GETECHNICAL INVESTIGATION
ALMEDA ROAD PAVING AND DRAINAGE FROM
OLD SPANISH TRAIL TO SOUTH MACGREGOR WAY
WBS NO. N-000806-0001-3
TXDOT CSJ NO. 0912-72-072
HOUSTON, TEXAS

SUBMITTED TO
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BY
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HOUSTON, TEXAS
DECEMBER 5, 2013

REPORT NO. HG1018580
KEY MAP NOS. 533 E & J

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December 5, 2013

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Re: Geotechnical Investigation
Almeda Road Paving and Drainage
From Old Spanish Trail (OST) to South MacGregor Way
Owner: City of Houston
WBS No. N-000806-0001-3
TxDOT CSJ No. 0912-72-072
HVJ Report No. HG1018580

Dear Mr. Silva:

Submitted herein is the final report of our geotechnical investigation for the above referenced project. The study was conducted in general accordance with our proposal number HG1018580 dated November 12, 2010 (revised September 13, 2012) and is subject to the limitations presented in this report. We appreciate the opportunity of working with you on this project. We received comments on our draft report form the City of Houston (August 9, 2013) and from TxDOT (October 8, 2013) and we addressed them in this revised report. Please read the entire report and notify us if there are questions concerning this report or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

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The seal appearing on this document was authorized by Ziad AlAawar, PE 107115 on December 5, 2013. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by Walter P Moore and Associates, Inc. to provide geotechnical recommendations for the proposed reconstruction of Almeda Road from Old Spanish Trail (OST) to South MacGregor in Houston, Texas. The project also involves sanitary sewer replacement crossing Almeda Road at the intersection of Dixie Road and also water line replacement along Almeda Road between Lockett Street and Holcombe Boulevard. Based on the information provided to us by Walter P Moore and Associates, Inc., we understand that the invert depth of the water line is about 7 feet below the existing grade at most locations, and 17 feet below the existing grade near the sanitary sewer location, and the invert depth of the sanitary sewer line is at approximately 10 feet below the existing grade. Based on the information provided to us by Walter P Moore and Associates, Inc., we also understand that open cut techniques will be used for the installation of the utility lines. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide geotechnical recommendations for utilities replacement using open cut techniques. Design of pavement cross section is beyond our scope and will be performed by TxDOT as mentioned in our proposal dated November 12, 2010 (Revised September 13, 2012). The field and laboratory investigations study performed for the pavement reconstruction were in accordance with TxDOT Geotechnical Manual dated December, 2012 and for utilities replacement were in accordance with the City of Houston, Department of Public Works and Engineering Design Manual Chapter 11 "Geotechnical and Environmental Requirements" dated July, 2012.

Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below:

1. At the design invert depth, the soil consisted mainly of firm and stiff clay as illustrated in the boring logs. At this level, the soil consisted predominantly of lean clay at B-1, B-3, and B-4, and of fat clay at boring B-2. At the location of the sewer line (B-4), stiff fat clay was observed at the invert depth corresponding to approximately 10 feet. The subsurface soils at the site generally comprise firm to stiff cohesive fat clays and firm to very stiff lean clays in the upper 12 feet at borings B-1, B-2, and B-3. At boring B-4, stiff to very stiff lean and fat clay were encountered up to a depth of approximately 33 feet. Fill material comprising of sand with shells and gravel was encountered at the top 2 feet at borings B-4 and P-2. Fill material consisting of sandy clay with shells and rocks was observed at top 2 feet at boring P-1 and also between 3 to 5 feet at boring P-2. Ferrous and calcareous nodules were encountered at various depths in most of the borings.

2. A review of surface faults was made from geologic literature and available in-house records. Based on our review, Pierce Junction salt dome is located at about 3.5 miles south of the project site and Memorial Park fault is located at about 4 miles northwest of the project site. We believe that faulting may not impact the project site. A detailed fault study is beyond the scope of our work.

3. Groundwater was not encountered at any of the borings during drilling operations except at boring B-4, which is a deeper boring. One piezometer was installed at boring location B-4 (PZ-1) and the 24-hour water level reading was recorded at 28.0 feet. Piezometer installation records and groundwater level data are provided in Appendix C.

4. Recommendations for replacement of sanitary sewer and water line using open cut techniques are presented in this report.

5. The existing pavement was cored at eight locations and the core data revealed three different types of pavement sections: 1- Asphalt over crushed concrete, 2- Asphalt over concrete, and 3- concrete over either stabilized sand or crushed concrete. In the case were asphalt was placed over crushed concrete (Borings C-2, C-4, and C-6), the asphalt thickness varied between 6 and 12 inches, and the crushed concrete varied between 4 and 12 inches. In the case where asphalt was placed over concrete (Borings C-1, C-3, and C-5), the asphalt thickness varied between 2 to 3 inches, and the concrete thickness varied between 9 and 10 inches. In this case, the concrete itself was placed over crushed concrete in the section corresponding to boring C-1. In the case of concrete over stabilized sand / crushed concrete (Borings C-7 and C-8), the observed stabilized base thickness was approximately 6 inches and the concrete layer varied in depth between 6 and 9 inches. At the location of the pavement borings (P-1 to P-4), sandy clay with sand and rocks were predominantly observed. Similar conditions were observed near the surface at boring B-4. At borings B-1 to B-3 fat clay was encountered and could be encountered in some locations beneath the pavement. More Details on the existing pavement thickness are presented in Section 8.2 of this report.

Please note that this executive summary does not fully relate our findings and opinions. Those findings and opinions are only presented through our full report.

2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by Walter P Moore and Associates, Inc. to provide geotechnical recommendations for the proposed reconstruction of Almeda Road from Old Spanish Trail (OST) to South MacGregor in Houston, Texas. The project also involves sanitary sewer replacement crossing Almeda Road at the intersection of Dixie Road and also water line replacement along Almeda Road between Lockett Street and Holcombe Boulevard. Based on the information provided to us by Walter P Moore and Associates, Inc., we understand that the invert depth of the water line is about 7 feet below the existing grade at most locations, and 17 feet below the existing grade near the sanitary sewer location, and the invert depth of the sanitary sewer line is at approximately 10 feet below the existing grade. Based on the information provided to us by Walter P Moore and Associates, Inc., we also understand that open cut techniques will be used for the installation of the utility lines. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

2.2 Geotechnical Investigation Program

The major objectives of this study were to gather information on subsurface conditions at the site and to provide recommendations for the proposed utilities and pavement reconstruction. The field and laboratory investigations study performed for the pavement reconstruction were in accordance with TxDOT Geotechnical Manual dated December, 2012 and for utilities replacement were in accordance with the City of Houston, Department of Public Works and Engineering Design Manual Chapter 11 "Geotechnical and Environmental Requirements" dated July, 2012. The objectives were accomplished by:

- Drilling eight soil borings to depths ranging from 5 to 55 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing. The 55 feet boring was drilled at the location of the sewer line assuming a depth of 36 feet based on our understanding of the information available at the time of the preparation of the proposal. When preparing the report, the invert depth at this location for the sewer line was found to be 10 feet based on the drawings provided to us by Walter P Moore and Associates, Inc.

- Installing one piezometer to gain an understanding of the groundwater conditions at the site and to evaluate the potential need for dewatering during construction.

- Performing laboratory tests to determine physical and engineering characteristics of the soils.

- Performing engineering analyses to develop design guidelines and recommendations for the proposed pavement reconstruction and utilities replacement.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations, and construction considerations.

3 FIELD INVESTIGATION

3.1 Geotechnical Borings

The field exploration program undertaken at the project site was performed between May 10, 2013 and May 13, 2013. Subsurface conditions were investigated by drilling eight soil borings to depths

ranging from 5 to 55 feet below the existing grade. The pavement was cored at eight locations near to the borings and the pavement thickness information was obtained.

All boreholes excluding the one with the piezometer were backfilled with cement grout by tremie method in accordance with the City Guidelines and patched at the surface where applicable. The piezometer was plugged after obtaining the 30 day water level reading. Approximate boring locations are presented on Plates 2A to 2G of the report.

3.2 Survey Data

Based on the survey information provided to us by Walter P Moore and Associates, Inc. according to the Texas State Plane Coordinate System, the station number, offset distance, ground surface elevation and coordinates for all the borings is presented below.

Boring Number	Base Line	Station Number	Offset, feet	Northing, feet	Easting, feet	Ground Elevation, feet
P-1	Almeda Road	13+83.20	22.01' LT	13,820,672.87	3,115,631.14	44.25
P-2	Almeda Road	23+20.52	25.63' RT	13,821,566.62	3,115,917.56	44.82
P-3	Almeda Road	59+98.97	19.10' LT	13,825,135.90	3,116,808.09	38.86
P-4	Almeda Road	67+69.89	5.91' LT	13,825,878.92	3,117,014.10	39.44
B-1	Almeda Road	33+00.42	7.40' LT	13,822,522.43	3,116,136.12	42.47
B-2	Almeda Road	38+01.30	0.81' RT	13,823,004.62	3,116,271.94	43.14
B-3	Almeda Road	44+00.24	2.15' RT	13,823,583.36	3,116,426.14	43.42
B-4	Almeda Road	52+56.82	27.05' RT	13,824,405.71	3,116,667.57	41.29

3.3 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings except at boring B-4 where samples were obtained continuously to a depth of 20 feet and then at 5 foot intervals thereafter to the termination depth of the borings. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with ASTM D-1587 standard. Each sample was removed from the sampler in the field, carefully examined and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split spoon sampler in accordance with ASTM D 1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

The TxDOT cone penetrometer test was performed at the termination depth of pavement borings (P-1 to P-4). The TxDOT cone test is used to determine the relative density or consistency of a soil material. The test involves driving a 3-inch diameter cone with a 170-pound hammer, which is dropped for a distance of 2 feet. The cone is seated and driven to 12 blows or 12 inches whichever comes first. Then, it is driven for two consecutive 6-inch increments and the blow counts for each increment are noted. In hard materials, the cone is driven with the resulting penetration in inches

recorded for the 50 blows. The number of blows for each 6-inch increment and/or the amount of penetration for each 50 blows is presented on the boring logs presented in Appendix A

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A. A key to the soils classification and symbols used in the boring logs is also presented in Appendix A.

3.4 Water Level Measurements

Groundwater was not encountered at any of the borings except at boring B-4 during drilling operations. One piezometer was installed at boring location B-4 (PZ-1) to observe 24-hour and 30-day water level readings. Piezometer installation records and groundwater level data are provided in Appendix C. Appendix C also includes the "Well Report" and the "Plugging Report". The well was plugged using the "tremmie pipe cement from bottom to top" plugging method.

4 LABORATORY TESTING

Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content measurement, pocket penetrometer, percent passing No. 200 sieve, Atterberg limits, unconsolidated undrained compression and unit dry weight tests.

The Atterberg limits and percent passing number 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System, and the unconsolidated undrained compression tests was performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	46
Atterberg Limits (ASTM D4318)	20
Percent Passing No. 200 Sieve (ASTM D1140)	14
Pocket Penetrometer	31
Unconsolidated Undrained (UU) (ASTM D 2850	18
Unit Dry Weight (ASTM D 2166/2850)	18
Standard Proctor (ASTM D698)	1
Laboratory CBR (ASTM D1883)	1

The laboratory test results are presented on the boring logs in Appendix A. A summary of laboratory test results are provided in Appendix B. Standard proctor and CBR test results are presented in Appendix D.

5 SITE CHARACTERIZATION

5.1 General Geology

There are two major surface geological formations that exist in the Houston area: the Beaumont formation and the Lissie formation. The Beaumont formation is a relatively younger formation generally found to the southeast of the Lissie formation. The Beaumont formation dips southeastward and extends beneath beach sand and waters of the Gulf of Mexico as far as the continental shelf. The project site is located in an area where the Beaumont formation is typically encountered.

The Beaumont formation was deposited on land near sea level in flat river deltas and in inter-delta regions. Soil deposition occurred in fresh water streams and in flood plains (as backwater marsh and natural levees). The courses of major streams and deltaic tributaries changed frequently during the period of deposition, generating within the Beaumont clay a complex stratification of sand, silt and clay deposits. Frequently, stream courses were diverted significant distances from a given point in a backwater marsh, and the water overlying the soil would evaporate since it was cut off from a drainage path. Such water, which would be highly alkaline, would precipitate large nodules of calcium carbonate (calcareous nodules) throughout the surface of evaporation. With the coming of the Second Wisconsin Ice Age, the nearby sea withdrew, leaving the formation several hundred feet above sea level and permitting the soil to desiccate. The process of desiccation compressed the clays in the formation such that they became significantly overconsolidated to a large depth. In addition to preconsolidating the soil, the process of desiccation, together with the later rewetting, produced a network of fissures and slickensides that are now closed but which represent potential planes of weakness in the soil.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area has been subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A review of surface faults was made from geologic literature and available in-house records. Based on our review, Pierce Junction salt dome is located at about 3.5 miles south of the project site and Memorial Park fault is located at about 4 miles northwest of the project site. We believe that faulting may not impact the project site. A detailed fault study is beyond the scope of our study.

5.3 Soil Stratigraphy

Our interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require reevaluation of our findings and conclusions.

At the design invert depth, the soil consisted mainly of firm and stiff clay as illustrated in the boring logs. At this level, the soil consisted predominantly of lean clay at B-1, B-3, and B-4, and of fat clay at boring B-2. At the location of the sewer line (B-4), stiff fat clay was observed at the invert depth corresponding to approximately 10 feet. The subsurface soils at the site generally comprise firm to stiff cohesive fat clays and firm to very stiff lean clays in the upper 12 feet at borings B-1, B-2, and B-3. At boring B-4, stiff to very stiff lean and fat clay were encountered up to a depth of approximately 33 feet. Also, at boring B-4, cohesionless medium dense clayey sand was encountered at deeper location (below 33 feet) followed by sandy lean clay and fat clay to the termination depth of the boring. Fill material comprising of sand with shells and gravel was encountered at the top 2 feet at borings B-4 and P-2. Fill material consisting of sandy clay with shells and rocks was observed at top 2 feet at boring P-1 and also between 3 to 5 feet at boring P-2. Ferrous and calcareous nodules were encountered at various depths in most of the borings.

At the location of the pavement borings (P-1 to P-4), sandy clay with sand and rocks were predominantly observed. Similar conditions were observed near the surface at boring B-4. At

borings B-1 to B-3 fat clay was encountered and could be encountered in some locations beneath the pavement.

Details of the subsurface stratigraphy encountered in the borings are shown on the boring logs presented in Appendix A.

5.4 Groundwater Conditions

Groundwater was not encountered at any of the borings except at boring B-4 during drilling operations. During drilling, the water level was observed at a depth of 20 feet at B-4. One piezometer was installed at boring location B-4 (PZ-1) and the 24-hour water level reading was recorded at 28 feet. Piezometer installation records and groundwater level data are provided in Appendix C.

It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. Groundwater levels measured in open standpipe piezometers are, on the other hand are more accurate; however, these readings will fluctuate seasonally and in response to rainfall. Other factors that might impact piezometric groundwater levels include leakage from existing water lines, storm sewers and/or sanitary sewers.

6 UTILITY DESIGN CRITERIA AND RECOMMENDATIONS FOR OPEN CUT TECHNIQUES

6.1 General

The project involves the replacement of a 40 feet segment of sanitary sewer crossing Almeda Road at the intersection of Dixie Road and about 1,200 feet of water line along Almeda Road between Lockett Street and Holcombe Boulevard. We understand that the invert depth of the water line is about 7 feet below the existing grade at most locations, and 17 feet below the existing grade near the sanitary sewer location, and the invert depth of the sanitary sewer line is at approximately 10 feet below the existing grade. Boring, B-4 was drilled within the close vicinity of both the sanitary sewer and the water line where as the borings B-1, B-2 and B-3 were drilled only for the water line replacement. Our recommendations for the installation of utilities using open cut techniques are presented below.

6.2 Geotechnical Parameters

Geotechnical design parameters are presented in the following table. Design parameters given in the table are based on field and laboratory test data obtained at boring locations drilled for the water lines at the approximate invert depth. It must be noted that because of the nature of the soil stratigraphy at this site, parameters at locations away from the borings may vary substantially from values reported in the table.

Boring No.	Street Name	Approximate Invert Depth (ft)	Soil Description at Invert Depth	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Allowable Bearing Pressure (psf)	E'_n, Long Term (psi)
B-1	Almeda Road	7	Stiff Lean Clay	103	1,600	2,600	600
B-2	Almeda Road	7	Firm Fat Clay	117	1,000	1,600	300
B-3	Almeda Road	7	Firm Lean Clay	128	1,000	1,400	300
B-4	Almeda Road	10 (Sanitary Sewer)	Firm Lean Clay	128	1,000	1,600	300
B-4	Almeda Road	17 (Water Line)	Firm Lean Clay	128	1,000	1,600	300

The values shown in the above table represent our interpretation of the soil properties based on the available laboratory and field test data. Use of the soil properties shown above may or may not be appropriate for a particular analysis, since choice of design parameters often depends on whether total or effective stress analysis is used, rate of loading, duration of loading, geometry of loaded area, and other factors. The total unit weight values shown above represent our interpretation of soil unit weight at natural moisture content. The undrained shear strength and allowable bearing pressure values represent our interpretation of the shear strength in clay soils based primarily on the results of unconsolidated undrained compression tests and hand penetrometer tests. The allowable bearing pressures include a factor of safety of three.

6.3 Pipe Design

The loads imposed on underground pipes depend principally upon the method of installation, the weight of overburden soils, roadway traffic load, and loads due to existing surface structures. For design of rigid pipes installed using open-cut excavation methods, loads due to overburden and traffic can be determined from Plate 3.

The traffic load applied to the pipe can be calculated using 85% of wheel load with an impact factor of 1.5 for one foot of soil cover, 50% of wheel load with an impact factor of 1.35 for 2 feet of cover, and 30% of wheel load with an impact factor of 1.15 for 3 feet of cover. This results in a total design traffic load on the pipe or box culvert of about 1.28, 0.68 and 0.35 times the wheel load for 1, 2 and 3 feet of cover, respectively. For pipes with four or more feet of cover, the traffic loads may be taken as a surcharge equivalent to 250 psf.

The design of flexible pipes requires the modulus of soil reaction of the native soil (E_n') in the trench wall as input. The E_n' values are based on empirical relationships to the soil consistency as defined by unconfined compression tests for cohesive soils. E_n' values for the native soils are presented in the table above. The E_n' values for short-term conditions in cohesive soils may be assumed to be 1.5 times the long-term values. These values are based on the soil data obtained at the boring locations only and may be used for the noted invert depth zone.

6.4 Open Cut Bedding and Backfill

Pipe Bedding. Pipe bedding should be performed according to City of Houston Standard Specification Section 02317, part 3.07 with item (J) for the water lines and item (K) for the sanitary sewers not constructed of HDPE (High Density Polyethylene). Water line installed using open-cut trenches should be placed using City of Houston Drawing No. 02317-04. The sanitary sewer may

be installed according to City of Houston Standard Drawing Nos. 02317-01, which is the typical cross section in the case of dry or wet stable trench, 02317-02, for wet stable trench where dewatering not used according to City of Houston Standard Specification 02317 item 3.07B, and 02317-08 for the shafts/manholes. Knowing that the water depth observed during drilling was at 20 feet, and after 24 hours at 28 feet, we do not expect the ground water to be above the trench bottom during construction and thus we do not expect ground water control measures to be needed and thus Drawing Nos. 02317-01 should be followed.

The excavations should be performed with equipment capable of providing a relatively clean bearing area. Stable soils are essential to provide a strong base during construction. In addition, stable soils enhance trench bottom stability, support for bedding compaction, and minimize possible pipe settlement. Whenever soft foundation soils are encountered during trench excavation, in accordance with section 02317, item 3.07.C, we recommend over excavating 3 feet below the base of the foundation and replacing with on-site soils or approved bedding material compacted to at least 95% of maximum dry density determined by ASTM D698 in loose lifts not exceeding 8 inches.

Trench Backfill. Trench backfill for utilities should be in accordance with Section 02317, Excavation and Backfill for Utilities, and in particular item 3.09 of the City of Houston Standard Specifications, January 2011. Backfill around the sanitary sewers should be in accordance with the provisions that are explained in the City of Houston Standard Details on Drawing Nos. 02317-01, knowing that the water table is below the bottom of the trench, and 02317-08 for the manholes. The water line backfill should be in accordance with Drawing No. 02317-04.

Pipe embedment should be in accordance with Section 02317 and the material used should be in accordance with City of Houston Standard Specification Sections 02320.

Trench zone backfill is that portion of trench backfill that extends vertically from the top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement. Trench zone backfill for utilities may consist of bank run sand, select fill, or random backfill material as specified in City of Houston Standard Specification Section 02320.

6.5 Thrust Force Design Recommendations

Piping System Thrust Restraint. Unbalanced thrust forces will be developed in water lines due to changes in direction, cross-sectional areas, or when the pipe is terminated. These forces may cause joints to disengage if not adequately restrained. There will be a slight loss of head due to turbulence in bends in the pipes. This loss will cause a pressure change across the bend, but it is usually small enough to be neglected.

The thrust force may require more reaction than is available just from the pipe bearing against the backfill. In order to prevent intolerable movement and overstressing of the pipe, suitable buttressing should be provided. In general, thrust blocks, concrete encasement, restrained joints and tie rods are common methods of providing reaction for the thrust restraint design. The thrust restraint design provisions described in this section are based on the American Water Works Association (AWWA) Manual M9 (2008) Concrete Pressure Pipe.

Various types of thrust restraint systems are used depending on the type of pipes and installation conditions. The thrust force at the bends should be evaluated based on the procedures described in Chapter 9 of AWWA manual M9.

Frictional Resistance. The unbalanced force produced by grade and alignment changes can also be resisted by friction on the pipe. The length of pipe will be formed by tying or welding joints together for the distance required to develop adequate capacity or by encasing the pipe in concrete. The resisting frictional force, F_R is computed, for most cases, as

$$F_R = f\,(2W_e + W_w + W_p)$$

Where:

f = Coefficient of friction between pipe and soil

W_e = Weight of soil over pipe in lb/ft

W_w = Weight of contained water in lb/ft

W_p = Weight of pipe in lb/ft

The friction value depends on the material in contact with the pipe and the soil used in the backfill around the pipe. For pipe surrounded by compacted sand or crushed stone, the friction between the pipe and soil may be based on a friction angle of 30 degrees. The allowable coefficient of friction, f, of 0.28, 0.23 and 0.18 can be used for concrete, steel and PVC pipes, respectively. This value includes a factor of safety of 2.0. The weight of soil above the pipe will depend on the soil unit weight and the pipe depth. For compacted soils used for backfill, a total unit weight of 125 pcf can be used.

In low cover situations, where depth of cover is less than 50% of pipe diameter, we should be contacted to evaluate the impact of shallow cover on thrust resistance.

Tied joints are used to transmit thrust across joints. These ties may be welded or harnessed joints. Joints may be welded in the field in order to transmit the thrust involved. Information concerning types of harnessed joints available and size and pressure limitations can be obtained from the pipe manufacturers.

7 UTILITY CONSTRUCTION RECOMMENDATIONS

7.1 General

This section is intended to address issues that might arise during construction. Our recommendations are intended for use as guidelines in dealing with particular soil conditions. The topics addressed in this section include trench excavation stability, groundwater control, and open-cut construction considerations.

The recommendations contained herein are not intended to dictate construction methods or sequences. Instead they are provided solely to assist designers in identifying potential construction problems related to excavation, based upon findings derived from sampling. Depending upon the final design chosen for the project, the recommendations may also be useful to personnel who observe construction activity.

Prospective contractors for the project must evaluate potential construction problems on the basis of their review of the contract documents, their own knowledge of and experience in the local area, and on the basis of similar projects in other localities, taking into account their own proposed methods and procedures.

7.2 Open Cut Excavation Considerations

Excavations should satisfy two requirements. First, the soils above final grade must be removed without disturbing the soil below, which will support constructed facilities. Second, the sides of the excavation must be stable to prevent damage to adjacent streets and facilities as a result of either vertical or lateral movements of the soil. In addition, a satisfactory excavation procedure must include an adequate construction dewatering system to lower and maintain the water level at least a few feet below the lowest excavation grade.

Excavation Stability. Excavations shall be shored, laid back to a stable slope or some other equivalent means may be used to provide safety for workers and adjacent structures. Earth pressures for braced excavations are presented on Plate 4. Assessment of the need for excavation sloping, use of trench boxes, or other measures required to provide a stable excavation, and the use of appropriate construction practices and/or equipment is the contractor's responsibility. The following comments are intended to represent common solutions to stability problems encountered in similar soil conditions in the Houston area, and may not be construed as excavation system design recommendations. The excavation operations shall be performed in accordance with 29 CFR Part 1926 subpart P, as amended, including rules published in the Federal Register, Vol. 54, No. 209, dated October 31, 1989, as a minimum. In addition, the provisions of legislation enacted by the Texas Legislature and City of Houston should be satisfied.

Boring No.	Street Name	Station No.	OSHA Soil Type			
			Depth of Trench (ft.)			
			0 – 5	5 – 10	10 – 15	15-20
B-1	Almeda Road	33+00.42	B	B	-	-
B-2	Almeda Road	38+01.30	C	B	-	-
B-3	Almeda Road	44+00.24	B	B	-	-
B-4	Almeda Road	52+56.82	C	B	B	B

In general, it is our opinion that the pressure distribution (for braced walls) should be used for design of sheeting or trench boxes. To reduce the potential for ground movement adjacent to the top of the excavation, the bracing should be preloaded in stages as the excavation is deepened. The detailed earth pressure diagram is presented on Plate 4.

The planned construction will be performed along alignments near existing utility installations (either crossing or paralleling the new alignments). The contractors should be aware of potential excavation stability problems while working in the vicinity of old trenches and the excavation system should be designed to accommodate this weak material (trench backfill).

The vertical walls of excavations should be located a safe distance from existing utilities in order to prevent movement in the soil mass behind the excavation that may adversely affect the utilities. We recommend that the horizontal distance should be 4 feet for excavation depths of up to 10 feet.

7.3 Select Fill and General Earthwork Recommendations

The select fill required to raise the grade or backfill should consist of sandy clay with a liquid limit less than 40 and a plasticity index between 8 and 20. Fill material that is used should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of standard Proctor maximum dry density as determined by ASTM D698.

7.4 Spoil Disposal

Spoil from construction will be generated from trench excavations. Soils that will be excavated from this project area will consist primarily of cohesive soils. Economically, possible uses of the cohesive spoil material may be limited to land reclamation, site grading, and final cover in sanitary landfill operations. These soils may not be suitable for use in engineered fill.

7.5 Groundwater Control

Based on our field investigation, we do not expect the groundwater seepage during excavation up to 10 feet. However, it depends upon the groundwater conditions at the time of construction. Assessment of the need for groundwater control and installation of appropriate dewatering equipment is the contractor's responsibility. The following comments are intended to represent common solutions to groundwater control problems encountered in similar soil conditions in the Houston area, and may not be construed as dewatering system design recommendations. A conventional pump and sump arrangement may be adequate if water bearing cohesive soils are encountered during trench excavations. Well points or eductors may be utilized to lower the groundwater level to at least three feet below the excavation level where water bearing cohesionless soils are encountered. Well points are generally not effective below about 15 feet beneath the top of the well point, and deeper dewatering requires deep wells with submersible pumps and eductors.

Control of groundwater should be accomplished in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation, and will not result in damage to existing structures. Where necessary, the water will be lowered in advance of excavation by pump and sump arrangement, wells, well points, or similar methods. Open pumping should not be permitted if it results in boils, loss of fines, softening of the subgrade, or excavation instability. Discharge should be arranged to facilitate sampling by the owner's representative or engineer.

8 EXISTING PAVEMENT DESCRIPTION

8.1 General

We understand that the project involves reconstruction of Almeda Road between from Old Spanish Trail (OST) to South MacGregor Way in Houston, Texas. Our scope is limited to provide field, laboratory test results and to obtain existing pavement thickness. Design of pavement cross section is beyond our scope and will be performed by TxDOT as mentioned in our proposal dated November 12, 2010 (Revised September 13, 2012).

8.2 Existing Pavement Thickness

The existing pavement within the project area was cored at eight locations as shown on Plates 2A to 2G. The existing pavement structure and thickness are presented in the following table:

Coring No.	Approximate Station No.	Total Thickness (inch)	Asphalt Thickness (inch)	Concrete Thickness (inch)	Base Thickness and Description
C-1	13+83.20	24	3	9	6" crushed concrete and 6" stabilized sand
C-2	23+20.52	18	6	-	12" crushed concrete
C-3	33+00.42	12	2	10	-
C-4	38+01.30	16	12	-	4" crushed concrete
C-5	44+00.24	12	2	10	-
C-6	52+56.82	24	9	-	9" crushed concrete and 6" shell
C-7	59+98.97	15	-	9	6" stabilized sand
C-8	67+69.89	12	-	6	6" crushed concrete

8.3 Moisture Density Relationship

Based on the results of the standard Proctor test presented on Plate D-1 of Appendix D, the maximum dry density of the composite sample was determined to be 107.6 pounds per cubic foot (pcf) at optimum moisture content of 16.6 percent.

8.4 CBR Value

One California Bearing Ratio (CBR) test was performed on the composite sample obtained from all the boring locations at the top 2 feet below pavement. A design CBR of 1.8 was estimated at 95% of the maximum dry density. The results of the CBR test are presented on Plates D-2 and D-3 of Appendix D.

9 MONITORING

9.1 Excavation Safety

As required under OSHA regulations, the contractor should provide a "competent person" to inspect trench excavations daily before the start of work, as needed during the shift, and after every rainstorm or other hazard increasing occurrence. When the competent person finds evidence of a hazardous condition, exposed workers should be removed from the hazardous area until the necessary precautions have been taken to ensure their safety. A competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to workers, and who has authorization to take prompt corrective measures to eliminate them.

9.2 Construction Material Testing

We recommend that backfill be monitored by an accredited testing laboratory to verify that construction is performed in conformance with project specifications. HVJ Associates routinely provides these services and would be pleased to do so for this project.

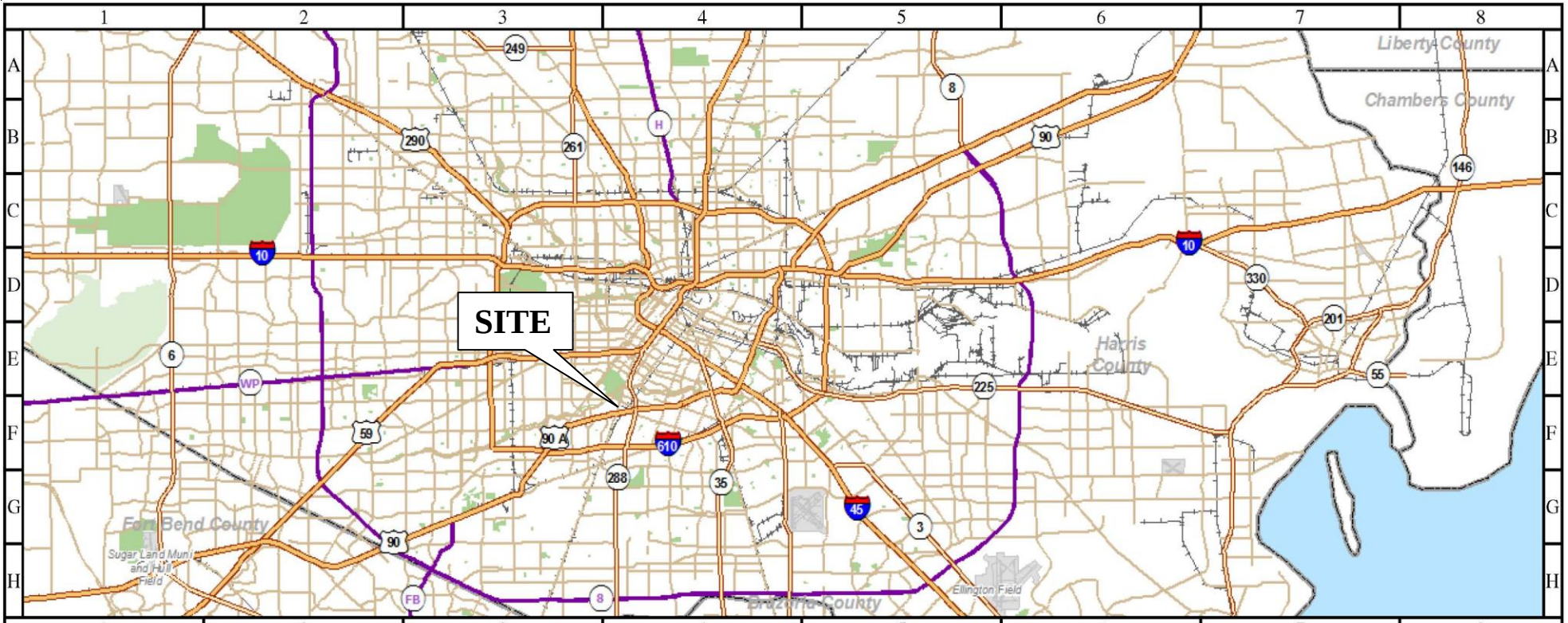
10 DESIGN REVIEW

HVJ Associates should be retained to review the final design plans and specifications for this project. During all excavation, grading and construction phases of this project, HVJ should provide the materials testing verification and observation services so our geotechnical recommendations may be interpreted and implemented correctly.

11 LIMITATIONS

This investigation was performed for the exclusive use of Walter P Moore and Associates, Inc., City of Houston and Texas Department of Transportation (TxDOT) for the proposed Almeda Road paving and drainage in Houston, Texas. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates, Inc. should be immediately notified so that further investigation and supplemental recommendations can be provided.

PLATES



CITY OF HOUSTON
Department of Public Works and Engineering
Geographic Information & Management System (GIMS)

1 inch = 23146 feet

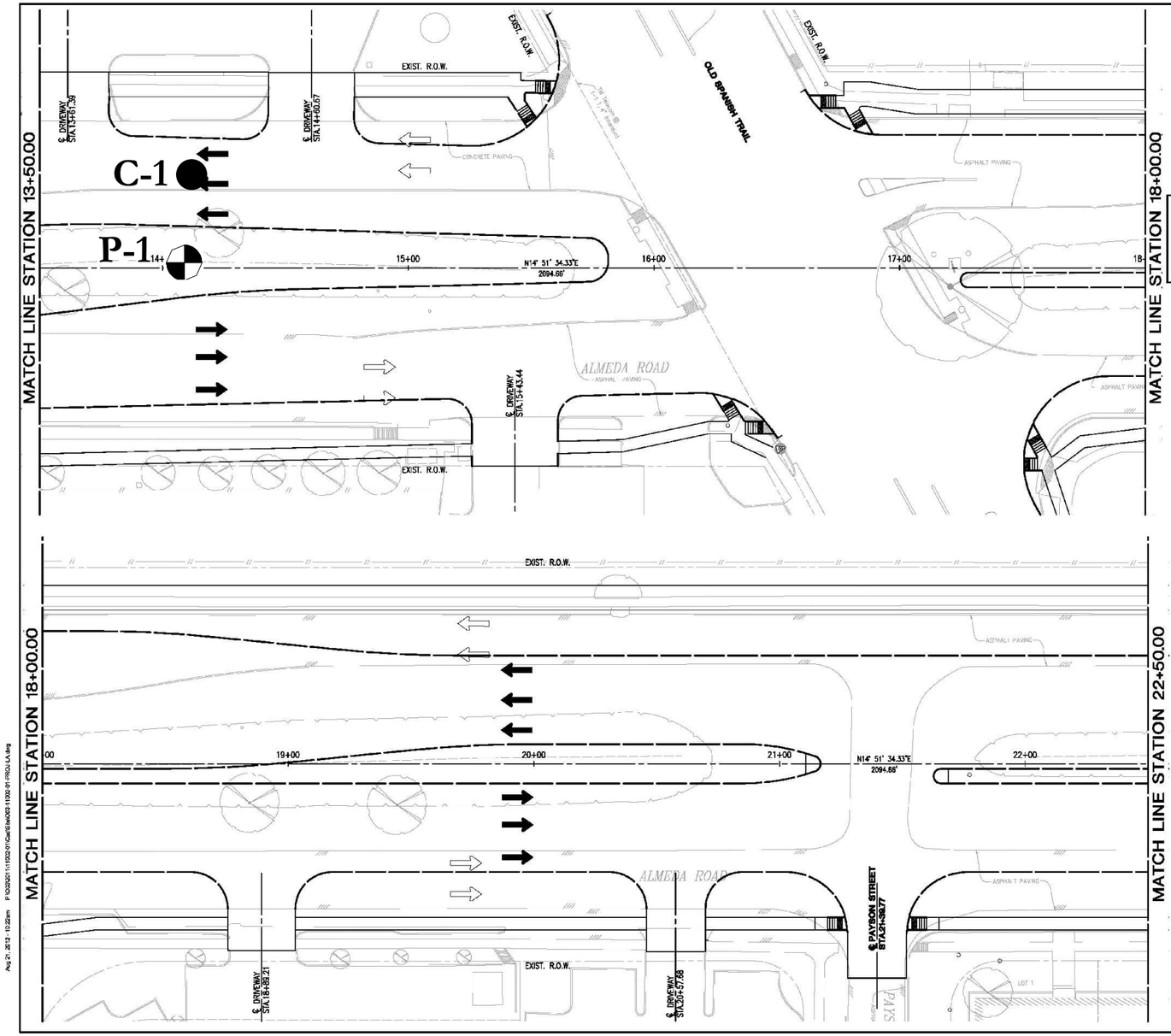
DISCLAIMER: THIS MAP REPRESENTS THE BEST INFORMATION AVAILABLE TO THE CITY.
THE CITY DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS.
FIELD VERIFICATIONS SHOULD BE DONE AS NECESSARY.

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 05/21/2013	APPROVED BY: ZA	PREPARED BY: NL

SITE VICINITY MAP
ALMEDA ROAD PAVING AND DRAINAGE
WBS No. N-000806-0001-3/ CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 1



SCALE: HORIZ. 1"=20'
VERT. 1"=2'

LEGEND

DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)

EXISTING LANE

NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-3098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Entrustide Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line markings are not visible, call 713-967-8337 (7:00 am to 4:30 pm). For details of line location request before excavation begins.
* When excavating within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark these lines since they are clearly visible, but you should locate them prior to beginning any construction. Texas law, Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of crew members under the law. This carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWBT facilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavations must be accomplished, using non-mechanized excavation procedures. When boring, the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean that there are no direct buried cables in the area. Follow the Direct Buried Cable Procedure to locate the AT&T Texas/SWBT buried cables as indicated in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT Facilities.
Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-7652 or email him at rl2556@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete: Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENT'S CALL THE LONE STAR NOTIFICATION 713-223-4567.

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY DESIGNED. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:
Approval for SWC underground conduit facilities only. Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED (Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
1301 McKINNEY, SUITE 1130
HOUSTON, TEXAS 77010
PHONE: 713.630.1800 FAX: 713.630.7898
TBPE FIRM REGISTRATION NUMBER 1856

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 13+50 TO STA. 22+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
0 000000 0000 C	
DRAWING SCALE	
VERT: AS NOTED HORIZ: AS NOTED	
CITY OF HOUSTON PM	
MICHELLE RANDON, P.E.	
SHEET NO. OF	

Aug 21, 2012 - 12:22am P:\0012011\1110022-01\Cad\SWD\3-11002-01-PROJ-LA.dwg

APPROXIMATE BORING LOCATION

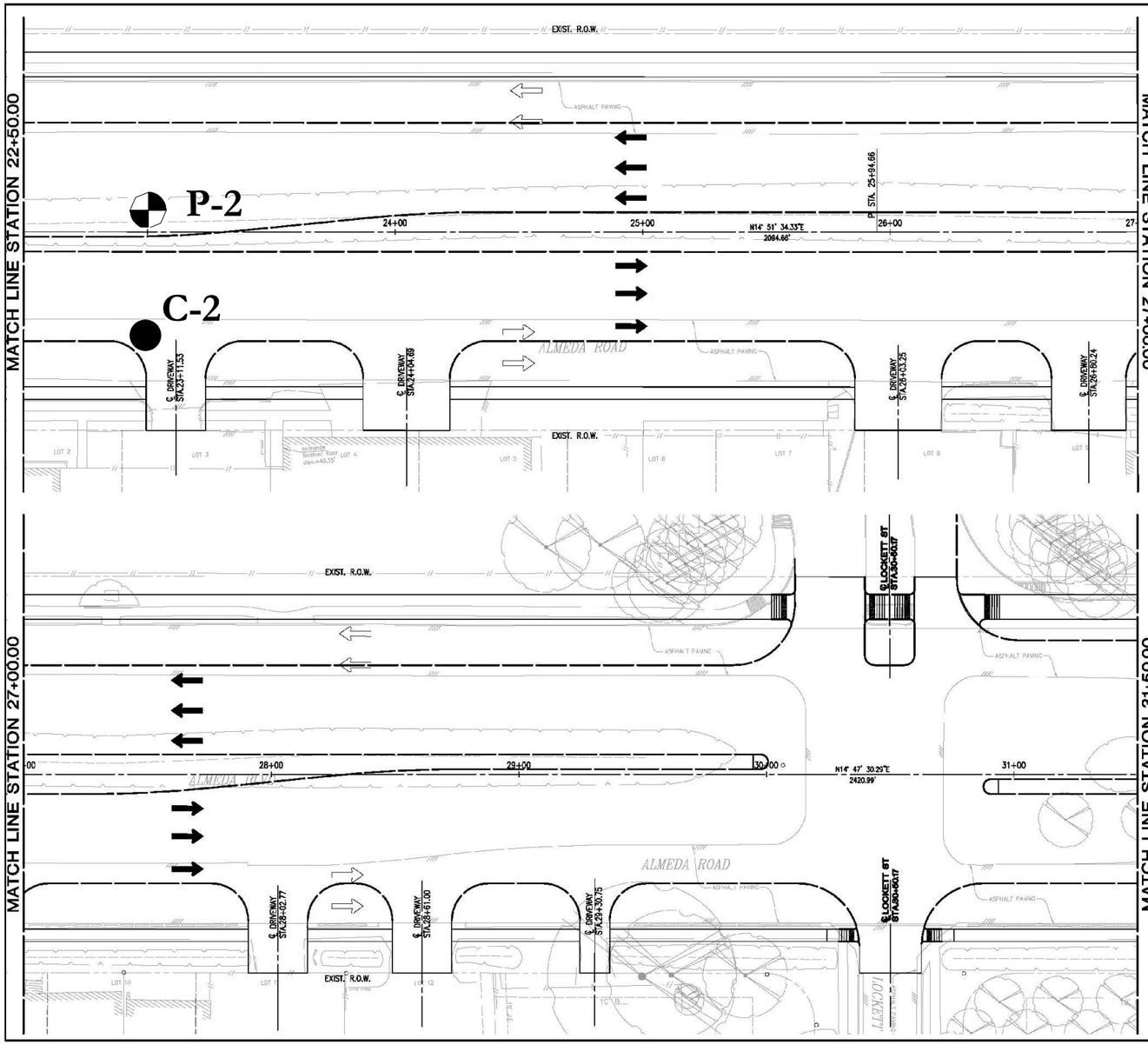
APPROXIMATE CORING LOCATION

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/ CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2A



20 0 20 40

SCALE: HORIZ. 1"=20'
VERT. 1"=2'

LEGEND

DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)

EXISTING LANE

NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-8098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (by Industrial CenterPoint Energy, Intrastate Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line markings are not visible, call 713-867-6037 (7:00 am to 4:30 pm). For status of line location request before excavation begins.
* When excavating within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark those lines since they are clearly visible, but you should locate them prior to beginning any construction. Texas law, Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under this law. This carries both criminal and civil liability. No arrangements for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWBT facilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavation must be accomplished using non-mechanized excavation procedures. When boring, the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean that there are no direct buried cables in the area. Follow the Direct Burial Cable Procedure to locate the AT&T Texas/SWBT buried cables as referred in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT Facilities.
Please contact the AT&T Texas Damage Prevention Manager at: Roosevelt Lee Jr. at 713-567-7552 or email hm at, rl4258@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete: Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1956

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4087.

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY SHOWN. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:
Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED
(Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
1301 MCKINNEY, SUITE 1130
HOUSTON, TEXAS 77010
PHONE: 713.630.7000 FAX: 713.652.7896
TBPE FIRM REGISTRATION NUMBER 1956

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 22+50 TO STA. 31+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
D-000000-0000-0	
DRAWING SCALE	
VERT: AS NOTED HORIZ: AS NOTED	
CITY OF HOUSTON PM	
MICHELLE RANDON, P.E.	
BUILD NO. OF	

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● APPROXIMATE BORING LOCATION

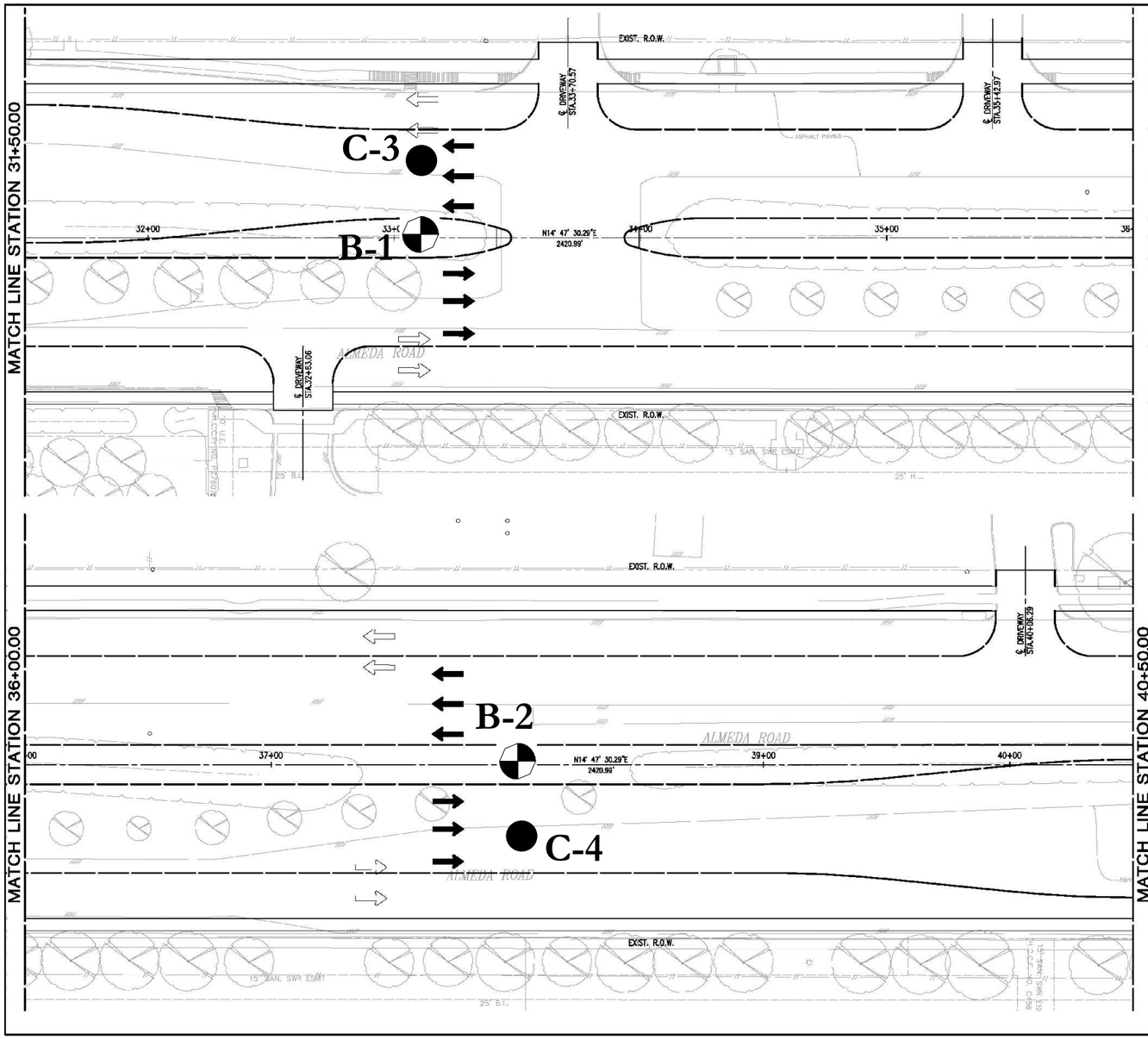
● APPROXIMATE CORING LOCATION

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/ CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2B



LEGEND

- DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)
- EXISTING LANE

NOTE:

The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-3098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES

Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Houston Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

- When Center Point Energy pipe line markings are not visible, call 713-207-7200 (7:00 am to 4:30 pm). For status of line location request before excavation begins.
- When exceeding within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
- When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

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WARNING: AT&T TEXAS/SWBT FACILITIES

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When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit, ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.

The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean there are no direct buried cables in the area. Follow the Direct Buried Cable Procedure to locate the AT&T Texas/SWBT buried cables as indicated in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT facilities.

Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-7422 or email him at rl4294@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY

Document Incomplete: Not intended for permit or construction.

Engineer: THUSITHA SILVA, P.E.

P.E. Serial No.: 82988

Date: 08/03/2011

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1256

TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN

AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567.

Date:

CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY DI-DAN. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:

Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:

CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED
(Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.

WALTER P MOORE

WALTER P. MOORE AND ASSOCIATES, INC.
301 McKINNEY, SUITE 1130
HOUSTON, TEXAS 77010

PHONE: 713.620.7500 FAX: 713.620.7996

TBPE FIRM REGISTRATION NUMBER 1256

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 31+50 TO STA. 40+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
D-000000-0000-C	
DRAWING SCALE	
VERT: AS NOTED HORZ: AS NOTED	
CITY OF HOUSTON PM MICHELLE RANDON, P.E.	
SHEET NO. OF	

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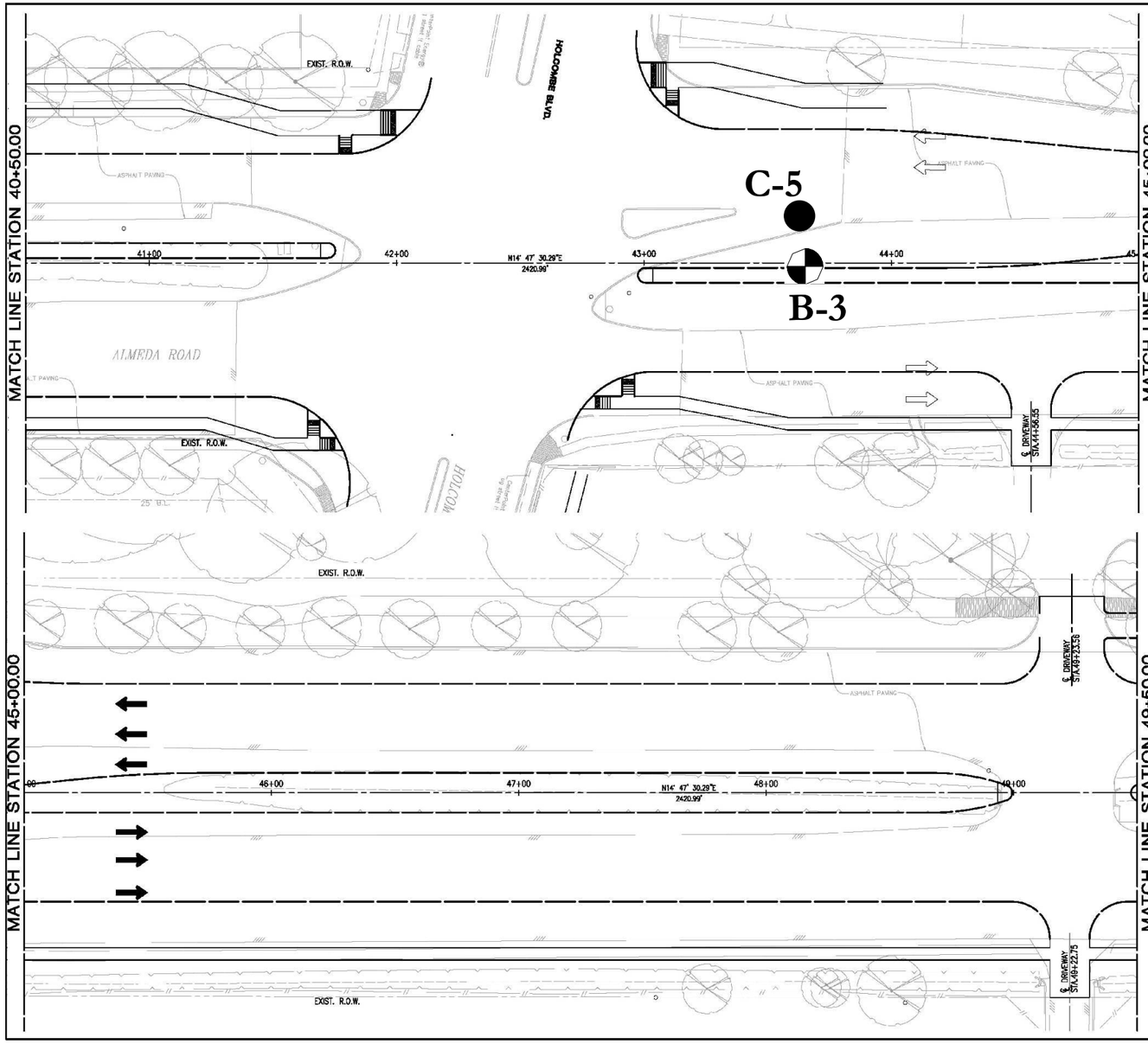
- ◐ **APPROXIMATE BORING LOCATIONS**
- ● **APPROXIMATE CORING LOCATIONS**

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/ CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2C



NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4087 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-3098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Mistletoe Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4087 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line markings are not visible, call 713-967-6037 (7:00 am to 4:30 pm). For data of line location request before excavation begins.
* When excavating within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark these lines since they are clearly visible; but you should locate them prior to beginning any construction. Texas Gas Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under the law. This carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWB facilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavation must be accomplished using non-mechanized excavation procedures. When boring, the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean that there are no direct buried cables in the area. Follow the Direct Buried Cable Procedure to locate the AT&T Texas/SWBT buried cables as indicated in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT facilities.
Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-7952 or email him at rl4204@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete. Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1956

TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4087

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY SHOWN. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:
Approver for SWC underground conduit facilities only.
Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED
(Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
301 McKINNEY, SUITE 1100
HOUSTON, TEXAS 77010
PHONE: 713.630.7800 FAX: 713.652.7996
TBPE FIRM REGISTRATION NUMBER 1956

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 40+50 TO STA. 49+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
D-000000-0000-0	
DRAWING SCALE	
VERT: AS NOTED HORZ: AS NOTED	
CITY OF HOUSTON PM	
MICHELLE RANDON, P.E.	
DRILL NO. CF	

Aug 21, 2012 - 10:22am P:\0200\011\1\0202-011\Cad\Sheets\0202-11000-01-PROJ-LA.dwg

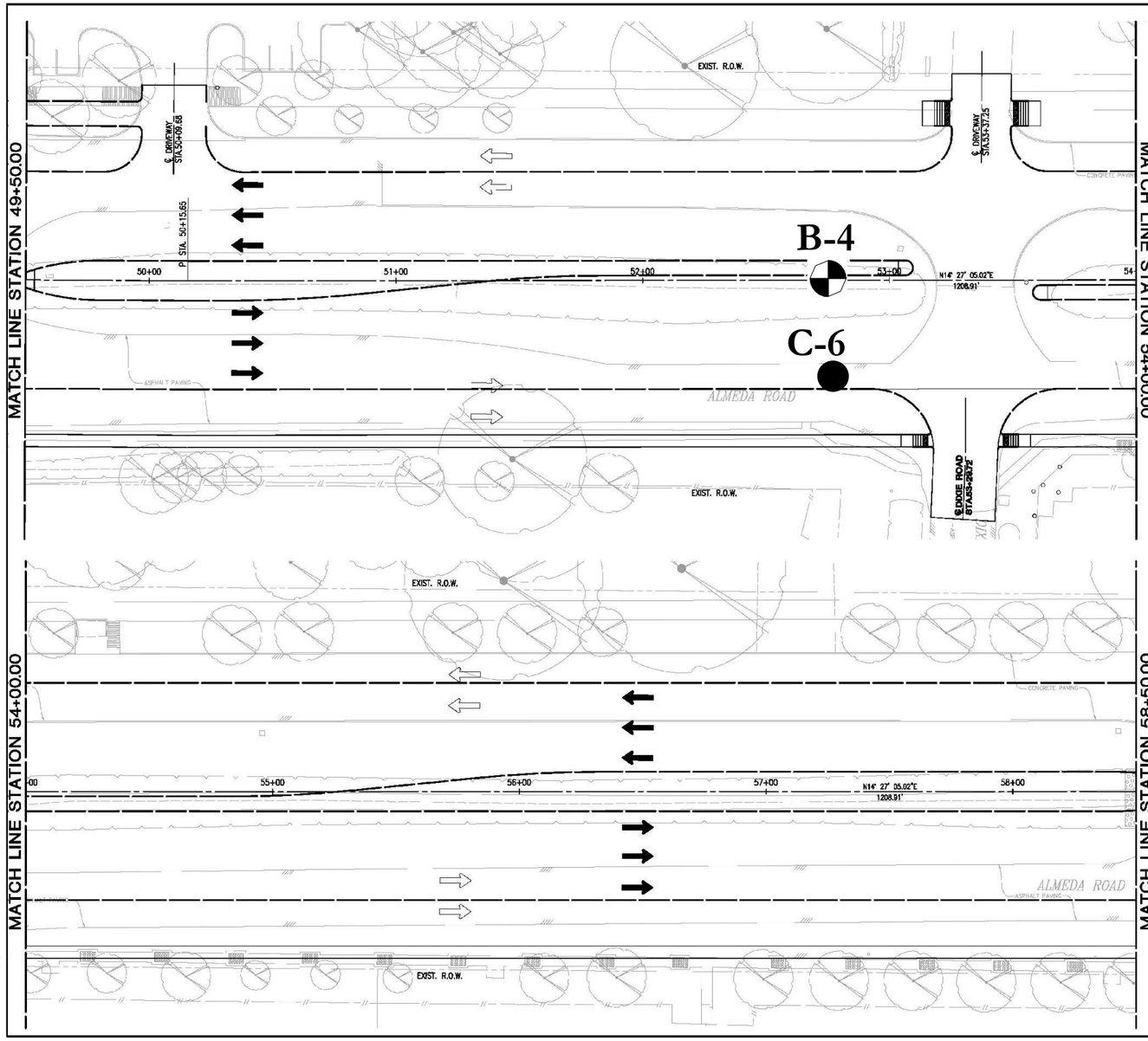
● APPROXIMATE BORING LOCATION
● APPROXIMATE CORING LOCATION

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.:	DRAWING NO.:
HG1018580	PLATE 2D



SCALE: HORIZ. 1"=20'
VERT. 1"=2'

LEGEND

- DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)
- EXISTING LANE

NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4087 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-8098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Mistletoe Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4087 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line markings are not visible, call 713-967-6009 (7:00 am to 4:30 pm). For status of line location request before excavation begins.
* When exceeding within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark these lines since they are clearly visible, but you should locate them prior to beginning any construction. Texas Rev. Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of their action workers under the law. This carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWB facilities are shown in an approximate way only. the contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior a construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavations must be accomplished using non-mechanized excavation procedures. When boring, the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean that there are no direct buried cables in the area. Follow the Direct Buried Cable Procedure to locate the AT&T Texas/SWBT buried cables as referred in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT Facilities.
Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-7552 or email him at rl4258@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete: Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4087

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY SPOTTED. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:
Approval for TWC underground conduit facilities only. Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED (Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
1301 McKINNEY ST., SUITE 1130
HOUSTON, TEXAS 77010
PHONE: 713.650.7900 FAX: 713.315.7994
TBPE FIRM REGISTRATION NUMBER 1856

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 49+50 TO STA. 58+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
D-000000-0000-C	
DRAWING SCALE	
VERT: AS NOTED	
HORZ: AS NOTED	
CITY OF HOUSTON PM	
MICHELLE RANDON, P.E.	
BUILD NO. OF	

Aug 21, 2012 - 10:24am P:\0200011\1002-01\CadSW\0003-1\002-01-PROJ-LA.dwg

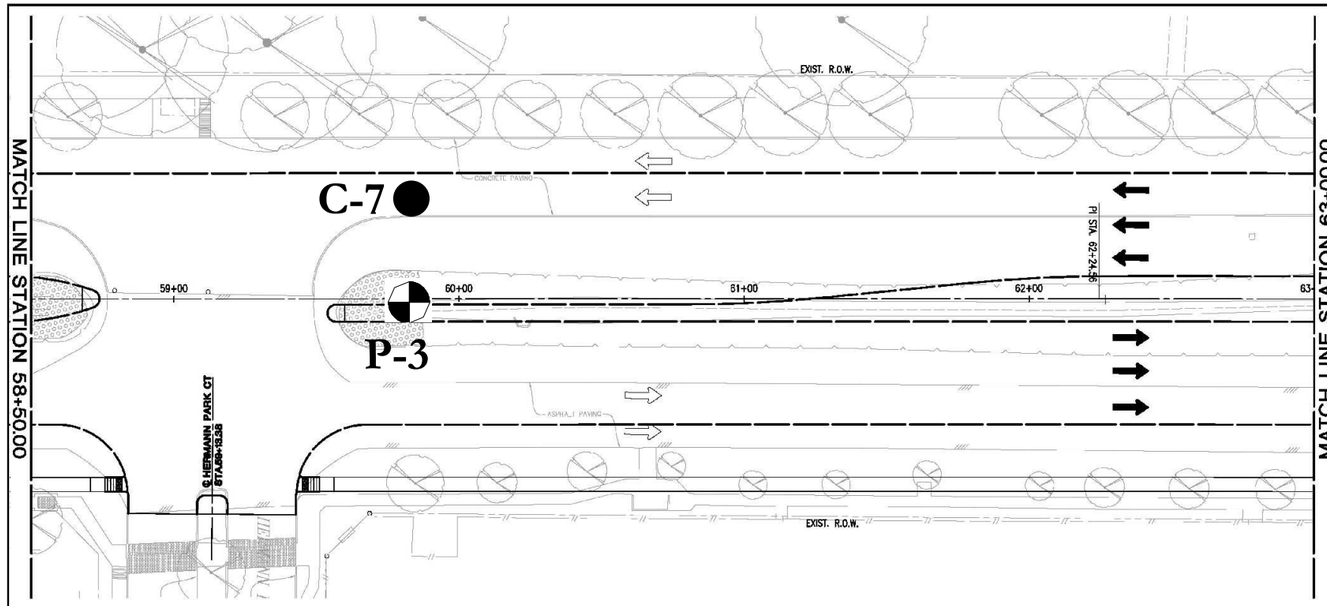
● APPROXIMATE BORING LOCATION
● APPROXIMATE CORING LOCATION

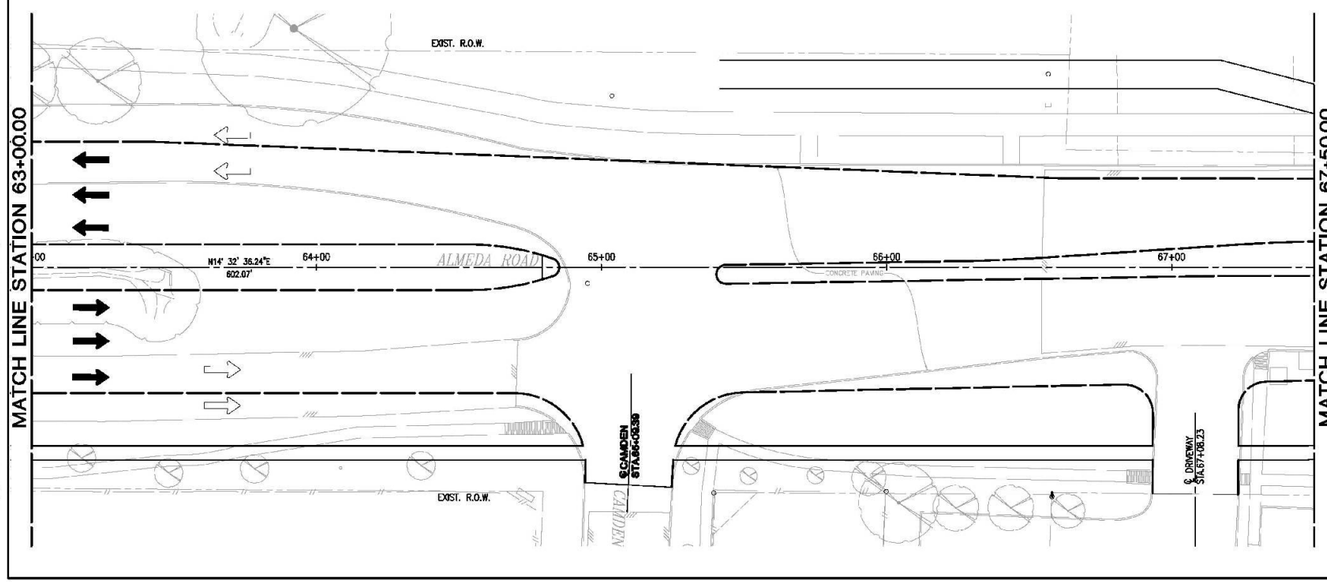
HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2E





20 0 20 40

SCALE: HORIZ. 1"=20'
VERT. 1"=2'

LEGEND

DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)

EXISTING LANE

NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 and the City of Houston Department of Public Works and Engineering at 832-394-8088 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Mirandale Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict or/and has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line marking are not visible, call 713-967-6037 (7:00 am to 4:30 pm). For status of line location request before excavation begins.
* When excavating within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the pipe.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark these lines since they are clearly visible, but you should locate them prior to beginning any construction. Texas law, Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under the law. This carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWB facilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavation must be accomplished using non-mechanized excavation procedures. When boring, the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not, near in, there are no direct buried cables in the area. Follow the Direct Burial Cable Procedure to locate the AT&T Texas/SWBT buried cables as indicated in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT Facilities.
Please contact the AT&T Texas Damage Prevention Manager M. Roosevelt Lee Jr. at 713-567-7452 or email him at m2l@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete: Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc
TBPE Firm Registration No. 1856

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENT'S CALL THE LONE STAR NOTIFICATION 713-223-4567.

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES THE UNDERGROUND ELECTRIC LINES ARE PROPERLY DESIGNED, NO ALTERNATE FOR CONSTRUCTION IS OVER.

Date:
Approved for SWB underground conduit facilities only. Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED (Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
2445 TANNER STREET
HOUSTON, TEXAS 77002
PHONE: 713.630.7900 FAX: 713.202.7996
TBPE FIRM REGISTRATION NUMBER 1856

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 58+50 TO STA. 67+50

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
D-000000-0000-0	
DRAWING SCALE	
VERT: AS NOTED HORIZ: AS NOTED	
CITY OF HOUSTON PM MICHELLE RANDON, P.E.	
SHEET NO. OF	

Aug 21, 2012 - 10:29am P:\0220011\11\0220-01\Cad\SWM03-11030-01-PROJ-LA.dwg

APPROXIMATE BORING LOCATION

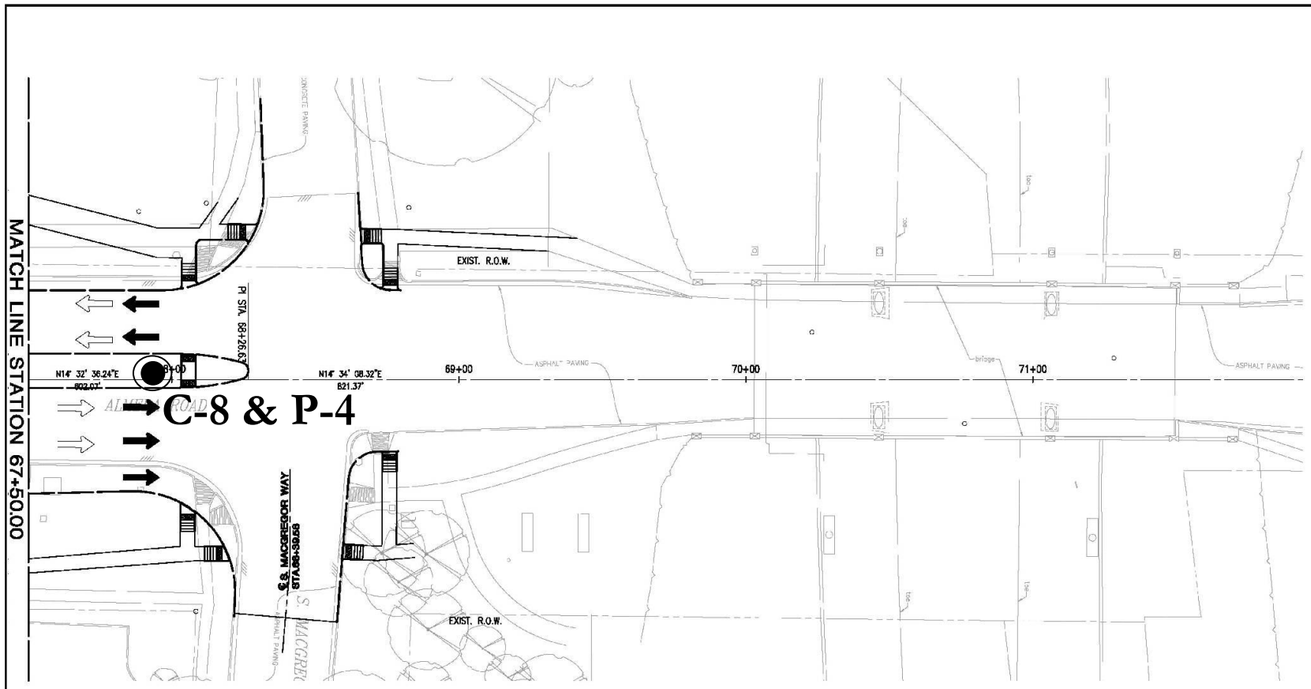
APPROXIMATE CORING LOCATION

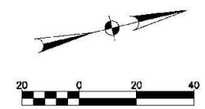
HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2F





LEGEND

- DIRECTION OF TRAFFIC FLOW (PROPOSED LANE)
- EXISTING LANE

NOTE:
The location of existing underground utilities are shown in an approximate way only. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 and the City of Houston Department of Public Works and engineering at 632-3941-3098 a minimum of two working days prior to construction to field locate utilities. The contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities.

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Minnesota Pipeline Inc. where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate location. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 713-223-4567 or 1-800-669-8344 a minimum of 48 hours prior to construction to have main and service lines field located.

* When Center Point Energy pipe line markings are not visible, call 713-967-6097 (7:00 am to 4:30 pm). for status of line location request before excavation begins.
* When excavating within eighteen inches (18") of the indicated location of Center Point Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
* When Center Point Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on this piping.

The contractor is fully responsible for any damages caused by the contractor's failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark these lines since they are clearly visible. But you should locate them prior to beginning any construction. Texas law, Section 752, Health and Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under this law. This carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222. Revised 2008

WARNING: AT&T TEXAS/SWBT FACILITIES
The locations of AT&T Texas/SWB facilities are shown in an approximate way only. the contractor shall determine the exact location before commencing work. he agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve these underground utilities.
The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.
When excavating within eighteen inches (18") of the indicated location of AT&T Texas/ SWBT facilities, all excavation must be accomplished using non-mechanized excavation procedures. When boring the contractor shall expose the AT&T Texas/SWBT facilities.
When AT&T Texas/SWBT facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.
The presence or absence of AT&T Texas/SWBT underground conduit facilities does not mean that there are no direct buried cables in the area. Follow the Direct Buried Cable Procedure to locate the AT&T Texas/SWBT buried cables as indicated in the AT&T Texas Research and Signature Process for AT&T Texas/SWBT Facilities.
Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-7652 or email him at rl2456@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

NO.	DATE	REVISIONS	APP.

INTERIM REVIEW ONLY
Document Incomplete: Not intended for permit or construction.
Engineer: THUSITHA SILVA, P.E.
P.E. Serial No.: 82988
Date: 08/03/2011
Walter P. Moore and Associates, Inc
TBPE Firm Registration No. 1856

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567.

Date:
CenterPoint Energy/Electric Facilities
SIGNATURE INDICATES underground ELECTRIC LINES ARE PROPERLY DI-GAN. NO APPROVAL FOR CONSTRUCTION IS GIVEN.

Date:
Approval for TWC underground conduit facilities only. Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX INCORPORATED (Gas service lines are not shown)

CABLE COMPANY

THUSITHA SILVA,P.E.
WALTER P MOORE
WALTER P. MOORE AND ASSOCIATES, INC.
1301 MONCRIEF, SUITE 1100
HOUSTON, TEXAS 77010
PHONE: 713.526.7928 FAX: 713.893.7996
TBPE FIRM REGISTRATION NUMBER 1856

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ALMEDA ROAD FROM OLD SPANISH TRAIL TO S. MACGREGOR WAY PROJECT LAYOUT STA. 67+50 TO END STA.

WBS NUMBER	FOR CITY OF HOUSTON USE ONLY
N-000806-0001-3	
DRAWING SCALE	
VERT: AS NOTED HORZ: AS NOTED	
CITY OF HOUSTON PM MICHELLE RANDON, P.E.	
SHEET NO. OF	

Aug 21, 2012 - 10:28am P:\0202011\110202-01\Cad\Sheets\202-11020-01-PROJ-LA.dwg

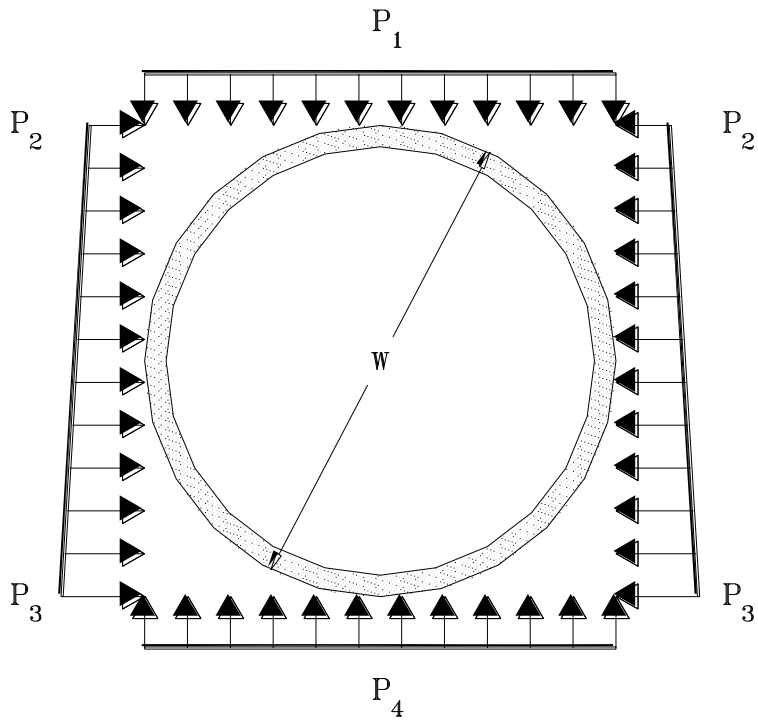
APPROXIMATE CORING & BORING LOCATION

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 5/22/13	APPROVED BY: MM	PREPARED BY: NL

PLAN OF BORINGS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO.: N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 2G



For

$D_w \leq H$

$P_1 = \gamma D_w + (H - D_w)(\gamma - \gamma_w) + P_s + (H - D_w)\gamma_w$

$P_2 \equiv [\gamma D_w + (H - D_w)(\gamma - \gamma_w) + P_s]K_o + (H - D_w)\gamma_w$

$P_3 = [\gamma D_w + (H + W - D_w)(\gamma - \gamma_w) + P_s]K_o + (H + W - D_w)\gamma_w$

$P_4 = \gamma D_w + (H + W - D_w)(\gamma - \gamma_w) + P_s + (H + W - D_w)\gamma_w$

For

$H < D_w < H + W$

$P_1 \equiv H\gamma + P_s$

$P_2 = (\gamma H + P_s)K_o$

$P_3 = [\gamma D_w + (H + W - D_w)(\gamma - \gamma_w) + P_s]K_o + (H + W - D_w)\gamma_w$

$P_4 = \gamma D_w + (H + W - D_w)(\gamma - \gamma_w) + P_s + (H + W - D_w)\gamma_w$

For

$D_w \geq (H + W)$

$P_1 \equiv H\gamma + P_s$

$P_2 = (\gamma H + P_s)K_o$

$P_3 = [(H + W)\gamma + P_s]K_o$

$P_4 = (H + W)\gamma + P_s$

Where

P_1, P_2, P_3 = Pressure imposed on pipe, psf

D_w = Depth of groundwater, feet

H = Depth of top of pipe from ground surface, feet

W = Diameter of pipe, feet

γ = Total Unit weight of soil, pcf

γ_w = Unit weight of water, pcf

P_s = Surcharge load, psf

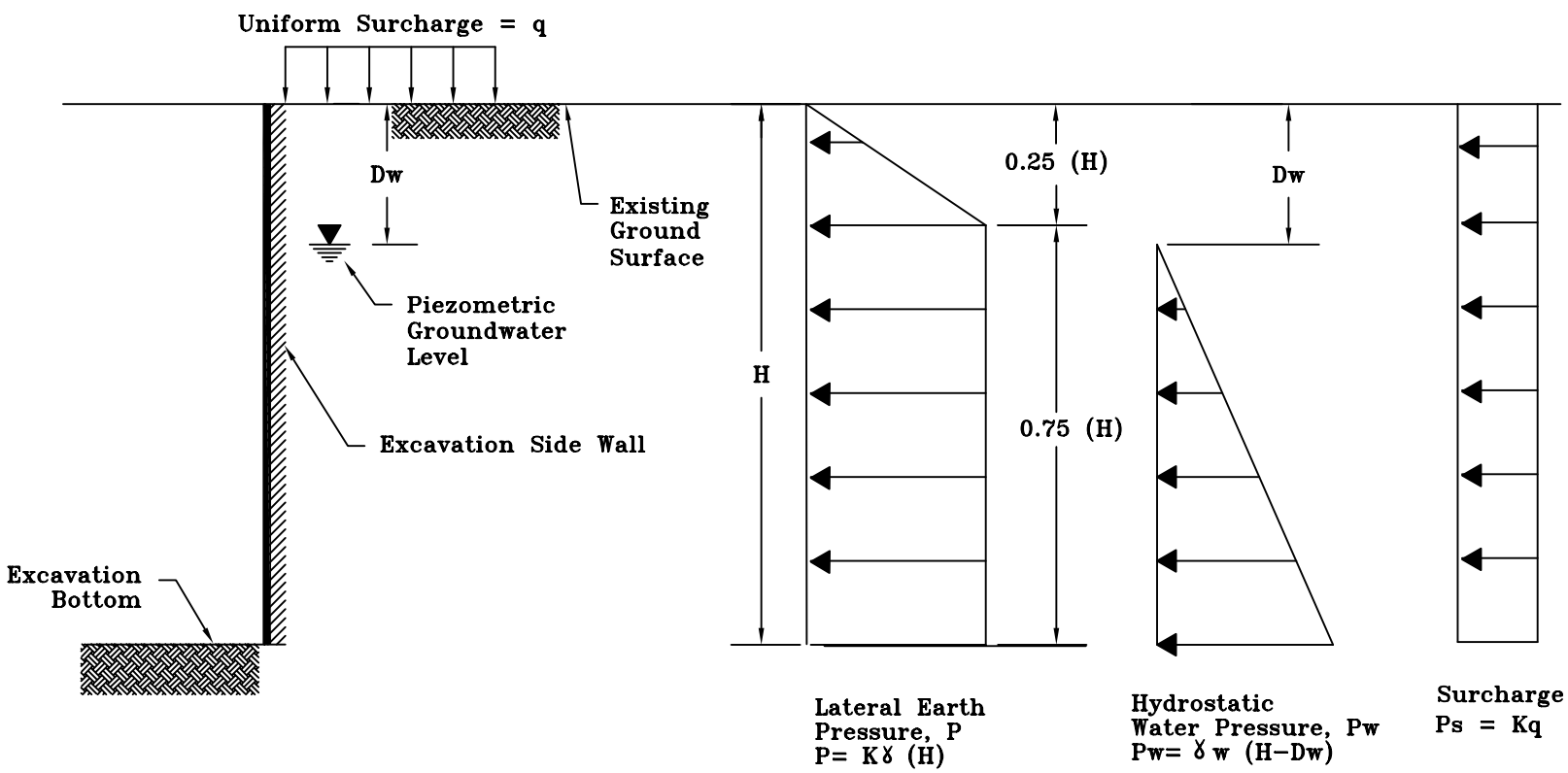
K_o = Coefficient of earth pressure, (1.0 for clays and 0.5 for sands)

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 06/03/2013	APPROVED BY: ZA	PREPARED BY: AR

RIGID PIPE AND TUNNEL LINER LOADS
WBS No. N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE 3



H, (ft) = Depth to Excavation Bottom

Ps, (psf) = Surcharge loading adjacent to Excavation wall

Dw, (ft) = Depth to groundwater below Existing grade

= Zero for temporary excavation

K = Lateral Earth Pressure coefficient

= Ka "active" for short-term conditions (use 0.50)

= Ko "at rest" for long-term conditions (use 1.0)

γ, (pcf) = Total unit weight above water table or submerged unit weight below groundwater level

γw, (pcf) = Unit weight of water = 62.4 pcf

Note: The pressure diagram shown is not appropriate for design of cantilever walls.

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BRACED EXCAVATION
LATERAL EARTH PRESSURE DIAGRAM (CLAY)
WBS No. N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.:	DRAWING NO.:
HG1018580	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS AND SYMBOLS

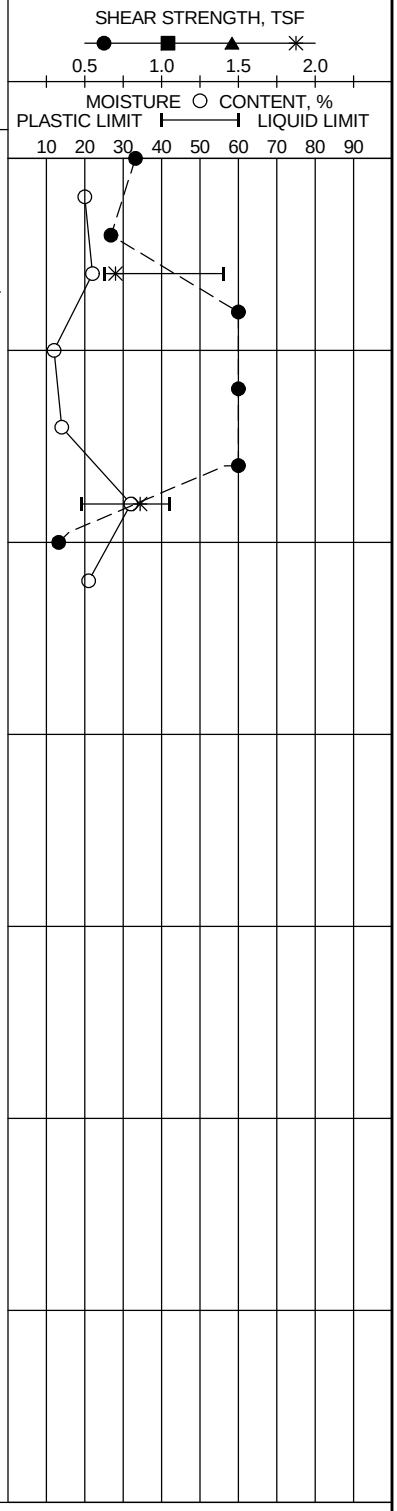
LOG OF BORING

Project: Almeda Road Paving and Drainage
Boring No.: B-1
Groundwater during drilling: Dry
Groundwater after 24 hrs: ---

Project No.: HG1018580
Date: 5/13/2013
Northing: 13,822,522.4
Easting: 3,116,136.1

WBS No.: N-000806-0001-3
Elevation: 42.471 feet
Station: 33+00.42
Offset: 7.40' LT

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0		Stiff reddish brown and gray FAT CLAY (CH)	92.3	104
5		Stiff to very stiff reddish brown and gray LEAN CLAY (CL) -w/ sand 4'-6'	76.6	92
10		Firm brown and gray SANDY LEAN CLAY (CL)	67.4	



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

See Plate 2 for boring location.

PLATE A-1

HVJ ASSOCIATES

LOG OF SOIL BORING HG-10-18580.GPJ HVJ.GDT 6/24/13

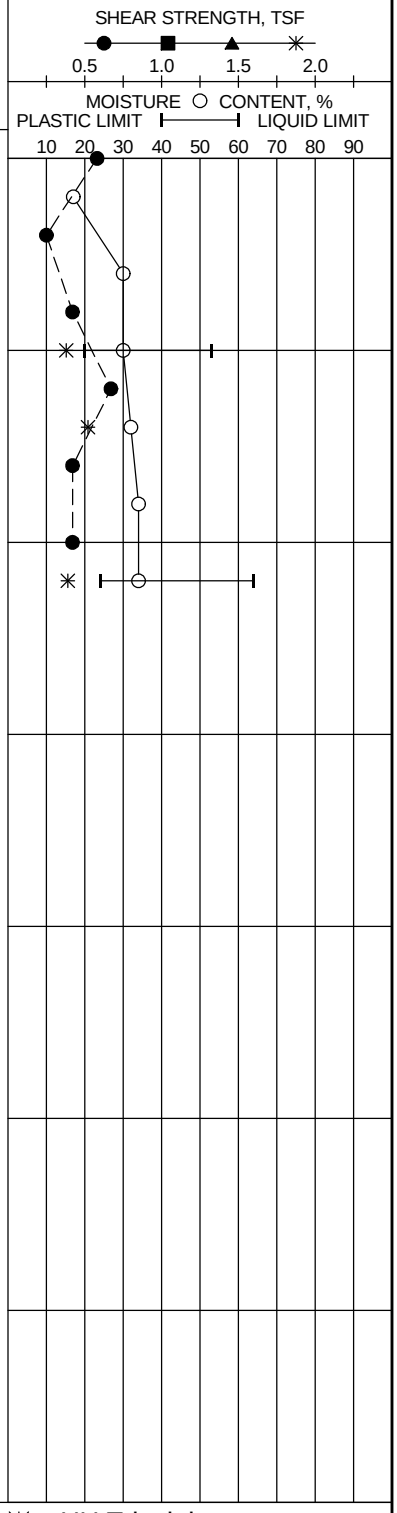
LOG OF BORING

Project: Almeda Road Paving and Drainage
Boring No.: B-2
Groundwater during drilling: Dry
Groundwater after 24 hrs: ---

Project No.: HG1018580
Date: 5/10/2013
Northing: 13,823,004.6
Easting: 3,116,271.9

WBS No.: N-000806-0001-3
Elevation: 43.144 feet
Station: 38+01.30
Offset: 0.81' RT

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0		Firm to stiff reddish brown and gray FAT CLAY (CH)		
40 / 5			90.4	
35 / 10			90.5	98
30 / 15			96.0	90
25 / 20				90
20 / 25				
15 / 30				
10 / 35				



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

See Plate 2 for boring location.

PLATE A-2

HVJ ASSOCIATES

LOG OF SOIL BORING HG-10-18580.GPJ HVJ.GDT 6/24/13

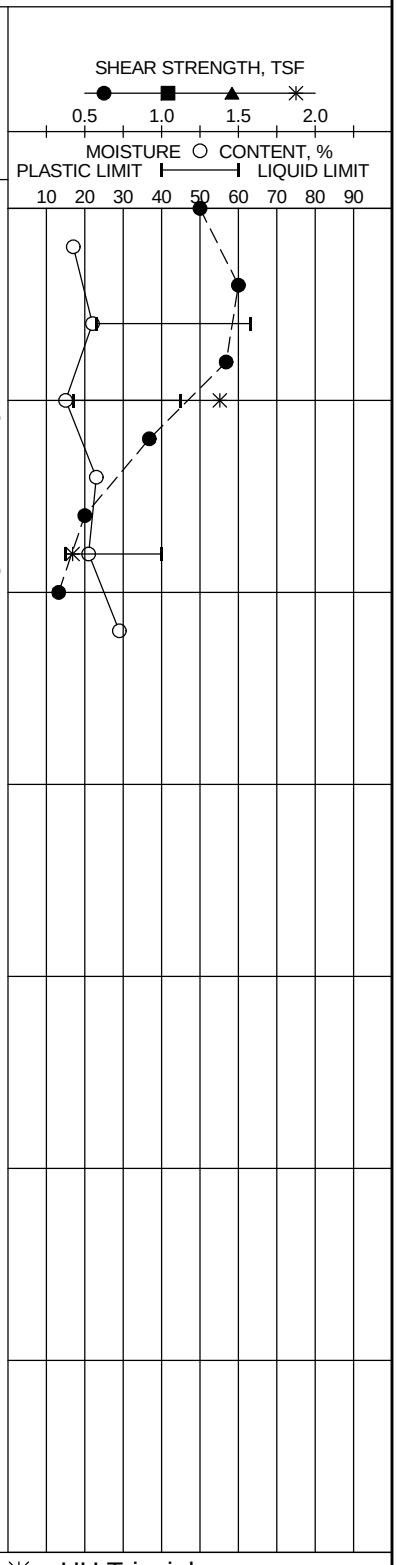
LOG OF BORING

Project: Almeda Road Paving and Drainage
Boring No.: B-3
Groundwater during drilling: Dry
Groundwater after 24 hrs: ---

Project No.: HG1018580
Date: 5/10/2013
Northing: 13,823,583.4
Easting: 3,116,426.1

WBS No.: N-000806-0001-3
Elevation: 43.423 feet
Station: 44+00.24
Offset: 2.15' RT

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0		Very stiff reddish brown and gray FAT CLAY (CH)		
5		Firm to very stiff reddish brown and gray LEAN CLAY (CL) -w/ calcareous nodules 4'-10'	56.5	103
10				106
15				
20				
25				
30				
35				



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

See Plate 2 for boring location.

PLATE A-3

HVJ ASSOCIATES

LOG OF SOIL BORING HG-10-18580.GPJ HVJ.GDT 6/24/13

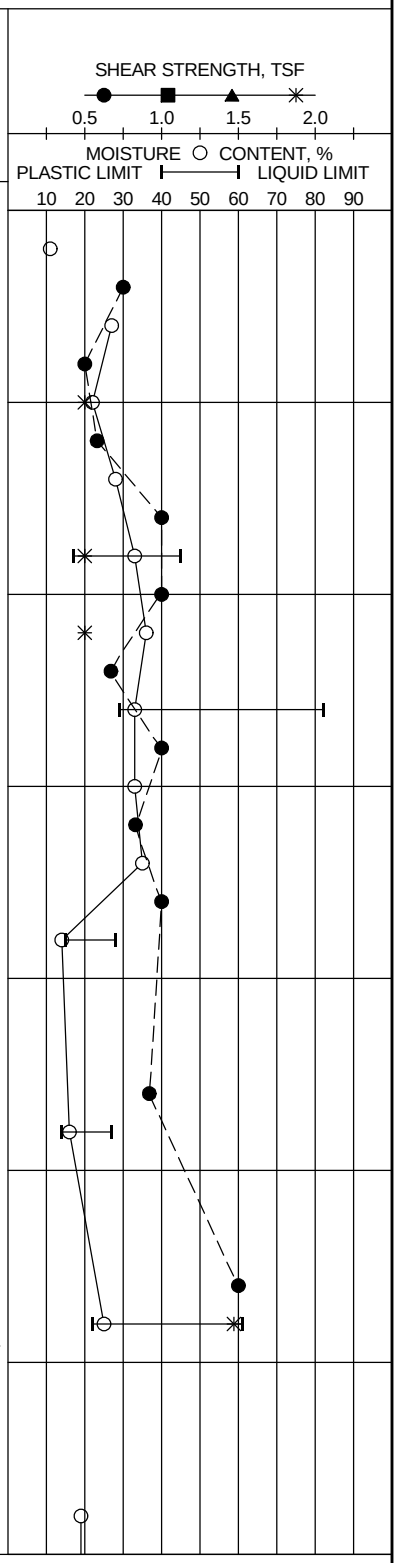
LOG OF BORING

Project: Almeda Road Paving and Drainage
Boring No.: B-4 (PZ-1)
Groundwater during drilling: 20 feet
Groundwater after 24 hrs: 28 feet

Project No.: HG1018580
Date: 5/13/2013
Northing: 13,824,405.7
Easting: 3,116,667.6

WBS No.: N-000806-0001-3
Elevation: 41.29 feet
Station: 52+56.82
Offset: 27.05' RT

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
0		FILL: Dark gray sand with shells & rocks		
5		Stiff brown and gray LEAN CLAY (CL) -w/ calcareous nodules 2'-6'	84.4	99
10		Stiff reddish brown and gray FAT CLAY (CH)	88.2	95
15		-w/ sand 16'-18'	85.4	87
20		Stiff brown and gray SANDY LEAN CLAY (CL)		
25		Very stiff reddish brown FAT CLAY (CH)		101
30		Medium dense brown CLAYEY SAND (SC)	42.7	
35				



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

See Plate 2 for boring location.

PLATE A-4a

HVJ ASSOCIATES

LOG OF SOIL BORING HG-10-18580.GPJ HVJ.GDT 6/24/13

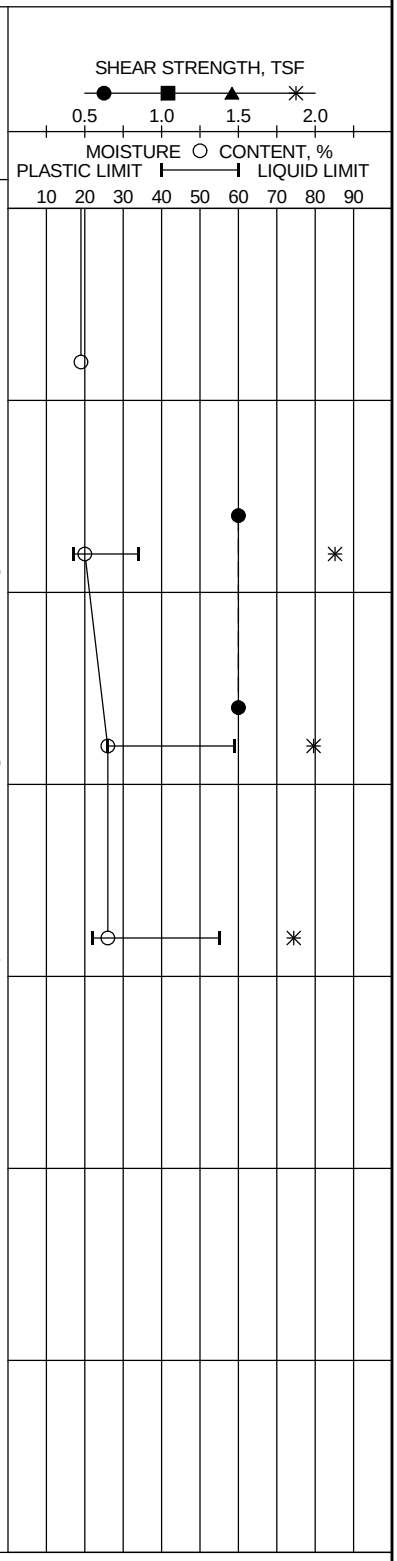
LOG OF BORING

Project: Almeda Road Paving and Drainage
Boring No.: B-4 (PZ-1)
Groundwater during drilling: 20 feet
Groundwater after 24 hrs: 28 feet

Project No.: HG1018580
Date: 5/13/2013
Northing: 13,824,405.7
Easting: 3,116,667.6

WBS No.: N-000806-0001-3
Elevation: 41.29 feet
Station: 52+56.82
Offset: 27.05' RT

ELEV. DEPTH, FEET	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	SOIL/ROCK CLASSIFICATION	% PASSING NO. 200 SIEVE	DRY DENSITY PCF
35		Medium dense brown CLAYEY SAND (SC)		
5	5-4-8		37.8	
40				
0				
		Very stiff to hard reddish brown SANDY LEAN CLAY (CL)		108
45				
-5				
		Very stiff reddish brown FAT CLAY (CH)		106
50				
-10				102
55				
-15				
60				
-20				
65				
-25				
70				



Shear Types: ● = Hand Penet. ■ = Torvane ▲ = Unconf. Comp. ✳ = UU Triaxial

See Plate 2 for boring location.

PLATE A-4b

HVJ ASSOCIATES

LOG OF SOIL BORING HG-10-18580.GPJ HVJ.GDT 6/24/13

SOIL SYMBOLS

Soil Types

Clay | Silt | Sand | Gravel

Modifiers

Clayey | Silty | Sandy | Cemented

Construction Materials

Asphaltic Concrete | Stabilized Base | Fill or Debris | Portland Cement Concrete

SAMPLER TYPES

- Thin Walled Shelby Tube
- No Recovery
- Split Barrel
- Core
- Liner Tube
- Jar Sample

WATER LEVEL SYMBOLS

- Groundwater level after drilling in open borehole or piezometer
- Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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KEY TO TERMS AND SYMBOLS
USED ON BORING LOGS
WBS No. N-000806-0001-3

PROJECT NO.: HG1018580

DRAWING NO.: PLATE A-5

DRILLING LOG

WinCore	County	Harris	Hole	P-1	District	Houston
Version 3.1	Highway	Almeda Road	Structure	Pavement	Date	5/13/2013
	CSJ	0912-72-072	Station	13+83.20	Grnd. Elev.	44.25 ft
			Offset	22.01'LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
42.3			FILL, Dark gray fat clay with gravel			21	59	32		
			CLAY, Sandy, stiff, brown and gray (CL)			16				
				3	23.5	24	31	14	129	
38.8		11 (6) 10 (6)								

Remarks: WBS No. N-000806-0001-3

The ground water elevation was not determined during the course of this boring.

Driller: Van & Sons **Logger: EE** **Organization: HVJ Associates, Inc.**

DRILLING LOG

WinCore	County	Harris	Hole	P-2		District	Houston
Version 3.1	Highway	Almeda Road	Structure	Pavement		Date	5/10/2013
	CSJ	0912-72-072	Station	23+20.52		Grnd. Elev.	44.82 ft
			Offset	25.63'RT		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
42.8			FILL, Brown sand with shells and gravel			7				
			FILL, Dark gray fat clay with shells and gravel	2	56.5	25	62	32	123	
39.3		9 (6) 6 (6)								

Remarks: WBS No. N-000806-0001-3

The ground water elevation was not determined during the course of this boring.

Driller: Van & Sons **Logger: EE** **Organization: HVJ Associates, Inc.**

DRILLING LOG

WinCore	County	Harris	Hole	P-3		District	Houston
Version 3.1	Highway	Almeda Road	Structure	Pavement		Date	5/13/2013
	CSJ	0912-72-072	Station	59+98.97		Grnd. Elev.	38.86 ft
			Offset	19.10'LT		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			CLAY, Fat, stiff to hard, brown and gray (CH)			24				
						23				% Passing #200 Sieve: 87.6
				3	99.3	20	72	42	128	
		17 (6) 13 (6)								
33.4										
5										
10										
15										
20										
25										
30										
35										
40										
45										
50										
55										
60										

Remarks: WBS No. N-000806-0001-3

The ground water elevation was not determined during the course of this boring.

Driller: Van & Sons **Logger: EE** **Organization: HVJ Associates, Inc.**

DRILLING LOG

WinCore	County	Harris	Hole	P-4	District	Houston
Version 3.1	Highway	Almeda Road	Structure	Pavement	Date	5/13/2013
	CSJ	0912-72-072	Station	67+69.89	Grnd. Elev.	39.44 ft
			Offset	5.91'LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
38.4			PAVEMENT, See Below							
			CLAY, Fat, soft to stiff, brown and gray w/ sand at 2' (CH)			23				% Passing #200 Sieve: 78.5
						24				
				3	21.1	26	56	33	121	
		7 (6) 7 (6)								
33.9										

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

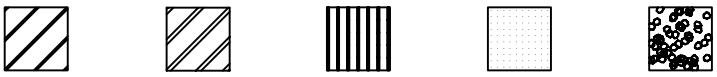
Remarks: WBS No. N-000806-0001-3. Pavement: 6" Concrete; Base: 6" Crushed Concrete.

The ground water elevation was not determined during the course of this boring.

Driller: Van & Sons **Logger: EE** **Organization: HVJ Associates, Inc.**

SOIL SYMBOLS

Soil Types



Clay (CH) | Clay (CL) | Silt | Sand | Gravel

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Density of Cohesionless Soil	TxDOT Cone Penetrometer Blow Count
Very Loose	0 - 8
Loose	8 - 20
Slightly Compact	20 - 40
Compact	40 - 80
Dense	80 - 100 (5")
Very Dense	100 (5") - 100 (0")

CONSISTENCY OF COHESIVE SOILS

Consistency	Deviator Stress Strength (psi)	TxDOT Cone Penetrometer Blow Count
Very Soft	0 - 3.48	0 - 8
Soft	3.48 - 13.9	8 - 20
Stiff	13.9 - 27.8	20 - 40
Very Stiff	27.8 - 55.6	40 - 80
Hard	> 55.6	80 - 100 (5")
Very Hard		100 (5") - 100 (0")

TxDOT Cone Penetrometer

Blows required to penetrate each of two consecutive 6-inch increments

If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

HVJ ASSOCIATES
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281.933.7293 Fax

KEY TO TERMS AND SYMBOLS
USED ON BORING LOGS
WBS No. N-000806-0001-3

PROJECT NO.: HG1018580

DRAWING NO.: PLATE A-10

APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Project: Almeda Road Paving and Drainage
Location: Houston, Texas
Number: HG1018580
WBS No. N-000806-0001-3
CSJ No. 0912-72-072

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Moisture Content (%)	Unit Weight (pcf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	0								0.83
B-1	1					19.8			
B-1	2								0.67
B-1	3	56	25	31	92	22.3	126.6	0.7	
B-1	4								1.5
B-1	5				77	11.8			
B-1	6								1.5
B-1	7					13.9			
B-1	8								1.5
B-1	9	42	19	23		32	120.8	0.86	
B-1	10								0.33
B-1	11				67	21			
B-2	0								0.58
B-2	1					17.2			
B-2	2								0.25
B-2	3				90	29.8			
B-2	4								0.42
B-2	5	53	20	33	91	30.4	127.2	0.38	
B-2	6								0.67
B-2	7					32	118.7	0.52	
B-2	8								0.42
B-2	9				96	33.7			
B-2	10								0.42
B-2	11	64	24	40		33.5	119.8	0.39	
B-3	0								1.25
B-3	1					17.1			
B-3	2								1.5
B-3	3	63	23	40		22			
B-3	4								1.42
B-3	5	45	17	28	57	15	124.3	1.38	
B-3	6								0.92
B-3	7					23.3			
B-3	8								0.5
B-3	9	40	15	25		20.7	128.5	0.42	
B-3	10								0.33
B-3	11					29.4			
B-4	1					11.1			
B-4	2								0.75

Project: Almeda Road Paving and Drainage
Location: Houston, Texas
Number: HG1018580
WBS No. N-000806-0001-3
CSJ No. 0912-72-072

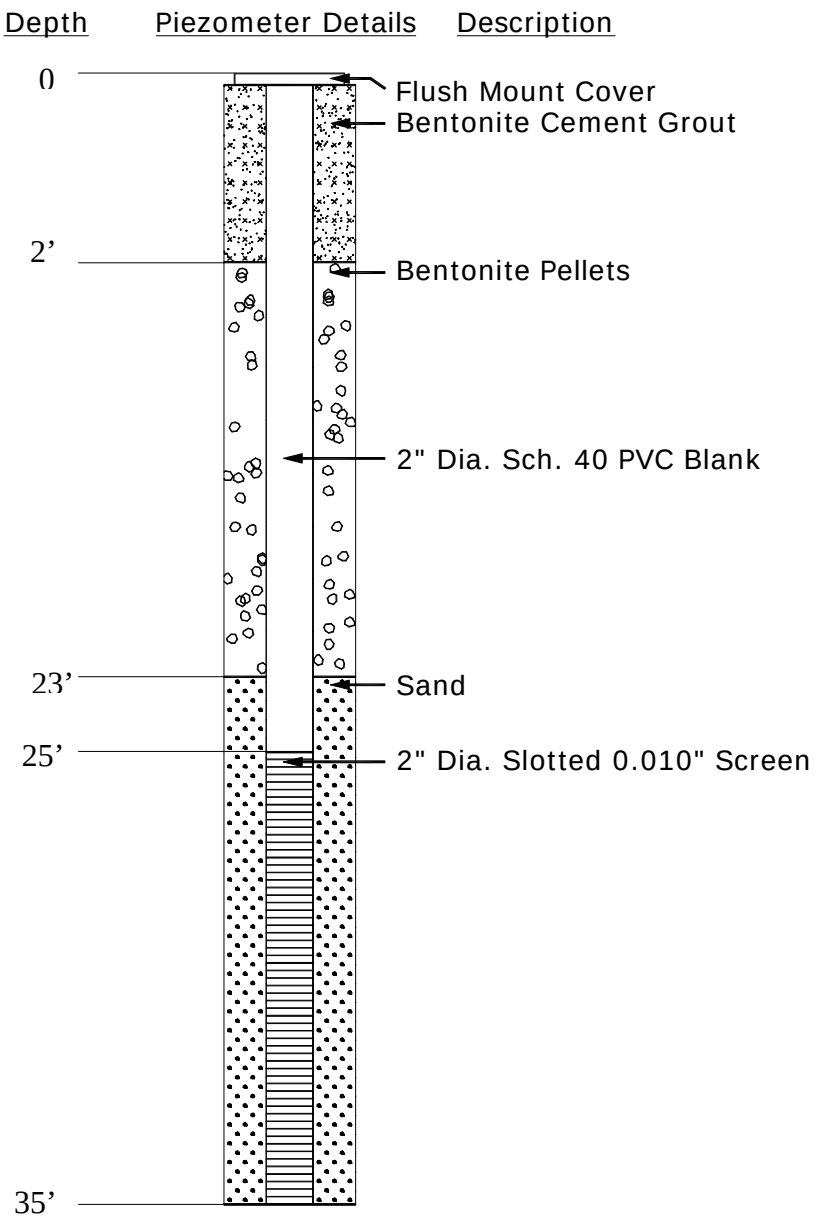
Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Moisture Content (%)	Unit Weight (pcf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-4	3				84	27.1			
B-4	4								0.5
B-4	5					22	120.6	0.5	
B-4	6								0.58
B-4	7					28.5			
B-4	8								1
B-4	9	45	17	28	88	33.3	125.3	0.5	
B-4	10								1
B-4	11					35.9	118.3	0.5	
B-4	12								0.67
B-4	13	82	29	53		33.3			
B-4	14								1
B-4	15					33.1			
B-4	16								0.83
B-4	17				85	34.5			
B-4	18								1
B-4	19	28	15	13		14.3			
B-4	23								0.92
B-4	24	27	14	13		16.5			
B-4	28								1.5
B-4	29	61	22	39		25.2	126.7	1.47	
B-4	34				43	19			
B-4	39				38	19.1			
B-4	43								1.5
B-4	44	34	17	17		20	129.2	2.13	
B-4	48								1.5
B-4	49	59	26	33		25.6	133.3	1.99	
B-4	54	55	22	33		26.2	129	1.86	
P-1	1	59	27	32		21			
P-1	3					16			
P-1	4	31	17	14		24	129	0.85	
P-2	1					7			
P-2	3	62	30	32		25	123	2.03	
P-3	1					24			
P-3	3				87.6	23			
P-3	4	72	30	42		20	128	3.57	
P-4	2				78.5	23			
P-4	3					24			

Project: Almeda Road Paving and Drainage
Location: Houston, Texas
Number: HG1018580
WBS No. N-000806-0001-3
CSJ No. 0912-72-072

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Moisture Content (%)	Unit Weight (pcf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
P-4	4	56	23	33		26	121	0.76	
Total		**20**	**20**	**20**	**14**	**46**	**18**	**18**	**31**

APPENDIX C

PIEZOMETER INSTALLATION RECORDS



Water Level Readings

Date	Depth (ft.)	Elev. (ft.)
5/14/13	28.0	13.29
6/12/13	Dry	N/A

NOTES:

- Piezometer was installed on 5/13/13.
- See Plate 2 for boring location; see Plate A-4 for boring log.

HVJ ASSOCIATES
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PIEZOMETER INSTALLATION REPORT
PIEZOMETER NO. PZ-1 (B-4)
WBS No. N-000806-0001-3/CSJ No. 0912-72-072

PROJECT NO.:	DRAWING NO.:
HG1018580	PLATE C-1

HJ

Attention Owner: Confidentiality Privilege Notice on reverse side of owner's copy.

Texas Department of Licensing and Regulation

Water Well Driller/Pump Installer Program
P.O. Box 12157 Austin, Texas 78711 (512) 463-7880 FAX (512) 463-8616
Toll free (800) 803-9202
Email address: water.well@license.state.tx.us

This form must be completed and filed with the department and owner **within 60 days** upon completion of the well.

WELL REPORT

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER

Name	Address	City	State	Zip
City of Houston Geotech Dept	611 Walker Floor 14	Houston	Tx	77002

2) WELL LOCATION

County	Physical Address	City	State	Zip
Harris	Almeda Rd at Dixie Dr	Houston	Tx	77030

Lat. ° ' " Long. ° ' " Grid # 65-21-6

3) Type of Work
☒ New Well ☐ Reconditioning ☐ Replacement ☐ Deepening

4) Proposed Use (check) ☒ Monitor ☐ Environmental Soil Boring ☐ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell ☐ Rig Supply ☐ Stock or Livestock
If Public Supply, were plans approved? ☐ Yes ☐ No

5) N↑

6) Drilling Date
Started 5/13/2013
Completed 5/13/2013

Diameter of Hole

Dia. (in)	From (ft)	To (ft)
4	Surface 0	55

7) Drilling Method (check)
☐ Driven ☐ Air Rotary ☒ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Hollow Stem Auger ☐ Reverse Circulation ☐ Other

From (ft)	To (ft)	Description and color of formation material
0	2	Fill
2	10	Cl
10	18	Ch
18	28	Cl
28	33	Ch
33	43	ClSa
43	48	SaCl
48	55	Ch

(Use reverse side of Well Owner's copy, if necessary)

8) Borehole Completion ☐ Open Hole ☐ Straight Wall ☐ Under-reamed ☐ Gravel Packed ☒ Other 9&12
Gravel Packed interval from ft. to ft. Size

Casing, Blank Pipe, and Well Screen Data

Dia. (in.)	New Or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft) From	Setting (ft) To	Gage Casing Screen
2	n	Sch 40 PVC Riser	0	25	
2	n	Sch 40 PVC Screen	25	35	.010

9) Annular Seal Data: i.e. *(from 0 ft to 100 ft #sacks & material 13 cement)*
from 0 ft. to 20 ft. #sacks & material 2 cement
from 20 ft. to 22 ft. #sacks & material .5 bentonite
from ft. to ft. #sacks & material
Method Used tremmie
Distance to septic field or other concentrated contamination na ft.
Distance to Property Line na ft Method na
Verified: na

10) Surface Completion (If steel cased, leave blank)
☐ Surface Slab Installed ☐ Surface Sleeve Installed ☐ Pitless Adapter Used ☒ Alternative Procedure Used

11) Water Level
Static level 20 ft. Date 5/13/2013
Artesian Flow gpm

12) Packers

Type	Depth	Type	Depth
20/40	22-55		

13) Plugged ☐ Well plugged within 48 hours
Casing left in well: Cement/Bentonite placed in well:

From (ft)	To (ft)	From (ft)	To (ft)	Material used & # Sacks

14) Type Pump
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other na
Depth to pump bowls, cylinder, jet, etc., ft.

15) Water Test
Type test ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: na gpm with ft. drawdown after hrs.

16) Water Quality
Type of water: Depth of Strata: Was a chemical analysis made? ☐ Yes ☒ No
Did you knowingly penetrate a strata which contains undesirable constituents? ☐ Yes ☒ No If yes, Continue:
Check One: ☐ Naturally poor-quality groundwater – type ☐ Hydrocarbons (i.e. gas, oil, etc.)
☐ Hazardous material/waste contamination encountered ☐ Other (describe)

☐ *I certify that while drilling, deepening, or otherwise altering the above described well, undesirable water or constituents was encountered and the landowner was informed that such well must be completed or plugged in such a manner as to avoid injury or pollution.*

Company or Individual's Name (type or print) Van and Sons Drilling Service, Inc Lic. No. 2903M
Address 319 John Alber City Houston State Tx Zip 77076

Signature	Date	Signature	Date
Licensed Driller/Pump Installer	6/24/2013	Apprentice	/ /

Texas Department of License and Regulation

Water Well Driller/Pump Installer Program
P.O. Box 12157 Austin, Texas 78711 (512)463-7880 FAX (512)463-8616
Email address: water.well@license.state.tx.us

This form must be completed and filed with the department within 30 days following the plugging of the well.

PLUGGING REPORT

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER

Name	Address	City	State	Zip
City of Houston Geo Dept	611 Walker Floor 14	Houston	Tx	77002

2) WELL LOCATION

County	Physical Address	City	State	Zip
Harris	Almeda Rd at Dixie Dr	Houston	Tx	77030

3) Owner's Well No. 1 | Long. ° ' " | Lat. ° ' " | Grid # 65-21-6

4) Type of Well ☐ Water ☒ Monitor ☐ Injection ☐ De-Watering

5) N↑

Drill, Pump Installer, or Landowner performing the plugging operations **must** locate and identify the location of the well within a specific grid on a full scale gridded map available from Texas Natural Resource Information Service. The location of the well should be denoted within the grid by placing a corresponding dot in the square to the right. The legal description is optional.

B) HISTORICAL DATA ON WELL TO BE PLUGGED (if available)

6) Driller: Eddie VanAntwerp | License No. 2903M

7) Drilled 05/13/2013 | 8) Diameter of hole 4 inches | 9) Total depth of well 35 feet.

C. CURRENT PLUGGING DATA

10) Date well plugged: 07/02/2013

12) Name of Driller/Pump Installer or Well Owner performing the plugging: Eddie VanAntwerp

License No. 2903M

13) CASING AND CEMENTING DATA RELATIVE TO THE PLUGGING OPERATIONS.

CASING LEFT IN WELL

DIAMETER (inches)	FROM (feet)	TO (feet)
2	0	35

CEMENT/BENTONITE PLUG(S) PLACED IN WELL

FROM (feet)	TO (feet)	SACKS
0	35	2

11) REMOVE ALL REMOVEABLE CASING

Please check box beside the method of plugging used

- ☒ Tremmie pipe cement from bottom to top.
- ☐ Tremmie pipe bentonite from bottom to 2 feet from surface, cement top 2 feet.
- ☐ Pour in 3/8 bentonite chips when standing water in well is less than 100 feet in depth, cement top 2 feet.
- ☐ Large diameter well filled with clay material from top to bottom.

COMMENTS

Tried to pull well
Top section of PVC broke off
Grouted well material in place

D. VALIDATION OF INFORMATION INCLUDED IN FORM

I certify that I plugged this well (or the well was plugged under my supervision) and that all of the statements herein are true and correct. I understand that failure to complete items 1 through 13 will result in the report(s) being returned for completion and resubmitted.

Company or Individual's Name (type or print): Van and Sons Drilling Service, Inc

Address: 319 John Alber | City: Houston | State: Tx | Zip: 77076

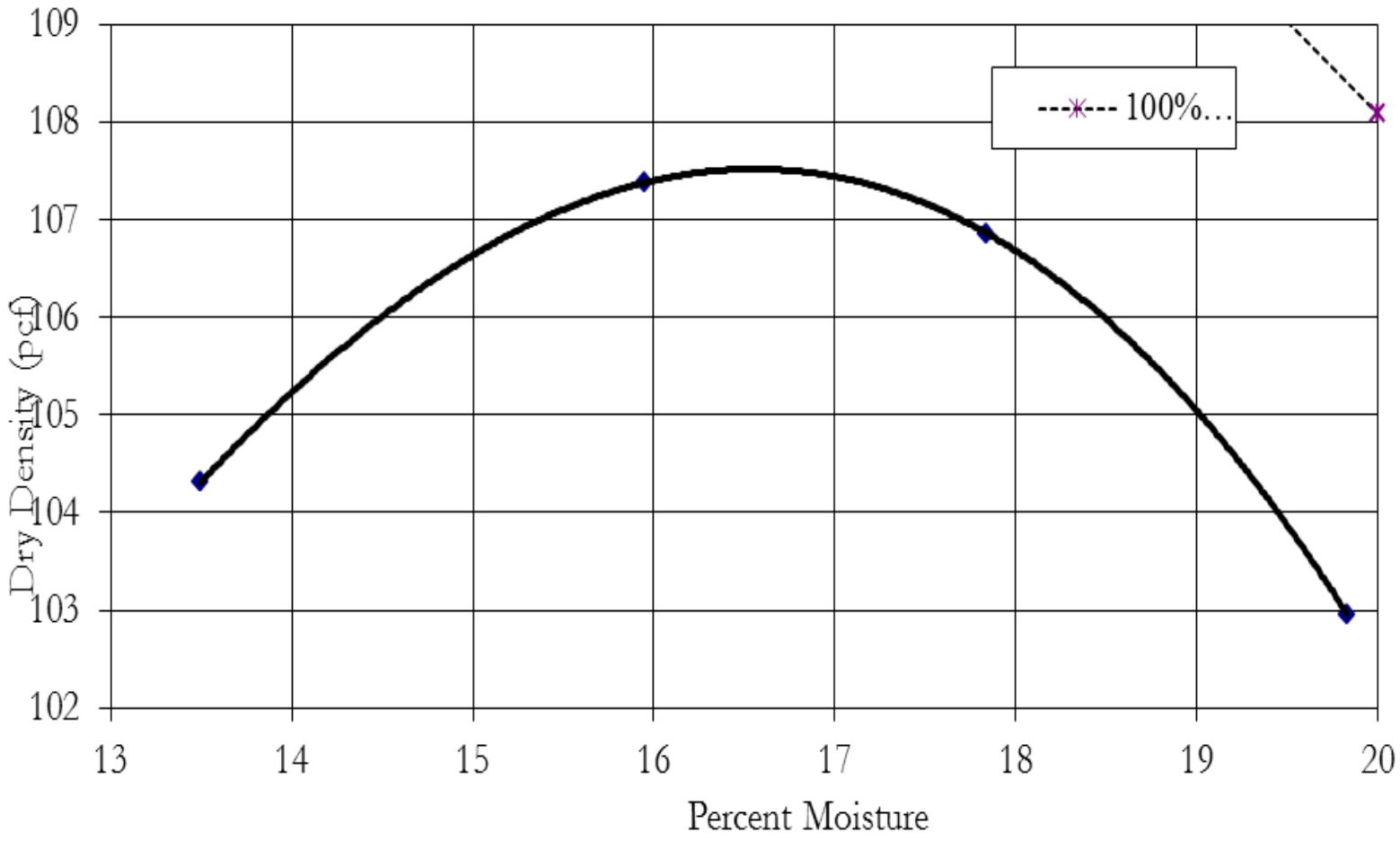
Signature		Signature	
Licensed Driller/Pump Installer	7/8/2013 Date	Apprentice	/ / Date

RECEIVED
JUL 11 2013
ASSOCIATES, IN

Form provided by Forms On-A-Disk, Inc. - Dallas, Texas - (214) 340-9429

APPENDIX D

STANDARD PROCTOR AND CBR TEST RESULTS



TEST DATA

DATE TESTED:	5/21/13	LIQUID LIMIT :	55
TYPE OF MATERIAL :	Brown Fat Clay with Sand (CH)	PLASTICITY INDEX :	36
MAXIMUM DRY DENSITY :	107.6 pcf	-200 SEIVE % :	75.8
OPT. MOISTURE CONTENT :	16.6 %		

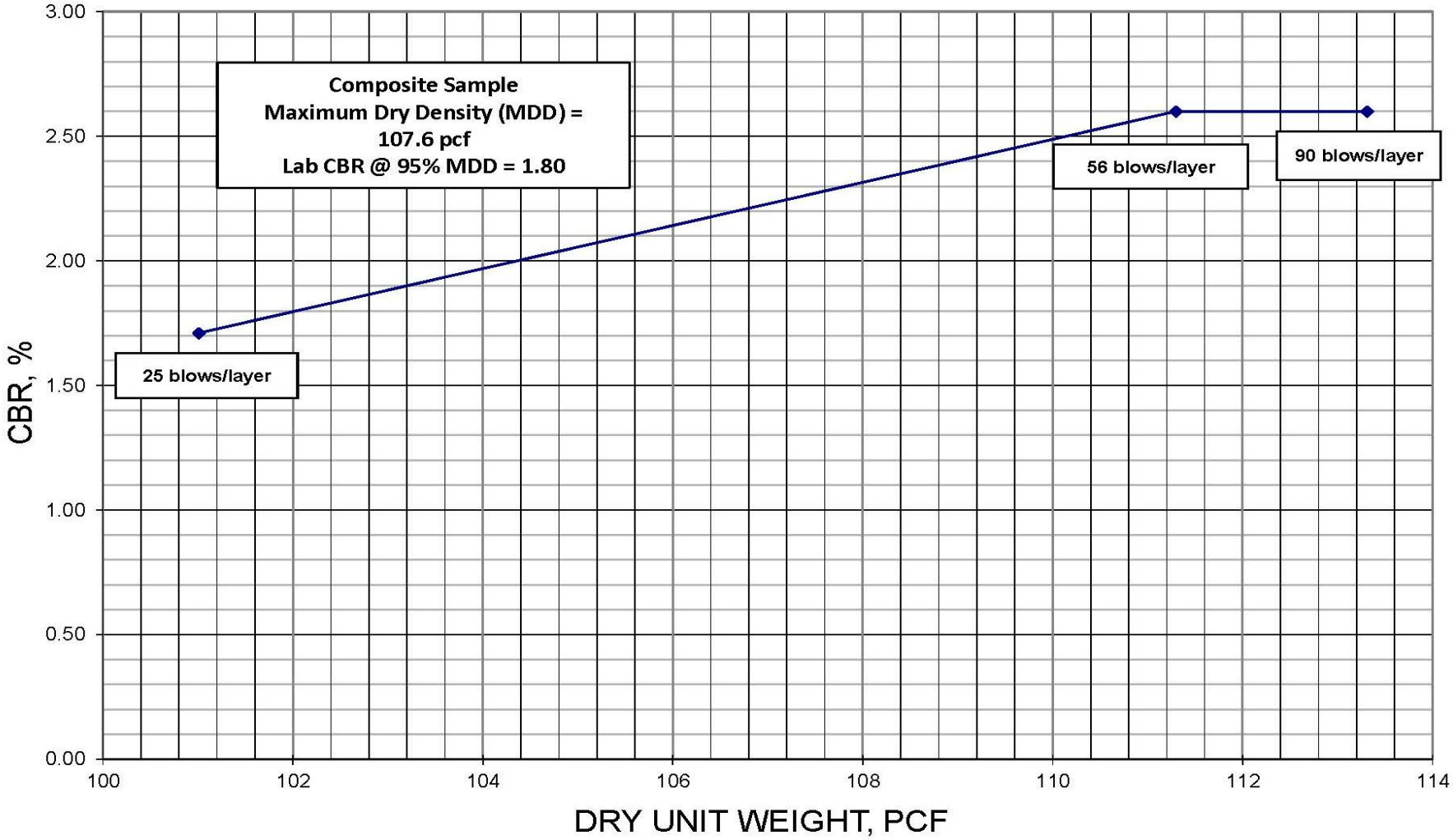
HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 06/03/2013	APPROVED BY: Z.A	PREPARED BY: AR

PROCTOR TEST RESULTS
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO. N-000806-0001-3/CSJ NO. 0912-72-072

PROJECT NO.:	DRAWING NO.:
HG1018580	PLATE D - 1

CALIFORNIA BEARING RATIO TEST RESULT



HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 06/03/2013	APPROVED BY: ZA	PREPARED BY: AR

CBR TEST RESULT
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO. N-000806-0001-3/CSJ NO. 0912-72-072

PROJECT NO.:	DRAWING NO.:
HG1018380	PLATE D - 2

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOILS ASTM D1883

Project: Almeda Road Paving and Drainage

Sample Location: Composite

Liquid Limit: 55 **Plastic Limit:** 19 **Plasticity Index:** 36

Method of Compaction: ☒ ASTM D698
☐ ASTM D1557

Sample Condition: ☒ soaked ☐ unsoaked

No. of Blows:	**25**	**56**	**90**
Dry Density Before Soaking (pcf):	101.01	111.30	113.31
Dry Density After Soaking (pcf):	98.70	105.20	107.20
Moisture Content:			
Before Compaction (%):	16.4	16.0	15.7
Top 1-inch Layer After Soaking (%):	29.4	25.9	25.3
Swell (%):	7.54	3.56	3.65
Bearing Ratio (%): (☒ soaked ☐ unsoaked)	1.71	2.60	2.60

Surcharge: 10 lbs.

HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

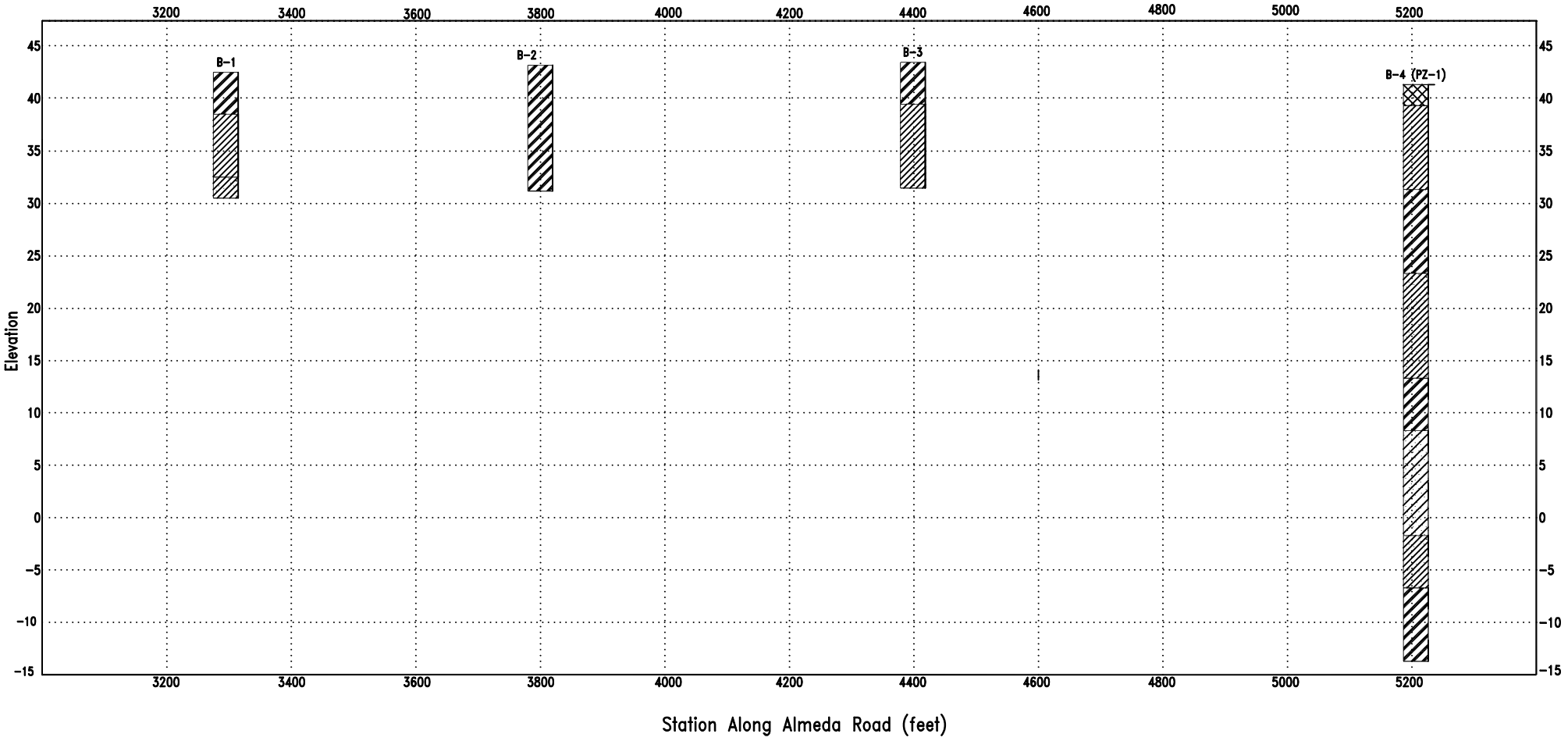
DATE: 06/04/2013	APPROVED BY: ZA	PREPARED BY: AR

CBR TEST SUMMARY
ALMEDA ROAD PAVING AND DRAINAGE
WBS NO. N-000806-0001-3/CSJ NO. 0912-72-072

PROJECT NO.: HG1018580	DRAWING NO.: PLATE D - 3

APPENDIX E

SOIL PROFILE



LEGEND:

- Concrete
- Fill (made ground)
- Sandy Clay
- Silt
- Asphaltic Concrete
- Fat Clay
- Base
- Clayey Sand
- Sand

Note:
Data concerning subsurface conditions obtained at boring locations only.

HVJ ASSOCIATES	11/07/2013	
	APPROVED BY: ZA	PREPARED BY: KL
BORING LOG PROFILE ALMEDA ROAD PAVING AND DRAINAGE WBS No: N-000806-0001-3/CSJ No: 0912-72-072		
PROJECT NO.: HG1018580	DRAWING NO.: PLATE E-1	