FINAL DRAINAGE REPORT
AND PLAN
for

****

P. C. INDUSTRIAL PARK ADDITION
Wichita, Kansas

****

November 15, 1985

Baughman Company, P.A.
330 Laura
Wichita, Kansas

FINAL DRAINAGE REPORT FOR
P.C. INDUSTRIAL PARK ADDITION

I. General

The P.C.Industrial Park Addition plat located south of 47th Street South and west of Water Street in Wichita, KS. The tract of ground is being platted to confirm requirements placed on the parcel of land. The addition is zoned for industrial development usage. The addition will not be allowed to develop for several years. Presently the tract of ground is adjacent to paved Water Street and adjacent to Railroad R.W. at the west side of the property. The 31 acre tract drains generally south with a small portion draining to the north to 47th St. The R.R. R.W. at the west side of the property will not discharge onto or across any portion of this land.

The City of Wichita constructed the pavement and storm sewer system for Water St. in prior years with the storm sewer discharging into only a temporary pond drainage site at the south and east end of the plat as indicated. Presently the drainage dedications is a 100 foot wide tract of land which extends approximately 1400 feet in length. Average depth of the drainage pond is presently five to six feet. Water Street presently discharges a 24" R.C.P. into the pond. No outlet exists to relieve the pond except the consideration of infiltration of runoff water into the subsoils.

A soil investigation report was performed for this area in 1978 by Engineering Testing Company of Wichita. The report identifies subsoil types with borings taken as silty sands and pure sands which are capable of passing water into the ground water vertically with ease from elevations 85 to 79. Average water table elevation at that time was observed to be 75.5. Soil conditions are identified for the lacal are in an earlier drainage concept report submitted to the City of Wichita.

II. Drainage Calculations

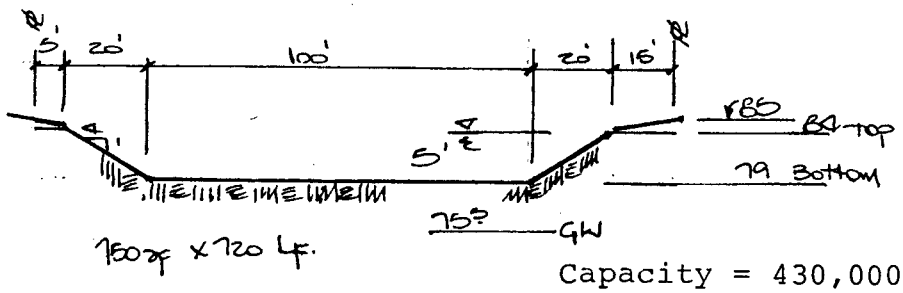
The area from the P.C. Industrial Park Addition plat which will discharge to either Water Street and south in storm sewers or directly into the drainage pond site is 25.4 acres. Street R.W. areas will amount to 1.6 acres. The acres to the east of Water St. will contribute approximately 5 acres. The total drainage area amount to 32 acres which will be considered for the drainage pond site. The north portion as indicated on the plan will drain to Water Street and drain north to 47th St. So.

The volume considered for the design pond will be the 6 hour - 6 inch storm. Using the average S.C.S. Runoff Curve Number of 91, the amount of runoff from the 6 inch storm will be 4.95 inches.

Design Inflow Volume = 32 Acres(4.95/12) = 13.2 AC-Ft.

Proposed pond sections for the drainage dedications -

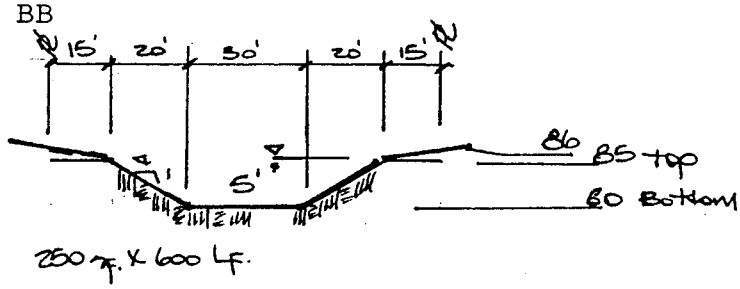
Section AA



150 ft x 720 Lf.

Capacity = 430,000 CF

Section BB



250 ft. x 600 Lf.

Capacity = 150,000 CF

Total = 580,000 CF

or = 13.3 Ac-Ft

The proposed ditch and pond improvements will require reshaping the existing pond for both sections of site and excavating additional width to conform to the new pond geometrics design and will provide the necessary volume capacity required. All of the work required for the reshaping and the excavating will be included in a petitioned project thru the City of Wichita as necessary.

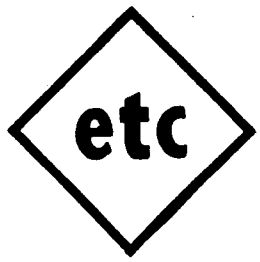
III. Improvements

Presently, the City of Wichita has plans to construct a large drainage improvement district for south Wichita which will at somepoint relieve this temporary drainage pond site. This is the basis for the City constructing Water Street and discharging into a temporary pond site. The plat cannot develop for several years due to encumbrances placed of the land. On that basis, the drainage plan provided herein will allow for the design of a detention site to recieve the 6 hour - 6 inch storm volume and maintain that volume for a period of time to relieve itself and regain the capacity again without over flowing onto adjacent properties, although no development has occured to the immediate south of this land. This will provide assurances that the plat could someday develop to its entireity assuming that the City of Wichita is not able to complete the planned drainage improvement district.

The pond enlargement areas as required will be dedicated on the plat as an additional 60 drainage dedication. If the City drainage improvements are ever implemented as proposed it would allow the owners of the addition to request vacation of the drainage dedication area. The extra amount of pond widening necessary for the total proposed pond will be quaranteed by petition and will not be activated till development accurs on the plat.

All interior site grading and drainage to the streets or pond site in the future will be done so at the time of development as is necessary.

Provided herein are copies of the soil investigation report performed in 1978 and also copies of the drainage plan and topgraphy for the addition.



Foundation Investigation

for

Fireball Industries of Kansas, Inc.

Wichita, Kansas

for

Baughman Company

Wichita, Kansas

Recommendations for Type and Loading of Foundations

for

Fireball Industries of Kansas, Inc.

Wichita, Kansas

for

Baughman Company

Wichita, Kansas

by

Orval W. Daniels, P.E.

Eight test holes were drilled at the proposed site of the Manufacturing Buildings for Fireball Industries of Kansas, Inc. located at the southwest corner of the intersection of 48th Street South and Broadway Avenue, Wichita, Kansas. The locations of the test holes are noted on the logs and are shown by a copy of the site plan. The elevations of the test holes were estimated from the contours determined for the site.

The test holes were drilled with a soils augering rig without the use of circulating water. During the course of the drilling, standard penetration tests were conducted by driving a two inch outside diameter split spoon sampler with a 140 pound hammer dropped 30 inches. The sampler was placed on the bottom of the test hole and was driven 1.5 feet for a completed test. At test holes #5, #6, #7 and #8, between depths of eight feet and ten feet, the sampler was driven two feet to achieve a test hole depth of ten feet. The number of blows required to drive the sampler each 0.5 feet interval and the moisture contents of the inplace soil samples are reported in the logs. The logs of the test holes, the number of blows required to drive the sampler from 0.5 to 1.5 feet penetration and the

moisture contents of the inplace soil samples are shown by figure #1.

The site is underlain by sandy clay or silty clay topsoil to a depth of approximately 0.5 feet, by silty sand to a depth of approximately three feet and by fine sand to the bottom of the test holes. The ground water table was encountered in test hole #4 at elevation 75.4 feet. The site is presently covered by vegetation approximately four feet high.

The proposed manufacturing complex will consist of three buildings as shown by a copy of the Grading and Drainage Plan. The finished floor elevation of the main building will equal 89.5 feet and the finished floor elevations of the two smaller buildings will equal 88.5 feet. Considerable fill will be required to attain these elevations. The fill will be obtained from a drainage ditch cut along the south side of the property then extending south to test hole #7 and west to test hole #8.

The drainage ditch will not have a drainage opening at the southwest end, but will serve to pond the runoff water until it evaporates or percolates down through the sand. The drainage of the existing site is almost all vertical drainage. Minor ponding occurs during very wet seasons, but the surface water drains away within a reasonable length of time. When the drainageway is constructed, the rain water will drain into the excavation rapidly and cause some ponding. The excavation, however, will expose the sand to water infiltration and water will flow from the drainageway more rapidly than through the existing top soil. Over a period of time the drainageway may silt up with material washed from the parking lot and from wind blown soil particles. If the drainageway holds water over an extended period of time, it will be necessary to remove the siltation and vegetation. The ground water table is expected to be near a depth of

ll feet and excavation below a depth of eight feet should not be made. Some erosion of the banks of the drainageway may occur, but because of the method of water disposal, it is suggested that no effort be made to seed the side slopes of the drainageway.

The construction site, including all of the area to be occupied by the building or the parking lots, should be stripped to a depth of six inches to remove a major portion of the top soil. All vegetation, trash and debris should be removed from the site. Because almost all of the site will be paved, it may be necessary to secure borrow from a pit south of the building site and to refill the borrow pit with the undesirable top soil. The top six inches of soil in the borrow areas must also be stripped off and not used beneath the site. The silty fine sand near elevation 85 feet is in a loose condition at test holes #2 and #4 and is only fairly dense at test holes #1 and #3. The elevation of the bottom of the exterior footings will be 86 feet for the large building and 85 feet for the smaller buildings, and these footings would bear on the loose material.

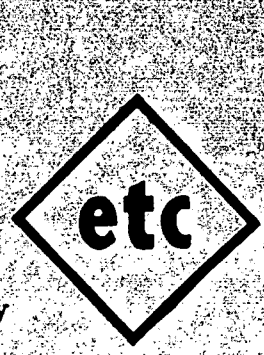
To provide suitable building sites for the buildings, each of the building sites should be excavated to elevation 83 feet. Excavation in excess of six inches will not be required beneath parking areas and the soil excavated from beneath the buildings may be compacted for fill beneath the parking area. With the exception of the top six inches of top soil, all soil sampled is considered suitable for structural fill. After the building sites are excavated to elevation 83 feet, the top six inches of the inplace soil should be compacted to an inplace density of at least 95% of maximum dry density. The maximum dry density of the cohesive silty sand should be determined by a moisture density relationship test conducted in accordance with AASHO T99. The maximum dry density of the cohesion-

less sand should be determined by inundation and vibration in accordance with ASTM D2049. The excavation beneath the building site should be filled with the soil excavated from beneath the buildings or with soil from the borrow areas. The fill soil should be placed in lifts not exceeding six inches in compacted thickness and should be compacted to at least 95% of maximum dry density as noted above.

Beneath the parking lots, after the top soil has been removed, the top six inches of the inplace soil and all fill should be compacted to an inplace density of at least 95% of maximum dry density determined as noted above. If the drainageway is excavated with scrapers, the soil throughout the depth of the cut will not be mixed. The soil from near the surface will contain more silt and will be more plastic. It is suggested that the upper portion of the excavated soil be used beneath the parking lots and that the cohesionless sand be used beneath the buildings. The cohesive soil will provide a more stable subgrade beneath asphaltic concrete paving equipment. The cohesionless soil, if dampened, will be stable beneath ordinary portland cement concrete placing equipment.

After the structural fill is completed from elevation 83 feet to immediately beneath the floor slab, the bottom of the exterior footings may be placed at elevation 86 feet for the large building and elevation 85 feet for the smaller buildings. These footings will bear on the structural fill and may be loaded at an intensity of 3,000 psf or less. Footings beneath interior columns may have bottom elevations at or above elevation 85 feet. If the bottoms of the footings are below elevation 85 feet, the allowable pressure may be less than 3,000 psf and must be calculated to conform to the design.

The interior column bases should be seperated from the floor slab by



expansion joints. If the building structure indures horizontal loads at the tops of the foundations, these horizontal loads must be resisted by horizontal ties beneath the floor slab or by continuous reinforcing steel in the floor slab. If the reinforcing steel in the floor slab must resist lateral loads, the floor slab should be placed on top of the grade beams. Reinforcing steel dowels cast in the grade beams should extend three feet into the floor slab. These dowels may be cast in position or may be bent over, after the grade beam concrete hardens. The reinforcing in the floor slab should extend to within three inches of the edge of the floor slab and should be tied to the dowels. If wire mesh reinforcing is used in the floor slab, it should be continuous across the building. Where splices occur the wire mesh should be lapped at least one foot and the two sections tied together. The concrete in the floor slab should be placed in as dry a condition as possible to reduce cracks due to drying shrinkage. Tension joints should be provided in the floor slab at intervals of approximately 25 feet in each direction. These joints may be construction joints or sawed joints. At construction joints, the reinforcing should extend through the joint through slots in the headers. The reinforcing should not be cut or terminated at the joints. Sawed joints should be cut as soon as the surface of the concrete will support the saw without damage. The concrete floor slab in the manufacturing areas may be cast directly on the compacted sub-grade. Concrete floor slabs in office areas should be underlain by at least six inches of clean sand and should be placed over a layer of plastic vapor barrier material which is well lapped and undamaged. Adhesive used to fasten floor coverings to the floor slab should be waterproof and all floor covering should be water resistant. Lightweight masonry non load bearing partition walls

not over ten feet high may be supported by thickened floor slab sections. Load bearing masonry walls or partition walls in excess of ten feet in height should be supported by footings bearing on the compacted fill.

Eight undisturbed samples of soil were secured from test holes #5, #6, #7 and #8. Inplace density tests were conducted on these samples and varied from 81.6 to 96.2 pounds per cubic foot. The average inplace unit weight equals 88.75 pounds per cubic foot. Two moisture density relationship tests and one California Bearing Ratio test were conducted on the disturbed soil samples from test holes #6 and #8. The maximum dry densities were 112.9, 118.5 and 116.5 pounds per cubic foot with an average density of 116.0 pounds per cubic foot. If it is assumed that the average compaction of the fill equals 97.5%, the average weight of the fill soil will be .975 x 116.0 = 113.1 pounds per cubic foot. The fill will be 113.1 - 88.75 = 24.35 pounds per cubic foot heavier than the inplace soil. The shrinkage will equal 24.35/88.75 = 27.4%. If the accidental soil volume loss is assumed to equal 5%, the total volume loss will equal 32.4% of the cut volume. This shrinkage factor must be applied in calculating all fill requirements including the replacement of soil in structural fills beneath the buildings.

The California Bearing Ratio test and the plasticity index test was conducted on soil from test holes #6 and #8. The plasticity index equalled 0.0%. The California Bearing Ratio equals 38.0% at 100% of maximum dry density and 8.0% at 95.7% of maximum dry density. The design of the parking lot paving should be based on the California Bearing Ratio of 8.0%.

The pavement thickness is based on "Thickness Design - Full - Depth Asphalt Pavement Structures for Highway and Streets" published by The As-

phalt Institute, College Park, Maryland, Manual Series No. 1 (MS-1) Eighth Edition, December 1969. For paving of the roads and drives traveled by trucks, the following values are used:

Average Number of Trucks per day	20
Single Axel Weight	20,000 lbs.
Average Gross Weight	40,000 lbs.
Initial Traffic Number	9
Annual Growth Rate	6%
Design Life	20 years
Design Traffic Number	1.84 x 9 = 16.6
Total Thickness of Asphaltic Concrete	6 inches

The paving section may consist of four inches of asphaltic concrete base course plus two inches of asphaltic concrete surface course for the roads and drives traversed by trucks. The paving section of the parking lots may consist of three inches of asphaltic concrete base course and two inches of asphaltic concrete surface course.

The asphaltic concrete base course should meet the materials requirements for BM-6 mix and the asphaltic concrete surface course should meet the material requirements for BM-2 mix as stated in the "Standard Specifications for State Road and Bridge Construction" by the State Highway Commission of Kansas, Edition 1973. In addition, the asphaltic concrete base course should have a stabilty of at least 800 pounds and a flow of from .06 to .16 inches when compacted for Marshall Stability by 50 blows on each side. The asphaltic concrete surface course shall have a stability of 1,200 pounds and a flow of from .06 to .16 inches when compacted for Marshall Stability by 50 blows on each side. The asphaltic concrete base course should be compacted in place to at least 95% of maximum density and

the asphaltic concrete surface course should be compacted in place to at least 96% of maximum density as determined above.

One of our technicians should be at the project during the construction of all fills beneath the buildings and paved areas. In addition, daily samples of the asphaltic concrete should be secured for extraction, gradation and unit weight determinations. Cores to determine the inplace density of the asphaltic concrete should be cut on a daily basis.

Respectfully submitted,

ENGINEERING TESTING COMPANY

Orval W. Daniels, P.E.

ORVAL W. DANIELS LICENSED 785 KANSAS PROFESSIONAL ENGINEER

OWD:db

cc: 4 to Baughman Company
1 to file

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134234 Hole No. 1 Total Depth 10.5' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
		79.0				30" Drop 6 Blows/.5 Foot		
	8.0	78.0				7 Blows/.5 Foot		
						12 Blows/.5 Foot 4.5% - Moisture		
	9.0	77.0			fine Brown Sand	140# Hammer 30" Drop 17 Blows/.5 Foot		
						21 Blows/.5 Foot		
	10.0	76.0				23 Blows/.5 Foot 4.5% - Moisture		
				Bottom of Hole				
	11.0	75.0						

Original Signed by _____

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

FORM 14

REPORT OF DRILLED HOLES

Sheet 1 of 2

Baughman Company, 330 Laura, Wichita, Kansas

Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
450' S. of ℄ of 48th St. S. & 820' W. of ℄ of Broadway

Laboratory No.	134235	Hole No.	2	Core Diameter	5"
Date Started	5-22-78	Date Finished	5-22-78	Surface Elev.	87.7'
Ft. Total	10.5'	Rock Elev.	----	Rock Total	----
Ground-Water Elev.	----	Bottom Elev.	77.2'	Total Depth	10.5'

Elev. Pull No.	Depth	Feet-Scale Elevation 88.0	DESCRIPTION OF MATERIALS: Specimen No. and Rk. Defects	Action of Drill	Drillers Log	O.B. Core Loss Press, Tests, Etc.: Tests	Core Loss	Box No.
	0.0				Ground Surface			
		87.0			sandy Clay			
	1.0					140# Hammer 30" Drop 1 Blow/.5 Foot		
		86.0			silty fine Sand			
	2.0					1 Blow/.5 Foot		
						2 Blows/.5 Foot 10.3% - Moisture		
		85.0						
	3.0							
		84.0						
	4.0					140# Hammer 30" Drop 2 Blows/.5 Foot		
		83.0				5 Blows/.5 Foot		
	5.0				light Brown fine Sand	7 Blows/.5 Foot 2.8% - Moisture		
		82.0						
	6.0					140# Hammer 30" Drop 6 Blows/.5 Foot		
		81.0				10 Blows/.5 Foot		
	7.0					14 Blows/.5 Foot 2.6% - Moisture		
		80.0						

Original Signed by _____

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134235 Hole No. 2 Total Depth 10.5' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 80.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	8.0	79.0			light Brown fine Sand			
	9.0	78.0				140# Hammer 30" Drop 17 Blows/.5 Foot		
	10.0	77.0				28 Blows/.5 Foot		
						38 Blows/.5 Foot 4.3% - Moisture		
				Bottom of Hole				

Original Signed by _____

FORM 14

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P O BOX 2391 / WICHITA, KANSAS 67201

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 650' S. of ℄ of 48th St. S. & 820' W. of ℄ of Broadway

Laboratory No.	134236	Hole No.	3	Core Diameter	5"
Date Started	5-22-78	Date Finished	5-22-78	Surface Elev.	86.7'
O. B. Total	10.5'	Rock Elev.	----	Rock Total	----
Ground-Water Elev.	----	Bottom Elev.	76.2'	Total Depth	10.5'

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 87.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	0.0				Ground Surface			
					Brown silty Clay			
		86.0						
	1.0					140# Hammer 30" Drop 4 Blows/.5 Foot		
		85.0				5 Blows/.5 Foot		
	2.0					5 Blows/.5 Foot 23.7% - Moisture		
		84.0						
	3.0				fine silty Sand			
		83.0						
	4.0					140# Hammer 30" Drop 3 Blows/.5 Foot		
		82.0				3 Blows/.5 Foot		
	5.0					5 Blows/.5 Foot 6.1% - Moisture		
		81.0						
	6.0					140# Hammer 30" Drop 5 Blows/.5 Foot		
		80.0				7 Blows/.5 Foot		
	7.0					7 Blows/.5 Foot 8.5% - Moisture		
		79.0						

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134236 Hole No. 3 Total Depth 10.5' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 79.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	8.0	78.0			fine Sand	140# Hammer 30" Drop 6 Blows/.5 Foot		
	9.0	77.0				9 Blows/.5 Foot		
	10.0	76.0		Bottom of Hole		10 Blows/.5 Foot 17.3% - Moisture		

Original Signed by

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

FORM 14

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 870' S. of ℄ of 48th St. S. & 820' W. of ℄ of Broadway
Laboratory No. 134237 — Hole No. 4 — Core Diameter 5"
Date Started 5-22-78 — Date Finished 5-22-78 — Surface Elev. 85.8'
O. B. Total 10.5' — Rock Elev. ---- — Rock Total ----
Ground-Water Elev. 75.2' — Bottom Elev. 75.3' — Total Depth 10.5'

Elev. Pull No.	Feet-Scale Depth	Elevation 86.0	DESCRIPTION OF MATERIALS: Specimen No. and Rk. Defects	Action of Drill	Drillers Log	O.B. Core Loss Press, Tests, Etc.: Tests	Core Loss	Box No.
	0.0				Ground Surface			
		85.0			sandy Clay			
	1.0					140# Hammer 30" Drop 1 Blow/.5 Foot		
		84.0				2 Blows/.5 Foot		
	2.0					4 Blows/.5 Foot 10.2% - Moisture		
		83.0			silty fine Sand			
	3.0							
		82.0						
	4.0					140# Hammer 30" Drop 4 Blows/.5 Foot		
		81.0				5 Blows/.5 Foot		
	5.0					9 Blows/.5 Foot 6.9% - Moisture		
		80.0			fine Sand			
	6.0					140# Hammer 30" Drop 8 Blows/.5 Foot		
		79.0				8 Blows/.5 Foot		
	7.0					8 Blows/.5 Foot 9.1% - Moisture		
		78.0						

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134237 Hole No. 4 Total Depth 10.5' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 78.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	8.0							
		77.0						
	9.0				fine Sand	140# Hammer 30" Drop 13 Blows/.5 Foot		
		76.0				15 Blows/.5 Foot		
	10.0					17 Blows/.5 Foot 16.1% - Moisture		
			Water Table					
		75.0		Bottom of Hole				

FORM 14

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 980' S. of ℄ of 48th St. S. & 610' W. of ℄ of Broadway

Laboratory No.	134238	Hole No.	5	Core Diameter	5"
Date Started	5-22-78	Date Finished	5-22-78	Surface Elev.	85.8'
O. B. Total	10.0'	Rock Elev.	----	Rock Total	----
Ground-Water Elev.	----	Bottom Elev.	75.8'	Total Depth	10.0'

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 86.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	0.0				Ground Surface			
		85.0			sandy Clay			
	1.0							
		84.0						
	2.0							
		83.0			fine silty Sand	UNDISTURBED SAMPLE		
	3.0							
		82.0						
	4.0					140# Hammer 30" Drop 4 Blows/.5 Foot		
		81.0				5 Blows/.5 Foot		
	5.0					6 Blows/.5 Foot 13.9% - Moisture		
		80.0						
	6.0				fine Sand			
		79.0				UNDISTURBED SAMPLE		
	7.0							
		78.0						

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134238 Hole No. 5 Total Depth 10.0' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 78.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	8.0					On Preceding Page		
						140# Hammer 30" Drop 8 Blows/.5 Foot		
		77.0			fine Sand	12 Blows/.5 Foot		
	9.0					16 Blows/.5 Foot		
		76.0				20 Blows/.5 Foot 10.7% - Moisture		
	10.0			Bottom	of Hole			
		75.0						

ENGINEERING TESTING COMPANY

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P. O. BOX 2391 / WICHITA, KANSAS 67201

FORM 14

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 980' S. of ℄ of 48th St. S. & 1,320' W. of ℄ of Broadway

Laboratory No.	134239	Hole No.	6	Core Diameter	5"
Date Started	5-22-78	Date Finished	5-22-78	Surface Elev.	87.2'
O. B. Total	10.0'	Rock Elev.	----	Rock Total	----
Ground-Water Elev.	----	Bottom Elev.	77.2'	Total Depth	10.0'

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 88.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	0.0	87.0			Ground Surface sandy Clay			
	1.0	86.0						
	2.0	85.0			silty Sand			
	3.0	84.0				UNDISTURBED SAMPLE		
	4.0	83.0				140# Hammer 30" Drop 2 Blows/.5 Foot		
	5.0	82.0			fine Sand	4 Blows/.5 Foot 4 Blows/.5 Foot 10.4% - Moisture		
	6.0	81.0						
	7.0	80.0				UNDISTURBED SAMPLE		

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134239 Hole No. 6 Total Depth 10.0' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 80.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
						UNDISTURBED SAMPLE		
	8.0	79.0			fine Sand	140# Hammer 30" Drop 6 Blows/.5 Foot		
	9.0	78.0				8 Blows/.5 Foot		
						9 Blows/.5 Foot		
	10.0	77.0				10 Blows/.5 Foot 2.8% - Moisture		
				Bottom of Hole				

FORM 14

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 1,680' S. of ℄ of 48th St. S. & 1,320' W. of ℄ of Broadway
Laboratory No. 134240 — Hole No. 7 — Core Diameter ###" 5"
Date Started 5-22-78 — Date Finished 5-22-78 — Surface Elev. 86.0'
O. B. Total 10.0' — Rock Elev. ---- — Rock Total ----
Ground-Water Elev. ---- — Bottom Elev. 76.0' — Total Depth 10.0'

Elev. Pull No.	Feet-Scale Depth	Elevation 87.0	DESCRIPTION OF MATERIALS: Specimen No. and Rk. Defects	Action of Drill	Drillers Log	O.B. Core Loss Press, Tests, Etc.: Tests	Core Loss	Box No.
	0.0	86.0			Ground Surface			
					sandy Clay			
	1.0	85.0						
		4						
	2.0	8#.0						
	3.0	83.0				UNDISTURBED SAMPLE		
					fine Sand			
	4.0	82.0				140# Hammer 30" Drop 9 Blows/.5 Foot		
	5.0	81.0				11 Blows/.5 Foot		
						13 Blows/.5 Foot 7.4% - Moisture		
	6.0	80.0						
						UNDISTURBED SAMPLE		
	7.0	79.0						

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134240 Hole No. 7 Total Depth 10.0' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth 7.0	Elevation 79.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
						UNDISTURBED SAMPLE		
	8.0	78.0				140# Hammer 30" Drop 12 Blows/.5 Foot		
					fine Sand			
	9.0	77.0				11 Blows/.5 Foot		
						11 Blows/.5 Foot		
	10.0	76.0				11 Blows/.5 Foot 12.1% - Moisture		
				Bottom of Hole				

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

FORM 14

REPORT OF DRILLED HOLES

Sheet 1 of 2

Reported to: Baughman Company, 330 Laura, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., SW cor. of 48th St. S. & Broadway
Location: 1,680' S. of ℄ of 48th St. S. & 2,020' W. of ℄ of Broadway

Laboratory No.	134241	Hole No.	8	Core Diameter	5"
Date Started	5-22-78	Date Finished	5-22-78	Surface Elev.	87.0'
O. B. Total	10.0'	Rock Elev.	----	Rock Total	----
Ground-Water Elev.	----	Bottom Elev.	77.0'	Total Depth	10.0'

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth	Elevation 88.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
	0.0	87.0			Ground Surface			
	1.0	86.0						
	2.0	85.0			sandy Clay			
	3.0	84.0				UNDISTURBED SAMPLE		
	4.0	83.0				140# Hammer 30" Drop 8 Blows/.5Foot		
	5.0	82.0				8 Blows/.5 Foot		
					fine Sand	8 Blows/.5 Foot 7.3% - Moisture		
	6.0	81.0						
	7.0	80.0				UNDISTURBED SAMPLE		

FORM 14 A

ENGINEERING TESTING COMPANY

REPORT OF DRILLED HOLES

Laboratory No. 134241 Hole No. 8 Total Depth 10.0' Sheet 2 of 2

Elev.	Feet-Scale		DESCRIPTION OF MATERIALS			O.B. Core Loss Press, Tests, Etc.		
Pull No.	Depth 0.0	Elevation 80.0	Specimen No. and Rk. Defects	Action of Drill	Drillers Log	Tests	Core Loss	Box No.
						UNDISTURBED SAMPLE		
	8.0	79.0			fine Sand	140# Hammer 30" Drop 8 Blows/.5 Foot		
	9.0	78.0				11 Blows/.5 Foot		
						10 Blows/.5 Foot		
	10.0	77.0				12 Blows/.5 Foot 10.7% - Moisture		
				Bottom	of Hole			

FORM 10

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON SOIL DENSITY TESTS

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. Specimen marked

TEST RESULTS

Laboratory Number:	134242	134243	134244	134245
Test Hole Number:	5	5	6	6
Depth (Feet):	2.0-4.0	6.0-8.0	2.0-4.0	6.0-8.0
Elevation (Feet):	83.8-81.8	79.8-77.8	85.2-83.2	81.2-79.2
% Moisture:	6.7	9.9	12.5	11.6
Unit Weight #/cu.ft.:	89.3	85.2	81.6	96.2

Remarks

Copies: 4 to Baughman Company
1 to file

Respectfully submitted,
ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-25-78 db

FORM 10

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON SOIL DENSITY TESTS

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, Kansas 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. Specimen marked

TEST RESULTS

Laboratory Number:	134246	134247	134248	134249
Test Hole Number:	7	7	8	8
Depth (Feet):	2.0-4.0	6.0-8.0	2.0-4.0	6.0-8.0
Elevation (Feet):	84.0-82.0	80.0-78.0	85.0-83.0	81.0-79.0
% Moisture:	6.6	7.3	18.3	11.5
Unit Weight #/cu.ft.:	88.1	98.3	84.4	86.9

Remarks

Copies: 4 to Baughman Company
1 to file

Respectfully submitted,
ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-25-78 db

ENGINEERING TESTING COMPANY
535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON MOISTURE DENSITY RELATIONSHIP TEST

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. 134250 Specimen marked

TEST RESULTS

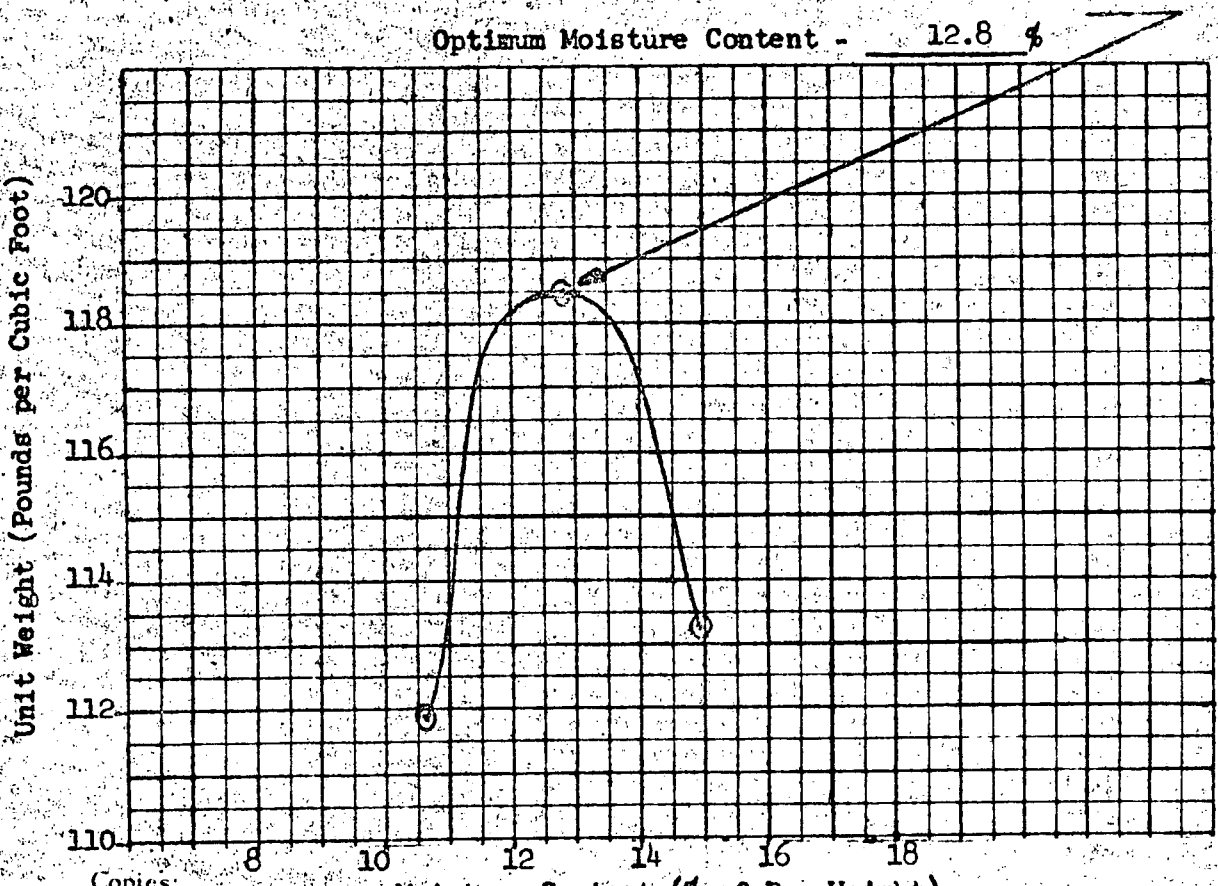
Material: Silty Sand

Location: Test Hole #6 Depth: 0.5'-6.0'

Below is the compaction curve for the Moisture Density Relationship.
AASHO T99 Compaction test, 5.5# hammer, dropped 12 ", 3 lifts, 25 blows/lift, 4.00" dia. Mold 4.59 " high.

Maximum Dry Density - 118.5 #/cu.ft.

Optimum Moisture Content - 12.8 %



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ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-25-78 db

ENGINEERING TESTING COMPANY
535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON MOISTURE DENSITY RELATIONSHIP TEST

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. 134251 Specimen marked

TEST RESULTS

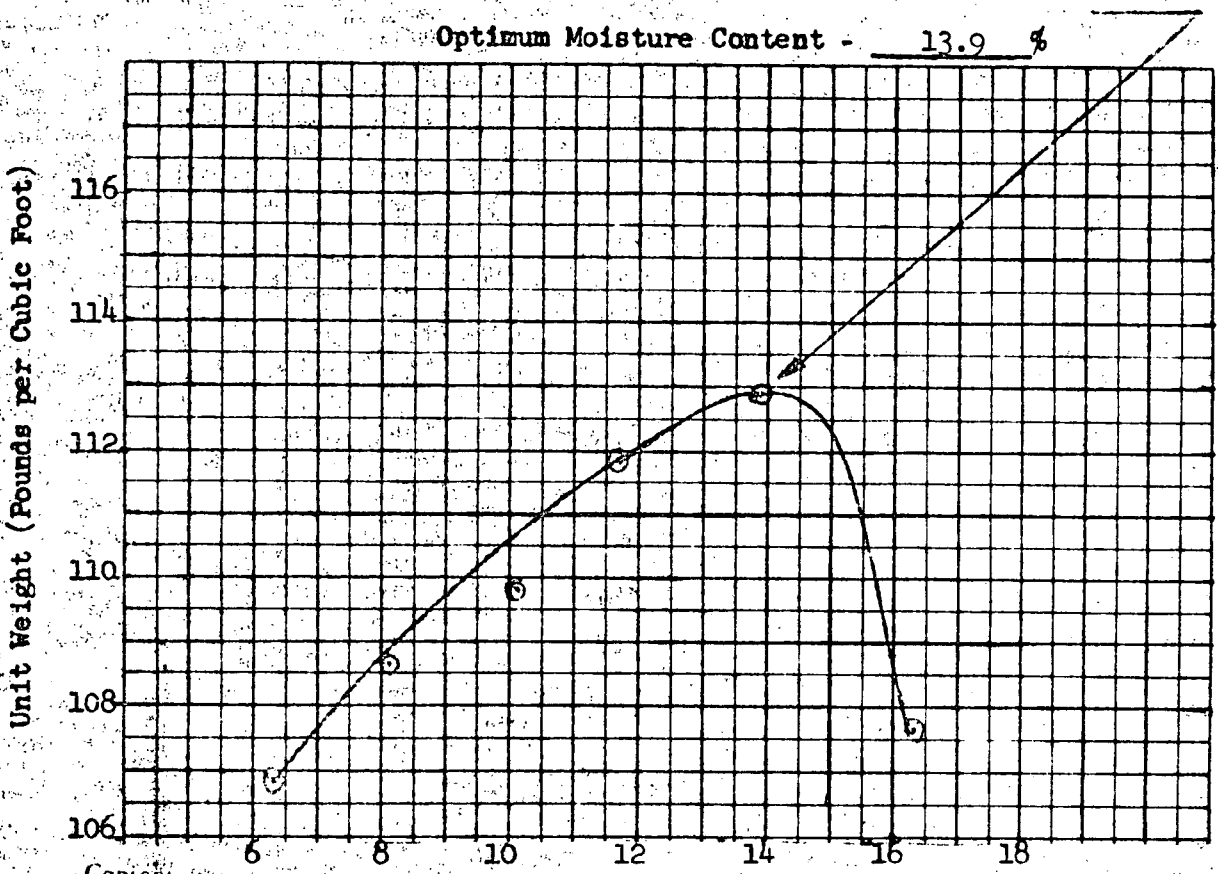
Material: Silty Sand

Location: Test Hole #8 Depth: 0.5'-6.0'

Below is the compaction curve for the Moisture Density Relationship.
AASHO T99 Compaction test, 5.5 # hammer, dropped 12 ", 3 lifts, 25 blows/lift, 4.00 " dia. Mold 4.59 " high.

Maximum Dry Density - 112.9 #/cu.ft.

Optimum Moisture Content - 13.9 %



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ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-25-78 db

FORM 10

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON CALIFORNIA BEARING RATIO TEST

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. 134263 Specimen marked

TEST RESULTS

Material: Brown Silty Sand

Location: Test Hole #6 Depth: 0.5'-6.0' & Test Hole #8 Depth: 0.5'-6.0'

AASHO T99 Compaction Test, 5.5# hammer, dropped 12", 3 lifts, 62 blows/lift, 6.00" dia. mold, 5.00" high.

Maximum Dry Density - 116.5#/cu.ft.

Optimum Moisture Content - 12.1%

C. B. R. DATA

Blows per Layer:	62	25
Dry Density as Molded:	116.5	111.6
Moisture Content as Molded:	12.1	14.1
Percent Expansion after Soaking 4 Days:	.04	-.12
Moisture Content in Top 1" after Soaking:	14.2	15.6
Moisture Content after Soaking 4 Days:	13.2	14.8
Corrected CBR in Percent at .1" Penetration:	38.0	8.0
Corrected CBR in Percent at .2" Penetration:	50.7	10.0

Remarks

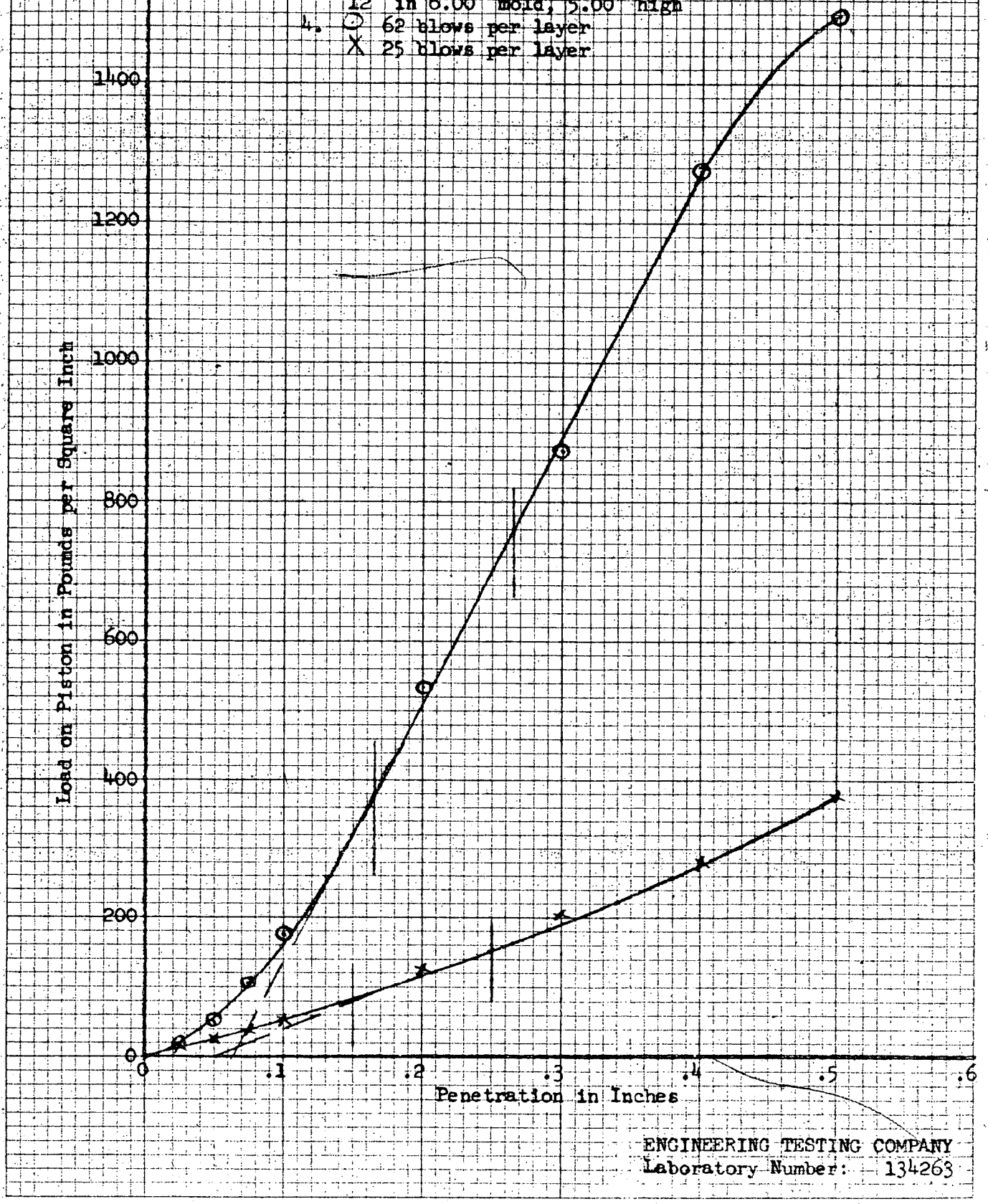
Copies: 4 to Baugham Company
1 to file

Respectfully submitted,
ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-31-78 db

CALIFORNIA BEARING RATIO TEST

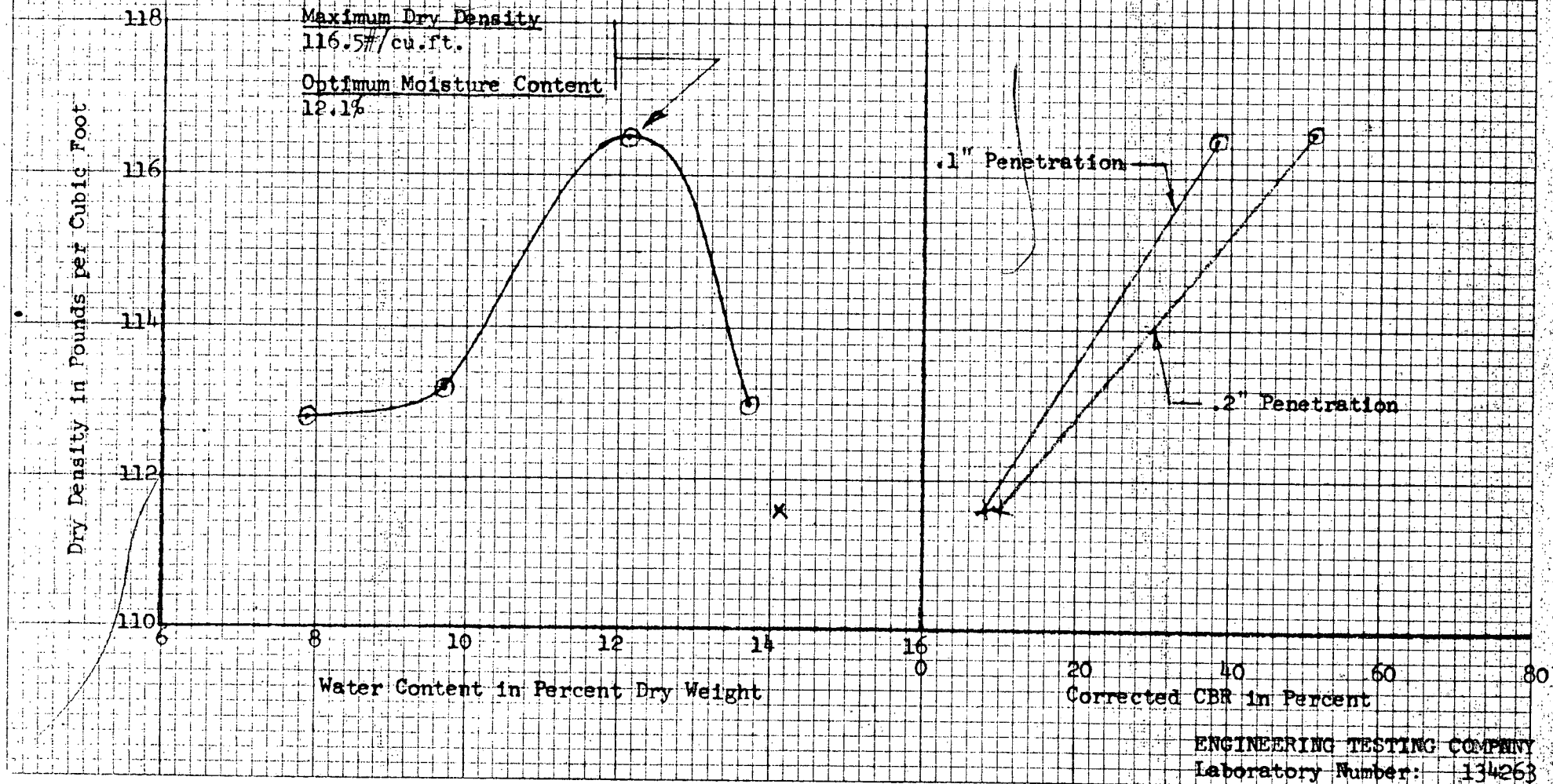
Reported to: Baughman Company, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., Wichita, Kansas
Location: Test Holes #6 & #8 Depth: 0.5'-6.0' Material: Brown Silty Sand
Notes:
1. Surcharge 10 lbs. for soaking and pene.
2. CBR specimens soaked top and bottom for 4 days
3. Specimens compacted in 3 layers, 5.5# hammer, dropped 12" in 6.00" mold, 5.00" high
4. ○ 62 blows per layer
   X 25 blows per layer



ENGINEERING TESTING COMPANY
Laboratory Number: 134263

CALIFORNIA BEARING RATIO TEST

Reported to: Baughman Company, Wichita, Kansas
Project: Fireball Industries of Kansas, Inc., Wichita, Kansas
Location: Test Hole #6 Depth: 0.5'-6.0' & Test Hole #8 Depth: 0.5'-6.0' Material: Brown Silty Sand
Notes:
1. Surcharge 10 lbs. for soaking and penetration
2. CBR specimens soaked top and bottom for 4 days
3. Specimens compacted in 3 layers, 5.5# hammer dropped 12" in 6.00" mold, 5.00" high
4. ○ 62 blows per layer
   X 25 blows per layer



ENGINEERING TESTING COMPANY
Laboratory Number: 134263

FORM 10

ENGINEERING TESTING COMPANY

535 North Washington / (316) 265-8553
P. O. BOX 2391 / WICHITA, KANSAS 67201

REPORT ON PLASTICITY INDEX TEST

Received 5-22-78 From

Reported to Baughman Company, 330 Laura, Wichita, Kansas 67211

Tests made by order of Baughman Company, 330 Laura, Wichita, 67211

Project Fireball Industries of Kansas, Inc., 48th St. S. & Broadway

Contractor

Laboratory No. 134264 Specimen marked

TEST RESULTS

Location: Test Hole #6 Depth: 0.5'-6.0' & Test Hole #8 Depth: 0.5'-6.0'

Visual Classification: Silty Sand

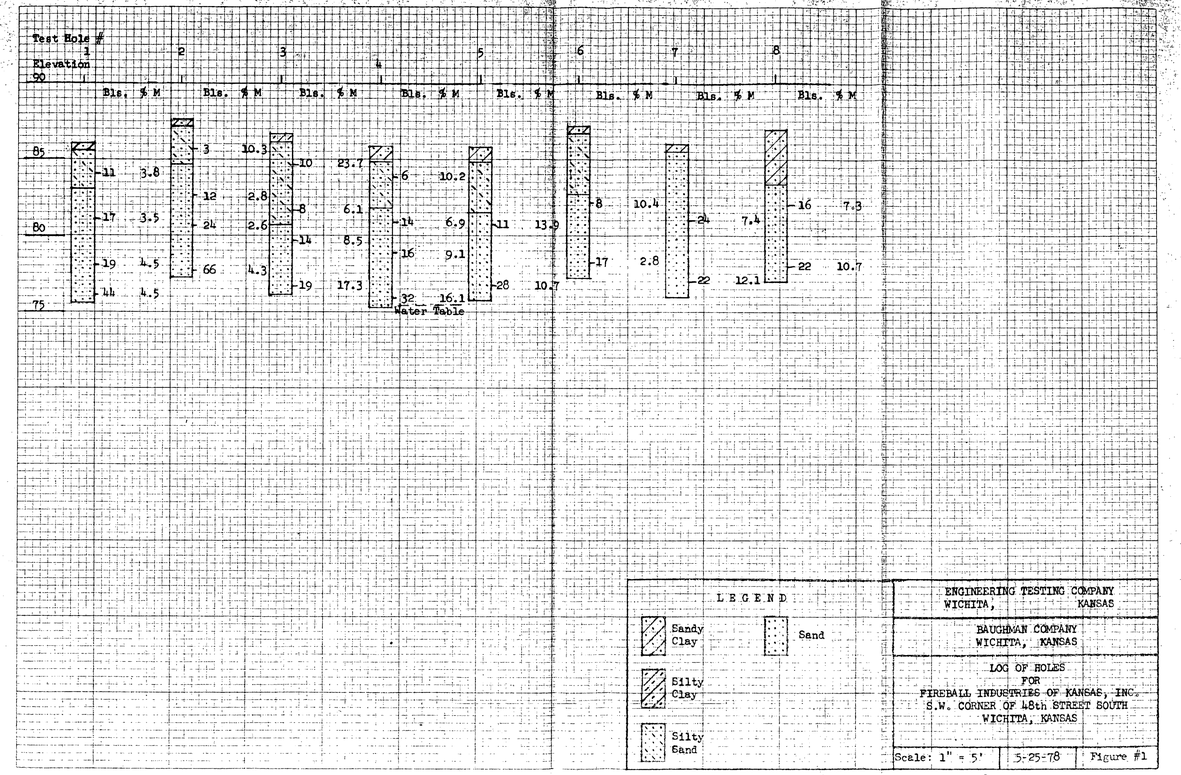
Liquid Limit:	**0.0**
Plastic Limit:	**0.0**
Plasticity Index:	**0.0**

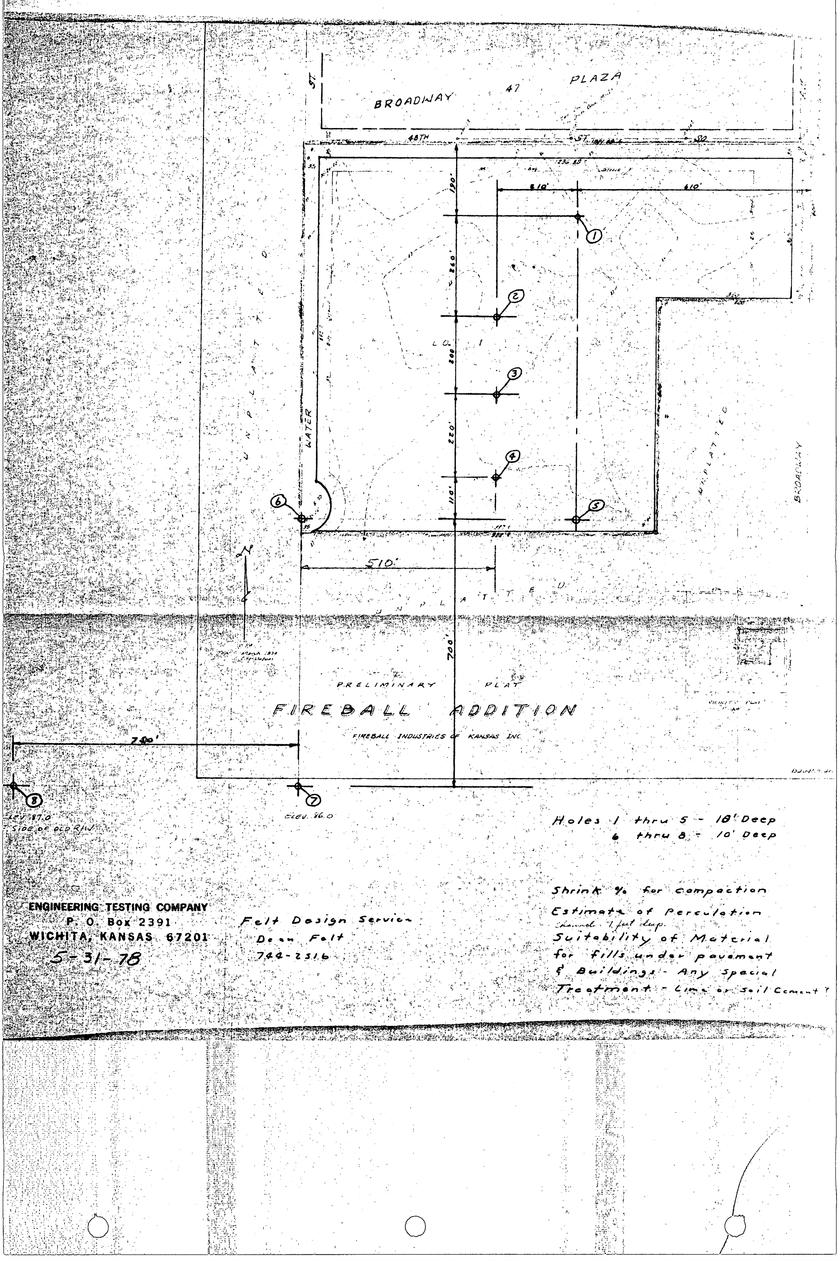
Remarks

Copies: 4 to Baughman Company
1 to file

Respectfully submitted,
ENGINEERING TESTING COMPANY
(Original Signed By)

Orval W. Daniels, P.E. 5-31-78 db


Test Hole #
Elevation
90
85
80
75
1
2
3
4
5
6
7
8
Bls. % M
3.8
3.5
4.5
4.5
10.3
2.8
2.6
4.3
23.7
6.1
8.5
17.3
10.2
6.9
9.1
16.1
13.9
10.7
10.4
2.8
7.4
12.1
7.3
10.7
Water Table
LEGEND
Sandy Clay
Silty Clay
Silty Sand
Sand
ENGINEERING TESTING COMPANY
WICHITA, KANSAS
BAUGHMAN COMPANY
WICHITA, KANSAS
LOG OF HOLES
FOR
FIREBALL INDUSTRIES OF KANSAS, INC.
S.W. CORNER OF 48th STREET SOUTH
WICHITA, KANSAS
Scale: 1" = 5'
5-25-78
Figure #1



ENGINEERING TESTING COMPANY
P. O. Box 2391
WICHITA, KANSAS 67201

5-31-78

Felt Design Service
Dean Felt
722-2316