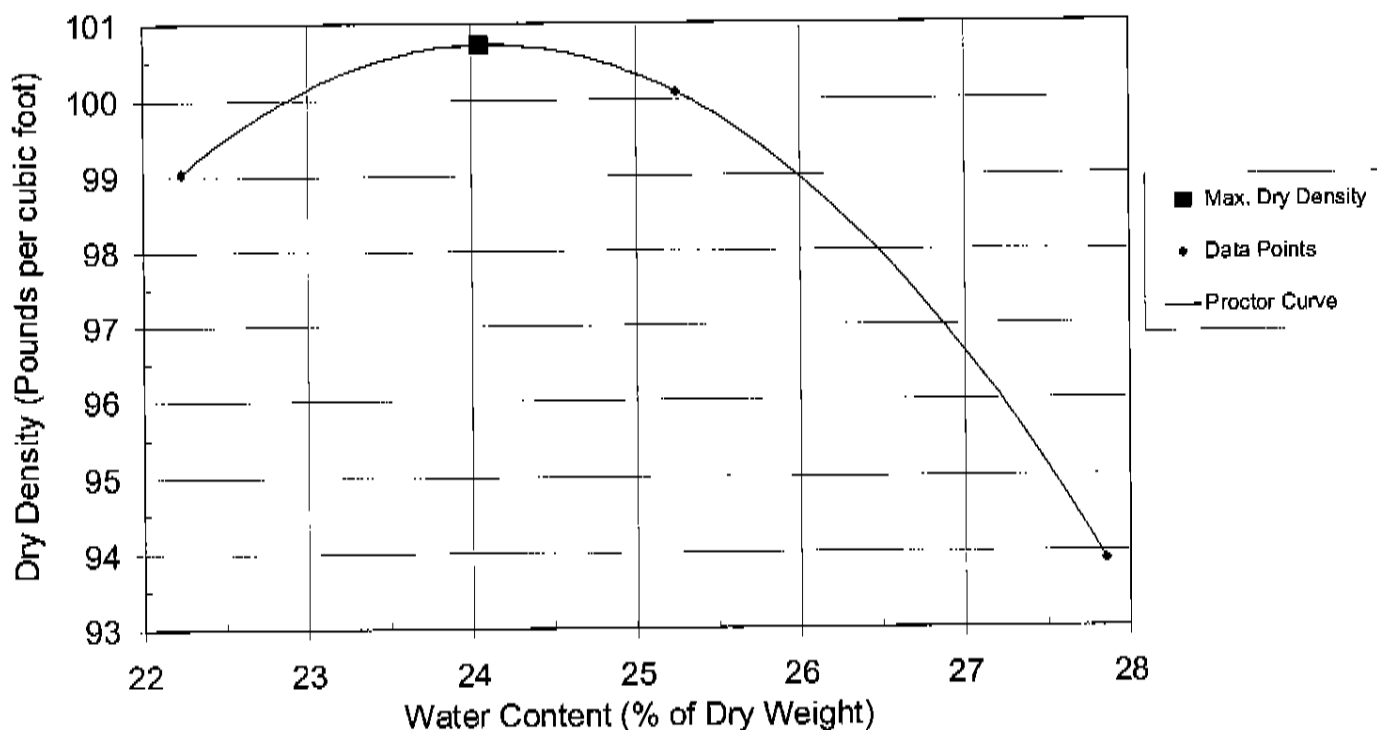
SME JOB NO: PP57419

REPORT NO: 14

DATE: 05/01/08

SAMPLED BY: SUDHAKAR MADAMANCHI

SAMPLE DATE: 2/26/2008



## TEST RESULTS

MAX DRY DENSITY: 100.7 pcf

OPT WATER CONT: 24.0 %

## REMARKS:

TESTED BY: KANTI PATEL

UNK - 434132

REVIEWED BY: KEITH D. TORO, PE



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 15

ARCHITECT/ENGINEER:

DATE: 05/01/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

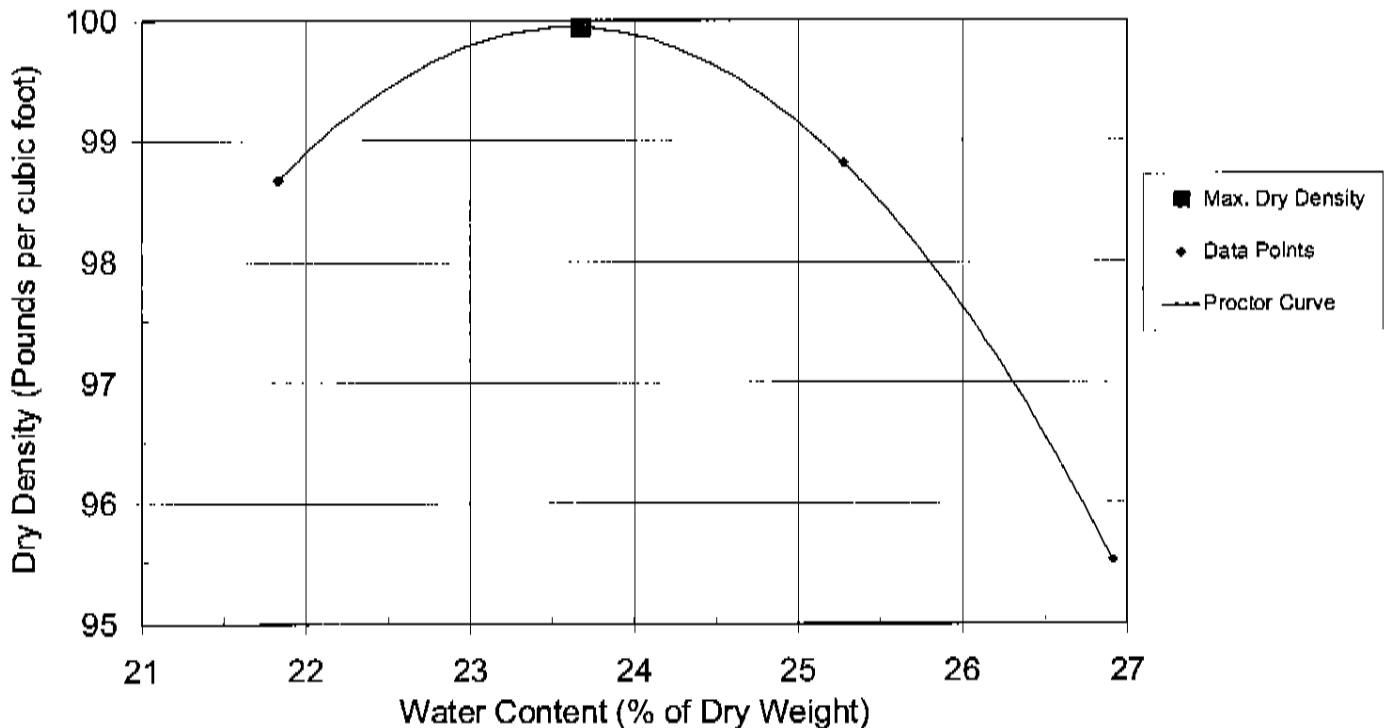
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION: CL

INTENDED USE:

MATERIAL SOURCE: I-75 NORTH BOUND

DESCRIPTION OF SOIL: CLAY 16.0% CKD



## TEST RESULTS

MAX DRY DENSITY: 99.9 pcf

OPT WATER CONT: 23.7 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: KEITH D. TORO, PE

UNK - 434133



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James M. Less, CIH  
Michael S. Meddock, PE  
Larry W. Shook, PE  
Michael J. Thelen, PE  
John C. Zarzecki, CWI, CDT

April 22, 2008

Mr. Paul Ruehle  
Lafarge North America  
30600 telegraph Road, Suite 4000  
Bingham Farms MI 48025

RE: CDK Stabilization Testing 3/15 Blend  
Gateway Project  
MDOT 82194-37795  
Detroit, MI  
SME Project No. PP57419

Dear Mr. Ruehle:

SME visited the referenced site on February 25 through March 4, 2008, to get bulk samples of the exposed subgrade soil at the referenced project. At the time of sampling there were a varying layers of sand (20 to 10 inches) overlying the clay subgrade soil. Bulk composite sample were obtained from 7 locations. The sample pits were extended to a depth of 18 inches into the clay sub grade and the recovered returned to our Plymouth, Michigan laboratory for testing. The CKD content to be added to the subgrade to meet the project criteria was determined by mixing the bulk composite sample with the CKD we received from Lafarge North America.

The project documents require several tests to be performed on the untreated and CKD treated soil. We met with Mr. Mark Grazioli of MDOT on February 28, 2008, regarding the tests to be performed on the samples recovered. MDOT had expressed concerns over the varying thickness of the layer of sand subbase encountered over the clay sub grade. It was decided that the clay and sand would be combined in three different composites using 3 inches of sand and 15 inches of clay, 6 inches of sand and 12 inches of clay and 9 inches of both sand and clay to develop the stabilization mix designs. Discussions with MDOT indicated where the sand was greater than 3 inches in depth CKD would be used to stabilize the soil. The tests required in the specification were modified to include the following:

Plymouth  
Bay City  
Grand Rapids  
Kalamazoo  
Lansing  
Shelby Township  
Toledo  
Traverse City

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consultants in the geosciences, materials, and the environment

1. Plasticity index tests, ASTM D4318, are to be run on all samples where the soil is plastic enough to test.
2. Standard proctors, ASTM D-698 are to be run on all mixtures and CKD combinations.
3. Unconfined compressive strengths will be performed on all optimum water content points for the mixtures. The point where just over 125 PSI is achieved will be considered the optimum CKD.
4. Hydrometers will be used to classify all sand clay combinations along with the Unified Soil Classification methods stated in ASTM D2487.
5. California Bearing Ratios (CBR) tests will be performed on the optimum CKD contents to verify the results are greater than 10%.
6. The PH tests have been eliminated because they are not useful in determining CKD content and were found to be too uniform to be useful in the initial testing. Plotting the wet density was also determined to be of no value and was eliminated.

The attached test results are for a ratio of 3 inches of sand and 15 inches of clay recovered from the southern portion of the project and are very similar to the samples taken from the northern portion last fall. The blend of sand and clay was mixed with CKD. For this sample the weight of sand and clay were treated with 6, 8 and 10% CKD. The soil sampled at Station 1251+00 on south bound I 75, was classified using ASTM D2487 and a hydrometer grain size analysis. The Plasticity Index testing was performed on materials before and after mixing each CKD content. The soil is classified as a silty clay with some sand and trace gravel, with a Unified Soil Classification group symbol of CL and the sand is classified as a fine sand with a trace of gravel Soil Classification group symbol of SM.

The optimum maximum density was determined using AASHTO T99 (or ASTM D698) for the treated and untreated soil. The reports plotting the dry densities are shown on the attached forms and graphs.

The California Bearing Ratio (CBR), ASTM D1883, test was performed on the uncured sample at 6% and 8% CKD. The minimum CBR for the treated soil is specified to be 10%. Our test results were 5.0% for the uncured 6% CKD sample and 11.2% for the 8% CKD sample. The test results are on the attached form.

Liquid, Plastic and Plasticity limit tests were performed in compliance with ASTM D4318 on the untreated soil and treated soil at varying CKD contents. The test results are as follows:





Percent CKD	Liquid Limit	Plastic Limit	Plasticity Index
0	40	18	22
6	54	30	24
8	52	31	21
10	55	30	25

A modified unconfined compression test was performed on samples at 6%, 8% and 10% CKD content using the test modification in the specification. The remainder of the test was similar to ASTM D5102. The specified unconfined compression result was to be a minimum of 125 psi. Our test results indicated an unconfined compressive strength of 235 psi @ 8% CKD content, performed after a seven day cure at 40 degrees Celsius. The unconfined compressive strength test results for the three CKD contents of 6, 8, and 10% were 172 psi, 235 psi, and 311 psi, respectively are shown on the attached graph.

Based on the referenced and attached test data, the appropriate CKD content to obtain the specified stabilization results using the soil we sampled is a minimum of 8% CKD based on the weight of the sand and clay.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this information please do not hesitate to contact us.

Very truly yours,

**SOIL AND MATERIALS ENGINEERS, INC.**



Thomas M. Powell  
Materials Consultant



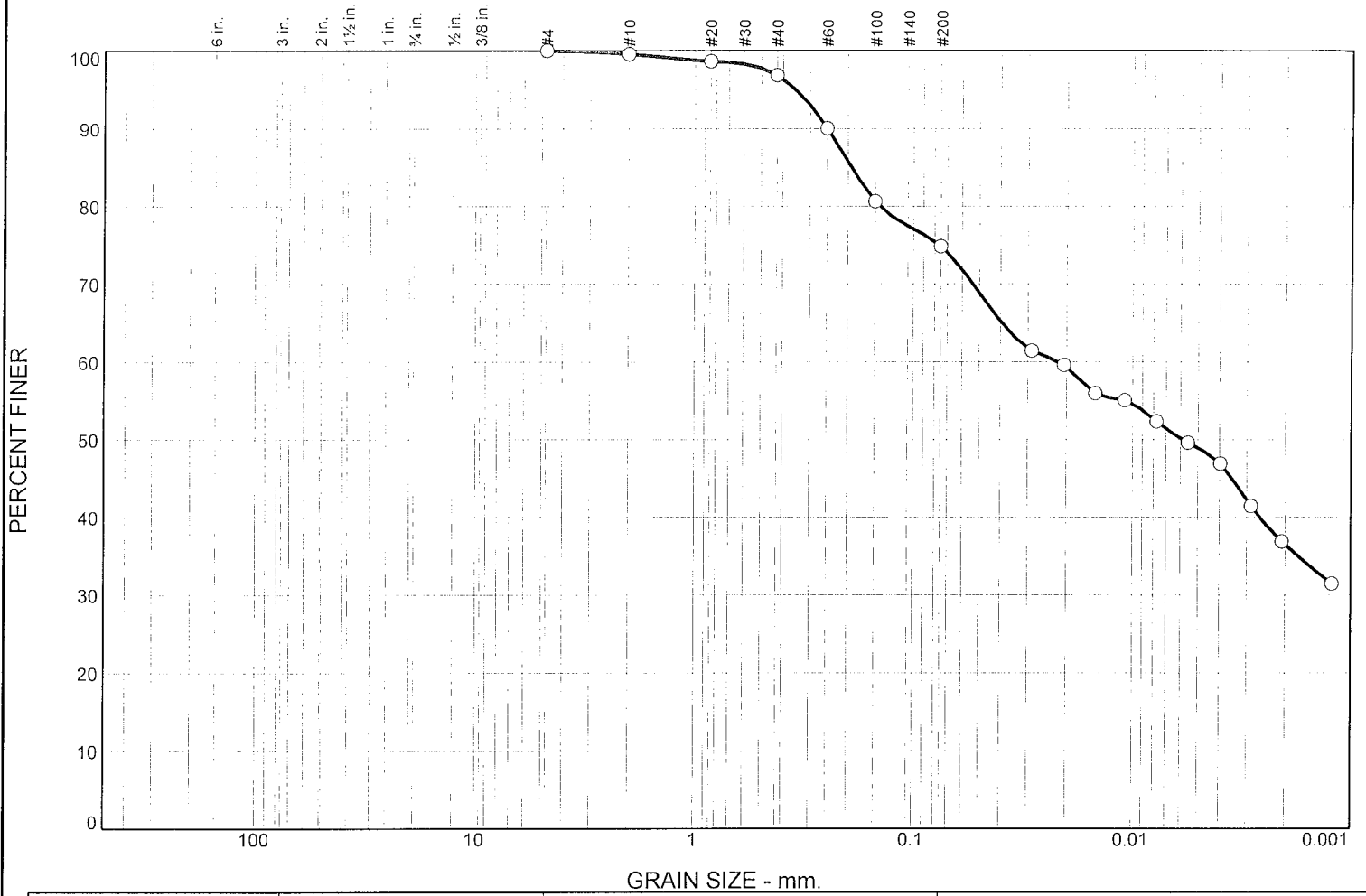
Gerard P Madej, PE  
Vice President

Attachments

S:/Powell/57419.doc



# Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.4	2.7	22.1	25.8	49.0		
⊗	LL	PL	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
○	40	18	0.1932	0.0217	0.0059					

Material Description	USCS	AASHTO
○ Sandy Silty Clay	CL	

**Project No.** PP57419      **Client:** Lafarge  
**Project:** Gateway Mix Designs  
 Detroit, MI  
 ○  
**Soil and Materials Engineers, Inc.**  
**Plymouth, MI**

**Remarks:**  
 ○ Mix 3/15  
  
**Figure**



# Laboratory Compaction Curve

PROJECT: GATEWAY PROJECT MDOT

SME JOB NO: PP57419

LOCATION: DETROIT, MI

REPORT NO: 9

ARCHITECT/ENGINEER:

DATE: 04/03/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

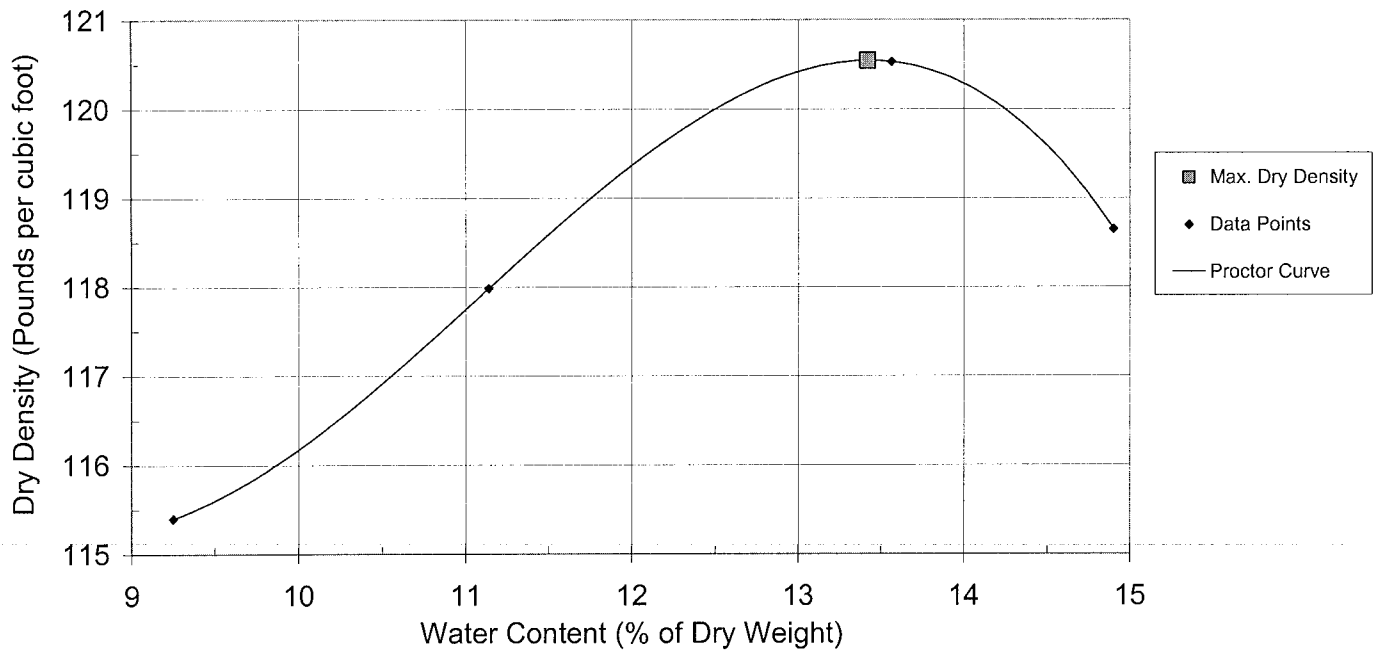
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B ( 3/15 MIX-A )

DESCRIPTION OF SOIL: CLAY & SAND MIX.



## TEST RESULTS

MAX DRY DENSITY: 120.3 pcf

OPT WATER CONT: 13.5 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 429793



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

LOCATION: BINGHAM FARMS, MI

ARCHITECT/ENGINEER:

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

RAMMER: Manual

MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/ CDK 3/15 6.0%

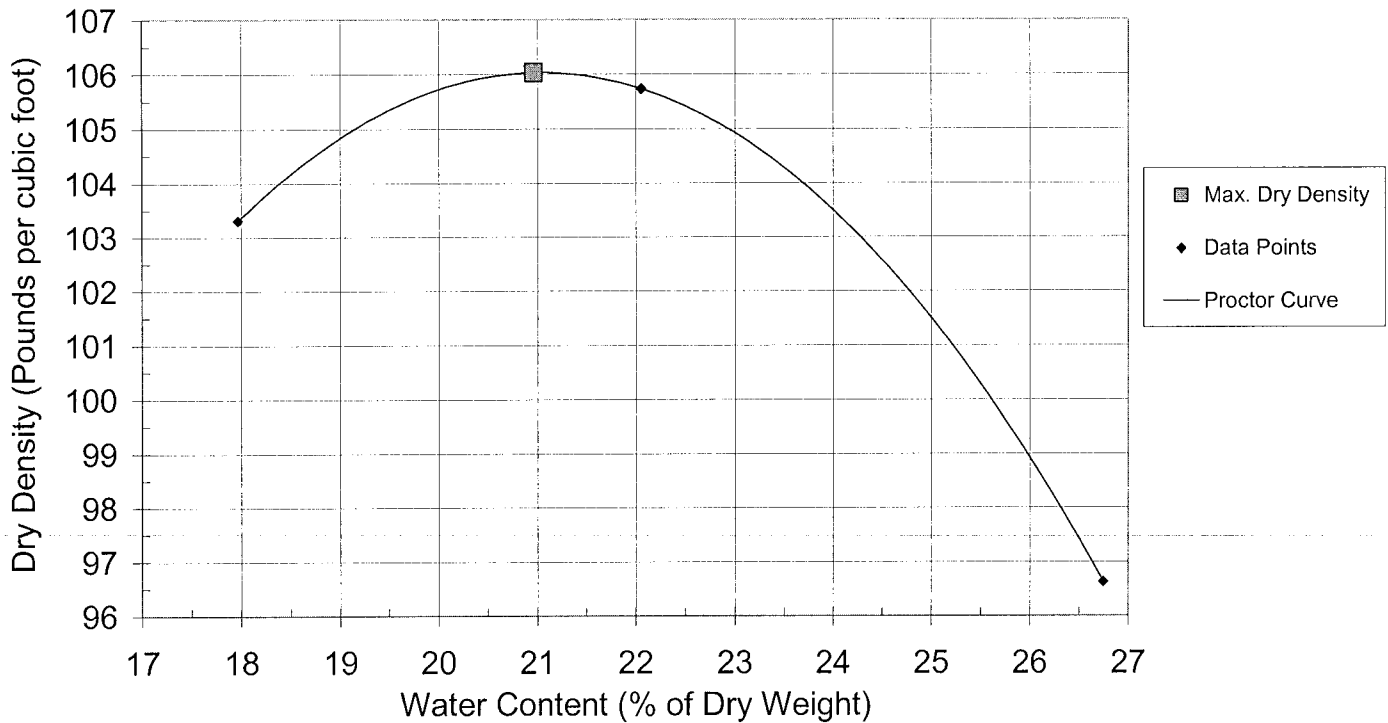
SME JOB NO: PP57419

REPORT NO: 1

DATE: 04/01/08

SAMPLED BY: SUDHAKAR MADAMANCHI

SAMPLE DATE: 2/26/2008



## TEST RESULTS

MAX DRY DENSITY: 106.0 pcf

OPT WATER CONT: 21.0 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 431185



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 2

ARCHITECT/ENGINEER:

DATE: 04/01/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

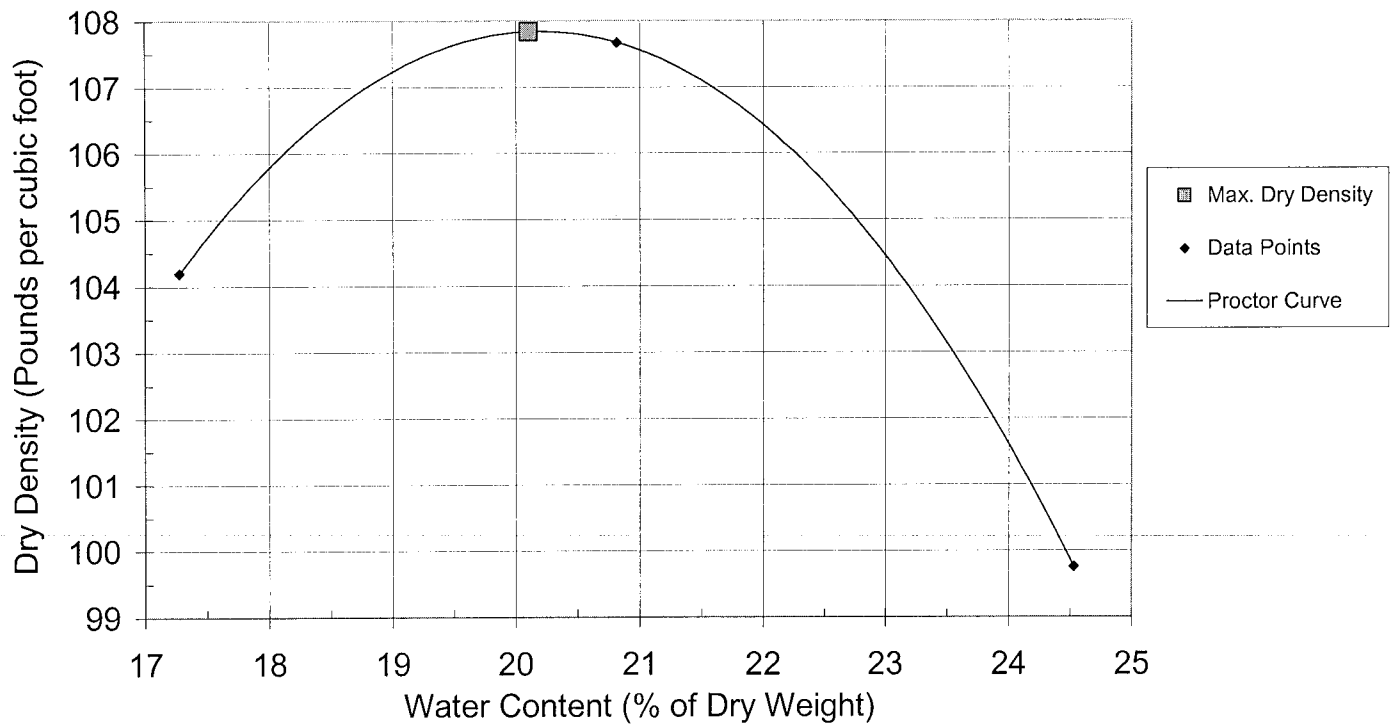
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 3/15 8.0%



## TEST RESULTS

MAX DRY DENSITY: 107.8 pcf

OPT WATER CONT: 20.1 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 431186



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 3

ARCHITECT/ENGINEER:

DATE: 04/01/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

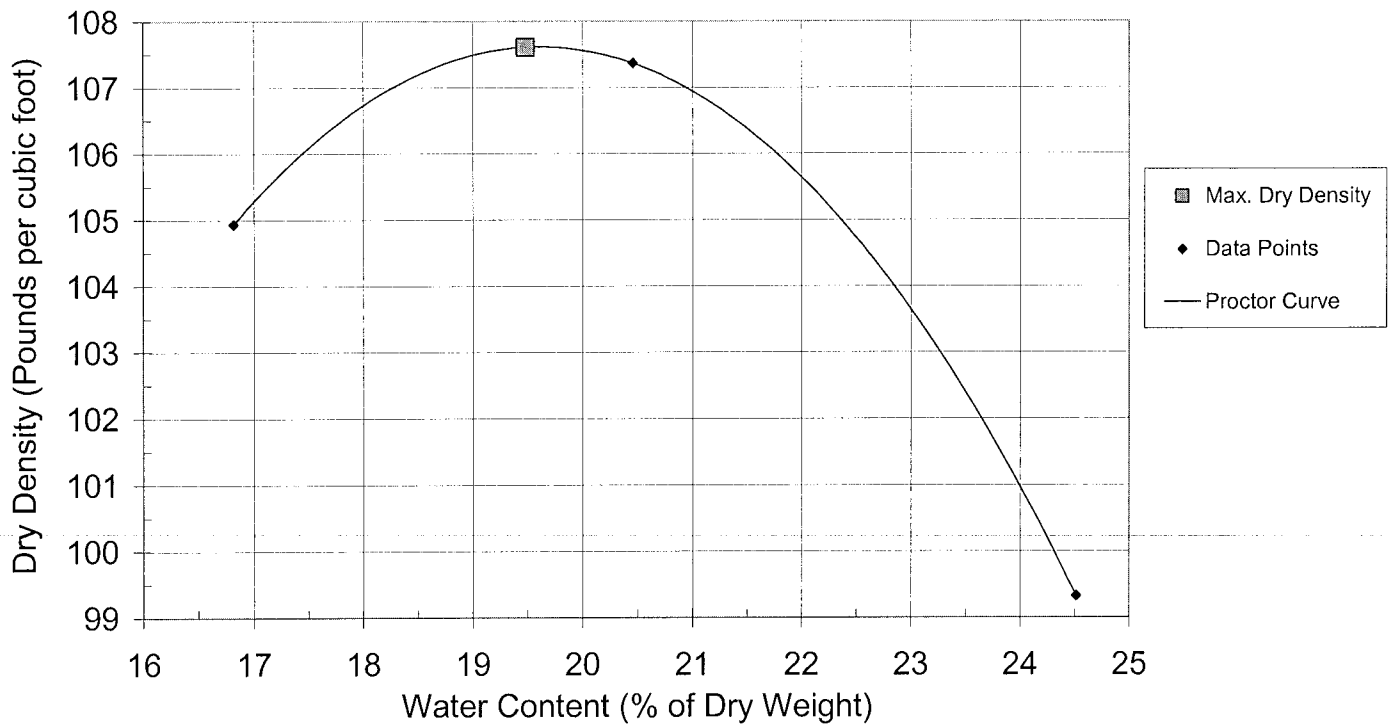
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 3/15 10.0 %



## TEST RESULTS

MAX DRY DENSITY: 107.6 pcf

OPT WATER CONT: 19.5 %

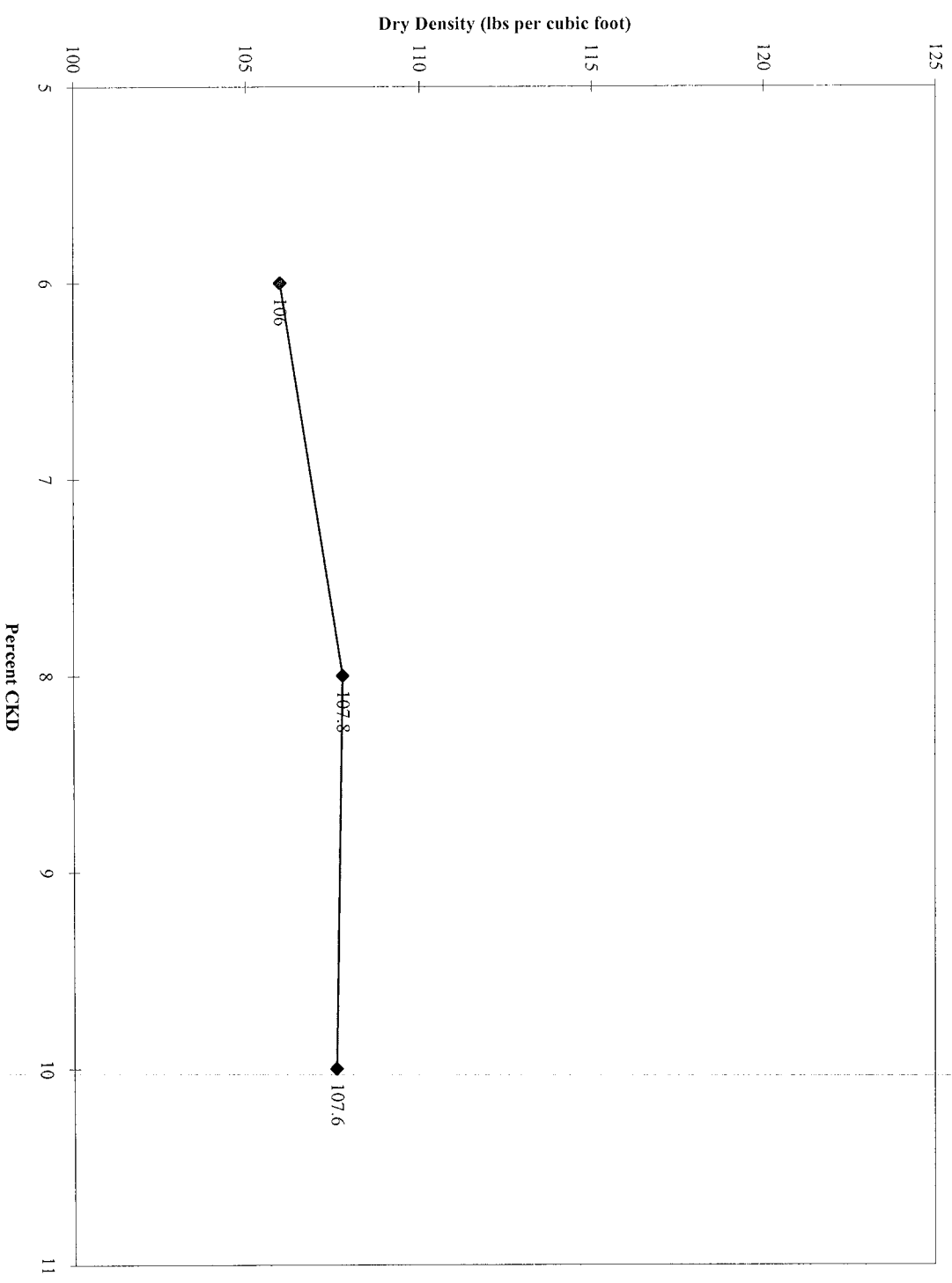
## REMARKS:

TESTED BY: KANTI PATEL

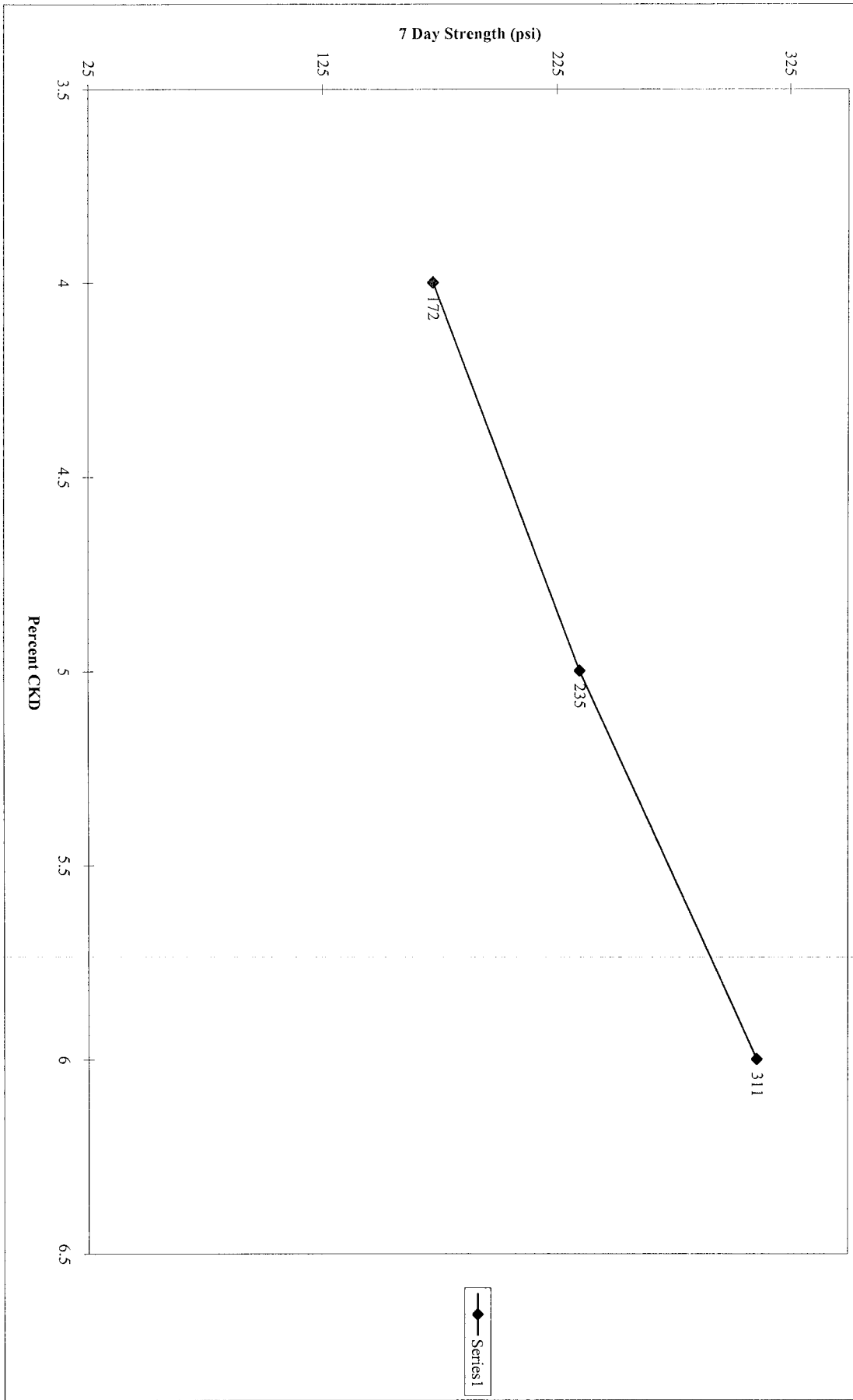
REVIEWED BY: PAUL BYCOFSKI

UNK - 431191

Density Curve  
3/15 Blend



Strength Curve  
3/15 Blend



Series1





# California Bearing Ratio Test

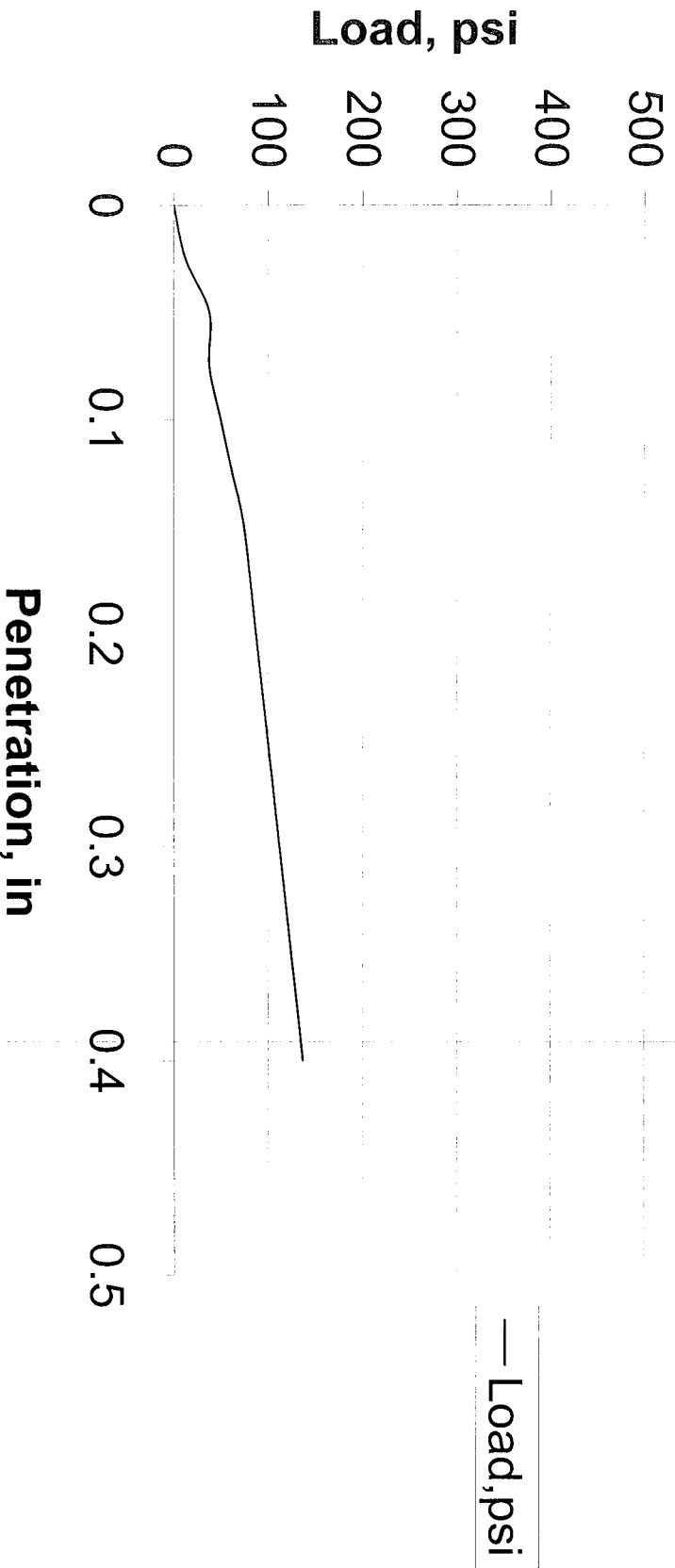
SME Project No. PP57419  
Date Tested: 4/16/08

Project: Gateway Project - MDOT  
Project Location: Detroit, MI

Material Source: I-75 Southbound

Material Description: Mix A 3/15 Blend 6% CKD

CBR @ 0.1= 5.0%  
CBR @ 0.2= 5.8%



Remarks: Material Tested at a dry density of 115.7 pcf and a moisture content of 14 percent.



# California Bearing Ratio Test

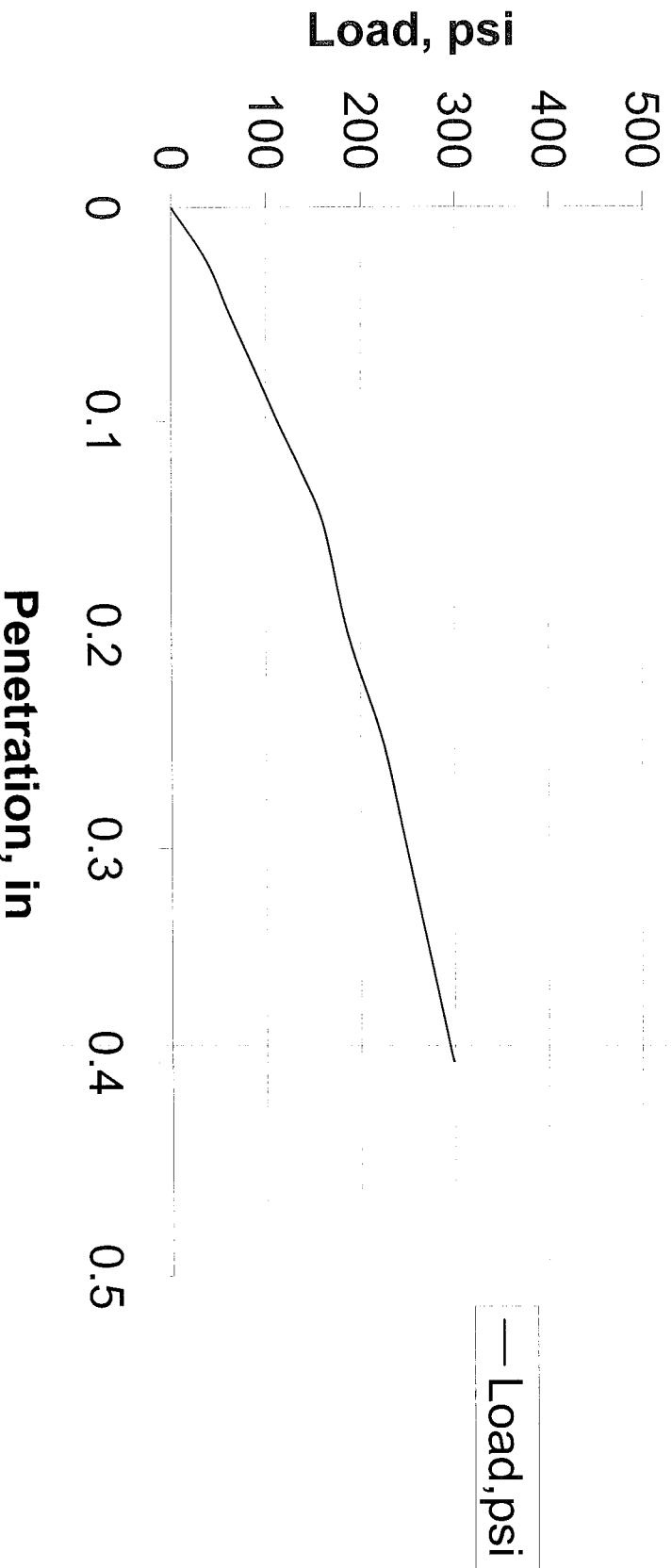
SME Project No. PP57419  
Date Tested: 4/17/08

Project: Gateway Project - MDOT  
Project Location: Detroit, MI

Material Source: I-75 Southbound

Material Description: Mix A 3/15 Blend 8% CKD

CBR @ 0.1 = 11.2%  
CBR @ 0.2 = 12.4%



Remarks: Material Tested at a dry density of 115.7 pcf and a moisture content of 14 percent.



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Michael J. Thelen, PE  
John C. Zarzecki, CWI, CDT

April 22, 2008

Mr. Paul Ruehle  
Lafarge North America  
30600 telegraph Road, Suite 4000  
Bingham Farms MI 48025

RE: CDK Stabilization Testing 6/12 Blend  
Gateway Project  
MDOT 82194-37795  
Detroit, MI  
SME Project No. PP57419

Dear Mr. Ruehle:

SME visited the referenced site on February 25 through March 4, 2008, to get bulk samples of the exposed subgrade soil at the referenced project. At the time of sampling there were a varying layers of sand (20 to 10 inches) overlying the clay subgrade soil. Bulk composite sample were obtained from 7 locations. The sample pits were extended to a depth of 18 inches into the clay sub grade and the recovered returned to our Plymouth, Michigan laboratory for testing. The CKD content to be added to the subgrade to meet the project criteria was determined by mixing the bulk composite sample with the CKD we received from Lafarge North America.

The project documents require several tests to be performed on the untreated and CKD treated soil. We met with Mr. Mark Grazioli of MDOT on February 28, 2008, regarding the tests to be performed on the samples recovered. MDOT had expressed concerns over the varying thickness of the layer of sand subbase encountered over the clay sub grade. It was decided that the clay and sand would be combined in three different composites using 3 inches of sand and 15 inches of clay, 6 inches of sand and 12 inches of clay and 9 inches of both sand and clay to develop the stabilization mix designs. Discussions with MDOT indicated where the sand was greater than 3 inches in depth, CKD would be used to stabilize the soil. The tests required in the specification were modified to include the following:

Plymouth  
Bay City  
Grand Rapids  
Kalamazoo  
Lansing  
Shelby Township  
Toledo  
Traverse City

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consultants in the geosciences, materials, and the environment

1. Plasticity index tests, ASTM D4318, are to be run on all samples where the soil is plastic enough to test.
2. Standard proctors, ASTM D-698 are to be run on all mixtures and CKD combinations.
3. Unconfined compressive strengths will be performed on all optimum water content points for the mixtures. The point where just over 125 PSI is achieved will be considered the optimum CKD.
4. Hydrometers will be used to classify all sand-clay combinations along with the Unified Soil Classification methods stated in ASTM D2487.
5. California Bearing Ratios (CBR) tests will be performed on the optimum CKD contents to verify the results are greater than 10%.
6. The PH tests have been eliminated because they are not useful in determining CKD content and were found to be too uniform to be useful in the initial testing. Plotting the wet density was also determined to be of no value and was eliminated.

The attached test results are for a ratio of 6 inches of sand and 12 inches of clay recovered from the southern portion of the project and are very similar to the samples taken from the northern portion last fall. The blend of sand and clay was mixed with CKD. For this sample the weight of sand and clay were treated with 6, 8 and 10% CKD. The soil sampled at Station 1251+00 on south bound I75, was classified using ASTM D2487 and a hydrometer grain size analysis. The Plasticity Index testing was performed on materials before and after mixing each CKD content. The soil is classified as a silty clay with some sand and trace gravel, with a Unified Soil Classification group symbol of CL and the sand is classified as a fine sand with a trace of gravel Soil Classification group symbol of SM.

The optimum maximum density was determined using AASHTO T99 (or ASTM D698) for the treated and untreated soil. The reports plotting the dry densities are shown on the attached forms and graphs.

The California Bearing Ratio (CBR), ASTM D1883, test was performed on the uncured sample at 6% CKD. The minimum CBR for the treated soil is specified to be 10%. Our test results were 18.6% for the uncured sample. The test results are on the attached form.

Liquid, Plastic and Plasticity limit tests were performed in compliance with ASTM D4318 on the untreated soil and treated soil at varying CKD contents. The test results are as follows:



Percent CKD	Liquid Limit	Plastic Limit	Plasticity Index
0	22	13	9
6	41	24	17
8	41	23	18
10	41	23	18

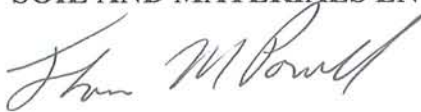
A modified unconfined compression test was performed on samples at 6%, 8% and 10% CKD content using the test modification in the specification. The remainder of the test was similar to ASTM D5102. The specified unconfined compression result was to be a minimum of 125 psi. Our test results indicated an unconfined compressive strength of 243 psi @ 6% CKD content, performed after a seven day cure at 40 degrees Celsius. The unconfined compressive strength test results for the three CKD contents of 6, 8 and 10% were 243 psi, 306 psi, and 480 psi, respectively, and are shown on the attached graph.

Based on the referenced and attached test data, the appropriate CKD content to obtain the specified stabilization results using the soil we sampled is a minimum of 6% CKD based on the weight of the sand and clay.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this information please do not hesitate to contact us.

Very truly yours,

**SOIL AND MATERIALS ENGINEERS, INC.**



Thomas M. Powell  
Materials Consultant



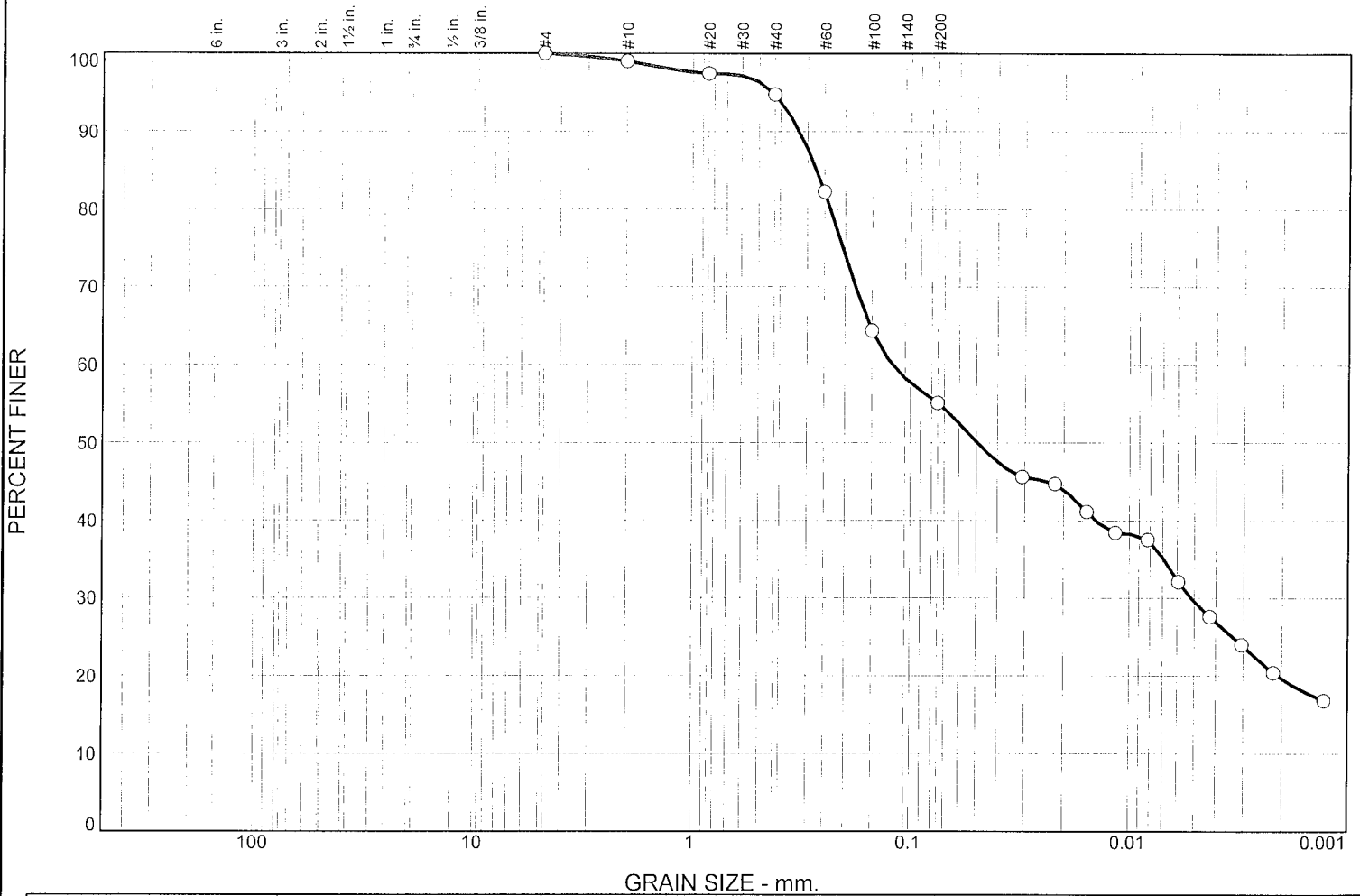
Gerard P. Madej, PE  
Vice President

Attachments

S:/Powell/57419.doc



# Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.0	4.2	39.7	25.6	29.5

	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
○	22	13	0.2724	0.1212	0.0494	0.0052				

Material Description	USCS	AASHTO
○ Silty Sandy Clay	CL	

**Project No.** PP57419      **Client:** Lafarge  
**Project:** Gateway Mix Designs  
 Detroit, MI  
 ○

---

**Soil and Materials Engineers, Inc.**  
**Plymouth, MI**

**Remarks:**  
 ○ Mix 6/12

**Figure**



# Laboratory Compaction Curve

PROJECT: GATEWAY PROJECT MDOT

SME JOB NO: PP57419

LOCATION: DETROIT, MI

REPORT NO: 10

ARCHITECT/ENGINEER:

DATE: 04/22/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

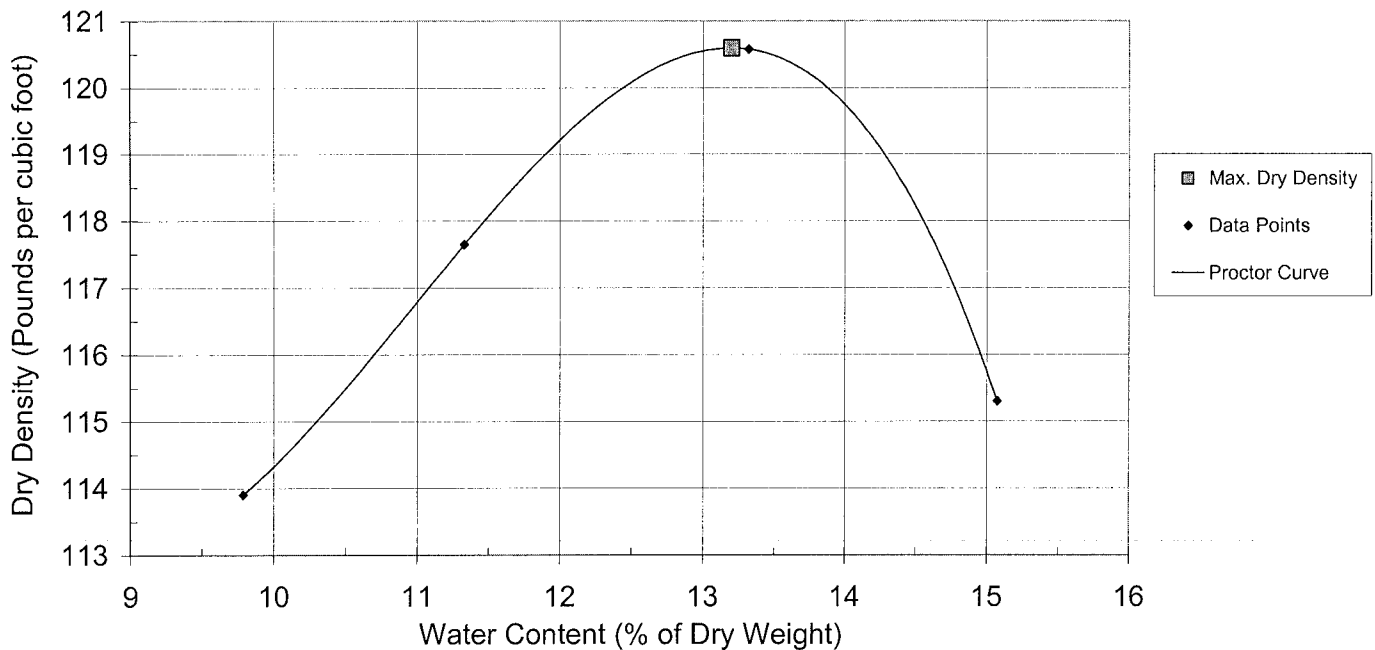
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION: CLAY & SAND MIX.

INTENDED USE:

MATERIAL SOURCE: I-75 S/B (6/12 MIX-A)

DESCRIPTION OF SOIL: CLAY & SAND MIX



## TEST RESULTS

MAX DRY DENSITY: 120.4 pcf

OPT WATER CONT: 13.4 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 429794



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

LOCATION: BINGHAM FARMS, MI

ARCHITECT/ENGINEER:

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

RAMMER: Manual

MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 6/12 6.0%

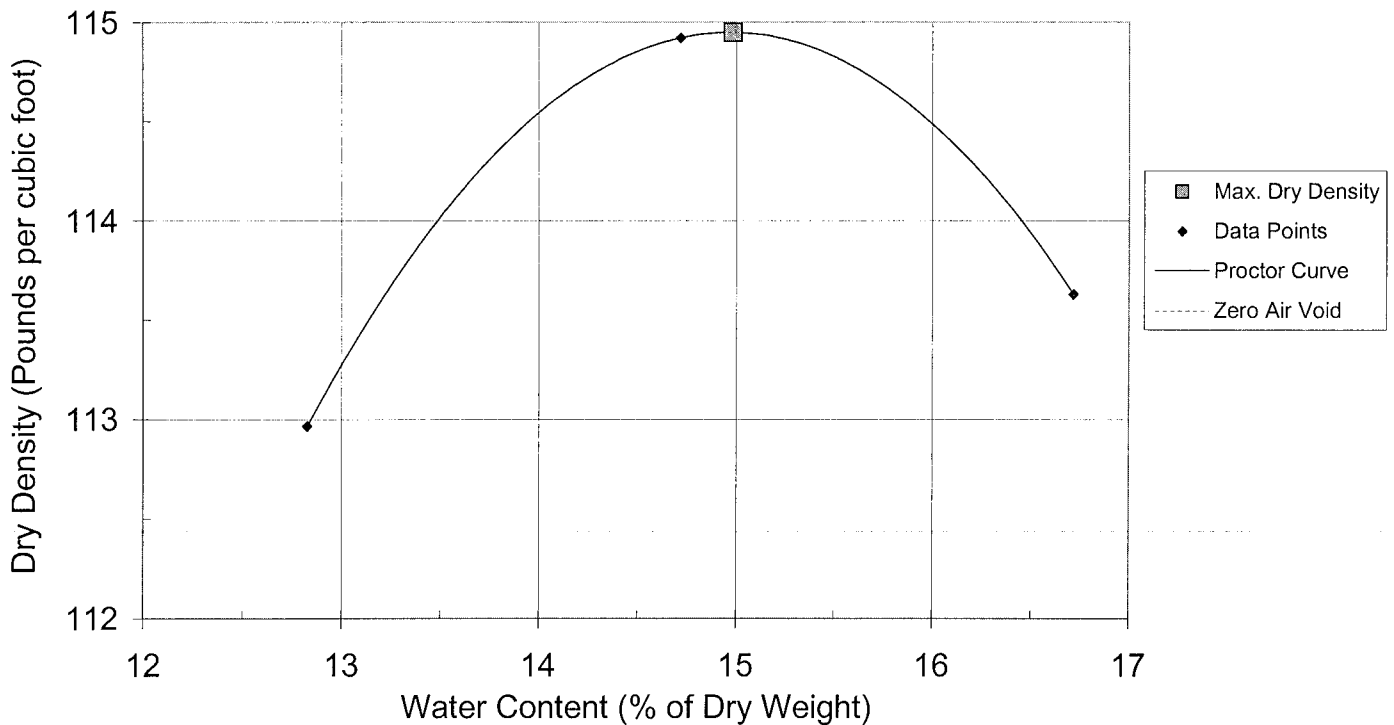
SME JOB NO: PP57419

REPORT NO: 4

DATE: 04/02/08

SAMPLED BY: SUDHAKAR MADAMANCHI

SAMPLE DATE: 4/2/2008



## TEST RESULTS

MAX DRY DENSITY: 114.9 pcf

OPT WATER CONT: 15.0 %

## REMARKS:

TESTED BY: KANTI PATEL

UNK - 431276

REVIEWED BY: PAUL BYCOFSKI





# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 5

ARCHITECT/ENGINEER:

DATE: 04/02/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

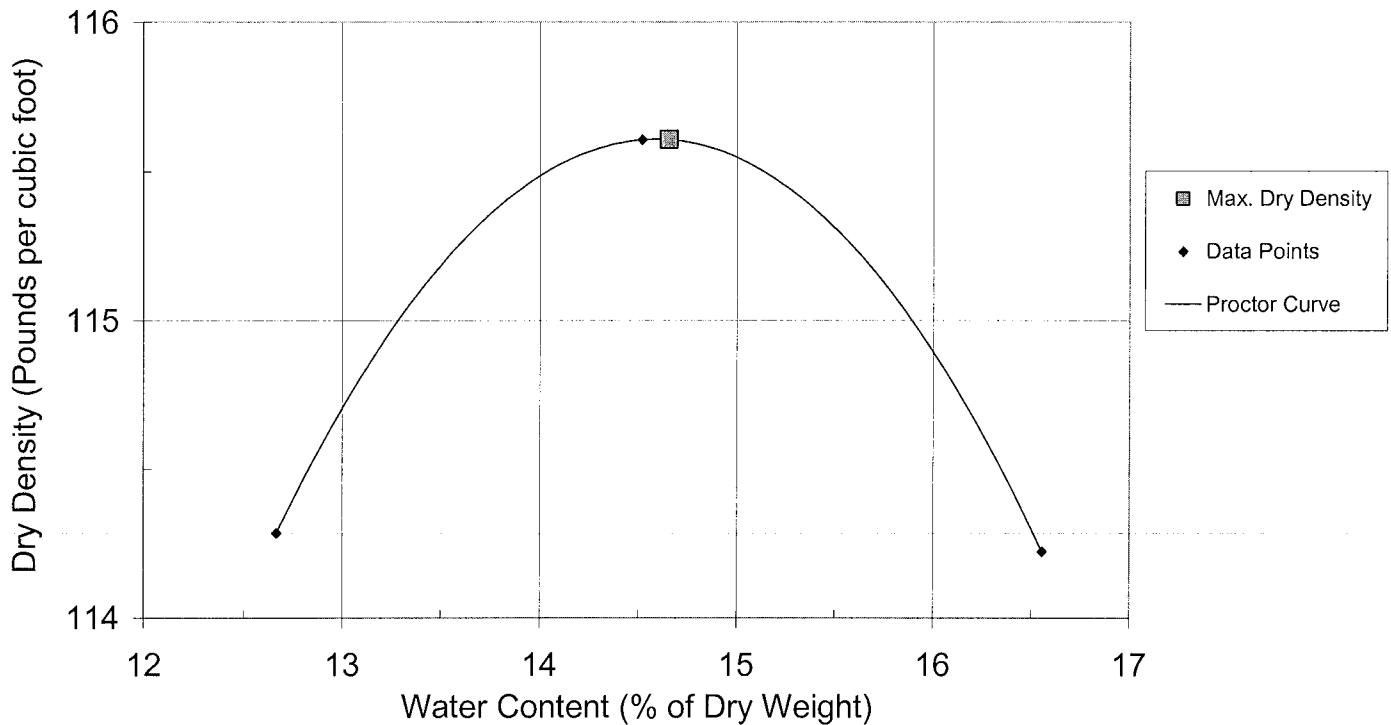
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 6/12 8.0%



## TEST RESULTS

MAX DRY DENSITY: 115.6 pcf

OPT WATER CONT: 14.7 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 431266



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 6

ARCHITECT/ENGINEER:

DATE: 04/02/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

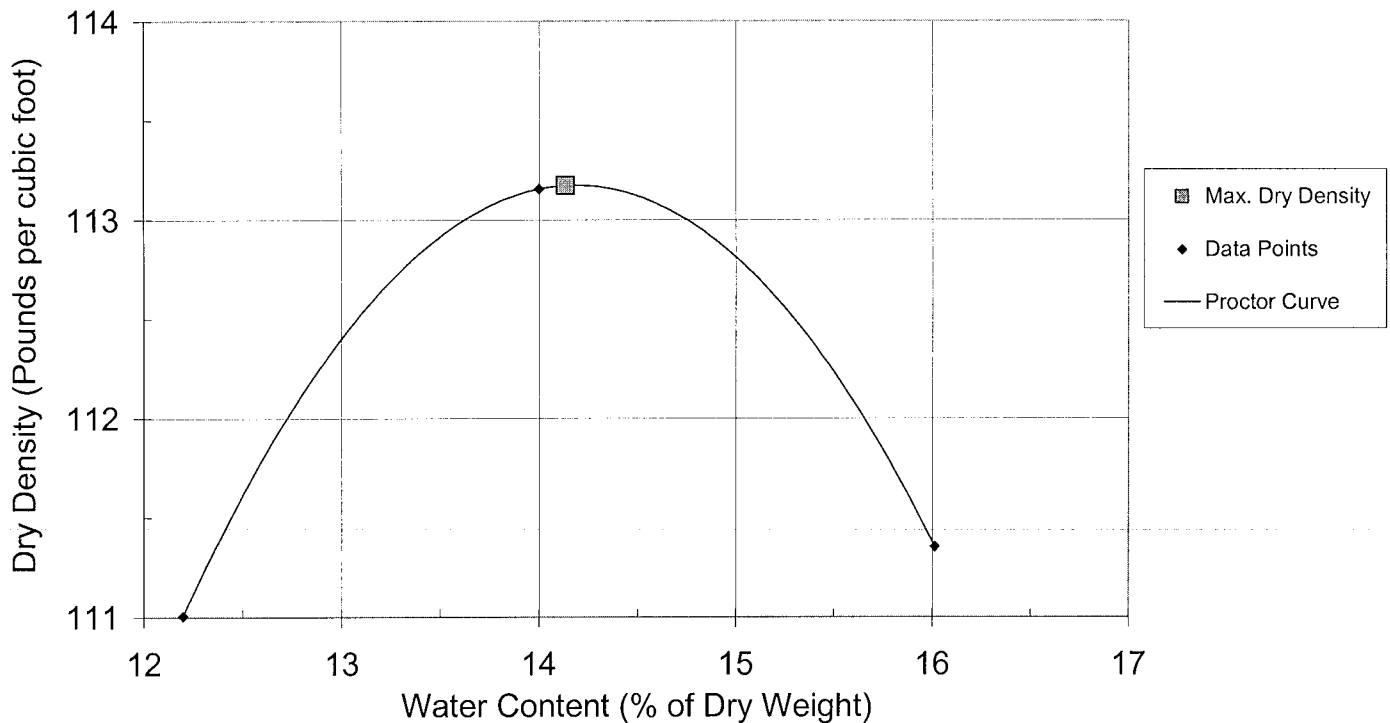
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 6/12 10.0%



## TEST RESULTS

MAX DRY DENSITY: 113.2 pcf

OPT WATER CONT: 14.1 %

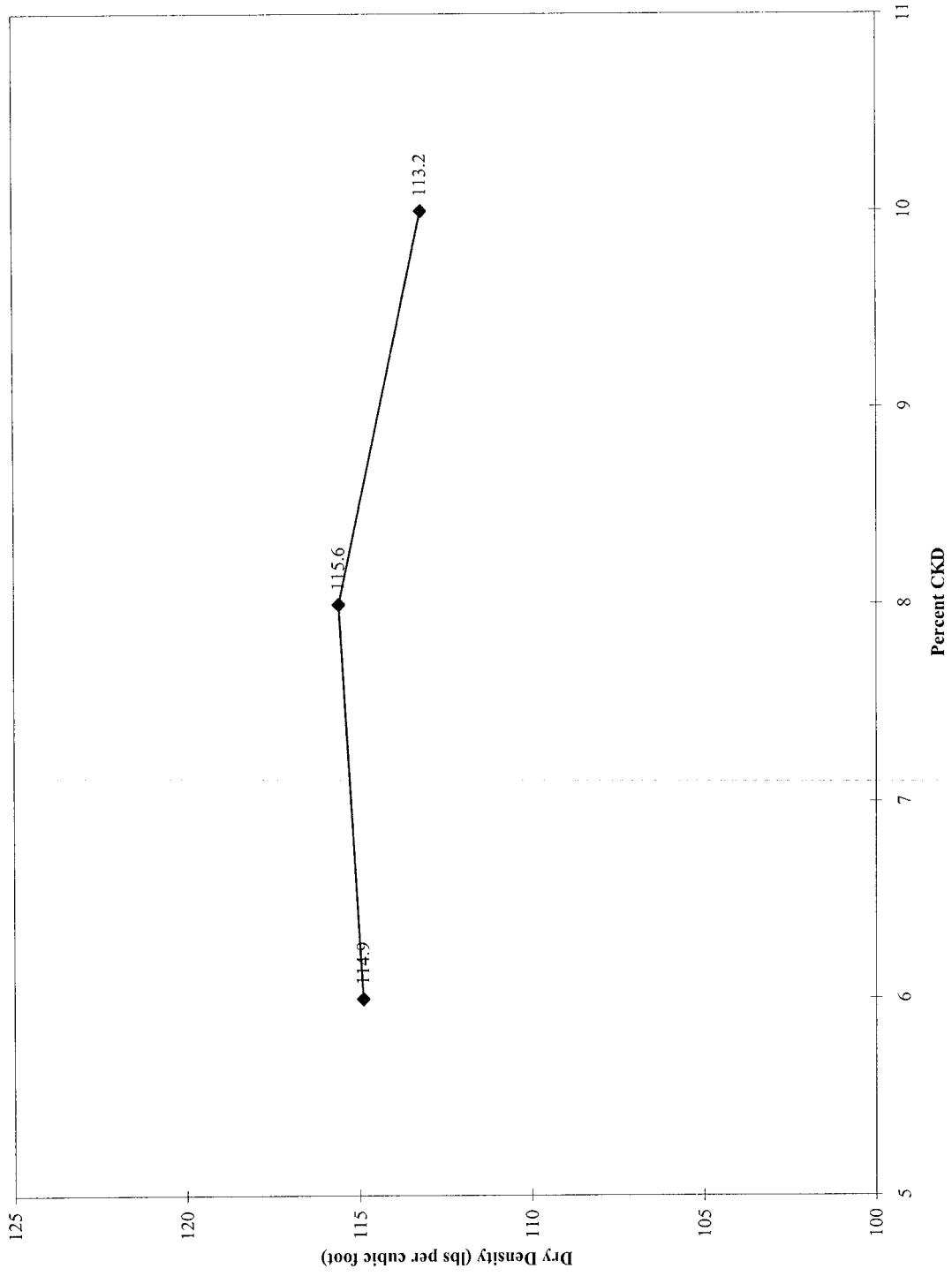
REMARKS:

TESTED BY: KANTI PATEL

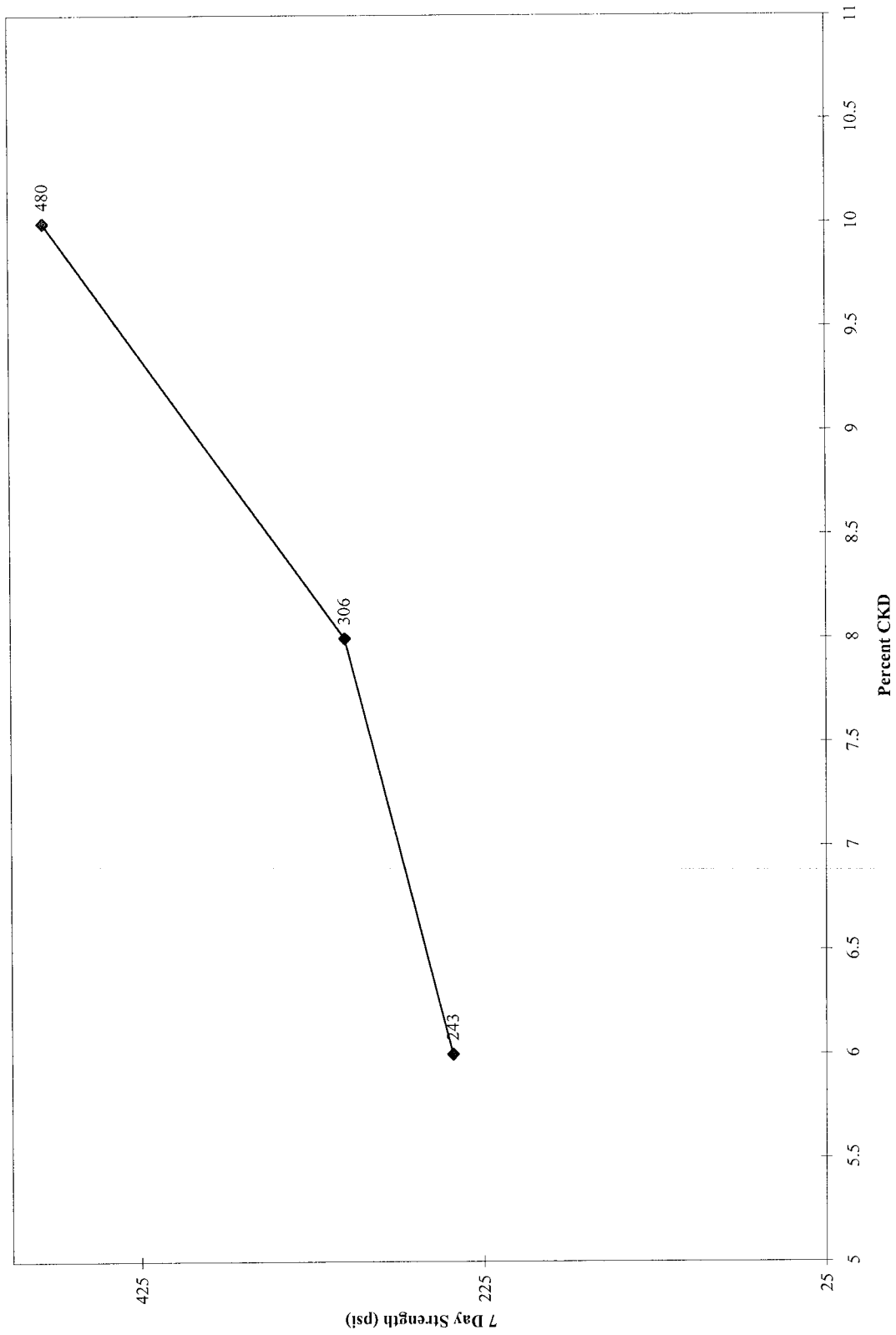
REVIEWED BY: PAUL BYCOFSKI

UNK - 431267

Density Curve  
6/12 Blend



Strength Curve  
6/12 Blend



Series 1



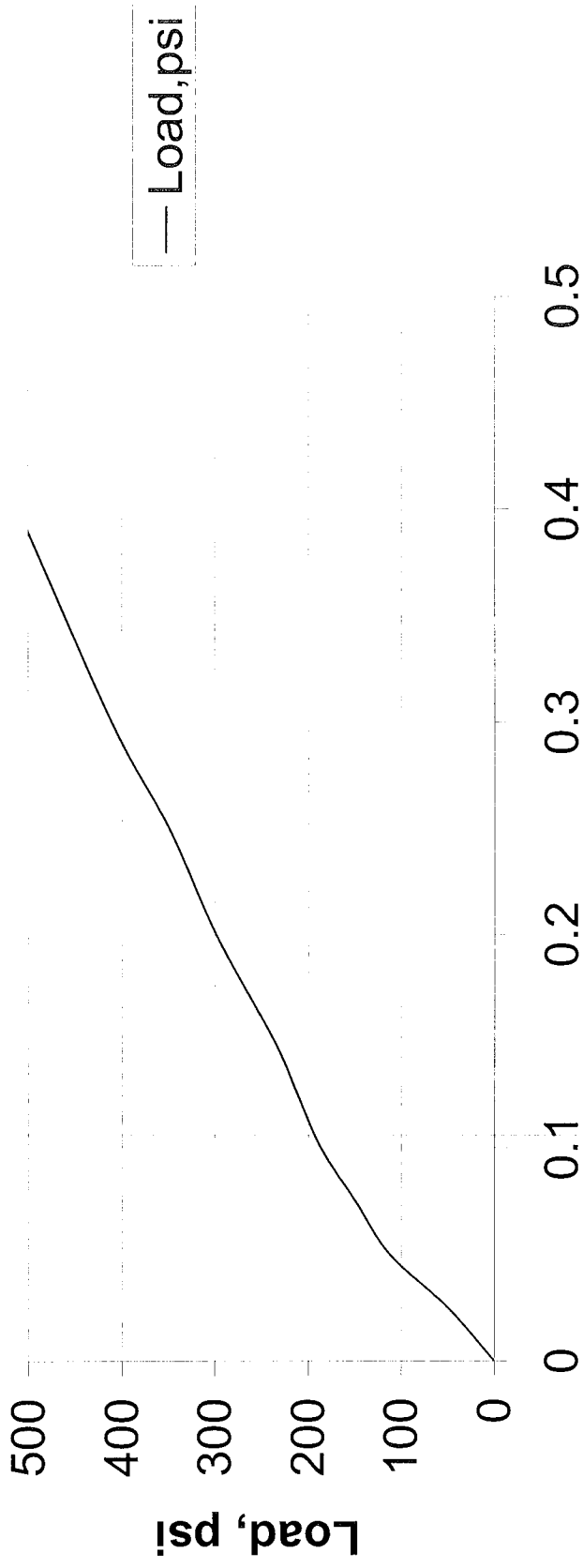
SME Project No. PP57419  
Date Tested: 4/16/08

# California Bearing Ratio Test

**Project:** Gateway Project - MDOT  
**Project Location:** Detroit, MI

**Material Source:** I-75 Southbound  
**Material Description:** Mix A 6/12 Blend 6% CKD

**CBR @ 0.1 = 18.6%**  
**CBR @ 0.2 = 19.9%**



Remarks: Material Tested at a dry density of 115.7 pcf and a moisture content of 14 percent.



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Larry W. Shook, PE  
Michael J. Thelen, PE  
John C. Zarzecki, CWI, CDT

April 22, 2008

Mr. Paul Ruehle  
Lafarge North America  
30600 telegraph Road, Suite 4000  
Bingham Farms MI 48025

RE: CDK Stabilization Testing 9/9 Blend  
Gateway Project  
MDOT 82194-37795  
Detroit, MI  
SME Project No. PP57419

Dear Mr. Ruehle:

SME visited the referenced site on February 25 through March 4, 2008, to get bulk samples of the exposed subgrade soil at the referenced project. At the time of sampling there were a varying layers of sand (20 to 10 inches) overlying the clay subgrade soil. Bulk composite sample were obtained from 7 locations. The sample pits were extended to a depth of 18 inches into the clay sub grade and the recovered returned to our Plymouth, Michigan laboratory for testing. The CKD content to be added to the subgrade to meet the project criteria was determined by mixing the bulk composite sample with the CKD we received from Lafarge North America.

The project documents require several tests to be performed on the untreated and CKD treated soil. We met with Mr. Mark Grazioli of MDOT on February 28, 2008, regarding the tests to be performed on the samples recovered. MDOT had expressed concerns over the varying thickness of the layer of sand subbase encountered over the clay sub grade. It was decided that the clay and sand would be combined in three different composites using 3 inches of sand and 15 inches of clay, 6 inches of sand and 12 inches of clay and 9 inches of both sand and clay to develop the stabilization mix designs. Discussions with MDOT indicated where the sand was greater than 3 inches in depth CKD would be used to stabilize the soil. The tests required in the specification were modified to include the following:

Plymouth  
Bay City  
Grand Rapids  
Kalamazoo  
Lansing  
Shelby Township  
Toledo  
Traverse City

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consultants in the geosciences, materials, and the environment

1. Plasticity index tests, ASTM D4318, are to be run on all samples where the soil is plastic enough to test.
2. Standard proctors, ASTM D-698 are to be run on all mixtures and CKD combinations.
3. Unconfined compressive strengths will be performed on all optimum water content points for the mixtures. The point where just over 125 PSI is achieved will be considered the optimum CKD.
4. Hydrometers will be used to classify all sand-clay combinations along with the Unified Classification methods stated in ASTM D2487.
5. California Bearing Ratios (CBR) tests will be performed on the optimum CKD contents to verify the results are greater than 10%.
6. The PH tests have been eliminated because they are not useful in determining CKD content and were found to be too uniform to be useful in the initial testing. Plotting the wet density was also determined to be of no value and was eliminated.

The attached test results are for a ratio of 9 inches of sand and 9 inches of clay recovered from the southern portion of the project and are very similar to the samples taken from the northern portion last fall. The blend of sand and clay was mixed with CKD. For this sample the weight of sand and clay were treated with 6, 8 and 10% CKD. The soil sampled at Station 1251+00 on south bound I 75, was classified using ASTM D2487 and a hydrometer grain size analysis. The Plasticity Index testing was performed on materials before and after mixing each CKD content. The soil is classified as a silty clay with some sand and trace gravel, with a Unified Soil Classification group symbol of CL and the sand is classified as a fine sand with a trace of gravel Soil Classification group symbol of SM.

The optimum maximum density was determined using AASHTO T99 (or ASTM D698) for the treated and untreated soil. The reports plotting the dry densities are shown on the attached forms and graphs.

The California Bearing Ratio (CBR), ASTM D1883, test was performed on the uncured sample at 6% CKD. The minimum CBR for the treated soil is specified to be 10%. Our test results were 22.3% for the uncured sample. The test results are on the attached form.

Liquid, Plastic and Plasticity limit tests were performed in compliance with ASTM D4318 on the untreated soil and treated soil at varying CKD contents. The test results are as follows:



Percent CKD	Liquid Limit	Plastic Limit	Plasticity Index
0	20	12	8
6	32	19	13
8	22	18	14
10	32	19	13

A modified unconfined compression test was performed on samples at 6%, 8% and 10% CKD content using the test modification in the specification. The remainder of the test was similar to ASTM D5102. The specified unconfined compression result was to be a minimum of 125 psi. Our test results indicated an unconfined compressive strength of 190 psi @ 6% CKD content, performed after a seven day cure at 40 degrees Celsius. The unconfined compressive strength test results for the three CKD contents of 6, 8 and 10% were 190 psi, 315 psi, and 318 psi, respectively and are shown on the attached graph.

Based on the referenced and attached test data, the appropriate CKD content to obtain the specified stabilization results using the soil we sampled is a minimum of 6% CKD based on the weight of the sand and clay.

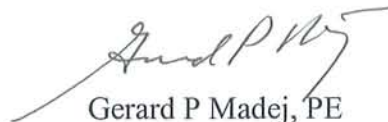
We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this information please do not hesitate to contact us.

Very truly yours,

**SOIL AND MATERIALS ENGINEERS, INC.**



Thomas M. Powell  
Materials Consultant



Gerard P. Madej, PE  
Vice President

Attachments

S:/Powell/57419.doc









# Laboratory Compaction Curve

PROJECT: GATEWAY PROJECT MDOT

SME JOB NO: PP57419

LOCATION: DETROIT, MI

REPORT NO: 26

ARCHITECT/ENGINEER:

DATE: 04/03/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

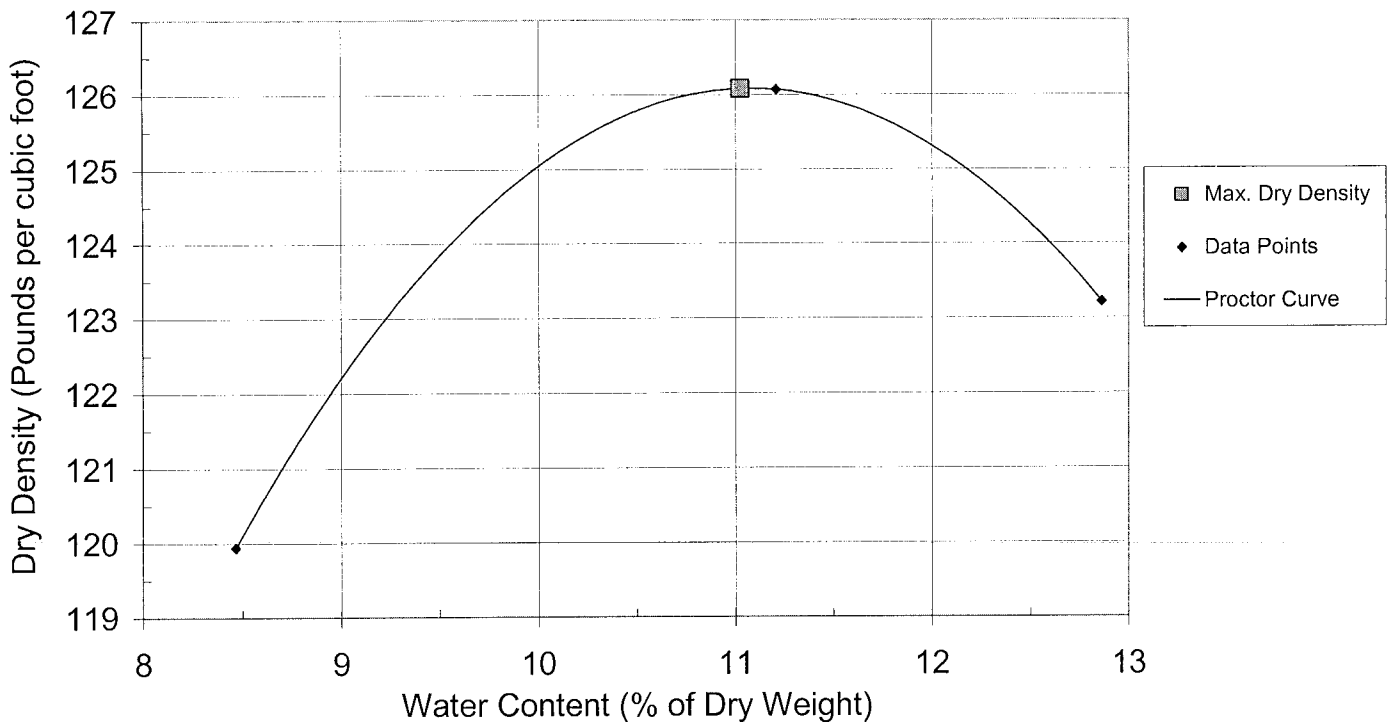
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: CLAY-SAND MIX A - 9/9



## TEST RESULTS

MAX DRY DENSITY: 126.3 pcf

OPT WATER CONT: 10.8 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 430175



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 7

ARCHITECT/ENGINEER:

DATE: 04/03/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

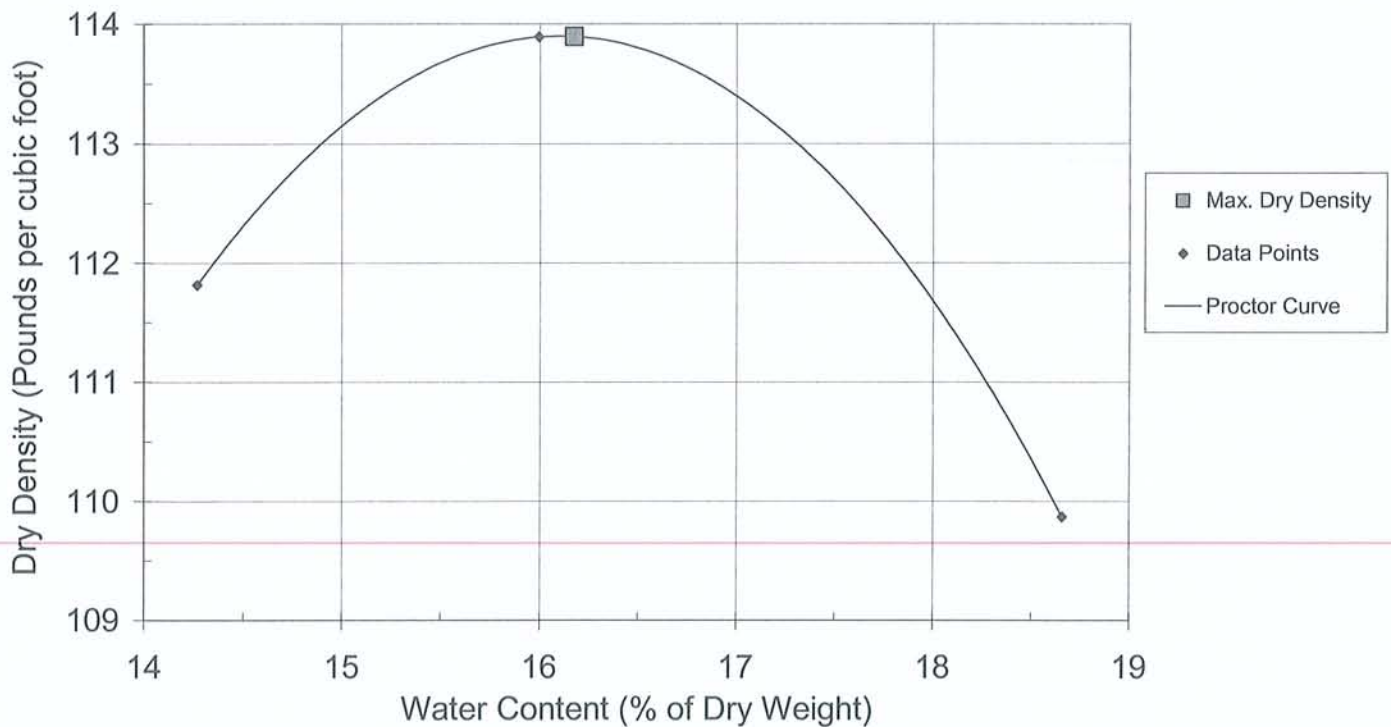
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 9/9 6.0%



## TEST RESULTS

MAX DRY DENSITY: 113.9 pcf

OPT WATER CONT: 16.2 %

REMARKS:

TESTED BY: KANTI PATEL

REVIEWED BY: PAUL BYCOFSKI

UNK - 431295



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

LOCATION: BINGHAM FARMS, MI

ARCHITECT/ENGINEER:

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

RAMMER: Manual

MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 9/9 8.0%

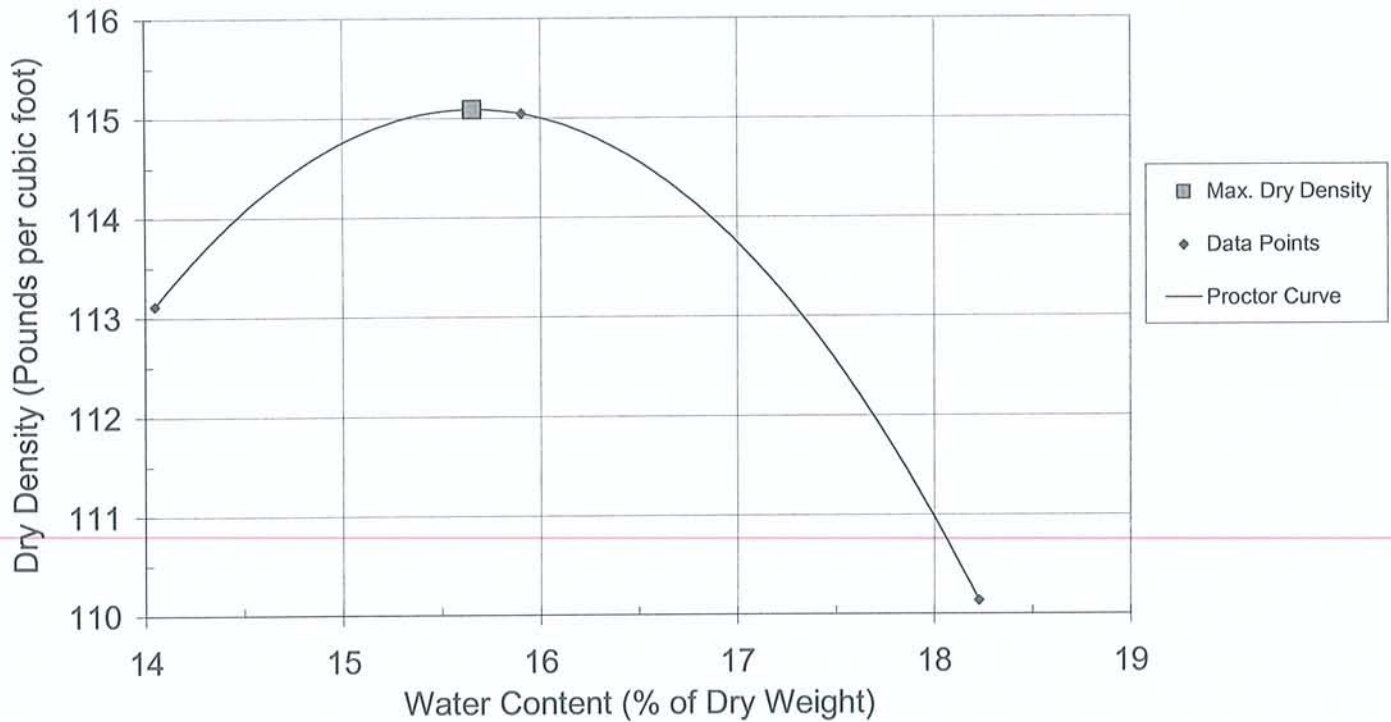
SME JOB NO: PP57419

REPORT NO: 8

DATE: 04/03/08

SAMPLED BY: SUDHAKAR MADAMANCHI

SAMPLE DATE: 2/26/2008



## TEST RESULTS

MAX DRY DENSITY: 115.1 pcf

OPT WATER CONT: 15.7 %

## REMARKS:

TESTED BY: KANTI PATEL

UNK - 431296

REVIEWED BY: PAUL BYCOFSKI



# Laboratory Compaction Curve

PROJECT: GATEWAY MIX DESIGNS

SME JOB NO: PP57419

LOCATION: BINGHAM FARMS, MI

REPORT NO: 9

ARCHITECT/ENGINEER:

DATE: 04/03/08

CONTRACTOR:

TEST PROCEDURE USED: ASTM D-698 'Standard'

SAMPLED BY: SUDHAKAR MADAMANCHI

RAMMER: Manual

SAMPLE DATE: 2/26/2008

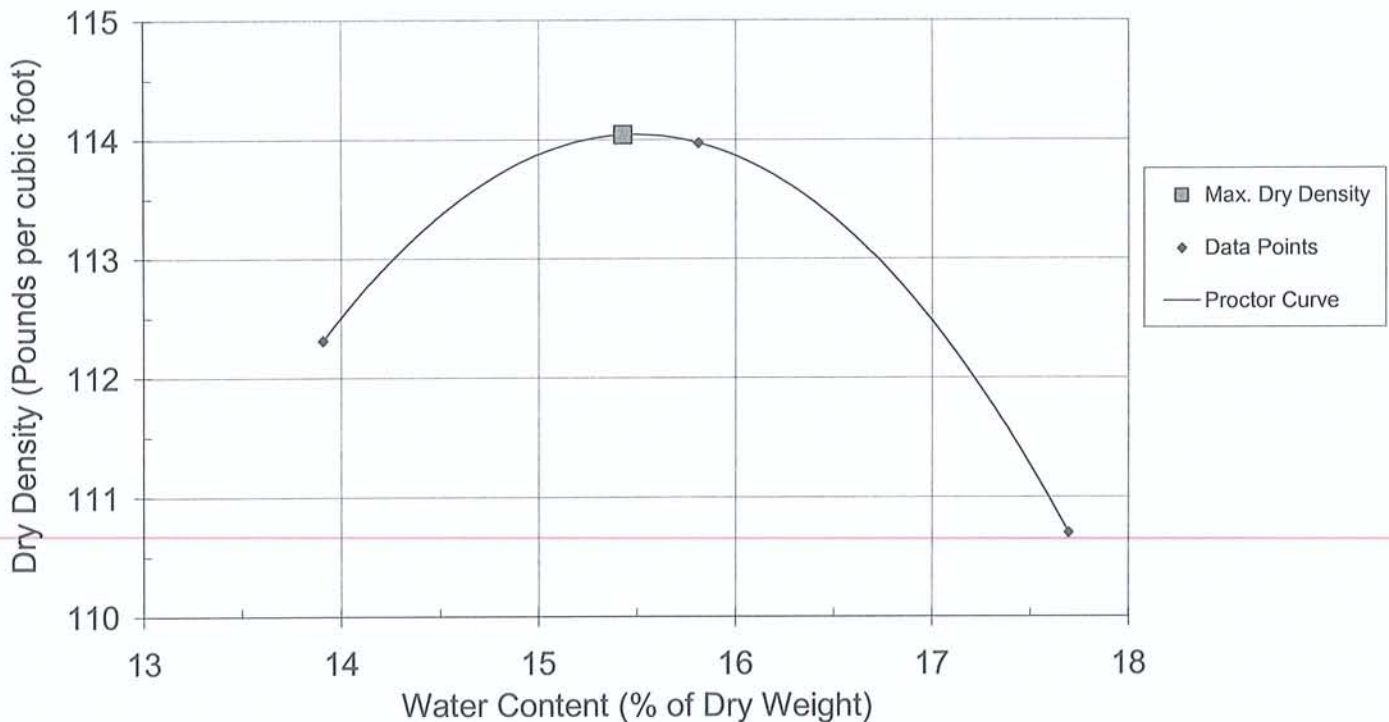
MOLD DIAMETER: 4

UNIFIED SOIL CLASSIFICATION:

INTENDED USE:

MATERIAL SOURCE: I-75 S/B

DESCRIPTION OF SOIL: SAND & CLAY MIX W/CDK 9/9 10.0%



## TEST RESULTS

MAX DRY DENSITY: 114.0 pcf

OPT WATER CONT: 15.4 %

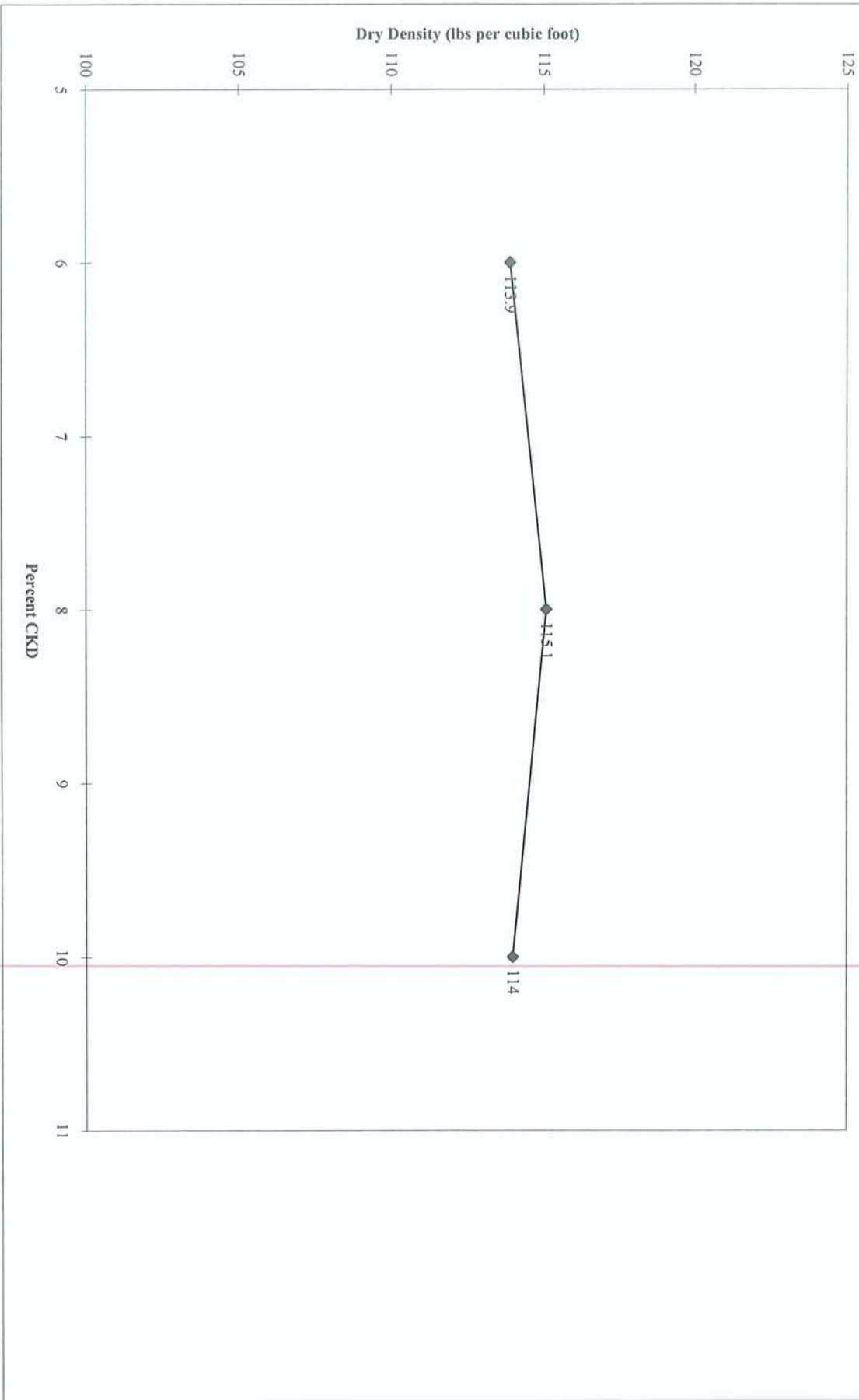
## REMARKS:

TESTED BY: KANTI PATEL

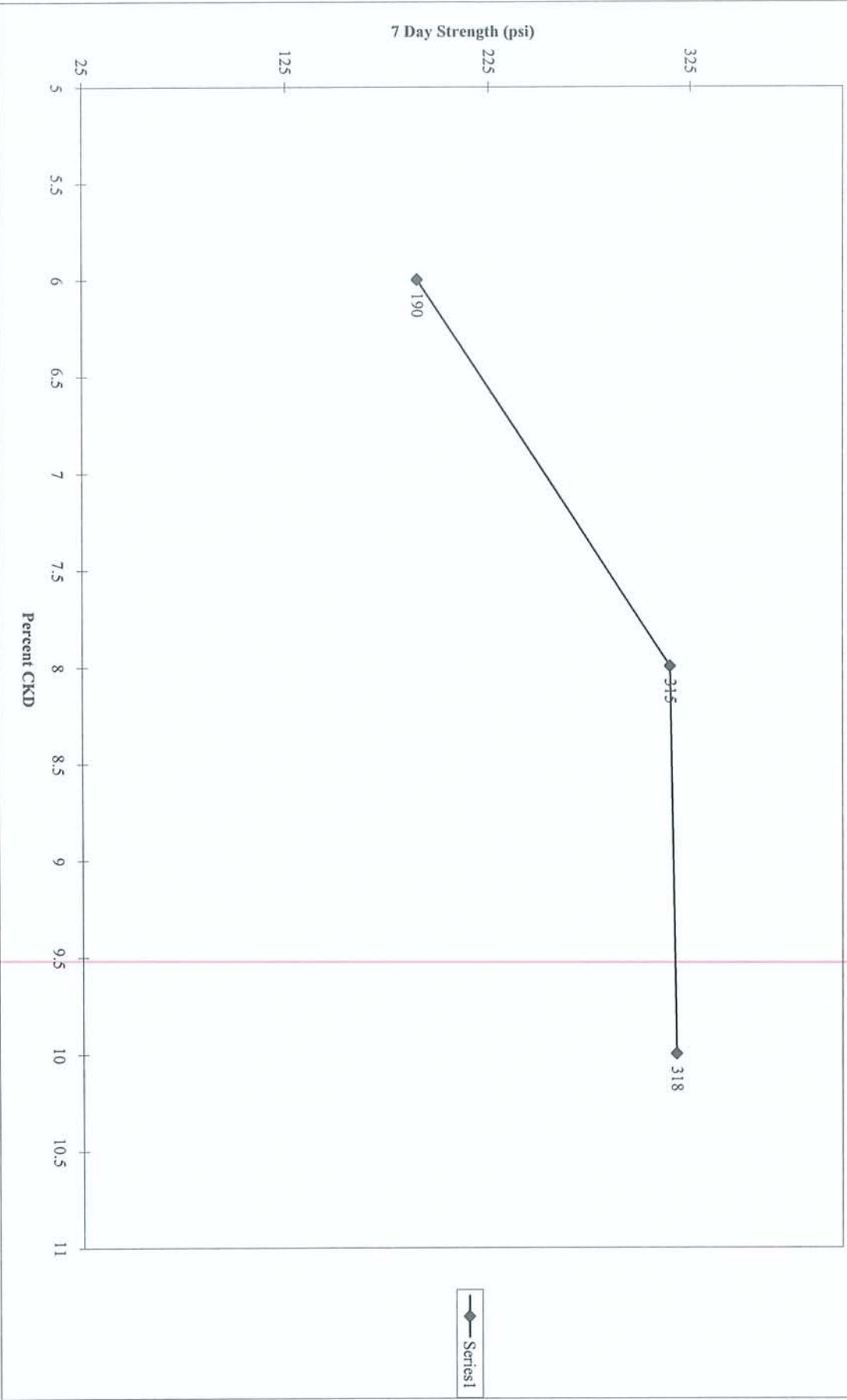
REVIEWED BY: PAUL BYCOFSKI

UNK - 431297

Density Curve  
9/9 Blend



### Strength Curve 9/9 Blend



Series1



# California Bearing Ratio Test

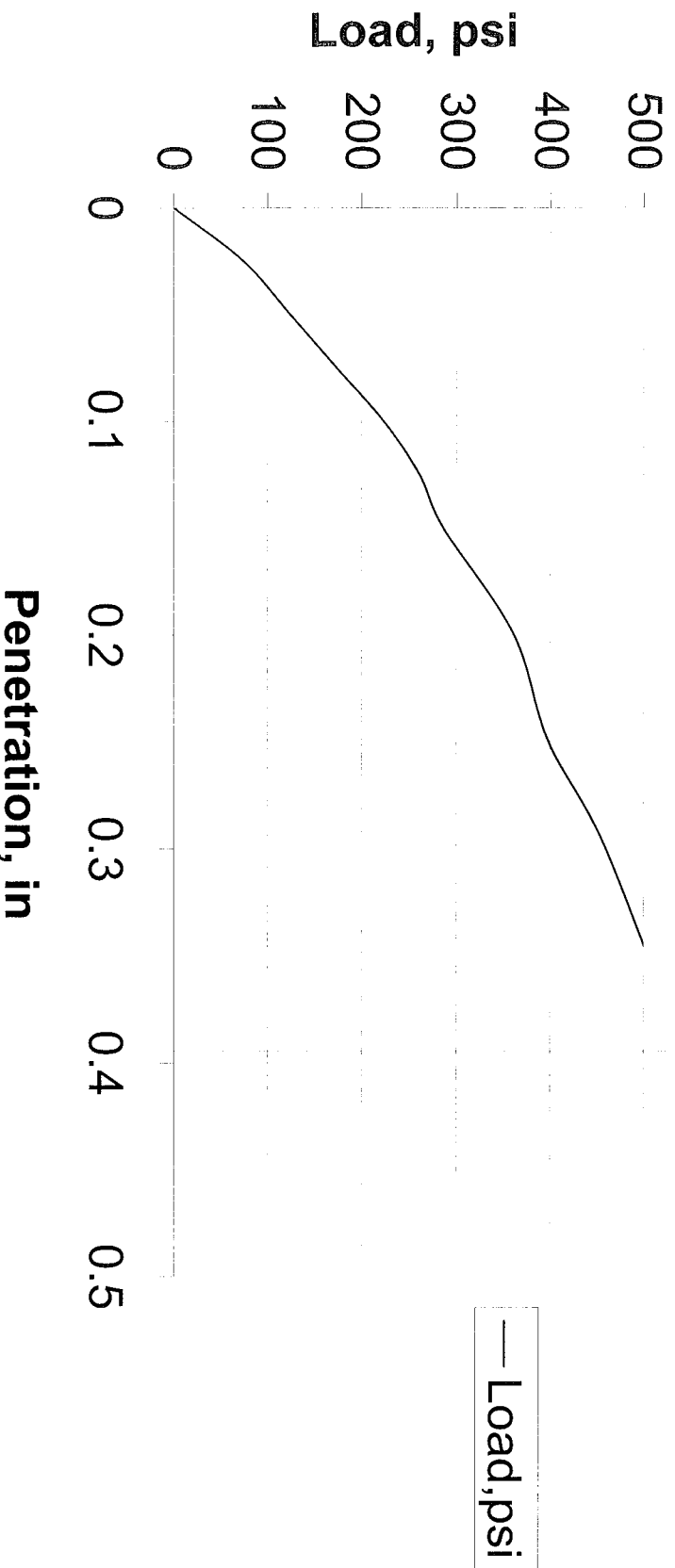
SME Project No. PP57419  
Date Tested: 4/16/08

Project: Gateway Project - MDOT  
Project Location: Detroit, MI

Material Source: I-75 Southbound

Material Description: Mix A 9/9 Blend 6% CKD

CBR @ 0.1 = 22.3%  
CBR @ 0.2 = 24.1%



Remarks: Material Tested at a dry density of 115.7 pcf and a moisture content of 14 percent.

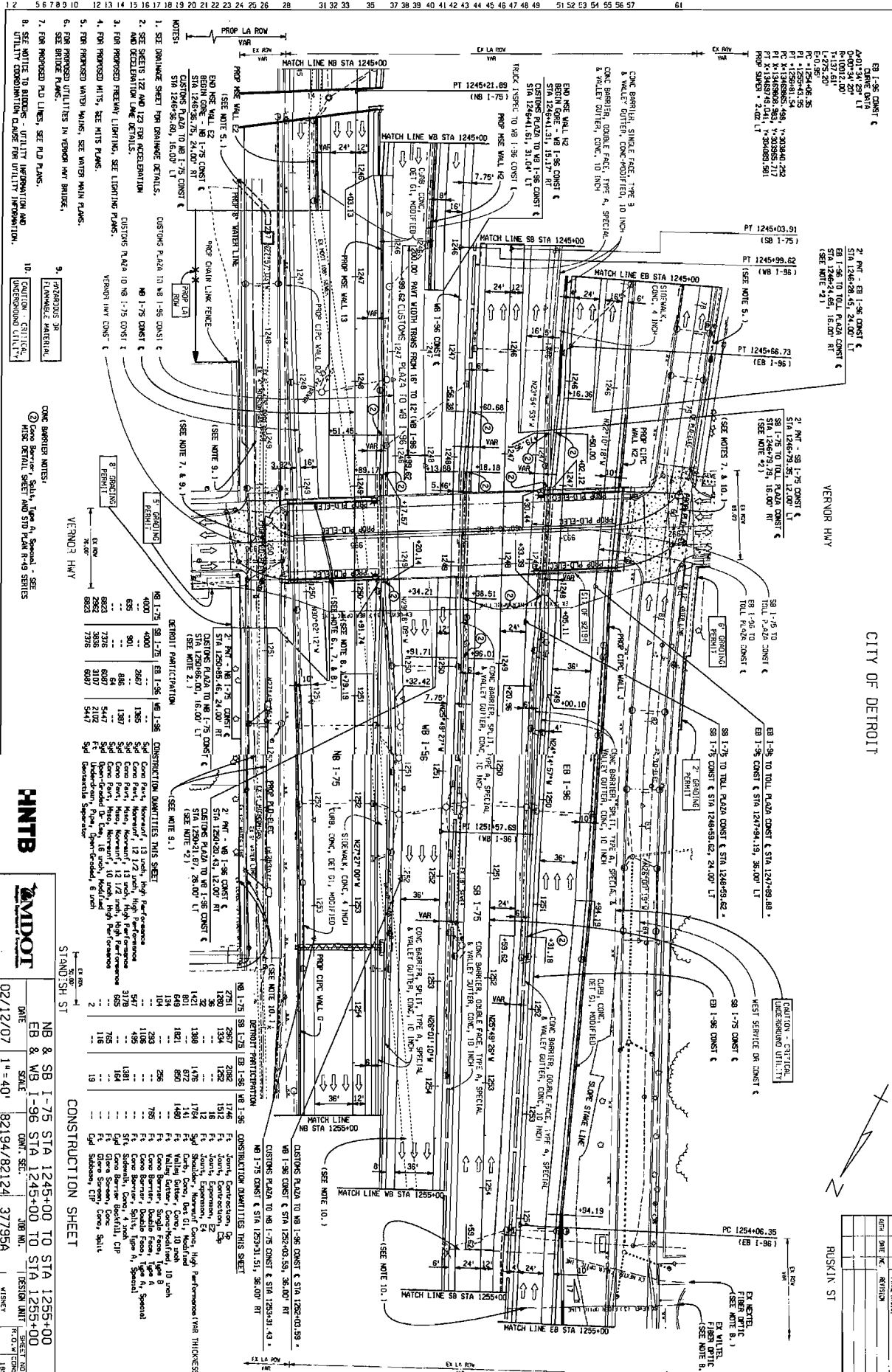


Appendix C  
Project Plan Sheets

CITY OF DETROIT

VERMOR HWY

RISKSIN ST



- NOTES:
1. SEE DRAWING SHEET FOR DRAINAGE DETAILS.
  2. SEE SHEETS 122 AND 123 FOR RECONSTRUCTION DETAILS.
  3. FOR PROPOSED PRELIM LIGHTING, SEE LIGHTING PLANS.
  4. FOR PROPOSED MITS, SEE MITS PLANS.
  5. FOR PROPOSED WATER MAINS, SEE WATER MAIN PLANS.
  6. FOR PROPOSED UTILITIES IN VERMOR HWY BRIDGE, SEE BRIDGE PLANS.
  7. FOR PROPOSED AD LINES, SEE AD PLANS.
  8. SEE NOTES TO AD LINES - UTILITY INFORMATION AND UTILITY CROSSING PLAN FOR UTILITY INFORMATION.

9. PROPOSED 3R FINISHES MATERIAL.
10. CANTON - CRITICAL CROSSING STREET.

CONCRETE BARRIER NOTES:  
 1. CONCRETE BARRIER - TYPE A, SPECIAL - SEE MISC DETAIL SHEET AND STD PLAN R-19 SERIES.

HNTB

MDOT

DATE: 02/12/07

SCALE: 1" = 40'

CONSTRUCTION SHEET

NB & SB I-75 STA 1245+00 TO STA 1255+00  
 EB & WB STA 1245+00 TO STA 1255+00

CITY OF DETROIT

WB 1-75 CONST & UNDERGROUND UTILITY

SB 1-75 CONST & UNDERGROUND UTILITY

WB 1-96 CONST & UNDERGROUND UTILITY

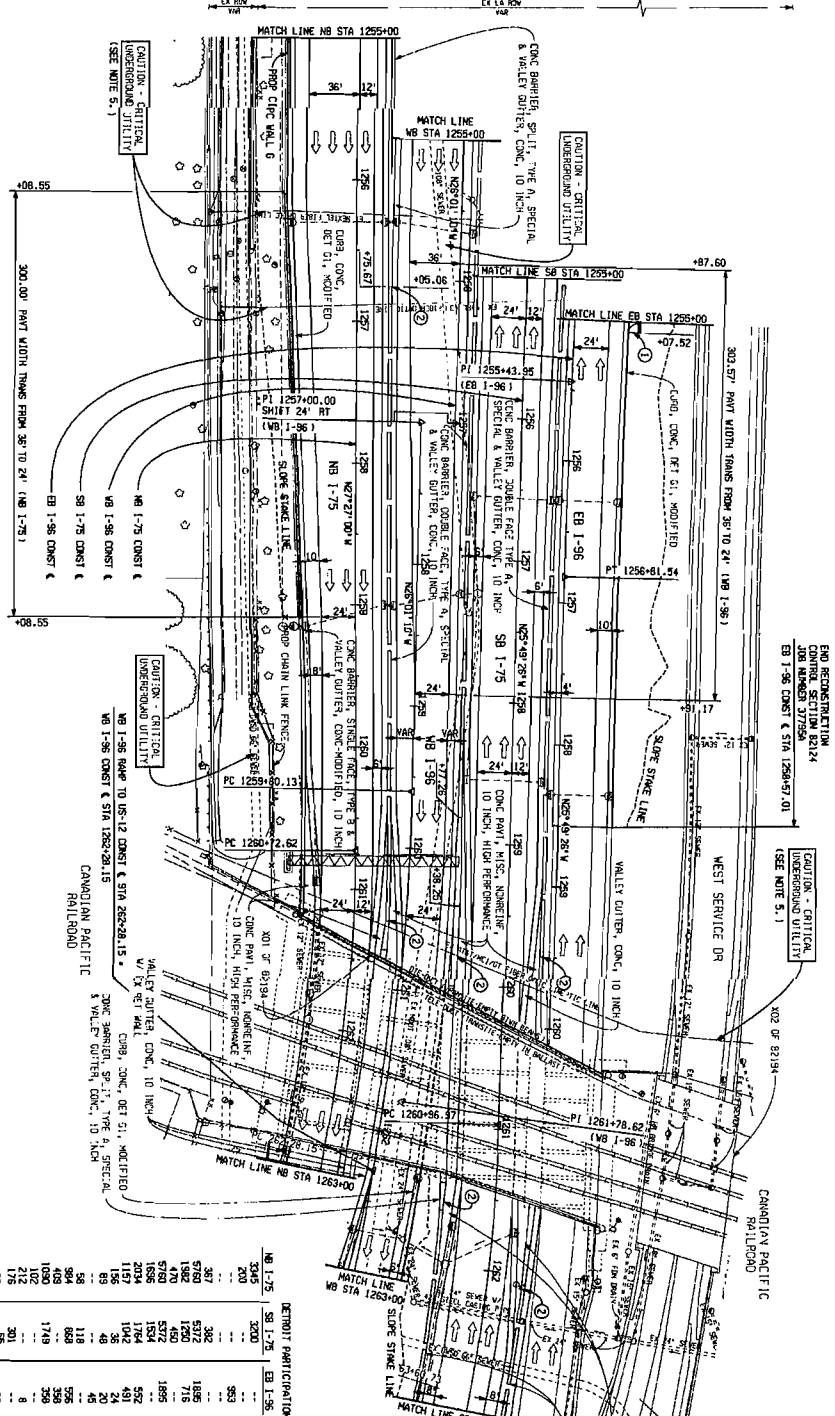
SB 1-96 CONST & UNDERGROUND UTILITY

WB 1-75 CONST & UNDERGROUND UTILITY

SB 1-75 CONST & UNDERGROUND UTILITY

WB 1-96 CONST & UNDERGROUND UTILITY

SB 1-96 CONST & UNDERGROUND UTILITY



- NOTES:
1. SEE DAMAGE SHEET FOR DRAINAGE DETAILS.
  2. FOR PROPOSED PREWAY LIGHTING, SEE LIGHTING PLANS.
  3. FOR PROPOSED SIGNS, SEE SIGNS PLANS.
  4. SEE MISC. DETAIL SHEETS FOR JOINT LOCATIONS AND SLOPES AND VALLEY CUTTER TRANSITIONS UNDER X01 OF 82194.
  5. SEE NOTICE TO ADVERTISE - UTILITY RECONSTRUCTION AND UTILITY CONSTRUCTION CASE FOR UTILITY RECONSTRUCTION.

- CONSTRUCTION NOTES:
1. SINGLE FACE BARRIER BURIED ENDING - SEE MISC. DETAIL SHEET
  2. MISC. DETAIL SHEET
  3. MISC. DETAIL SHEET
  4. MISC. DETAIL SHEET
  5. MISC. DETAIL SHEET

HNTB

AMDOT

CONSTRUCTION SHEET

DATE: 02/12/07

SCALE: 1" = 40'

PROJECT: NB & SB STA 1255+00 TO STA 1263+00

CONTRACT: 82194/82124

JOB NO.: 37795A

DESIGN UNIT: 1397

DETROIT PARTICIPATION

NO.	DATE	DESCRIPTION
1	02/12/07	Final Design
2	02/12/07	Final Design
3	02/12/07	Final Design
4	02/12/07	Final Design
5	02/12/07	Final Design
6	02/12/07	Final Design
7	02/12/07	Final Design
8	02/12/07	Final Design
9	02/12/07	Final Design
10	02/12/07	Final Design
11	02/12/07	Final Design
12	02/12/07	Final Design
13	02/12/07	Final Design
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42	02/12/07	Final Design
43	02/12/07	Final Design
44	02/12/07	Final Design
45	02/12/07	Final Design
46	02/12/07	Final Design
47	02/12/07	Final Design
48	02/12/07	Final Design
49	02/12/07	Final Design
50	02/12/07	Final Design



Appendix D  
Inspectors Daily Reports



# Inspector's Daily Report

Michigan Department of Transportation

7/3/2008 11:43 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/1/2008	<b>Day of Week</b> Tuesday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/3/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.	
<b>Inspector's Initials-Name</b> CDN Chris D Nelson			<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.					
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>		<b>Revision Date</b>	<b>Revision No.</b>
<b>Temperatures</b> <b>Low:</b> 65 ° F <b>High:</b> 81 ° F		<b>Weather</b> Clear			

**Comments**

Cement Kiln Dust- test section 1251+00 to 1259+00

Contractor Six-S completed final grading of subgrade on NB I-75 from Vernor to RR bridge. Contractor Wadel was on site this morning at 10 am, Started spreading CKD material at 1251+00 on NB I-75, test area. Received 137.3 tons CKD material from LaFarge North America. Carrier for product: Partners Bulk Logistic Inc. Branch/plant 66324, ticket # M125898, M125899, 2207288.

Attendance on site reviewing process: John Station, Lansing C&T, Victor Judnic, delivery engineer, Detroit TSC, Nishantha Bandora, Metro Region C&T, Paul, Representative of LaFarge.

Conditions of grade was very unstable due to heavy moisture content prior to placing CKD. After completion of rotary pulvermixer grade become much more stabilized. Checks were made to determine full depth mixing of CKD into subgrade soil, soil type- gray clay. Test area was not completed today and will resume tomorrow.

Six-S grading operation in line with soil stabilization. contractor started cutting clay grade immediately after permission was granted to proceed.

Work was halted at 7:30pm after witnessing deflection in subgrade from equipment. Final trimming will be completed tomorrow.

Moisture tests conducted by MDOT representative, Ed  
 12% 1252+00  
 16% 1253+50  
 19% 1255+00  
 14.3% 1256+00

Johnnt Watkins: 7am-7:30pm  
 Chris Nelson: 7am-6:30

**Contractors**

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Six-S, Inc.	Foreman- Harvey operator	1	12.00	Caterpillar Grader 143	1	12.00
		4	12.00	H GPS		
				Ford F250 Fx4	1	12.00
				Ingersall Roller DD 110HF	1	12.00
				Vibrator Sheep Foot CP-563C	1	12.00



# Inspector's Daily Report

## Contractors

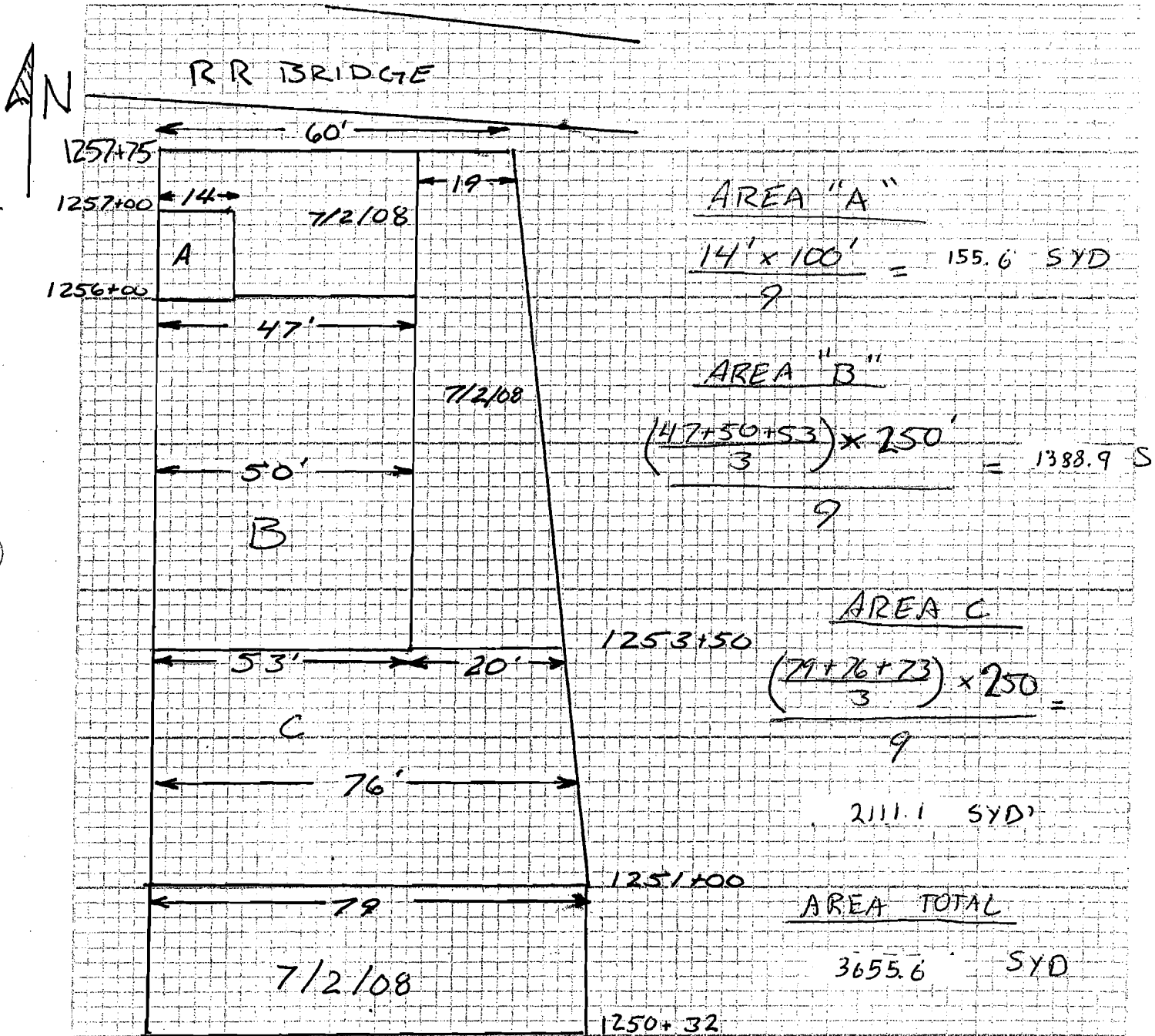
Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Wadel Stabilization, Inc.	Delevery Driver	3	9.00	Foreman's Truck	1	9.00
	Foreman	1	9.00	2500HD		
	Lime Spreader	1	9.00	Lime Spreader	2	9.00
	Operator			Service Truck	1	9.00
	Tiller Operator	1	9.00	Tilling Machine	1	9.00
	Water Truck Operator	1	9.00	RS-500B Water Truck	1	9.00

## Item Postings

Item/Material Description	Item Code	Prop. Line	Project	Category	Quantity	Unit	Location	Brkdw ID	Attn
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	137.300	Ton	Sta 1252+00 to Sta 1257+00 NB I-75 CKD Test strip	134	
Lime					137.30	Ton			
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	3,655.600	Syd	Sta 1252+00 to Sta 1257+00 NB I-75 CKD Test strip	134	

Reviewed By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)



VERNOR





# Inspector's Daily Report

Michigan Department of Transportation

7/3/2008 11:43 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/2/2008	<b>Day of Week</b> Wednesday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/3/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.
<b>Inspector's Initials-Name</b> CDN Chris D Nelson		<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.				
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>	<b>Revision Date</b>	<b>Revision No.</b>
<b>Temperatures</b> Low: 60 ° F High: 83 ° F		<b>Weather</b> Clear		

**Comments**

Contractor Wadel continued with test strip today. Additional area was included on the south end of project 1250+32 to 1251+00 with CKD material. Our purposed test strip was 1251+00 to 1259+00, actual test strip based on time, total tonage delived and conditions of subgrade, 1250+32 to 1257+75. Contractor Wadel completed appoximately 4:45 pm. Contractor Six-S completed grading stabilized area at 5:30, and area without CKD ar 5:45. The remaining 125 ft of subgrade was sealed due to rain shower. Victor Judnic was seen on site this morning. Contractor Six-S also cleaning around structures. Six-S was informed that material against wall and footing will have to be removed and replaced due to saturation, material unstable. Received call from metro region C&T Nishantha Bandera, D.C.P test will be performed on CKD treated area tomorrow morning if weather permits. Contractor Atsalis on site late this PM moving equipment into position at RR structure. Dust control operation on going throughout the day by Six-S, contractor using two trucks to complete this work.

**Contractors**

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Six-S, Inc.	Foreman- Harvey	1	10.00	Caterpillar Dozer D6m	1	10.00
	Grade Checker operator	1	10.00	GPS		
		4	10.00	Caterpillar Grader 143	1	10.00
				H GPS		
				Caterpillar Paddle 613C	1	10.00
				Ford F250 Fx4	1	10.00
				Ingersall Roller DD 110HF	1	10.00
				Vibrator Sheep Foot CP-563C	1	10.00



# Inspector's Daily Report

Michigan Department of Transportation

7/3/2008 11:43 AM

FieldManager 4.3a

## Contractors

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Wadel Stabilization, Inc.	Deelivery Driver	2	10.00	Foreman's Truck	1	10.00
	Foreman	1	10.00	2500HD		
	Lime Spreader Operator	1	10.00	Lime Spreader	2	10.00
	Tiller Operator	1	10.00	Service Truck	1	10.00
	Water Truck Operator	1	10.00	Tilling Machine	1	10.00
					RS-500B	
				Water Truck	1	10.00

## Item Postings

Item/Material Description	Item Code	Prop. Line	Project	Category	Quantity	Unit	Location	Brkdwn ID	Attn
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	71.500	Ton	Sta 1250+32 to Sta 1257+75 Various areas along I-75 NI CKD was placed instead of lime as a test strip. See drawing for actual locations	134	
Lime						71.50	Ton		
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	2,963.200	Syd	Sta 1250+32 to Sta 1257+75 Various areas along I-75 NI CKD was placed instead of lime as a test strip. See drawing for actual locations	134	

Reviewed By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)





*2nd lead from 1/28/08  
railway project*

SEE OTHER CONDITIONS ON THE BACK

ORIGINAL

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transport of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1  
NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Signature of Shipper: \_\_\_\_\_

Branch/Plant :  
67301  
ALPENA PLANT  
1435 FORD AVE  
ALPENA MI 49707-2135  
(989) 354-4171

Shipped To :  
7301141  
SIX S GATEWAY PROJECT  
175 & 196  
DETROIT MI 48216  
( )

<b>BOL No.</b>	<b>2221009</b>
<b>Load No.</b>	
<b>Sales Order No.</b>	<b>19728867</b>
<b>Shipment No.</b>	<b>14485458</b>
<b>Shipment Date</b>	<b>07/03/08</b>
<b>Customer Requested Delivery Date</b>	<b>07/03/08</b>
<b>Customer Requested Delivery Time (ET)</b>	<b>17:00:00</b>

<b>Pallets Returned</b>	
-------------------------	--

Sold To		Customer Purchase Order No.			Bags or Gross	PLT	Bag Wgt or Tare	Net	Total
SIX S CONSTRUCTION INC					LB		LB	LB	TS
Item Description	Item No.	Begin/End	Silo						
CEMENT KILN DUST	CD100007301	17:12 18:05	CKD		112,300		52,400	59,900	29.95
CEMENT KILN DUST	CD100007301	17:12 18:05	CKD		160,350		112,300	48,050	24.03
BULK	NO_BELOW	STANDARD		<b>Total US</b>	<b>160,350 *</b>		<b>112,300 *</b>	<b>107,950 *</b>	<b>53.98 *</b>
				<b>Total CA</b>					
<b>Additional Sales Order No. - If Applicable</b>									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
10	CUSTOMER PICKUP	99999	B12PART	9103PART	9104PART
	Rail Route Description	Transportation Contract	Trailer 1 Seal No.	Trailer 2 Seal No.	

State Stamp :

Collect
<i>[Signature]</i>
<b>Shipper Signature/ Date</b>
<i>[Signature]</i>
<b>Driver Signature / Date</b>
<b>Customer Signature / Date</b>



Michigan Department of Transportation

# Inspector's Daily Report

7/14/2008 11:34 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/4/2008	<b>Day of Week</b> Friday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/14/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.	
<b>Inspector's Initials-Name</b> CDN Chris D Nelson			<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.					
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>	<b>Revision Date</b>	<b>Revision No.</b>	
<b>Temperatures</b> Low: 60 ° F      High: 75 ° F			<b>Weather</b> Clear		
<b>Comments</b> No work- 4th of July holiday					

**Reviewed By:** \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)



# Inspector's Daily Report

Michigan Department of Transportation

7/14/2008 11:34 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/7/2008	<b>Day of Week</b> Monday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/14/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.	
<b>Inspector's Initials-Name</b> CDN Chris D Nelson			<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.					
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>	<b>Revision Date</b>	<b>Revision No.</b>	
<b>Temperatures</b> Low: 65 ° F High: 88 ° F			<b>Weather</b> Clear ands Sunny		

**Comments**  
 Soil Stabilization  
 Wadel- 7am-4:45pm  
 Six-S- 7am-5:30

Contractor Wadel returned to site to continue with CKD test area contractor completed test area 1 today. Test area from 1251+00 to 1259+00 included areas before 1251 and after 1259 due to short distance to X01. Six-S compacted and graded this late afternoon and sealed due to forcasted rain. Contractor was able to complete operation before rain.

Contractor started test site 2 this late PM north of X01, Final grading not completed.

Regional C&T nishantha on site to perform DCP test from 1251+00 to 1257+80 on NB I-75 right and left of center line. Density inspector also performing density test this AM as well as moisture checks. Dust control performed by Six-S. Other operation in in area- blast cleaning steel at X01by Atsalis Bro. Contractor also staking n graded test area this late PM.

## Contractors

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Six-S, Inc.	Foreman-Harvey	1	10.50	Caterpillar Grader	1	10.50
	Operator	2	10.50	143H GPS		
				Ford F250 Fx4	1	10.50
				Ingersall Roller DD 110HF	1	10.50
Wadel Stabilization, Inc.				Vibrator Sheep Foot CP-563C	1	10.50
	Driver	2	9.50	GMC 2500 HD	1	9.50
	Forman/Owner-Rick	1	9.50	Mack Service truck	1	9.50
	Laborer	1	9.50	Mack Spreador truck	2	9.50
	Operator-Harry	1	9.50	Rotary Pulverizor RS-500B	1	9.50
			Water Truck	1	9.50	



# Inspector's Daily Report

Michigan Department of Transportation

7/14/2008 11:34 AM

FieldManager 4.3a

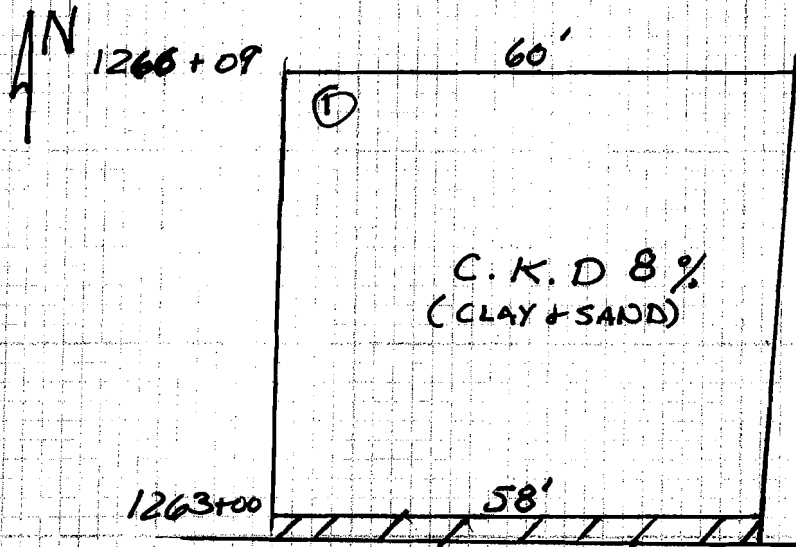
## Item Postings

Item/Material Description	Item Code	Prop. Line	Project	Category	Quantity	Unit	Location	Brkwn ID	Attn
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	163.640	Ton	Sta 1257+75 to Sta 1266+09 I-75 NB CKD, skipped section under XO1	134	
Lime						163.64	Ton		
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	3,527.400	Syd	Sta 1257+75 to Sta 1266+09 I-75 NB skipped section under XO1	134	

Reviewed By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

NB 1-75



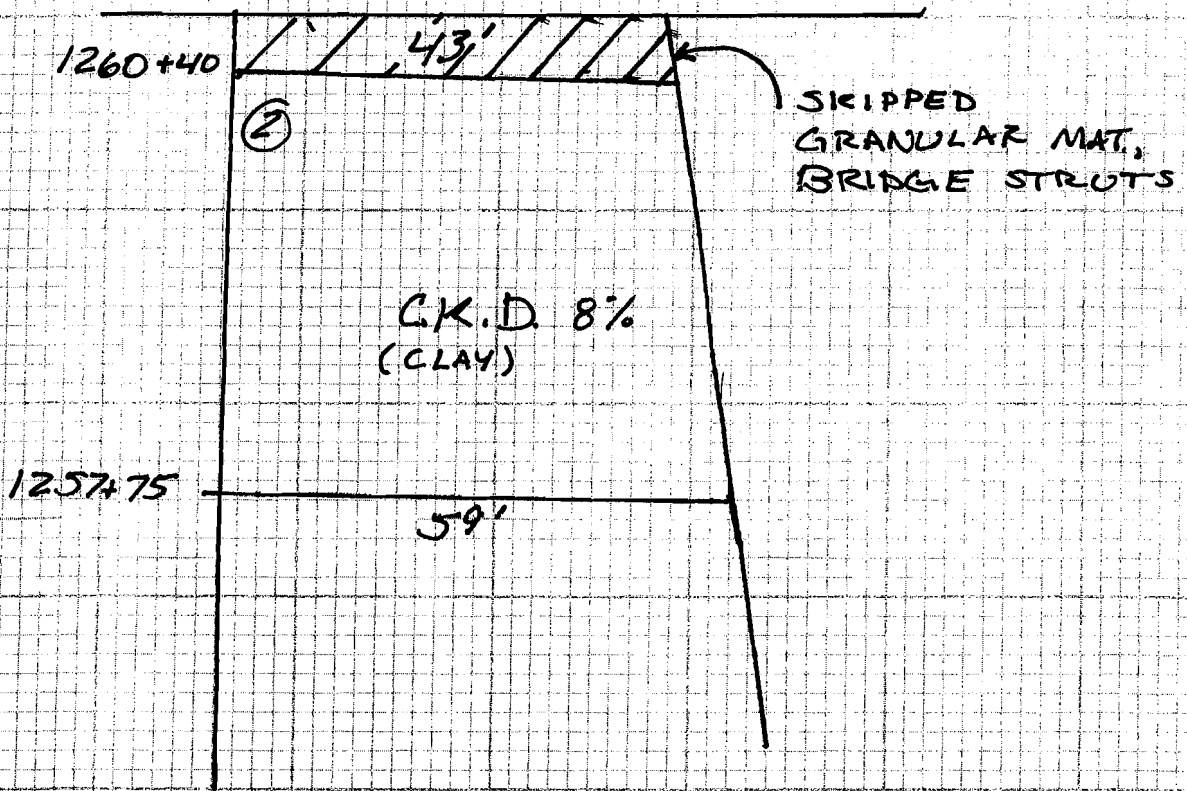
AREA 1  

$$\frac{(\frac{60+58}{2}) \times 309}{9} = 2025.75$$

AREA 2  

$$\frac{(\frac{59+43}{2}) \times 265}{9} = 1507.5$$


RAIL ROAD BRIDGE



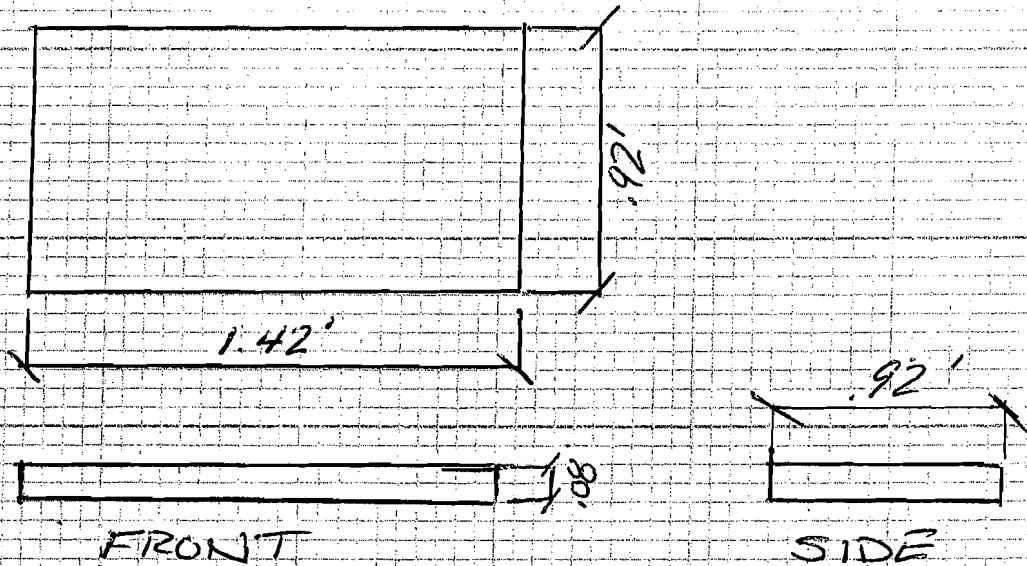
TOTAL SYD = 3527.4 SYD  
 TONAGE = 163.64 TONS

YIELD = 92.78 lb/SYD



	Made by CHRIS N.	Date 7/7/08	Job Number 37795A
	Checked by	Date	Sheet Number
Calculations For CKD APPLICATION RATE	Backchecked by	Date	

TOP VIEW



CALCULATIONS

1. AREA OF PAN  $1.42' \times .92' = 1.31 \text{ FT}^2$
2. WEIGHT OF PAN = 1.4 lb
3. DESIGN APPLICATION % = 8%  $\rightarrow .08$
4. AVE. SOIL DRY WEIGHT = 120 lb/cft
5. DESIGN APPLICATION RATE =  $120 \text{ lb/cft} \times .08 = 9.6 \text{ lbs/sft PER}$
6. TARGET WEIGHT OF PAN + LIME: 12" DEPTH  
 $9.6 \text{ lbs/sft} \times 1.31 \text{ sft} = 12.576 + 1.4 = 13.98 \text{ lbs}$   
(CKD)      (PAN)
7. TEST WEIGHT:  
15.8 lbs    9.1 %
8. TOTAL TONNAGE; 163.64 tons      327280 lb
9. TOTAL SYD OF CKD STABILIZATION: 35274 SYD
10. DAILY YIELD      92.78 <sup>14</sup>/SYD

*2nd load see 7/8/8  
generator per oct*

**SEE OTHER CONDITIONS ON THE BACK**

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transpo of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1  
NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Signature of Shipper: \_\_\_\_\_

**Branch/Plant :**  
67301  
ALPENA PLANT  
1435 FORD AVE  
ALPENA MI 49707-2135  
(989) 354-4171

**Shipped To :**  
7301141  
SIX S GATEWAY PROJECT  
175 & 196  
DETROIT MI 48216  
( )

<b>BOL No.</b>	<b>2224493</b>
<b>Load No.</b>	
<b>Sales Order No.</b>	<b>19730940</b>
<b>Shipment No.</b>	<b>14485776</b>
<b>Shipment Date</b>	<b>07/07/08</b>
<b>Customer Requested Delivery Date</b>	<b>07/08/08</b>
<b>Customer Requested Delivery Time (ET)</b>	<b>00:00:00</b>

<b>Pallets Returned</b>	
-------------------------	--

Sold To		Customer Purchase Order No.			Bags or Gross LB	PLT	Bag Wgt or Tare LB	Net LB	Total TS
SIX S CONSTRUCTION INC									
Item Description	Item No.	Begin/End	Silo						
CEMENT KILN DUST	CD100007301	14:29 14:30	CKD		105,000		51,000	54,000	27.00
CEMENT KILN DUST	CD100007301	14:29 14:30	CKD		143,000		105,000	38,000	19.00
<b>BULK</b>	<b>NO_BELOW</b>	<b>STANDARD</b>	<b>Total US</b>		<b>143,000 *</b>		<b>105,000 *</b>	<b>92,000 *</b>	<b>46.00 *</b>
			<b>Total CA</b>						
<b>Additional Sales Order No. - If Applicable</b>									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
3	PARTNERS BULK LOGISTICS INC	311584	817PART	115APART	87BPART
	Rail Route Description	Transportation Contract	Trailer 1 Seal No.	Trailer 2 Seal No.	

State Stamp :

Prepaid	<i>[Signature]</i>
	<b>Shipper Signature/ Date</b>
	<b>Driver Signature / Date</b>
	<b>Customer Signature / Date</b>



*3rd load per 1/7/08  
Gateway Project I 73 NO*

ORIGINAL

SEE OTHER CONDITIONS ON THE BACK

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transport of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1

Signature of Shipper: \_\_\_\_\_

Branch/Plant :  
67301  
ALPENA PLANT  
1435 FORD AVE  
ALPENA MI 49707-2135  
(989) 354-4171

Shipped To :  
7301141  
SIX S GATEWAY PROJECT  
175 & 196  
DETROIT MI 48216  
( )

<b>BOL No.</b>	<b>2222637</b>
<b>Load No.</b>	
<b>Sales Order No.</b>	<b>19730389</b>
<b>Shipment No.</b>	<b>14485623</b>
<b>Shipment Date</b>	<b>07/07/08</b>
<b>Customer Requested Delivery Date</b>	<b>07/07/08</b>
<b>Customer Requested Delivery Time (ET)</b>	<b>00:00:01</b>

<b>Pallets Returned</b>	
-------------------------	--

Sold To		Customer Purchase Order No.			Bags or Gross LB	PLT	Bag Wgt or Tare LB	Net LB	Total TS
SIX S CONSTRUCTION INC									
Item Description	Item No.	Begin/End	Silo						
CEMENT KILN DUST	CD100007301	06:36 06:52	CKD		102,150		46,100	56,050	28.03
CEMENT KILN DUST	CD100007301	06:36 06:52	CKD		158,450		102,150	56,300	28.15
BULK NO_BELOW STANDARD				Total US	158,450 *		102,150 *	112,350 *	56.18 *
				Total CA					
Additional Sales Order No. - If Applicable									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
3	PARTNERS BULK LOGISTICS INC	311584	821PART	308PART	309PART
Rail Route Description		Transportation Contract	Trailer 1 Seal No.		Trailer 2 Seal No.

State Stamp :	Prepaid
	Shipper Signature / Date
	Driver Signature / Date
	Customer Signature / Date

WARNING: Corrosive - May cause severe eye and skin burns. Toxic - May cause lung disease. Read Material Safety Data Sheet (MSDS)

OPERATOR



*3rd hand loc. 7/8/08  
gator on pallet*

ORIGINAL

SEE OTHER CONDITIONS ON THE BACK

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transport of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1  
NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Signature of Shipper: \_\_\_\_\_

Branch/Plant :  
67301  
ALPENA PLANT  
1435 FORD AVE  
ALPENA MI 49707-2135  
(989) 354-4171

Shipped To :  
7301141  
SIX S GATEWAY PROJECT  
175 & 196  
DETROIT MI 48216  
( )

BOL No.	2224928
Load No.	
Sales Order No.	19663781
Shipment No.	14443430
Shipment Date	07/07/08
Customer Requested Delivery Date	07/02/08
Customer Requested Delivery Time (ET)	00:00:00

Pallets Returned	
------------------	--

Sold To		Customer Purchase Order No.							
SIX S CONSTRUCTION INC									
Item Description	Item No.	Begin/End	Site	Bags or Gross LB	PLT	Bag Wgt or Tare LB	Net LB	Total TS	
CEMENT KILN DUST	CD100007301	17:40 17:41	CKD	94,750		49,700	45,050	22.53	
CEMENT KILN DUST	CD100007301	17:40 17:41	CKD	139,800		94,750	45,050	22.53	
BULK	NO_BELOW	STANDARD		Total US	139,800 *	94,750 *	90,100 *	45.05 *	
				Total CA					
Additional Sales Order No. - If Applicable									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
10	CUSTOMER PICKUP	99999	827PART	91APART	88BPART
Rail Route Description		Transportation Contract	Trailer 1 Seal No.		Trailer 2 Seal No.

State Stamp :

Collect	<i>[Signature]</i>
Shipper Signature / Date	<i>[Signature]</i>
Driver Signature / Date	<i>[Signature]</i> 7/7/08
Customer Signature / Date	

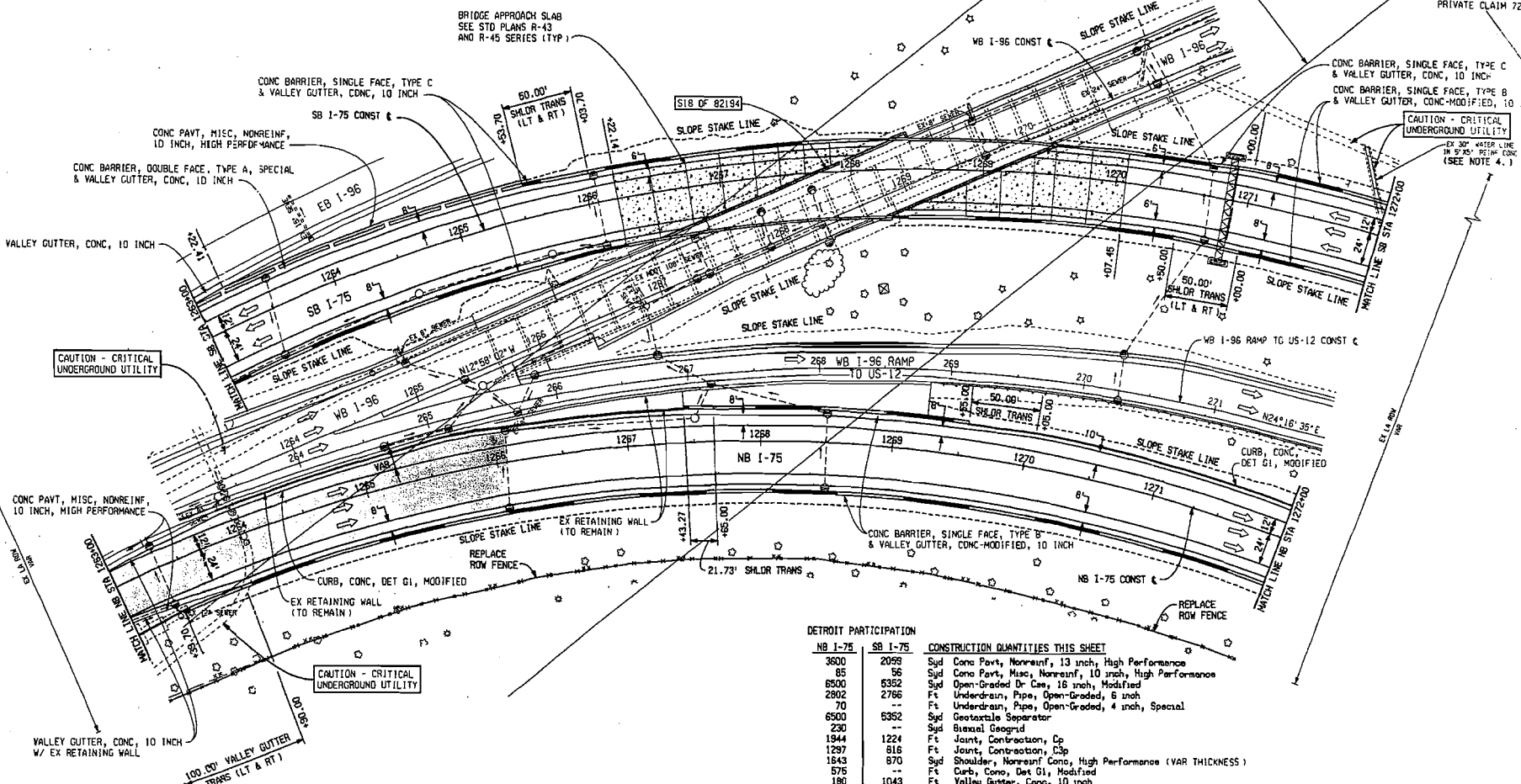
WARNING: Corrosive - May cause severe eye and skin burns. Toxic - May cause lung disease. Read Material Safety Data Sheet (MSDS)

CUSTOMER

FINAL R.O.V.		
AUTH.	DATE	REVISION

DETROIT PARTICIPATION

SB I-75	SIB OF R2194 BRIDGE APPROACH QUANTITIES
1280	Syd Conc Pavt, Misc, Reinf, 13 inch, High Performance
216	Ft Joint, Expansion, E2
346	Ft Joint, Expansion, E3
114	Ft Joint, Expansion, E4
265	Ft Joint, Plane-of-Weakness, D1



CAUTION - CRITICAL UNDERGROUND UTILITY

CAUTION - CRITICAL UNDERGROUND UTILITY

DETROIT PARTICIPATION

NB I-75	SB I-75	CONSTRUCTION QUANTITIES THIS SHEET
3600	2099	Syd Conc Pavt, Nonreinf, 13 inch, High Performance
85	96	Syd Conc Pavt, Misc, Nonreinf, 10 inch, High Performance
6500	5352	Syd Open-Graded Dr. Cms, 18 inch, Modified
2902	2786	Ft Underdrain, Pipe, Open-Graded, 6 inch
70	--	Ft Underdrain, Pipe, Open-Graded, 4 inch, Special
6500	5352	Syd Geotextile Separator
230	--	Syd Biaxial Geogrid
1944	1224	Ft Joint, Construction, CIP
1297	916	Ft Joint, Construction, CIP
1843	870	Syd Shoulder, Nonreinf Conc, High Performance (VAR THICKNESS)
576	--	Ft Curb, Conc, Det G1, Modified
190	1043	Ft Valley Gutter, Conc, 10 inch
1047	446	Ft Valley Gutter, Conc-Modified, 10 inch
1072	472	Ft Conc Barrier, Single Face, Type B
--	766	Ft Conc Barrier, Single Face, Type C
--	254	Ft Conc Barrier, Double Face, Type A, Special
118	---	Cyd Conc Barrier Backfill, CIP
3908	3092	Syd Turf Establishment, Performance

- NOTES:
1. SEE DRAINAGE SHEET FOR DRAINAGE DETAILS.
  2. FOR PROPOSED FREEWAY LIGHTING, SEE LIGHTING PLANS.
  3. FOR PROPOSED MITS, SEE MITS PLANS.
  4. SEE NOTICE TO BIDDERS - UTILITY INFORMATION AND UTILITY COORDINATION CLAUSE FOR UTILITY INFORMATION.

7/7/08

CKD  
TEST STRIP  
# 7

HNTB

MDOT  
Michigan Department of Transportation

NB & SB I-75 STA 1263+00 TO STA 1272+				
DATE	SCALE	CONT. SEC.	JOB NO.	DESIGN UNIT
02/12/07	1" = 40'	82194	37795A	WISHE

CONSTRUCTION SHEET







# Inspector's Daily Report

Michigan Department of Transportation

7/14/2008 11:34 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/8/2008	<b>Day of Week</b> Tuesday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/14/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.
<b>Inspector's Initials-Name</b> CDN Chris D Nelson		<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.				
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>	<b>Revision Date</b>	<b>Revision No.</b>
<b>Temperatures</b> Low: 64 ° F      High: 87 ° F		<b>Weather</b> Cloudy/Rain		

**Comments**

Soil Stabilization  
Wadel 7am-4pm  
Six-S 7am-5:30pm

Contractor Wadel continued sreading CKD in test strip number 2(clay/sand) this AM. Material polverized into existing soil blend.

Six-S worked in conjunction with Wadel stabilization compacting and grading subgrade.

Completed spreading the balance of 400 tons provided by LaFarge Cement, additional material will be needed in order to complete second test section. CKD was used to close gap area at the begining and end area of test strip #1 and at the begining of test strip #2 blend area which additional CKD was needed and used in these areas.

Mr. Paul Ruehl of LaForge Cement on site this AMand PM reveiwing operation.

Contractor Wadel anticipates finishing test section #2 tomorrow.

MDOT density inspector on site this PM. No test performed this PM due to rain an d incomplete final grading. Density test will performed tomorrow. Moisture checks performed this AM , 8% and 7% before water was added to soil, a later moisture check 14% and 15.5%.

Contractor Six-S continue to final trim of subgrade this late PM operation halted due to rain. Dust control ongoing throughout the day by Six-S. Six-S continued final trim existing subgrade for quick lime operation north of test area. Atsalis bro. cleaning steel in area

**Contractors**

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Six-S, Inc.	Foreman-Harvey	1	10.00	Caterpillar Grader	1	10.00
	Operator	2	10.00	143H GPS		
				Ford F250 Fx4	1	10.00
				Ingersall Roller DD 110HF	1	10.00
				Vibrator Sheep Foot CP-563C	1	10.00





# Inspector's Daily Report

## Contractors

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Wadel Stabilization, Inc.	Driver	2	9.00	GMC 2500 HD	1	9.00
	Forman/Owner-Rick	1	9.00	Mack Service truck	1	9.00
	Laborer	1	9.00	Mack Spreador truck	2	9.00
	Operator-Harry	1	9.00	Rotary Pulverizer RS-500B	1	9.00
				Water Truck	1	9.00

## Item Postings

Item/Material Description	Item Code	Prop. Line	Project	Category	Quantity	Unit	Location	Brkdw ID	Attn
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	134.500	Ton	Sta 1266+09 to Sta 1269+71 I-75 NB test area 2, Soil combination clay/sand	134	
Item Remarks: CKD paid as Quick Lime									
Lime						134.50 Ton			
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	2,694.900	Syd	Sta 1266+09 to Sta 1269+71 I-75 NB Cement Kiln Dust Teat section 2, clay and granular material	134	

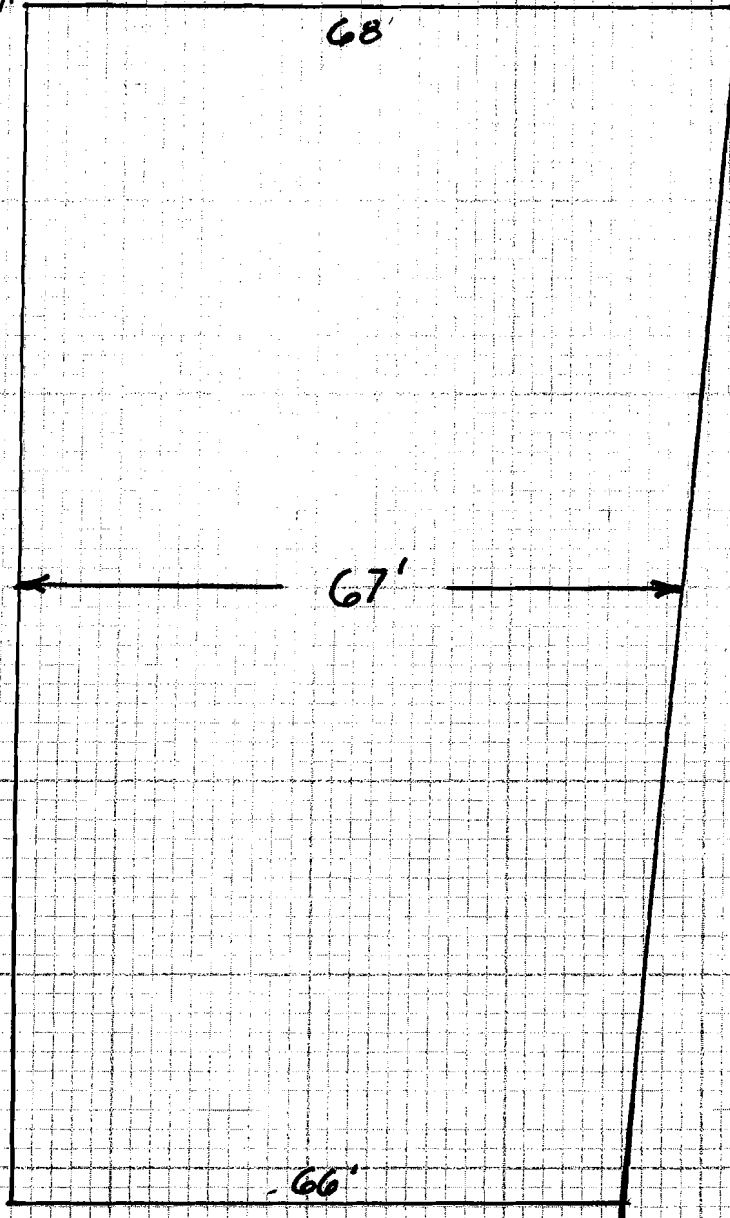
Reviewed By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

**AN**  
COMBINATION SOIL  
CLAY + SAND

**NB 1-75**

1269+71



1266+09

TONAGE = 134.05

YIELD = 99.48 lb/syd

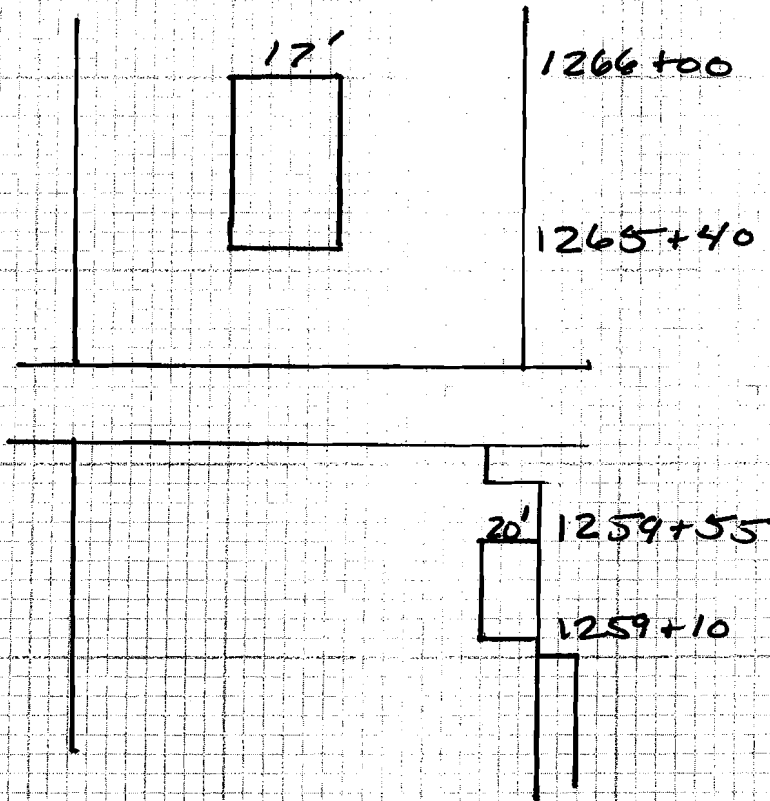
AREA

$$\frac{(66 + 67 + 68)}{3} \times 362' = 2694.9 \text{ SYD}$$

9

## RESTABILIZED AREAS

NOT TO SCALE




$$\frac{20 \times 45}{9} = 100 \text{ SYD}$$

$$\frac{60 \times 17}{9} = 113.33 \text{ SYD}$$

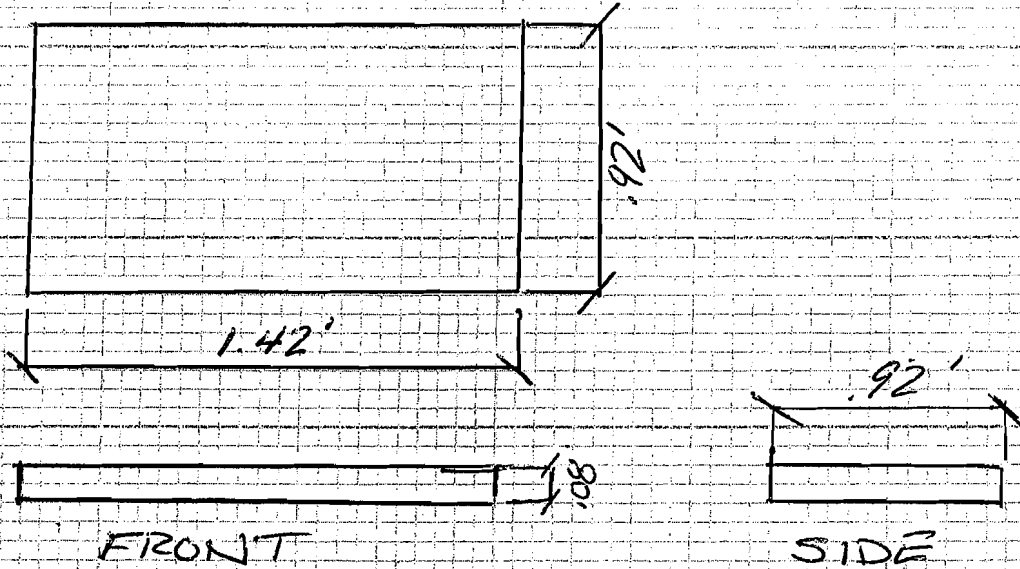
$$\text{TOTAL SYD} = 2908.2 \text{ SYD}$$

$$\text{YIELD} = 92.19$$

\* CONTRACTOR  
WILL NOT BE  
PAID THE  
ADDITIONAL SYD  
FOR RESTABILIZING \*

	Made by CHRIS N.	Date 7/6/08	Job Number 37795A
	Checked by	Date	Sheet Number
Calculations For CKD APPLICATION RATE	Backchecked by	Date	

TOP VIEW



CALCULATIONS

1. AREA OF PAN  $1.42' \times .92' = 1.31 \text{ FT}^2$
2. WEIGHT OF PAN = 1.4 lb
3. DESIGN APPLICATION % = 8%  $\rightarrow .08$
4. AVE. SOIL DRY WEIGHT = 120 lb/CFT
5. DESIGN APPLICATION RATE =  $120 \text{ lb/CFT} \times .08 = 9.6 \text{ lbs/SFT PER}$
6. TARGET WEIGHT OF PAN + LIME: 12" DEPTH  
 $9.6 \text{ lbs/SFT} \times 1.31 \text{ SFT} = 12.576 + 1.4 = 13.98 \text{ lbs}$   
(CKD)      (PAN)
7. TEST WEIGHT:  
 $\underline{16.2} \text{ lbs} \quad \underline{9.4} \%$
8. TOTAL TONNAGE;  $\underline{134.05} \text{ tons}$   $\underline{268100} \text{ lb}$
9. TOTAL SYD OF CKD STABILIZATION:  $\underline{2908.25 \text{ SYD}}$   
PAID SYD =  $\underline{2794.9}$
10. DAILY YIELD  
 $\underline{92.19}$

REV.	DATE	NO.	REVISION

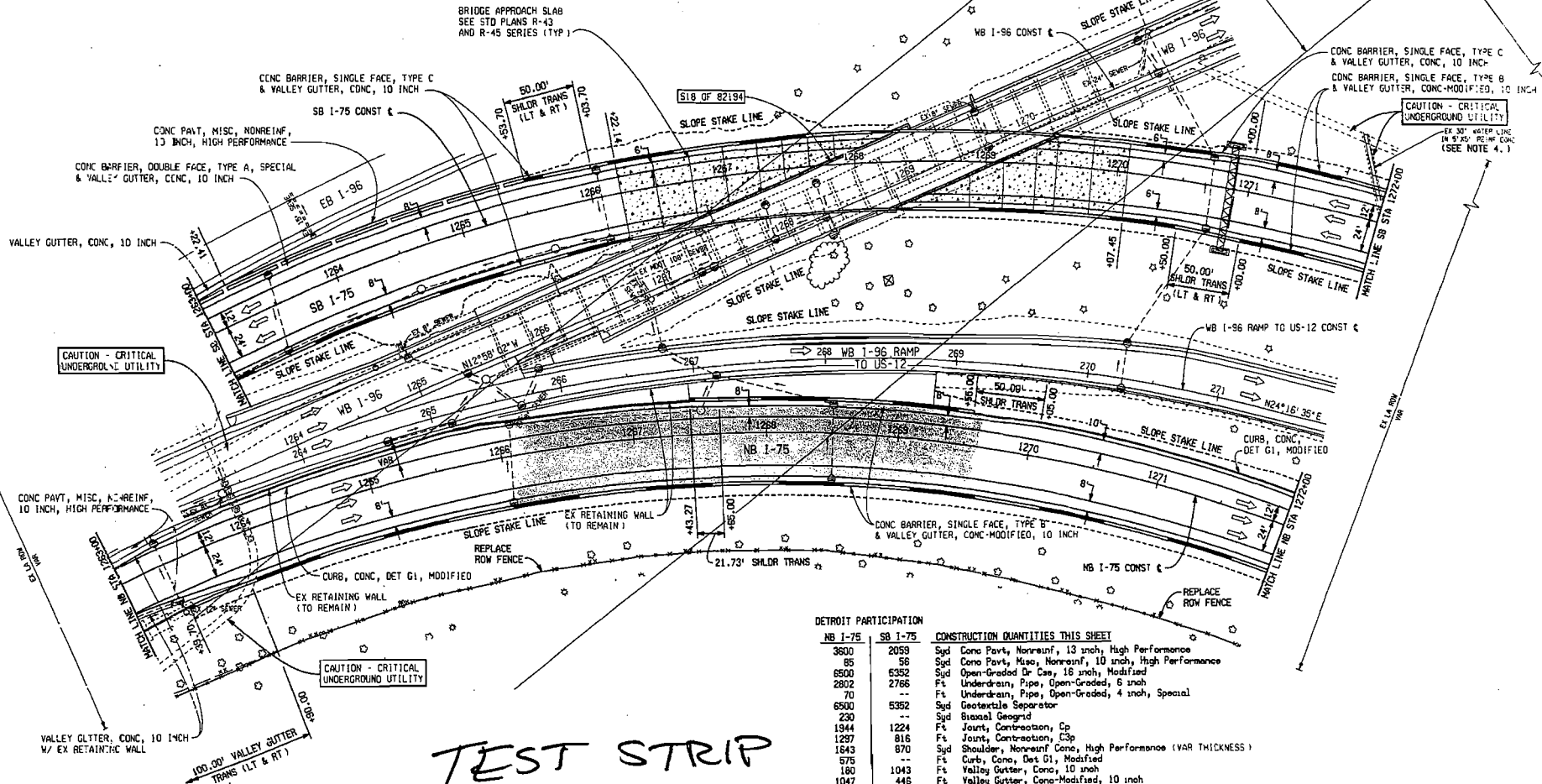
DETROIT PARTICIPATION

SB I-75		S18 OF 82194 BRIDGE APPROACH QUANTITIES	
1280	Syd	Conc Pavt, Misc, Reinf, 13 inch, High Performance	
216	Ft	Joint, Expansion, E2	
345	Ft	Joint, Expansion, E3	
114	Ft	Joint, Expansion, E4	
255	Ft	Joint, Plane-of-Weakness, D1	

PRIVATE CLAIM 20

PRIVATE CLAIM 727

PRIVATE CLAIM 729



CAUTION - CRITICAL UNDERGROUND UTILITY

CAUTION - CRITICAL UNDERGROUND UTILITY

CAUTION - CRITICAL UNDERGROUND UTILITY

DETROIT PARTICIPATION

NB I-75		SB I-75		CONSTRUCTION QUANTITIES THIS SHEET	
3600	Syd	2059	Syd	Conc Pavt, Nonreinf, 13 inch, High Performance	
95	Syd	56	Syd	Conc Pavt, Misc, Nonreinf, 10 inch, High Performance	
6500	Syd	6352	Syd	Open-Graded Dr Cas, 16 inch, Modified	
2802	Ft	2766	Ft	Underdrain, Pipe, Open-Graded, 6 inch	
70	Ft	--	Ft	Underdrain, Pipe, Open-Graded, 4 inch, Special	
6500	Syd	5362	Syd	Geotextile Separator	
230	Syd	--	Syd	Gravel General	
1844	Ft	1224	Ft	Joint, Contraction, Cp	
1257	Ft	816	Ft	Joint, Contraction, C3p	
1643	Syd	870	Syd	Shoulder, Nonreinf Conc, High Performance (VAR THICKNESS)	
575	Ft	--	Ft	Curb, Conc, Det G1, Modified	
180	Ft	1043	Ft	Valley Gutter, Conc, 10 inch	
1047	Ft	446	Ft	Valley Gutter, Conc-Modified, 10 inch	
1072	Ft	472	Ft	Conc Barrier, Single Face, Type B	
--	Ft	766	Ft	Conc Barrier, Single Face, Type C	
--	Ft	254	Ft	Conc Barrier, Double Face, Type A, Special	
118	Cyd	--	Cyd	Comp Barrier Backfill, CIP	
3908	Syd	3092	Syd	Turf Establishment, Performance	

TEST STRIP #2

- NOTES:
1. SEE DRAINAGE SHEET FOR DRAINAGE DETAILS.
  2. FOR PROPOSED FREEWAY LIGHTING, SEE LIGHTING PLANS.
  3. FOR PROPOSED MITS, SEE MITS PLANS.
  4. SEE NOTICE TO BIDDERS - UTILITY INFORMATION AND UTILITY COORDINATION CLAUSE FOR UTILITY INFORMATION.

CONSTRUCTION SHEET

HNTB

MDOT  
Michigan Department of Transportation

NB & SB I-75 STA 1263+00 TO STA 1272+00				
DATE	SCALE	CONT. SEC.	JOB NO.	DESIGN UNIT
02/12/07	1" = 40'	82194	37795A	WISNEY

7/8/08  
CNS



SEE OTHER CONDITIONS ON THE BACK

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transport of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1  
 NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Signature of Shipper: \_\_\_\_\_

Branch/Plant :  
 67301  
 ALPENA PLANT  
 1435 FORD AVE  
 ALPENA MI 49707-2135  
 (989) 354-4171

Shipped To :  
 7301141  
 SIX S GATEWAY PROJECT  
 I75 & I96  
 DETROIT MI 48216  
 ()

<b>BOL No.</b>	<b>2223875</b>
<b>Load No.</b>	
<b>Sales Order No.</b>	<b>19730389</b>
<b>Shipment No.</b>	<b>14485636</b>
<b>Shipment Date</b>	<b>07/07/08</b>
<b>Customer Requested Delivery Date</b>	<b>07/07/08</b>
<b>Customer Requested Delivery Time (ET)</b>	<b>00:00:03</b>

<b>Pallets Returned</b>	
-------------------------	--

Sold To		Customer Purchase Order No.			Bags or Gross	PLT	Bag Wgt or Tare	Net	Total
SIX S CONSTRUCTION INC					LB		LB	LB	TS
Item Description	Item No.	Begin/End	Silo						
CEMENT KILN DUST	CD100007301	11:56 11:56	CKD		90,500		47,500	43,000	21.50
CEMENT KILN DUST	CD100007301	11:56 11:56	CKD		133,500		90,500	43,000	21.50
BULK	NO_BELOW	STANDARD		<b>Total US</b>	<b>133,500 *</b>		<b>90,500 *</b>	<b>86,000 *</b>	<b>43.00 *</b>
				<b>Total CA</b>					
<b>Additional Sales Order No. - If Applicable</b>									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
3	PARTNERS BULK LOGISTICS INC	311584	179PART	87APART	91BPART
<b>Rail Route Description</b>		<b>Transportation Contract</b>	<b>Trailer 1 Seal No.</b>		<b>Trailer 2 Seal No.</b>

<b>State Stamp :</b>	Prepaid
	Shipper Signature/ Date
	Driver Signature / Date
	Customer Signature / Date



*Handwritten notes:*  
 11-11-10 Lot 7408  
 100 lbs per bag

ORIGINAL

SEE OTHER CONDITIONS ON THE BACK

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transport of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions. Page 1 of 1  
 NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Signature of Shipper: \_\_\_\_\_

Branch/Plant :  
 67301  
 ALPENA PLANT  
 1435 FORD AVE  
 ALPENA MI 49707-2135  
 (989) 354-4171

Shipped To :  
 7301141  
 SIX S GATEWAY PROJECT  
 I75 & I96  
 DETROIT MI 48216  
 ()

<b>BOL No.</b>	<b>2228200</b>
<b>Load No.</b>	
<b>Sales Order No.</b>	<b>19838615</b>
<b>Shipment No.</b>	<b>14544087</b>
<b>Shipment Date</b>	<b>07/08/08</b>
<b>Customer Requested Delivery Date</b>	<b>07/08/08</b>
<b>Customer Requested Delivery Time (ET)</b>	<b>00:00:00</b>

<b>Pallets Returned</b>	
-------------------------	--

Sold To		Customer Purchase Order No.			Bags or Gross LB	PLT	Bag Wgt or Tare LB	Net LB	Total TS
SIX S CONSTRUCTION INC									
Item Description	Item No.	Begin/End	Silo						
CEMENT KILN DUST	CD100007301	18:50 19:05	CKD		112,250		51,950	60,300	30.15
CEMENT KILN DUST	CD100007301	18:50 19:05	CKD		160,250		112,250	48,000	24.00
BULK	NO_BELOW	STANDARD		<b>Total US</b>	<b>160,250 *</b>		<b>112,250 *</b>	<b>108,300 *</b>	<b>54.15 *</b>
				<b>Total CA</b>					
<b>Additional Sales Order No. - If Applicable</b>									

Special Delivery Instructions :

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
10	CUSTOMER PICKUP	99999	PART162	PART130A	PART130B
Rail Route Description		Transportation Contract	Trailer 1 Seal No.		Trailer 2 Seal No.

State Stamp :	Collect
	<i>[Signature]</i>
	Shipper Signature/ Date
	<i>[Signature]</i> Driver Signature/ Date
	Customer Signature / Date



# Inspector's Daily Report

Michigan Department of Transportation

7/14/2008 11:34 AM

FieldManager 4.3a

**Contract: 82194-37795, Concrete road reconstruction, 24 structures**

<b>IDR Date</b> 7/9/2008	<b>Day of Week</b> Wednesday	<b>Sequence No.</b> 1	<b>Import Date</b> 7/14/2008	<b>Project / Resident Engineer</b> Victor Judnic, P.E.
<b>Inspector's Initials-Name</b> CDN Chris D Nelson		<b>Federal Project Number</b> IM 0782(075)		<b>Elec. Attachments</b> None
<b>Prime Contractor</b> Walter Toebe Construction Co.				
<b>Entered By</b> CDN, Chris D Nelson		<b>Revised By</b>	<b>Revision Date</b>	<b>Revision No.</b>
<b>Temperatures</b> Low: 64 ° F High: 82 ° F		<b>Weather</b> clear and sunny		

**Comments**

Soil Stabilization  
 Wadel 7am-8:30pm  
 Six-S 7am-7:30pm  
 Contractor Wadel continued with the CKD test section #2 clay and granular material blended. Completed test section #2 at approximately 11am.  
 Contractor Six-S was grading and compacting to subgrade elevation.  
 Note: three areas of failure were determined today and yesterday for remixing. These areas were caused by heavy rain fall on previously completed sections and rubber tire equipment , both contribute to failure where the use of CKD was used. Also determined that previously approved area after rain had low strength based on the DCP test. See detail drawing for areas of failure.  
 Edge drain crew on site placing drain in approved CKD area.  
 Density checks were performed by Ed this evening on CKD subgrade and passed.  
 All test area was completed today. Metro region C&T, nashantha was on site to review subgrade material from 1271+50 to P.O.E  
 Contractor Wadel resumed soil stabilization with quick lime this afternoon. Determination was made on site by C&T representative to proceed with adding quick lime for additional depth of a total 18" of stabilized material, in order to stabilize soft gray clay. Gray clay was extremely soft during auguring test and probe testing. Contractor Wadel completed spreading limits of quick lime north of Michigan Ave, 1275+50+ - and initial mixing. Contractor Six-S continued the grading operation on subgrade in NB I-75 and final grading approved on CKD and quick lime area.

**Contractors**

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Six-S, Inc.	Foreman-Harvey	1	12.00	Caterpillar Grader	1	12.00
	Operator	3	12.00	143H GPS		
				Ford F250 Fx4	1	12.00
				Ingersall Roller DD 110HF	1	12.00
				Vibrator Sheep Foot CP-563C	1	12.00





# Inspector's Daily Report

## Contractors

Contractor's Name	Personnel	No.	Hrs.	Equipment	No.	Hrs.
Wadel Stabilization, Inc.	Driver	2	13.50	GMC 2500 HD	1	13.50
	Forman/Owner-Rick	1	13.50	Mack Service truck	1	13.50
	Laborer	1	13.50	Mack Spreador truck	2	13.50
	Operator-Harry	1	13.50	Rotary Pulverizer RS-500B	1	13.50
				Water Truck	1	13.50


## Item Postings

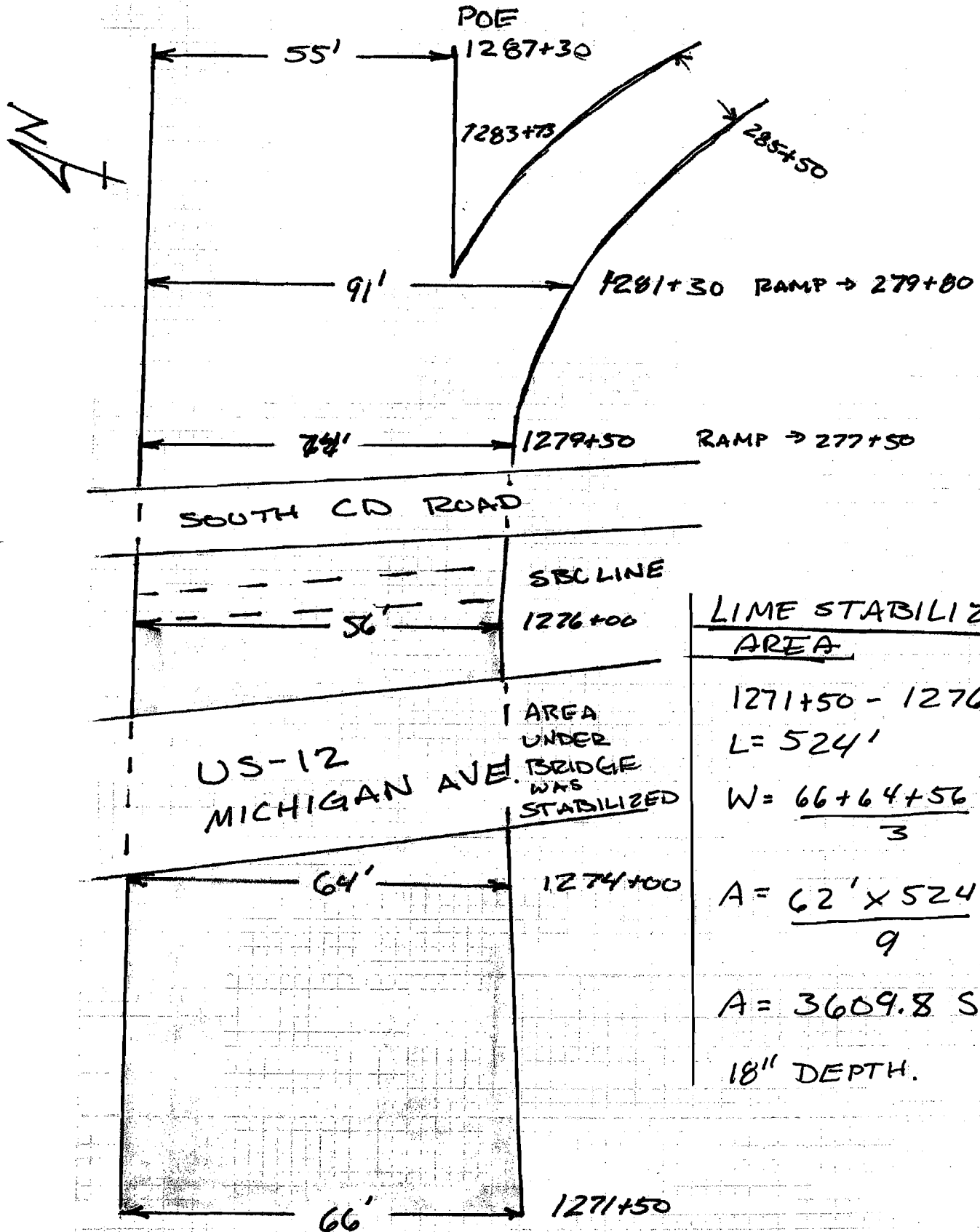
Item/Material Description	Item Code	Prop. Line	Project	Category	Quantity	Unit	Location	Brkdwn ID	Attn
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	90.650	Ton	Sta 1269+71 to Sta 1271+50 I-75 NB CKD test section 2	134	
Item Remarks: CKD paid as Lime									
						Lime	90.65 Ton		
_ Lime Contractor: Wadel Stabilization, Inc.	8507031	5820	37795A	0003	119.070	Ton	Sta 1271+50 to Sta 1276+74 I-75 NB Lime stabilization resumes	134	
						Lime	119.07 Ton		
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	1,312.700	Syd	Sta 1269+71 to Sta 1271+50 I-75 NB CKD test section 2	134	
Item Remarks: CKD paid as Lime									
_ Lime Stabilized Subgrade Contractor: Wadel Stabilization, Inc.	2057011	0380	37795A	0003	5,414.700	Syd	Sta 1271+50 to Sta 1276+74 I-75 NB Lime stabilization resumes	134	

Item Remarks: Contractor mixed 18" as directed by C&T.  
3609.8syd x 1.5=5414.7syd, paid for added depth

Reviewed By: \_\_\_\_\_  
(Signature)


\_\_\_\_\_  
(Date)

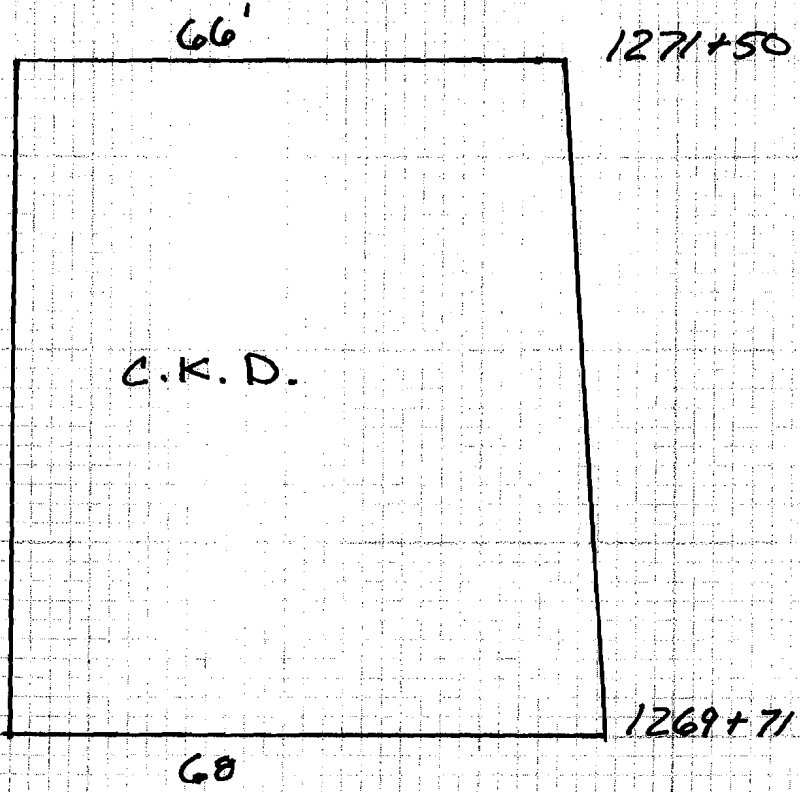
	Made by CHRIS N.	Date 7/19/08	Job Number 37795A
	Checked by	Date	Sheet Number
Calculations For LIME STABILIZATION	Backchecked by	Date	



LIME STABILIZED AREA

$1271+50 - 1276+74$   
 $L = 524'$   
 $W = \frac{66 + 64 + 56}{3} = 62$   
 $A = \frac{62' \times 524'}{2}$   
 $A = 3609.8 \text{ SYD}$   
 18" DEPTH.

 <b>TYME ENGINEERING</b>	Made by <b>CHRIS N.</b>	Date <b>7/9/08</b>	Job Number <b>37795A</b>
	Checked by	Date	Sheet Number
Calculations For <b>CKD STABILIZATION TEST #2</b>	Backchecked by	Date	



AREA:  $\frac{(68+66)}{2} \times 179' = 1312.7 \text{ SYD}$

TONAGE = 90.65 TONS

YIELD = 138 lb/syd \* HIGH YIELD DOE  
EXTREMELY WET  
CONDITIONS \*

Made by  
CHRIS N.

Date  
7/9/08

Job Number  
37795A  
~~37795A~~

Checked by

Date

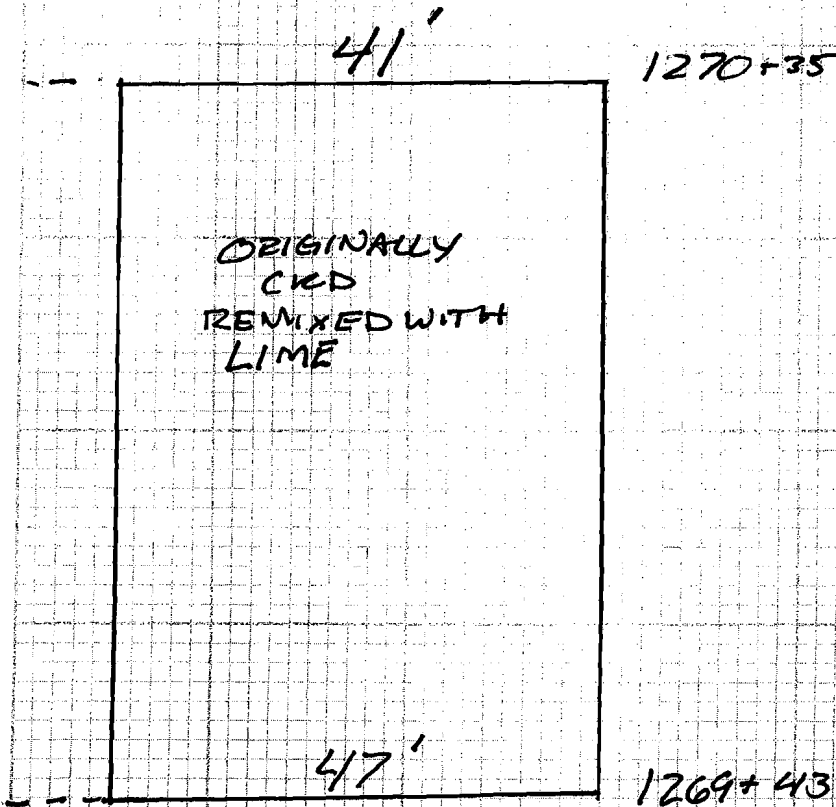
Sheet Number

Calculations For

Backchecked by

Date

## RE STABILIZED AREA



\* AREA WAS ORIGINAL MIXED WITH CKD. HOWEVER, IT WAS REMIXED WITH LIME BECAUSE CONTRACTOR WAS OUT OF C. K. D. CONTRACTOR WILL ONLY BE PAID FOR LIME MATERIAL USED.

RIGHT SIDE OF GRADE

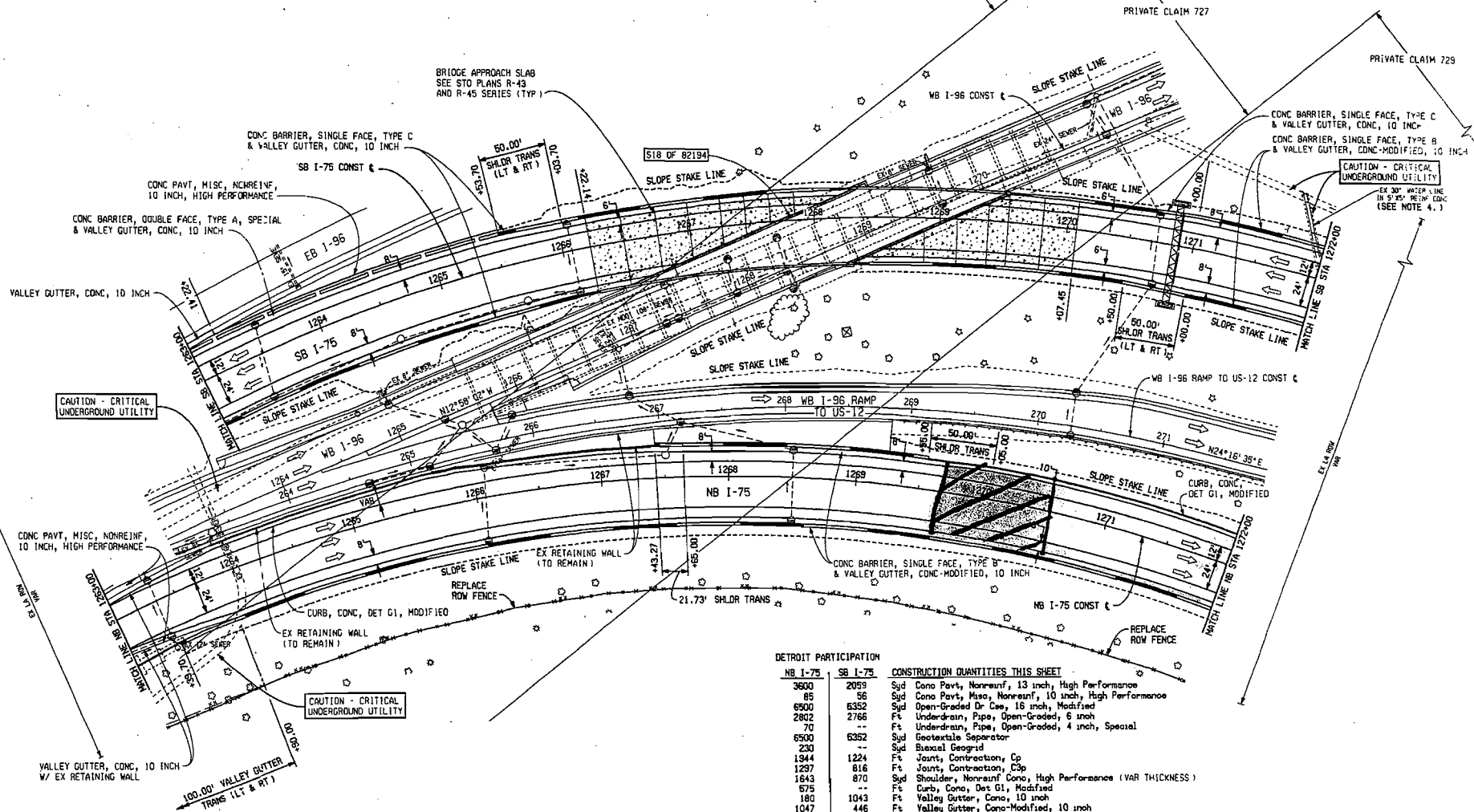
AREA

$$\frac{(47 + 41)}{2} \times 91 = 4144.9 \text{ SYD}$$

REV	DATE	NO.	REVISION

DETROIT PARTICIPATION

SB I-75	S18 OF 82154 BRIDGE APPROACH QUANTITIES
1280	Syd Cono Pavt, Misc, Nonrauf, 13 inch, High Performance
216	Ft Joint, Expansion, E2
345	Ft Joint, Expansion, E3
114	Ft Joint, Expansion, E4
255	Ft Joint, Plane-of-Weakness, D1



CAUTION - CRITICAL UNDERGROUND UTILITY

CAUTION - CRITICAL UNDERGROUND UTILITY

CAUTION - CRITICAL UNDERGROUND UTILITY

DETROIT PARTICIPATION

NB I-75	SB I-75	CONSTRUCTION QUANTITIES THIS SHEET
3600	2059	Syd Cono Pavt, Nonrauf, 13 inch, High Performance
85	56	Syd Cono Pavt, Misc, Nonrauf, 10 inch, High Performance
6900	6352	Syd Open-Graded Dr Cms, 18 inch, Modified
2802	2766	Ft Underdrain, Pipe, Open-Graded, 6 inch
70	--	Ft Underdrain, Pipe, Open-Graded, 4 inch, Special
6500	6352	Syd Geotextile Separator
230	--	Syd Basal Geogrid
1944	1224	Ft Joint, Construction, Cp
1297	816	Ft Joint, Construction, C3p
1643	870	Syd Shoulder, Nonrauf Cono, High Performance (VAR THICKNESS)
575	--	Ft Curb, Cono, Det G1, Modified
180	1043	Ft Valley Gutter, Cono, 10 inch
1047	446	Ft Valley Gutter, Cono-Modified, 10 inch
1072	472	Ft Cono Barrier, Single Face, Type B
--	766	Ft Cono Barrier, Single Face, Type C
--	254	Ft Cono Barrier, Double Face, Type A, Special
118	--	Cyd Cono Barrier Backfill, CIP
3808	3092	Syd Turf Establishments, Performance

- NOTES:
1. SEE DRAINAGE SHEET FOR DRAINAGE DETAILS.
  2. FOR PROPOSED FREEWAY LIGHTING, SEE LIGHTING PLANS.
  3. FOR PROPOSED MITS, SEE MITS PLANS.
  4. SEE NOTICE TO BIDDERS - UTILITY INFORMATION AND UTILITY COORDINATION CLAUSE FOR UTILITY INFORMATION.

CONSTRUCTION SHEET

HNTB

MDOT  
Michigan Department of Transportation

NB & SB I-75 STA 1263+00 TO STA 1272+00				
DATE	SCALE	CONT. SEC.	JOB NO.	DESIGN UNIT
02/12/07	1" = 40'	82194	37795A	WISNEY



CKD TEST SECTION #2

7/9/08

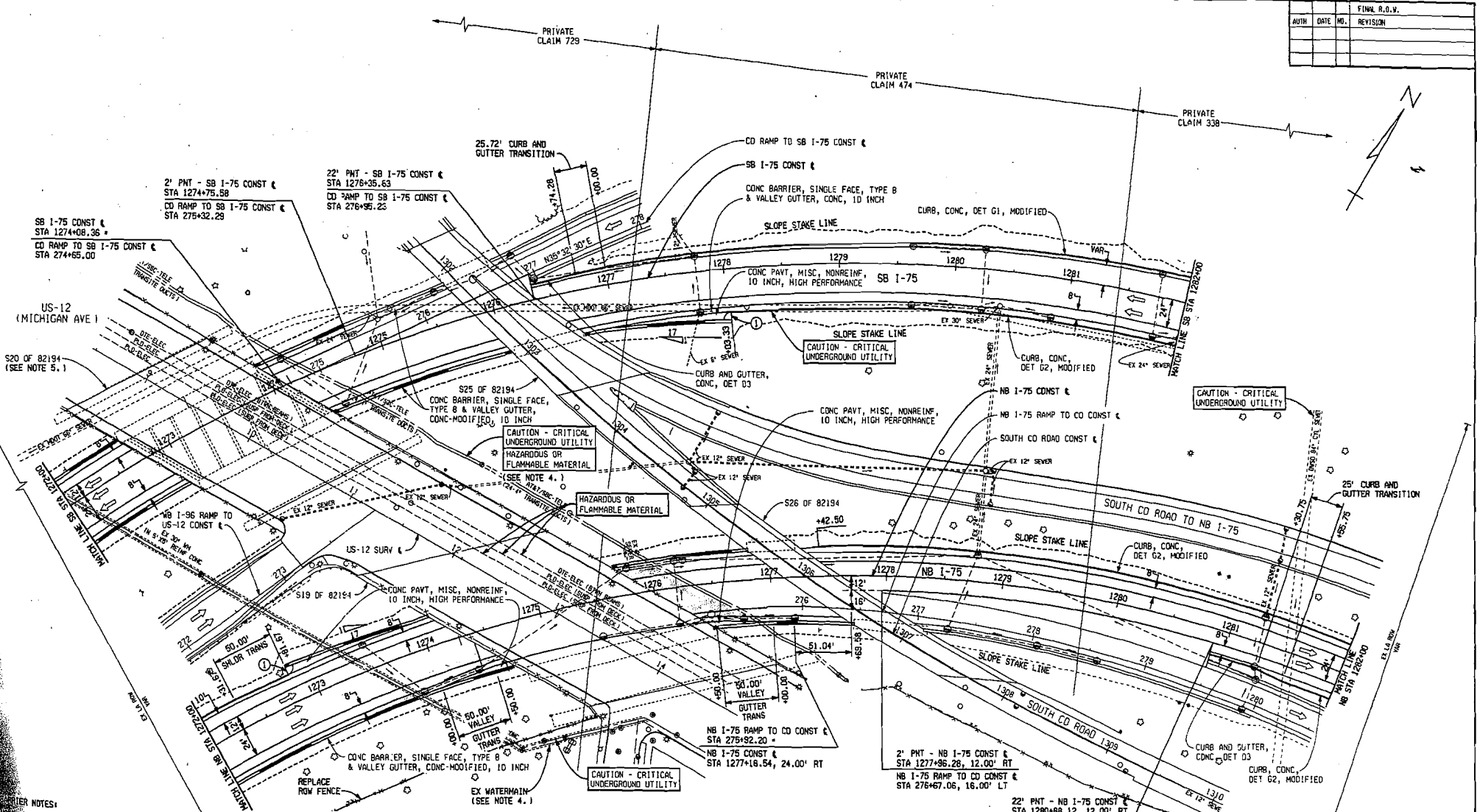


QUICK LIME 18" DEPTH

T.S.

AUTH		DATE		FINAL R.O.V.	
				REVISION	

PLOT DATE: 2/6/2007 7:58:01 PM  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 FILE NAME: 307950/251212.dwg



OTHER NOTES:  
 1. FACE BARRIER BURIED ENDING - SEE DETAIL SHEET  
 2. SEE SHEET FOR DRAINAGE DETAILS.  
 3. SEE SHEET FOR FREEMWAY LIGHTING, SEE LIGHTING PLANS.  
 4. SEE SHEET FOR PROPOSED MITS, SEE MITS PLANS.  
 5. SEE BIDDERS - UTILITY INFORMATION AND COORDINATION CLAUSE FOR UTILITY INFORMATION.  
 6. SEE DETAIL SHEETS FOR JOINT LOCATIONS.  
 7. SEE LIMITS UNDER S20 OF 82194

DETROIT PARTICIPATION		CONSTRUCTION QUANTITIES THIS SHEET	
NB I-75	SB I-75		
3359	2546	Syd	Conc Pavt, Nonreinf, 13 inch, High Performance
130	38	Syd	Conc Pavt, Misc, Nonreinf, 13 inch, High Performance
258	71	Syd	Conc Pavt, Misc, Nonreinf, 10 inch, High Performance
6347	6382	Syd	Open-Graded Dr Cae, 16 inch, Modified
2999	2400	Ft	Underdrain, Pipe, Open-Graded, 6 inch
--	480	Ft	Underdrain, Pipe, Open-Graded, 4 inch, Special
6347	6382	Syd	Geotextile Separator
--	1780	Syd	Staxial Geogrid
2007	1644	Ft	Joint, Contracton, Cp
1352	880	Ft	Joint, Contracton, C3p
80	132	Ft	Joint, Expansion, E2
38	84	Ft	Joint, Expansion, E4
--	145	Ft	Joint, Plane-of-Weakness, O1
1417	2214	Syd	Shoulder, Nonreinf Conc, High Performance (VAR THICKNESS)
43	65	Ft	Curb and Gutter, Conc, Det U3
70	500	Ft	Curb, Conc, Det G1, Modified

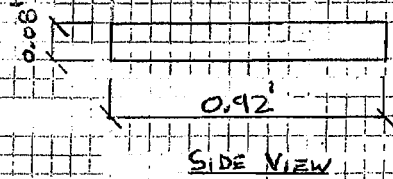
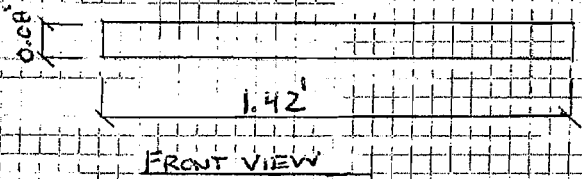
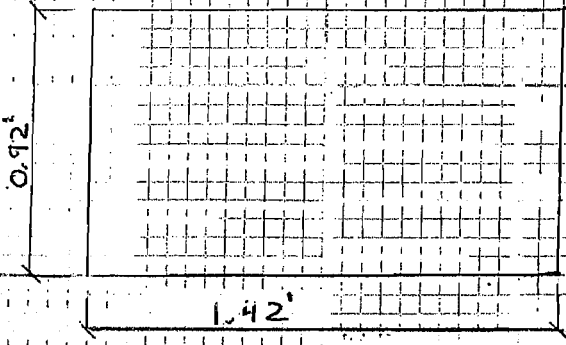
DETROIT PARTICIPATION		CONSTRUCTION QUANTITIES THIS SHEET	
NB I-75	SB I-75		
528	385	Ft	Curb, Conc, Det G2, Modified
544	766	Ft	Valley Gutter, Conc, 10 inch
278	766	Ft	Valley Gutter, Conc-Modified, 10 inch
509	880	Ft	Conc Barrier, Single Face, Type B
44	46	Sft	Sidewalk, Conc, 4 inch
6860	7010	Syd	Turf Establishment, Performance



<b>CONSTRUCTION SHEET</b>					
NB & SB I-75 STA 1272+00 TO STA 1282+00					
DATE	SCALE	CONT. SEC.	JOB NO.	DESIGN UNIT	SHEET NO.
02/12/07	1" = 40'	82194	37795A	WISNEY	534 211

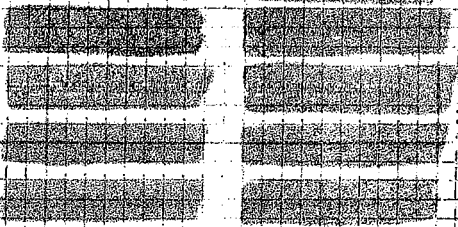
\* NOT TO SCALE

TOP VIEW



CALCULATIONS

- ① AREA OF PAN:  $1.42' \times 0.92' = 1.31 \text{ FT}^2$
- ② WEIGHT OF PAN: 1.4 LB
- ③ TARGET APPLICATION %: 5.0% → 0.05
- ④ AVG. SOIL DRY WEIGHT: 120 <sup>lbs</sup>/cft
- ⑤ TARGET APPLICATION RATE:  $120 \frac{\text{lbs}}{\text{cft}} \times 0.05 = 6.0 \frac{\text{lbs}}{\text{cft}} \rightarrow 6.0 \frac{\text{lbs}}{\text{sft}} \text{ PER 12" DEPTH}$
- ⑥ TARGET WEIGHT OF PAN+LIME:  $6.0 \frac{\text{lbs}}{\text{sft}} \times 1.31 \text{ sft} = 7.86 \text{ LB} + 1.4 \text{ LB} = 9.26 \text{ LBS}$
- ⑦ WEIGH-IN #1: 10.2 LBS → 5.6% (LIME) (PAN)



DAILY YIELD: TOTAL TONNAGE / TOTAL SYD











**Lafarge Building Materials**

2<sup>nd</sup> load wed. 7/9/08  
gate way for pct

Received subject to the terms of any written transportation contract between the Carrier(s) transporting this shipment and Lafarge North America or its affiliates (Shipper) on the date of issue of this Bill of Lading, the property described hereon, in apparent good order, except as noted, marked, consigned and destined as set forth hereon, which said Carrier(s) agrees to carry with reasonable dispatch to such destination. Carrier(s) shall verify the weight of the shipment and Carrier(s) agree to indemnify Shipper from any loss, cost or expense (including, but not limited to, attorney's fees) arising from or relating to Carrier(s) transportation of a load that exceeds the maximum allowable weight. Consignee accepts such shipment in accordance with Lafarge's standard terms and conditions.  
NON-RECOURSE: If Shipper signs this provision, Shipper shall not be liable for freight charges and Carrier shall not deliver this shipment without advance payment of all shipping and related charges.

Page

Signature of Shipper: \_\_\_\_\_

Branch/Plant:

ALPENA

Shipped To :

WADEL




BOL No. Load No.	M 248994
Sales Order No. Shipment No.	
Shipment Date	7-8-08
Customer Requested Delivery Date	
Customer Requested Delivery Time	

Pallets Returned	
------------------	--

Sold To		Customer Purchase Order No.							
Item Description	Item No.	Begin/End	Silo	Bags or Gross KG LB	PLT	Bag Wgt or Tare KG LB	Net KG LB	Total TM TS	
CKD				123500		50500	73000		
				36.5 tons					
				Total US					
				Total CA					
Additional Sales Order No. - If Applicable									
Special Delivery Instructions :									

Mode	Carrier Full Name	Carrier Code	Tractor/Rail Car	Trailer 1	Trailer 2
	PNEUMATIC		164	129A	15A
Rail Route Description		Transportation Contract	Trailer 1 Seal No.	Trailer 2 Seal No.	

State Stamp :

  
 Shipper Signature / Date  
  
 Driver Signature / Date  
  
 Customer Signature / Date

Appendix E  
Dynamic Cone Penetrometer (DCP) Test Data

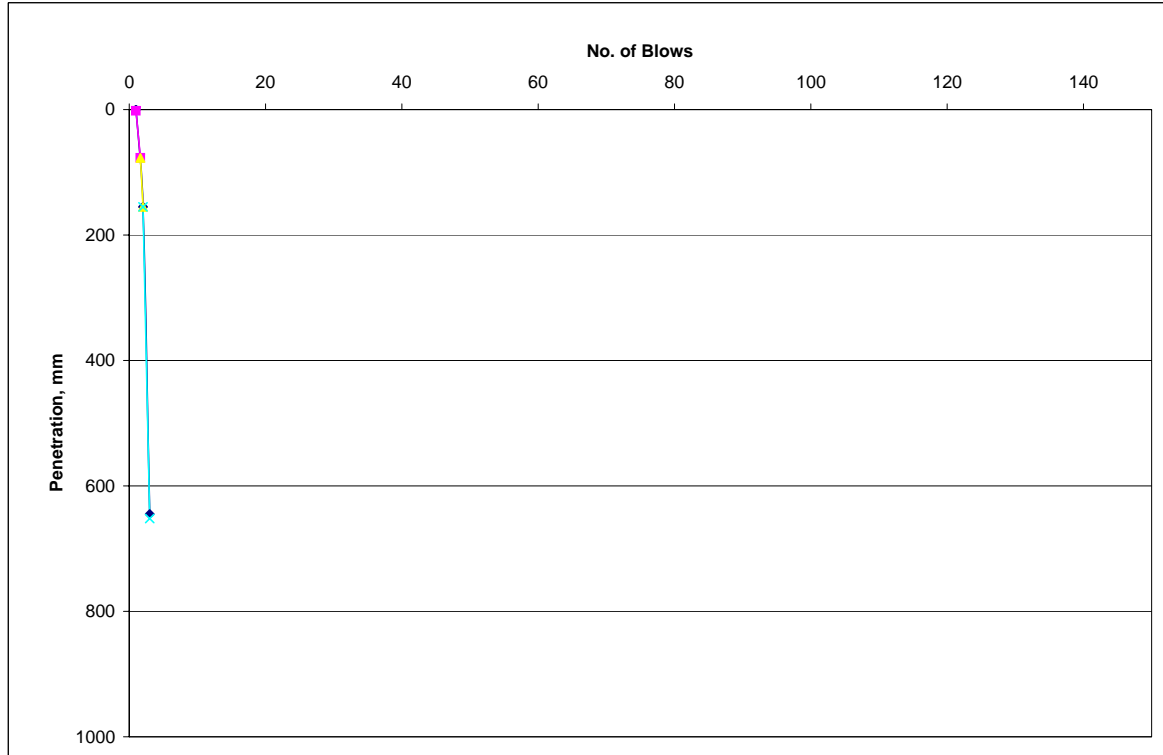
**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1257+50 18' LT wall  
**Comment:** untreated clay - candidate for CKD  
**Date of Treatment:**  
**Date of DCP Testing:** 6/20/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	1.64	2	77	0.64	75	117.688	1.4
1.64	2.02	77	155	0.38	78	205.763	0.8
2.02	3	155	652	0.98	497	507.643	0.4

**Result**  
 From 0.1 inches to 3.0 inches, the CBR value is 1.4.  
 From 3.0 inches to 6.1 inches, the CBR value is 0.8.  
 From 6.1 inches to 25.7 inches, the CBR value is 0.4.

**Weighted Average CBR:**

0.6
-----



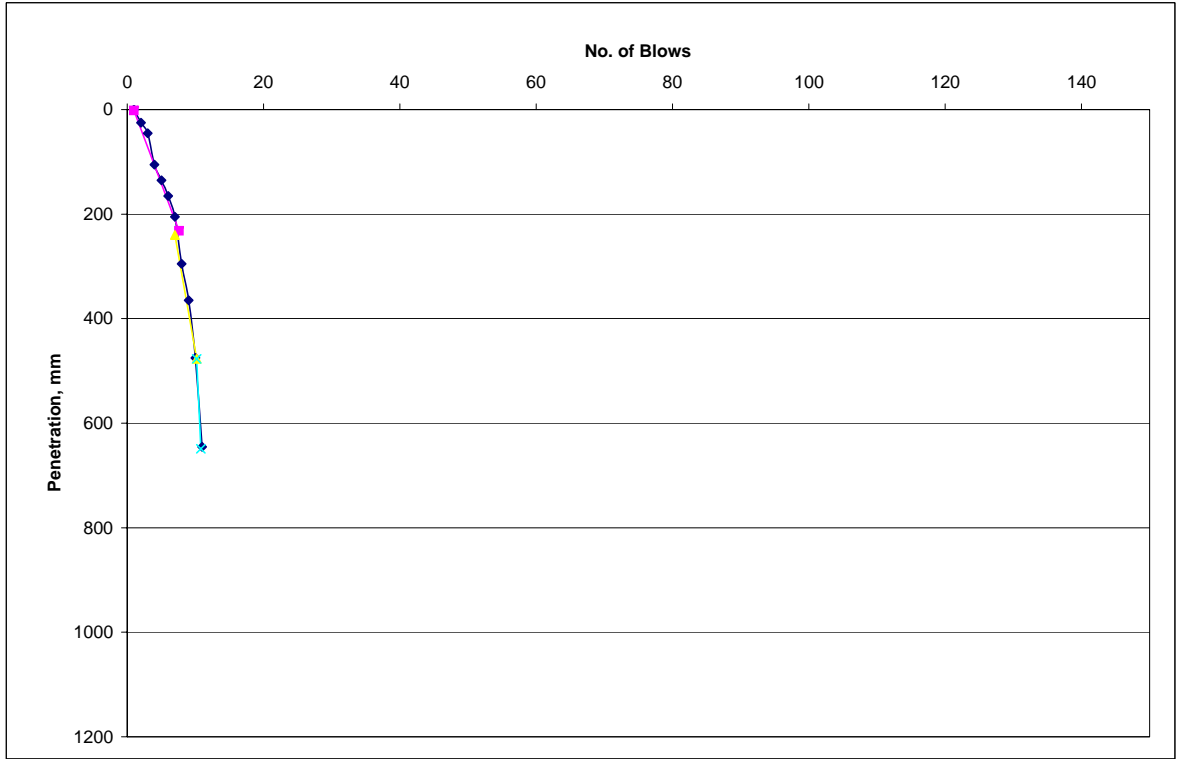
**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1255+00 33' LT wall  
**Comment:** untreated clay - candidate for CKD  
**Date of Treatment:**  
**Date of DCP Testing:** 6/20/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	7.6	2	232	6.6	230	35.348	5
7	10.2	240	477	3.2	237	74.563	2.4
10.2	10.8	477	649	0.6	172	287.167	0.5

**Result**  
 From 0.1 inches to 9.1 inches, the CBR value is 5.  
 From 9.4 inches to 18.8 inches, the CBR value is 2.4.  
 From 18.8 inches to 25.6 inches, the CBR value is 0.5.

**Weighted Average CBR:**

2.8
-----

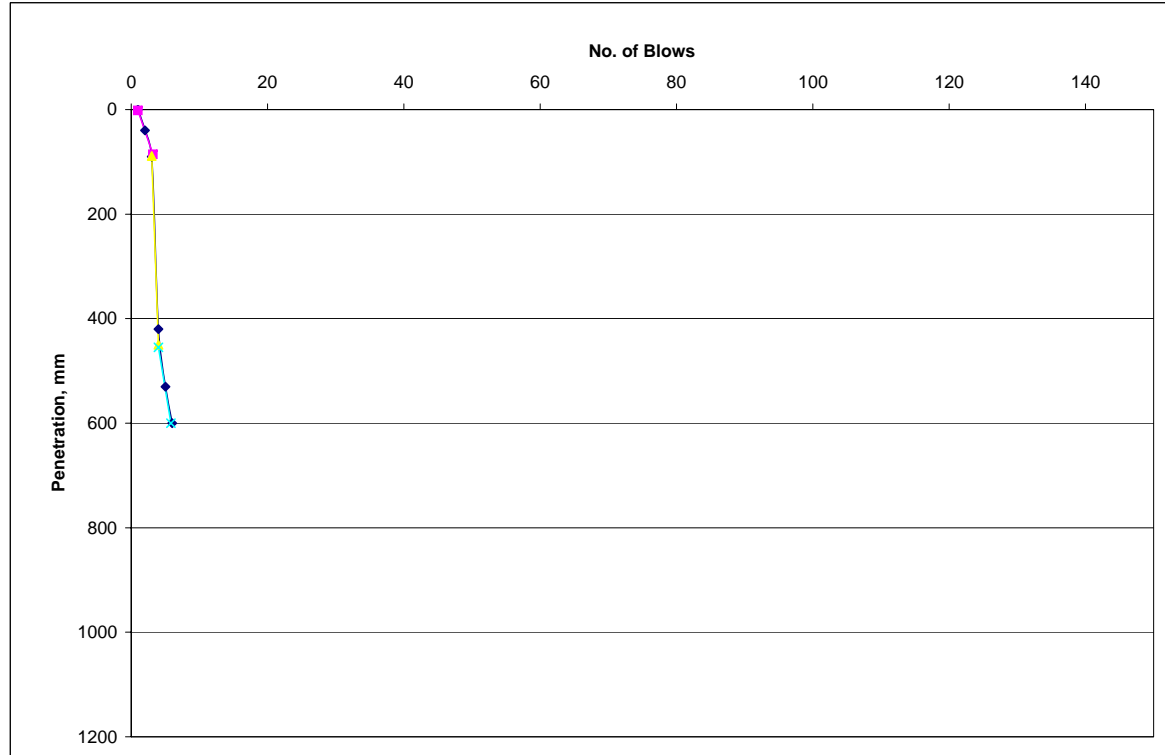


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1252+00 12' RT wall  
**Comment:** untreated clay - candidate for CKD  
**Date of Treatment:**  
**Date of DCP Testing:** 6/20/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	3.2	2	86	2.2	84	38.682	5
3	4	89	450	1	361	361.500	0.4
4	5.8	455	600	1.8	145	81.056	2.1

**Result**  
 From 0.1 inches to 3.4 inches, the CBR value is 5.  
 From 3.5 inches to 17.7 inches, the CBR value is 0.4.  
 From 17.9 inches to 23.6 inches, the CBR value is 2.1.

**Weighted Average CBR:** 1.5



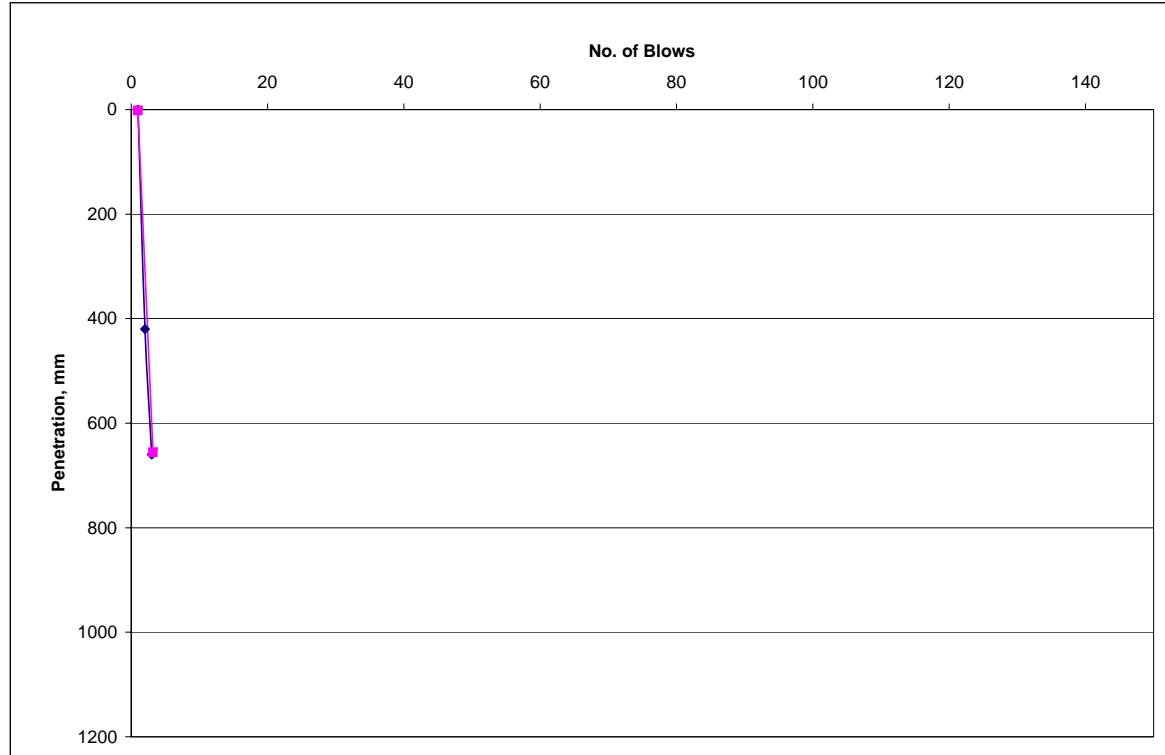
**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1258+00 25' LT wall  
**Comment:** untreated clay - candidate for CKD  
**Date of Treatment:**  
**Date of DCP Testing:** 6/20/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	3.2	2	656	2.2	654	297.773	0.5

**Result**  
From 0.1 inches to 25.8 inches, the CBR value is 0.5.

Weighted Average CBR: 

0.5
-----

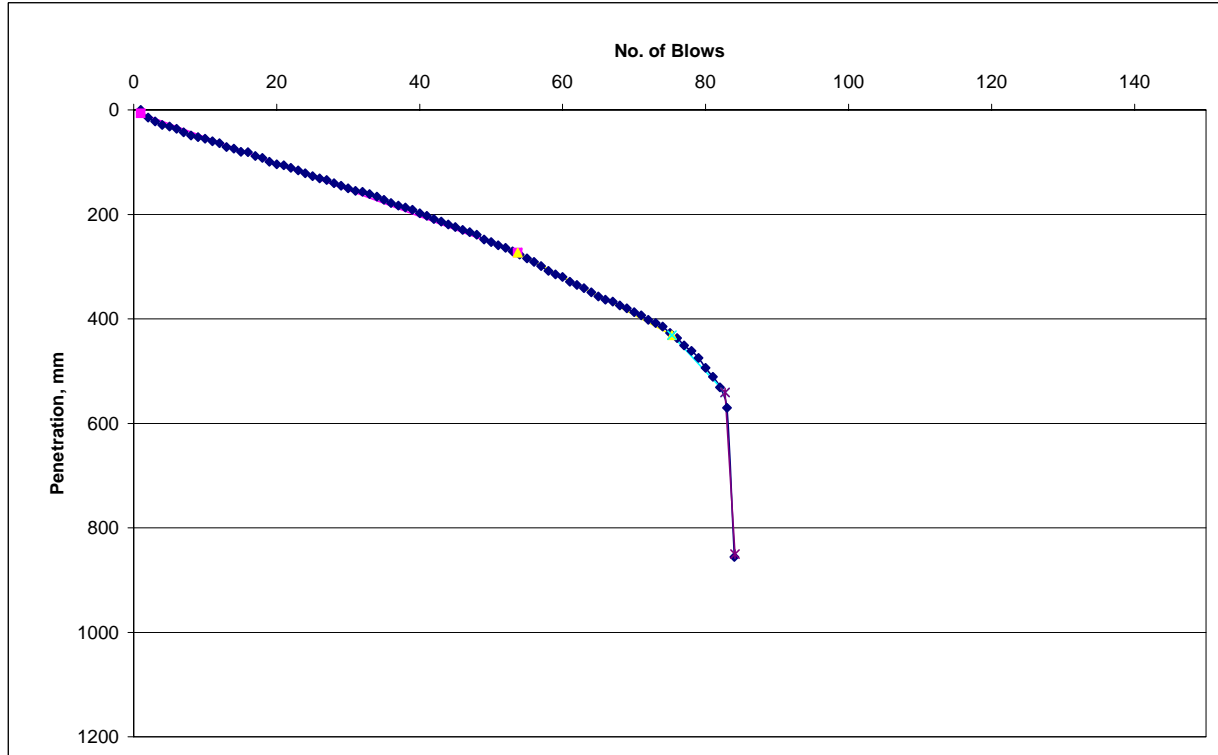


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1251+86 2' RT of C/L  
**Comment:** CKD treated clay - dry  
**Date of Treatment:** 7/1/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	53.7	7	273	52.7	266	5.547	50
53.7	75.3	273	431	21.6	158	7.815	35
75.3	82.7	431	541	7.4	110	15.365	14
82.7	84.1	541	850	1.4	309	221.214	0.7

**Result**  
 From 0.3 inches to 10.7 inches, the CBR value is 50.  
 From 10.7 inches to 17.0 inches, the CBR value is 35.  
 From 17.0 inches to 21.3 inches, the CBR value is 14.  
 From 21.3 inches to 33.5 inches, the CBR value is 0.7.

Weighted Average CBR (stabilized): **38.1**  
 Insitu CBR: **0.7**



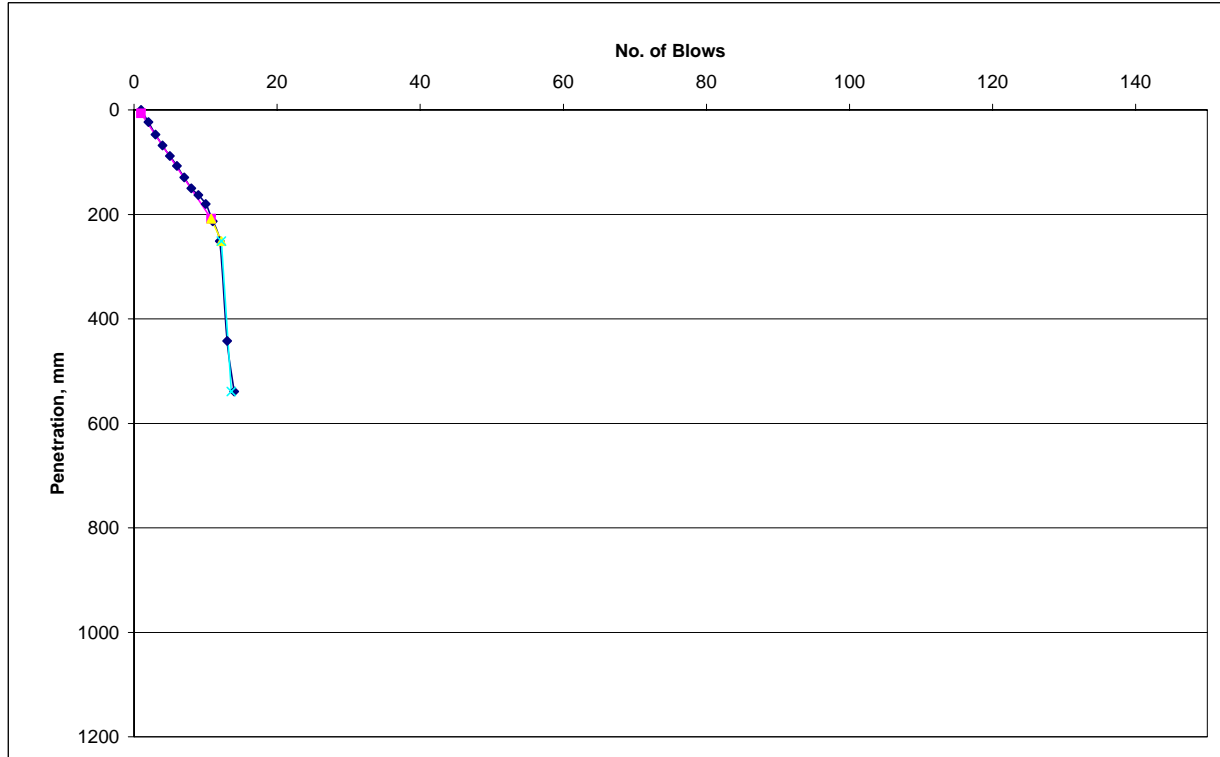


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1252+75 18' LT of C/L  
**Comment:** CKD treated clay - wet- 4 days of standing water  
**Date of Treatment:** 7/1/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	10.8	7	208	9.8	201	21.010	10
10.8	12.2	208	251	1.4	43	31.214	6
12.2	13.6	251	539	1.4	288	206.214	0.7

**Result**  
 From 0.3 inches to 8.2 inches, the CBR value is 10.  
 From 8.2 inches to 9.9 inches, the CBR value is 6.  
 From 9.9 inches to 21.2 inches, the CBR value is 0.7.

**Weighted Average CBR (Stabilized):** 9.3  
**Insitu:** 0.7

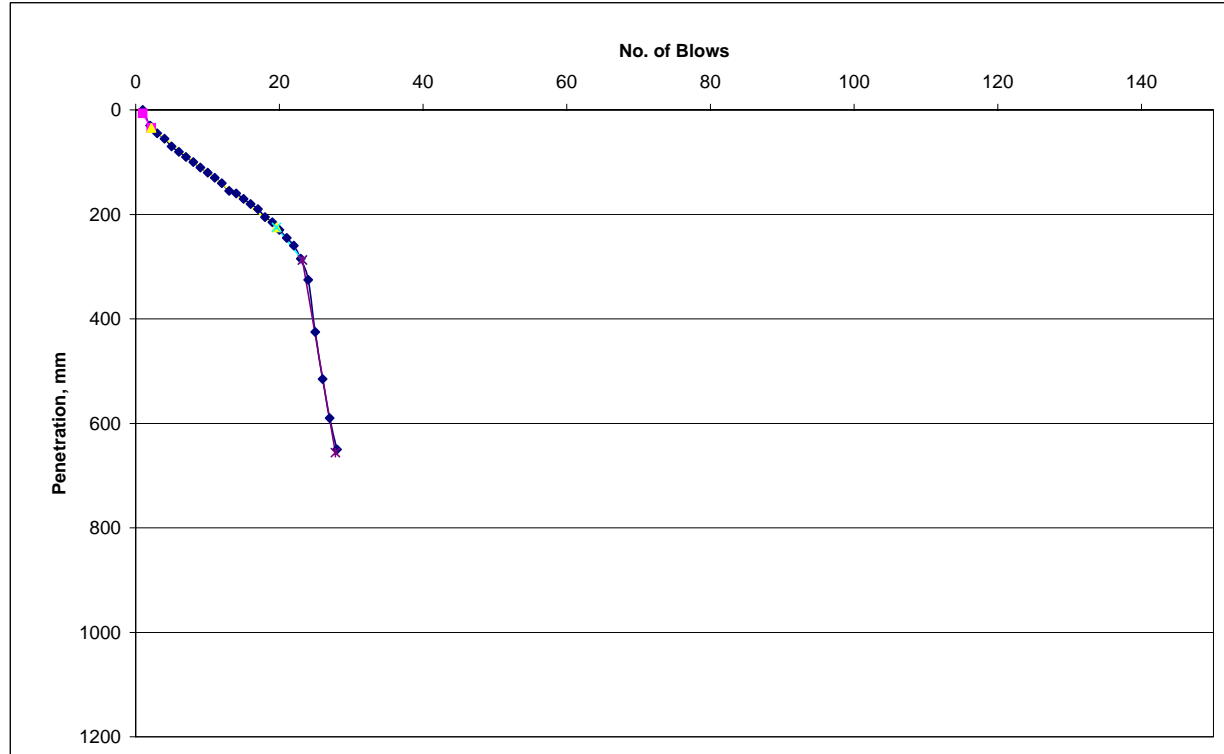


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1252+75 18' LT of C/L  
**Comment:** CKD treated clay - re-test, after removing OGDC, area looks moist under the fabric  
**Date of Treatment:** 7/1/2008  
**Date of DCP Testing:** 7/14/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	2.2	7	34	1.2	27	23.000	9
2.2	19.6	34	225	17.4	191	11.477	20
19.6	23.2	225	287	3.6	62	17.722	12
23.2	27.8	287	656	4.6	369	80.717	2.2

**Result**  
 From 0.3 inches to 1.3 inches, the CBR value is 9.  
 From 1.3 inches to 8.9 inches, the CBR value is 20.  
 From 8.9 inches to 11.3 inches, the CBR value is 12.  
 From 11.3 inches to 25.8 inches, the CBR value is 2.2.

**Weighted Average CBR (Stabilized):** 17.2  
**In situ:** 2.2

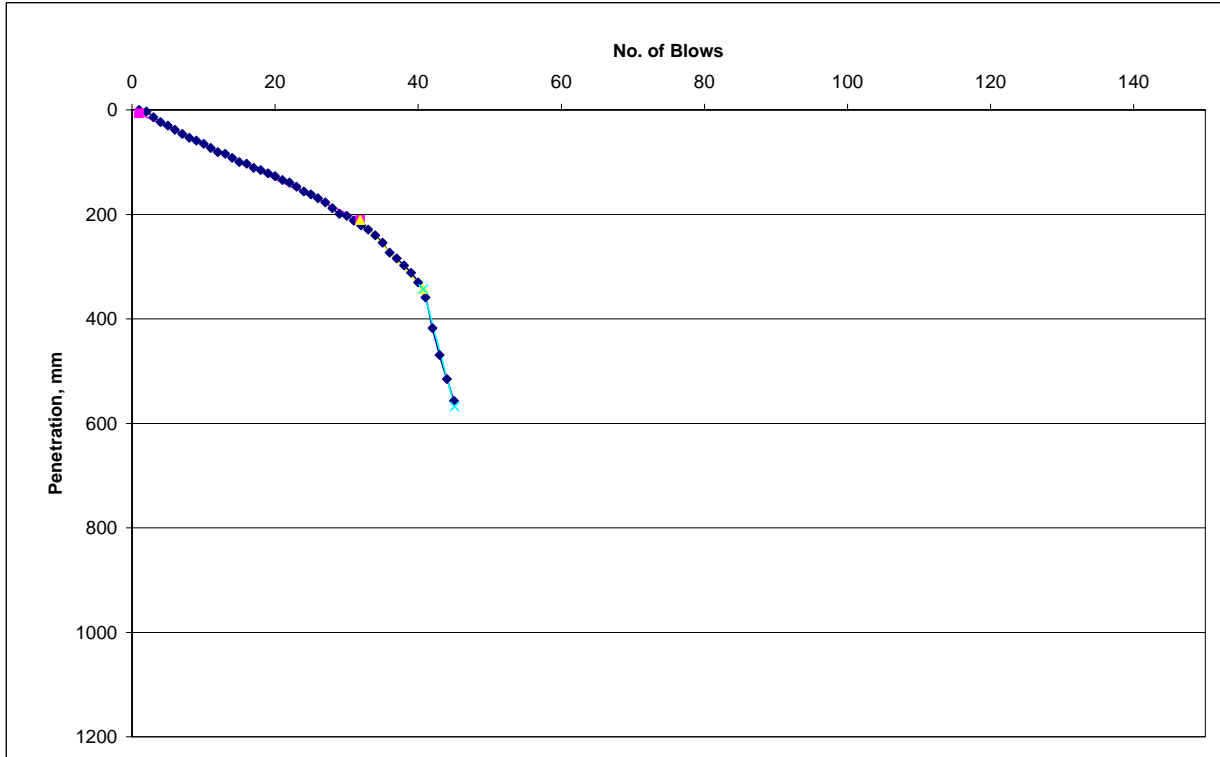


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1253+75 21' RT of C/L  
**Comment:** CKD treated clay - dry  
**Date of Treatment:** 7/1/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	31.9	7	211	30.9	204	7.102	35
31.9	40.7	211	343	8.8	132	15.500	14
40.7	45.1	343	568	4.4	225	51.636	3.6

**Result**  
 From 0.3 inches to 8.3 inches, the CBR value is 35.  
 From 8.3 inches to 13.5 inches, the CBR value is 14.  
 From 13.5 inches to 22.4 inches, the CBR value is 3.6.

**Weighted Average CBR (Stabilized):** 26.8  
**In situ:** 3.6

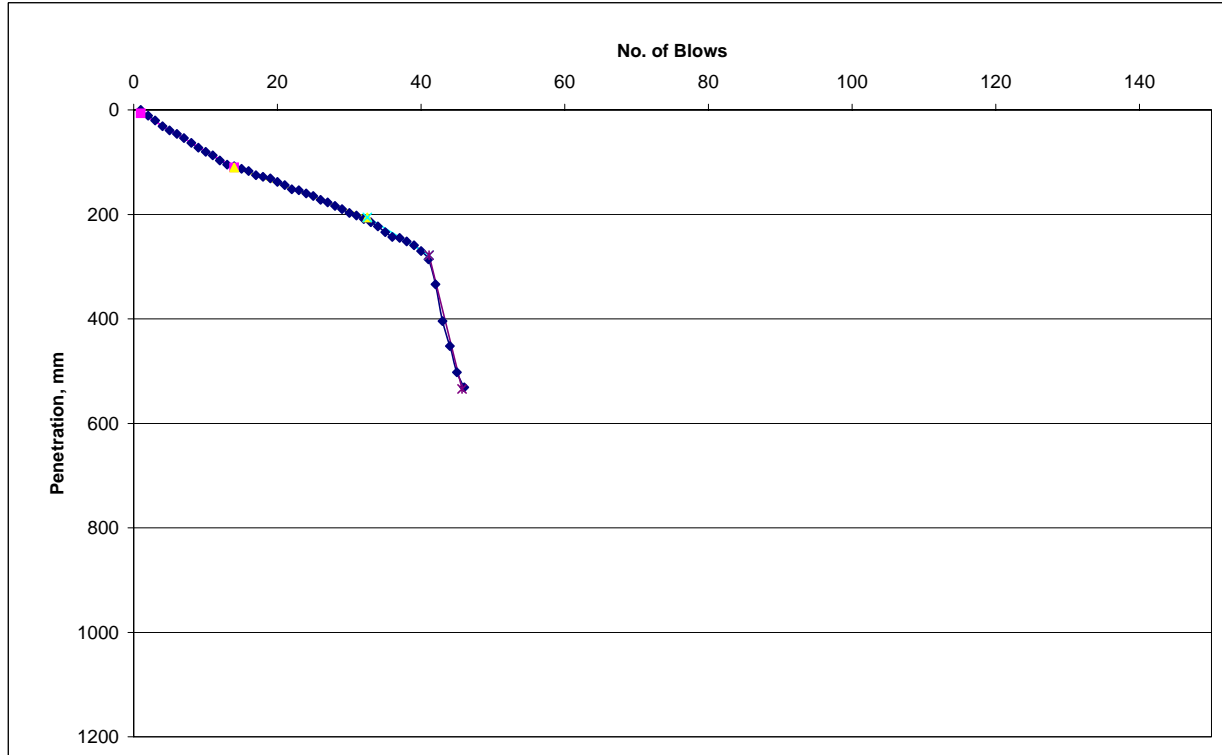


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1255+00 30' RT of C/L  
**Comment:** CKD treated clay - dry (rained on the night of 7/2/08)  
**Date of Treatment:** 7/2/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	14	7	110	13	103	8.423	30
14	32.5	110	206	18.5	96	5.689	50
32.5	41.1	206	278	8.6	72	8.872	30
41.1	45.7	278	534	4.6	256	56.152	3.2

**Result**  
 From 0.3 inches to 4.3 inches, the CBR value is 30.  
 From 4.3 inches to 8.1 inches, the CBR value is 50.  
 From 8.1 inches to 10.9 inches, the CBR value is 30.  
 From 10.9 inches to 21.0 inches, the CBR value is 3.2.

**Weighted Average CBR (Stabilized):** 37.1  
**Insitu:** 3.2



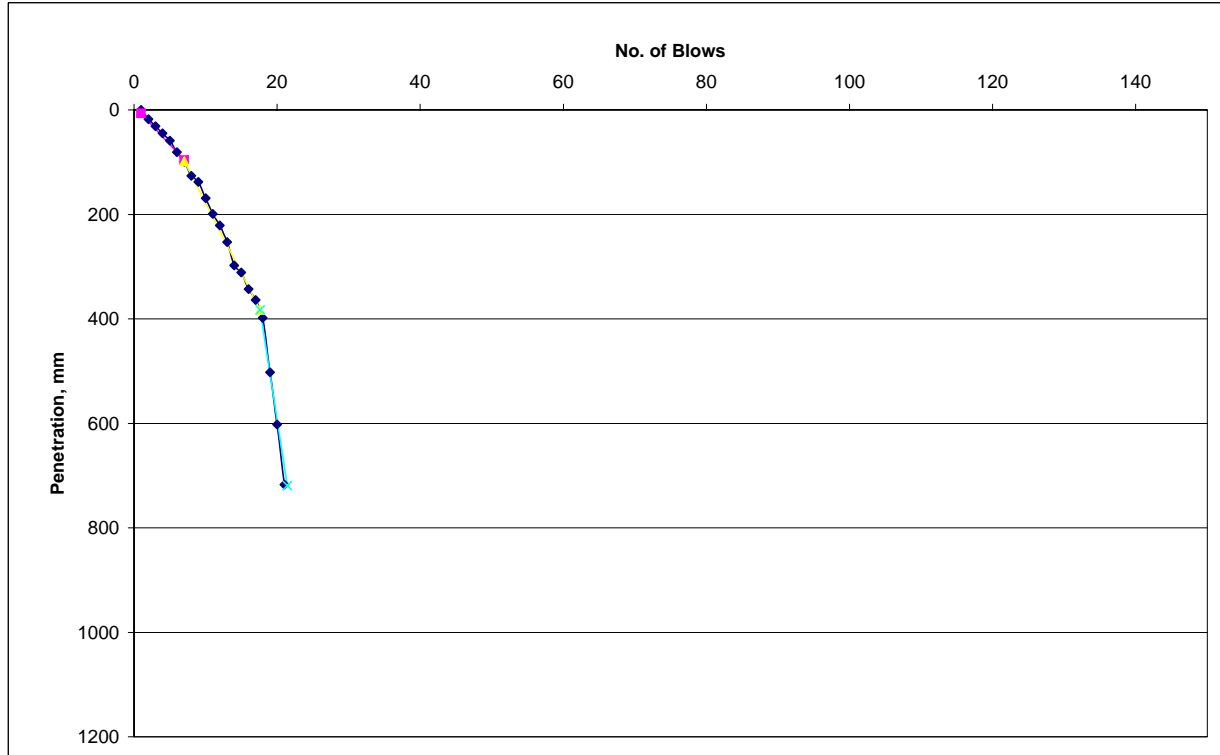
**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1256+80 8' LT of C/L  
**Comment:** CKD treated clay - moist area (rained on the night of 7/2/08)  
**Date of Treatment:** 7/2/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	7	7	96	6	89	15.333	14
7	17.6	98	383	10.6	285	27.387	7
17.6	21.4	383	719	3.8	336	88.921	1.9

**Result**

From 0.3 inches to 3.8 inches, the CBR value is 14.  
 From 3.9 inches to 15.1 inches, the CBR value is 7.  
 From 15.1 inches to 28.3 inches, the CBR value is 1.9.

**Weighted Average CBR (Stabilized):** 8.7  
**In situ:** 1.9

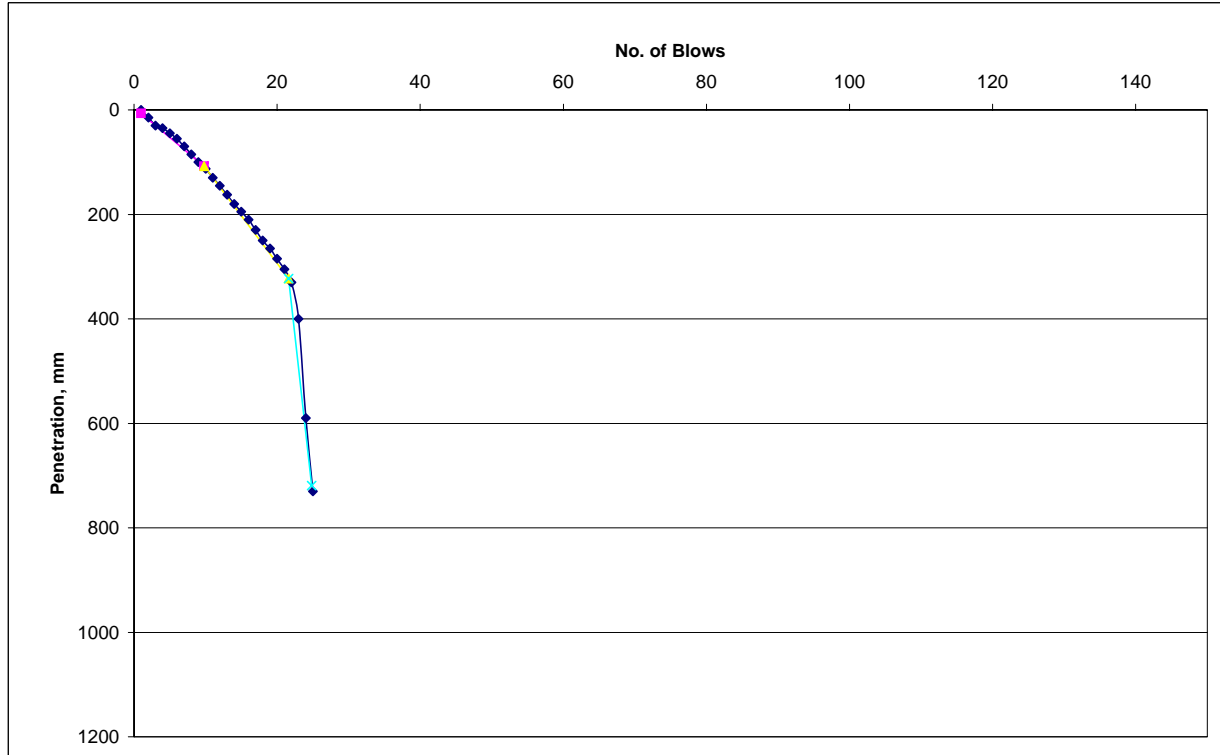


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1256+80 8' LT of C/L  
**Comment:** CKD treated clay - re-test, after removing OGDC, area looks moist under the fabric  
**Date of Treatment:** 7/2/2008  
**Date of DCP Testing:** 7/14/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	9.8	7	108	8.8	101	11.977	20
9.8	21.6	108	323	11.8	215	18.720	11
21.6	24.8	323	719	3.2	396	124.250	1.3

**Result**  
 From 0.3 inches to 4.3 inches, the CBR value is 20.  
 From 4.3 inches to 12.7 inches, the CBR value is 11.  
 From 12.7 inches to 28.3 inches, the CBR value is 1.3.

**Weighted Average CBR (Stabilized):** 13.9  
**In situ:** 1.3

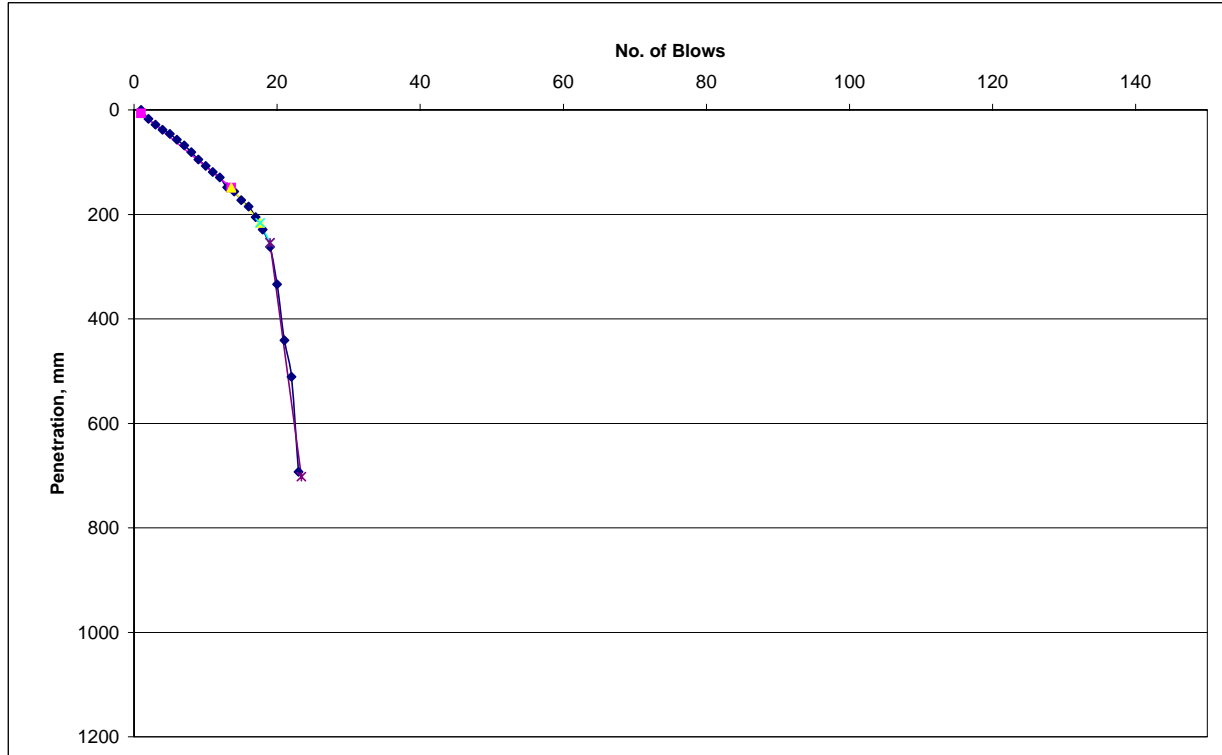


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1258+00 15' RT of C/L  
**Comment:** CKD treated clay - (rained on the night of 7/2/08)  
**Date of Treatment:** 7/2/2008  
**Date of DCP Testing:** 7/7/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	13.6	7	149	12.6	142	11.770	20
13.6	17.6	149	216	4	67	17.250	12
17.6	19	216	254	1.4	38	27.643	7
19	23.4	254	702	4.4	448	102.318	1.6

**Result**  
 From 0.3 inches to 5.9 inches, the CBR value is 20.  
 From 5.9 inches to 8.5 inches, the CBR value is 12.  
 From 8.5 inches to 10.0 inches, the CBR value is 7.  
 From 10.0 inches to 27.6 inches, the CBR value is 1.6.

**Weighted Average CBR (Stabilized):** 15.8  
**Insitu:** 1.6

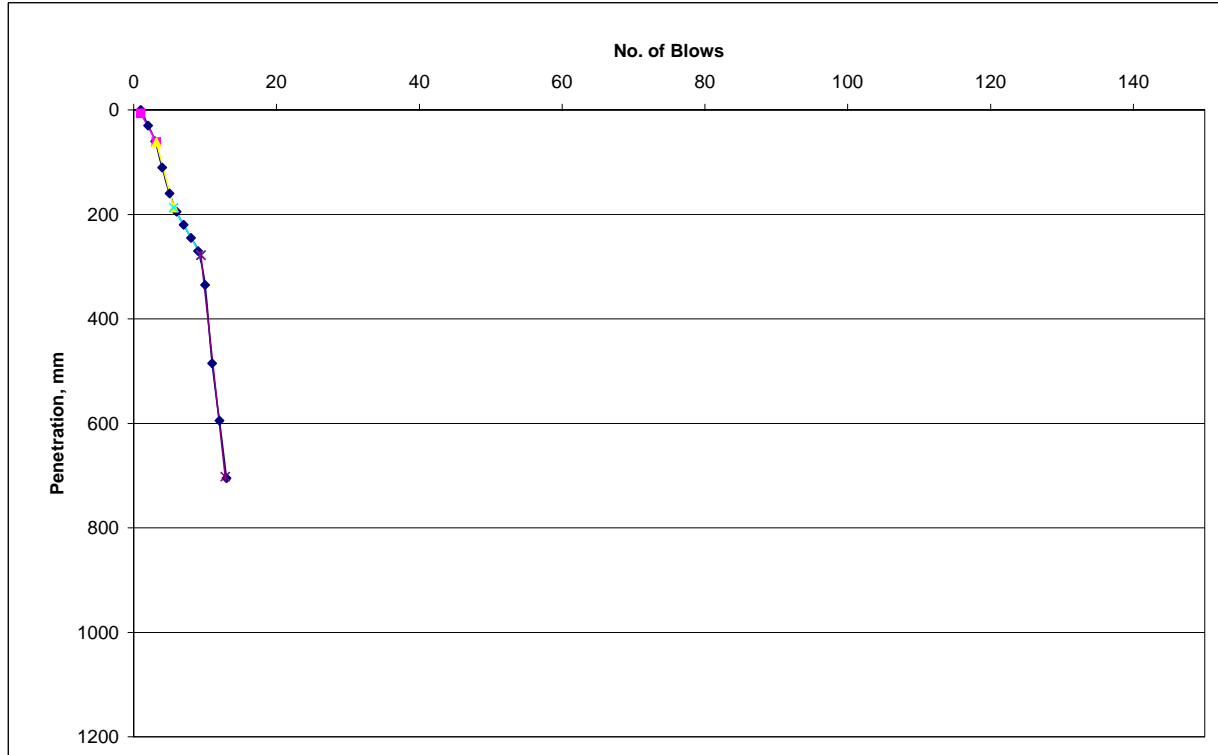


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1258+00 15' RT of C/L  
**Comment:** CKD treated clay - retest, after removing OGDC, area looks moist under the fabric  
**Date of Treatment:** 7/2/2008  
**Date of DCP Testing:** 7/14/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	3.2	7	62	2.2	55	25.500	8
3.2	5.6	62	187	2.4	125	52.583	3.5
5.6	9.4	187	278	3.8	91	24.447	8
9.4	12.8	278	702	3.4	424	125.206	1.3

**Result**  
 From 0.3 inches to 2.4 inches, the CBR value is 8.  
 From 2.4 inches to 7.4 inches, the CBR value is 3.5.  
 From 7.4 inches to 10.9 inches, the CBR value is 8.  
 From 10.9 inches to 27.6 inches, the CBR value is 1.3.

**Weighted Average CBR (Stabilized):** 5.9  
**In situ:** 1.3

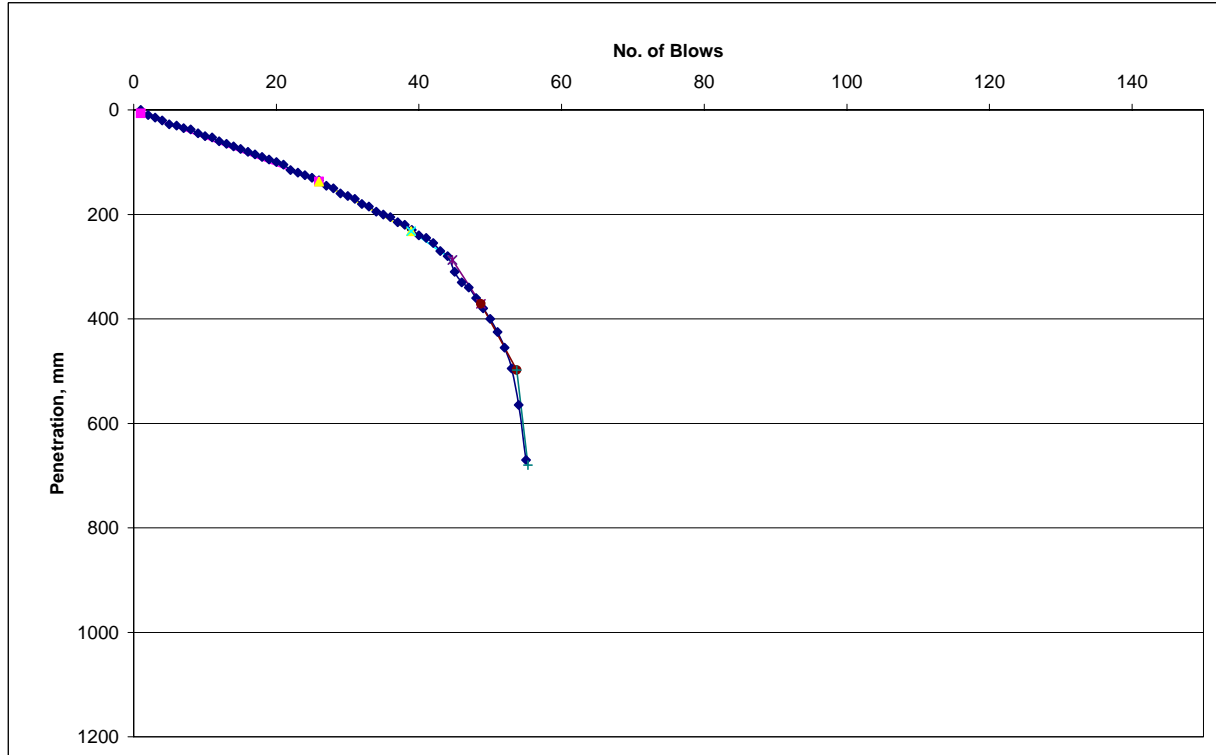




**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1264+00 15' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD  
**Date of Treatment:** 7/7/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	26	7	137	25	130	5.700	50
26	38.9	137	232	12.9	95	7.864	35
38.9	44.7	232	287	5.8	55	9.983	25
44.7	48.7	287	371	4	84	21.500	10
48.7	53.7	371	498	5	127	25.900	8
53.7	55.3	498	680	1.6	182	114.250	1.5

**Result**  
 From 0.3 inches to 5.4 inches, the CBR value is 50.  
 From 5.4 inches to 9.1 inches, the CBR value is 35.  
 From 9.1 inches to 11.3 inches, the CBR value is 25.  
 From 11.3 inches to 14.6 inches, the CBR value is 10.  
 From 14.6 inches to 19.6 inches, the CBR value is 8.  
 From 19.6 inches to 26.8 inches, the CBR value is 1.5.  
**Weighted Average CBR (Stabilized):** 33.1  
**In situ:** 4.2

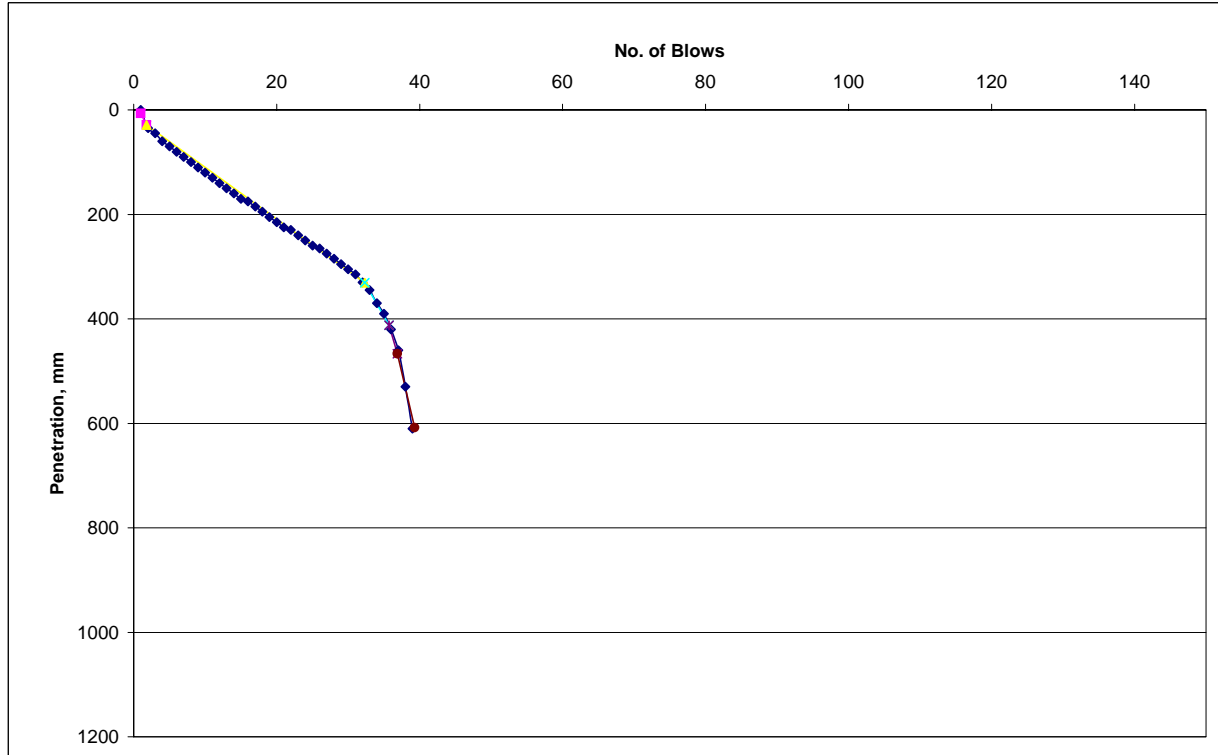


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1267+35 4' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD (wet area rutting)  
**Date of Treatment:** 7/8/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	1.8	7	29	0.8	22	28.000	7
1.8	32.3	29	331	30.5	302	10.402	20
32.3	35.7	331	412	3.4	81	24.324	8
35.7	36.9	412	467	1.2	55	46.333	4
36.9	39.3	467	608	2.4	141	59.250	3

**Result**  
 From 0.3 inches to 1.1 inches, the CBR value is 7.  
 From 1.1 inches to 13.0 inches, the CBR value is 20.  
 From 13.0 inches to 16.2 inches, the CBR value is 8.  
 From 16.2 inches to 18.4 inches, the CBR value is 4.  
 From 18.4 inches to 23.9 inches, the CBR value is 3.

**Weighted Average CBR (Stabilized):** 16.9  
**Insitu:** 3.3

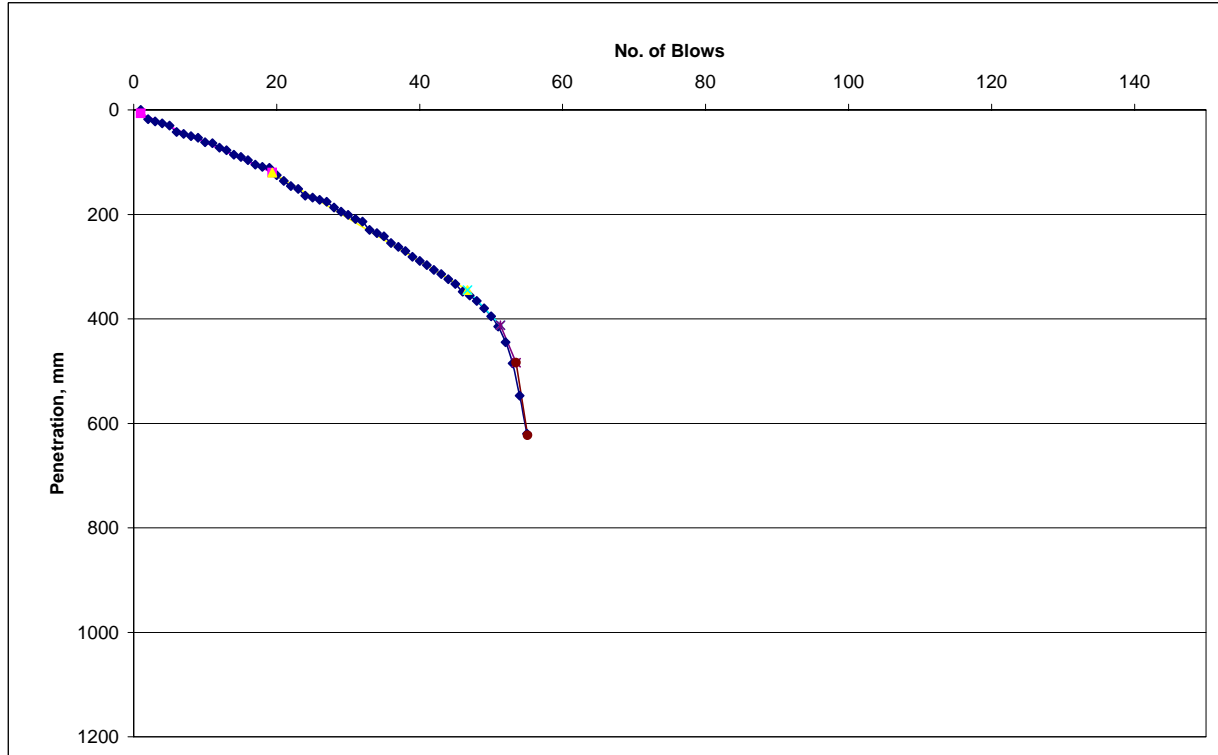


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1264+00 16' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD (wet area rutting)  
**Date of Treatment:** 7/7/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	19.4	7	120	18.4	113	6.641	40
19.4	46.7	120	345	27.3	225	8.742	30
46.7	51.3	345	412	4.6	67	15.065	14
51.3	53.5	412	484	2.2	72	33.227	6
53.5	55.1	484	623	1.6	139	87.375	2

**Result**  
 From 0.3 inches to 4.7 inches, the CBR value is 40.  
 From 4.7 inches to 13.6 inches, the CBR value is 30.  
 From 13.6 inches to 16.2 inches, the CBR value is 14.  
 From 16.2 inches to 19.1 inches, the CBR value is 6.  
 From 19.1 inches to 24.5 inches, the CBR value is 2.

**Weighted Average CBR (Stabilized):** 30.1  
**In situ:** 3.4

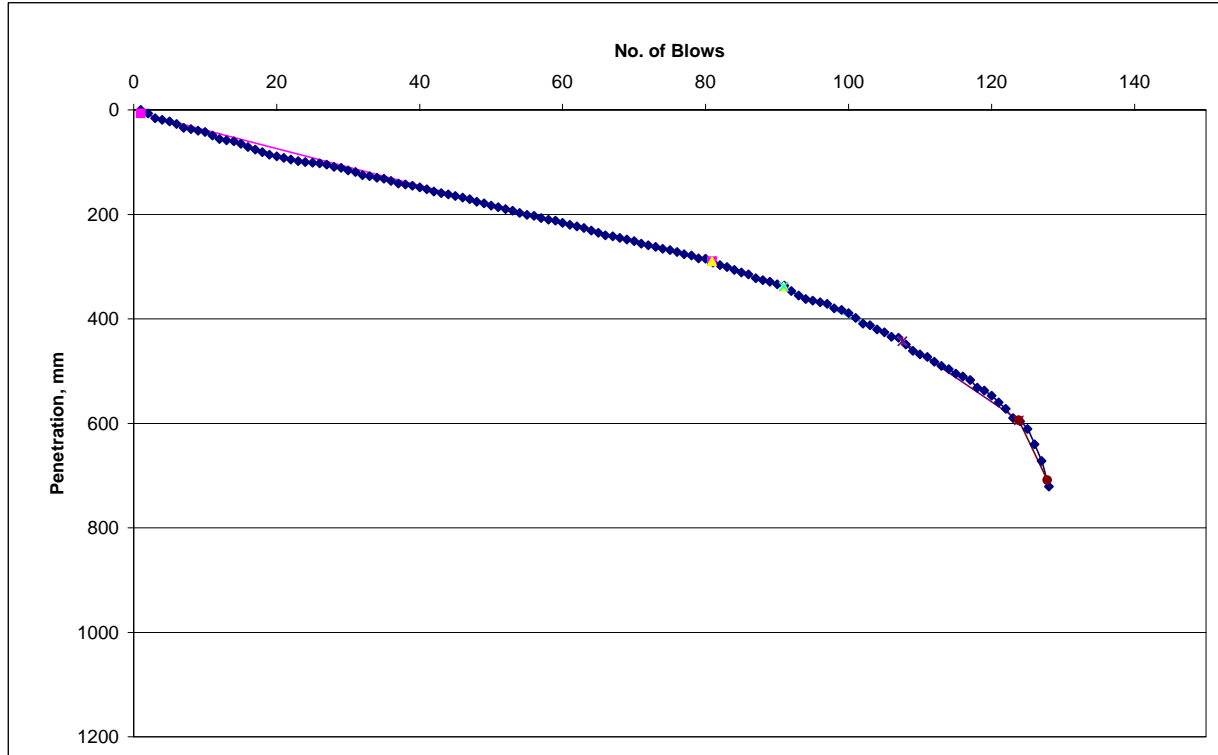


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1268+00 3' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD (wet area rutting)  
**Date of Treatment:** 7/8/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	80.9	7	290	79.9	283	4.042	60
80.9	90.9	290	338	10	48	5.300	50
90.9	107.5	338	443	16.6	105	6.825	40
107.5	123.8	443	594	16.3	151	9.764	25
123.8	127.8	594	709	4	115	29.250	7

**Result**  
 From 0.3 inches to 11.4 inches, the CBR value is 60.  
 From 11.4 inches to 13.3 inches, the CBR value is 50.  
 From 13.3 inches to 17.4 inches, the CBR value is 40.  
 From 17.4 inches to 23.4 inches, the CBR value is 25.  
 From 23.4 inches to 27.9 inches, the CBR value is 7.

**Weighted Average CBR (Stabilized):** 46.6  
**Insitu:** 7.0

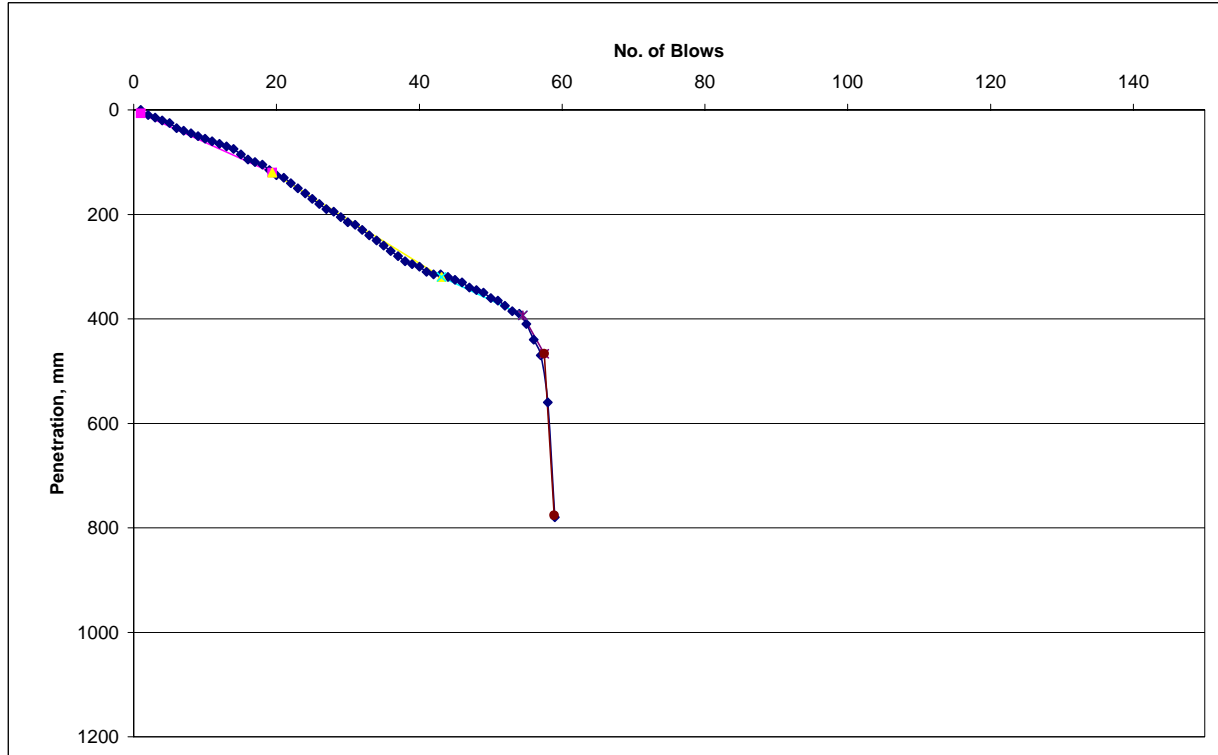


**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1269+50 18' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD  
**Date of Treatment:** 7/9/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	19.4	7	120	18.4	113	6.641	40
19.4	43.1	120	320	23.7	200	8.939	30
43.1	54.5	320	393	11.4	73	6.904	40
54.5	57.5	393	467	3	74	25.167	8
57.5	58.9	467	776	1.4	309	221.214	0.7

**Result**  
 From 0.3 inches to 4.7 inches, the CBR value is 40.  
 From 4.7 inches to 12.6 inches, the CBR value is 30.  
 From 12.6 inches to 15.5 inches, the CBR value is 40.  
 From 15.5 inches to 18.4 inches, the CBR value is 8.  
 From 18.4 inches to 30.6 inches, the CBR value is 0.7.

**Weighted Average CBR (Stabilized):** 34.8  
**Insitu:** 2.1



**Control Section:** 82194  
**Job #:** 37795  
**Project Name:** NB I-75  
**Core #:** Sta. 1271+10 3' RT of C/L  
**Comment:** CKD treated clay+sand 8% CKD  
**Date of Treatment:** 7/9/2008  
**Date of DCP Testing:** 7/11/2008

X (# of Blows)		Y (Penetration)		Blow Count	Total Penetration	mm/Blow	CBR
Begin	End	Begin	End				
1	31.7	7	194	30.7	187	6.591	40
31.7	43.1	194	297	11.4	103	9.535	25
43.1	47.3	297	383	4.2	86	20.976	10
47.3	48.3	383	757	1	374	374.500	0.4

**Result**  
 From 0.3 inches to 7.6 inches, the CBR value is 40.  
 From 7.6 inches to 11.7 inches, the CBR value is 25.  
 From 11.7 inches to 15.1 inches, the CBR value is 10.  
 From 15.1 inches to 29.8 inches, the CBR value is 0.4.

**Weighted Average CBR (Stabilized):** 29.0  
**In situ:** 0.4

