Subject: **Minutes of Pre-Bid Meeting held at PMU Office on 05 October 2020**
ICB-Works/PICIIP-08A
Construction of Wastewater Treatment Plant (WWTP) in North Zone, Sahiwal

As per the Bidding Documents issued on **September 18, 2020** the date of pre-bid meeting was scheduled on **September 05, 2020**. The pre-bid meeting was convened and chaired by the Project Director (PD), Program Management Unit (PMU), Punjab Intermediate Cities Improvement Investment Program (PICIIP), Local Government & Community Development Department, Punjab, Pakistan. Following officials from PMU and EPCM Consultant attended the meeting:

i. Mr. Socrat Aman Rana, Project Director, PMU, PICIIP.
ii. Mr. Javed Iqbal (Chief Engineer), PMU, PICIIP.
iii. Mr. Shuja Dar (Director Procurement & Contracts), PMU, PICIIP.
iv. Mr. Ahmed Naveed Shahbaz (Project Manager/Deputy Team Lead) EPCM.
v. Mr. Muhammad Ayyub (Senior Resident Engineer) EPCM.
vi. Mr. Muhammad Nashad Khan (Procurement & Contract Specialist) EPCM.
vii. Mr. Mohsen Islam Khan (Independent Consultant, Procurement & Contract Specialist) PMU, PICIIP.

The meeting started with the recitation of Holy Quran. The chair welcomed the participants (list attached as **Annex-A**) and asked the Independent Consultant, Procurement & Contract Specialist to start the meeting. The participants were briefed on the bidding documents, particularly the contents of Section-2 (Bid Data Sheet), Section-3 (Evaluation and Qualification Criteria), Section-4 (Bidding Forms) and Section-8 (Particular Conditions of the Contract).

The meeting was held in two parts. During the first part, it was explained in detail by reading the important Instructions to Bidders clauses on preparation of bids and application of evaluation criteria (financial and experience). It was also stressed on significance of a responsive bid submission.

During second part of the meeting, the participants were invited to raise queries. Director Procurement & Contracts advised them to submit their written queries to PMU for written replies / advice accordingly. The Bidders submitted their written queries from time to time before **19th October 2020** and the replies thereof, in writing, are attached as **Annex-B**.

The meeting was concluded with a vote of thanks to and from all the participants.

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RESPONSES TO BIDDERS' QUERIES
ICB-Works/PICIIP-08A: Construction of Wastewater Treatment Plant (WWTP) in North Zone, Sahiwal

Sr#	Bidder Queries	PMU Clarification
1.	No Water proofing item is available in BOQ as it is mention in DWG (3976/033/C/15G01).	Addendum-01 is attached herewith to cover water proofing item.
2.	Hardcopy of drawings is not clear for reading. Please provide clear copy of drawings.	Fair copy of drawings in PDF format are attached with the email.
3.	Will the Employer provide any place for contractor camp, storage and Plant facilities?	No. The Contractor has to make those arrangements on its own. The Employer may assist the Contractor in this regard.
4.	Will the Employer designate any disposal area for excess excavated material and debris?	Area for disposal of excess excavated material and debris is not designated. The Contractor will locate and inform Employer/RE for disposal area. He will get required permissions from MC/relevant authorities before disposal of excess material/debris. Payment will be made as per actual lead chart to be approved by the Engineer.
5.	Please provide the soil investigation report or borehole logs to understand the strata.	The requisite data is attached in the email.
6.	We need to visit the site to understand the scope of work and jurisdiction of site for availability of materials etc. so it is requested that please arrange the site visit and also aligned your representative who will guide us during the site visit.	As per ITB 7.2 of the Bidding Document (BD), the Bidder is responsible to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
7.	Is it allowed or enough space available to establish our camp near site?	The Bidder is responsible to make this determination on its own as per ITB 7.2
8.	Please advise our prices are exclusive of PST or not?	As per ITB 14.7, all duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder. This includes all applicable taxes including federal, provincial, direct, and indirect taxes.
9.	Please provide List of Approved Manufacturer / Vendors.	All the materials, equipment and works will be according to specifications and drawings. The material will be approved by The Engineer according to the specification.

Sr#	Bidder Queries	PMU Clarification
10.	Amcorp is registered with PEC in CA 'No Limit' category and Orient in C-1 category but we do not have following: Specialization Codes ME07 and EE 11 Which is for General works. Please advise can we eligible to participate in bidding process or not?	As per subclause 2.1.6 of Section – 3 of the BD, the Bidder will be considered eligible to participate in the bidding process if they do not have any specialization code at the time of submission of bid, however, the bidder shall be bound to obtain these specialization codes before the award of the Contract, if determined as lowest evaluated bidder. Refer to Addendum No. 1.
11.	As mention in ITB 20.1 Clause Please provide BOQ in Excel or PDF format so we can submit at the time of bid submission.	ITB 20.1 requires the bidder to submit the soft copy of the priced bids in MS Excel format, that has to be developed by the bidder on their own and the Employer shall not provide the soft copies of BOQs.
12.	Please elaborate the type of WWTP, is it lagoon type or activated sludge Please confirm?	WWTP is based on waste stabilization ponds technology which consists of Anaerobic, Facultative and Maturation Ponds.
13.	Please confirm the capacity? Type of plant? And type of waste?	WWTP will treat wastewater flow of 24.6 MGD (45.7 cusec). It is based on waste stabilization ponds technology. Wastewater is mostly domestic sewage with small quantity of industrial waste.
14.	Please advise what is the completion time of the project?	Time for Completion of the Project is 730 Days as per sub-clause 1.1.3.3 of the PCC in Section – 8 of the BD.
15.	How to define the Exchange rate for conversion of USD to PKR to determine the project cost which is done in last 10 years?	The bidder shall apply the appropriate selling rate notified by the State Bank of Pakistan or National Bank of Pakistan applicable on the date of completion of the project indicated by the bidder in EXP-1 and/or EXP-2.
16.	There is no water proofing item present in BOQ?	Please refer to response at Sr. No.1
17.	Please advise if the project is in hand so it is considered for evaluation?	Only the completed project will be considered against sub-clause 2.4.1 and 2.4.2 of the Section – 3 of the BD during the evaluation of the technical bids.
18.	Please advise if one partner have the construction experience of WWTP and other has not so is it fine to participate in the bidding process with the experience available with one partner?	For a bidder who is participating in the bidding process as a Joint Venture of two or more firms, any one partner of the joint venture must meet the requirements of experience in contracts of similar size and nature as per sub-clause 2.4.1 of the Section – 3 of the BD
19.	15 Million CFT earthwork is required from general earthwork or is it required to be meet from WWTP earthwork please advise?	The bidder must demonstrate the experience in execution of at least 15 Million CFT of "Mechanically Compacted Earthwork" and 0.1 Million CFT of "Reinforced Concrete Works" as per sub-clause 2.4.2 of the Section – 3 of the BD. This is a general requirement and not related to a specific type of project.

Sr#	Bidder Queries	PMU Clarification
20.	Please advise the final discharge point / location.	The treated effluent from the WWTP will be discharged into Sukhrawa Seepage Drain. Please refer Drawing No.3976//11/C/2J106 (sheet 1 of 3).
21.	Please advise, whether the contract type is re-measured or lump sum?	It is an admeasurement contract. Payments will be made for the quantity of work actually executed, on the basis of approved rates.
22.	Please elaborate the BOD, COD, & TSS standard?	Treated effluent from WWTP shall meet PEQS standard. The values of the standard for BOD, COD and TSS are 80 mg/l, 150 mg/l and 200mg/l respectively.
23.	Please advise on personnel requirements. For example, Civil engineer is responsible for execution of civil work, so the bidder has to provide the engineer having execution experience of 12 years for civil construction projects please confirm?	Any individual proposed by the bidder must possess the appropriate qualification and minimum general and specific experience requirements as indicated in Section 6 of the BD. The indicated experience should be aligned with the specified position.
24.	Please advise on evaluating the escalation as you know the monthly bulletin is not available regularly and the rates are different from the rates available in market please advise?	As per sub-clause 13.8 of GCC Section – 7 of the BD the Engineer is empowered to determine the provisional indices until such time as each current cost index is available, for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.
25.	What is the minimum amount of Interim Payment Certificate allowed?	As per sub-clause 14.6 of the PCC in Section – 8 of the BD the minimum amount of IPC is 3% (three percent) of the Accepted Contract Amount.
26.	Anaerobic Ponds, BOQ Item No.1, Jungle Clearance. Please specify the types of trees and plants to be cleared on site.	The bidder should visit the WWTP site to better ascertain the existing trees and plants at site. However, WWTP area is mostly crop area with some trees.
27.	Anaerobic Ponds, BOQ Item No.5, Brick Pavement. Please provide section drawing.	It is MRS item and should be considered according to description of item and relevant specifications.
28.	Anaerobic Ponds, BOQ Item No.6, Barbed wire fencing. Please provide section drawing.	It is MRS item and should be considered according to description of item and relevant specifications.
29.	Anaerobic Ponds, BOQ Item No.7, Steel grated doors. Please provide drawing and specify size of door.	It is MRS item and should be considered according to description of item and relevant specifications. Two doors are considered in the BOQ and quantity is given in Sft. The contractor shall submit shop drawings of gates for approval by the Engineer.
30.	Anaerobic Ponds, BOQ Item No.9, Interconnection Structures. Please provide section drawing.	Refer to drawing Nos. 3976/11/C/2J114, 3976/11/C/2J115, 3976/11/C/2J116 3976/033/C/15G03, 3976/033/C/15G03A, 3976/033/C/15G04, 3976/033/C/15G04A, 3976/033/C/15G05 & 3976/033/C/15G05A.

Sr#	Bidder Queries	PMU Clarification
31.	Inlet outlet channel, BOQ Item No.1, Pen Stock gates. Please provide drawing.	The contractor will submit the shop drawings of pen stock gates. However, functional details/ drawings, specifications and BOQ description are already included in the bidding documents.
32.	Office laboratory building. BOQ item No.30.Iron Grills. Please provide drawing.	It is MRS item and should be considered according to description of item and relevant specifications. For the size of windows, please refer to Drawings No. 3976/11/C/2J120.'.
33.	Office laboratory building. BOQ item No.17.Glazed tiles. Please specify the base rates for tiles.	Base rate to be decided by the bidder.

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PROGRAM MANAGEMNT UNIT
PUNJAB INTERMEDIATE CITIES IMPROVEMENT INVESTMENT PROGRAM

LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT DEPARTMENT
GOVERNMENT OF THE PUNJAB

CONSULTANCY SERVICES FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT (EPCM) FOR PUNJAB INTERMEDIATE CITIES IMPROVEMENT INVESTMENT PROGRAM

(Wastewater Treatment Plant, Zone-1, Sahiwal City)

GEOTECHNICAL INVESTIGATION DATA

December 2019

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
Geotechnical & Geoenvironmental Engineering Division
NESPAK House, 1-C, Block N, Model Town Extension, Lahore
Email: geotech@nespak.com.pk; Tel: 042-99090000, Ext. 409/442/3017; Fax: 042-99231950

CONSULTANCY SERVICES FOR
ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT (EPCM) FOR PUNJAB INTERMEDIATE CITIES IMPROVEMENT INVESTMENT PROGRAM

(Wastewater Treatment Plant, Zone-1, Sahiwal City)

GEOTECHNICAL INVESTIGATION DATA

TABLE OF CONTENTS

As per geotechnical investigations data, composite liner should be used for the construction of wastewater treatment plant to control leakage/migration of contaminants from the impoundment into the underlying soil/groundwater. The components of composite liner are:

a) Compacted soil liner
b) Geomembrane (HDPE)
c) Protective soil cover

Compacted Soil Liner:

The compacted soil liner shall be placed at the bottom and on side slopes of the ponds. The material suitable to be used for compacted soil liner shall meet the following specifications:

Vertical in-situ hydraulic conductivity in compacted state $\leq 1 \times 10^{-7}$ cm/sec
Fines (particles passing 0.075 mm sieve) ≥ 30 %
Plasticity index = 8 – 30 %
Gravels (particles passing 75 mm sieve and retaining 4.75 mm sieve) ≤ 20 %
Maximum particle size ≤ 10 mm

During current geotechnical investigations, thirteen (i.e. two onsite and eleven borrow area) soil samples were collected to check their suitability for compacted soil liner. Location of onsite and borrow area investigation points are attached herewith as ***Appendix - A***. Laboratory test results indicated that tested soil samples (collected from TP-1, TP-6, BA-1, BA-2, BA-6, BA-8 & BA-10) have characteristics as per requirement as stated above. Therefore, material from these sources can be used as lining material.

Soft soil / fill material, if encountered during construction of treatment plants, it should be excavated and removed completely. The exposed surface should be compacted to at least 90 % of the maximum modified Proctor dry density at ± 2 % of optimum moisture content.

The compacted soil liner shall be placed at the bottom and on side slopes of the ponds and shall have a minimum thickness of 600 mm and shall meet the material specifications mentioned above. The soil liner shall be placed in layers with maximum compacted layer thickness of 150 mm and compacted to at least 90 percent of the maximum modified Proctor dry density or 95 percent of the maximum standard Proctor dry density at 2 to 3 % wet of optimum moisture content.

After the placement of each layer, it shall be inspected and tested to ascertain compliance with specifications, including dry density, moisture content, hydraulic conductivity, etc. by an independent laboratory and Engineer's approval must be taken before laying the next layer.

Geomembrane (HDPE Liner):

High density polyethylene, HDPE Liner having minimum thickness of 60 mils (60/1000 inches) shall be placed over the compacted soil liner. HDPE liner must cover the entire area of earth material that would be in contact with the treated or stored effluent.

HDPE liners shall be installed according to the manufacturer's recommendations, with particular emphasis on seaming, and QA/QC.

Protective Soil Cover:

HDPE Liner is required to be covered immediately after placement. The HDPE Liner shall be covered by at least 300 mm thick cover of soil to prevent puncture by equipment and to protect it from degradation by ultraviolet light. The on-site / borrow area fine grained soils classified as ASTM class CL (Lean Clay), free of any objectionable material, can be used in the construction of protective soil cover.

The protective soil cover shall be placed in layers with maximum compacted layer thickness of 150 mm and compacted to at least 90 percent of the maximum modified Proctor dry density at 2% of optimum moisture content. Place protective soil cover within 24 hours after placement of the HDPE Liner to minimize the potential for damage from various sources, including precipitation, wind, and ultraviolet light exposure.

The Environmental Protection Agency (EPA) requires the highest level of supervision, i.e. Level 1 supervision for clay-lined waste stabilization ponds. It means that all the earth work operations must be continuously supervised and tested by people specializing in these kinds of works.

Treatment Plant / Pond Embankment:

A side slope of 3H: 1V may be considered during the construction of pond embankment

Interior slopes must be kept free of vegetation that could cause liner damage. Trees must not be allowed to grow either in the base or on the banks of the pond. However, interior slopes should be protected by low growing grass above the water line to withstand erosion.

APPENDICES

- **APPENDIX-A:**

  GEOTECHNICAL INVESTIGATION PLAN & LOCATION PLAN OF BORROW AREAS

- **APPENDIX-B:**

  BOREHOLE, TESTPIT LOGS & FIELD PERMEABILITY TEST RESULTS

- **APPENDIX-C:**

  SUMMARY OF LABORATORY TEST RESULTS & DETAILED RESULT SHEETS

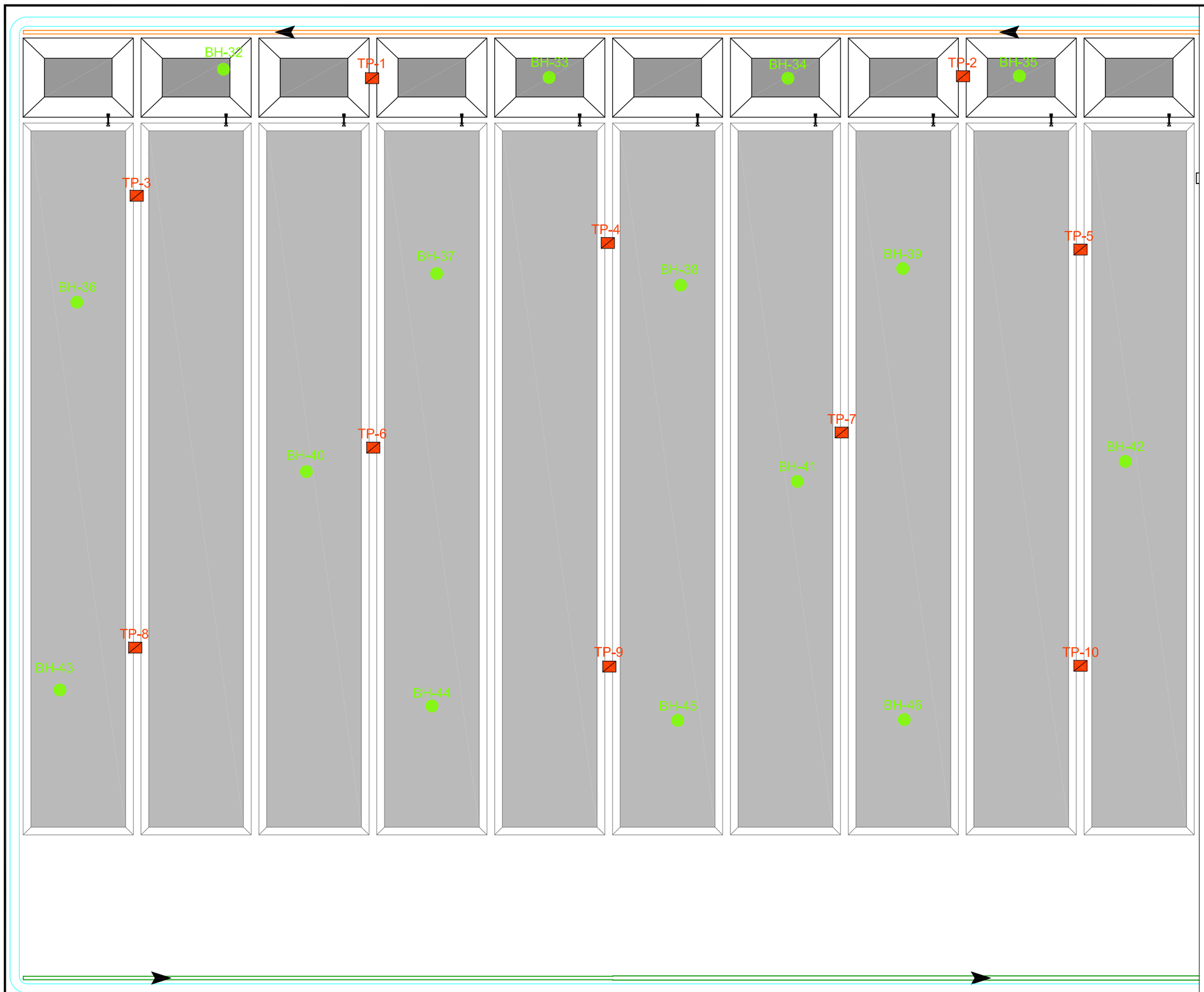
- **APPENDIX-D:**

  REFERENCE FOR LINING MATERIAL

APPENDIX-A

GEOTECHNICAL INVESTIGATION PLAN

LOCATION PLAN OF BORROW AREAS



Sr.No	Northing (ft)	Easting (ft)	Depth (m)
BH-32	11154708	1021880	10.0
BH-33	11153866	1021859	10.0
BH-34	11153248	1021857	10.0
BH-35	11152649	1021863	10.0
BH-36	11155088	1021278	10.0
BH-37	11154157	1021352	10.0
BH-38	11153526	1021322	10.0
BH-39	11152951	1021365	10.0
BH-40	11154494	1020840	10.0
BH-41	11153224	1020815	10.0
BH-42	11152375	1020866	10.0
BH-43	11155132	1020276	10.0
BH-44	11154169	1020234	10.0
BH-45	11153533	1020197	10.0
BH-46	11152947	1020199	10.0
TP-1	11154324	1021857	1.5
TP-2	11152795	1021862	1.5
TP-3	11154933	1021553	1.5
TP-4	11153714	1021431	1.5
TP-5	11152491	1021414	1.5
TP-6	11154321	1020902	1.5
TP-7	11153109	1020941	1.5
TP-8	11154937	1020385	1.5
TP-9	11153710	1020336	1.5
TP-10	11152491	1020338	1.5

LEGEND:

- BOREHOLES 10m DEPTH
- TESTPITS 1.5m DEPTH

NOTES:

1. THE GEOTECHNICAL INVESTIGATION PLAN HAS BEEN DEVELOPED ON THE BASIS OF LAYOUT PLAN PROVIDED BY PROJECT MANAGER.

0 100 200 300 FT

GRAPHIC SCALE

SHEET 2 OF 5

CLIENT
LG & CD DEPARTMENT, GOVT. OF PUNJAB

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01	-	-	

DRAWN	SALEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

GEOTECHNICAL INVESTIGATION PLAN (WASTEWATER TREATMENT PLANT, ZONE-1)

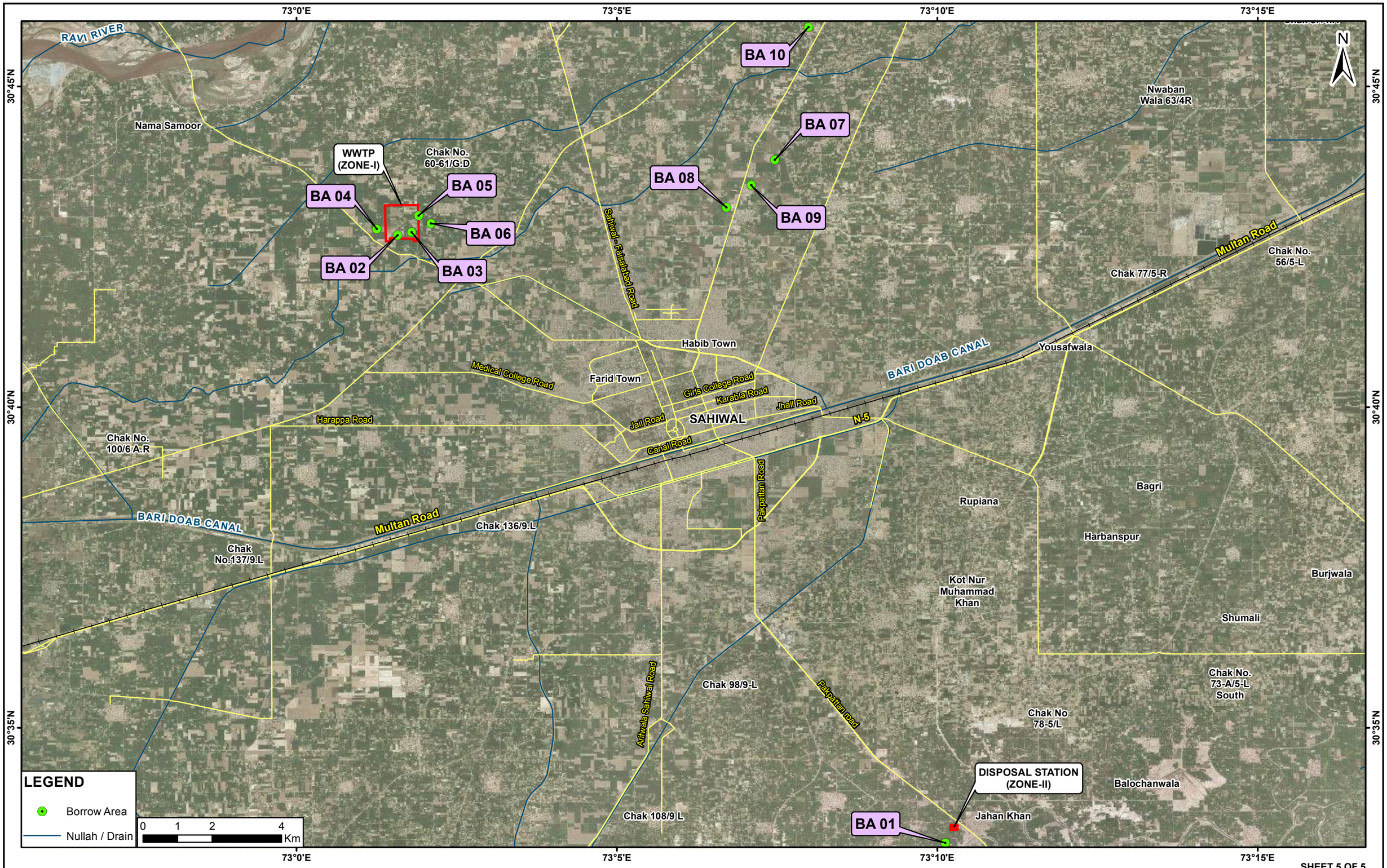
SCALE: -

DATE: JANUARY, 2020

DRAWING No.: 3976/024/D/6D001

REV.: 0

D:\3976 SAHIWAL\FINAL GT PLANS (JANAURY 2020) AS PER FIELD\FINAL DRAWINGS FIELD\FINAL GT PLAN ZONE-1 (1.1.20) AS PER FIELD LOG.DWG



SHEET 5 OF 5

CLIENT	CONSULTANT						PROJECT		
LG & CD DEPARTMENT, GOVT. OF THE PUNJAB	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	BILAL	PUNJAB INTERMEDICAL CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY	GEOTECHNICAL INVESTIGATION PLAN BORROW AREAS
		03				SUBMITTED			
		02				RECOMMENDED			
		01				CHD/VER.			
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			

SCALE	DATE	DRAWING No.	REV.
1:100,000	JANUARY, 2020	3976/024/D/6D001	0

APPENDIX-B

BOREHOLE, TESTPIT LOGS & PERMEABILITY TEST RESULTS

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-32
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)
Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3399955 m Ground Elevation 164.74 m Date 01-11-2019 To 01-11-2019
E: 311469 m

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
	SPT-1		ML	Brown, SILT, low plastic, trace roots, moist.		2	
1.0							
	SPT-2			Brownish grey, very loose to medium dense, fine grained, SILTY SAND, trace mica, moist.		3	
2.0							
	SPT-3					7	
3.0							
	SPT-4					8	
4.0							
	SPT-5		SM		Ø 100 mm	10	
5.0							
	SPT-6					12	
6.0							
	SPT-7					13	
7.0							
	SPT-8					8	
8.0							
	SPT-9					11	
9.0							
			SP-SM	Grey, medium dense, poorly graded SAND with SILT, trace mica, moist.			
10.0	SPT-10			BOTTOM OF BOREHOLE		13	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-33
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399698 m E: 311463 m Ground Elevation 163.89 m Date 28-10-2019 To 28-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	P.L. ▽ N.M.C. x L.L. ○ SPT Blows/30cm	Remarks
0.0							
	SPT-1			Brown, SILT, low plastic, trace to few brick pieces, race roots, moist.			
1.0						2	
	SPT-2		CL-ML	Brown, very soft, SILTY CLAY, low plastic, medium dry strength, moist.		2	
2.0	UDS-1						(Shellby) UDS-1 2.45-2.95m depth.
	SPT-3			Brown, SILTY CLAY with SAND, low plastic, medium dry strength, moist.		5	
3.0				Brownish grey, loose to medium dense, fine grained, SILTY SAND, trace mica, moist.			
	SPT-4					7	
4.0							
	SPT-5				Ø 100 mm	12	
5.0							
	SPT-6		SM			11	
6.0							
	SPT-7					5	
7.0							
	SPT-8					8	
8.0							
	SPT-9					10	
9.0							
10.0	SPT-10			BOTTOM OF BOREHOLE		11	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-34

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT

Job No. 3976 Project PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399510 m E: 311462 m Ground Elevation 163.95 m Date 27-10-2019 To 27-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Light brown, SILT, low plastic, trace roots, moist.	Ø 100 mm		
1.0	SPT-1			Grey, loose to medium dense, fine grained, SILTY SAND, trace mica, moist.		5	
2.0	SPT-2					7	
3.0	SPT-3					8	
4.0	SPT-4					9	
5.0	SPT-5		SM			11	
6.0	SPT-6					10	
7.0	SPT-7					13	
8.0	SPT-8					9	
9.0	SPT-9					12	
10.0	SPT-10			BOTTOM OF BOREHOLE		16	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-35
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)
Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3399327 m, E: 311464 m Ground Elevation 165.17 m Date 31-10-2019 To 31-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
	SPT-1		CL-ML	Brown, SILTY CLAY, low plastic, low dry strength, trace fine sand, trace roots, moist.	Ø 100 mm	2	
1.0	SPT-2		CL-ML	Brown, soft, SILTY CLAY, low plastic, medium dry strength, trace to few fine sand, moist.		3	
2.0	SPT-3		SM	Brownish grey, loose, fine grained, SILTY SAND, trace mica, moist.		7	
3.0	SPT-4					8	
4.0	SPT-5					10	
5.0	SPT-6					12	
6.0	SPT-7					13	
7.0	SPT-8					8	
8.0	SPT-9		SP-SM	Grey, medium dense, fine grained, poorly graded SAND with SILT, moist.		11	
9.0	SPT-10			BOTTOM OF BOREHOLE		13	
10.0							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-36
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)
Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3400071 m Ground Elevation 164.65 m Date 29-10-2019 To 29-10-2019
E: 311286 m

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Grey, fine grained, SILTY SAND, trace roots, moist.	Ø 100 mm		
1.0	SPT-1					7	
			SM	Grey, loose, fine grained, SILTY SAND, trace clay, trace mica, moist.			
2.0	SPT-2					8	
3.0	SPT-3					6	
4.0	SPT-4					6	
5.0	SPT-5					9	
6.0	SPT-6					10	
7.0	SPT-7					9	
			SP-SM	Brownish grey, loose to medium dense, poorly graded SAND with SILT, trace mica, moist.			
8.0	SPT-8					11	
9.0	SPT-9					11	
10.0	SPT-10			BOTTOM OF BOREHOLE		9	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-37
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/G-D (WWTP ZONE-1)
Site Incharge M.ARIF Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3399787 m E: 311308 m Ground Elevation 164.01 m Date 29-10-2019 To 29-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
			ML	Brown, SILT, low plastic, low to medium dry strength, trace roots, moist.			
1.0	SPT-1					3	
				Brownish grey, very loose to loose, SANDY SILT, non plastic, trace mica, moist.			
2.0	SPT-2					6	
3.0	SPT-3					5	
4.0	SPT-4					4	
5.0	SPT-5		ML		Ø 100 mm	6	
6.0	SPT-6					6	
7.0	SPT-7					8	
8.0	SPT-8					6	
9.0	SPT-9					8	
10.0	SPT-10			BOTTOM OF BOREHOLE		13	

SPT Blows/30cm: 10 20 30 40 50 60 70 80 90 100

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-38

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT

Job No. 3976 Project PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399595 m E: 311299 m Ground Elevation 165.35 m Date 27-10-2019 To 27-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Brown, SILT, low plastic, trace roots, moist.	Ø 100 mm		
1.0	SPT-1					4	
			SM	Grey, very loose to loose, fine grained, SILTY SAND with CLAY, trace concretion, moist.			
2.0	SPT-2					5	
				Grey, loose, fine grained, poorly graded SAND with SILT, trace concretions, trace mica, moist.			
3.0	SPT-3					8	
4.0	SPT-4					7	
5.0	SPT-5		SP-SM			9	
6.0	SPT-6					10	
7.0	SPT-7					11	
8.0	SPT-8					17	
9.0	SPT-9					12	
10.0	SPT-10			BOTTOM OF BOREHOLE		19	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-39

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399510 m E: 311462 m Ground Elevation 164.81 m Date 26-10-2019 To 26-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Brown, SILTY CLAY, low plastic, trace roots, trace concretions, moist.	Ø 100 mm		
1.0	SPT-1			Grey, very loose to medium dense, fine grained, SILTY SAND, trace mica, moist.		3	
2.0	SPT-2					3	
3.0	SPT-3					6	
4.0	SPT-4					6	
5.0	SPT-5		SM			7	
6.0	SPT-6					8	
7.0	SPT-7					11	
8.0	SPT-8					9	
9.0	SPT-9					8	
10.0	SPT-10			BOTTOM OF BOREHOLE		8	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-40

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399890 m E: 311152 m Ground Elevation 164.04 m Date 29-10-2019 To 29-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
	SPT-1		SM	Greyish brown, fine grained, SILTY SAND, trace roots, moist.			
1.0						3	
	SPT-2		SM	Greyish brown, very loose, SILT with SAND, trace mica, moist.		3	
2.0							
	SPT-3					3	
3.0							
	SPT-4					7	
4.0							
	SPT-5		SP-SM	Grey, loose to medium dense, poorly graded SAND with SILT, trace mica, moist.	Ø 100 mm	6	
5.0							
	SPT-6					13	
6.0							
	SPT-7					12	
7.0							
	SPT-8					10	
8.0							
	SPT-9					11	
9.0							
	SPT-10					10	
10.0				BOTTOM OF BOREHOLE			

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-41
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)
Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3399503 m E: 311144 m Ground Elevation 163.80 m Date 26-10-2019 To 26-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Brownish grey, fine grained, SILTY SAND, trace roots, moist.	Ø 100 mm		
1.0	SPT-1		SM	Grey, very loose to loose, fine grained, SILTY SAND, trace mica, moist.		4	
2.0	SPT-2					6	
3.0	SPT-3					9	
4.0	SPT-4					7	
5.0	SPT-5					10	
6.0	SPT-6					12	
7.0	SPT-7					9	
8.0	SPT-8					11	
9.0	SPT-9					11	
10.0	SPT-10		SP-SM	Brownish grey, medium dense, poorly graded SAND with SILT, trace mica, moist.		15	
				BOTTOM OF BOREHOLE			

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-42

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399244 m E: 311160 m Ground Elevation 163.65 m Date 25-10-2019 To 25-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0				Top: Field (Cultivated Land) Brownish grey, SANDY SILT/SILTY SAND, trace roots, moist.	Ø 100 mm		
1.0	SPT-1					3	
2.0	SPT-2		ML	Brownish grey, very loose, fine grained, SILT with SAND, trace roots, moist.		2	
3.0	SPT-3					2	
4.0	SPT-4					3	
5.0	SPT-5					8	
6.0	SPT-6		SP-SM	Brownish grey, loose to medium dense, poorly graded SAND with SILT, trace mica, moist.		11	
7.0	SPT-7					8	
8.0	SPT-8					10	
9.0	SPT-9					17	
10.0	SPT-10			BOTTOM OF BOREHOLE		15	

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-43

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3400084 m E: 310980 m Ground Elevation 165.32 m Date 30-10-2019 To 31-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
	SPT-1		SM	Greyish brown, fine grained, SILTY SAND, trace roots, moist.			
1.0						7	
	SPT-2			Greyish brown, very loose to medium dense, fine grained, poorly graded SAND with SILT, trace mica, moist.		9	
2.0							
	SPT-3					9	
3.0			SP-SM				
	SPT-4					11	
4.0							
	SPT-5				Ø 100 mm	9	
5.0							
	SPT-6					7	
6.0				Grey, loose to medium dense, fine grained, SILTY SAND, trace mica, moist.			
	SPT-7					10	
7.0							
	SPT-8		SM			15	
8.0							
	SPT-9					14	
9.0							
	SPT-10			BOTTOM OF BOREHOLE		21	
10.0							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-44

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT

Job No. 3976 Project PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY Location WWTP (ZONE-1)

Site Incharge NAUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399791 m E: 310967 m Ground Elevation 165.54 m Date 30-10-2019 To 30-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	SPT Blows/30cm (P.L. ▽, N.M.C. x, L.L. ○)	Remarks
0.0							
	SPT-1		CL-ML	Light brown, SILTY CLAY, low plastic, trace roots, moist.		3	
1.0							
	SPT-2		CL-ML	Brown, soft, SILTY CLAY, low plastic, medium dry strength, trace fine sand, moist.		6	
2.0							
	SPT-3		SP-SM	Brownish grey, loose to medium dense, poorly graded SAND with SILT, fine grained, trace concretions, trace mica, moist.	Ø 100 mm	11	
3.0							
	SPT-4					10	
4.0							
	SPT-5					11	
5.0							
	SPT-6					11	
6.0							
	SPT-7					12	
7.0							
	SPT-8					11	
8.0							
	SPT-9					9	
9.0							
	SPT-10					10	
10.0				BOTTOM OF BOREHOLE			

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

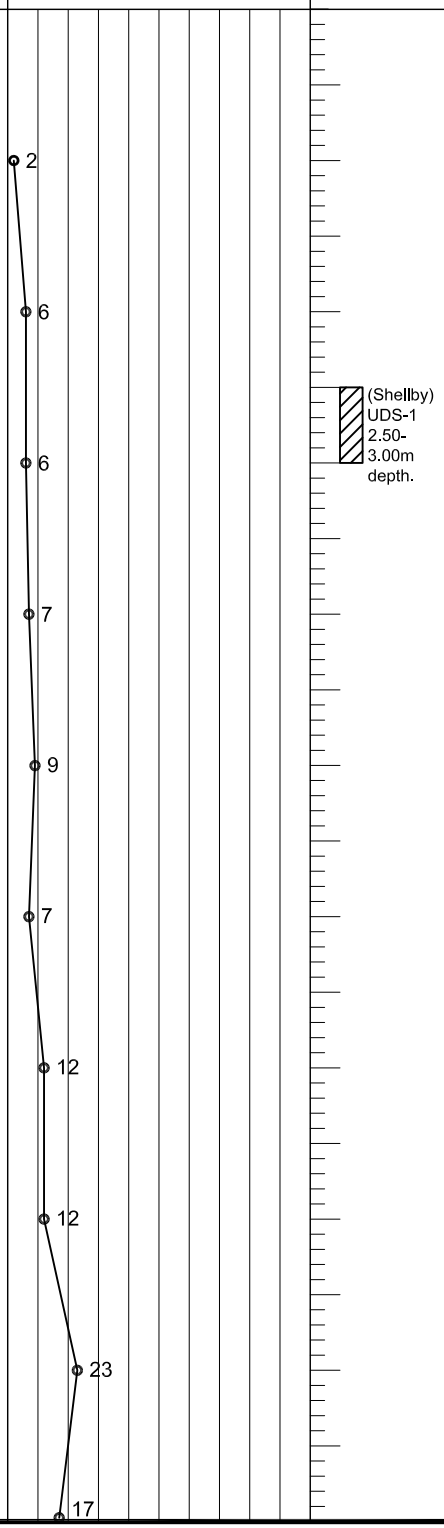
BOREHOLE NO. BH-45
SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/G.D (WWTP ZONE-1)
Site Incharge M.ARIF Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES
Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED
Coordinates N: 3399597 m E: 310956 m Ground Elevation 165.63 m Date 29-10-2019 To 29-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole
0.0					
	SPT-1		CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.	
1.0					
			CL	Brown, very soft to firm, LEAN CLAY, low to medium plastic, medium dry strength, trace concretion, moist.	
2.0	SPT-2				
	UDS-1				
	SPT-3				
3.0			ML	Brown, loose, SANDY SILT, non plastic, low dry strength, trace concretion, moist.	
4.0	SPT-4				
	SPT-5				
5.0			SP-SM	Brownish grey, loose to medium dense, fine grained, poorly graded SAND with SILT, trace mica, moist.	Ø 100 mm
6.0	SPT-6				
7.0	SPT-7				
8.0	SPT-8				
9.0	SPT-9				
10.0	SPT-10			BOTTOM OF BOREHOLE	



Remarks: (Shellby) UDS-1 2.50-3.00m depth.

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

BOREHOLE NO. BH-46

SHEET 1 OF 1

BOREHOLE LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT

Job No. 3976 Project PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY Location CHAK 66/G.D (WWTP ZONE-1)

Site Incharge M.ARIF Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Type of boring HAND AUGER Drilling Fluid - Ground Water Depth NOT ENCOUNTERED

Coordinates N: 3399418 m E: 310957 m Ground Elevation 165.38 m Date 30-10-2019 To 30-10-2019

Depth (m)	Sample No.	Legend	USCS Symbol	Description of Material	Dia of Casing/ Hole	Remarks
0.0						
	SPT-1		CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.		
1.0	SPT-2		CL-ML	Brown, very soft, SILTY CLAY, low to medium plastic, high dry strength, moist.		
2.0	SPT-3		CL	Brown, very soft, LEAN CLAY, medium plastic, high dry strength, moist.		
3.0	SPT-4					
4.0	SPT-5		SM	Grey, medium dense, fine grained, SILTY SAND, trace mica, moist.	Ø 100 mm	
5.0	SPT-6					
6.0	SPT-7					
7.0	SPT-8					
8.0	SPT-9					
9.0	SPT-10			BOTTOM OF BOREHOLE		
10.0						

P.L. ▽ N.M.C. x L.L. ○

SPT Blows/30cm

10 20 30 40 50 60 70 80 90 100

SPT-1: 2
SPT-2: 2
SPT-3: 7
SPT-4: 18
SPT-5: 12
SPT-6: 12
SPT-7: 19
SPT-8: 13
SPT-9: 11
SPT-10: 12

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-01

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399838 m E: 311462 m Ground Elevation 164.41 m Date 02-11-2019 TO 02-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Brown, SILT, low plastic, trace fine sand, trace clay, trace roots, moist.							
0.5			ML	Brown, SILT, low plastic, low dry strength, trace to few fine sand, moist.	FDT-1	15.7	6.7	-	-	-	
1.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	CS-1						
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-02

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399372 m E: 311464 m Ground Elevation 164.68 m Date 02-11-2019 TO 02-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Brown, SILT, low plastic, trace clay, trace roots, moist.							
0.5			ML	Brown, SILT, low plastic, low dry strength, trace roots, moist.	FDT-1	16.3	2.5	-	-	-	
1.0			SM	Brownish grey, fine grained, SILTY SAND, trace mica, moist.	CS-1						
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-03

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3400023 m E: 311369 m Ground Elevation 164.81 m Date 02-11-2019 TO 02-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0				Brown, SILT, low plastic, low to dry strength, trace clay, trace fine sand, moist.							
0.5			ML		FDT-1	15.2	13.1	-	-	-	
1.0				Greyish brown, fine grained, SILTY SAND, moist.							
1.5			SM								
				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-04

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399652 m E: 311332 m Ground Elevation 165.05 m Date 03-11-2019 TO 03-11-2019

Depth in meter	Elevation in meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Brown, SILT, low plastic, trace clay, trace roots, moist.							
				Light brown, SILT with SAND, non plastic to low plastic, trace roots, moist.							
0.5			ML		CS-1						
1.0											
1.5			CL-ML	Brown, SILTY CLAY, low to medium plastic, low to medium dry strength, moist.	FDT-1	14.0	21.9	-	-	-	
				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-05

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399279 m E: 311327 m Ground Elevation 164.84 m Date 02-11-2019 TO 02-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			SM	Grey, fine grained, SILTY SAND, trace roots, moist.							
0.5			ML	Brownish grey, fine grained, SANDY SILT with GRAVEL, trace mica, moist.	CS-1						
1.0					FDT-1	16.9	5.2	16.5	16	102	
			CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, moist.							
1.5			SM	Greyish brown, fine grained, SILTY SAND, trace mica, moist.							
				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-06

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399837 m E: 311171 m Ground Elevation 164.41 m Date 03-11-2019 TO 03-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Light brown, SILT, low plastic, trace clay, trace roots, moist.							
			ML	Light brown, SANDY SILT, non plastic, trace roots, moist.							
0.5			CL	Brown, LEAN CLAY, medium plastic, low to medium dry strength, trace roots, moist.	CS-1						
1.0					FDT-1	14.0	24.8	-	-	-	
			SM	Greyish brown, SILTY SAND, fine grained, trace mica, moist.							
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-07

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399468 m E: 311183 m Ground Elevation 164.07 m Date 03-11-2019 TO 03-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.							
0.5			SP-SM	Grey, fine grained, poorly graded SAND with SILT, trace mica, trace concretions, moist.	CS-1						
1.0					FDT-1	16.5	5.3	16.6	16	100	
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-08

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3400025 m E: 311013 m Ground Elevation 165.11 m Date 03-11-2019 TO 03-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Brown, SILT, trace clay, low plastic, trace roots, moist.							
0.5			SP-SM	Grey, fine grained, poorly graded SAND with SILT, trace mica, moist.	FDT-1 / CS-1	4.6	16.9	15.7	18	108	
1.0											
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-09

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399651 m E: 310998 m Ground Elevation 165.48 m Date 03-11-2019 TO 03-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Wet Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.							
0.5											
1.0			CL	Light brown, LEAN CLAY, medium plastic, few fine sand, moist.	CS-1						
					FDT-1	15.0	11.6	19.2	12.3	78	
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. TP-10

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location WWTP (ZONE-1)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399279 m E: 310999 m Ground Elevation 165.29 m Date 02-11-2019 TO 02-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.	FDT-1	14.0	24.4	-	-	-	
0.5											
1.0			ML	Light brown, SANDY SILT, trace mica, moist.							
			ML	Brown, SILT, low plastic, low dry strength, trace clay, moist.							
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-01

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location AABADI JAHAN KHAN

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3381531 m E: 324351 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
0.5											
0.90				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-02

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/4 D-WWTP

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399276 m E: 310996 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL	Brown, LEAN CLAY, low to medium plastic, low to medium dry strength, moist.	BS-1						
0.5											
1.0				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-03

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/4 D-WWTP

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399359 m E: 311352 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
0.5											
0.7				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-04

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/4 NEAR SITE AREA

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399470 m E: 310479 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			ML	Brown, SILT, low plastic, trace roots, moist.							
			CL	Brown, SANDY LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
0.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-05

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 66/4 NEAR SITE AREA

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399835 m E: 311530 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0				Brown, SILT, low plastic, trace roots, moist.							
0.5			CL-ML	Brown, SILTY CLAY with SAND, low to medium plastic, medium dry strength, moist.	BS-1						
1.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-2						
1.5											
1.70				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-06

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location DEPUTY WALA (CHAK 66/4)

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates N: 3399600 m E: 311833 m Ground Elevation - Date 08-11-2019 TO 08-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
0.5											
0.6				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-07

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 88/6 R

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates Lat: 30.7308 Long: 73.1244 Ground Elevation - Date 09-11-2019 TO 09-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Brown, SILTY CLAY, low to medium plastic, medium dry strength, trace roots, moist.							
			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
0.5											
0.8				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-08

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location RATTI TABBI

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates Lat: 30.718553 Long: 73.111852 Ground Elevation - Date 09-11-2019 TO 09-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Top: Cultivated land. Brown, SILTY CLAY, medium plastic, trace roots, moist.							
0.5			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
1.0				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-09

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location PATTI TABBI

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates Lat: 30.724351 Long: 73.118289 Ground Elevation - Date 09-11-2019 TO 09-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL-ML	Brown, SILTY CLAY, low to medium plastic, trace roots, moist.							
			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
1.5				BOTTOM OF TESTPIT							

NATIONAL ENGINEERING SERVICES
PAKISTAN (Pvt.) LIMITED, LAHORE

Test Pit No. BA-10

Sheet 1 OF 1

TESTPIT LOG

PUNJAB INTERMEDIATE CITIES IMPROVEMENT PROGRAM, WATER SUPPLY AND SEWERAGE SYSTEM IN SAHIWAL CITY

Job No. 3976 Project Location CHAK 55/6 D

Site Incharge NOUMAN Client LG & CD DEPARTMENT, GOVT. OF PUNJAB Contractor M/S SAFE SERVICES

Coordinates Lat: 30.765520 Long: 73.133173 Ground Elevation - Date 09-11-2019 TO 09-11-2019

Depth in meter	Elevation In meter	Legend	USCS Symbol	DESCRIPTION OF MATERIAL	Sample Type/No.	Field Density Test: Dry Density kN/m 3	Field Density Test: Moisture Content %	Lab. Density Test: Max. Dry Density kN/m 3	Lab. Density Test: Optimum m.c. %	Inplace % Compaction	REMARKS
0.0			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, few roots, moist.							
0.5			CL	Brown, LEAN CLAY, medium plastic, medium dry strength, moist.	BS-1						
1.0											
1.3				BOTTOM OF TESTPIT							

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Wastewater Treatment Plant
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 32
(a) bottom of borehole: 5.80 m	Date: 01-11-2019	Sheet 1 of 1
(b) bottom of casing:5.90 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Cloudy	Temperature: 23 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:- Not encountered	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.80 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	$1/\sqrt{t}$ Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_i (m^3/s)	Head, H (m)	q_i/H m^2/s
1036	- 1	1630							
	- 2	3050							
	- 2	3020							
	- 3	3970							
	- 3	3760							
	- 5	5870							
	- 5	5690							
	- 5	5610							
	- 5	5600							
	- 5	5600							
	- 5	5600							
	41 min	**49400 ml**							

$K = q / (F \times H_C)$, $q = 20.08$ cc/sec.
$D = 8.2$ cm, $F = 2.75 * D = 22.55$ cm
$K = 1.5 * 10^{-3}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Wastewater Treatment Plant
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 35
(a) bottom of borehole: 8.10 m	Date: 01-11-2019	Sheet 1 of 1
(b) bottom of casing: 8.20 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Sunny	Temperature: 28 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level: Not encountered	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.10 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	1 / √ t Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1701	- 1	2660							
	- 2	4970							
	- 2	4800							
	- 3	6700							
	- 3	6410							
	- 5	9270							
	- 5	8550							
	- 5	7920							
	- 5	7790							
	- 5	7450							
	- 5	7200							
	- 5	7010							
	- 5	6840							
	- 5	6705							
	- 5	6705							
	- 5	6705							
	66 min	**107685 ml**							

$K = q / (F \times H_C)$, $q = 27.19$ cc/sec.
$D = 8.2$ cm, $F = 2.75 * D = 22.55$ cm
$K = 1.47 * 10^{-3}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Wastewater Treatment Plant
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 43
(a) bottom of borehole: 7.37 m	Date: 31-10-2019	Sheet 1 of 1
(b) bottom of casing: 7.47 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Sunny	Temperature: 30 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:- Not encountered	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.87 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	t / √ t Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1036	- 1	1290							
	- 2	2010							
	- 2	1760							
	- 3	2240							
	- 3	2020							
	- 5	2900							
	- 5	2780							
	- 5	2660							
	- 5	2570							
	- 5	2520							
	- 5	2410							
	- 5	2350							
	- 5	2310							
	- 5	2300							
	- 5	2300							
	- 5	2300							
	66 min	**36720 ml**							

$K = q / (F \times H_C)$, q = 9.27 cc/sec.
D = 8.2 cm, F=2.75* D=22.55 cm
K = $0.62*10^{-3}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Wastewater Treatment Plant
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 46
(a) bottom of borehole: 4.50 m	Date: 30-10-2019	Sheet 1 of 1
(b) bottom of casing: 4.60 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Sunny	Temperature: 29 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level: Not encountered	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.50 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr	min	1 / √ t Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min	sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1221	-	1	640								
	-	2	950								
	-	2	1140								
	-	3	1470								
	-	3	1490								
	-	5	2480								
	-	5	2550								
	-	5	2325								
	-	5	2300								
	-	5	2270								
	-	5	2240								
	-	5	2185								
	-	5	2125								
	-	5	2120								
	-	5	2120								
	-	5	2120								
	66 min		**30525 ml**								

$K = q / (F \times H_C)$, $q = 7.71$ cc/sec.
$D = 8.2$ cm, $F = 2.75 * D = 22.55$ cm
$K = 0.74 * 10^{-3}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Disposal Station
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 47
(a) bottom of borehole: 5.75 m	Date: 03-11-2019	Sheet 1 of 1
(b) bottom of casing:5.75 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Cloudy	Temperature: 28 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:-	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.25 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	1 / √ t Loss in Lit	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1450	- 1	2.200							
	- 2	3.500							
	- 2	2.800							
	- 3	4.070							
	- 3	4.030							
	- 5	6.500							
	- 5	6.150							
	- 5	5.300							
	- 5	5.900							
	- 5	5.950							
	- 5	5.970							
	- 5	6.625							
	- 5	7.530							
	- 5	7.530							
	- 5	7.530							
	61 min	**81.585 Litre**							

$K = q / (F \times H_C)$, $q = 0.223$ lit/sec.
$D = 8.2$ cm, $F = 2.75 * D = 22.55$ cm
$K = 1.8 * 10^{-2}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-1	Location: Disposal Station
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 50
(a) bottom of borehole: 4.67 m	Date: 03-11-2019	Sheet 1 of 1
(b) bottom of casing:4.67 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Cloudy	Temperature: 29 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:-	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.17 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	1 / √ t Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1612	- 1	1000							
	- 1	700							
	- 2	1100							
	- 2	1200							
	- 3	1425							
	- 3	1775							
	- 5	2275							
	- 5	2500							
	- 5	2475							
	- 5	2750							
	- 5	2650							
	- 5	2400							
	- 5	2375							
	- 5	2300							
	- 5	2300							
	- 5	2300							
	62 min	**31525 ml**							

$K = q / (F \times H_C)$, $q = 8.47$ cc/sec.
$D = 8.2$ cm, $F = 2.75 * D = 22.55$ cm
$K = 0.8 * 10^{-3}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-2	Location: Disposal Station
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 54
(a) bottom of borehole: 4.13 m	Date: 07-11-2019	Sheet 1 of 1
(b) bottom of casing: 4.13 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Cloudy	Temperature: 24 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:-	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.13 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	1 / √ t Loss in Lit	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1602	- 1	0.460							
	- 2	0.480							
	- 2	0.450							
	- 3	0.900							
	- 3	0.560							
	- 5	1.050							
	- 5	0.820							
	- 5	0.790							
	- 5	0.540							
	- 5	0.420							
	- 5	0.390							
	- 5	0.350							
	- 5	0.350							
	- 5	0.350							
	56 min	**7.910 Litre**							

$K = q / (F \times H_C)$, q = 2.35 cc/sec.
D = 8.2 cm, F=2.75* D=22.55 cm
K = $2.5*10^{-4}$ cm/sec.

Remarks:

National Engineering Services Pakistan (Pvt.) Limited

CONSTANT HEAD PERMEABILITY TEST

Name of Project: WATER SUPPLY AND SANITATION SECTORS SAHIWAL CITY	Site: Zone-2	Location: Disposal Station
Depth below top of casing/standpipe to:	Job No. 3976	Borehole No. 55
(a) bottom of borehole: 5.95 m	Date: 07-11-2019	Sheet 1 of 1
(b) bottom of casing: 6.05 m	Ground level: (Ordnance datum)	Crew/Operator:
(c) top of filter material: -	Weather: Cloudy	Temperature: 19 °C
(d) centre of piezometer tip: -	Type of test: inflow	
(e) initial groundwater level:- Not encountered	Internal diameter of casing / standpipe: 8.2 cm	
Height of casing/standpipe above surface: 0.45 m	Length of filter: - mm Dia. of filter mm	
Elevation of casing/standpipe: (Ordnance datum)	Type of piezometer	

Test record

Time	Time elapsed 't' hr min	1 / √ t Loss in ml	Measurement of flow: Fall in standpipe (m)	Internal dia. of standpipe (m)	Volume of flow (m^3)	Time for flow min sec	Flow q_t (m^3/s)	Head, H (m)	q_t/H m^2/s
1659	- 1	670							
	- 2	980							
	- 2	1005							
	- 3	1095							
	- 3	1010							
	- 5	1560							
	- 5	1550							
	- 5	1550							
	- 5	1550							
	31 min	**10970 ml**							

$K = q / (F \times H_C)$, q = 5.90 cc/sec.
D = 8.2 cm, F=2.75* D=22.55 cm
K = $0.43*10^{-3}$ cm/sec.

Remarks:

APPENDIX-C

TABLE C-1 SUMMARY OF LABORATORY TEST RESULTS

TABLE C-2 SUMMARY OF FIELD DENSITY TESTS

DETAILED RESULT SHEETS

CONSULTANCY SERVICES FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT FOR PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM
(Wastewater Treatment Plant, Zone-1)

SUMMARY OF THE LABORATORY TEST RESULTS

Sr. No.	Location	BH/TP No.	Sample No.	Depth	Natural Moisture Content NMC	In-situ Bulk Density	In-situ Dry Density	Grain Size Analysis(% Passing)						Atterberg Limits			Material Classification			Modified AASHTO Compaction Test		3 Point Soaked CBR at 95% of MDD	Standard Proctor AASHTO Compaction Test		Consolidation Test with swell potential Measurement				Unconfined Compression Test (on soil sample)		Direct Shear Test		Chemical Analysis of Soil			Chemical Analysis of water			
														LL	PL	PI	Unified Soil Classification System Symbol (USCS)	AASHTO Classification Symbol	Material Description	OMC	Max. Dry Density (MDD)		OMC	Max. Dry Density (MDD)	Hydraulic Conductivity	e_o	C_c	Swell Pressure	q_u	Failure Strain	φ	c	Sulphate Content	Chloride Content	Organic Matter	Sulphate Content	Chloride Content	TDS	pH
				(m)	(%)	(kN/m^3)	(kN/m^3)	3/8	#4	#10	#40	#100	# 200	(%)	(%)	(%)				(%)	kN/m^3	(%)	(%)	kN/m^3	(cm/sec)	-	-	(kPa)	(kPa)	(%)	Deg	kPa	(%)	(%)	(%)	(ppm)	(ppm)	(ppm)	-
81	Waste Water Treatment plant (Zone-1)	BH-32	SPT-3	3.00-3.45				100	100	100	100	61	29				SM	A-2-4	Silty sand																			
82			SPT-9	9.00-9.45				100	100	99	95	22	11				SP-SM	A-2-4	Poorly graded sand with silt																			
83		BH-33	UDS-01	2.45-2.95	25.61	16.96	13.5	100	100	100	99	81	71	22	16	6	CL-ML	A-4	Silty clay with sand							0.70	0.142		12.7	10							
84			SPT-8	8.00-8.45				100	100	100	100	62	27				SM	A-2-4	Silty sand																			
85		BH-34	SPT-4	4.00-4.45				100	96	61	37	24	20				SM	A-2-4	Silty sand															0.08	0.04	0.16				
86			SPT-9	9.00-9.45				100	97	91	84	25	16				SM	A-2-4	Silty sand																			
87		BH-35	SPT-3	3.00-3.45				100	100	100	96	17	13				SM	A-2-4	Silty sand																			
88			SPT-8	8.00-8.45				100	100	100	96	14	10				SP-SM	A-3	Poorly graded sand with silt																			
89		BH-36	SPT-3	3.00-3.45				100	100	100	100	38	13				SM	A-2-4	Silty sand															0.09	0.06	0.14				
90			SPT-7	7.00-7.45				100	100	100	99	32	9				SP-SM	A-3	Poorly graded sand with silt																			
91		BH-37	SPT-5	5.00-5.45				100	100	100	99	89	58				ML	A-4	Sandy silt																			
92			SPT-10	10.00-10.45				100	100	100	100	34	12				SP-SM	A-2-4	Poorly graded sand with silt																			
93		BH-38	SPT-5	5.00-5.45				100	100	100	98	38	12				SP-SM	A-2-4	Poorly graded sand with silt																			
94			SPT-10	10.00-10.45				100	99	98	93	22	15				SM	A-2-4	Silty sand																			
95		BH-39	SPT-3	3.00-3.45				100	100	100	100	88	44				SM	A-4	Silty sand																			
96			SPT-9	9.00-9.45				100	100	99	98	81	46				SM	A-4	Silty sand																			
97		BH-40	SPT-2	2.00-2.45				100	100	100	99	93	76				ML	A-4	Silt with sand																			
98			SPT-7	7.00-7.45				100	100	100	99	30	8				SP-SM	A-3	Poorly graded sand with silt																			
99		BH-41	SPT-4	4.00-4.45				90	90	90	89	53	16				SM	A-2-4	Silty sand															0.11	0.17	0.20				
100			SPT-9	9.00-9.45				100	100	100	96	7	5				SP-SM	A-3	Poorly graded sand with silt																			
101		BH-42	SPT-3	3.00-3.45				100	100	100	100	97	78				ML	A-4	Silt with sand																			
102			SPT-8	8.00-8.45				100	100	100	97	23	8				SP-SM	A-3	Poorly graded sand with silt																			
103		BH-43	SPT-4	4.00-4.45				100	100	99	93	13	8				SP-SM	A-3	Poorly graded sand with silt																			
104			SPT-9	9.00-9.45				100	100	99	97	40	13				SM	A-2-4	Silty sand																			
105		BH-44	SPT-5	5.00-5.45				100	100	100	99	18	7				SP-SM	A-3	Poorly graded sand with silt																			
106		BH-45	UDS-01	2.45-3.0	23.50	18.40	14.9	100	100	97	96	95	95	30	20	10	CL	A-4	Lean clay							0.69	0.198		17.6	5			0.09	0.16	0.26				
107			SPT-10	10.00-10.45				100	100	99	97	45	13				SM	A-2-4	Silty sand																			
108		BH-46	SPT-2	2.00-2.45				100	100	100	100	99	98	36	21	15	CL	A-6	Lean clay																			
109			SPT-7	7.00-7.45				100	100	100	96	29	14				SM	A-2-4	Silty sand																			
135		TP-01	CS-1	1.15-1.50				100	100			98	97	35	21	14	CL	A-6	lean clay				17.4	17.6	8.00x10^{-6}	0.62	0.164	Nil											
136		TP-02	CS-1	1.05-1.50				100	100	100	100	57	25				SM	A-2-4	Silty sand	16.4	16.8	13																	
137		TP-04	CS-1	0.7-1.40				100	100	100	100	92	79	Non plastic			ML	A-4	Silt with sand	14.3	17.7	11																	
138		TP-05	CS-1	0.40-1.22				100	100	100	100	84	67				ML	A-4	Sandy silt	15.8	16.5	13																	
139		TP-06	CS-1	0.50-1.35				100	100	100	99	97	96	33	20	13	CL	A-6	Lean clay				17.4	16.9	7.43x10^{-6}	0.65	0.170	Nil											
140		TP-07	CS-1	0.45-1.50				100	100	100	97	29	9				SP-SM	A-3	Poorly graded sand with silt	16.12	16.6	16																	
141		TP-08	CS-1	0.35-1.50				100	100	100	100	41	5				SP-SM	A-3	Poorly graded sand with silt	18.35	15.7	15																	
142		TP-09	CS-1	0.70-1.50				100	100	100	99	96	94	29	20	9	CL	A-4	Lean clay	12.3	19.2	7																	

CONSULTANCY SERVICES FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT FOR PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM
(Wastewater Treatment Plant, Zone-1)

SUMMARY OF THE LABORATORY TEST RESULTS

Sr. No.	Location	BH/TP No.	Sample No.	Depth	Natural Moisture Content NMC	In-situ Bulk Density	In-situ Dry Density	Grain Size Analysis(% Passing)						Atterberg Limits			Material Classification			Modified AASHTO Compaction Test		3 Point Soaked CBR at 95% of MDD	Standard Proctor AASHTO Compaction Test		Consolidation Test with swell potential Measurement				Unconfined Compression Test (on soil sample)		Direct Shear Test		Chemical Analysis of Soil			Chemical Analysis of water			
														LL	PL	PI	Unified Soil Classification System Symbol (USCS)	AASHTO Classification Symbol	Material Description	OMC	Max. Dry Density (MDD)		OMC	Max. Dry Density (MDD)	Hydraulic Conductivity	e_o	C_c	Swell Pressure	q_u	Failure Strain	φ	c	Sulphate Content	Chloride Content	Organic Matter	Sulphate Content	Chloride Content	TDS	pH
				(m)	(%)	(kN/m^3)	(kN/m^3)	3/8	#4	#10	#40	#100	# 200	(%)	(%)	(%)				(%)	kN/m^3	(%)	(%)	kN/m^3	(cm/sec)	-	-	(kPa)	(kPa)	(%)	Deg	kPa	(%)	(%)	(%)	(ppm)	(ppm)	(ppm)	-
143	Borrow Areas	BA-01	CS-1#	0.20-0.90				100	100	100	100	95	92	31	20	11	CL	A-6	Lean clay				15.7	17.9	$7.79x10^{-6}$	0.55	0.113	Nil												
144		BA-02	CS-1#	0.50-1.00				100	100	99	98	96	95	33	20	13	CL	A-6	Lean clay				17.2	17.2	$5.03x10^{-6}$	0.62	0.142	Nil												
145		BA-03	CS-1#	0.20-0.70				100	100	100	100	98	96	31	20	11	CL	A-6	Lean clay																				
146		BA-04	CS-1#	0.15-0.50				100	100	100	100	96	69	29	20	9	CL	A-4	Sandy lean clay																				
147		BA-05	CS-1#	0.25-1.00				100	100	100	100	93	85	24	17	7	CL-ML	A-4	Silty clay with sand																				
148			CS-2#	1.00-1.70				100	100	100	100	99	96	34	21	13	CL	A-6	lean clay																				
149		BA-06	CS-1#	0.20-0.60				100	100	100	100	98	97	32	20	12	CL	A-6	lean clay				15.9	17.0	$8.73x10^{-6}$	0.65	0.113	Nil												
150		BA-07	CS-1#	0.20-0.80				100	100	97	96	94	92	34	21	13	CL	A-6	lean clay																				
151		BA-08	CS-1#	0.15-1.00				100	100	100	100	98	95	37	21	16	CL	A-6	lean clay				17.2	16.7	$8.21x10^{-6}$	0.71	0.179	Nil												
152		BA-09	CS-1#	0.20-1.50				100	100	99	99	97	95	32	20	12	CL	A-6	lean clay																				
153		BA-10	CS-1#	0.70-1.30				100	100	99	97	95	94	35	21	14	CL	A-6	lean clay				17.1	16.7	$7.75x10^{-6}$	0.72	0.179	Nil												

LEGEND :

BH	**BOREHOLE**	**TP**	**TESTPIT**
SPT	**STANDARD PENETRATION TEST**	**CS**	**COMPOSITE SAMPLE**
UDS	**UNDISTURBED SAMPLE**	**BA/BTP**	**BORROW AREA TESTPIT**
W/S	**WATER SAMPLE**		

CONSULTANCY SERVICES FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT FOR PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM (Wastewater Treatment Plant, Zone-1)									
Summary of Field Density Tests									
Sr. No.	Testpit No.	FDTs	Depth (m)	Moisture Content (%)	Density		Modified AASHTO		Relative Compaction (%)
					Bulk (kN/m^3)	Dry (kN/m^3)	Max. Dry Density (kN/m^3)	OMC(%)	
1	TP-1	FDT-1	0.80	6.7	16.8	15.7			
2	TP-2	FDT-1	0.60	2.5	16.7	16.3			
3	TP-3	FDT-1	0.50	13.1	17.2	15.2			
4	TP-4	FDT-1	1.50	21.9	17.1	14.0			
5	TP-5	FDT-1	1.00	5.2	17.8	16.9	16.5	16	102
6	TP-6	FDT-1	1.10	24.8	17.5	14.0			
7	TP-7	FDT-1	1.25	5.3	17.4	16.5	16.6	16	100
8	TP-8	FDT-1	0.90	4.6	17.7	16.9	15.7	18	108
9	TP-9	FDT-1	1.35	11.6	16.7	15.0	19.2	12.3	78
10	TP-10	FDT-2	0.70	24.4	17.4	14.0			

SOILCON

GEOTECHNICAL TESTING LABORATORIES
18-Km, Multan Road, Lahore. Ph: 042-37510942-43 Fax:042-37515267

SUMMARY OF NMC BULK DENSITY TEST RESULTS

Project: PUNJAB INTERM CITIES INVESTMENT PROGRAM
Location: SAHIWAL CITY

Client: SAFE SERVICES
Lab. Ref: 54/2019

BH / TP No.	Sample No.	Depth (m)	Location	MC%	DENSITY (g/cu.cm)		Specific Gravity	REMARKS
					Bulk	Dry		
BH-28	UDS-1	4.00-4.80		20.50	1.808			
BH-28	UDS-2	8.00-8.80		24.39	1.781			
BH-28	UDS-3	12.00-12.70		14.88	1.910			
BH-29	UDS-1	5.00-5.80		16.42	1.516			
BH-29	UDS-2	10.00-10.80		17.89	1.857			
BH-30	UDS-1	7.00-7.50		22.67	1.635			
BH-30	UDS-4	16.00-16.70		21.41	1.879			
BH-33	UDS-1	2.45-2.95		25.61	1.729			

Tested By: Ikram Ullah
Checked By: Mahmood
Dated: 22/11/2019

SOILCON

GEOTECHNICAL TESTING LABORATORIES
18-Km, Multan Road, Lahore. Ph: 042-37510942-43 Fax:042-37515267

SUMMARY OF NMC BULK DENSITY TEST RESULTS

Project: PUNJAB INTERM CITIES INVESTMENT PROGRAM
Location: SAHIWAL CITY

Client: SAFE SERVICES
Lab. Ref: 56/2019

BH / TP No.	Sample No.	Depth (m)	Location	MC%	DENSITY (g/cu.cm)		Specific Gravity	REMARKS
					Bulk	Dry		
BH-31	UDS-1	4.50-5.00		31.69	1.649			
BH-31	UDS-2	13.00-13.90		14.05	1.881			
BH-45	UDS-1	2.45-3.00		23.58	1.845			
BH-51	UDS-1	6.00-6.80		25.88	1.748			
BH-52	UDS-1	4.00-4.50		35.38	1.866			
BH-52	UDS-2	10.00-10.80		15.25	1.584			
BH-53	UDS-1	4.00-4.80		12.93	1.888			
BH-53	UDS-2	12.00-12.60		24.07	1.860			
BH-56	UDS-1	6.00-6.80		15.35	1.728			
BH-57	UDS-1	4.00-4.60		23.98	2.015			
BH-58	UDS-1	7.00-7.80		24.51	1.940			
BH-58	UDS-2	10.00-10.80		17.71	1.730			

Tested By: Ikram Ullah
Checked By: Mahmood
Dated: 3/12/2019

SOILCON

18-Km, Multan Road, Lahore. Ph: 042-7510942-43 Fax:042-7515267

SUMMARY OF FIELD DENSITY TEST

Project: PUNJAB INTERMEDIATE CITY INVESTMENT
Location: PROGRAM TREATMENT PLANT IN SAHIWAL CITY

Client: SAFE SERVICES
Lab. Ref: 56/2019

BH / TP No.	Sample No.	Depth (m)	Location	M.C.%	Field Dry Density (g/cu.cm)	Specific Gravity	Remarks
TP-1	FDT	0.80		6.70			
TP-2	FDT	6.00		2.51			
TP-3	FDT	0.50		13.14			
TP-4	FDT	-		21.99			
TP-5	FDT	1.00		5.27			
TP-6	FDT	1.10		24.84			
TP-7	FDT	1.25		5.39			
TP-8	FDT	-		4.61			
TP-9	FDT	1.35		11.62			
TP-10	FDT	0.7		24.47			

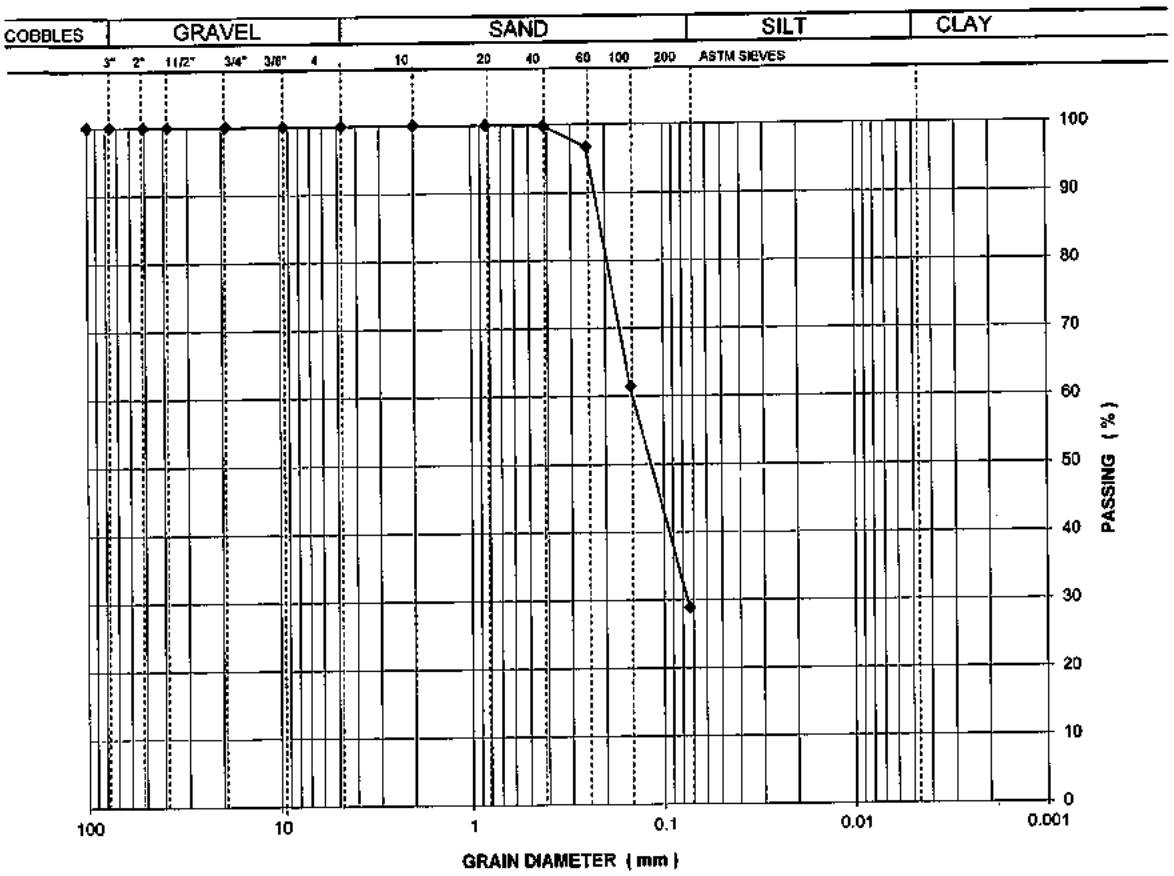
Tested By: M. ASLAM
Checked By: MAHMOOD
Dated: 30.12-2019

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-32	SAMPLE	SPT-3
TYPE	DISTURBED	DEPTH(m)	3.00-3.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	61	29

LAB. REF.	56/2019

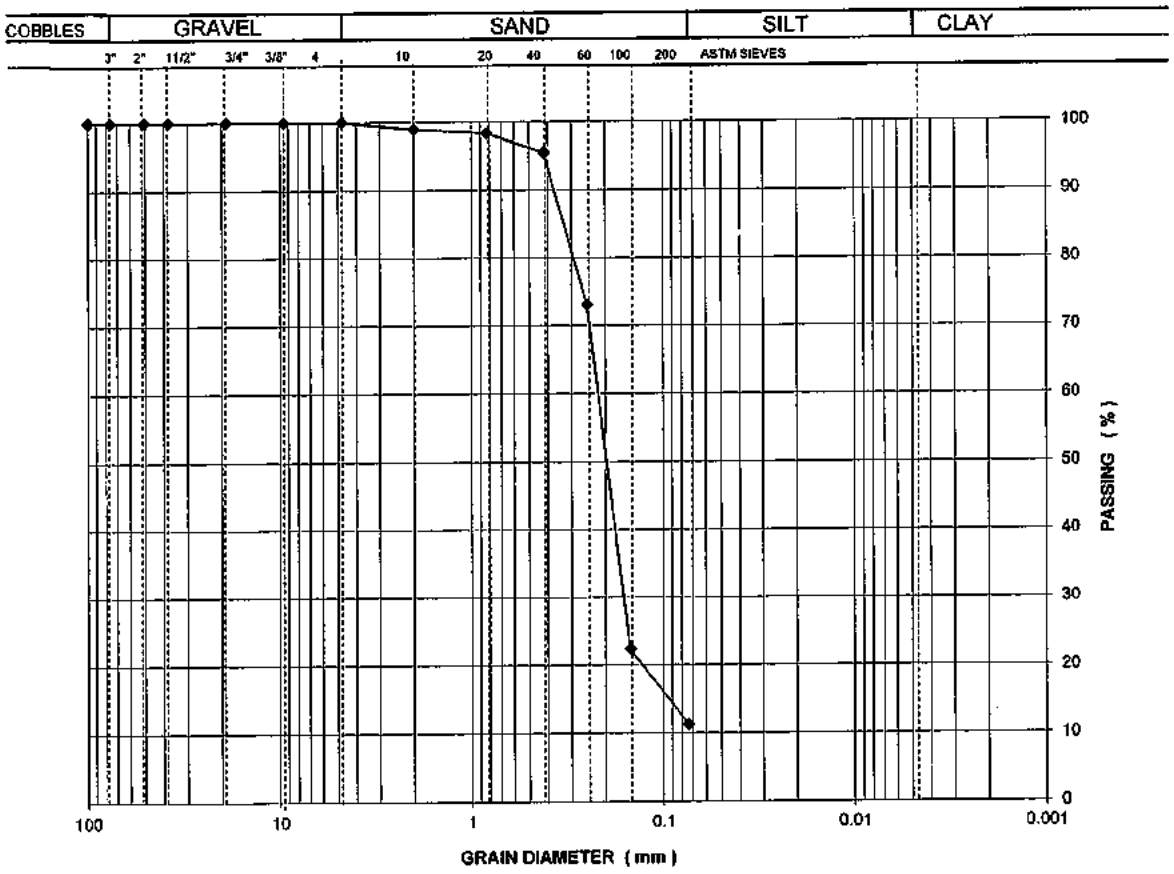
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-32	SAMPLE	SPT-9
TYPE	DISTURBED	DEPTH(m)	9.00-9.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	95	22	11

LAB. REF.	56/2019

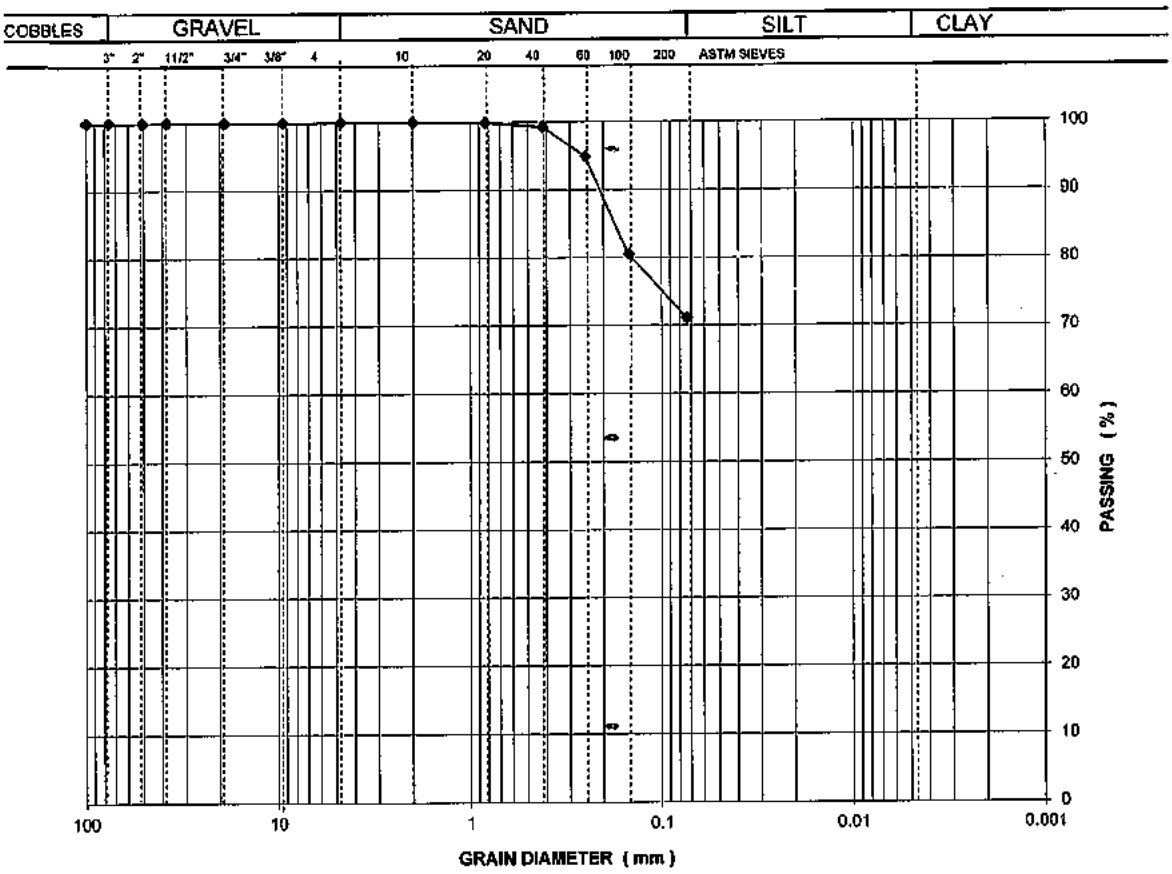
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-33	SAMPLE	UDS-1
TYPE	DISTURBED	DEPTH(m)	2.45-2.95
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	81	71

LAB. REF.	54/2019

REMARKS :

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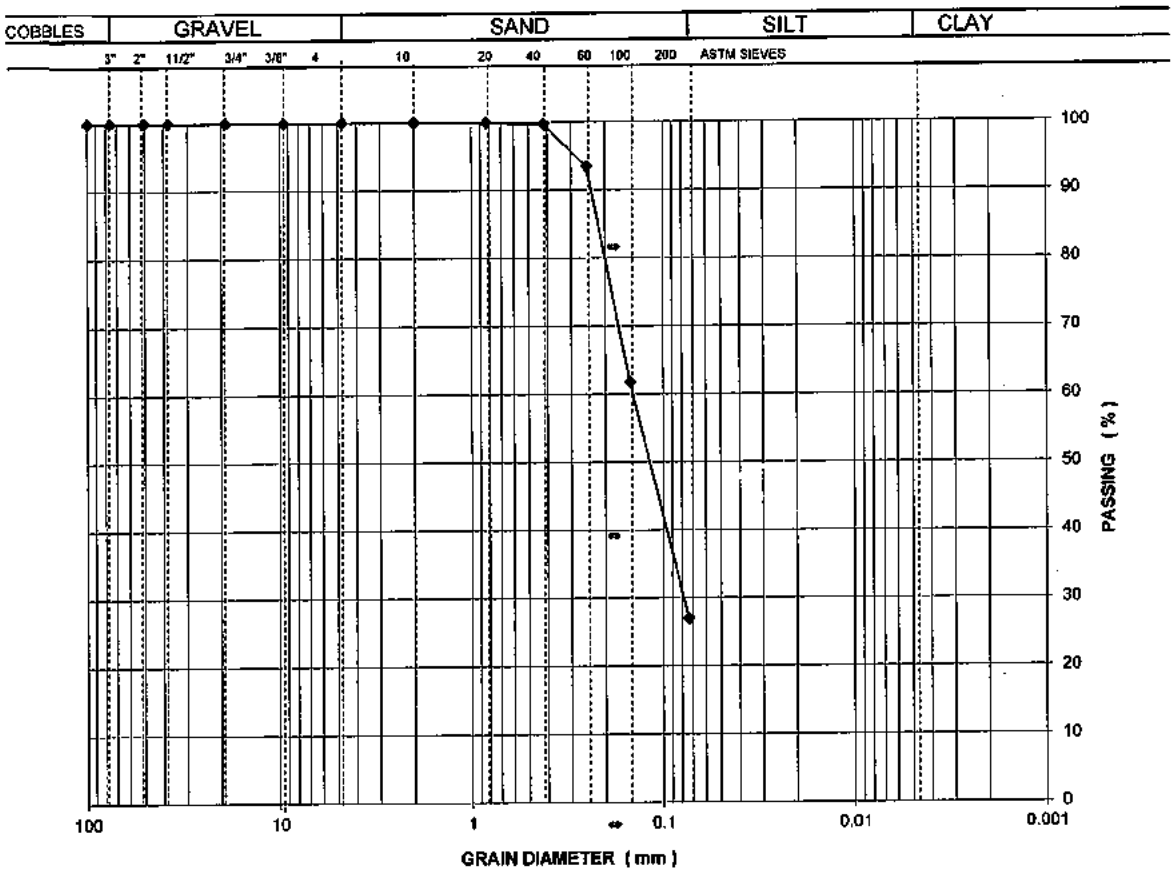
GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-33	SAMPLE	SPT-8
TYPE	DISTURBED	DEPTH(m)	8.00-8.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	62	27

LAB. REF.	54/2019

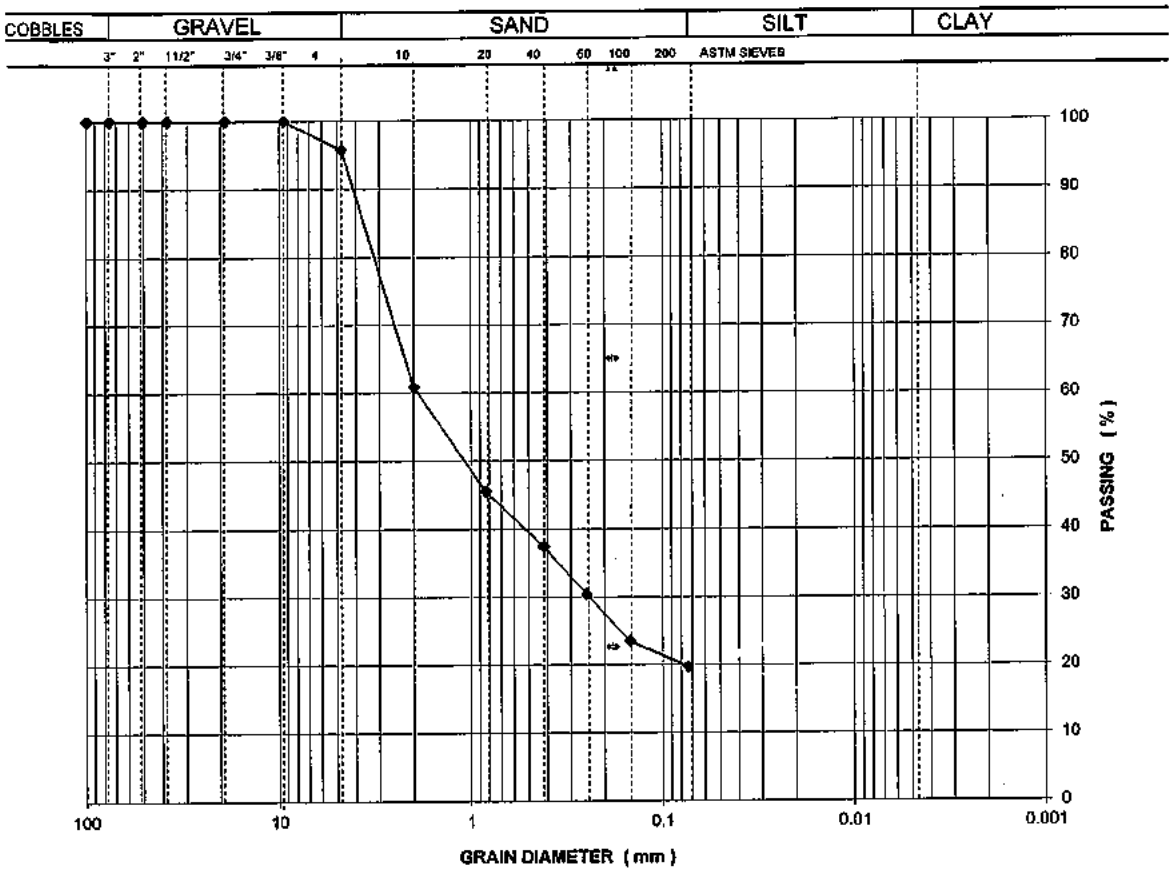
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	NAIMGOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-34	SAMPLE	SPT-4
TYPE	DISTURBED	DEPTH(m)	4.00-4.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	96	61	37	24	20

LAB. REF.	54/2019

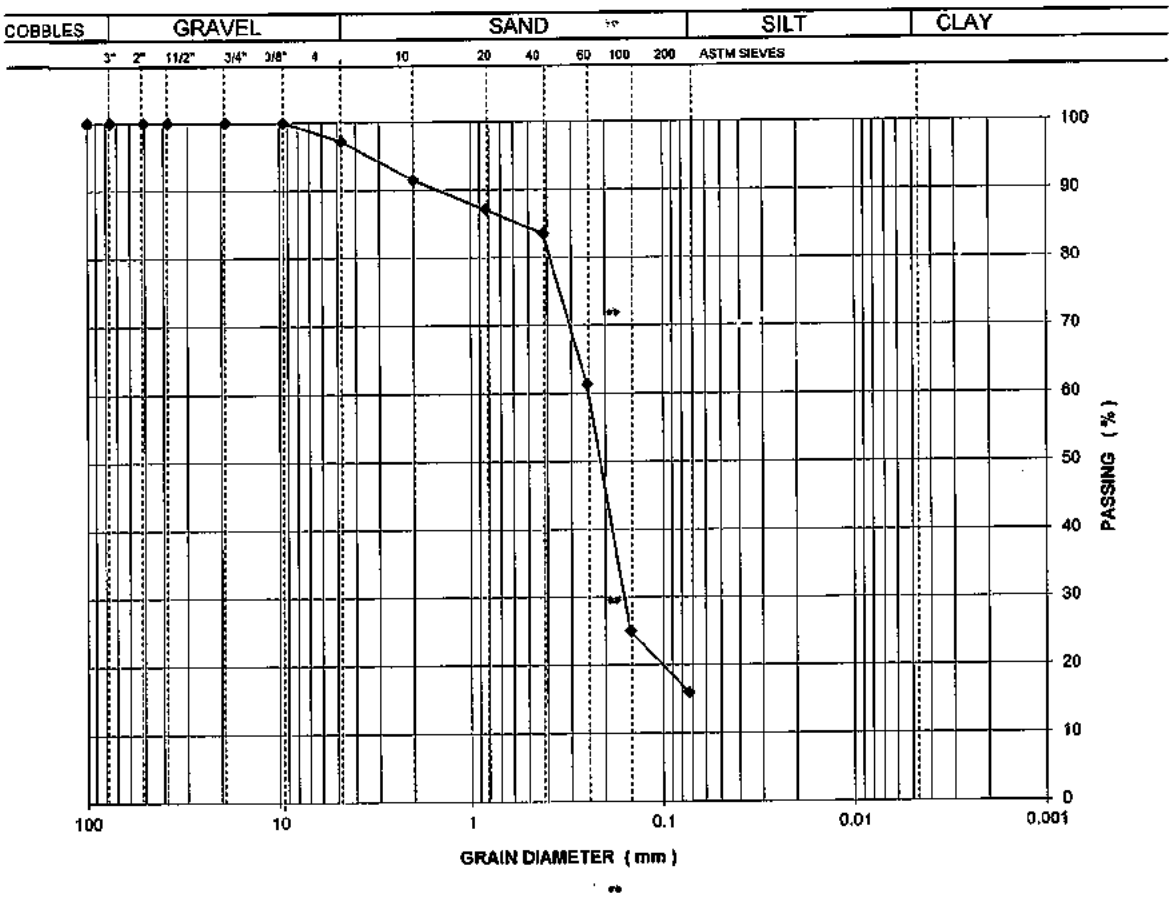
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-34	SAMPLE	SPT-9
TYPE	DISTURBED	DEPTH(m)	9.00-9.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	97	91	84	25	16

LAB. REF.	54/2019

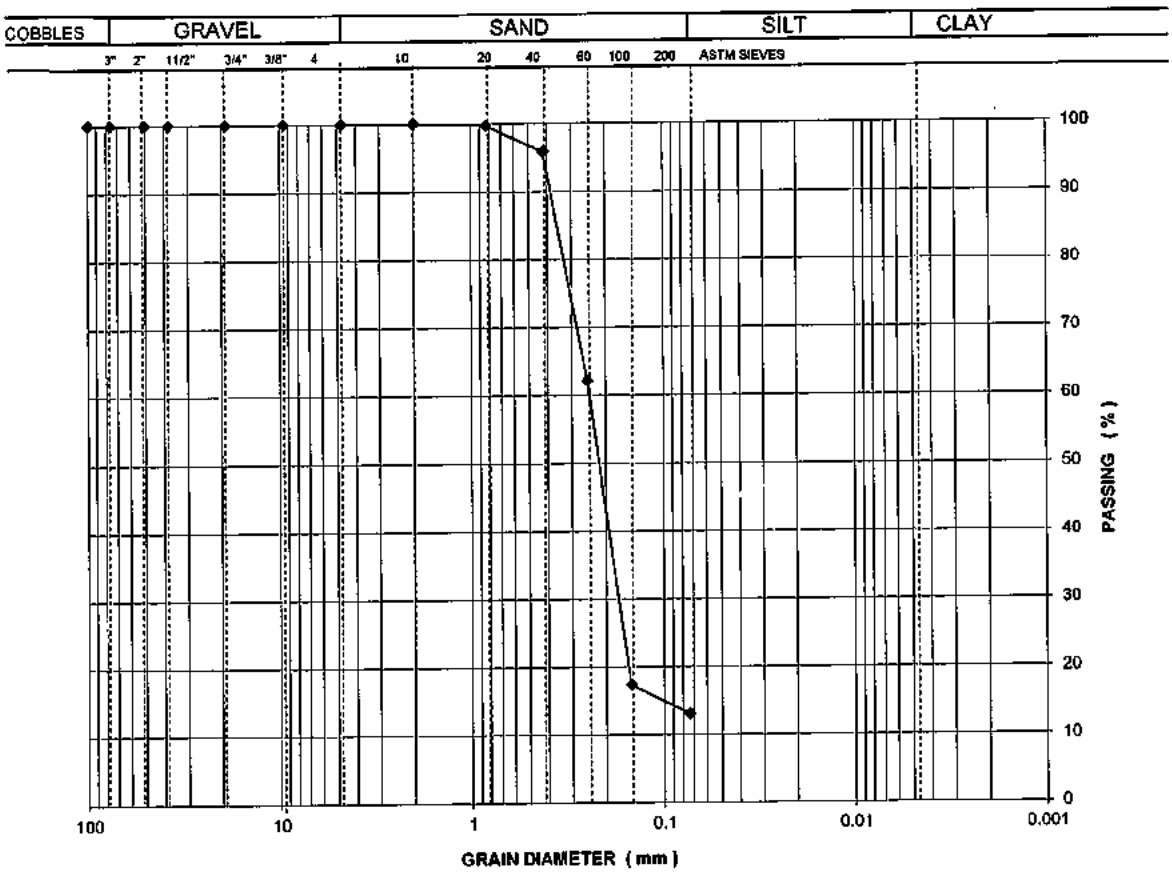
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-35	SAMPLE	SPT-3
TYPE	DISTURBED	DEPTH(m)	3.00-3.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	96	17	13

LAB. REF.	56/2019

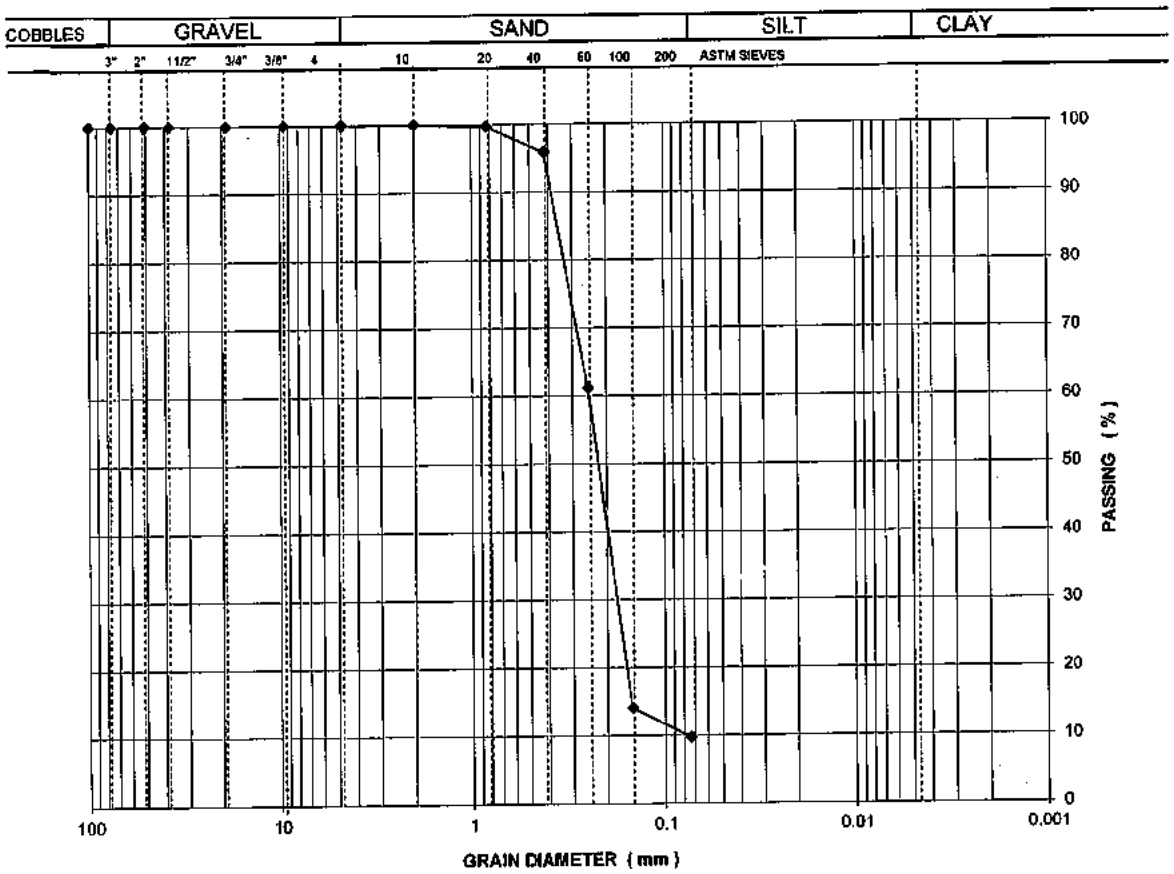
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-35	SAMPLE	SPT-8
TYPE	DISTURBED	DEPTH(m)	8.00-8.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	96	14	10

LAB. REF.	56/2019

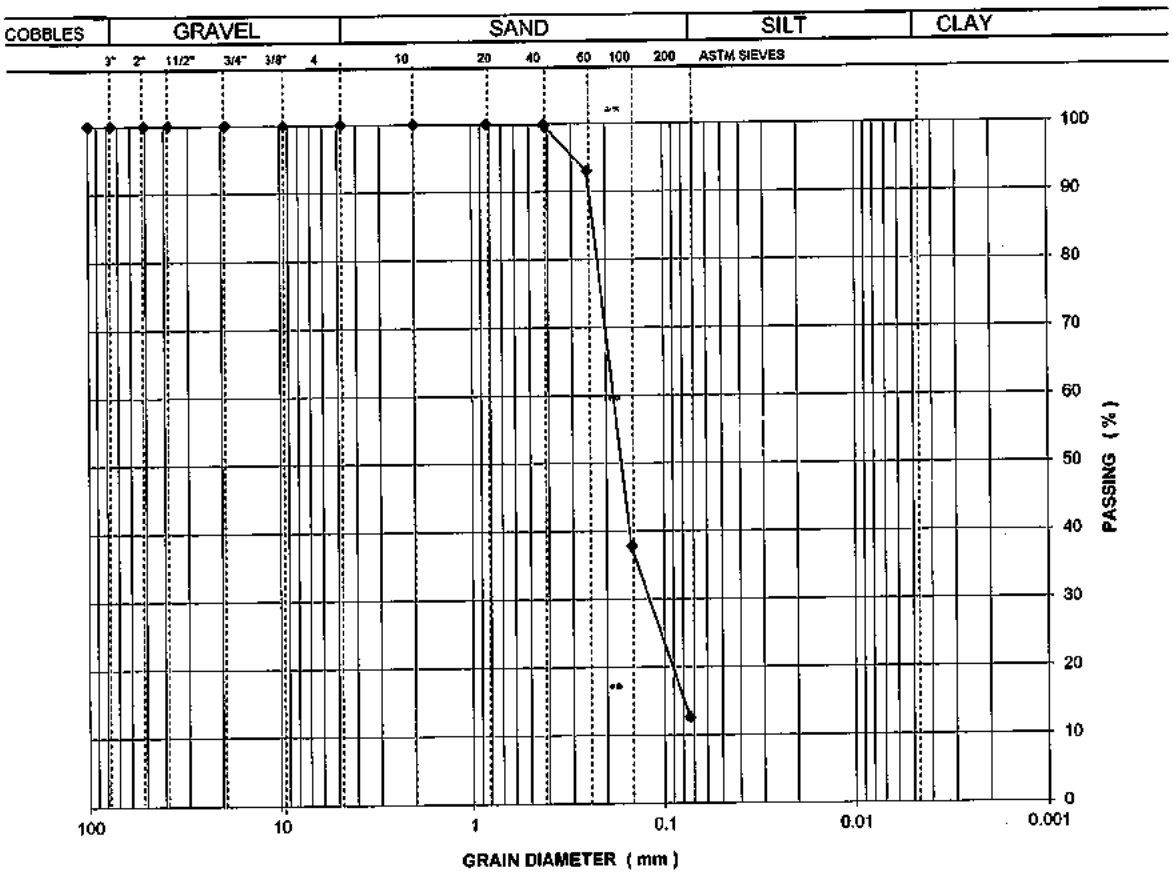
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-36	SAMPLE	SPT-3
TYPE	DISTURBED	DEPTH(m)	3.00-3.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	38	13

LAB. REF.	54/2019

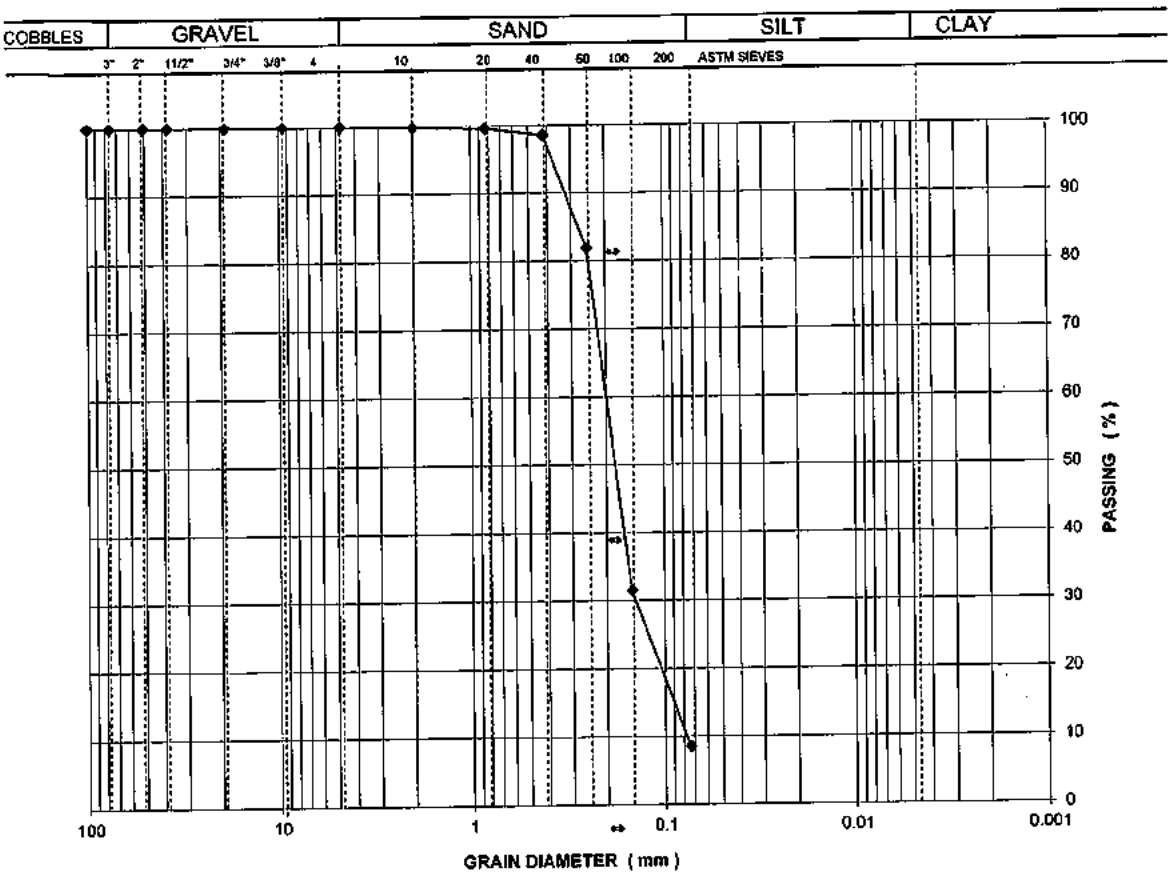
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH ✓	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-36	SAMPLE	SPT-7
TYPE	DISTURBED	DEPTH(m)	7.00-7.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	32	9

LAB. REF.	54/2019

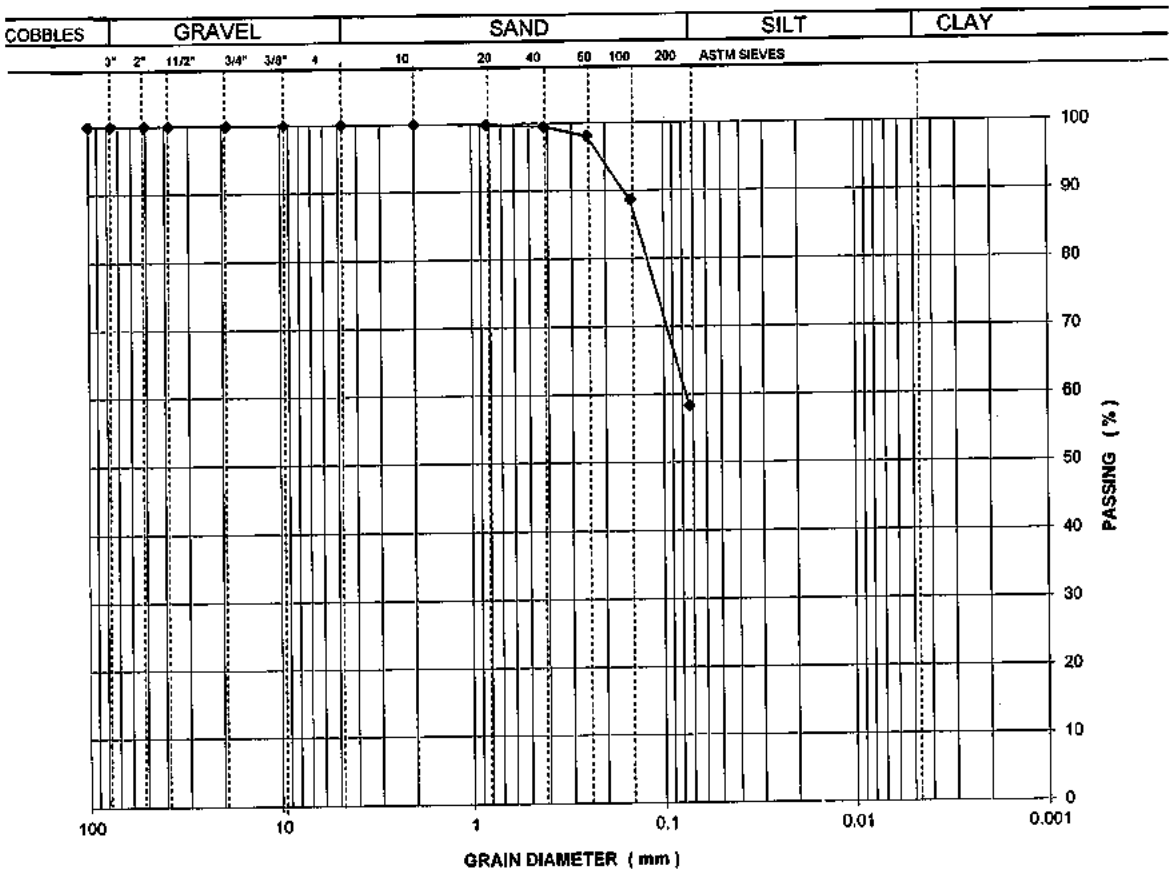
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-37	SAMPLE	SPT-5
TYPE	DISTURBED	DEPTH(m)	5.00-5.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	89	58

LAB. REF.	56/2019

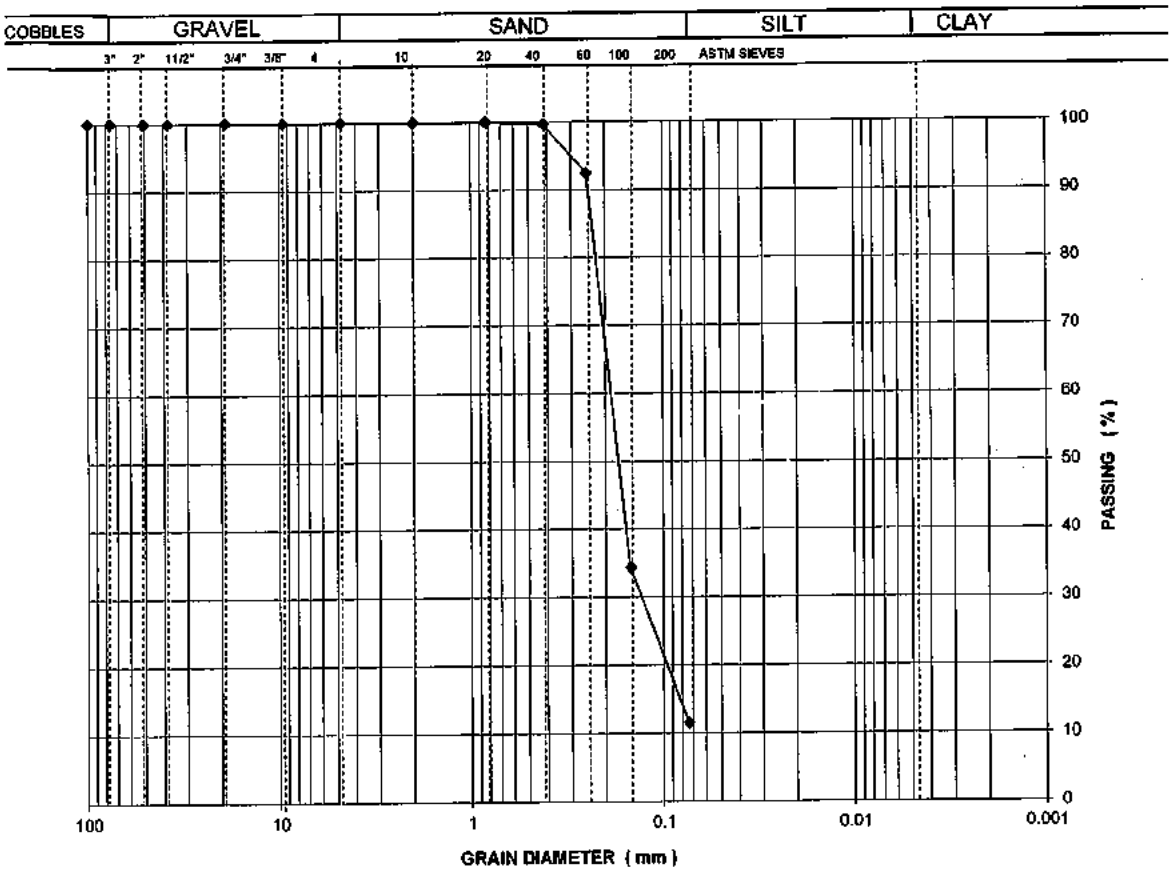
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-37	SAMPLE	SPT-10
TYPE	DISTURBED	DEPTH(m)	10.00-10.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	34	12

LAB. REF.	56/2019

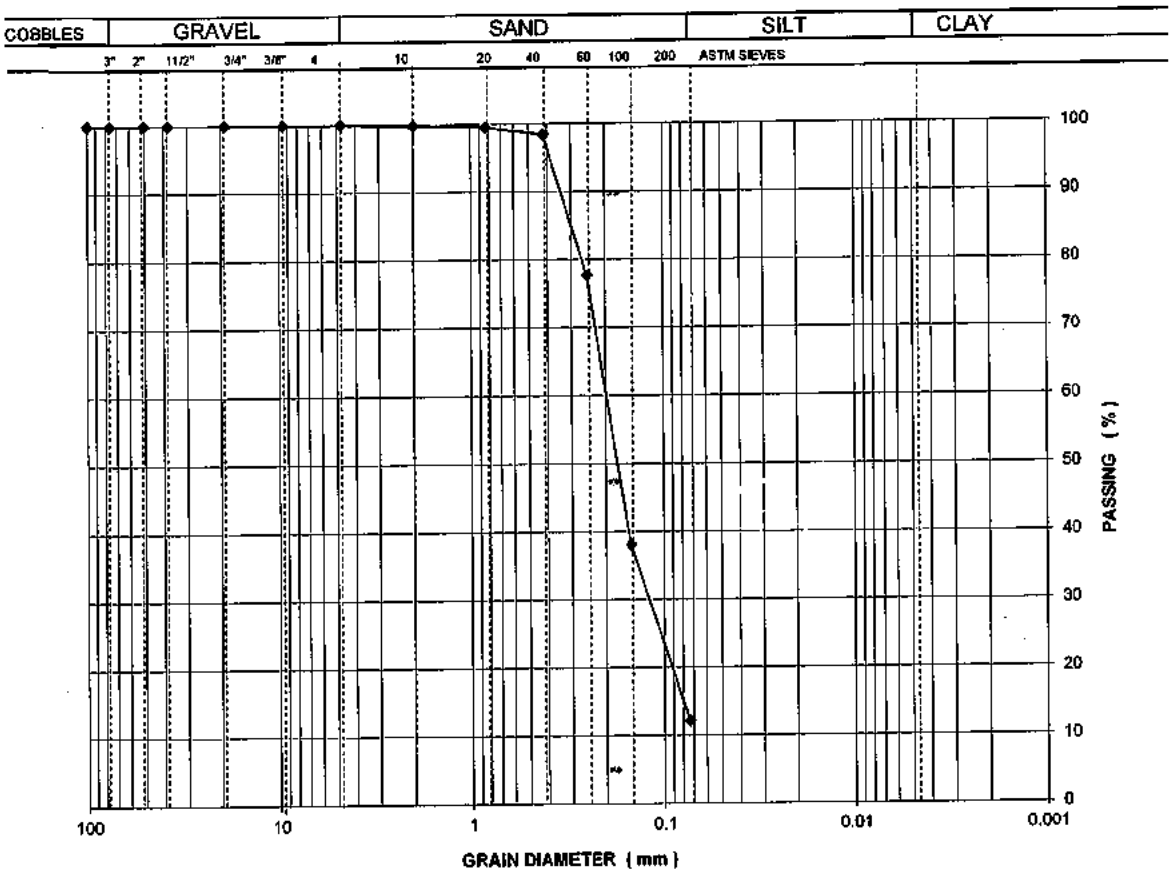
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-38	SAMPLE	SPT-5
TYPE	DISTURBED	DEPTH(m)	5.00-5.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	98	38	12

LAB. REF.	54/2019

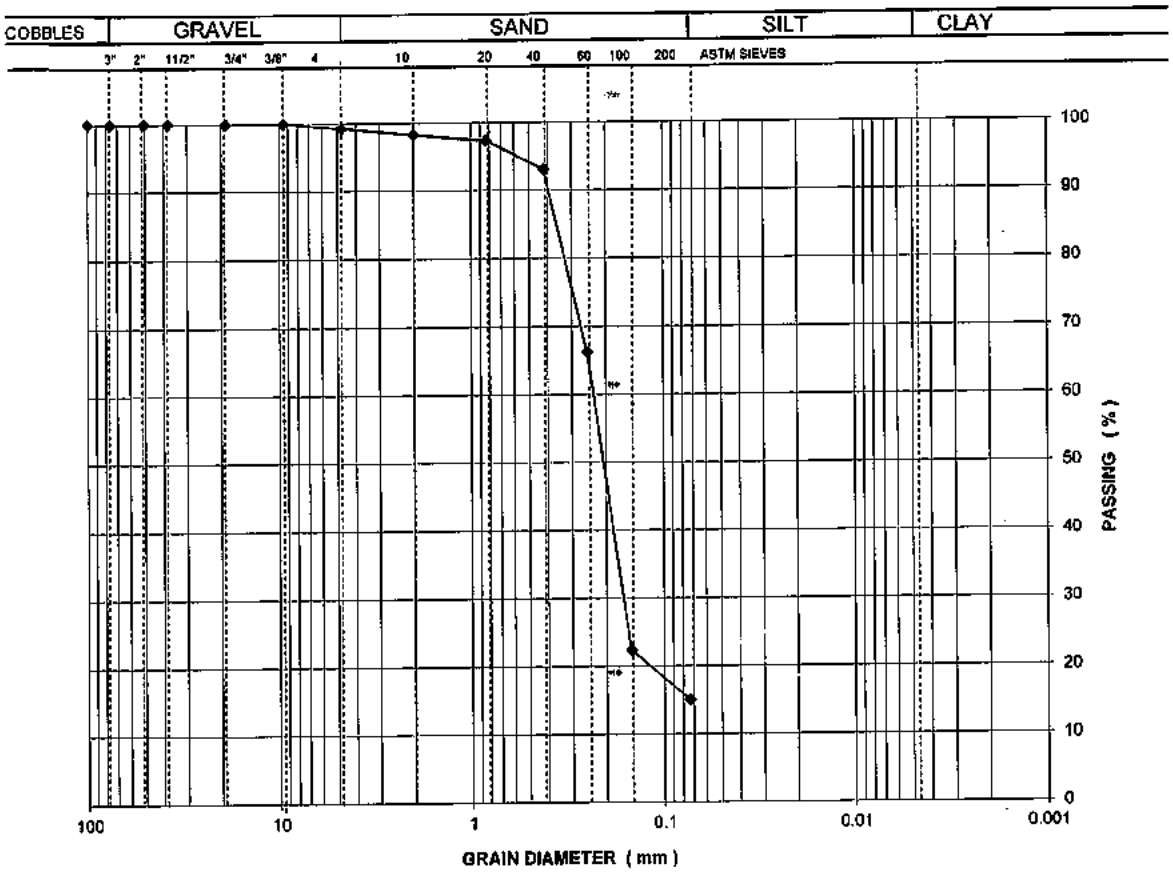
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-38	SAMPLE	SPT-10
TYPE	DISTURBED	DEPTH(m)	10.00-10.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	99	98	93	22	15

LAB. REF.	54/2019

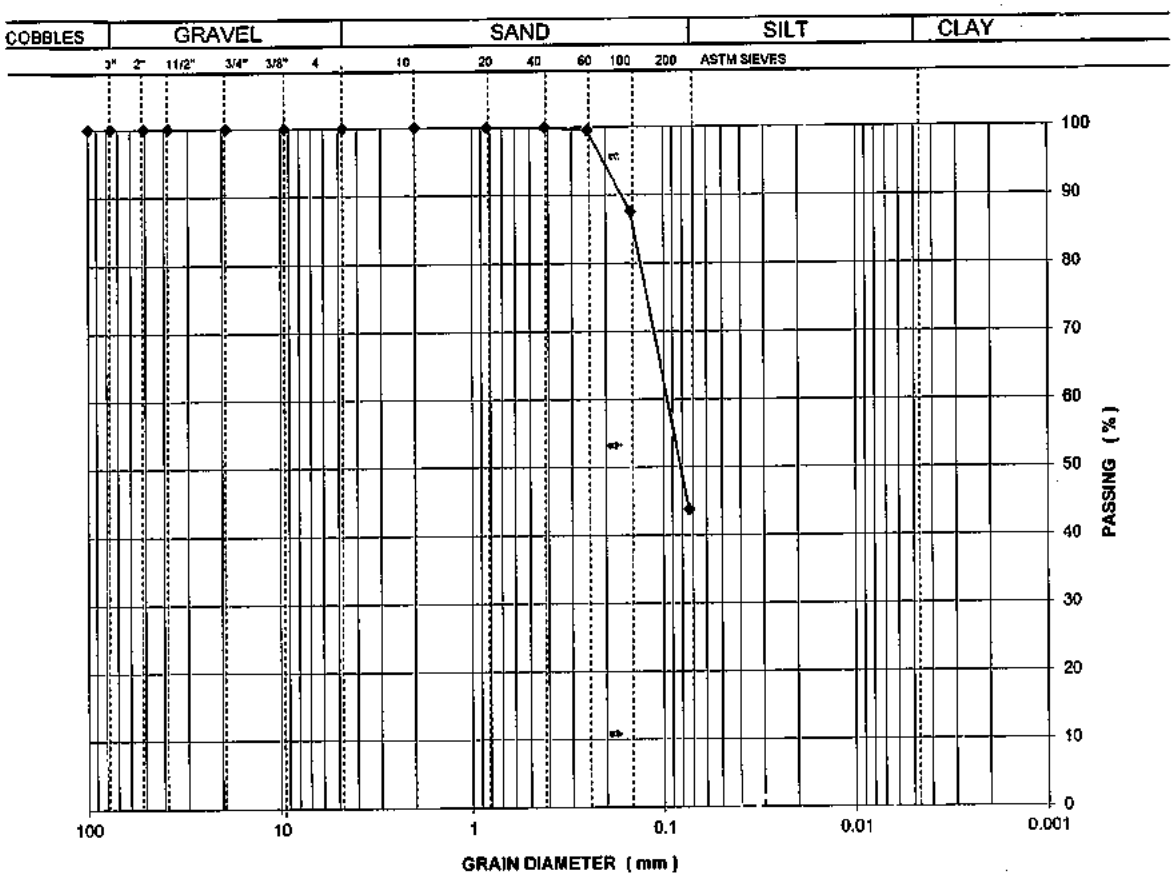
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-39	SAMPLE	SPT-3
TYPE	DISTURBED	DEPTH(m)	3.00-3.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	88	44

LAB. REF.	54/2019

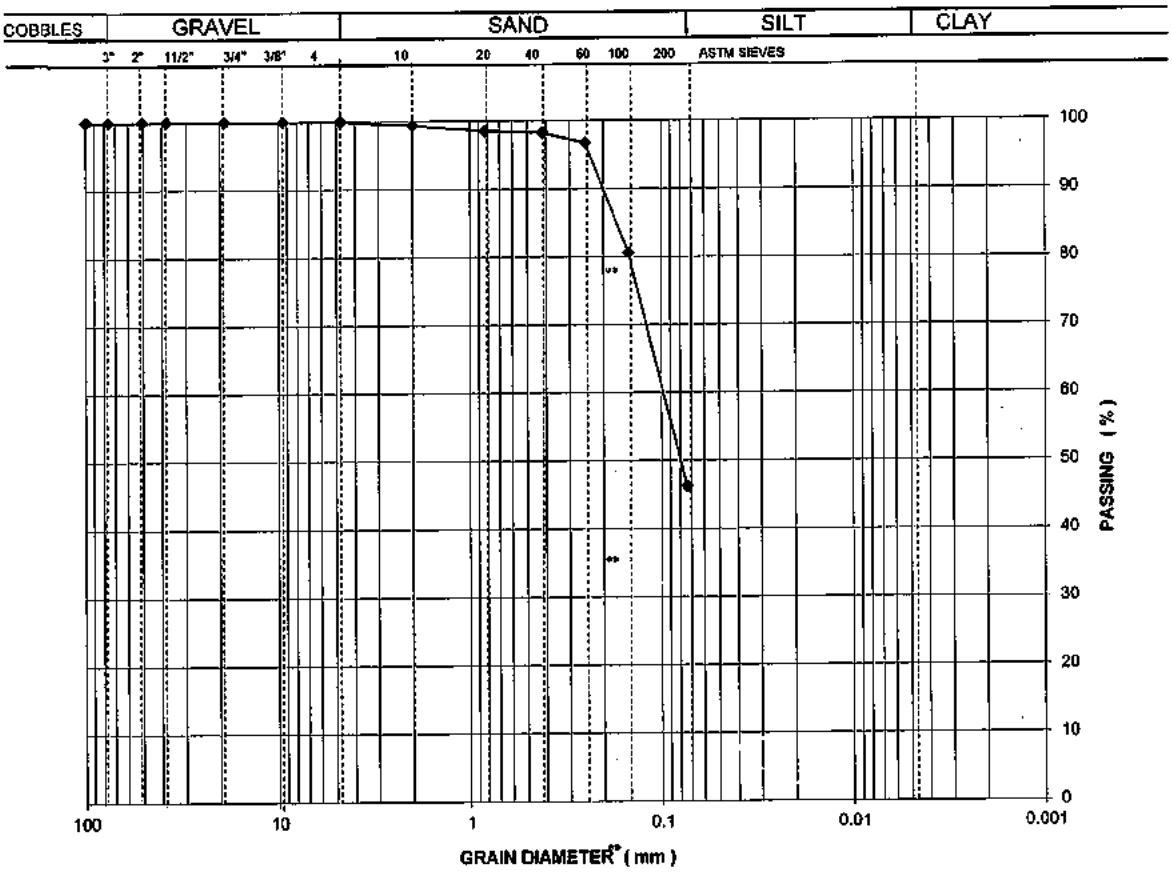
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-39	SAMPLE	SPT-9
TYPE	DISTURBED	DEPTH(m)	9.00-9.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	98	81	46

LAB. REF.	54/2019

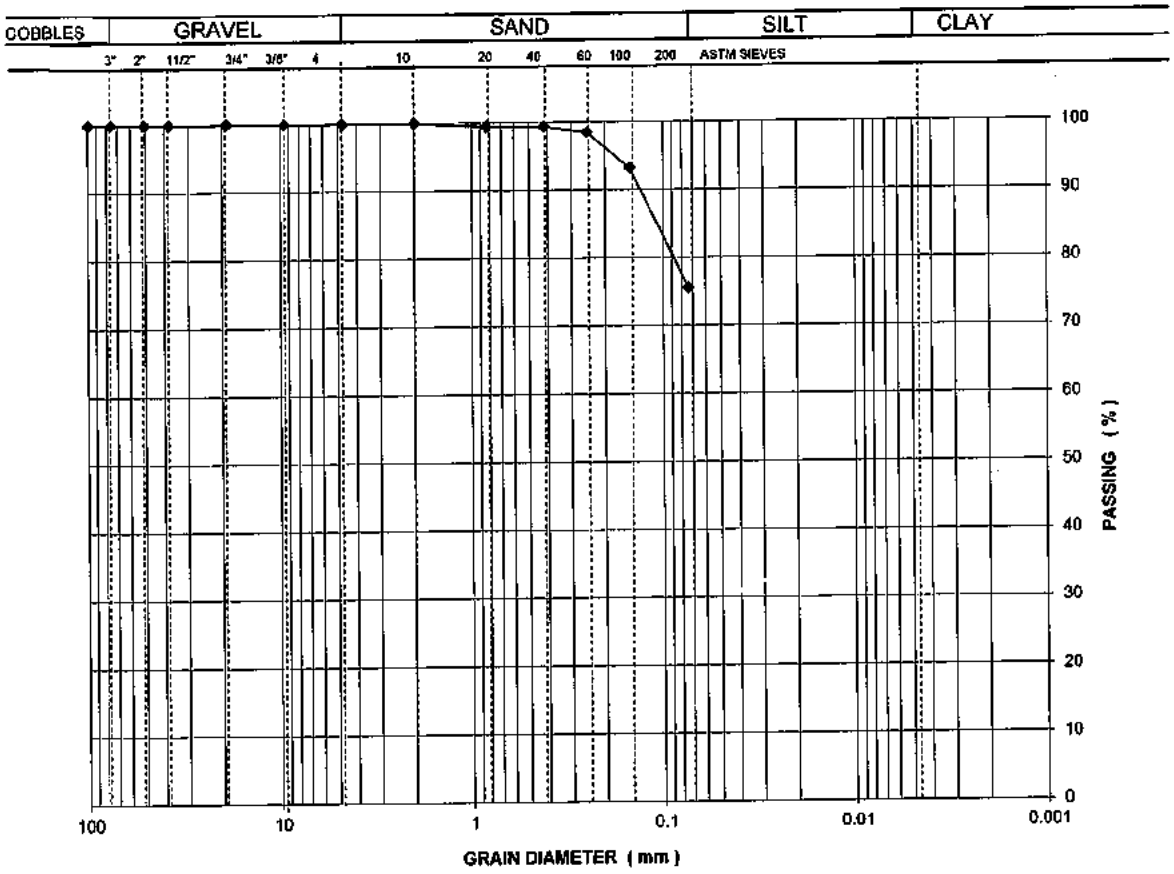
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-40	SAMPLE	SPT-2
TYPE	DISTURBED	DEPTH(m)	2.00-2.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	93	76

LAB. REF.	56/2019

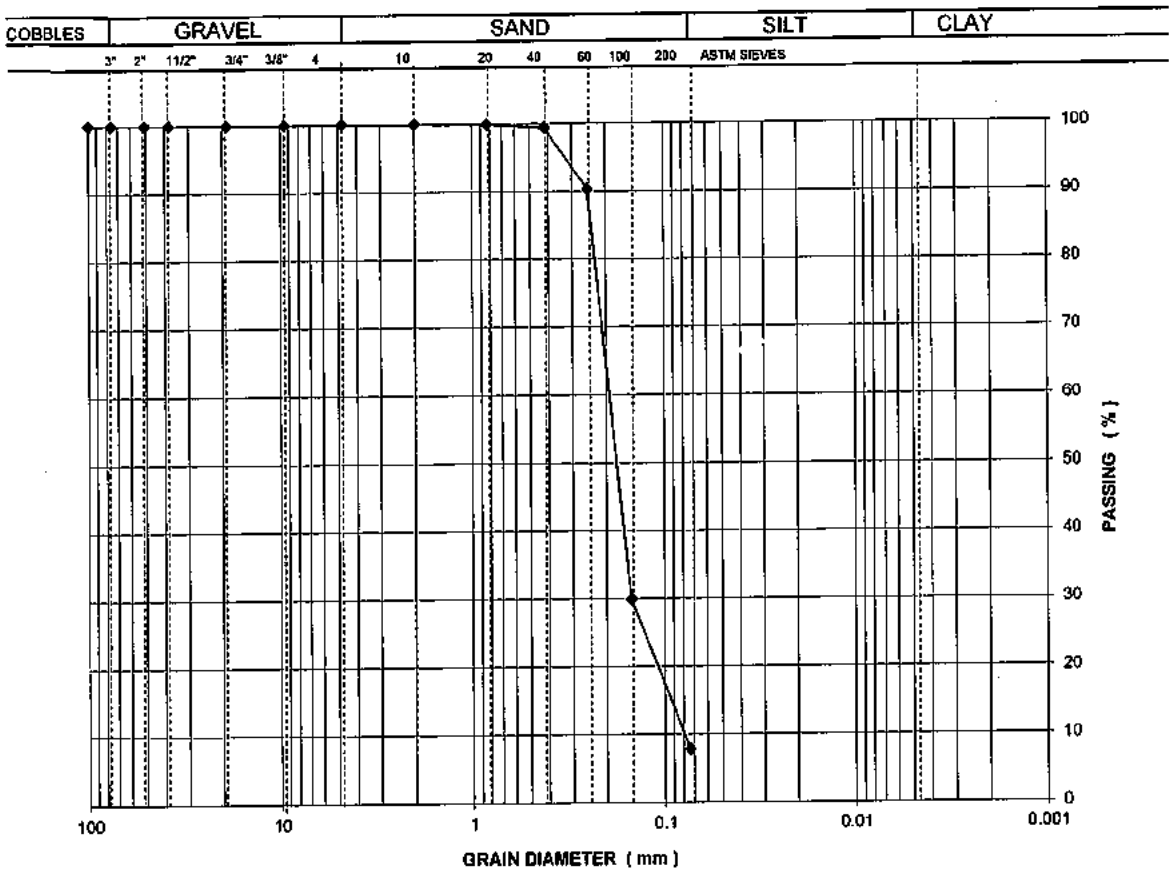
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-40	SAMPLE	SPT-7
TYPE	DISTURBED	DEPTH(m)	7.00-7.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	30	8

LAB. REF.	56/2019

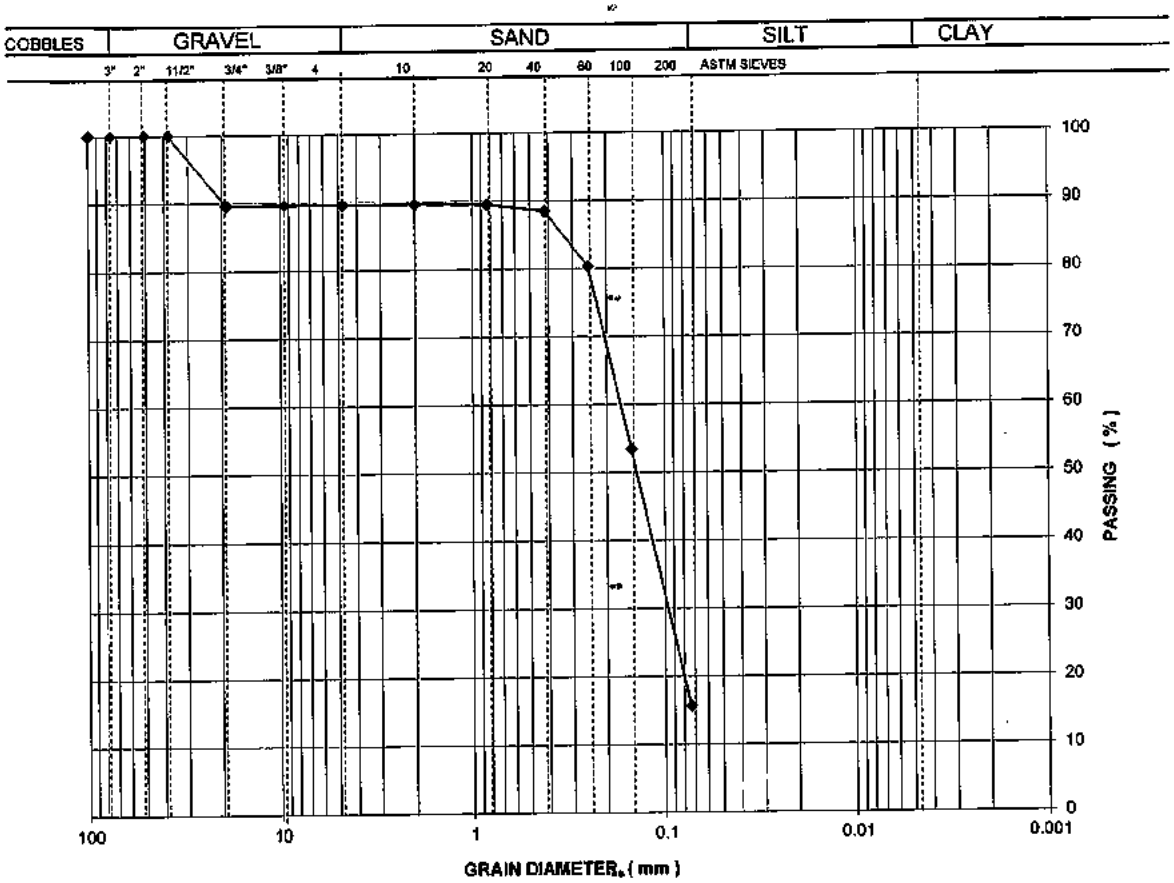
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-41	SAMPLE	SPT-4
TYPE	DISTURBED	DEPTH(m)	4.00-4.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	90	90	90	90	89	53	16

LAB. REF.	54/2019

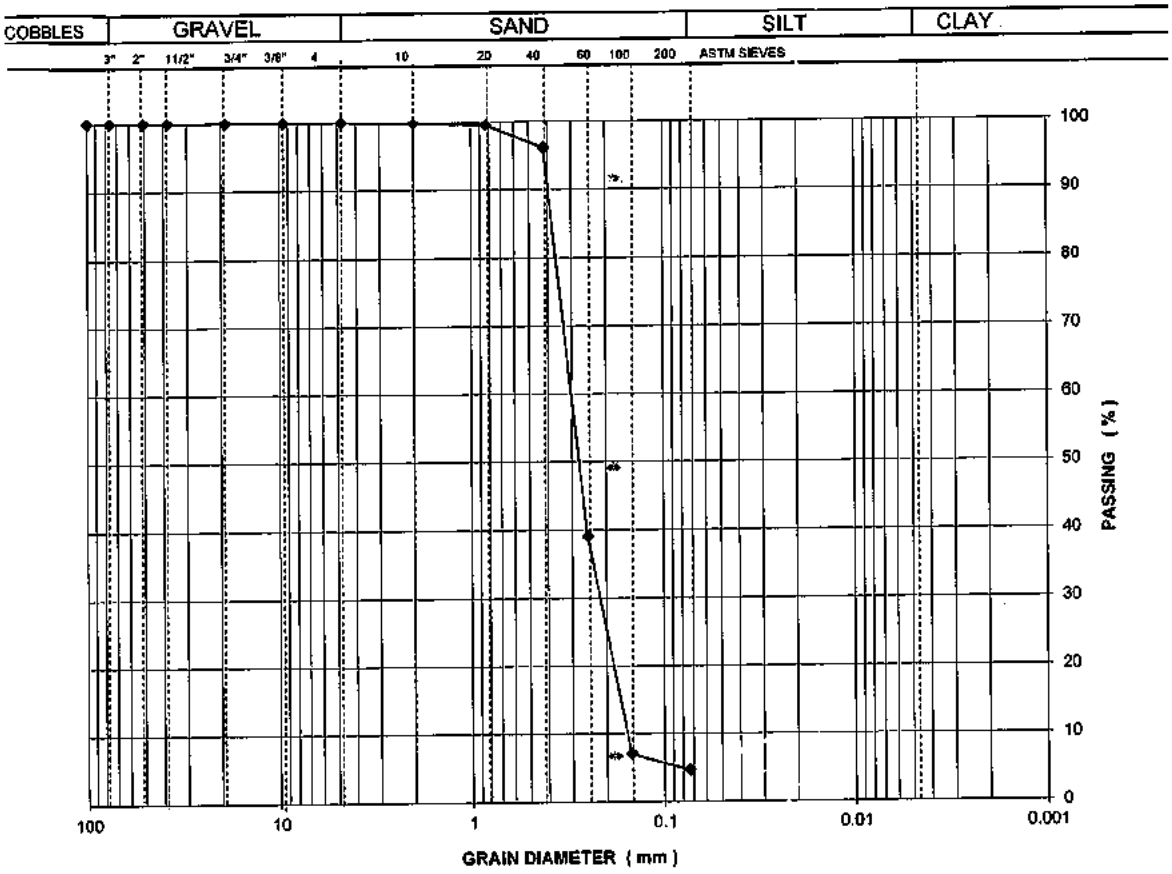
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-41	SAMPLE	SPT-9
TYPE	DISTURBED	DEPTH(m)	9.00-9.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	96	7	5

LAB. REF.	54/2019

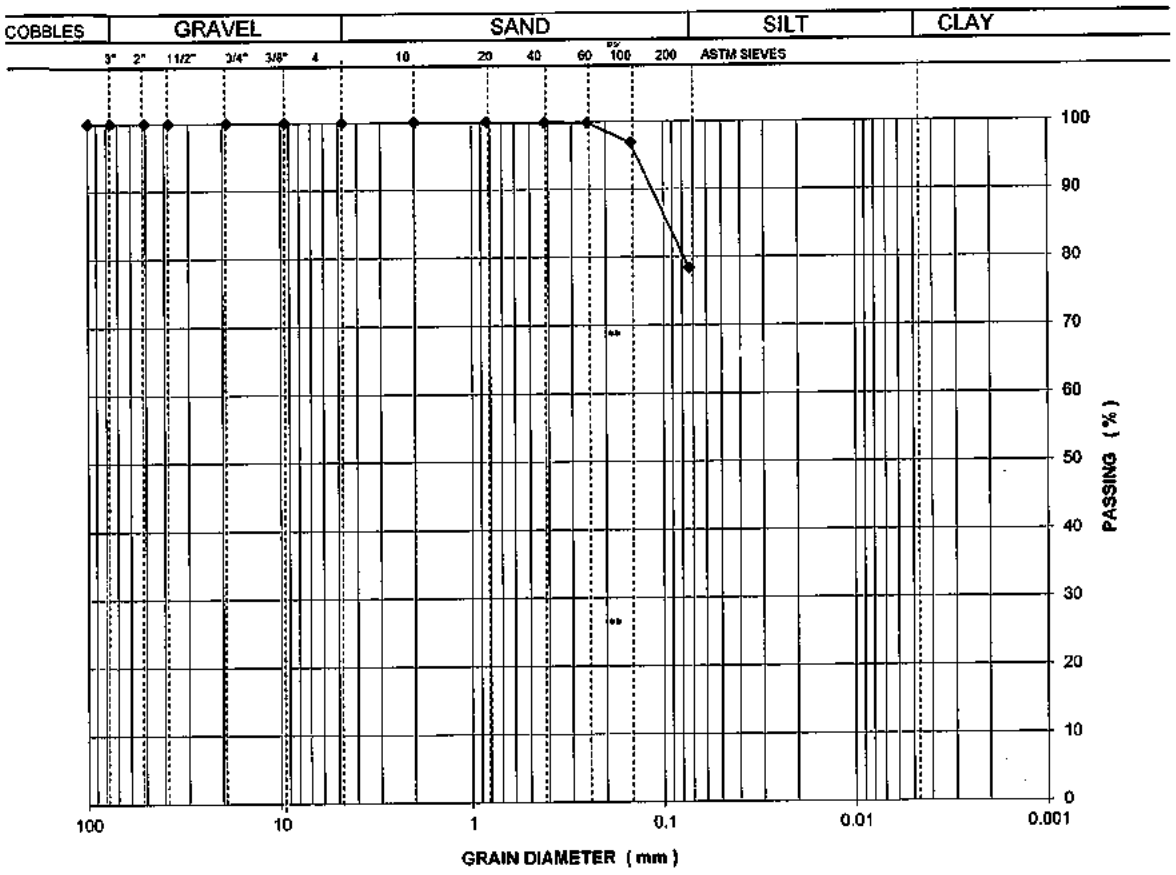
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-42	SAMPLE	SPT-3
TYPE	DISTURBED	DEPTH(m)	3.00-3.45
SPECIMEN	1	DATE	13/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	97	78

LAB. REF.	54/2019

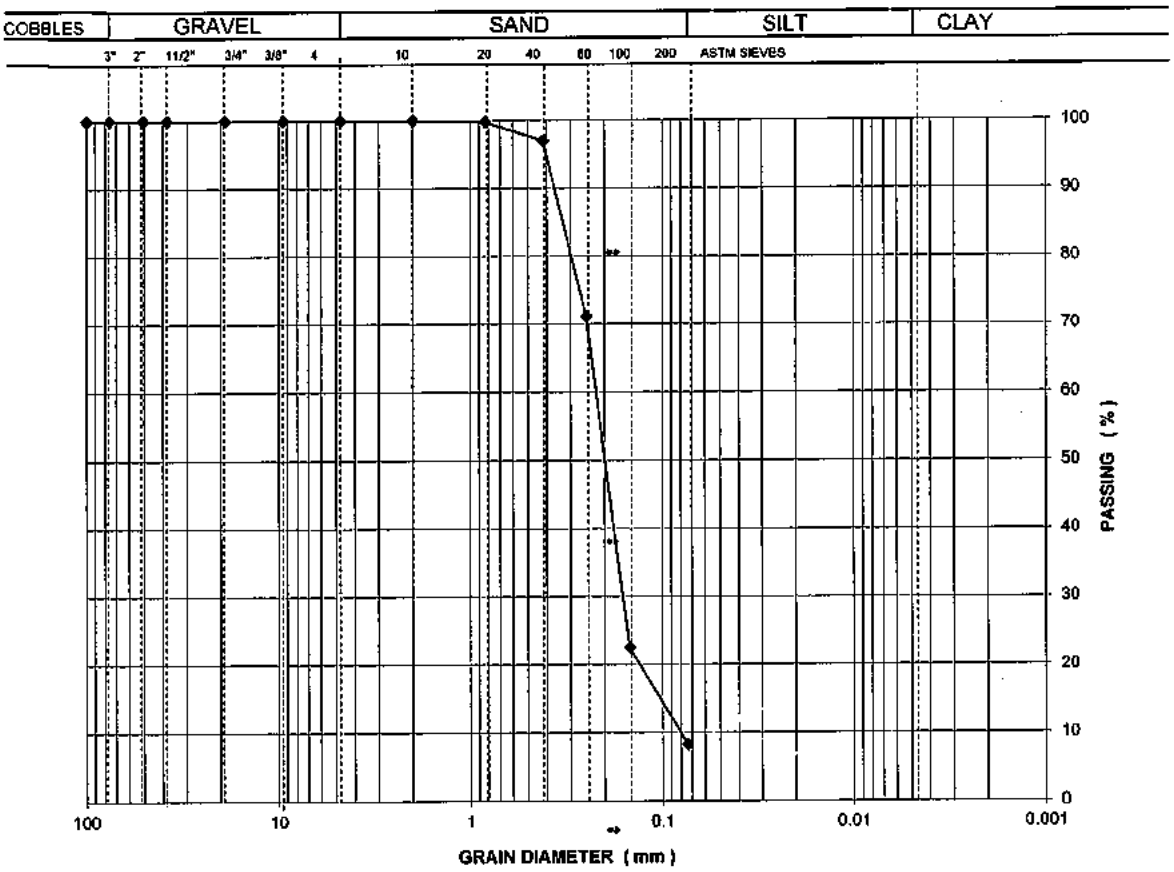
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-42	SAMPLE	SPT-8
TYPE	DISTURBED	DEPTH(m)	8.00-8.45
SPECIMEN	1	DATE	17/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	97	23	8

LAB. REF.	54/2019

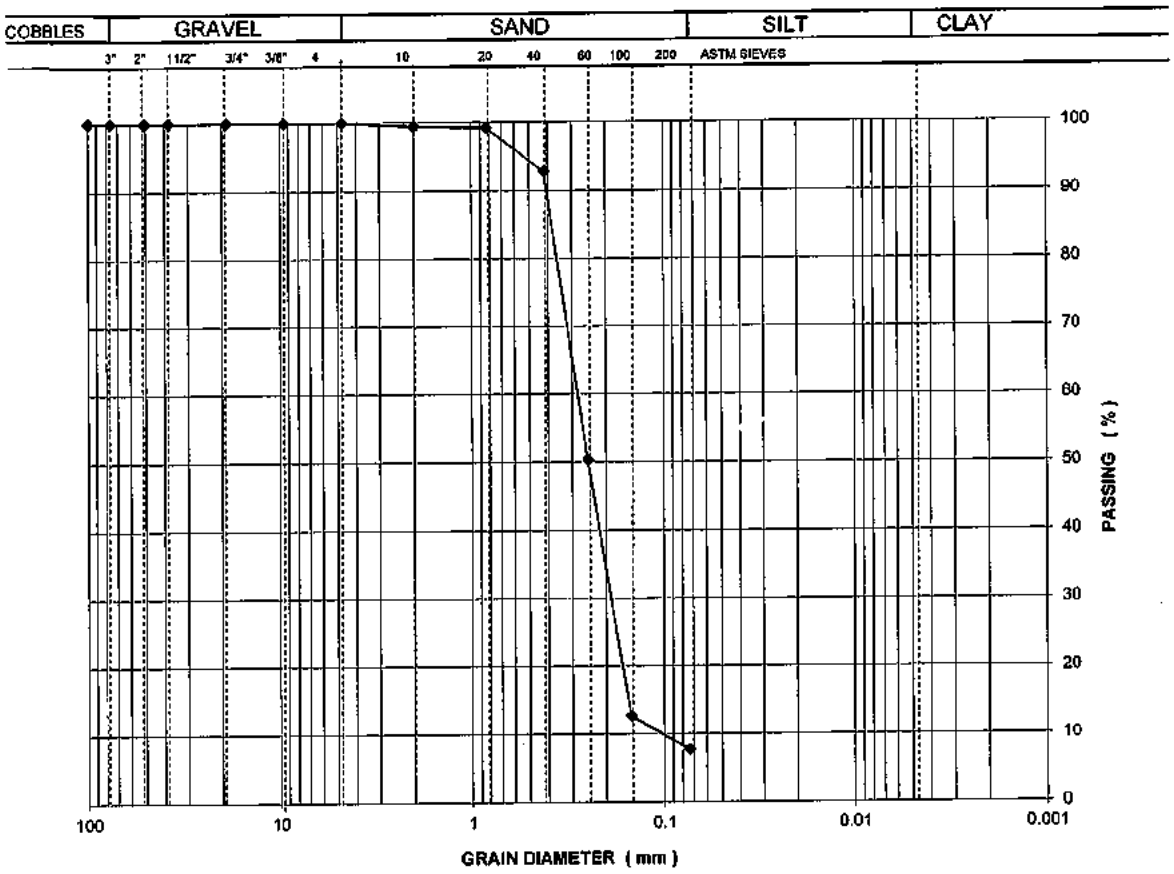
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-43	SAMPLE	SPT-4
TYPE	DISTURBED	DEPTH(m)	4.00-4.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	93	13	8

LAB. REF.	56/2019

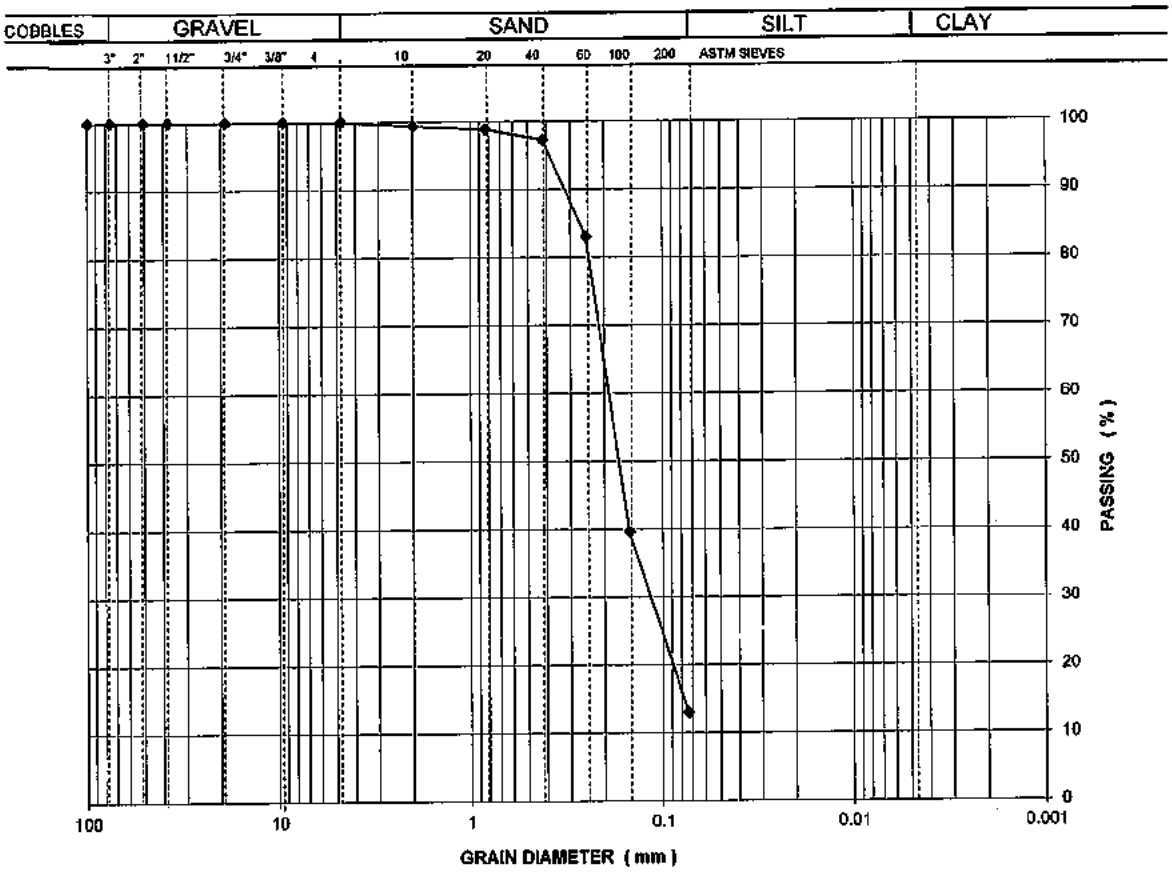
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-43	SAMPLE	SPT-9
TYPE	DISTURBED	DEPTH(m)	9.00-9.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	97	40	13

LAB. REF.	56/2019

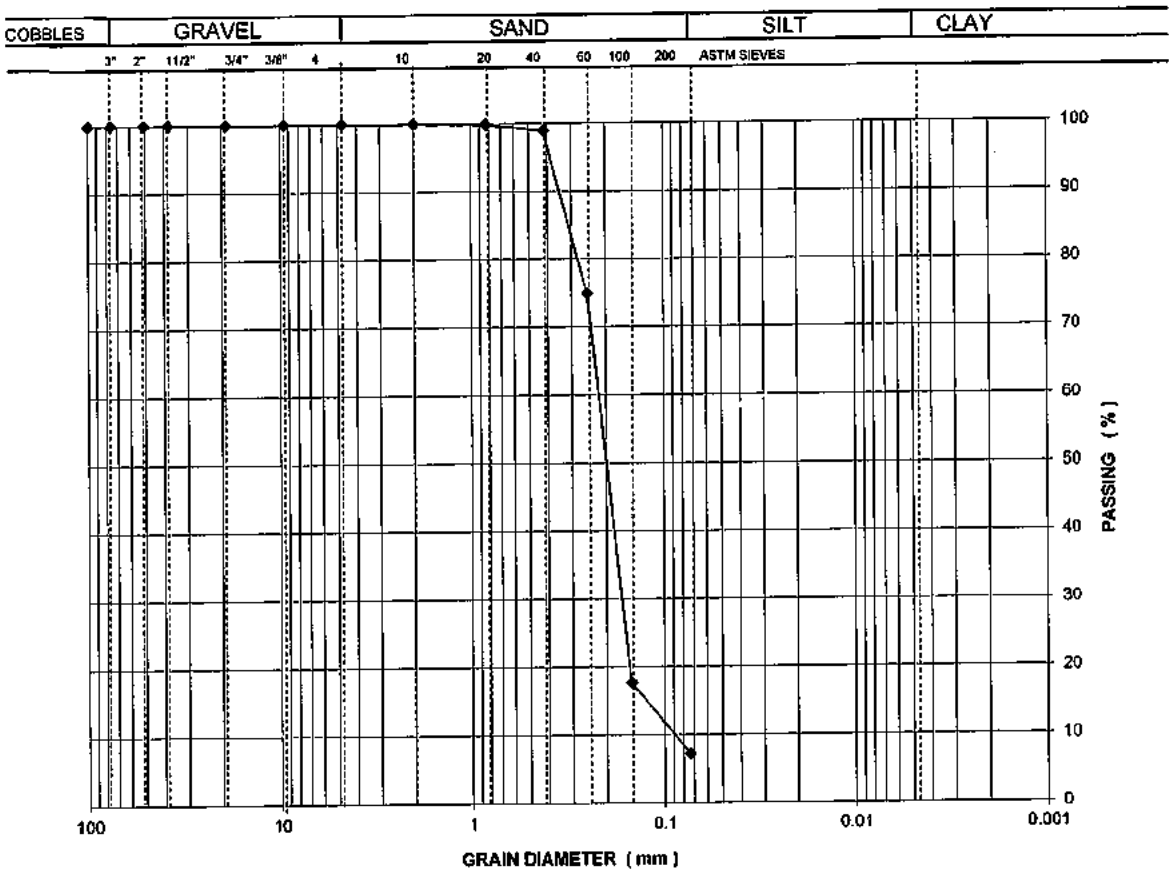
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-44	SAMPLE	SPT-5
TYPE	DISTURBED	DEPTH(m)	5.00-5.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	18	7

LAB. REF.	56/2019

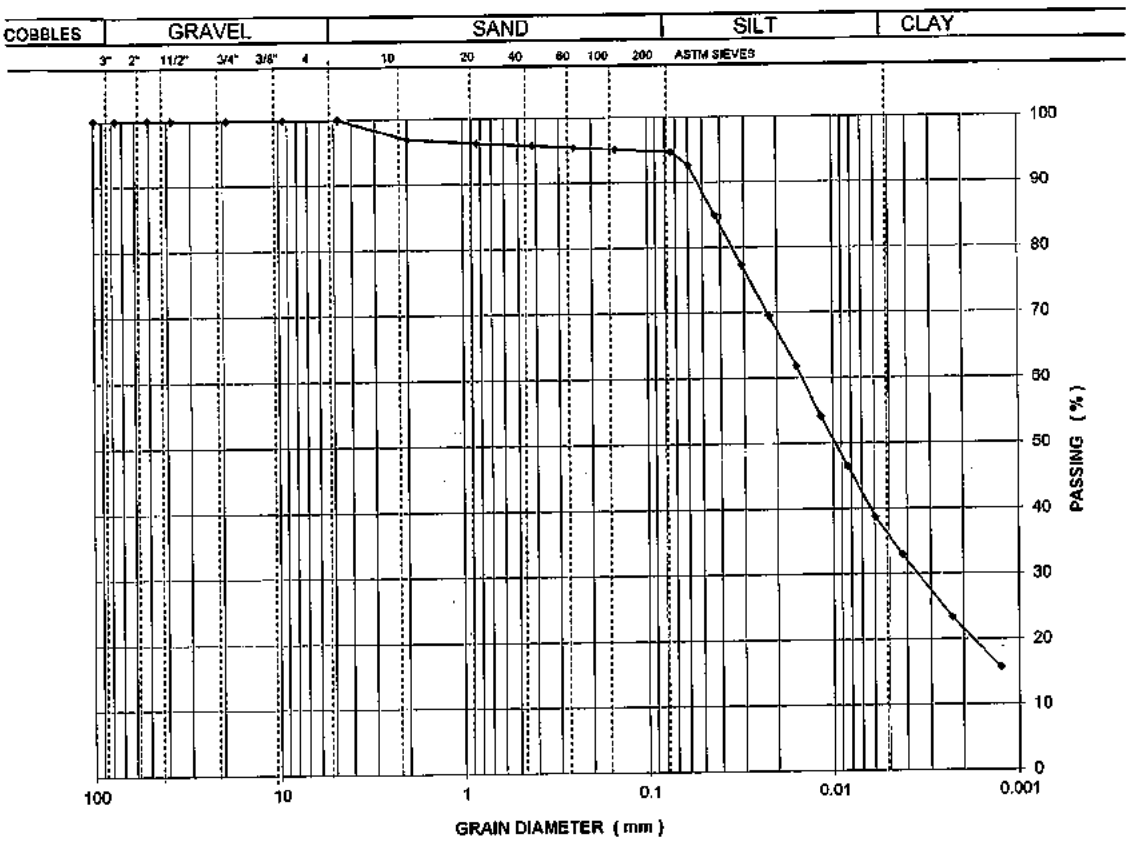
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	GEOSCIENCE ASSOCIATES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT		
SITE	PROGRAM SAHIWAL CITY		
BORE HOLE	BH-45	SAMPLE	UDS-1
TYPE	UNDISTURBED	DEPTH m	2.45-3.00
SPECIMEN	1	DATE	2/12/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	97	96	95	95

LAB. REF.	56/2019

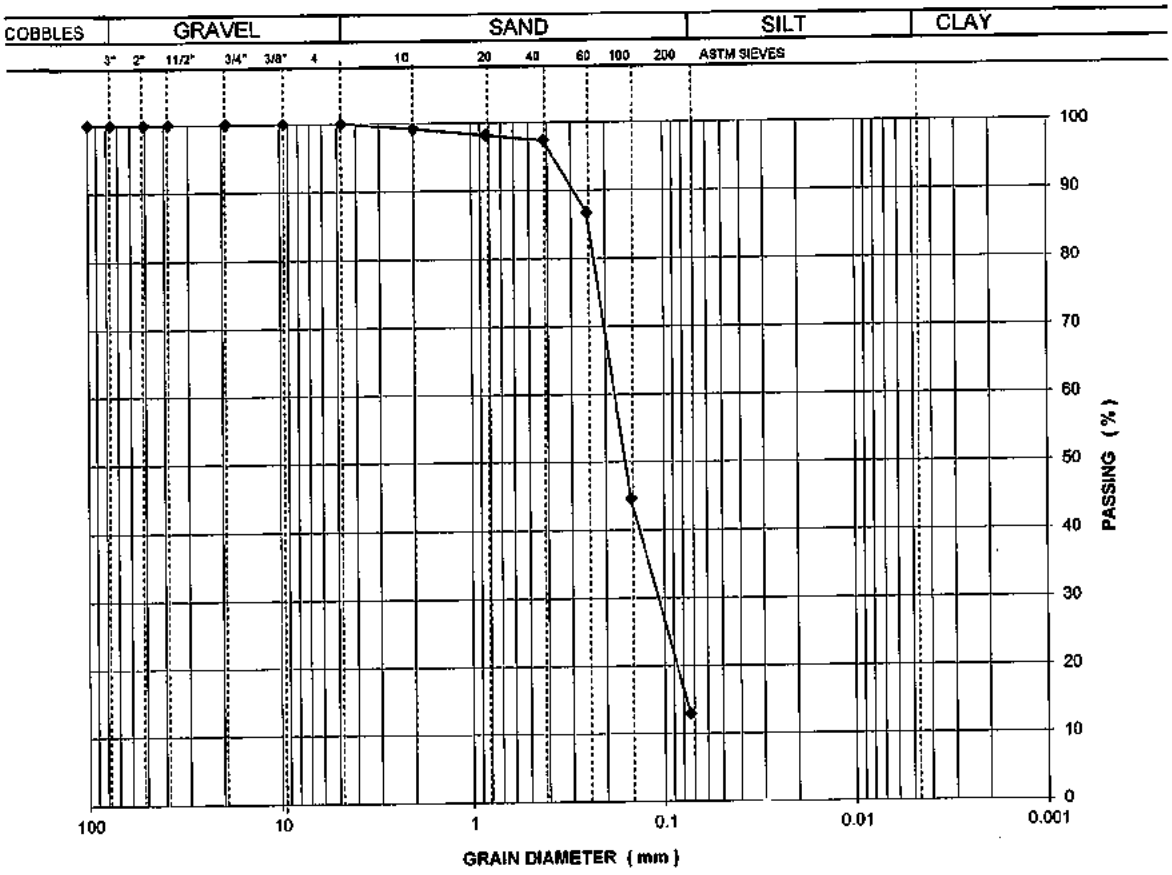
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-45	SAMPLE	SPT-10
TYPE	DISTURBED	DEPTH(m)	10.00-10.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	97	45	13

LAB. REF.	56/2019

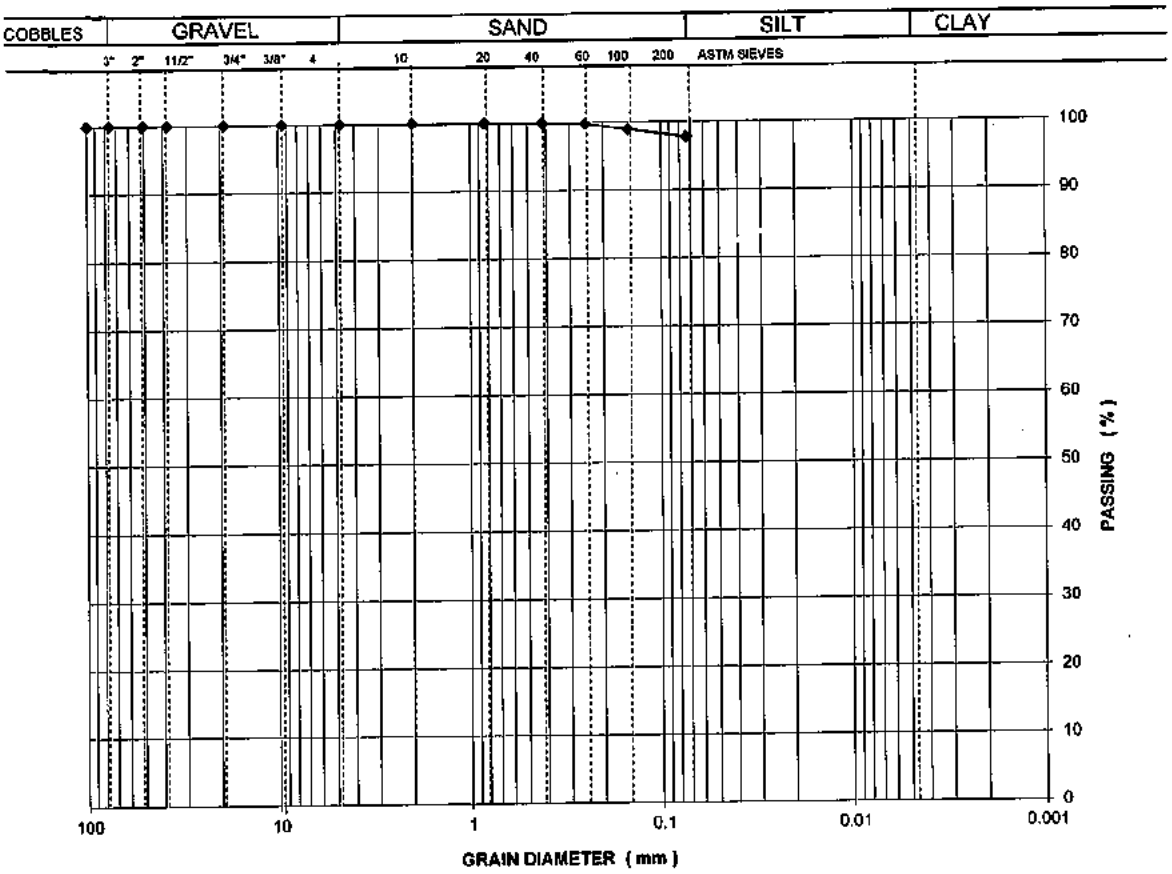
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-46	SAMPLE	SPT-2
TYPE	DISTURBED	DEPTH(m)	2.00-2.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	99	98

LAB. REF.	56/2019

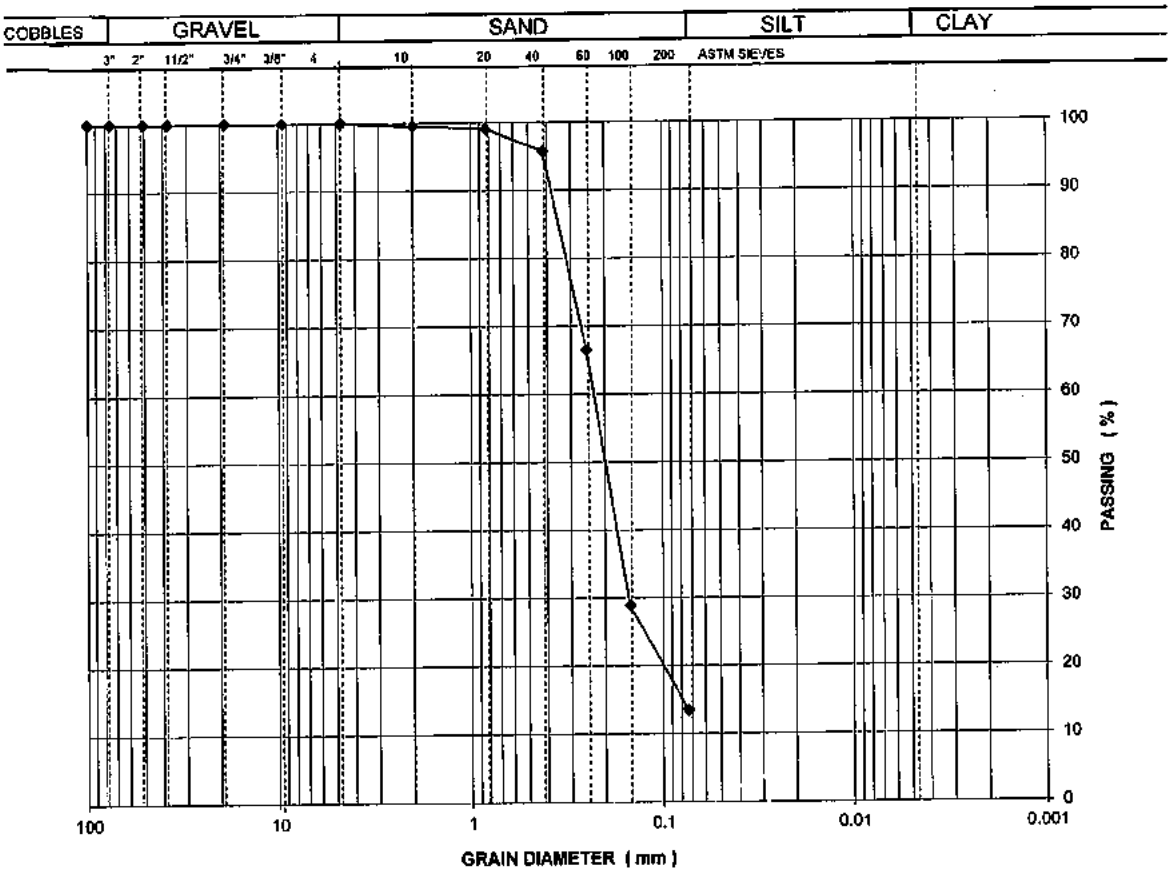
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAN ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BH-46	SAMPLE	SPT-7
TYPE	DISTURBED	DEPTH(m)	7.00-7.45
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	96	29	14

LAB. REF.	56/2019

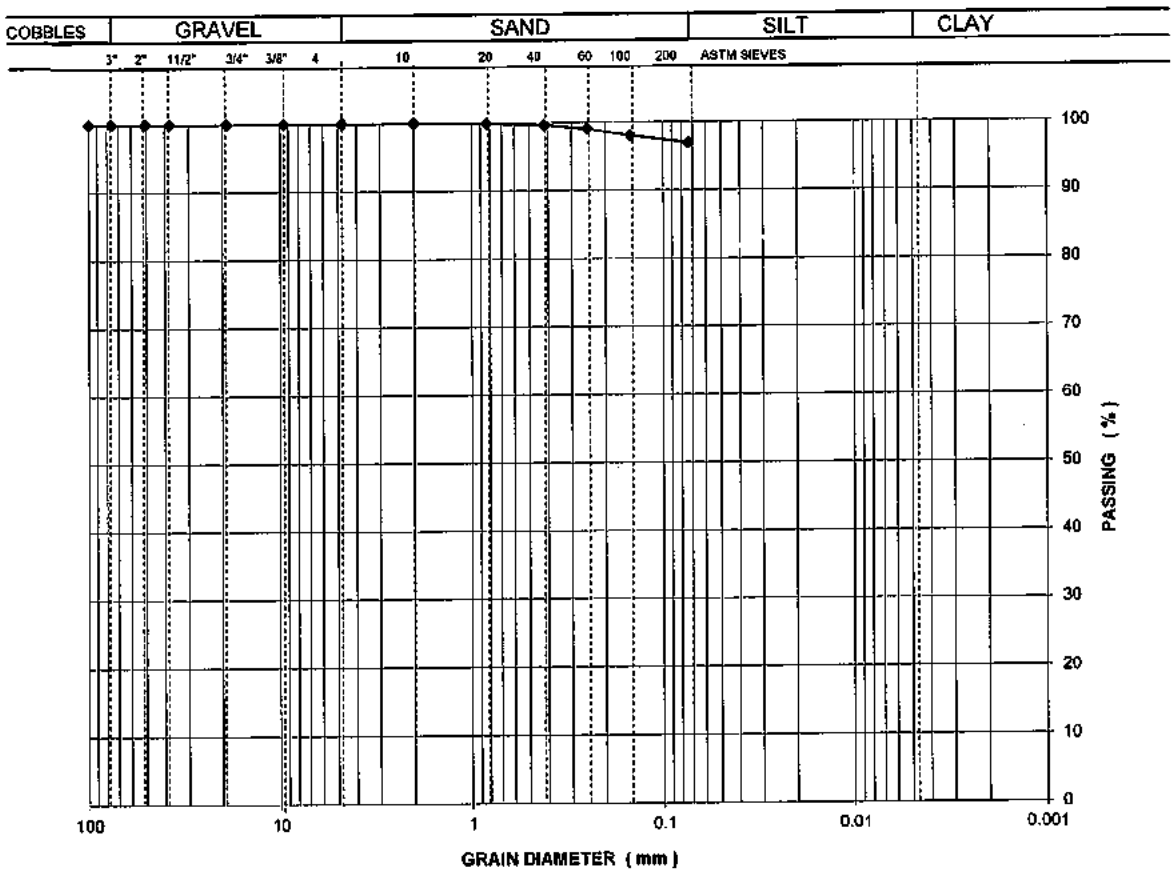
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-1	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	1.15-1.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	98	97

LAB. REF.	56/2019

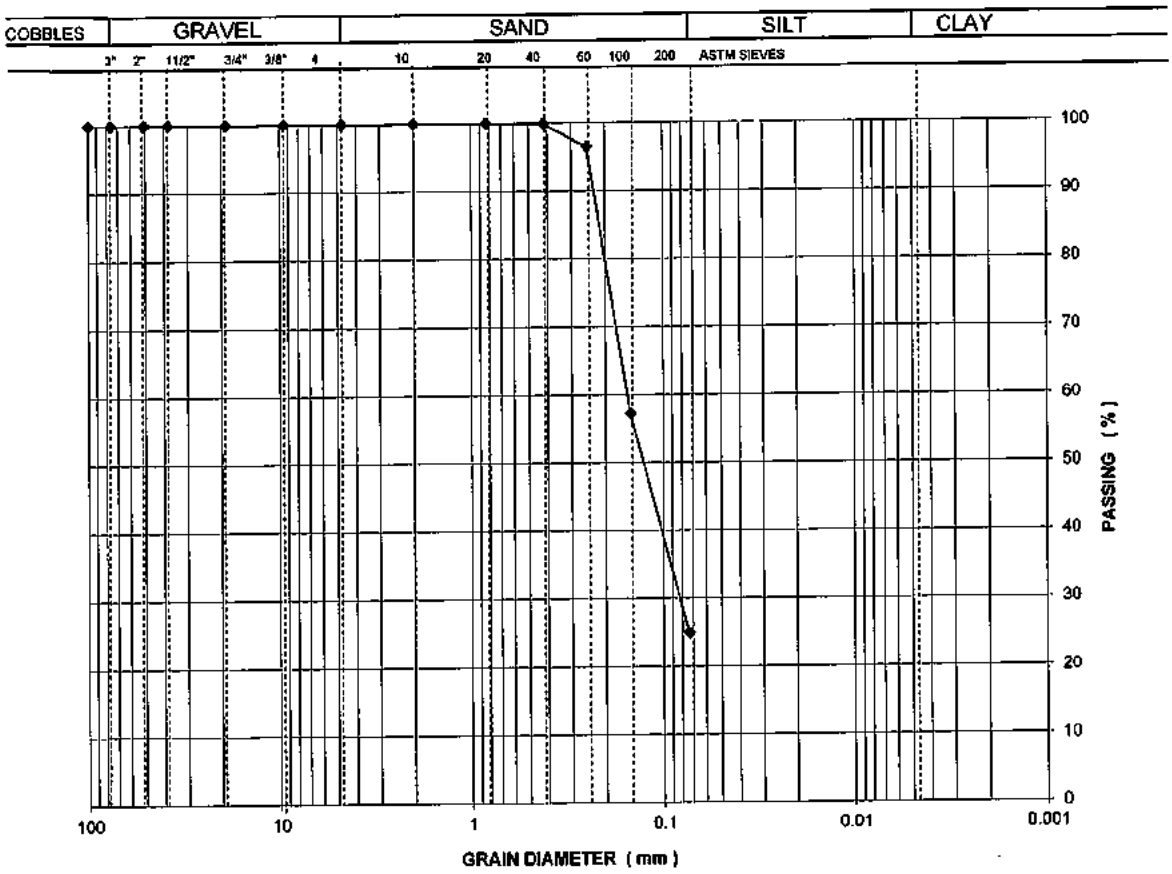
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-2	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	1.05-1.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	57	25

LAB. REF.	56/2019

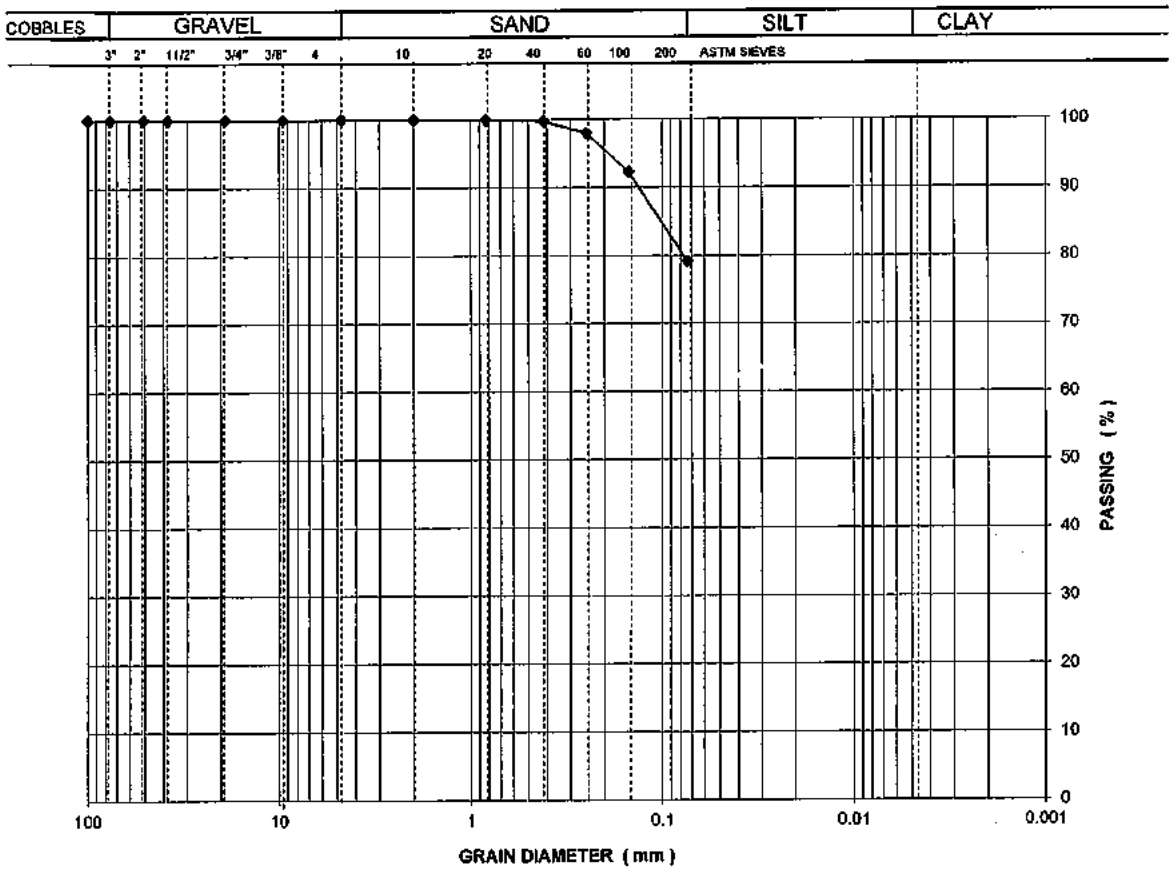
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-4	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.70-1.40
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	92	79

LAB. REF.	56/2019

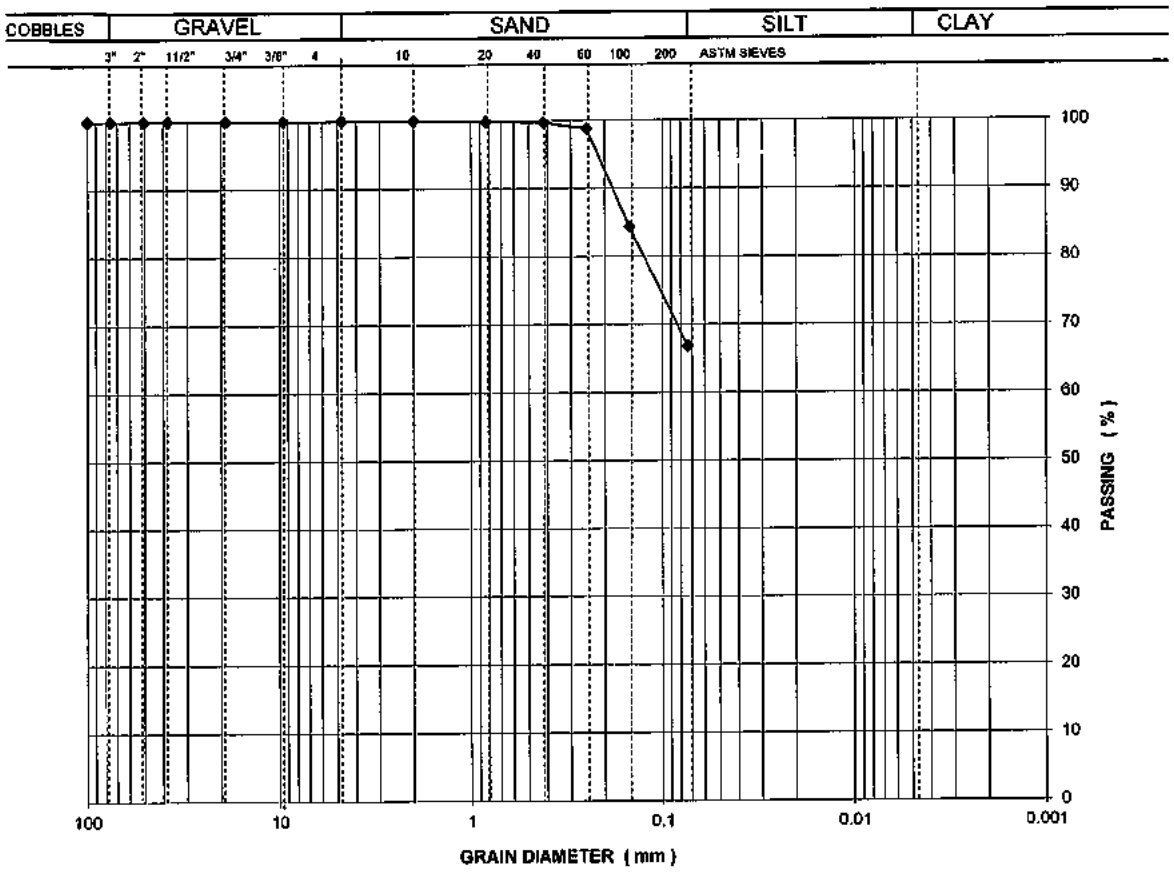
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-5	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.40-1.22
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	84	67

LAB. REF.	56/2019

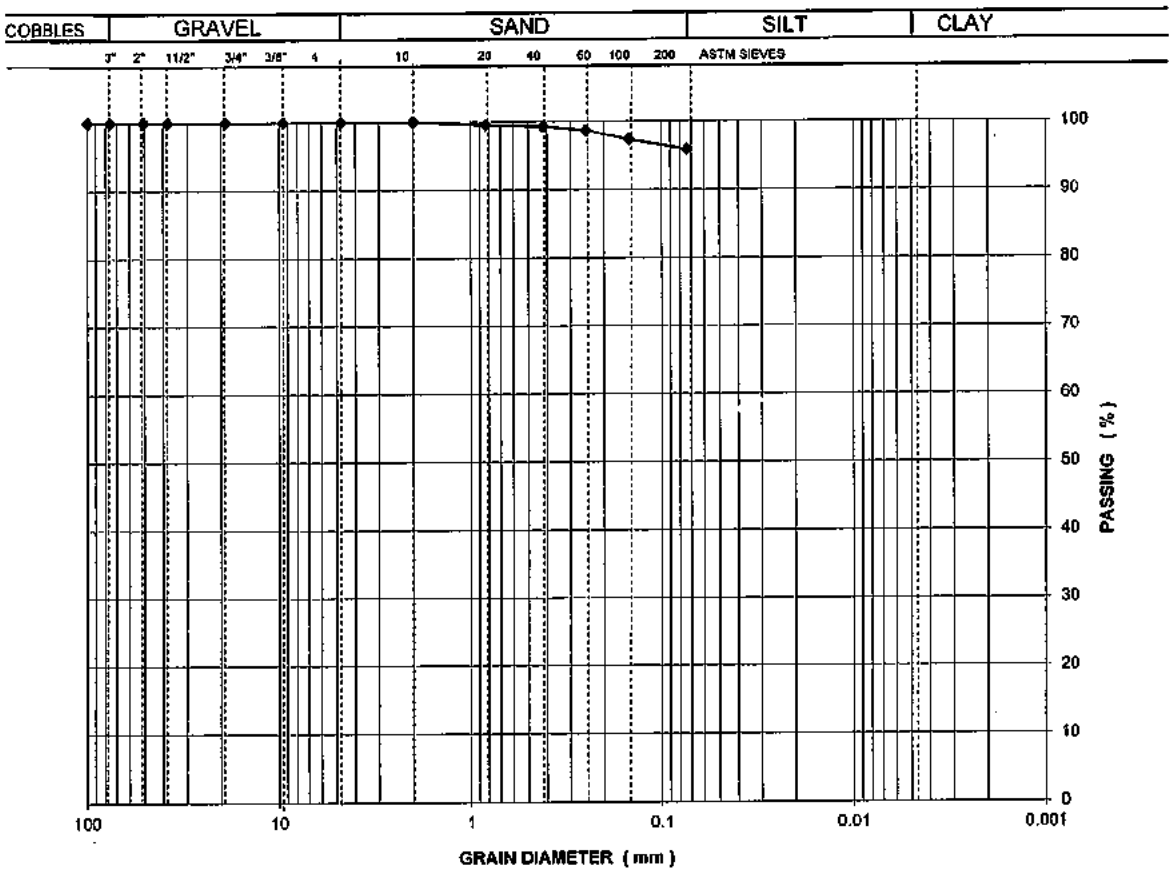
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-6	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.50-1.35
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	97	96

LAB. REF.	56/2019

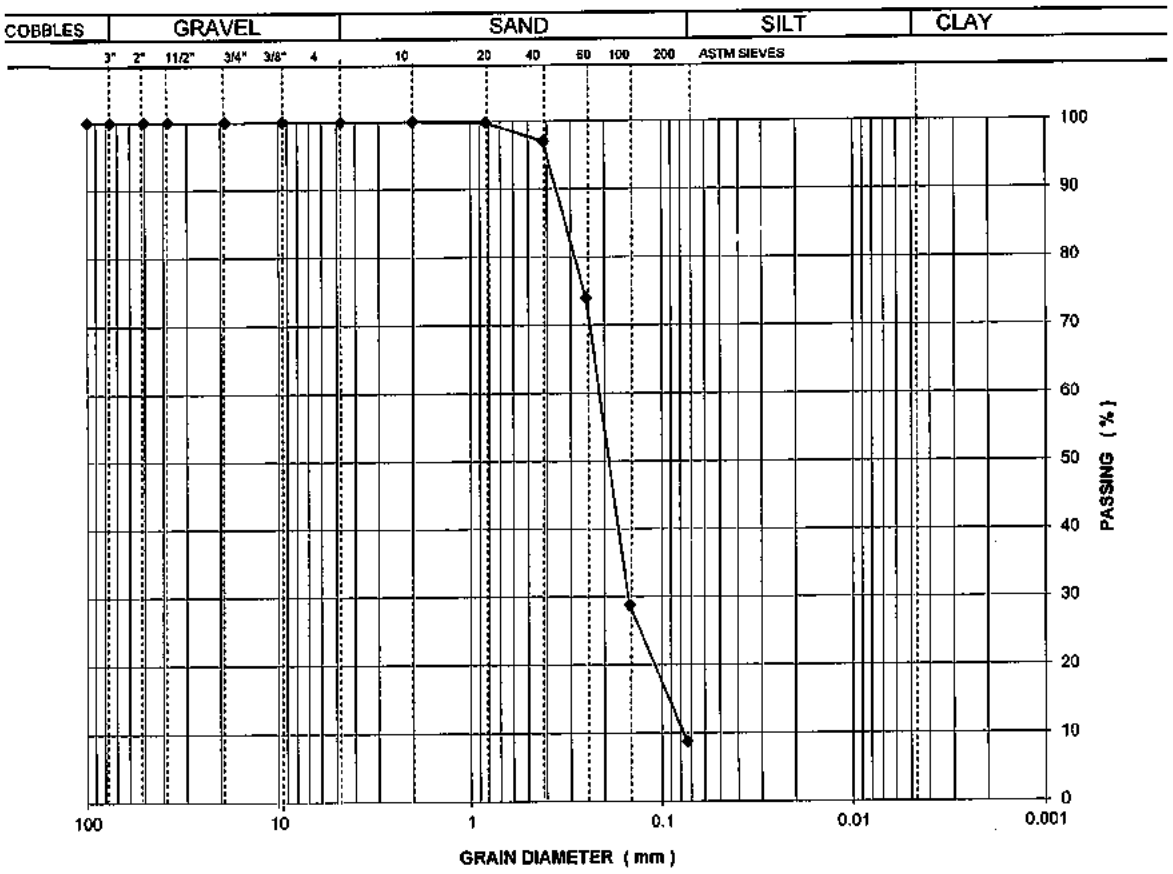
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-7	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.45-1.60
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	97	29	9

LAB. REF.	56/2019

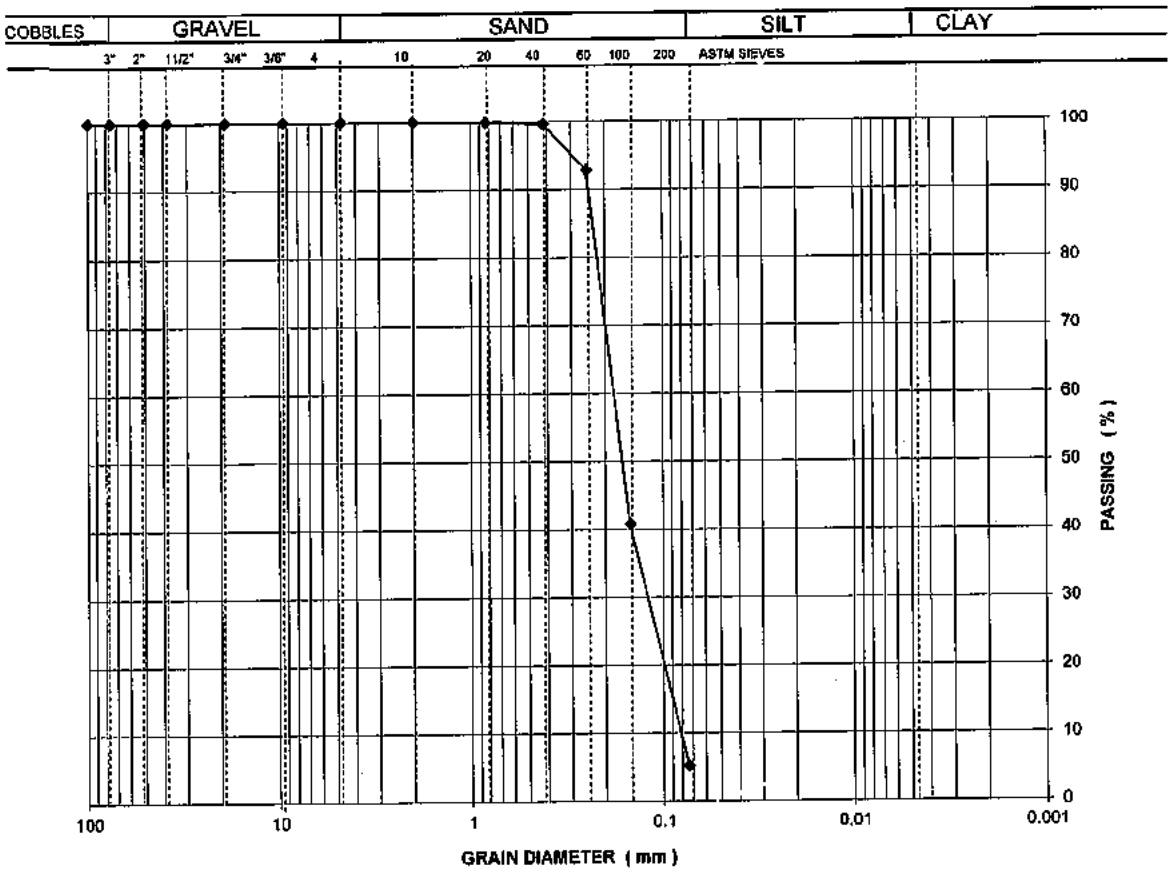
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-8	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.35-1.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	41	5

LAB. REF.	56/2019

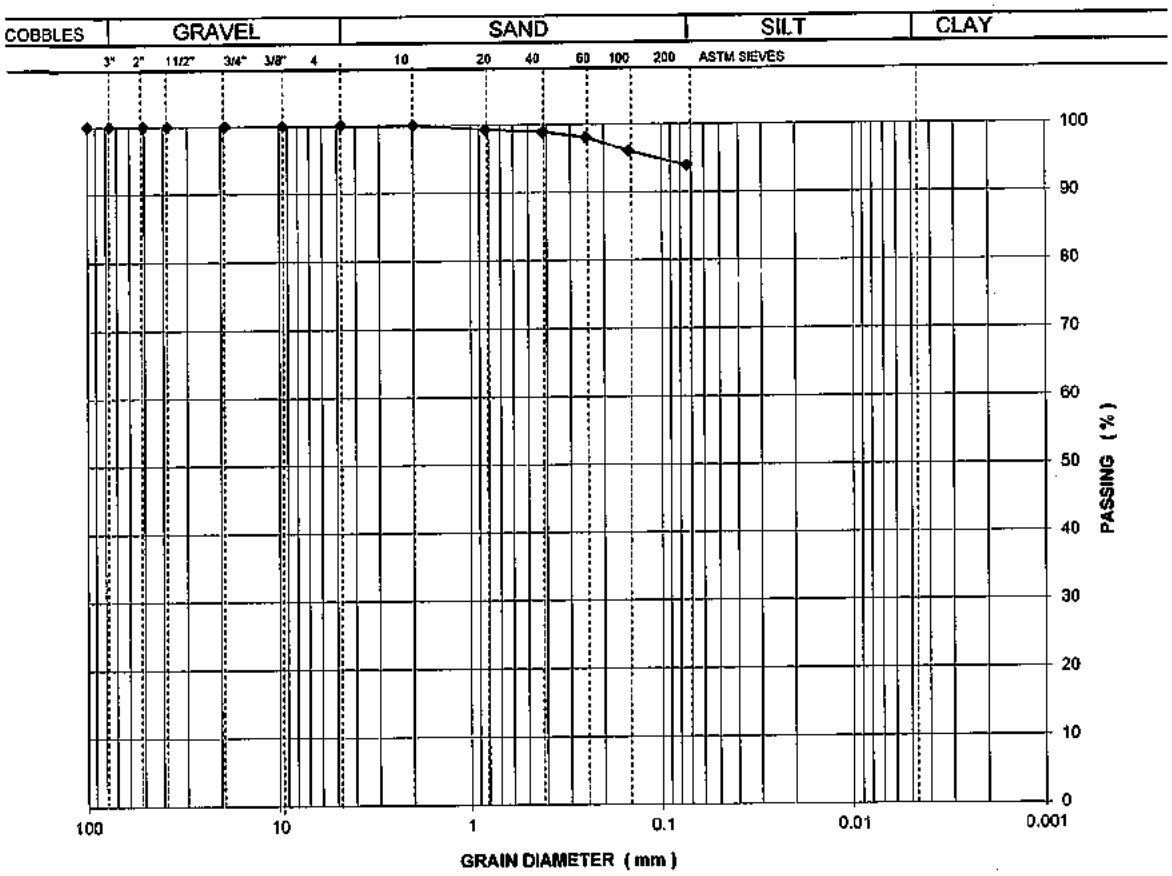
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	TP-9	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-1.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	99	96	94

LAB. REF.	56/2019

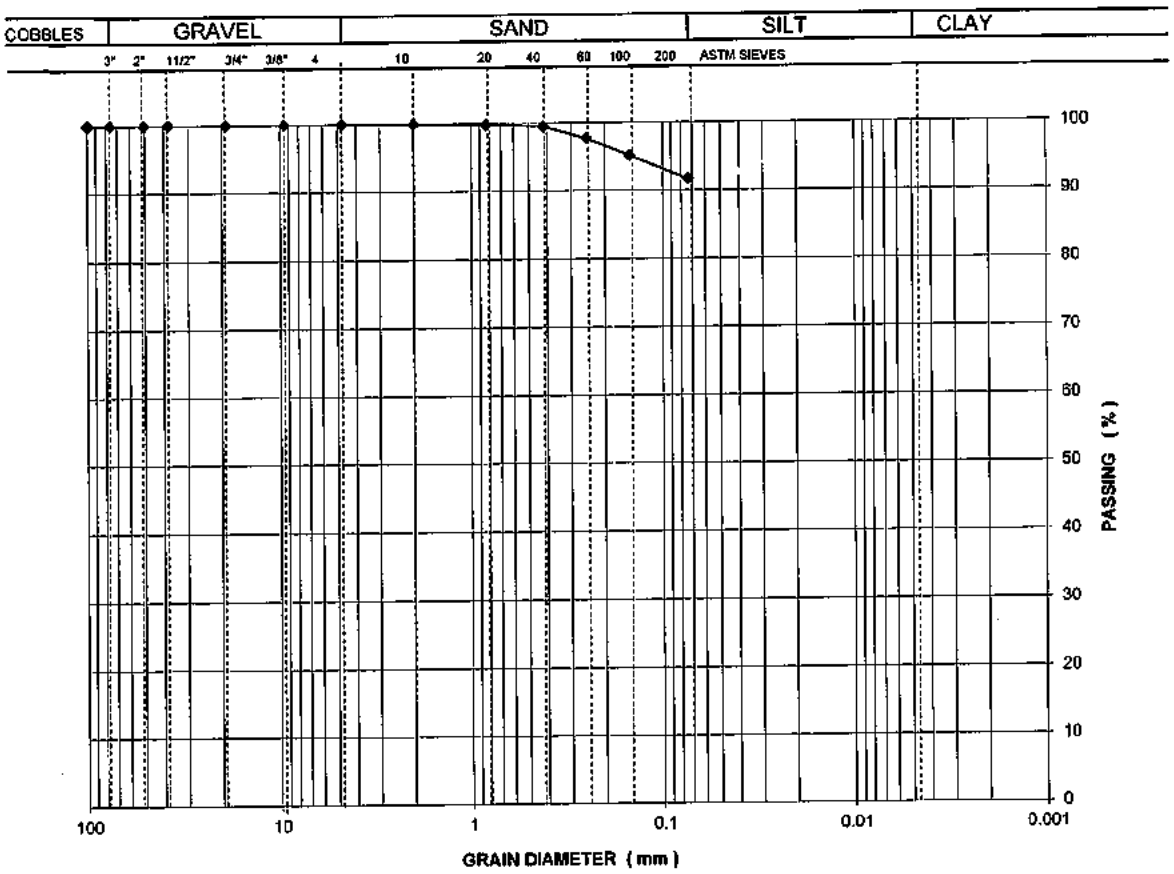
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-1	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-0.90
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	95	92

LAB. REF.	56/2019

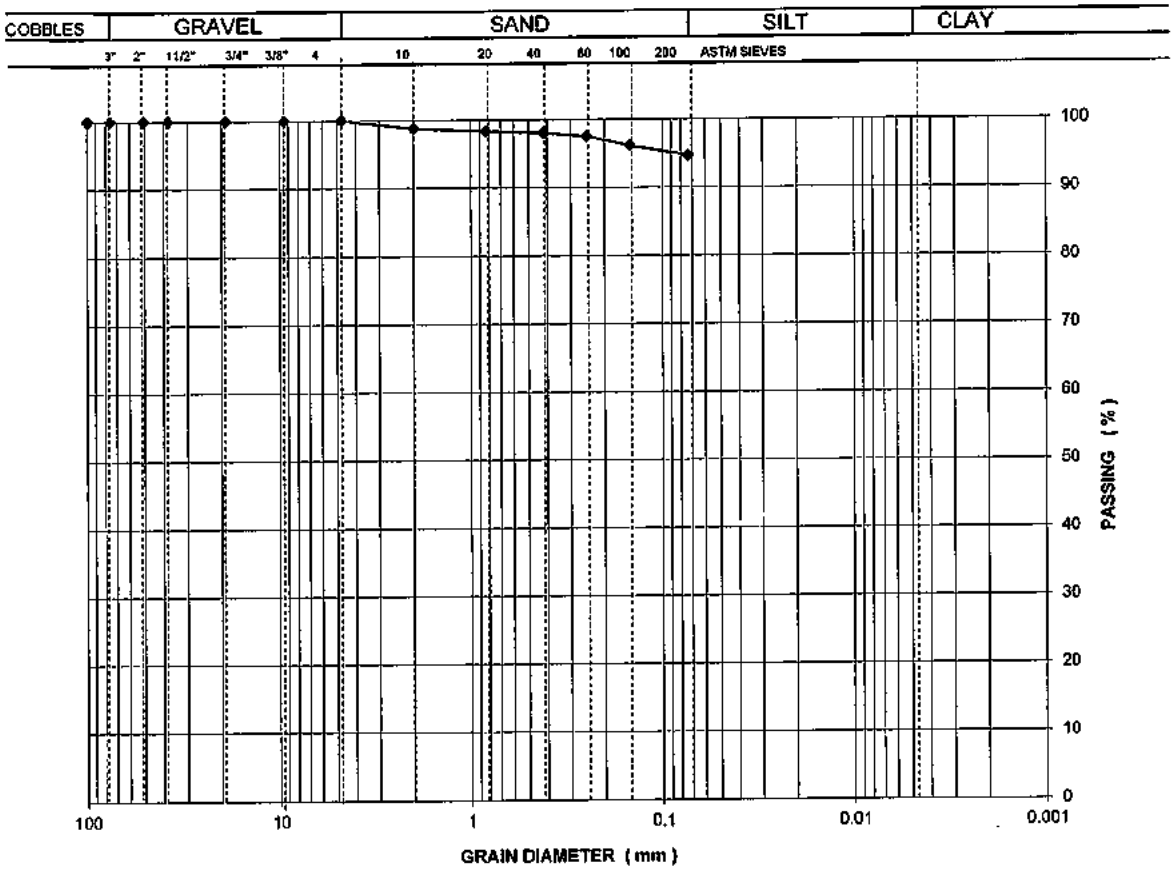
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-2	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.50-1.00
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	98	96	95

LAB. REF.	56/2019

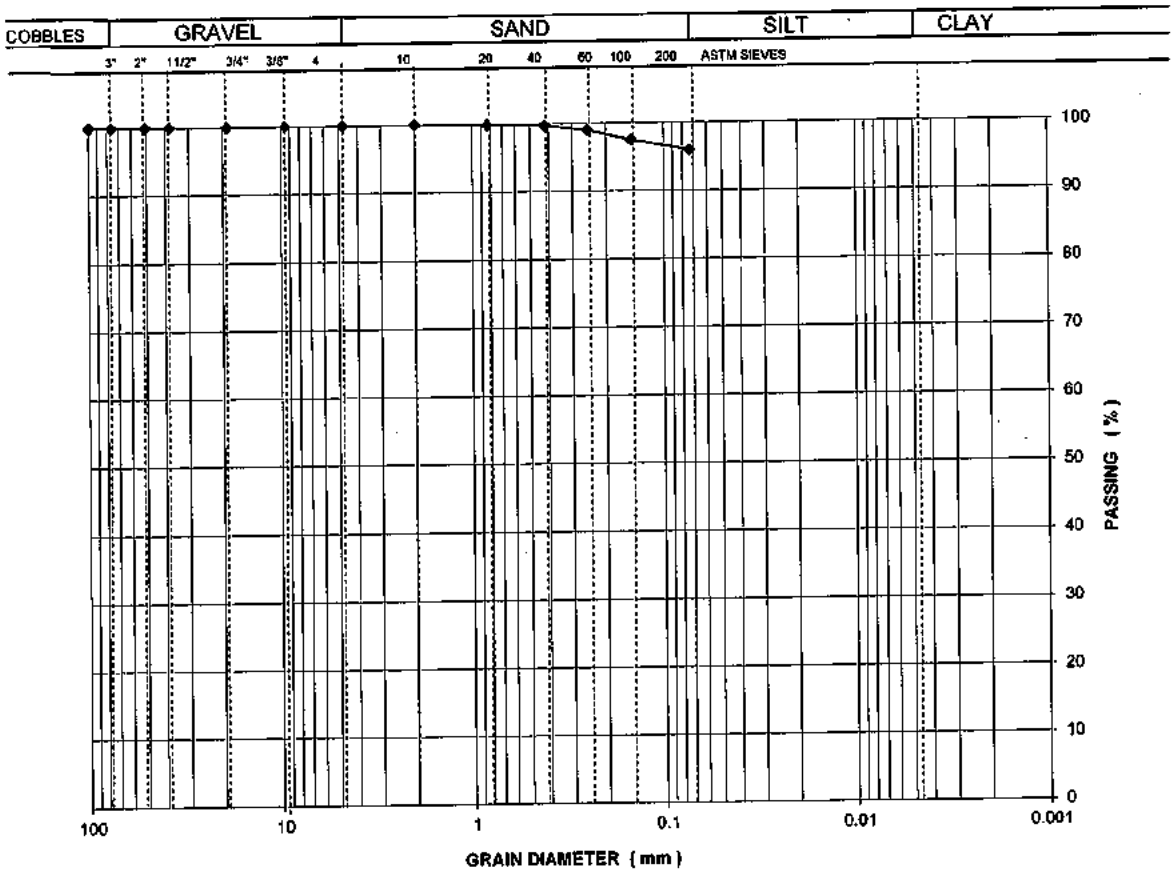
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-3	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-0.70
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	98	96

LAB. REF.	56/2019

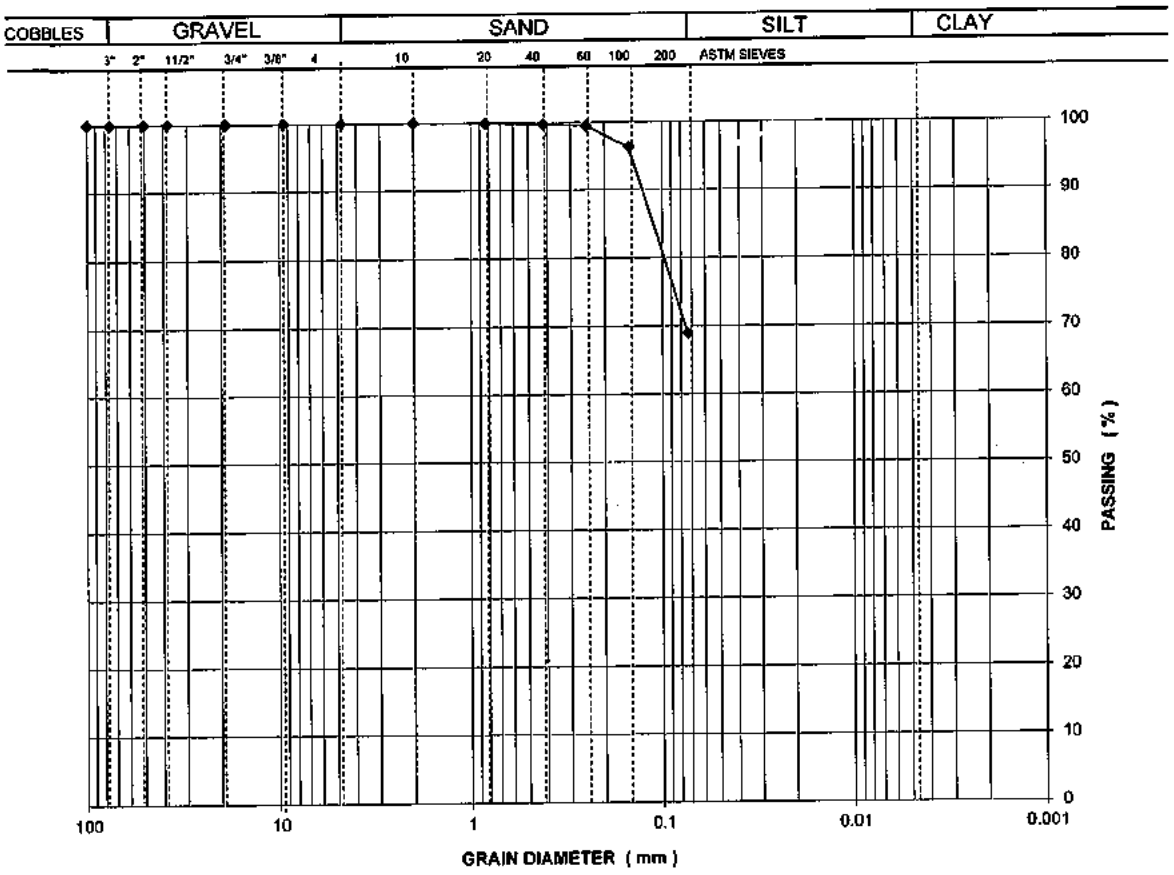
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-4	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.15-0.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	96	69

LAB. REF.	56/2019

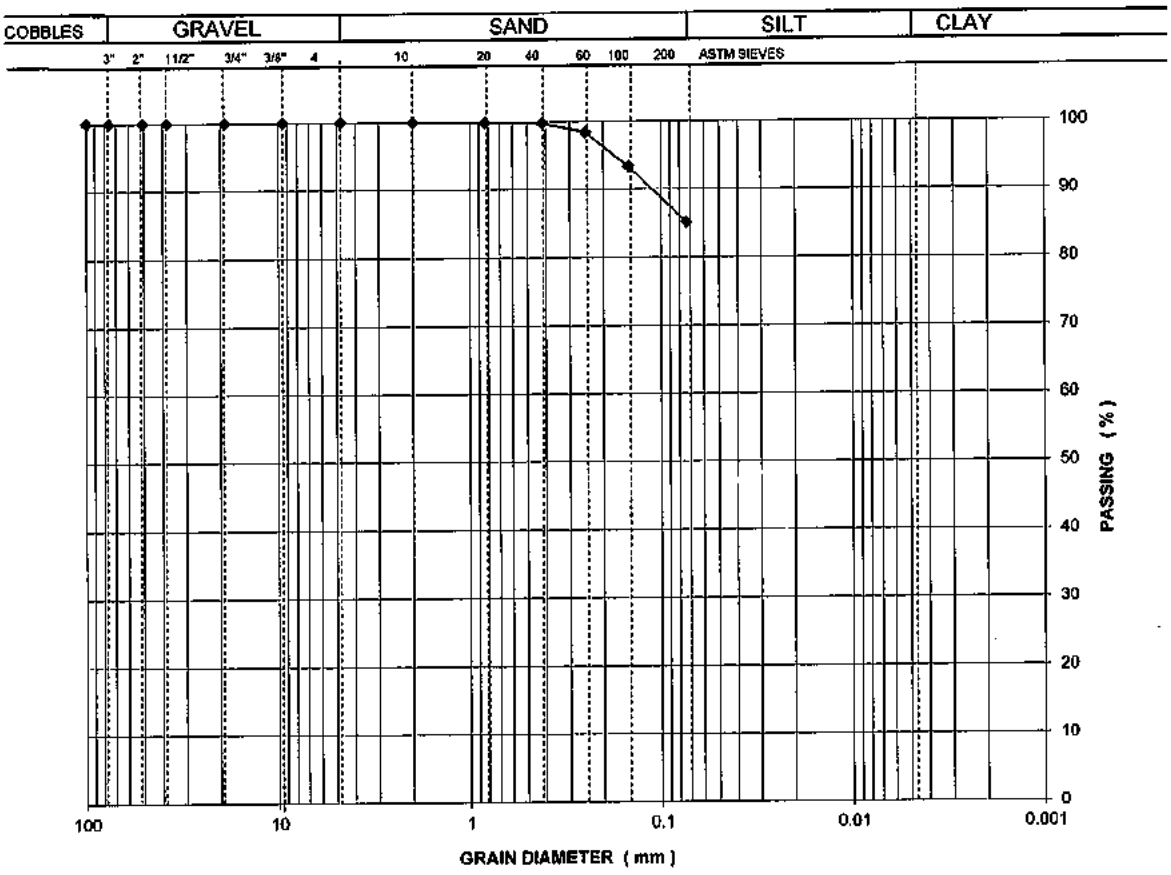
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH ✓	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-5	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.25-1.00
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	93	85

LAB. REF.	56/2019

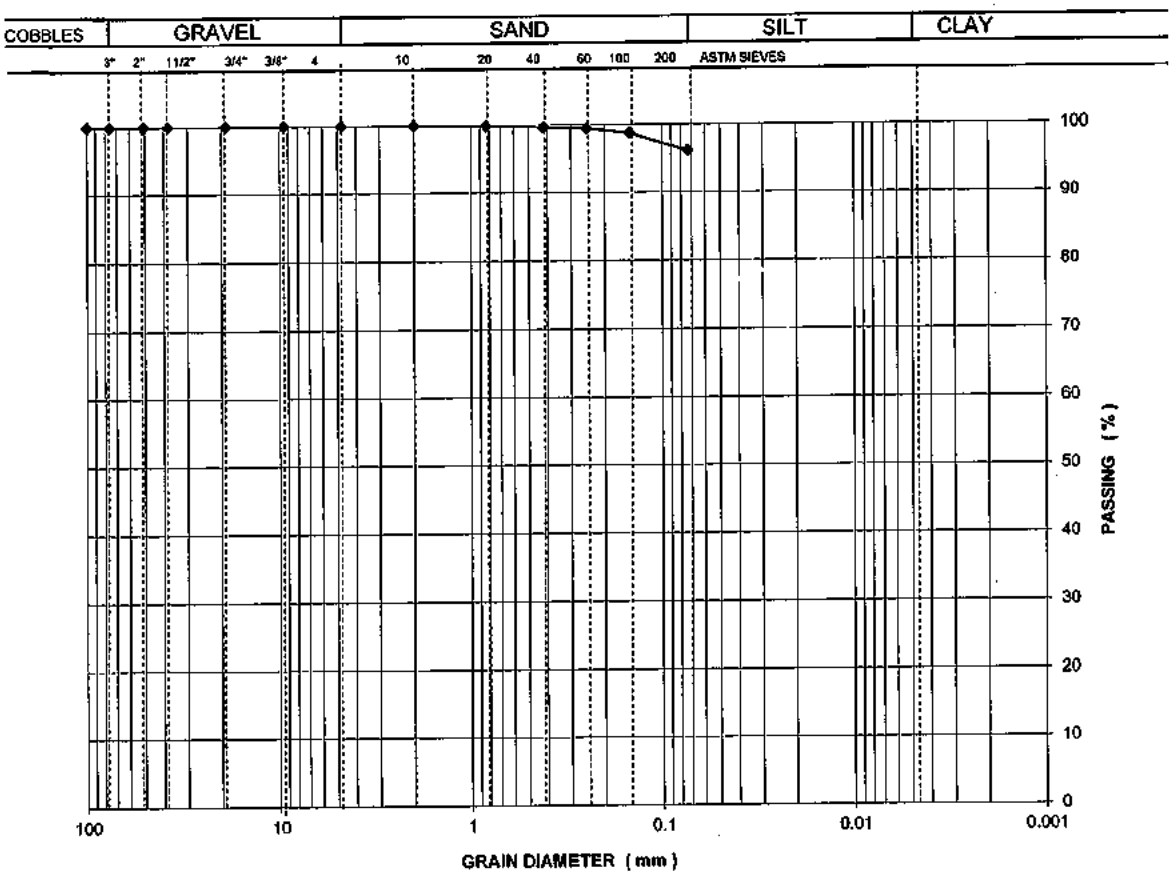
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-5	SAMPLE	CS-2
TYPE	DISTURBED	DEPTH(m)	1.00-1.70
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	99	96

LAB. REF.	56/2019

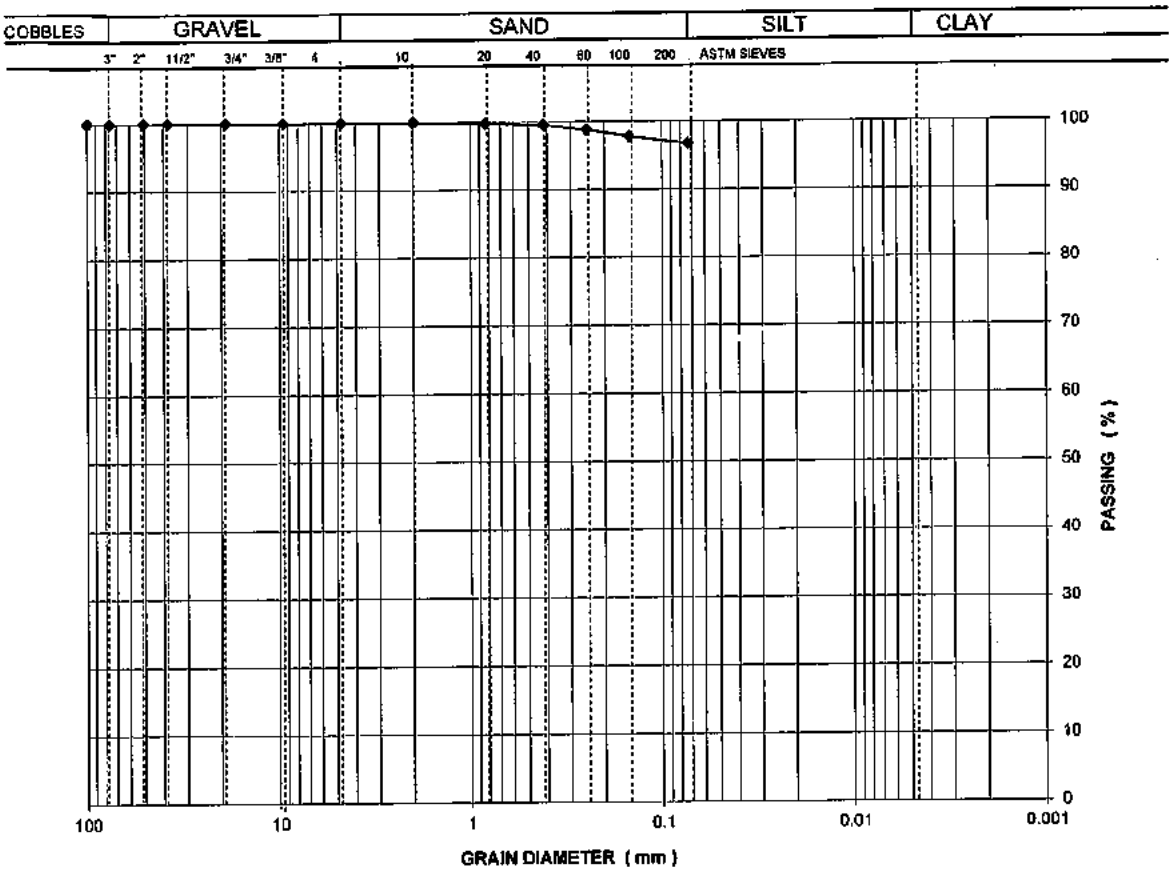
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-6	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-0.80
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	98	97

LAB. REF.	56/2019

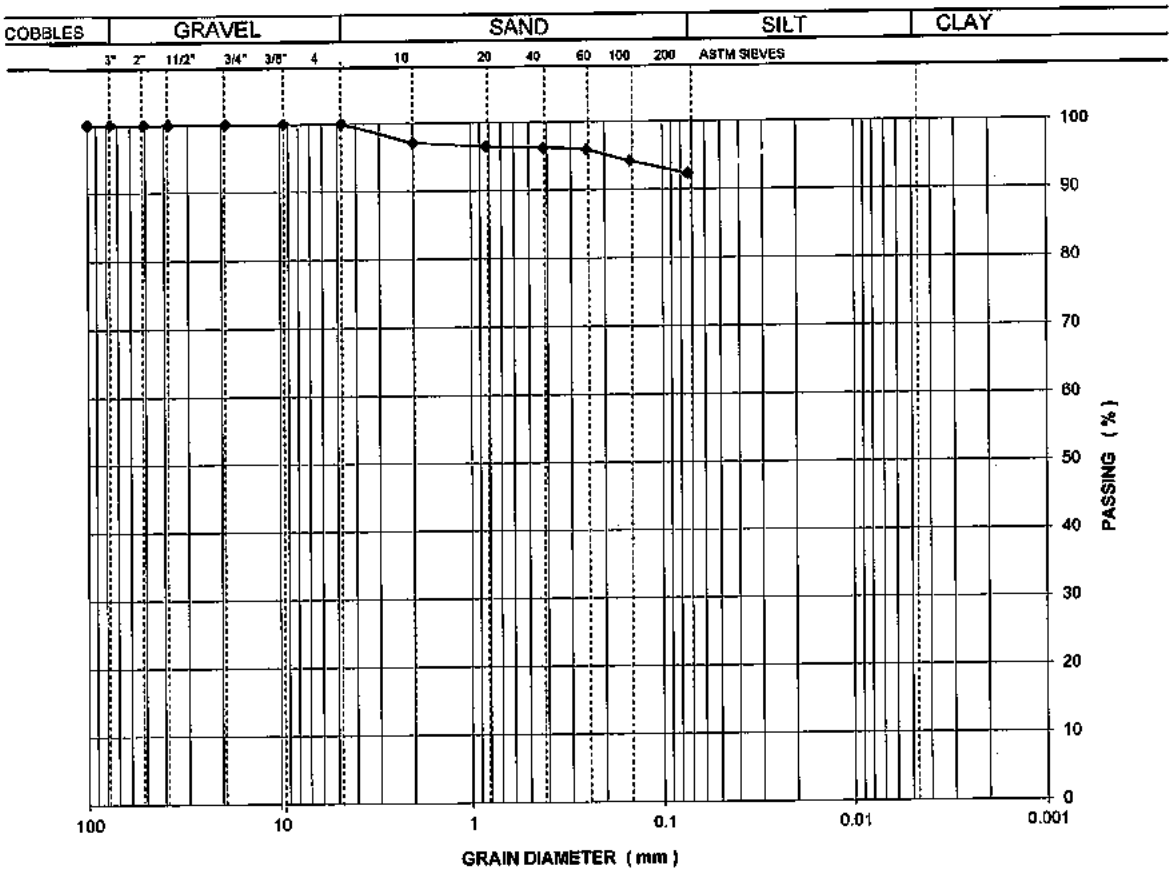
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-7	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-0.80
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	97	96	94	92

LAB. REF.	56/2019

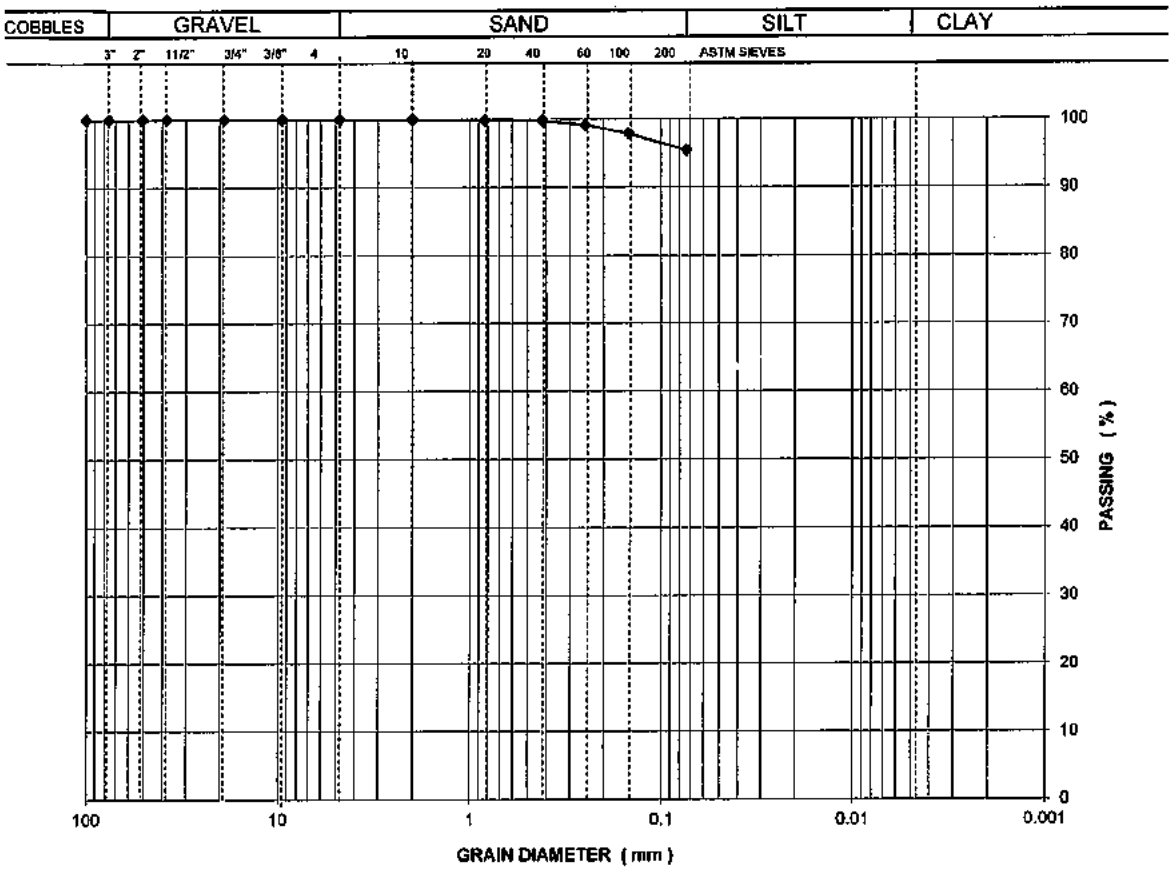
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-8	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.15-1.00
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	100	100	98	95

LAB. REF.	56/2019

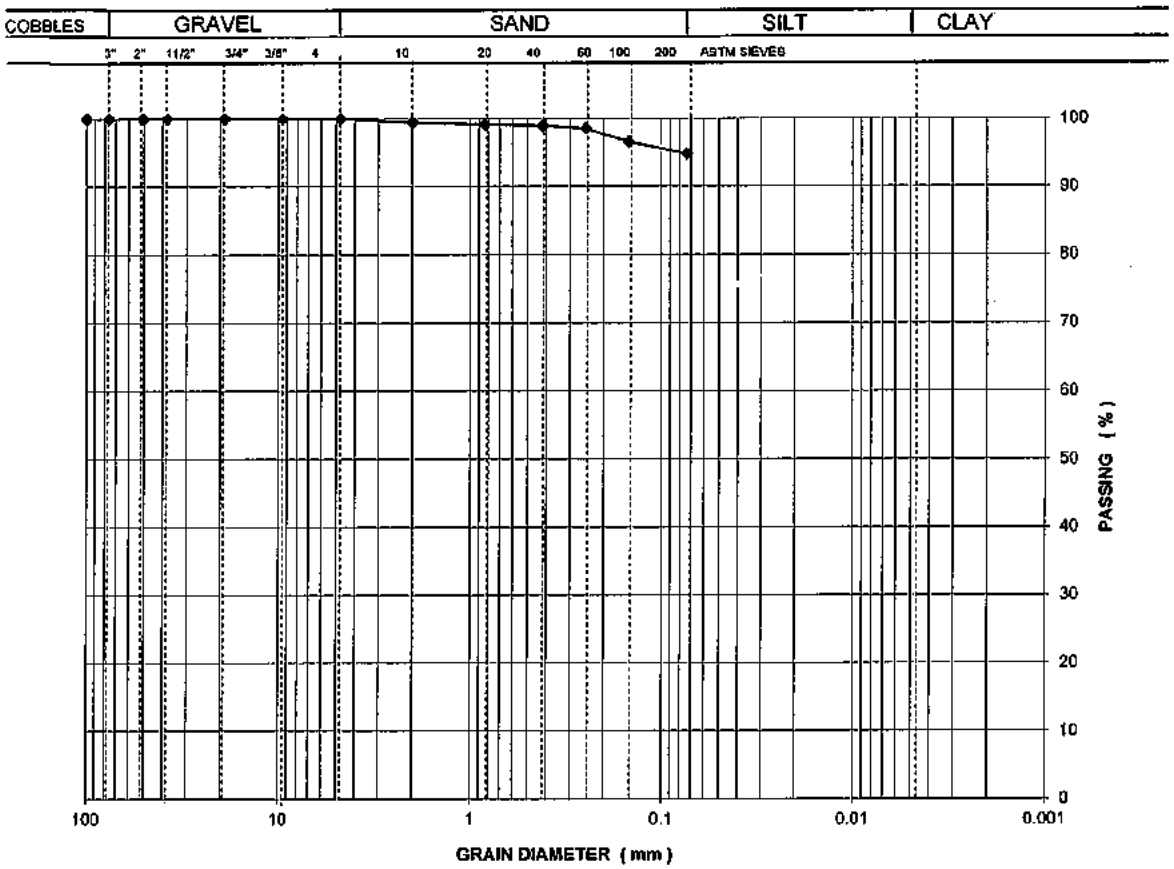
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-9	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.20-1.50
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	99	97	95

LAB. REF.	56/2019

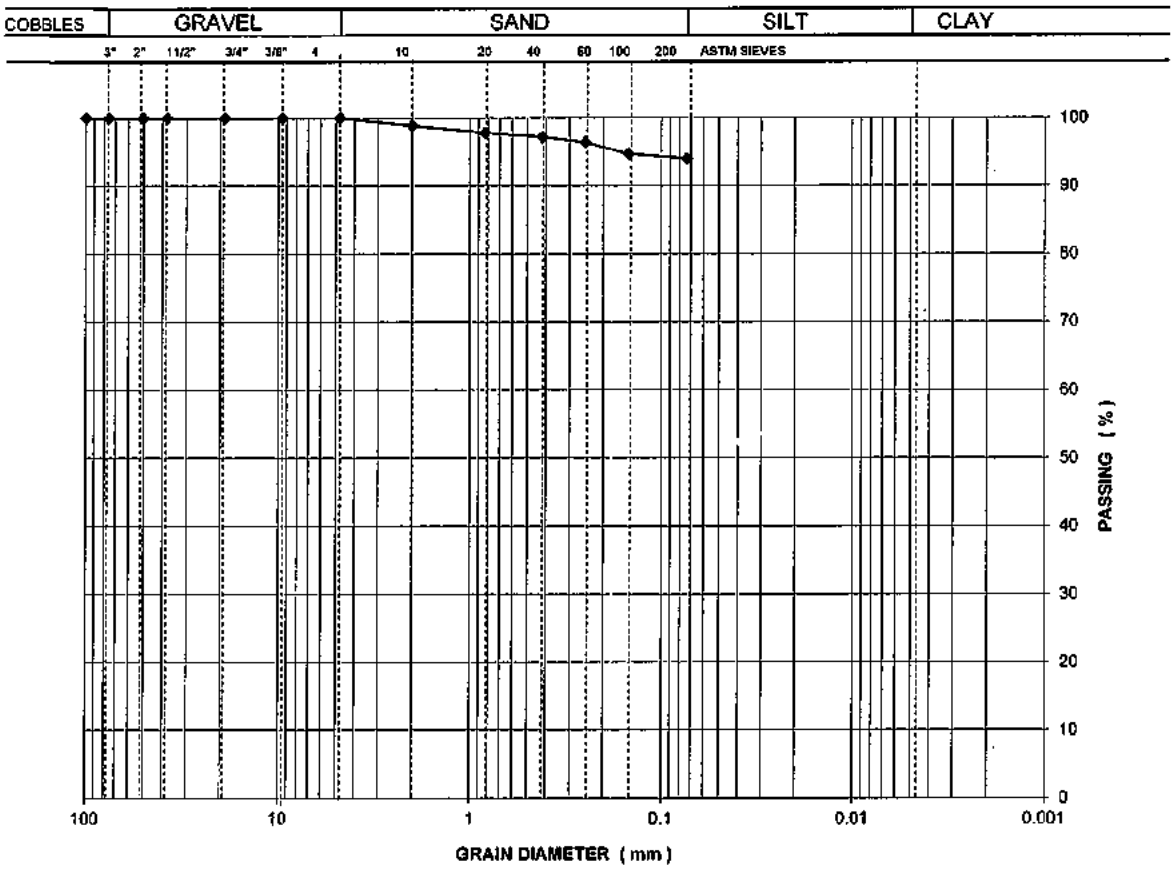
REMARKS :

SOILCON

GRAIN SIZE ANALYSIS

TESTED BY	CHECKED BY
IKRAM ULLAH	MAHMOOD

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
SITE	TREATMENT PLANT IN SAHIWAL CITY		
BORE HOLE	BA-10	SAMPLE	CS-1
TYPE	DISTURBED	DEPTH(m)	0.70-1.30
SPECIMEN	1	DATE	21/11/2019



SIEVE NO.	3"	2"	1"1/2	3/4"	3/8"	4	10	40	100	200
PASSING (%)	100	100	100	100	100	100	99	97	95	94

LAB. REF.	56/2019

REMARKS :

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BH-33	SAMPLE	UDS-1	TYPE	DISTURBED
LAB. REF.	54/2019	DEPTH m	2.45-2.95	DATE	18.11.2019

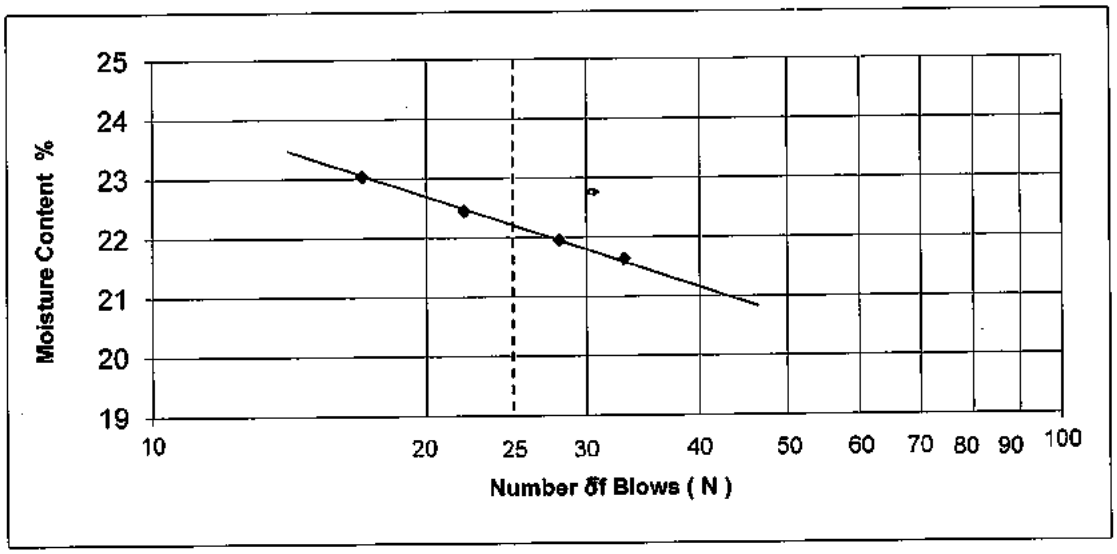
LIQUID LIMIT

Number of Blows N	17	22	28	33	
Moisture Content %	23.04	22.45	21.95	21.64	

PLASTIC LIMIT

Moisture Content %	15.62	15.67	15.72

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
22	16	6



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BH-45	**SAMPLE**	UDS-1	**TYPE**	DISTURBED
LAB. REF.	56/2019	**DEPTH m**	2.45-3.00	**DATE**	27.11.2019

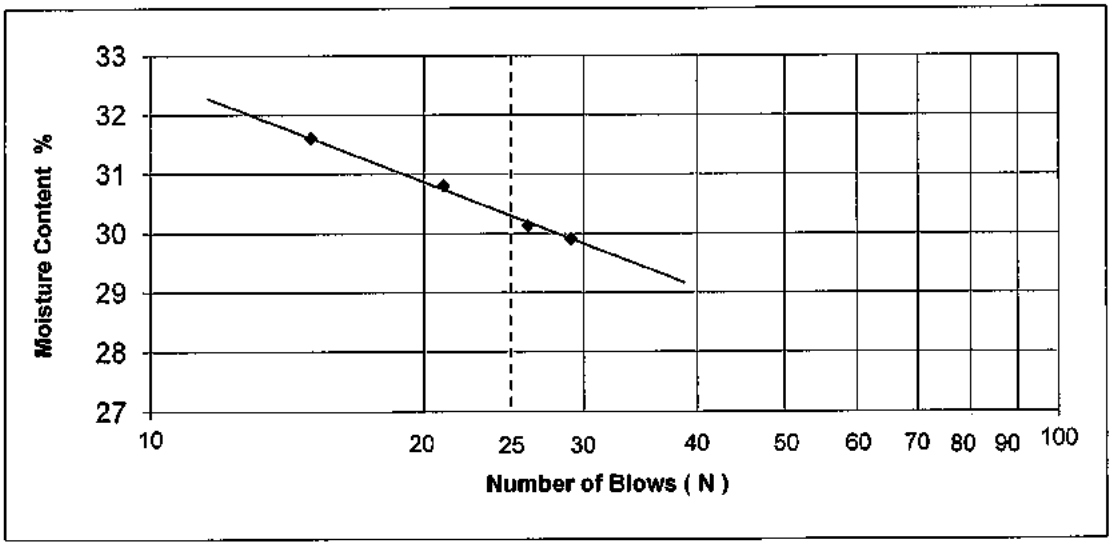
LIQUID LIMIT

Number of Blows N	15	21	26	29	
Moisture Content %	31.61	30.81	30.14	29.91	

PLASTIC LIMIT

Moisture Content %	19.63	19.69	19.72

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
30	20	10



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BH-46	SAMPLE	SPT-2	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	2.00-2.45	DATE	27.11.2019

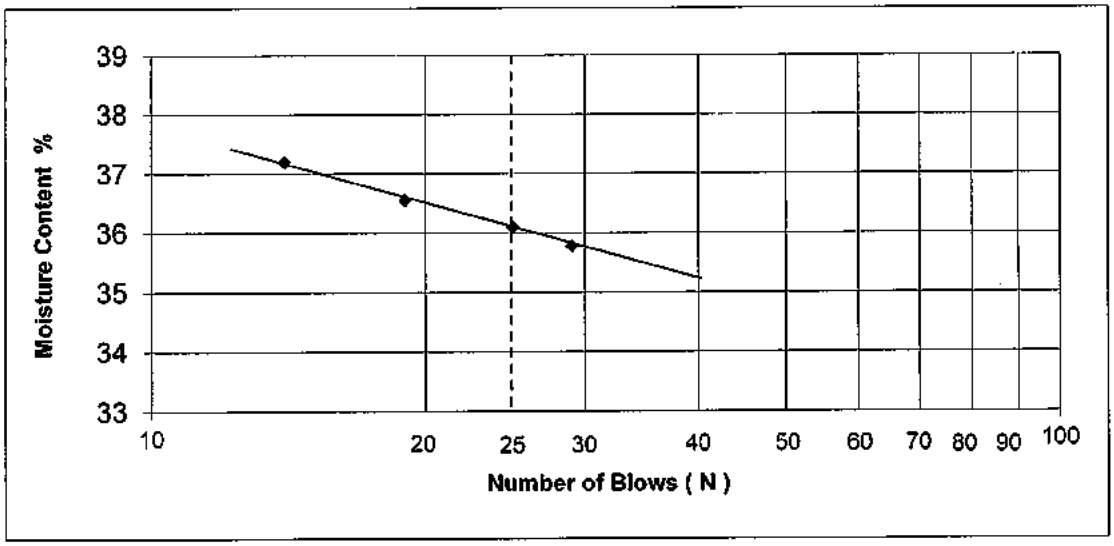
LIQUID LIMIT

Number of Blows N	14	19	25	29	
Moisture Content %	37.20	36.56	36.10	35.78	

PLASTIC LIMIT

Moisture Content %	20.82	20.86	20.91

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
36	21	15



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	TP-1	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	1.15-1.50	DATE	21.11.2019

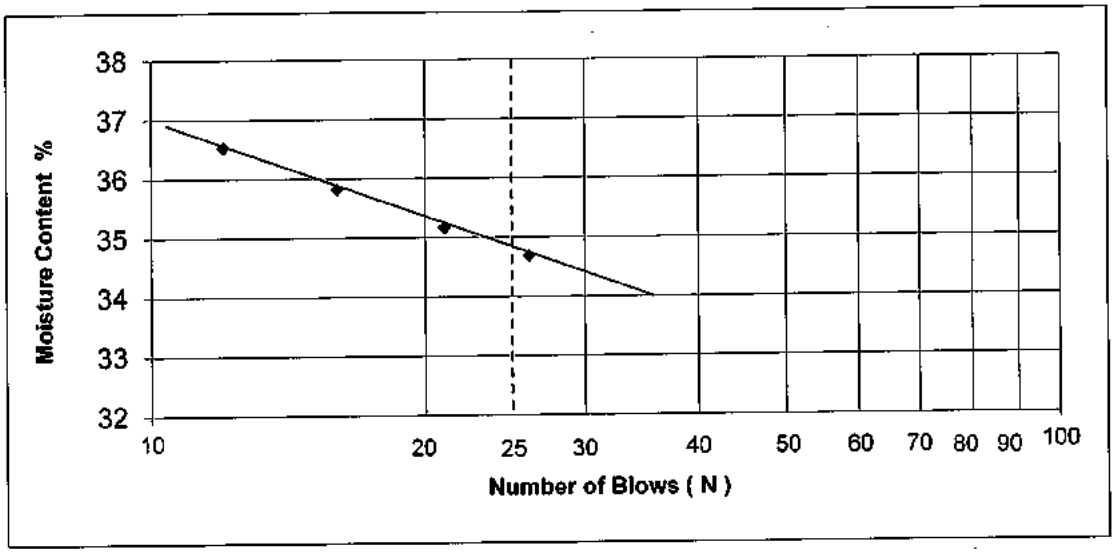
LIQUID LIMIT

Number of Blows N	12	16	21	26	
Moisture Content %	36.53	35.82	35.17	34.69	

PLASTIC LIMIT

Moisture Content %	21.14	21.18	21.22

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
35	21	14



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	TREATMENT PLANT IN SAHIWAL				
BOREHOLE	TP-4	**SAMPLE**	CS-1	**TYPE**	DISTURBED
LAB. REF.	56/2019	**DEPTH m**	0.70-1.40	**DATE**	21.11.2019

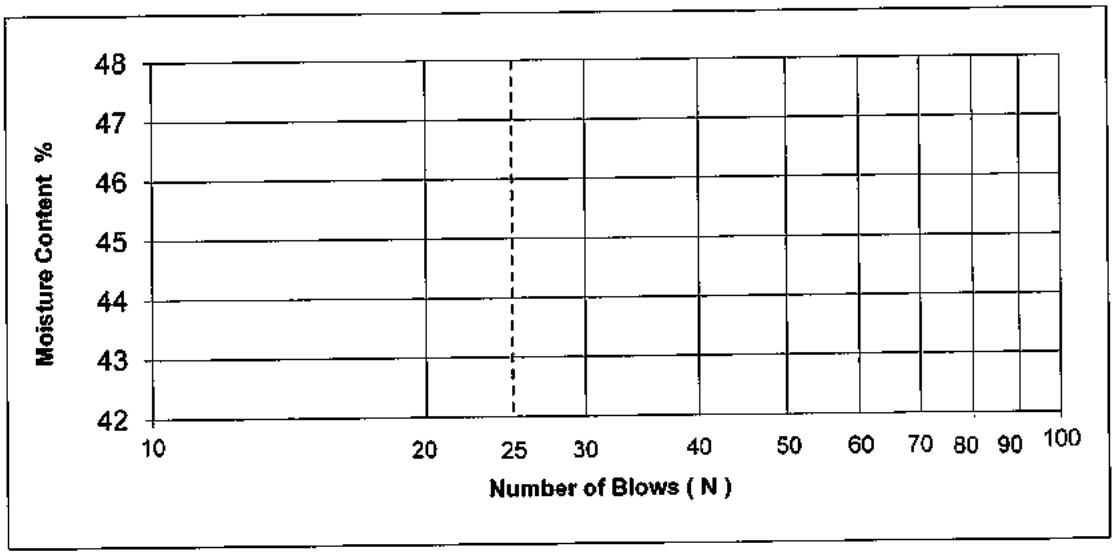
LIQUID LIMIT

Number of Blows N	11	**FOURTHER READING NOT POSSIBLE**
Moisture Content %	25.00	

PLASTIC LIMIT

Moisture Content %			

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
	NON-PLASTIC	



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	TP-6	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.50-1.35	DATE	21.11.2019

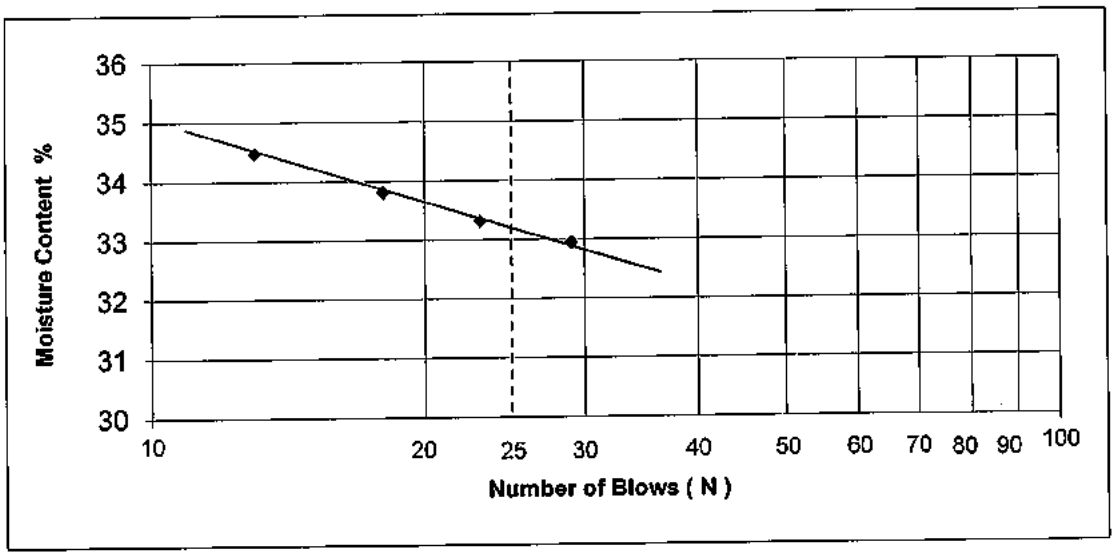
LIQUID LIMIT

Number of Blows N	13	18	23	29	
Moisture Content %	34.48	33.81	33.32	32.95	

PLASTIC LIMIT

Moisture Content %	20.21	20.27	20.32

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
33	20	13



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	TP-9	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.25-1.00	DATE	21.11.2019

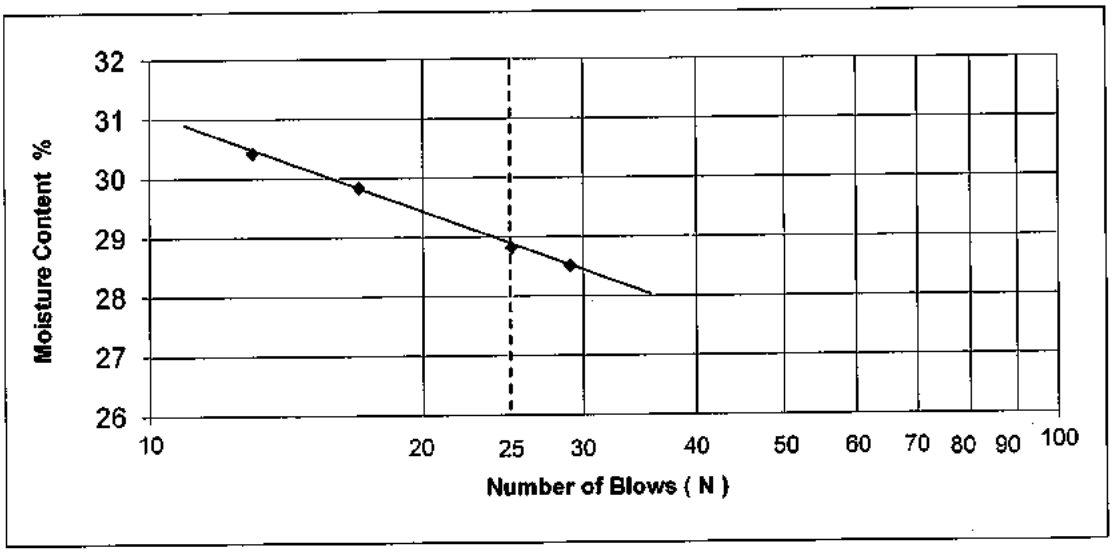
LIQUID LIMIT

Number of Blows N	13	17	25	29	
Moisture Content %	30.43	29.84	28.82	28.51	

PLASTIC LIMIT

Moisture Content %	20.31	20.36	20.41

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
29	20	9



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-1	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.20-0.90	DATE	21.11.2019

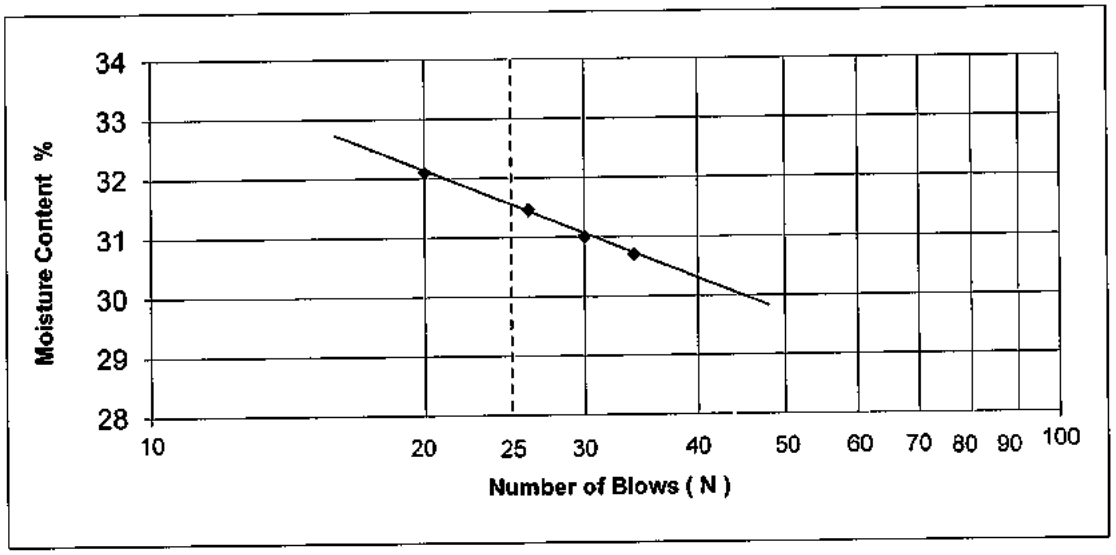
LIQUID LIMIT

Number of Blows N	20	26	30	34	
Moisture Content %	32.10	31.47	31.01	30.70	

PLASTIC LIMIT

Moisture Content %	20.18	20.22	20.26

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
31	20	11



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-2	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.50-1.00	DATE	21.11.2019

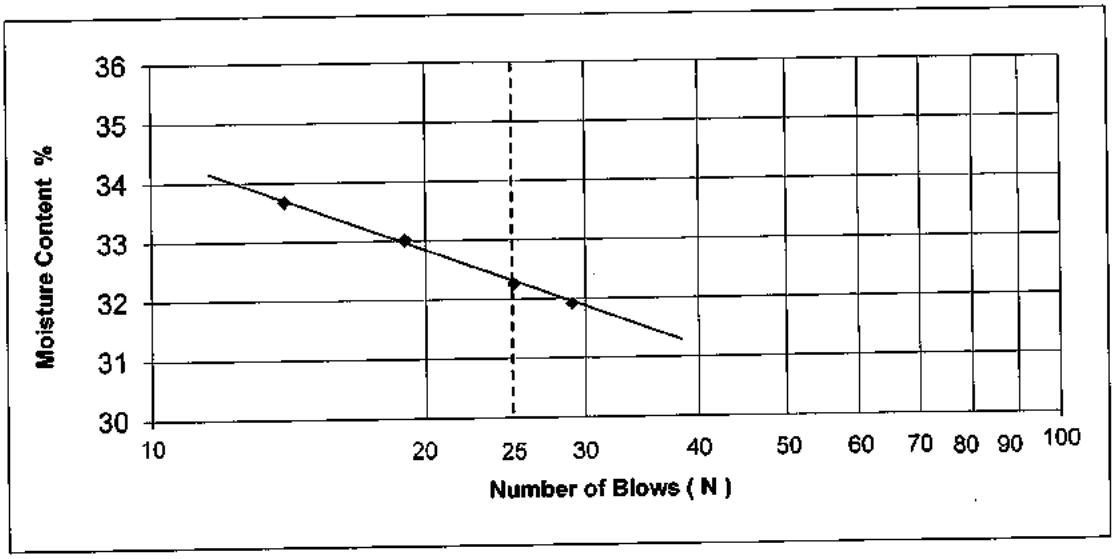
LIQUID LIMIT

Number of Blows N	14	19	25	29	
Moisture Content %	33.68	33.02	32.26	31.92	

PLASTIC LIMIT

Moisture Content %	19.62	19.67	19.72

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
33	20	13



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-3	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.20-0.70	DATE	21.11.2019

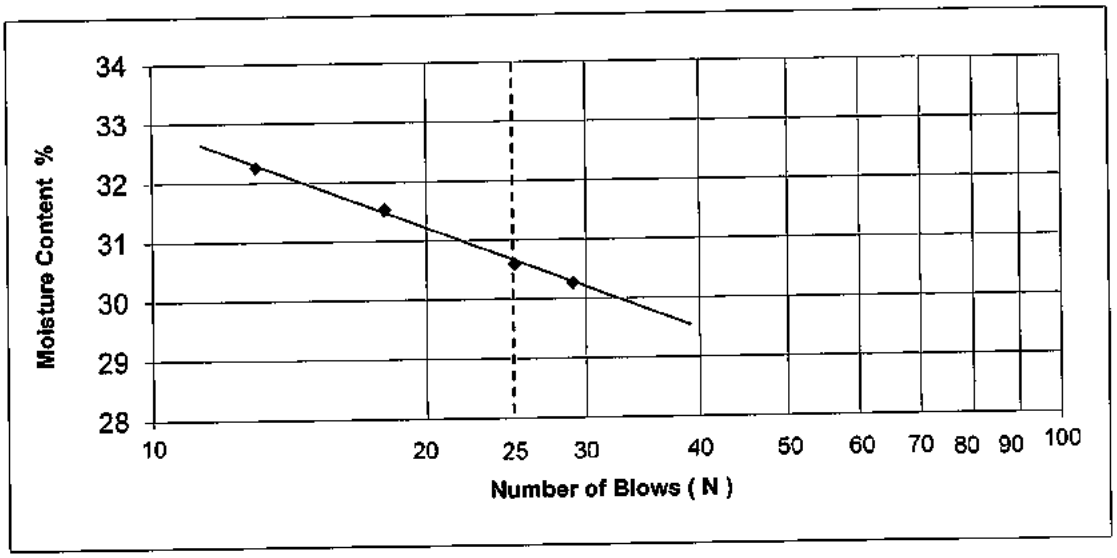
LIQUID LIMIT

Number of Blows N	13	18	25	29	
Moisture Content %	32.26	31.53	30.59	30.27	

PLASTIC LIMIT

Moisture Content %	19.92	19.97	20.01

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
31	20	11



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-4	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.15-0.50	DATE	21.11.2019

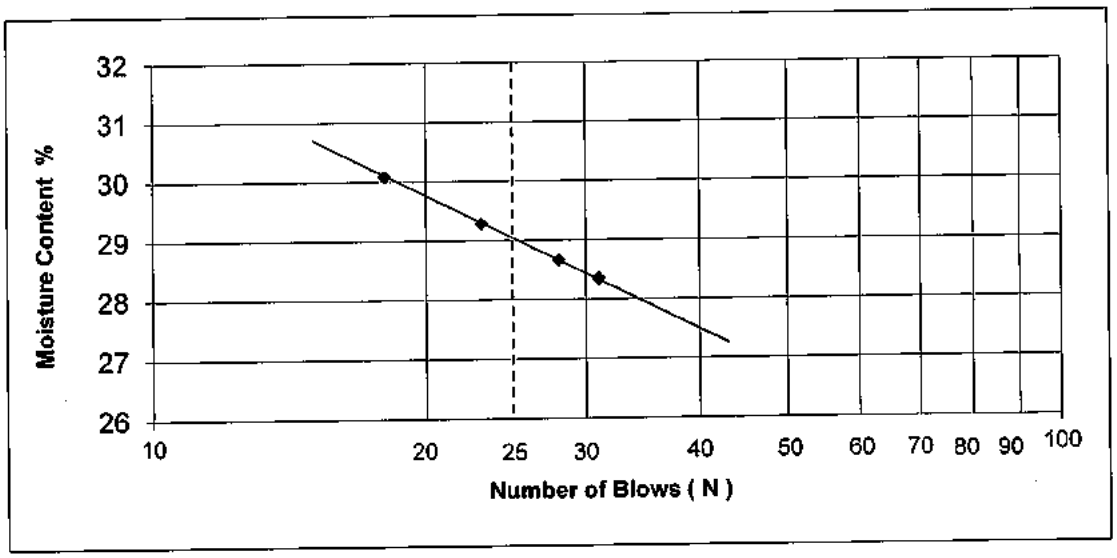
LIQUID LIMIT

Number of Blows N	18	23	28	31	
Moisture Content %	30.09	29.29	28.67	28.35	

PLASTIC LIMIT

Moisture Content %	20.11	20.17	20.22

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
29	20	9



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

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LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-5	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.25-1.00	DATE	21.11.2019

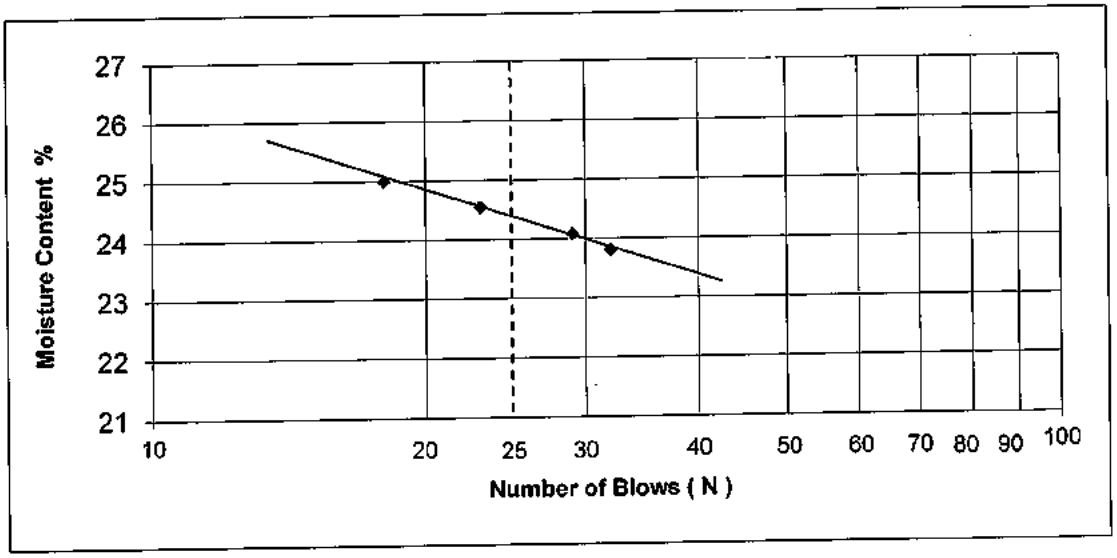
LIQUID LIMIT

Number of Blows N	18	23	29	32	
Moisture Content %	25.00	24.55	24.09	23.81	

PLASTIC LIMIT

Moisture Content %	16.52	16.57	16.61

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
24	17	7



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-5	SAMPLE	CS-2	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	1.00-1.70	DATE	21.11.2019

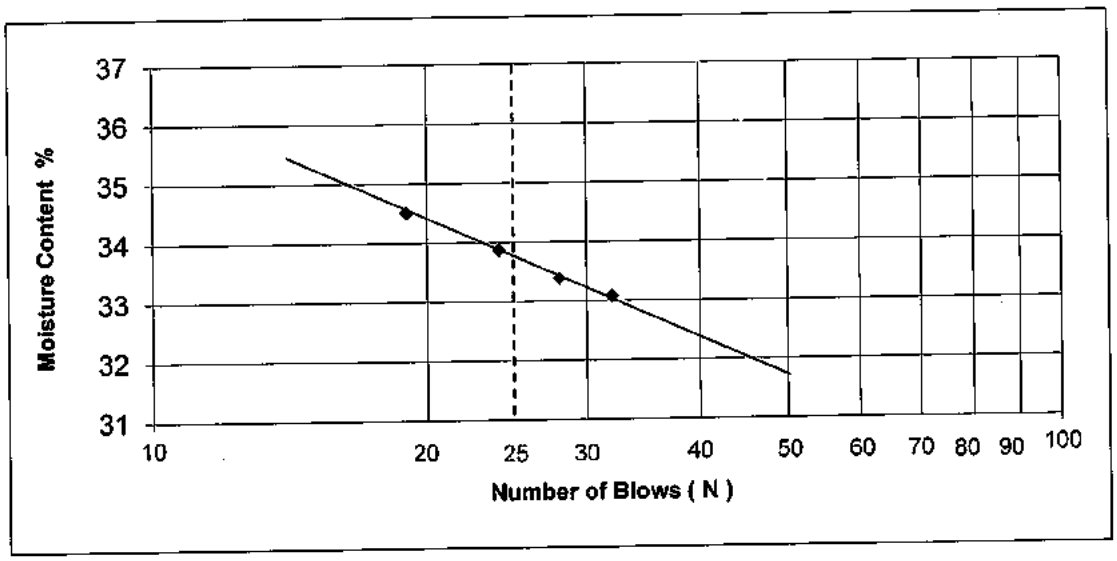
LIQUID LIMIT

Number of Blows N	19	24	28	32	
Moisture Content %	34.51	33.87	33.39	33.08	

PLASTIC LIMIT

Moisture Content %	21.32	21.36	21.41

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
34	21	13



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-6	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.20-0.60	DATE	21.11.2019

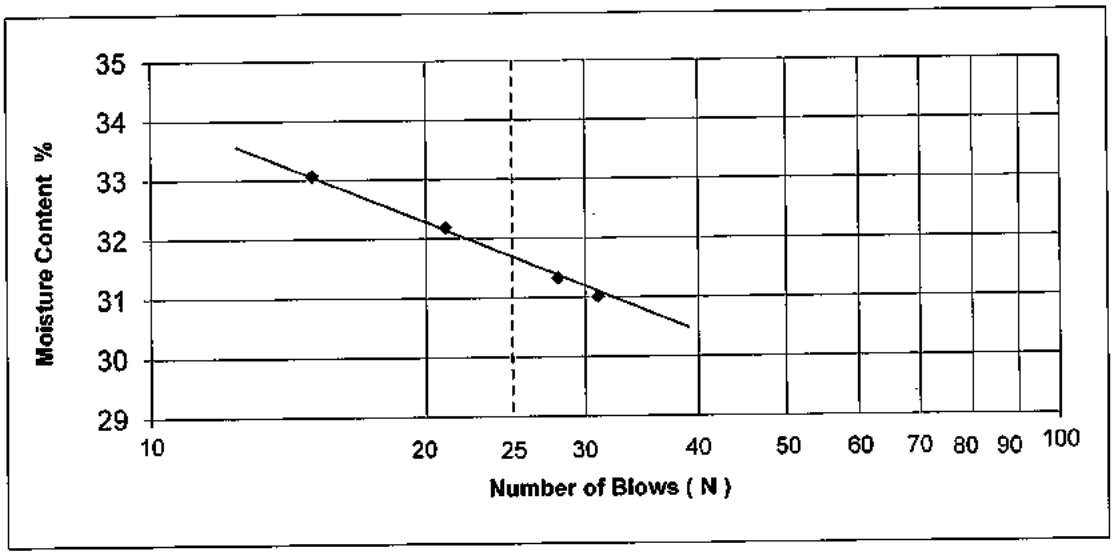
LIQUID LIMIT

Number of Blows N	15	21	28	31	
Moisture Content %	33.07	32.19	31.33	31.02	

PLASTIC LIMIT

Moisture Content %	20.21	20.26	20.31

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
32	20	12



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-7	**SAMPLE**	CS-1	**TYPE**	DISTURBED
LAB. REF.	56/2019	**DEPTH m**	0.20-0.80	**DATE**	21.11.2019

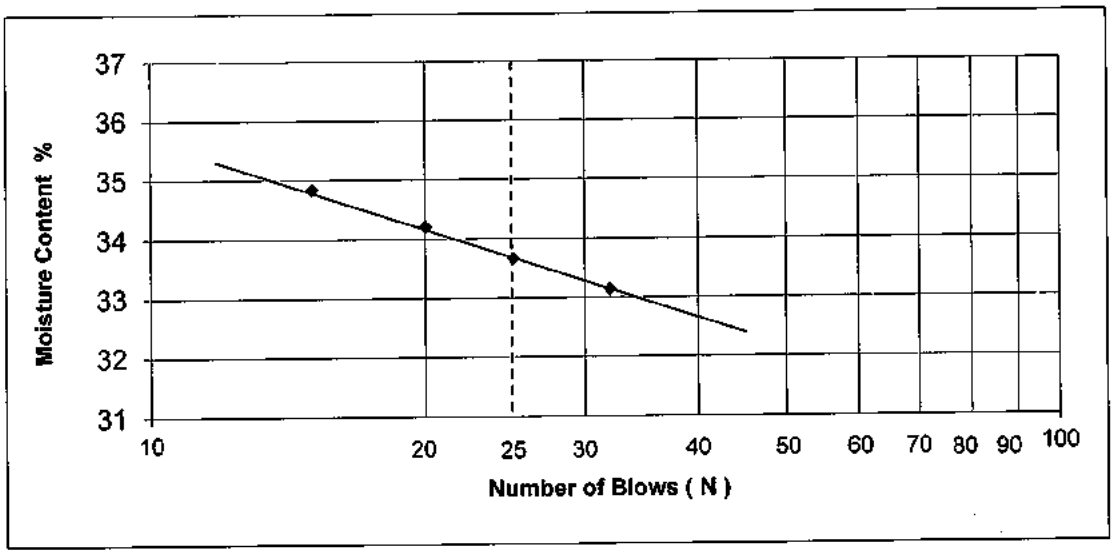
LIQUID LIMIT

Number of Blows N	15	20	25	32	
Moisture Content %	34.64	34.21	33.67	33.14	

PLASTIC LIMIT

Moisture Content %	20.81	20.86	20.92

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
34	21	13



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-8	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.15-1.00	DATE	21.11.2019

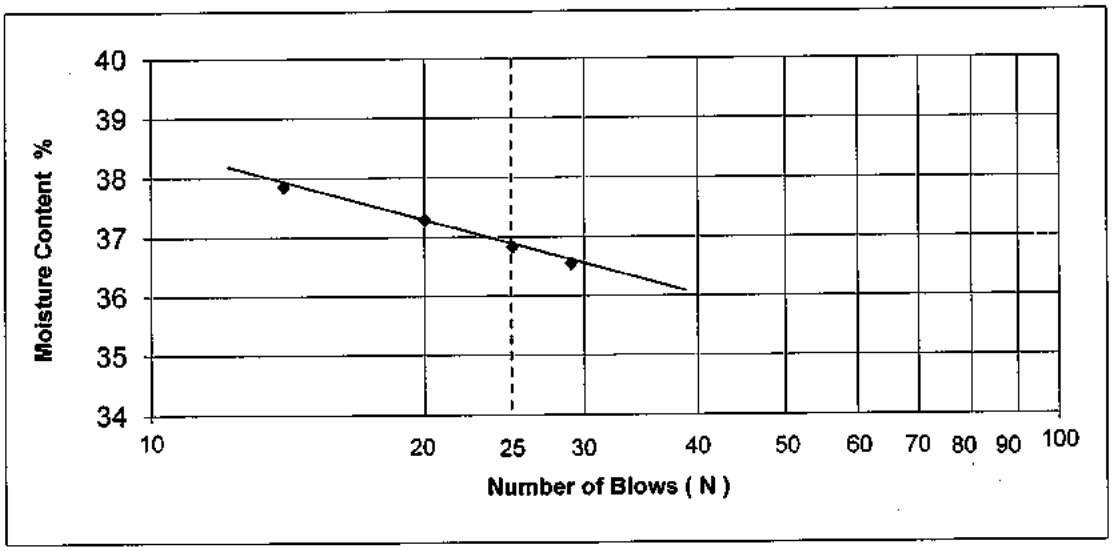
LIQUID LIMIT

Number of Blows N	14	20	25	29	
Moisture Content %	37.86	37.29	36.83	36.55	

PLASTIC LIMIT

Moisture Content %	21.18	21.23	21.27

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
37	21	16



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-9	**SAMPLE**	CS-1	**TYPE**	DISTURBED
LAB. REF.	56/2019	**DEPTH m**	0.20-1.50	**DATE**	21.11.2019

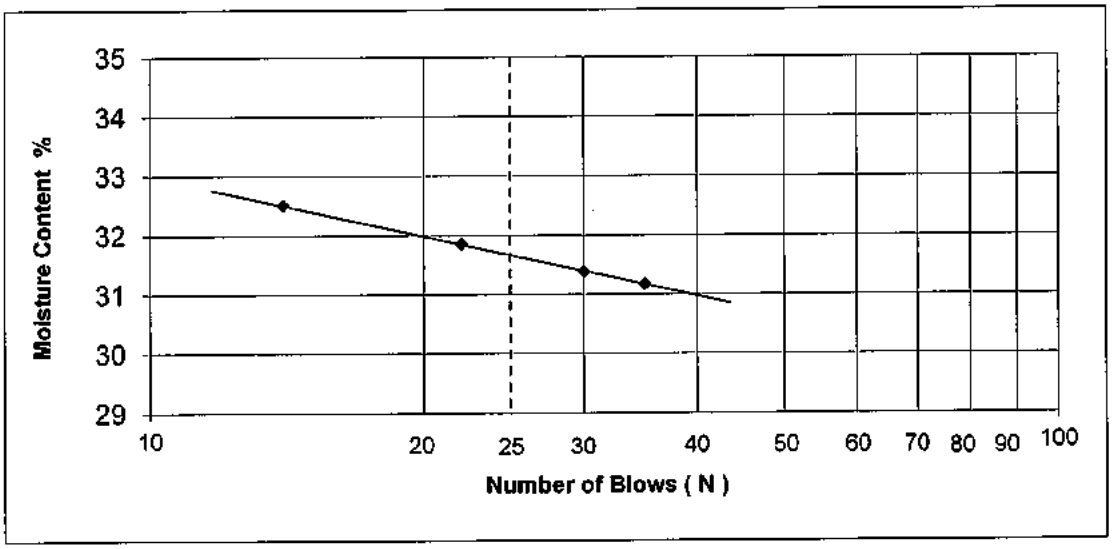
LIQUID LIMIT

Number of Blows N	14	22	30	35	
Moisture Content %	32.51	31.86	31.39	31.18	

PLASTIC LIMIT

Moisture Content %	19.61	19.64	19.69

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
32	20	12



TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

LIQUID & PLASTIC LIMIT

(ASTM D - 4318)

PROJECT	PUNJAB INTERMEDIATE INVESTMENT PROGRAM				
LOCATION	TREATMENT PLANT IN SAHIWAL				
CLIENT	SAFE SERVICES				
BOREHOLE	BA-10	SAMPLE	CS-1	TYPE	DISTURBED
LAB. REF.	56/2019	DEPTH m	0.70-1.00	DATE	21.11.2019

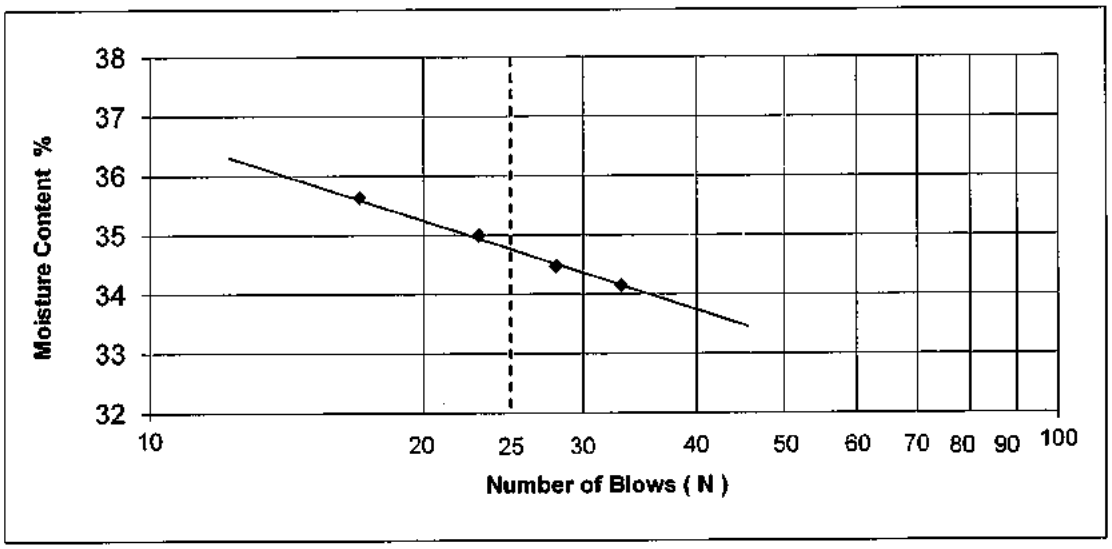
LIQUID LIMIT

Number of Blows N	17	23	28	33	
Moisture Content %	35.64	35.00	34.48	34.15	

PLASTIC LIMIT

Moisture Content %	20.82	20.86	20.91

LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
35	21	14



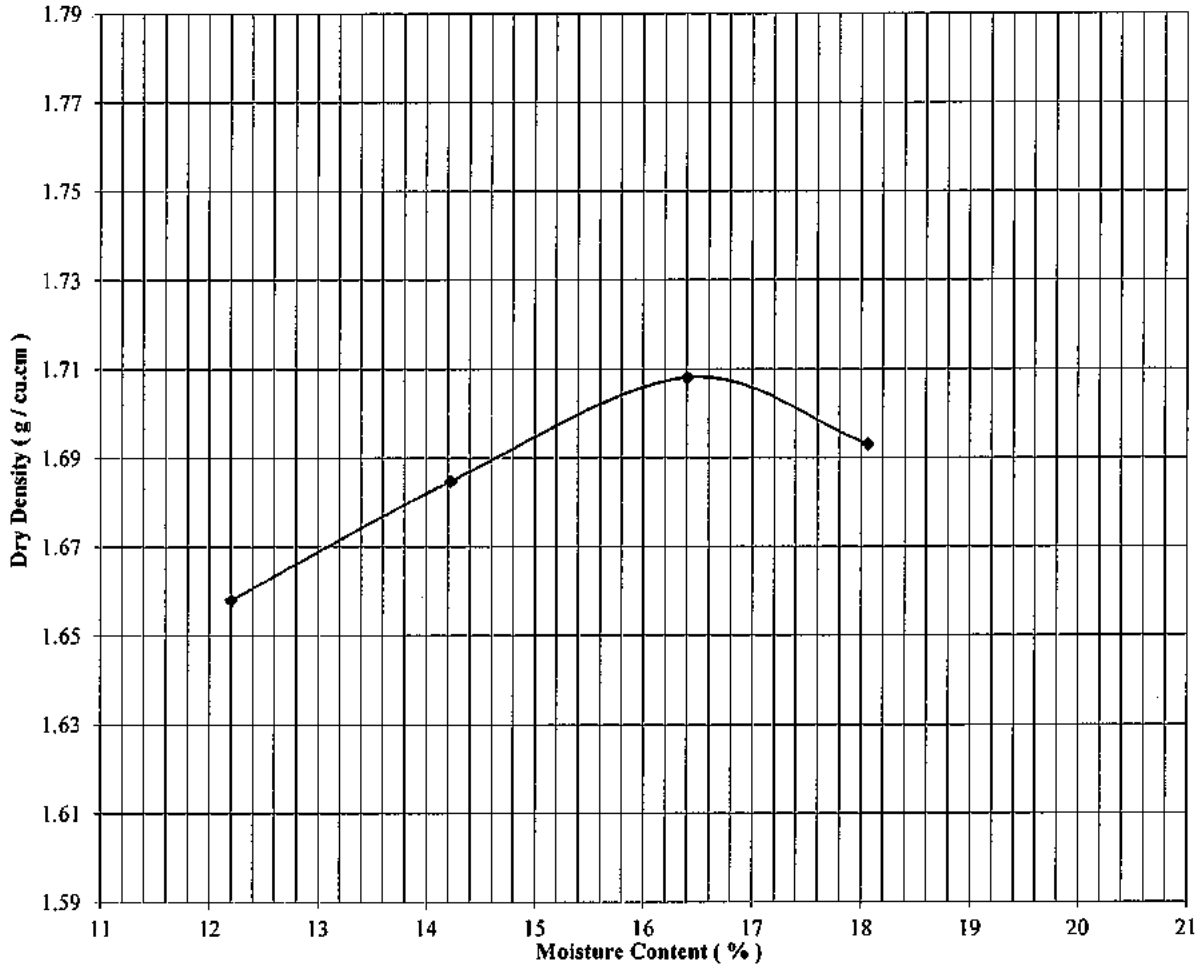
TESTED BY	CHECKED BY
MAHMOOD	ASLAM

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-2	**Sample No.**	CS-1	**Depth (m):**	1.05-1.50



Optimum Moisture Content (%)		16.40	**Maximum Dry Density**		1.708 g/cm^3
Project:	**PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM**				
Location :	**TREATMENT PLANTS IN SAHIWAL CITY**			**Client: SAFE SERVICES**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**06.12.2019**	**56/2019**

REMARKS:

SOILCON

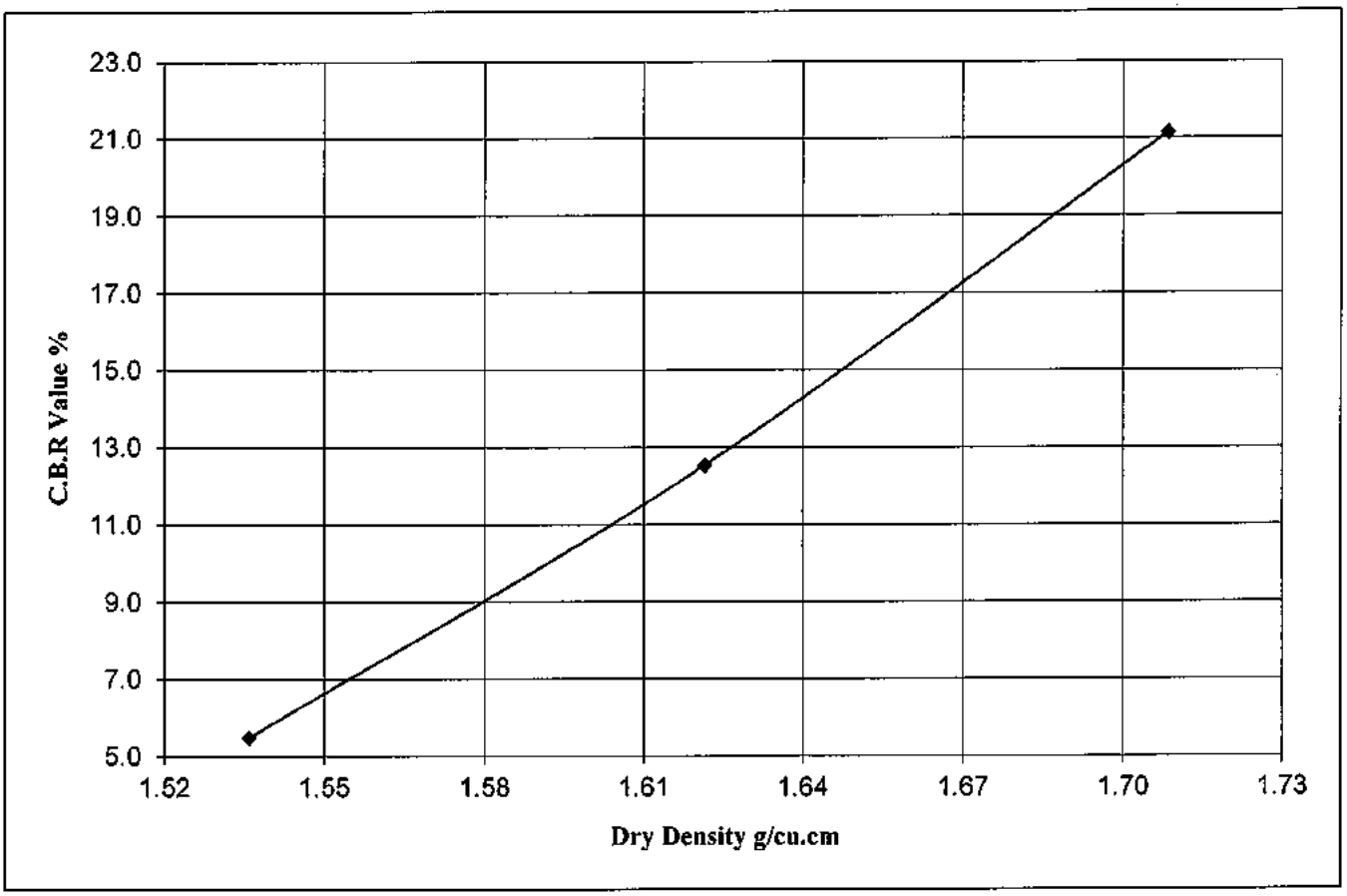
GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	21.2	12.5	5.5
Dry Density	g/ cm ^{3}	1.708	1.621	1.536
Moisture Content	%	16.11	16.11	16.11
Absorption	%	4.13	6.21	8.48
Swelling	%		-	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.708
O.M.C %	16.40



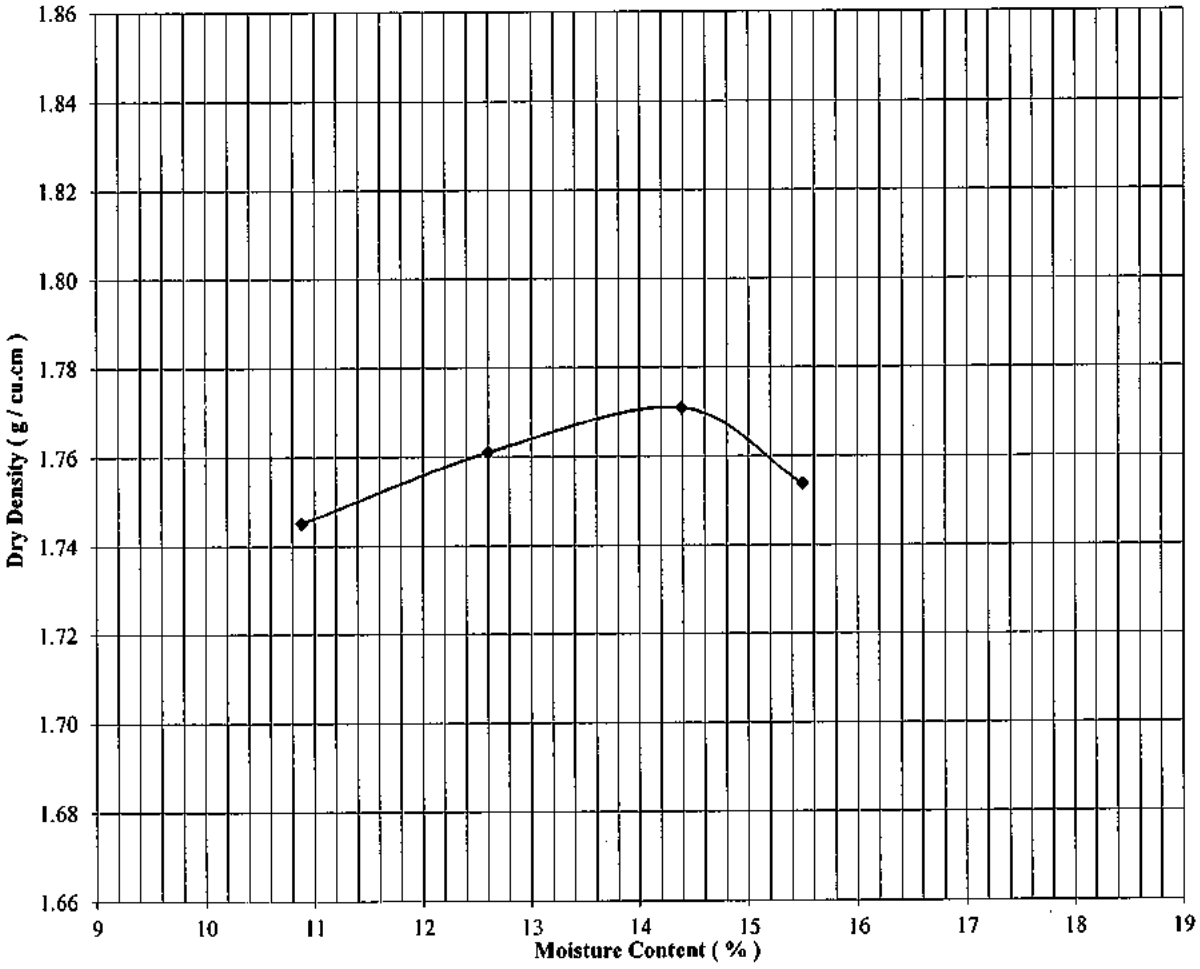
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-2	SAMPLE NO:	CS-1	DEPTH (m)	1.05-1.50
LAB REF. NO :	56/2019	DATE :	31.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-4	**Sample No.**	CS-1	**Depth (m):**	0.70-1.40



Optimum Moisture Content (%)		14.38	**Maximum Dry Density**		1.771 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENT PLANTS IN SAHIWAL CITY			**Client: SAFE SERVICES**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**06.12.2019**	**56/2019**

REMARKS:

SOILCON

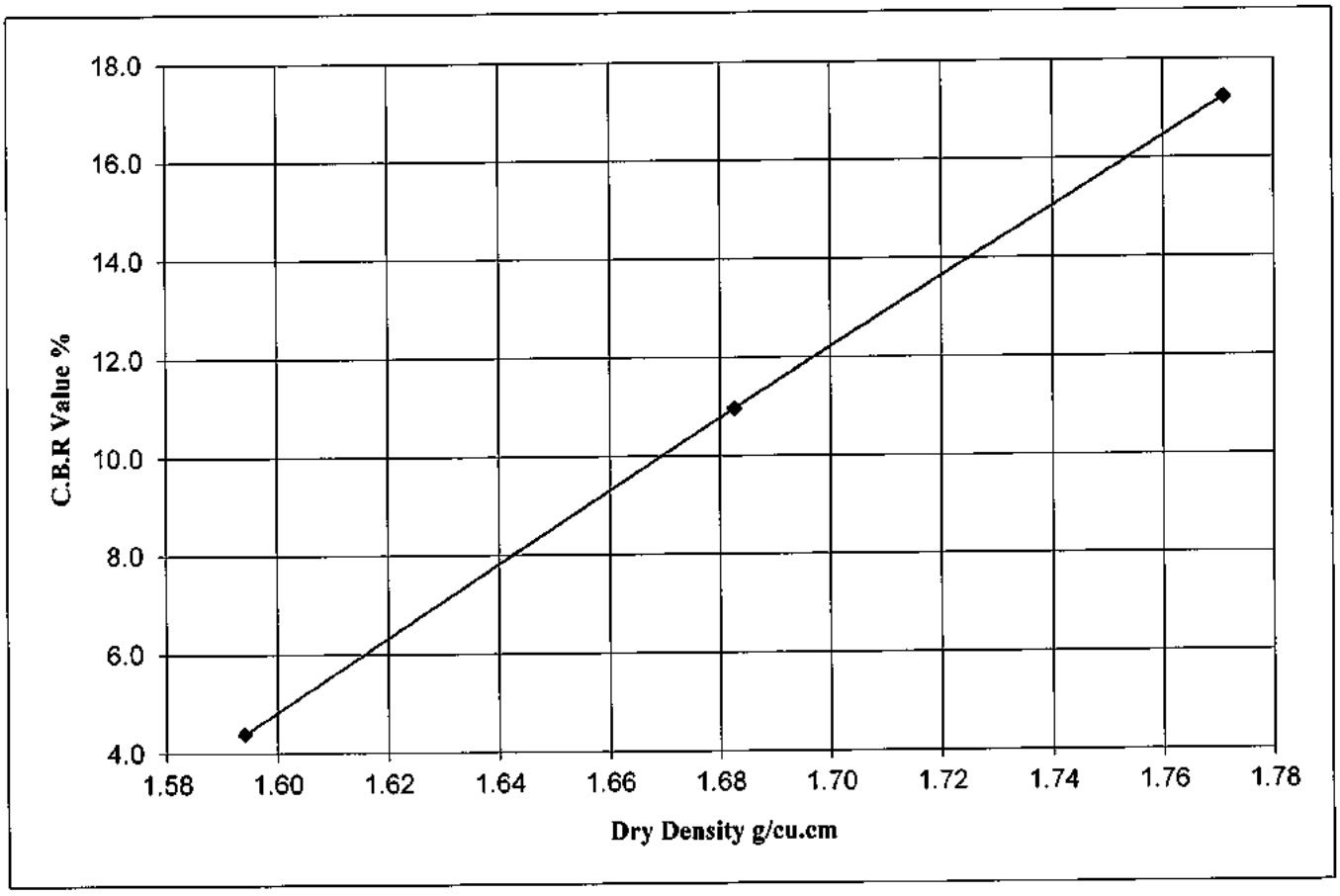
GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	17.2	11.0	4.4
Dry Density	g/ cm ^{3}	1.771	1.683	1.594
Moisture Content	%	14.09	14.09	14.09
Absorption	%	3.14	4.77	5.80
Swelling	%		-	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.771
O.M.C %	14.38



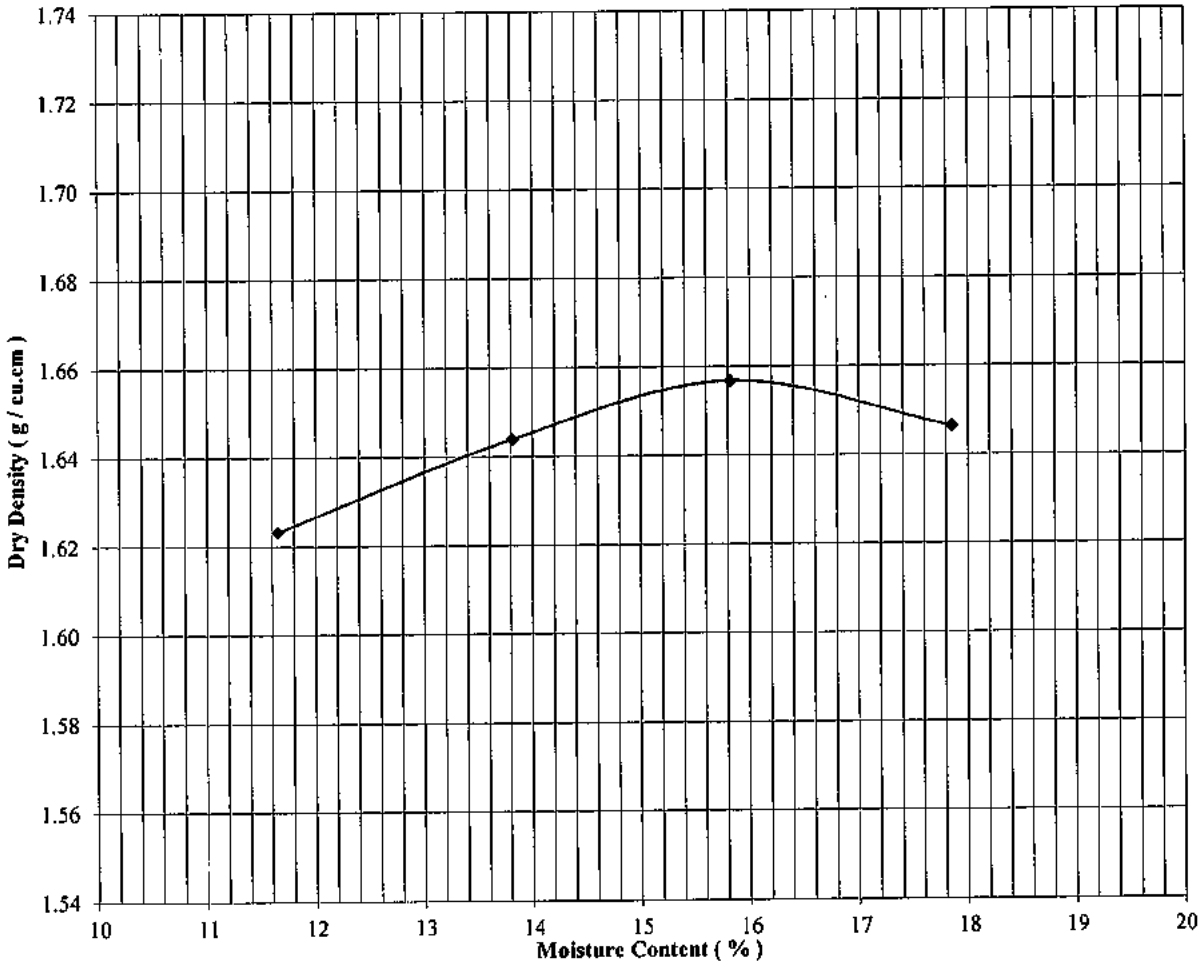
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-4	SAMPLE NO:	CS-1	DEPTH (m)	0.70-1.40
LAB REF. NO :	56/2019	DATE :	30.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-5	**Sample No.**	CS-1	**Depth (m):**	0.40-1.22



Optimum Moisture Content (%)		15.82	**Maximum Dry Density**		1.657 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENT PLANTS IN SAHIWAL CITY			**Client: SAFE SERVICES**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**06.12.2019**	**56/2019**

REMARKS:

SOILCON

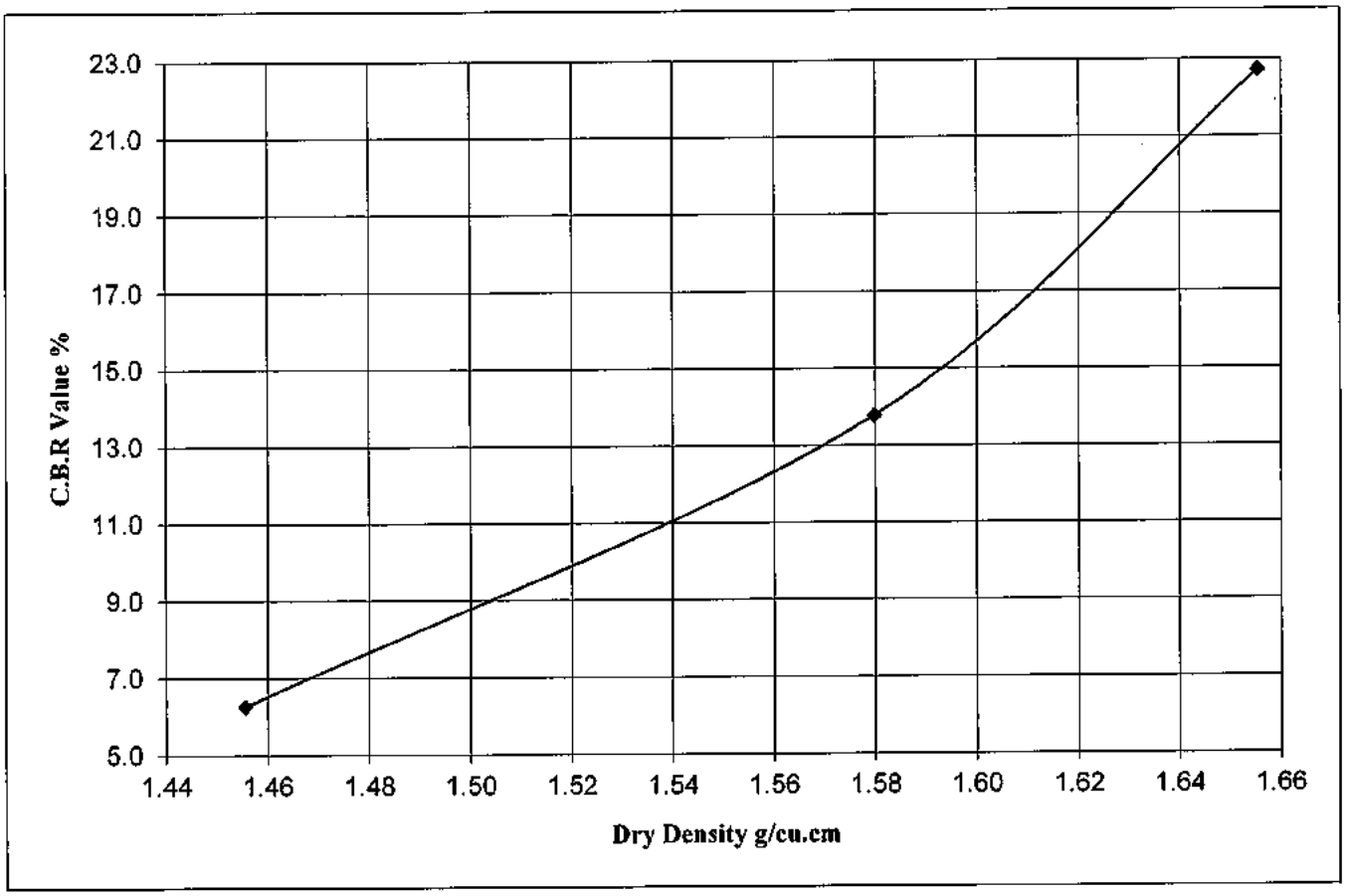
GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	22.7	13.8	6.3
Dry Density	g/ cm ^{3}	1.655	1.580	1.456
Moisture Content	%	15.43	15.43	15.43
Absorption	%	6.45	7.10	8.18
Swelling	%		-	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.657
O.M.C %	15.82



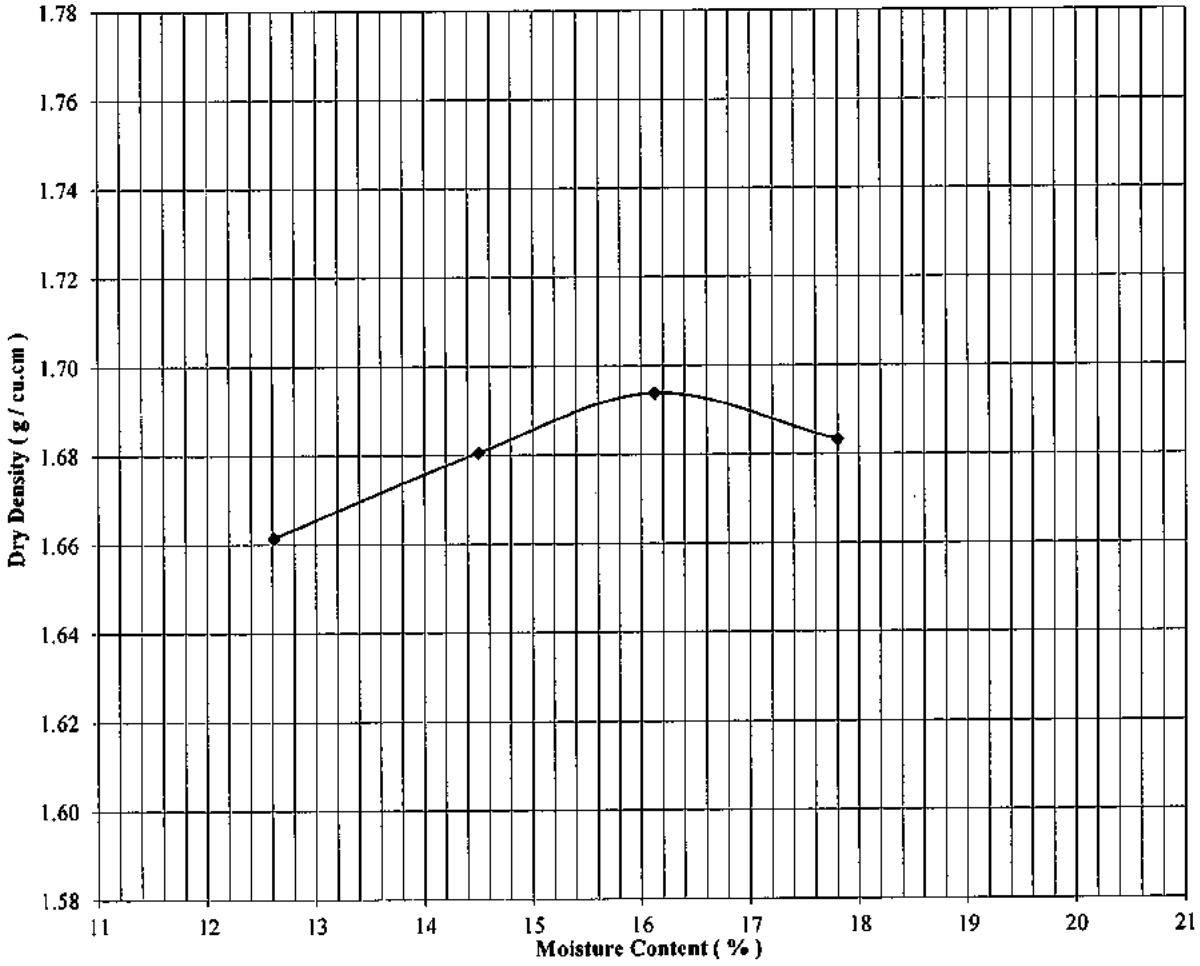
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-5	SAMPLE NO:	CS-1	DEPTH (m)	0.40-1.22
LAB REF. NO :	56/2019	DATE :	30.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-7	**Sample No.**	CS-1	**Depth (m):**	0.45-1.60



Optimum Moisture Content (%)		16.12	**Maximum Dry Density**		1.694 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENT PLANTS IN SAHIWAL CITY			**Client: SAFE SERVICES**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**06.12.2019**	**56/2019**

REMARKS:

SOILCON

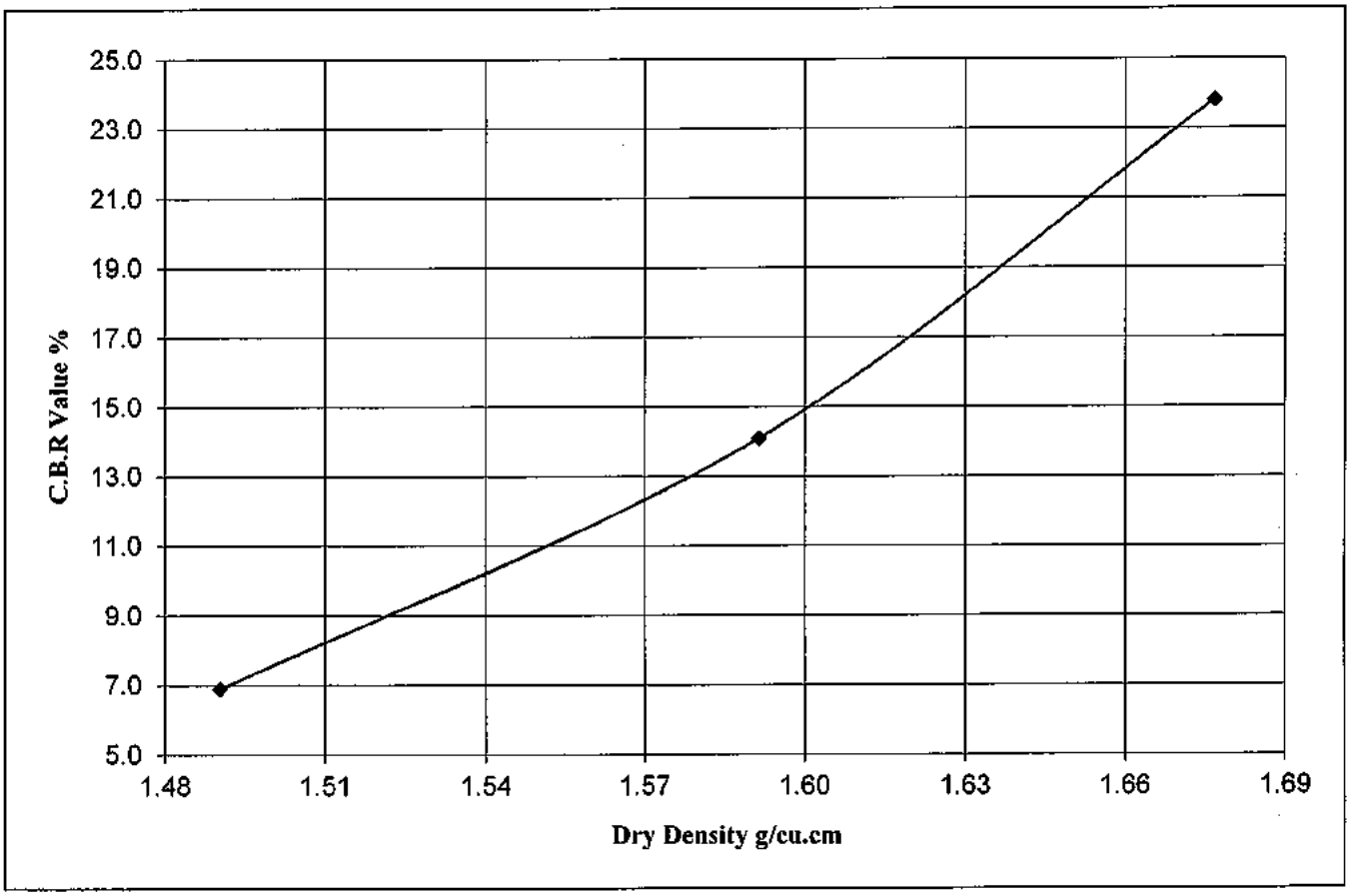
GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	23.8	14.1	6.9
Dry Density	g/ cm ^{3}	1.677	1.591	1.490
Moisture Content	%	15.88	15.88	15.88
Absorption	%	3.64	5.28	7.77
Swelling	%		-	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.694
O.M.C %	16.12



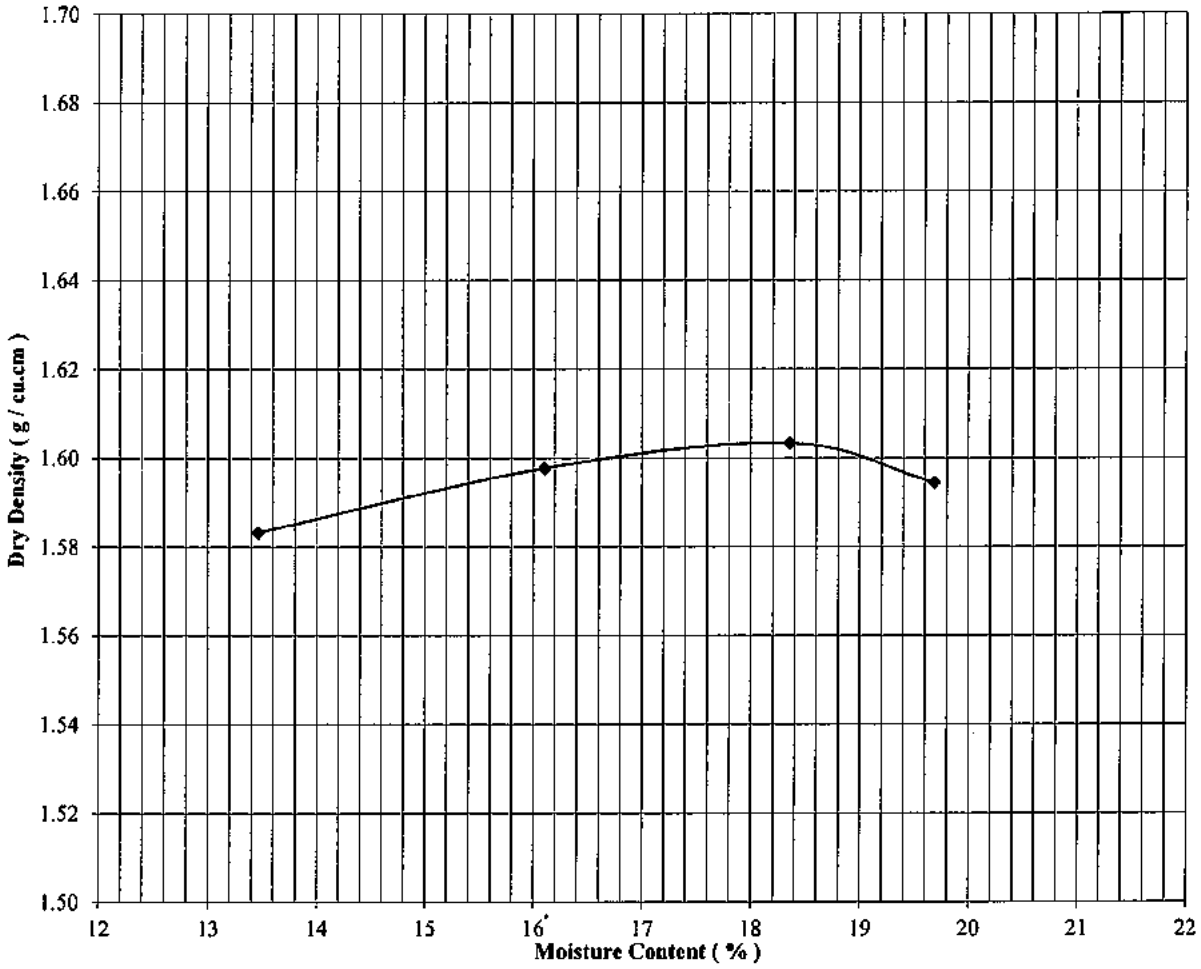
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-7	SAMPLE NO:	CS-1	DEPTH (m)	0.45-1.60
LAB REF. NO :	56/2019	DATE :	31.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-8	**Sample No.**	CS-1	**Depth (m):**	0.35-1.50



Optimum Moisture Content (%)		18.35	**Maximum Dry Density**		1.603 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENT PLANTS IN SAHIWAL CITY			**Client: SAFE SERVICES**	
Tested By	**Checked By**			**Dated**	**LAB. REF**
Mahmood	**Ikram Ullah**			**06.12.2019**	**56/2019**

REMARKS:

SOILCON

GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	23.2	13.8	6.4
Dry Density	g/ cm ^{3}	1.602	1.505	1.410
Moisture Content	%	17.88	17.88	17.88
Absorption	%	6.20	7.56	8.83
Swelling	%		-	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.603
O.M.C %	18.35

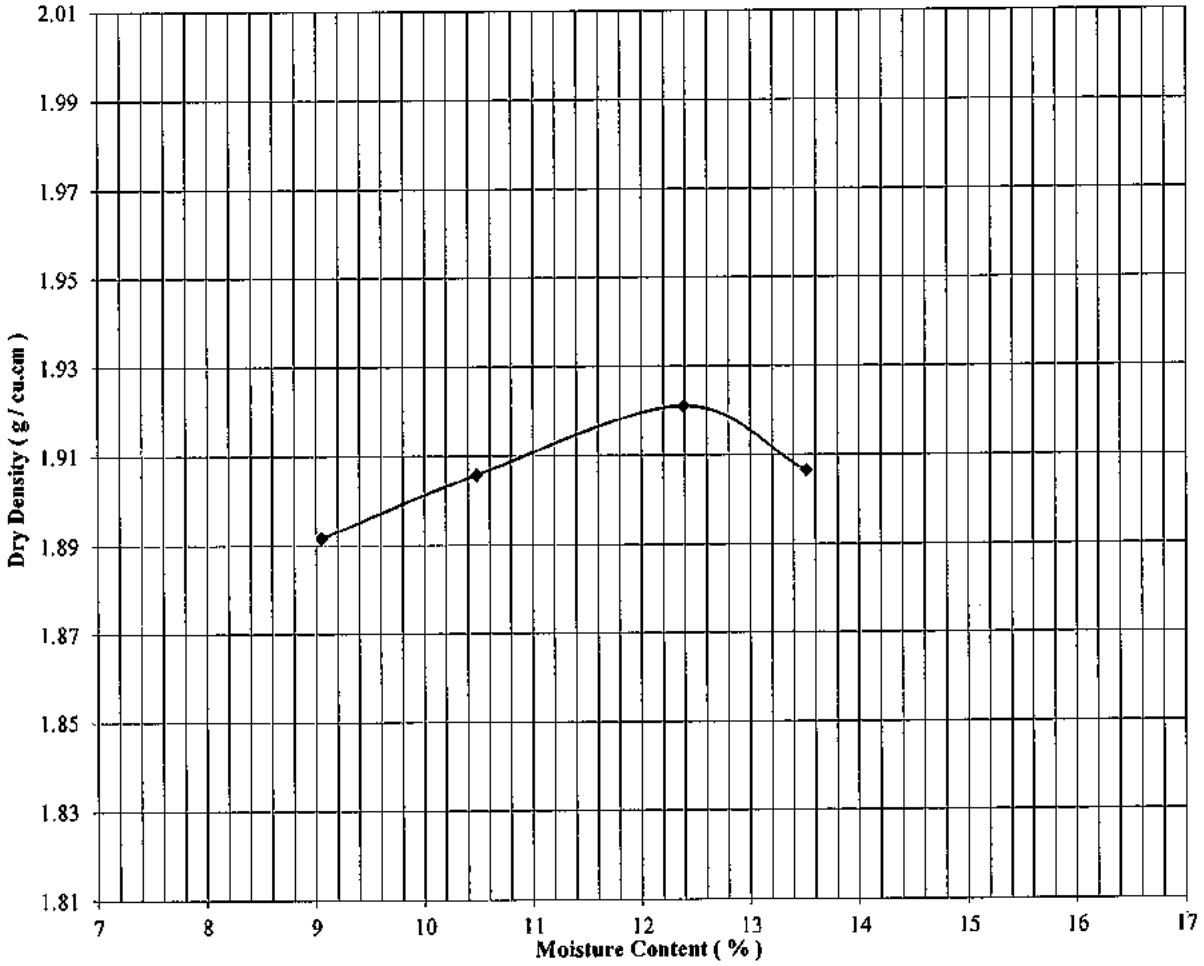
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-8	SAMPLE NO:	CS-1	DEPTH (m)	0.35-1.50
LAB REF. NO :	56/2019	DATE :	31.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Modified AASHTO T-180 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	18 inch
No of Blows :	25	**No of Layers**	5	**Wt of Hammer :**	10 lbs
Test Pit No:	TP-9	**Sample No.**	CS-1	**Depth (m):**	0.70-1.50



Optimum Moisture Content (%)		12.38	**Maximum Dry Density**		1.921 g/cm^3
Project:	**PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM**				
Location :	**TREATMENT PLANTS IN SAHIWAL CITY**			**Client: SAFE SERVICES**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**06.12.2019**	**56/2019**

REMARKS:

SOILCON

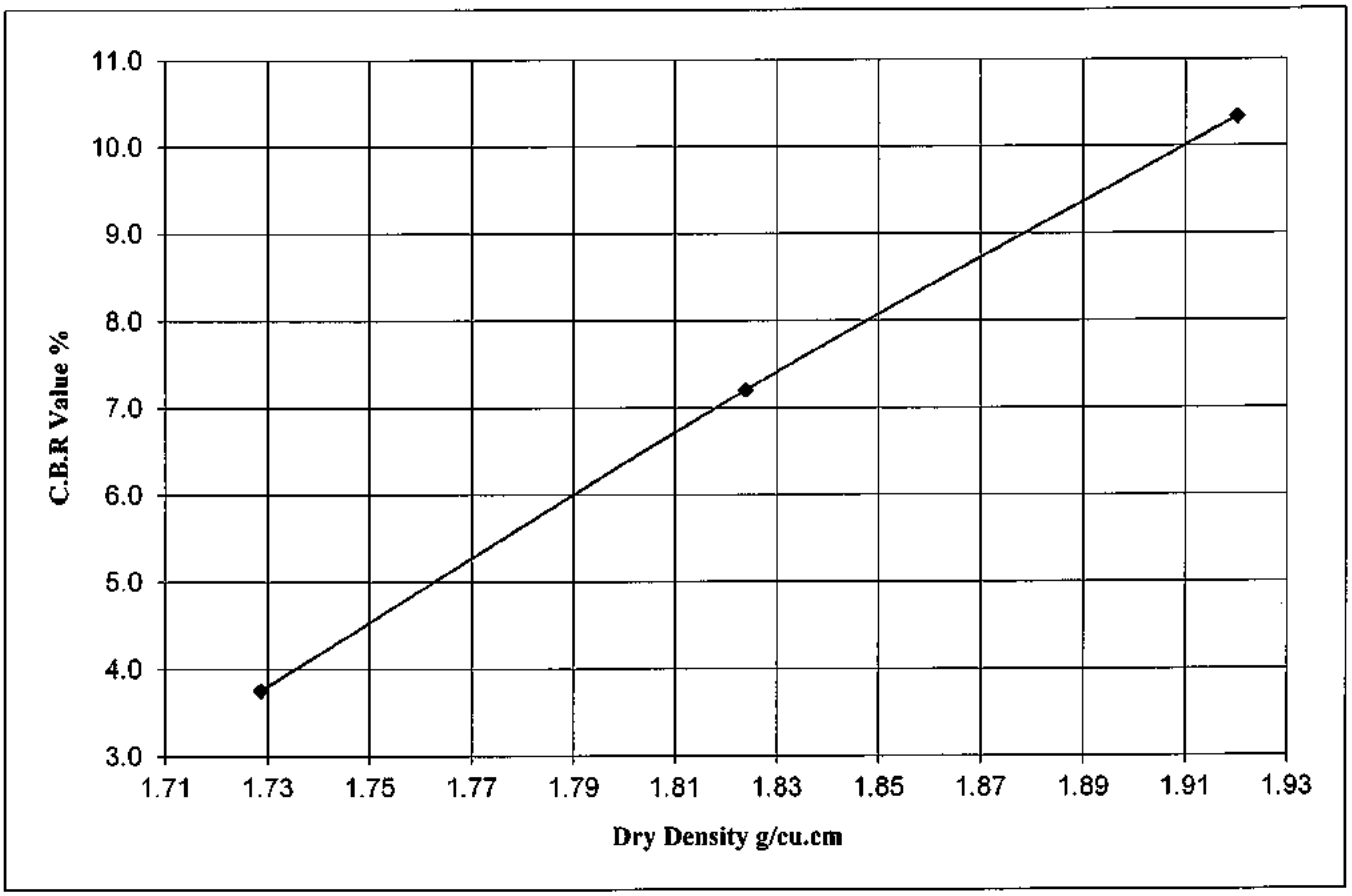
GEOTECHNICAL TESTING LABORATORIES, 18-Km,
MULTAN ROAD, LAHORE

C.B.R. TEST

(AASHTO T-193)

No.of Blows per Layer		65	30	10
CBR Value at 0.1 in	%			
CBR Value at 0.2 in	%	10.3	7.2	3.8
Dry Density	g/ cm ^{3}	1.920	1.824	1.729
Moisture Content	%	11.61	11.61	11.61
Absorption	%	1.89	2.57	3.68
Swelling	%		1.63	

COMPACTION	MODIFIED
M.D.D. g/cu.cm	1.921
O.M.C %	12.38



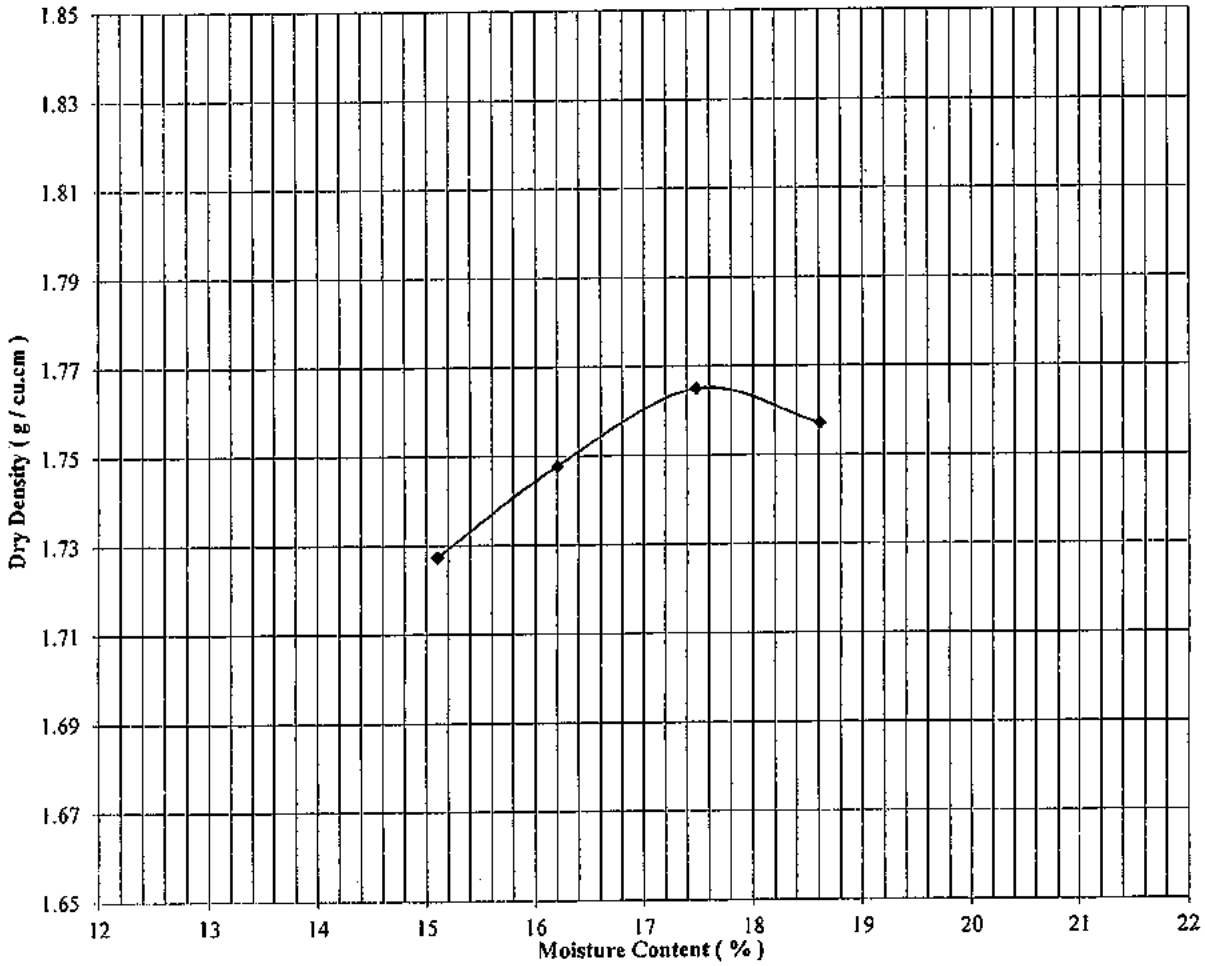
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
LOCATION:	TREATMENT PLANTS IN SAHIWAL CITY			CLIENT	SAFE SERVICES
TP/ BH NO:	TP-9	SAMPLE NO:	CS-1	DEPTH (m)	0.70-1.50
LAB REF. NO :	56/2019	DATE :	30.12.2019		
TESTED BY : MAHMOOD			CHECKED BY : IKRAM ULLAH		

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	12 inch
No of Blows :	25	**No of Layers**	3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	TP-1	**Sample No.**	CS-1	**Depth (m):**	1.15-1.50



Optimum Moisture Content (%)		17.48	**Maximum Dry Density**		1.765 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENTS PLANT IN SAHIWAL CITY			**Client: SAFE SERVICE**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**17.12.2019**	**56/2019**

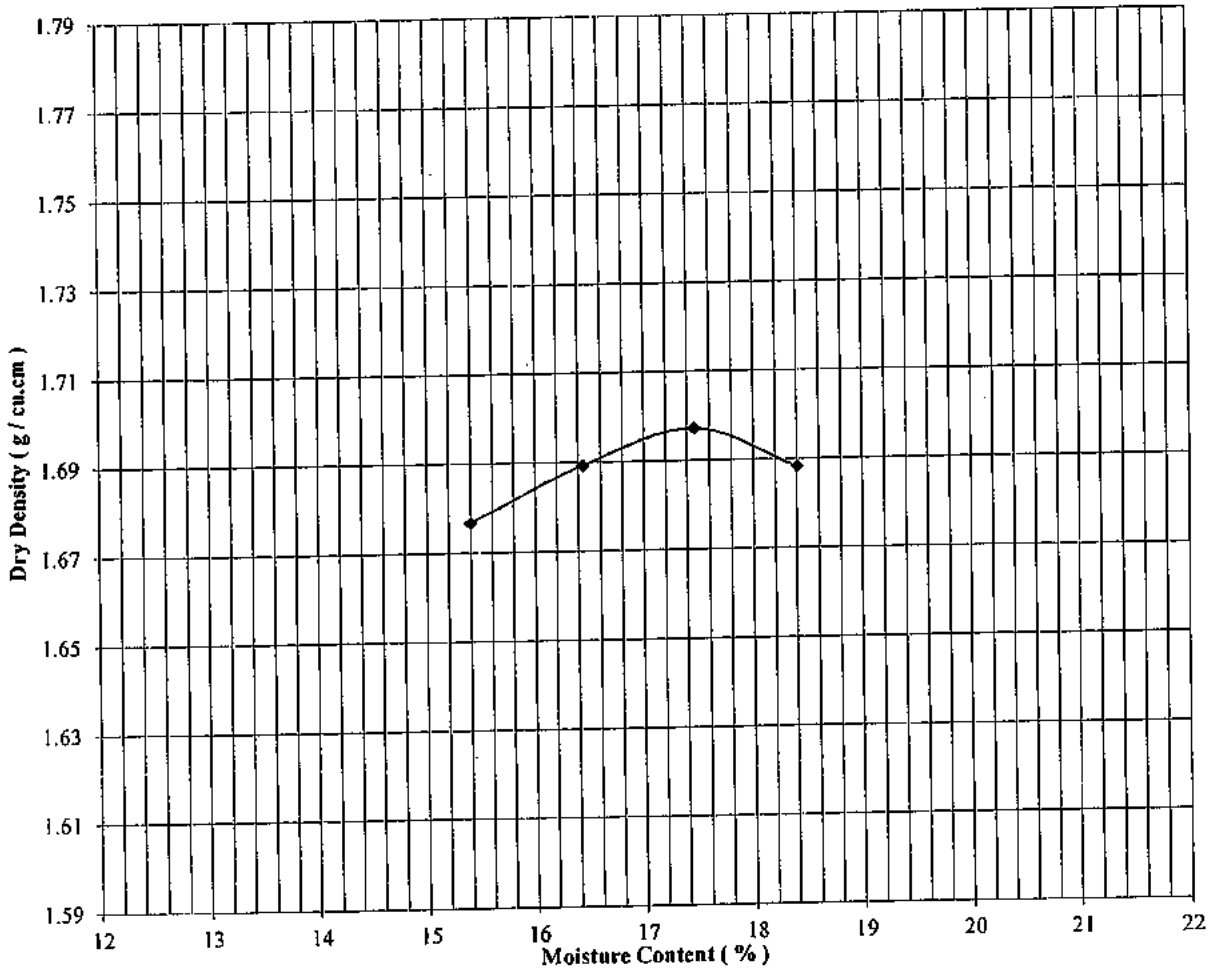
REMARKS: _____

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	12 inch
No of Blows :	25	**No of Layers**	3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	TP-6	**Sample No.**	CS-1	**Depth (m):**	0.50-1.35



Optimum Moisture Content (%)		17.46	**Maximum Dry Density**		1.697 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENTS PLANT IN SAHIWAL CITY			**Client:** SAFE SERVICE	
Tested By	**Checked By**			**Dated**	**LAB. REF**
Mahmood	**Ikram Ullah**			**17.12.2019**	**56/2019**

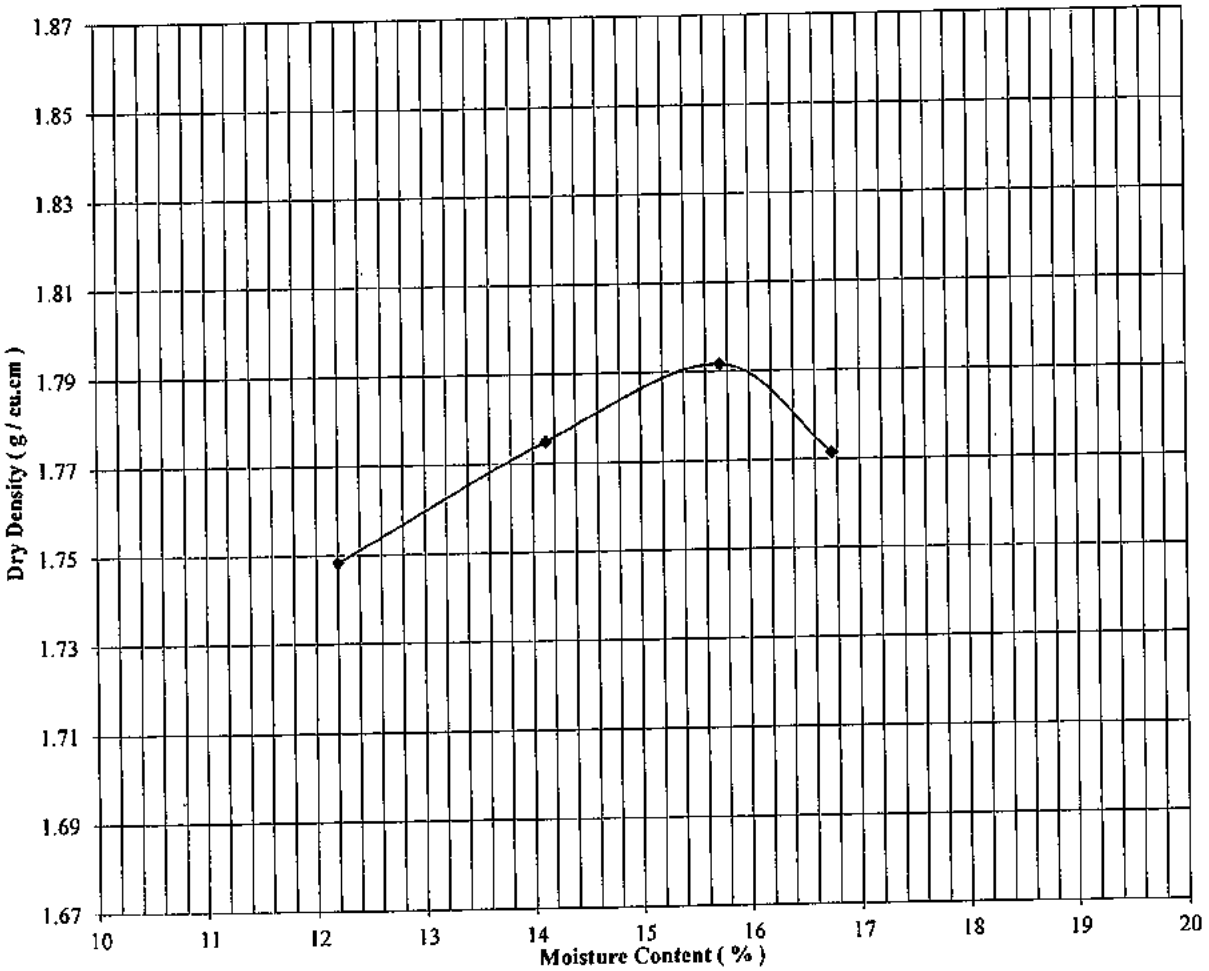
REMARKS: _____

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	12 inch
No of Blows :	25	**No of Layers**	3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	BA-1	**Sample No.**	CS-1	**Depth (m):**	0.20-0.90



Optimum Moisture Content (%)		15.73	**Maximum Dry Density**		1.792 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENTS PLANT IN SAHIWAL CITY			Client: SAFE SERVICE	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**20.12.2019**	**56/2019**

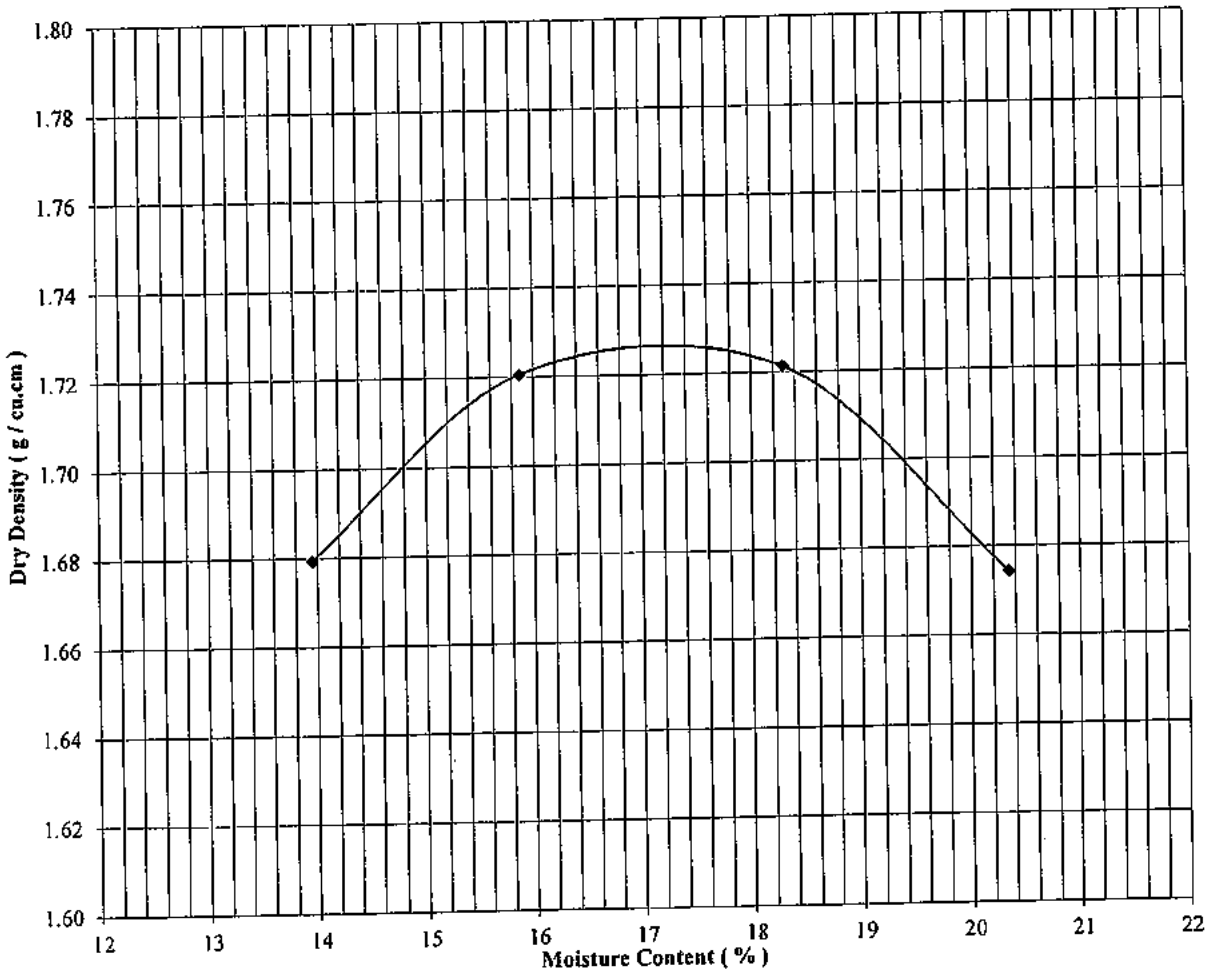
REMARKS: _____

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)	**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch	**Drop :**	12 inch
No of Blows :	25 **No of Layers** 3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	BA-2 **Sample No.** CS-1	**Depth (m):**	0.50-1.50



Optimum Moisture Content (%)	17.20	**Maximum Dry Density**	1.728 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
Location :	TREATMENTS PLANT IN SAHIWAL CITY	**Client: SAFE SERVICE**	
Tested By Mahmood	**Checked By** Ikram Ullah	**Dated** 17.12.2019	**LAB. REF** 56/2019

REMARKS: _____

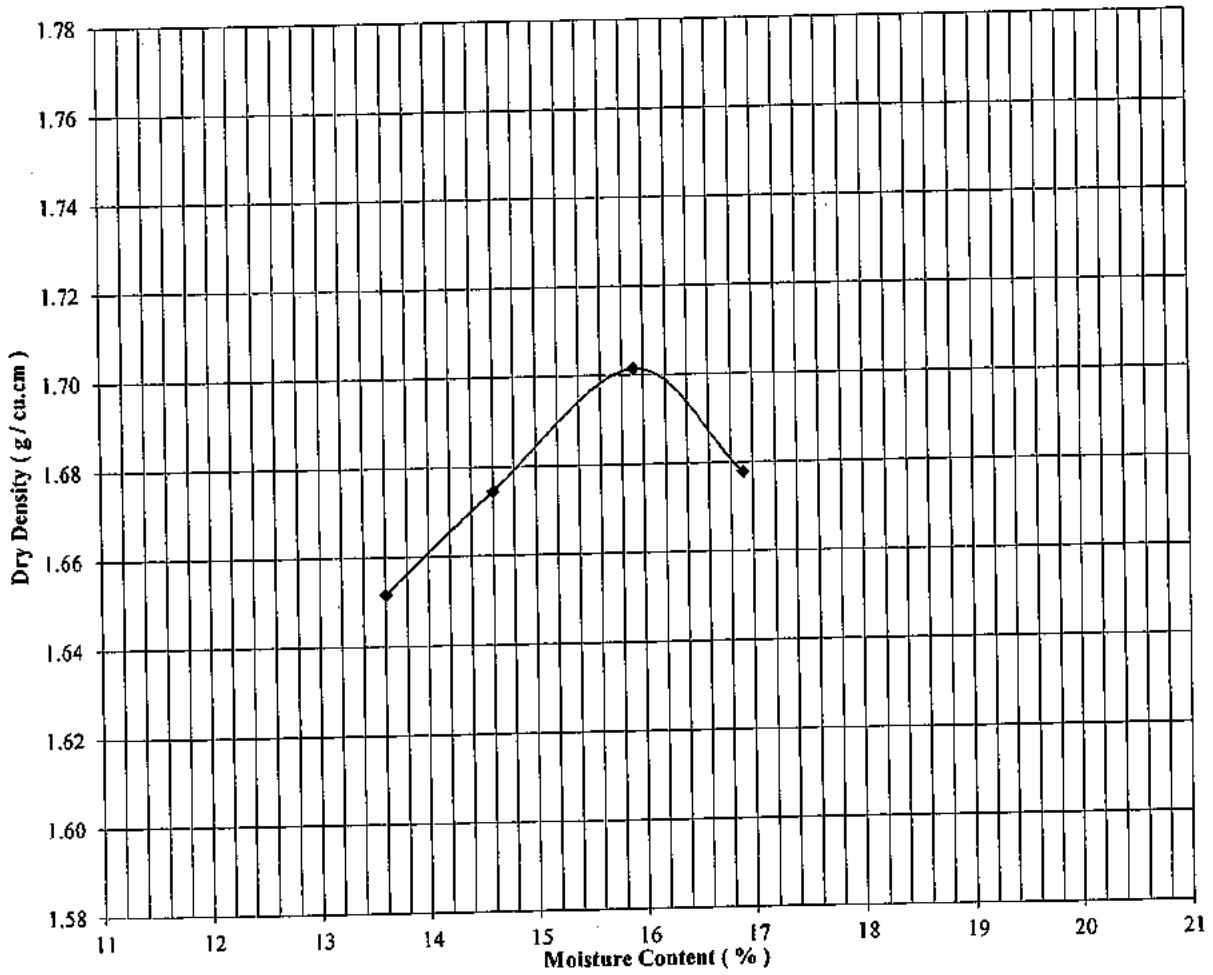
SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method : Standard Proctor AASHTO T-99 (Method A)
Dia of Mould : 4.0 inch
No of Blows : 25 **No of Layers** 3
Test Pit No: BA-6 **Sample No.** CS-1

Volume of Mould : 938 cm^3
Drop : 12 inch
Wt of Hammer : 5.5 lbs
Depth (m): 0.20-0.60



Optimum Moisture Content (%)		**15.91**	**Maximum Dry Density**		**1.702 g/cm^3**
Project:	**PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM**				
Location :	**TREATMENTS PLANT IN SAHIWAL CITY**			**Client: SAFE SERVICE**	
Tested By		**Checked By**		**Dated**	**LAB. REF**
Mahmood		**Ikram Ullah**		**17.12.2019**	**56/2019**

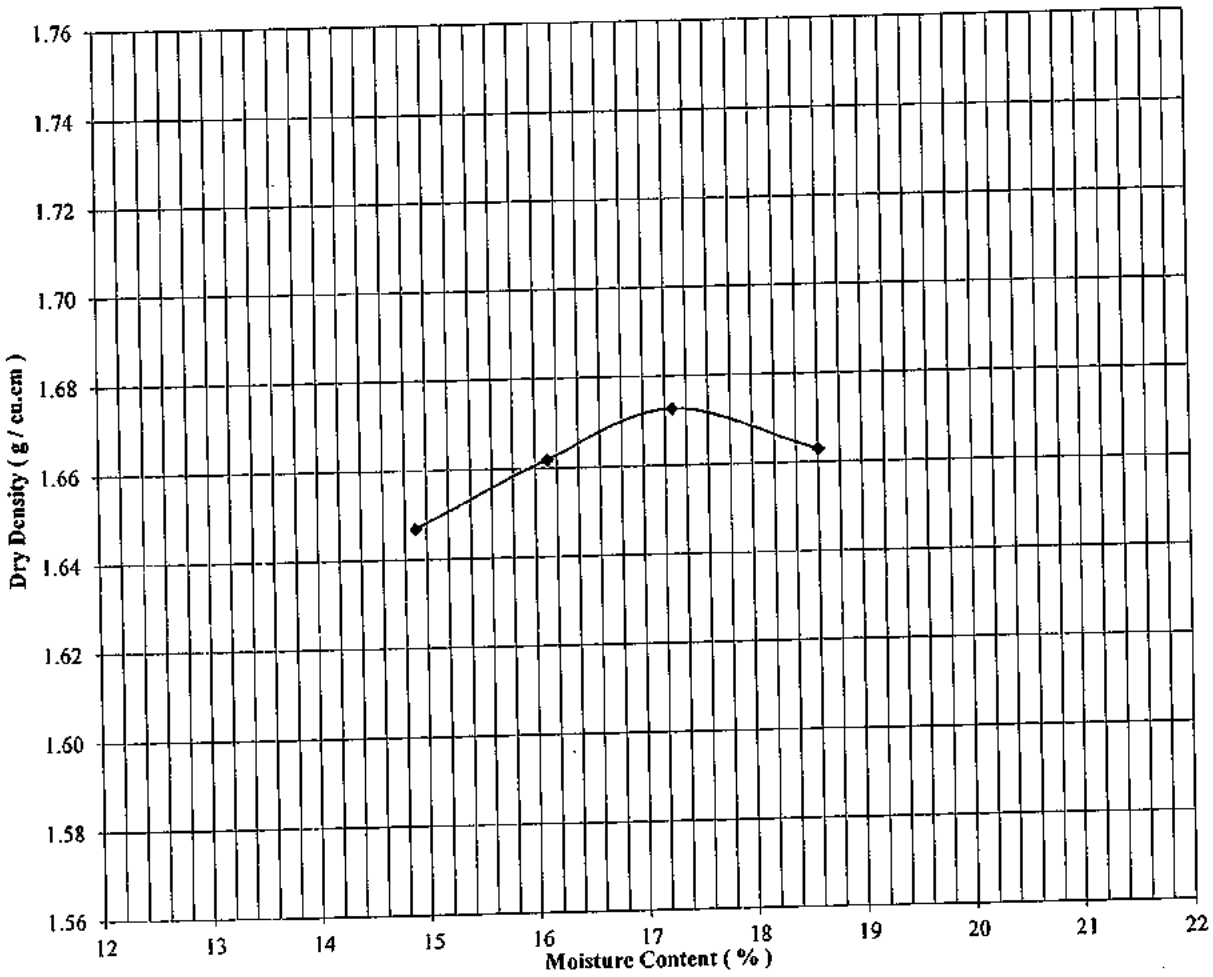
REMARKS:

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)			**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch			**Drop :**	12 inch
No of Blows :	25	**No of Layers**	3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	BA-8	**Sample No.**	CS-1	**Depth (m):**	0.15-1.00



Optimum Moisture Content (%)	17.27		**Maximum Dry Density**	1.673 g/cm^3	
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM				
Location :	TREATMENTS PLANT IN SAHIWAL CITY			**Client:** SAFE SERVICE	
Tested By	**Checked By**			**Dated**	**LAB. REF**
Mahmood	**Ikram Ullah**			**17.12.2019**	**56/2019**

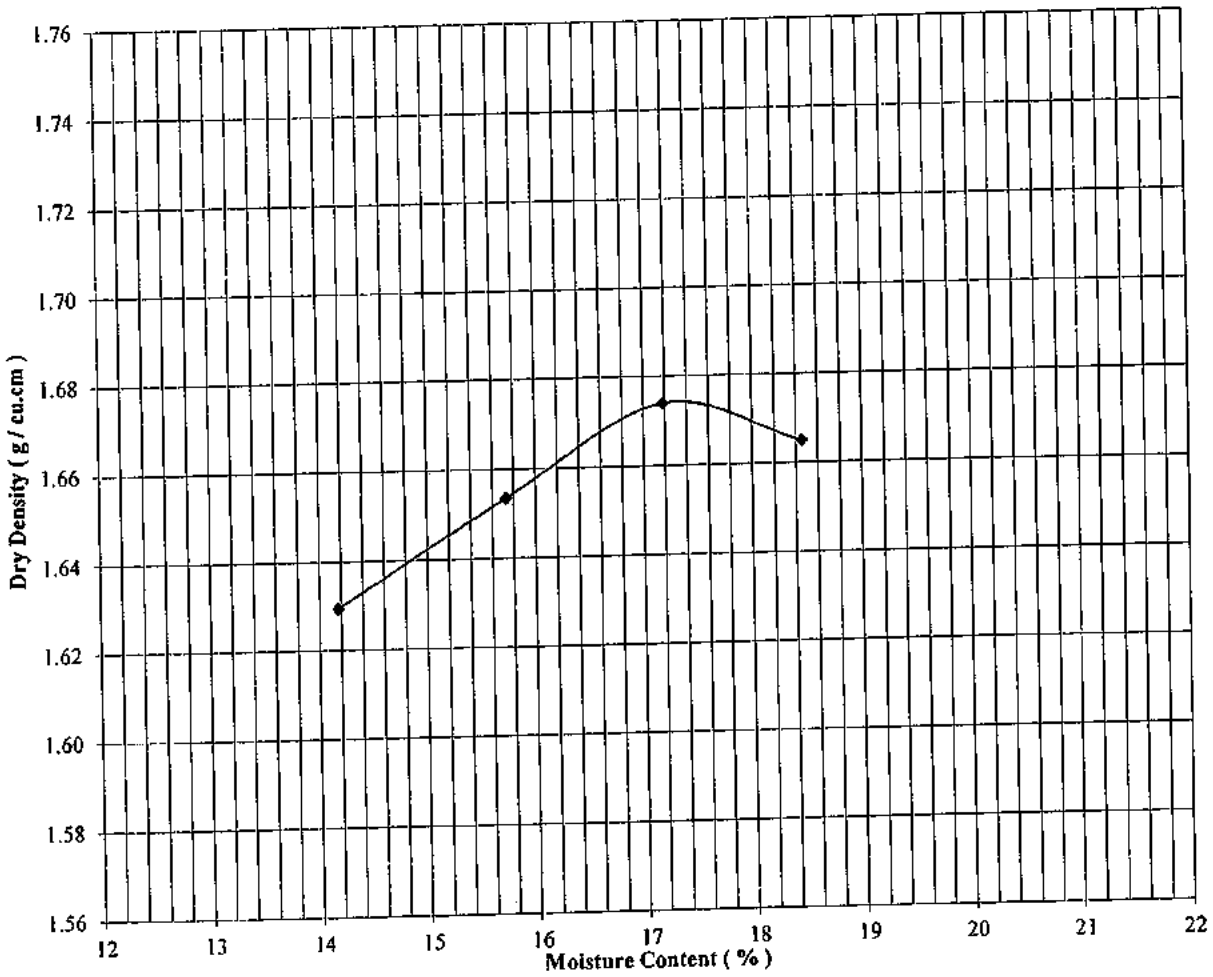
REMARKS:

SOILCON

COMPACTION TEST

SOILCON GEOTECHNICAL TESTING LABORATORIES
18-Km Multan Road Lahore, Ph.No: 042-7510942-3 Fax No: 7510944

Test Method :	Standard Proctor AASHTO T-99 (Method A)	**Volume of Mould :**	938 cm^3
Dia of Mould :	4.0 inch	**Drop :**	12 inch
No of Blows :	25 **No of Layers** 3	**Wt of Hammer :**	5.5 lbs
Test Pit No:	BA-10 **Sample No.** CS-1	**Depth (m):**	0.70-1.30



Optimum Moisture Content (%)	17.18	**Maximum Dry Density**	1.674 g/cm^3
Project:	PUNJAB INTERMEDIATE CITIES INVESTMENT PROGRAM		
Location :	TREATMENTS PLANT IN SAHIWAL CITY	**Client:** SAFE SERVICE	
Tested By Mahmood	**Checked By** Ikram Ullah	**Dated** 20.12.2019	**LAB. REF** 56/2019

REMARKS:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. TP-1 **Sample No.** CS-1 **Depth (m)** 1.15 -1.50

Internal Dia of mould = D (cm) = 10.53 cm

Remoulded dry density of sample = 1.8 gm/cm^3

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)]log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	50	49.2	0.01	60	26	1.11E-05	8.46E-06
2	55	54.3	0.01	60	26	8.79E-06	6.72E-06
3	60	59	0.01	60	26	1.15E-05	8.82E-06

by:

Director

Checked by:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. TP-6 **Sample No.** CS-1 **Depth (m)** 0.50 -1.35

Internal Dia of mould = D (cm) = 10.53 cm

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Remoulded dry density of sample = 1.8 gm/cm^3

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)]log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	60	59.3	0.01	60	26	8.06E-06	6.16E-06
2	50	49.2	0.01	60	26	1.11E-05	8.46E-06
3	55	54.2	0.01	60	26	1.01E-05	7.69E-06

by:

Geotech. Engg. Lab * Director * Civil Engg. Deptt. UET Lahore

Checked by:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. BA-1 **Sample No.** CS-1 **Depth (m)** 0.20 -0.90

Internal Dia of mould = D (cm) = 10.53 cm

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Remoulded dry density of sample = 1.8 gm/cm^3

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)]log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	45	44.9	0.00	60	26	1.53E-06	1.17E-06
2	55	53.8	0.01	60	26	1.51E-05	1.16E-05
3	50	49	0.01	60	26	1.39E-05	1.06E-05

by:

Geotech. Engg. Lab. Director Civil Engg. Dept. UET Lahore

Checked by:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. BA-2 **Sample No.** CS-1 **Depth (m)** 0.50 -1.50

Internal Dia of mould = D (cm) = 10.53 cm

Remoulded dry density of sample = 1.8 gm/cm^3

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)\log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	60	59.6	0.00	60	26	4.59E-06	3.51E-06
2	65	64.4	0.00	60	26	6.37E-06	4.86E-06
3	55	54.3	0.01	60	26	8.79E-06	6.72E-06

by:

Geotech. Engg. Lab * Director * Civil Engg. Deptt. UET

Checked by:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. BA-6 **Sample No.** CS-1 **Depth (m)** 0.20 -0.60

Internal Dia of mould = D (cm) = 10.53 cm

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Remoulded dry density of sample = 1.8 gm/cm^3

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=\{2.3a.L/A.t\}\log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	50	49.2	0.01	60	26	1.11E-05	8.46E-06
2	45	44.3	0.01	60	26	1.08E-05	8.22E-06
3	50	49.1	0.01	60	26	1.25E-05	9.53E-06

by:

Geotech. Engg. Lab. Director Civil Engg. Dept. UET LHR

Checked by:

(164)

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. BA-8 **Sample No.** CS-1 **Depth (m)** 0.15 -1.00

Internal Dia of mould = D (cm) = 10.53 cm

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Remoulded dry density of sample = 1.8 gm/cm^3

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)]log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	55	54.1	0.01	60	26	1.13E-05	8.65E-06
2	60	59.2	0.01	60	26	9.21E-06	7.04E-06
3	65	63.9	0.01	60	26	1.17E-05	8.95E-06

by:

Director Geotech. Engg. Lab Civil Engg. Dept. UET

Checked by:

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

Falling Head Permeability Test

Project: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

BH No. BA-10 Sample No. CS-1 Depth (m) 0.70 -1.30

Internal Dia of mould = D (cm) = 10.53 cm

Internal Height of mould = L (cm) = 12.7 cm

Int Area of Mould = A 87.09 cm^2

Int. Vol of mould = V 1105.99 cm^3

Dia of stand pipe, d 0.6 cm

Area of stand pipe, a 0.28 cm^2

Remoulded dry density of sample = 1.8 gm/cm^3

Test No	h1 (cm)	h2 (cm)	Log(h1/h2)	t sec	T °C	$K_T=[2.3a.L/A.t)]\log(h1/h2)$	$K_{20}=K_T(\eta_T/\eta_{20})$
1	50	49.3	0.01	60	26	9.68E-06	7.40E-06
2	60	59.4	0.00	60	26	6.90E-06	5.27E-06
3	45	44.1	0.01	60	26	1.39E-05	1.06E-05

by:

Geotech. Engg. Lab * Director * UET Lahore

Checked by:

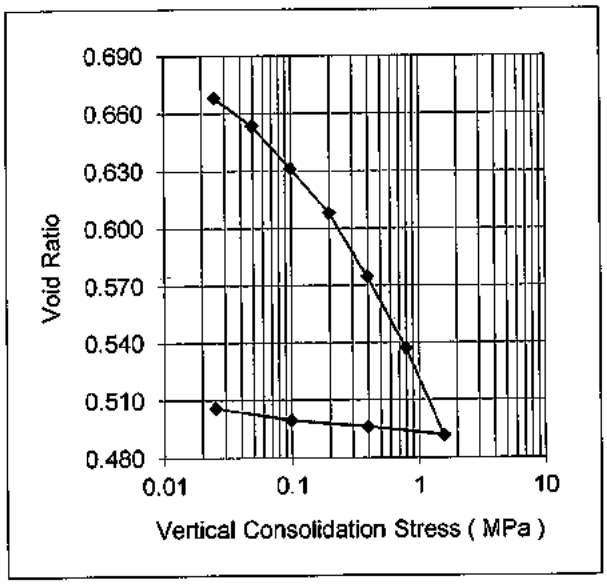
SOILCON

18-Km, Multan Road Lahore. Ph: 042-7510942, Fax: 042-7510944

CONSOLIDATION TEST

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BH-33	SAMPLE	UDS-1
SPECIMEN	1	TYPE	UNDISTURBED
DEPTH m	2.45-2.95	DATE	22.11.2019

Operator	Checked by
Nisar Ahmad	Mahmood



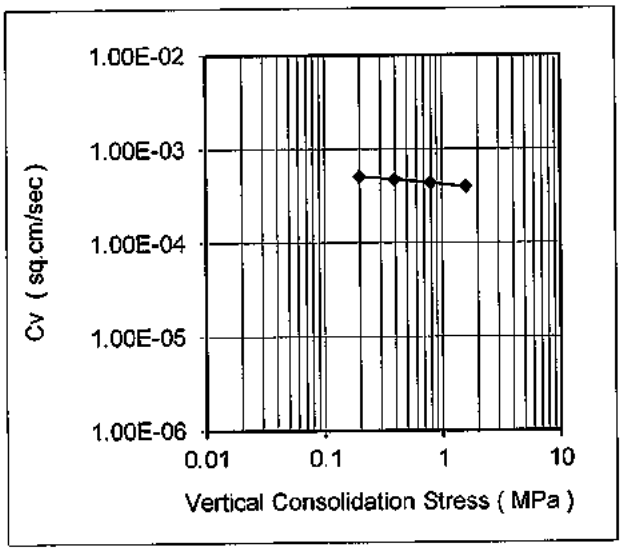
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1949	Kg/m^3
Final Bulk Density	2053	Kg/m^3
Initial Water Content	22.46	%
Final Water Content	19.49	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity App.	2.708	
Initial Void Ratio	0.702	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF. 54/2019



Pressure Mpa	Void Ratio	Cv cm^2/sec
0		
0.025	0.668	
0.049	0.654	
0.098	0.632	
0.196	0.608	5.12E-04
0.392	0.575	4.75E-04
0.785	0.537	4.37E-04
1.569	0.492	3.99E-04
0.392	0.496	
0.098	0.500	
0.025	0.506	

REMARKS:

SOILCON

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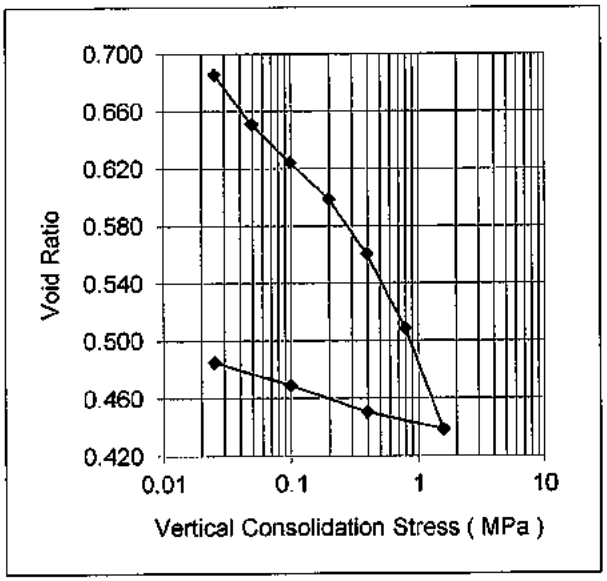
CONSOLIDATION TEST

Operator	Checked by
Nisar Ahmad	Mahmood

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BH-45	SAMPLE	UDS-1
SPECIMEN	1	TYPE	UNDISTURBED
DEPTH m	2.45-2.95	DATE	27.11.2019



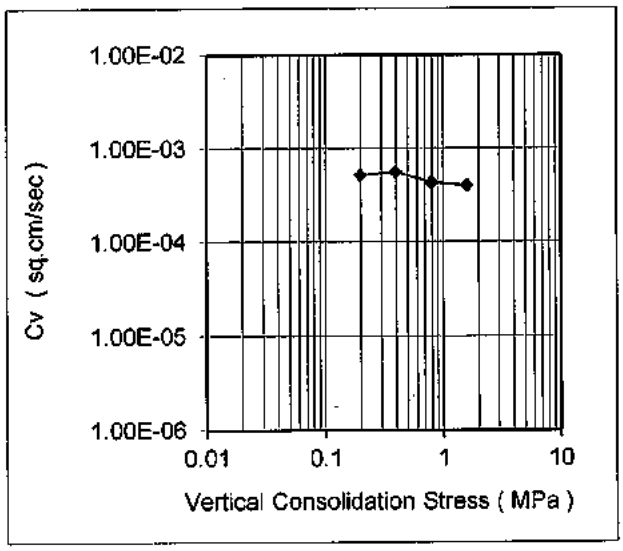
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1878	Kg/m^3
Final Bulk Density	2065	Kg/m^3
Initial Water Content	22.50	%
Final Water Content	18.66	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.585	
Initial Void Ratio	0.686	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.686	
0.049	0.651	
0.098	0.624	
0.196	0.599	5.17E-04
0.392	0.560	5.60E-04
0.785	0.509	4.33E-04
1.569	0.439	3.99E-04
0.392	0.451	
0.098	0.469	
0.025	0.485	

REMARKS:

SOILCON

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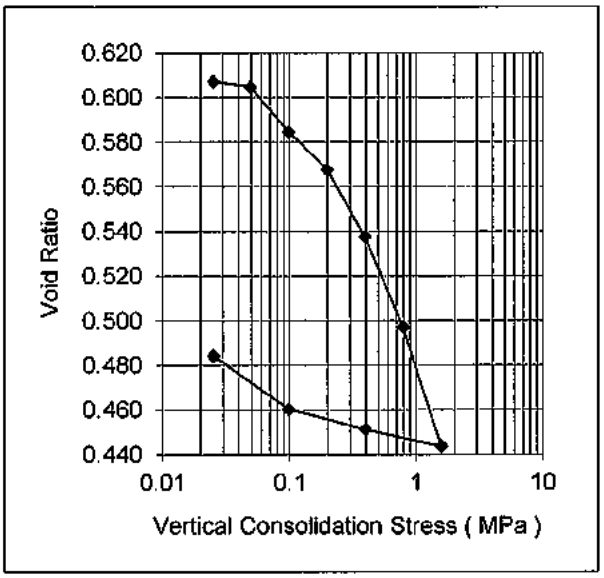
CONSOLIDATION TEST

Operator	Checked by
Nisar Ahmad	Mahmood

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	TP-1	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	1.15-1.50	DATE	30.12.2019



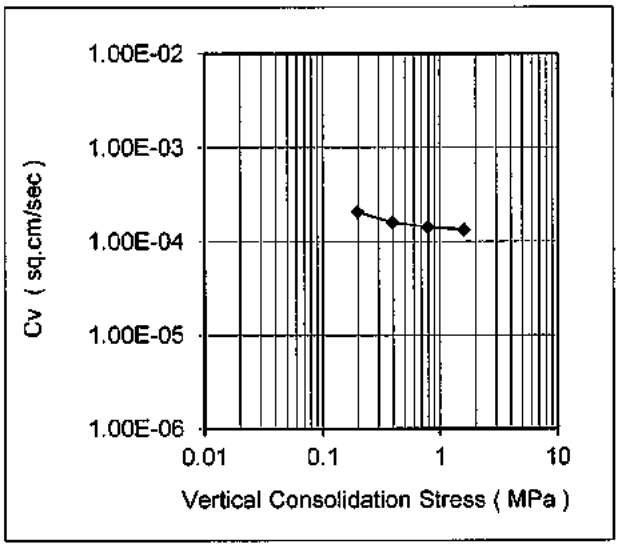
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1987	Kg/m^3
Final Bulk Density	2156	Kg/m^3
Initial Water Content	18.50	%
Final Water Content	17.71	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.718	
Initial Void Ratio	0.621	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.607	
0.049	0.605	
0.098	0.585	
0.196	0.568	2.09E-04
0.392	0.538	1.60E-04
0.785	0.497	1.43E-04
1.569	0.444	1.34E-04
0.392	0.451	
0.098	0.460	
0.025	0.484	

REMARKS:

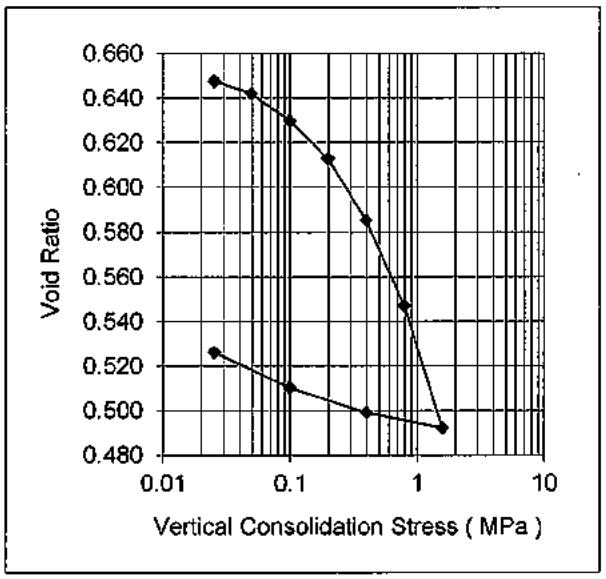
SOILCON

18-Km, Multan Road Lahore. Ph: 042-7510942, Fax: 042-7510944

CONSOLIDATION TEST

Operator	Checked by
Nisar Ahmad	Mahmood

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	TP-6	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.50-1.35	DATE	30.12.2019



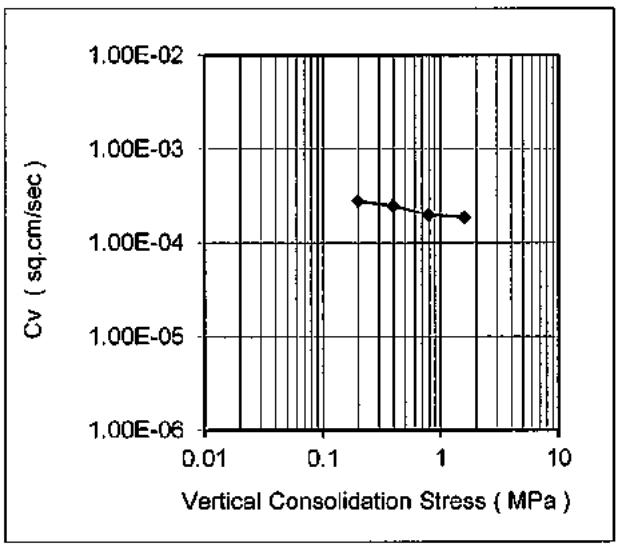
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1926	Kg/m^3
Final Bulk Density	2090	Kg/m^3
Initial Water Content	19.46	%
Final Water Content	19.63	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.666	
Initial Void Ratio	0.654	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.648	
0.049	0.642	
0.098	0.630	
0.196	0.613	2.77E-04
0.392	0.585	2.48E-04
0.785	0.547	1.98E-04
1.569	0.492	1.87E-04
0.392	0.499	
0.098	0.510	
0.025	0.526	

REMARKS:

SOILCON

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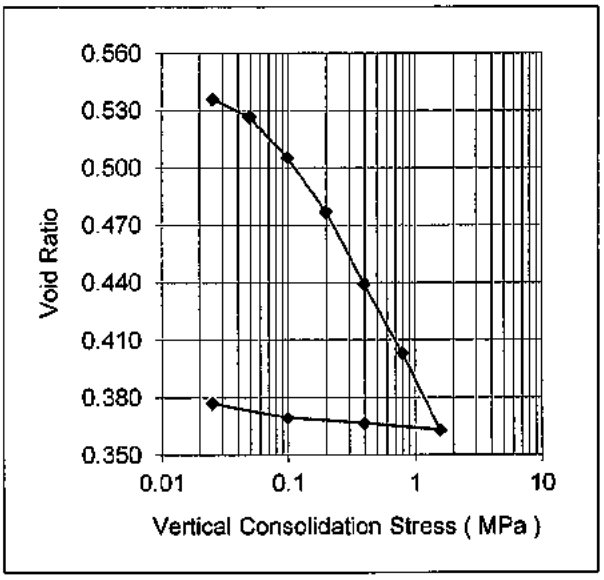
CONSOLIDATION TEST

Operator	Checked by
Nisar Ahmad	Mahmood

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BA-1	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.20-0.90	DATE	01.01.2020



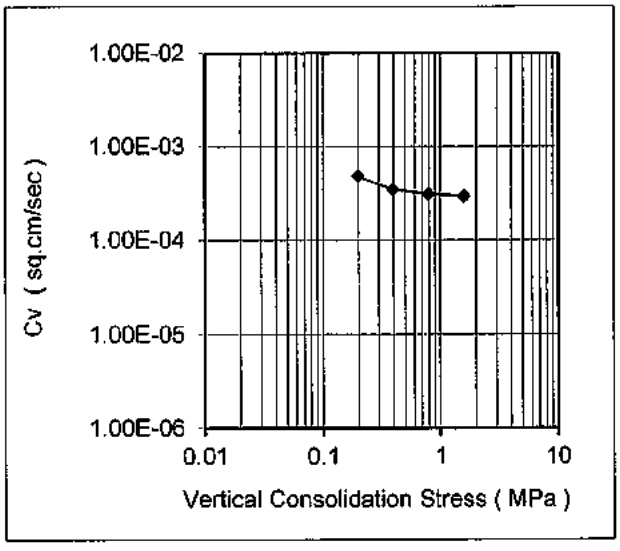
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	2004	Kg/m^3
Final Bulk Density	2185	Kg/m^3
Initial Water Content	17.73	%
Final Water Content	14.21	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.635	
Initial Void Ratio	0.548	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.536	
0.049	0.527	
0.098	0.506	
0.196	0.477	4.85E-04
0.392	0.439	3.49E-04
0.785	0.403	3.10E-04
1.569	0.363	2.94E-04
0.392	0.367	
0.098	0.370	
0.025	0.377	

REMARKS:

SOILCON

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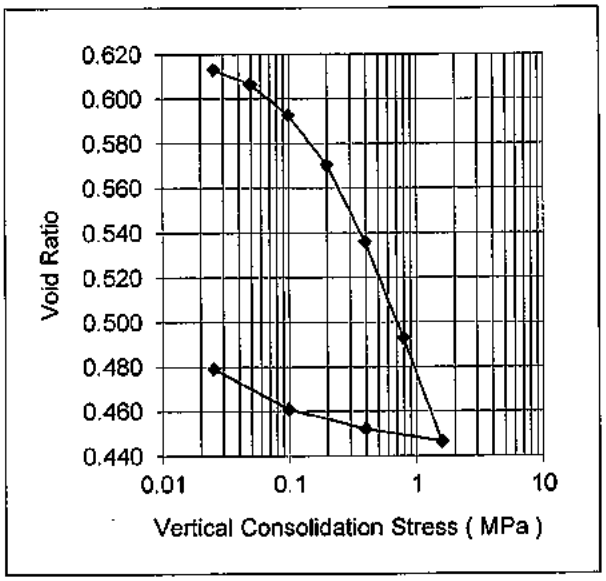
CONSOLIDATION TEST

Operator	Checked by
Nisar Ahmad	Mahmood

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BA-2	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.50-1.50	DATE	30.12.2019



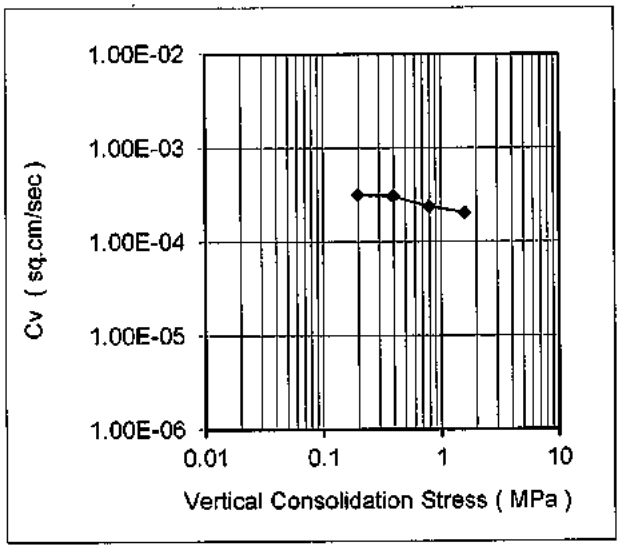
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1961	Kg/m^3
Final Bulk Density	2109	Kg/m^3
Initial Water Content	19.46	%
Final Water Content	17.09	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.664	
Initial Void Ratio	0.623	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF. 56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.613	
0.049	0.607	
0.098	0.593	
0.196	0.571	3.18E-04
0.392	0.536	3.06E-04
0.785	0.493	2.37E-04
1.569	0.446	2.06E-04
0.392	0.452	
0.098	0.461	
0.025	0.479	

REMARKS:

SOILCON

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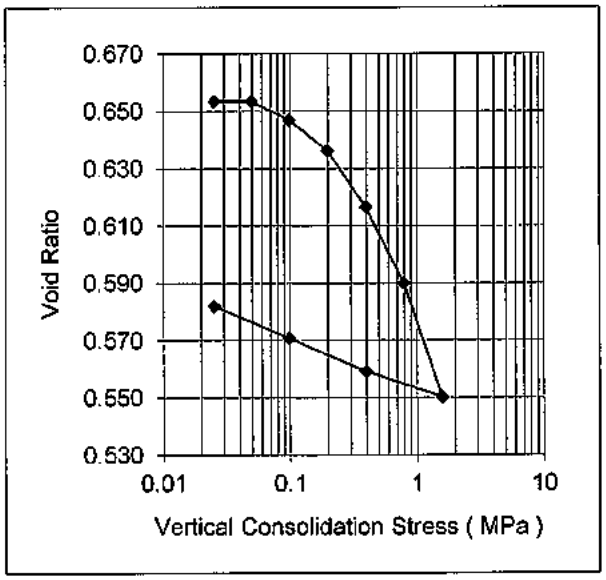
CONSOLIDATION TEST

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BA-6	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.20-0.60	DATE	30.12.2019

Operator	Checked by
Nisar Ahmad	Mahmood



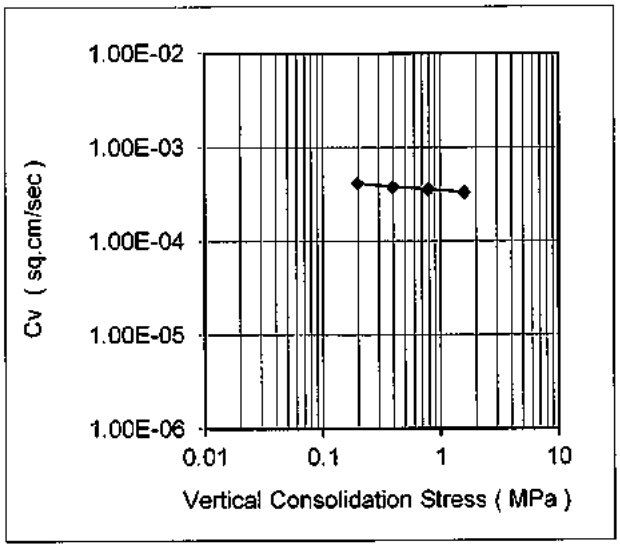
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1874	Kg/m^3
Final Bulk Density	2039	Kg/m^3
Initial Water Content	17.07	%
Final Water Content	21.89	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.646	
Initial Void Ratio	0.653	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.653	
0.049	0.653	
0.098	0.647	
0.196	0.636	4.14E-04
0.392	0.617	3.80E-04
0.785	0.590	3.57E-04
1.569	0.550	3.32E-04
0.392	0.559	
0.098	0.571	
0.025	0.582	

REMARKS:

SOILCON

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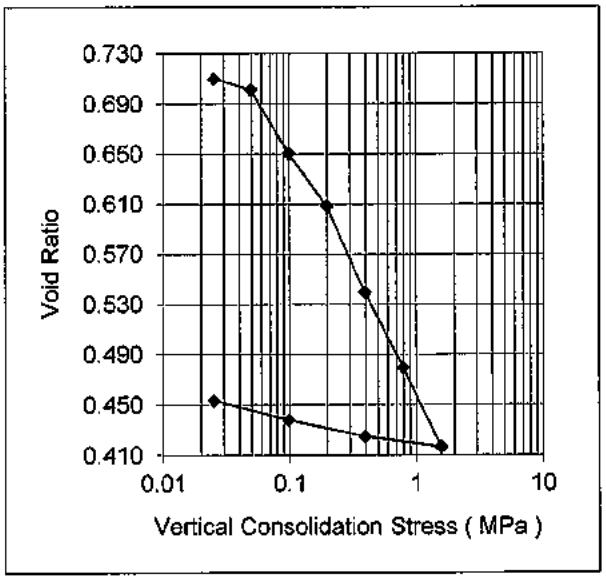
CONSOLIDATION TEST

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BA-8	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.20-0.90	DATE	01.01.2020

Operator	Checked by
Nisar Ahmad	Mahmood



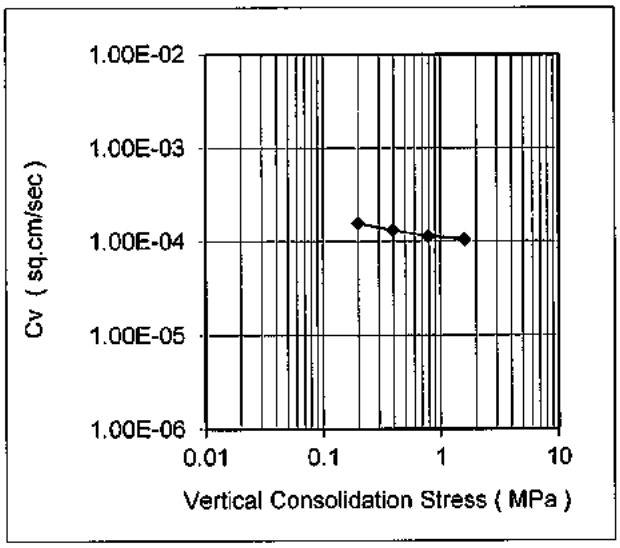
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1896	Kg/m^3
Final Bulk Density	2185	Kg/m^3
Initial Water Content	19.27	%
Final Water Content	16.57	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.725	
Initial Void Ratio	0.714	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.710	
0.049	0.702	
0.098	0.651	
0.196	0.609	1.58E-04
0.392	0.540	1.32E-04
0.785	0.480	1.14E-04
1.569	0.417	1.05E-04
0.392	0.425	
0.098	0.438	
0.025	0.454	

REMARKS:

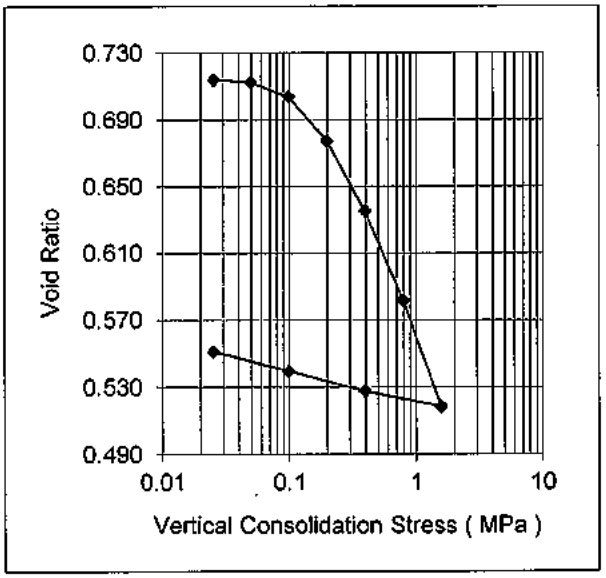
SOILCON

18-Km, Multan Road Lahore. Ph: 042-7510942, Fax: 042-7510944

CONSOLIDATION TEST

CLIENT	SAFE SERVICES		
PROJECT	PUNJAB INTERMEDIATE CITIES INVESTMEN		
SITE	PROGRAM IN SAHIWAL CITY		
BORE HOLE	BA-10	SAMPLE	CS-1
SPECIMEN	1	TYPE	DISTURBED
DEPTH m	0.70-1.30	DATE	01.01.2020

Operator	Checked by
Nisar Ahmad	Mahmood



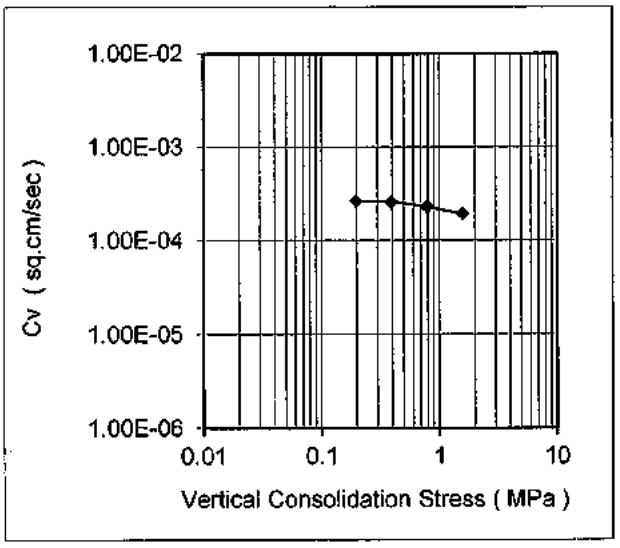
SOIL AND SPECIMEN CHARACTERISTICS

Initial Bulk Density	1895	Kg/m^3
Final Bulk Density	2111	Kg/m^3
Initial Water Content	19.18	%
Final Water Content	20.11	%
Initial Specimen Height	20.00	mm
Specimen Diameter	63.70	mm
Specific Gravity	2.727	
Initial Void Ratio	0.715	

TEST CHARACTERISTICS

No. of Loading Steps	7
No. of unloading Steps	3

LAB REF.	56/2019



Pressure	Void Ratio	Cv
Mpa		cm^2/sec
0		
0.025	0.714	
0.049	0.713	
0.098	0.704	
0.196	0.678	2.65E-04
0.392	0.636	2.59E-04
0.785	0.582	2.30E-04
1.569	0.519	1.92E-04
0.392	0.528	
0.098	0.540	
0.025	0.551	

REMARKS:

SOILCON
GEOTECHNICAL TESTING LABORATORIES
18-Km, Multan Road, Lahore. Ph: 042-7510942-43 Fax:042-7515267

SUMMARY OF SWELL PRESSURE TEST RESULTS

Project: PUNJAB INTERMEDIATES CITIES IMPROVEMENT PROGRAM
Location: TREATMENT PLANT IN SAHIWAL CITY
Client: SAFE SERVICES
Lab. Ref: 56/2019

BH / TP No.	Sample No.	Depth (m)	Location	Free swell %	DENSITY (g/cu.cm)		Swell Pressure (kg/cm^2)	Remarks
					Bulk	Dry		
TP-1	CS-1	1.15-1.50					NIL	
TP-6	CS-1	0.50-1.35					NIL	
BA-1	CS-1	0.20-0.90					NIL	
BA-2	CS-1	0.50-1.50					NIL	
BA-6	CS-1	0.20-0.60					NIL	
BA-8	CS-1	0.15-1.00					NIL	
BA-10	CS-1	0.70-1.30					NIL	

Tested By: Ikram Ullah
CHECKED BY Mahmood
Dated: 01.01.2020

(176)

SOILCON

GEOTECHNICAL TESTING LABORATORIES, 18-Km,

UNCONFINED COMPRESSION TEST

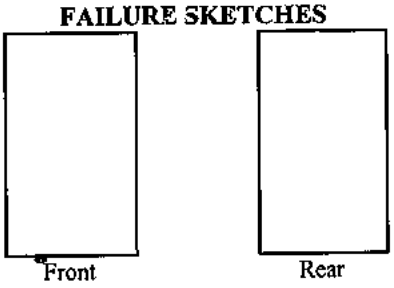
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT	**BH NO**	BH-33
LOCATION:	PROGRAM SAHIWAL	**SAMPLE NO**	UDS-1
LAB REF.	54/19	**DEPTH m**	2.45-2.95
DATE:	22.11.2019	**CLIENT**	SAFE SERVICES

SAMPLE DESCRIPTION:

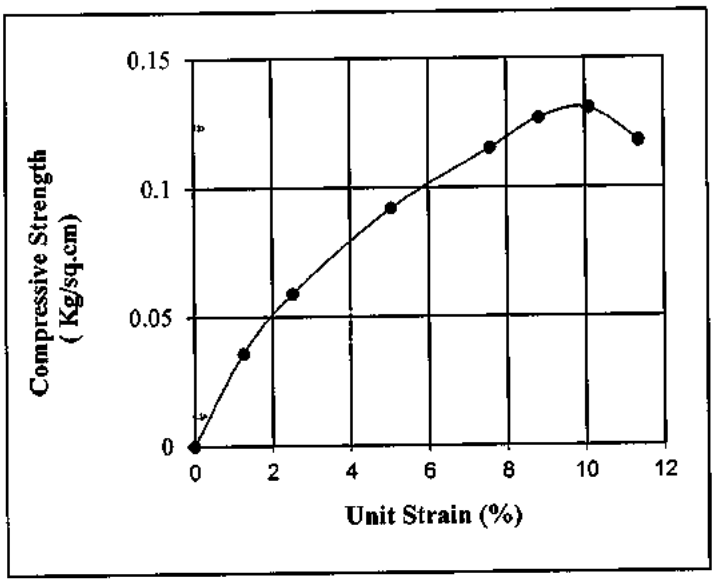
Specimen Conditions

Diameter Average	3.86	cm
Area Average	11.75	cm^2
Height	7.925	cm
Volume	92.78	cm^3
Weight Wet	156.61	g
Water Content	25.66	%
Dry Density	1.343	g/cm^3
P.R Factor	0.1422	Kg/div.
Compressive Strength	0.13	Kg/cm^2
Strain	8.83	%

FAILURE SKETCHES



Deformation Dial Reading	Unit Strain %	Compressive Strength (Kg/sq.cm)
0	0.00	0.00
100	1.26	0.04
200	2.52	0.06
400	5.05	0.09
600	7.57	0.12
700	8.83	0.13
800	10.09	0.13
1000	11.36	0.12



Remarks:

Tested By: M. Aslam

Checked By: Mahmood

SOILCON

GEOTECHNICAL TESTING LABORATORIES, 18-Km,

UNCONFINED COMPRESSION TEST

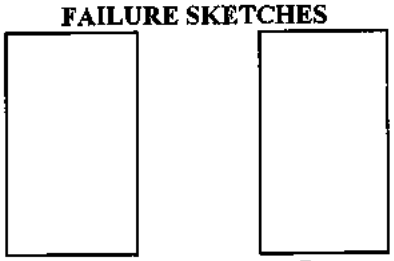
PROJECT:	PUNJAB INTERMEDIATE CITIES INVESTMENT	**BH NO**	BH-45
LOCATION:	PROGRAM SAHIWAL CITY	**SAMPLE NO**	UDS-1
LAB REF.	56/19	**DEPTH m**	2.45-3.00
DATE:	3.12.2019	**CLIENT**	SAFE SERVICES

SAMPLE DESCRIPTION:

Specimen Conditions

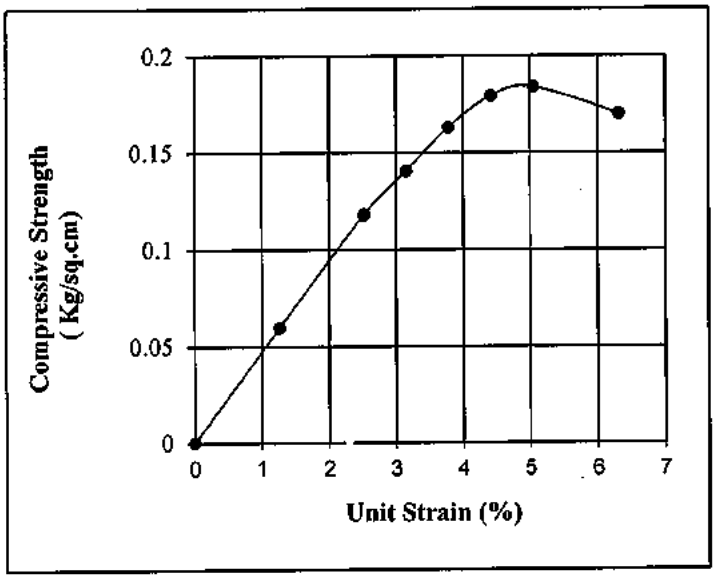
Diameter Average	3.86	cm
Area Average	11.75	cm^2
Height	7.925	cm
Volume	92.78	cm^3
Weight Wet	171.11	g
Water Content	23.61	%
Dry Density	1.492	g/cm^3
P.R Factor	0.1422	Kg/div.
Compressive Strength	0.18	Kg/cm^2
Strain	4.42	%

FAILURE SKETCHES



Front Rear

Deformation Dial Reading	Unit Strain %	Compressive Strength (Kg/sq.cm)
0	0.00	0.00
100	1.26	0.06
200	2.52	0.12
250	3.15	0.14
300	3.79	0.16
350	4.42	0.18
400	5.05	0.18
500	6.31	0.17



Remarks:

Tested By: M. Aslam

Checked By: Mahmood

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

SUMMARY OF THE TEST RESULTS

PROJECT: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

Job Ref. SS/Letter/1637/19

Dated: 21/11/2019

BH/ TP No.	Sample No	Depth (m)	Sulphate Contents (%)	Chloride Contents (%)	Organic Contents (%)
BH-36	SPT-3	3.00-3.45	0.09	0.06	0.14
BH-34	SPT-4	4.00-4.45	0.08	0.04	0.16
BH-31	UDS-1	4.50-5.00	0.06	0.09	0.08
BH-30	UDS-1	7.00-7.50	0.07	0.13	0.06
BH-29	UDS-1	5.00-5.80	0.03	0.08	0.15
BH-28	UDS-1	4.00-4.80	0.05	0.09	0.12

Prepared by:

Geotech. Engg. Lab * Director * Civil Engg. Dept. UET L

Checked by:

27-11-19

University of Engineering & Technology, Lahore
Department of Civil Engineering
Geotechnical Engineering Laboratory

SUMMARY OF THE TEST RESULTS

PROJECT: Consultancy Services For Engineering, Procurement And Construction Management For Punjab Intermediate Cities Improvement Investment Program (Treatment Plants in Sahiwal City)

Client: SAFE

Job Ref. SS/Letter/1637/19

Dated: 21/11/2019

BH/ TP No.	Sample No	Depth (m)	Sulphate Contents (%)	Chloride Contents (%)	Organic Contents (%)
BH-58	SPT-3	3.00-3.45	0.06	0.14	0.22
BH-56	UDS-1	6.00-6.80	0.03	0.11	0.13
BH-53	UDS-1	4.00-4.80	0.08	0.13	0.16
BH-51	UDS-1	6.00-6.80	0.04	0.09	0.09
BH-45	UDS-1	2.45-3.00	0.09	0.16	0.26
BH-41	SPT-4	4.00-4.45	0.11	0.17	0.20

Prepared by:

Geotech. Engg. Lab. Director Civil Engg. Dept. UET

Checked by:

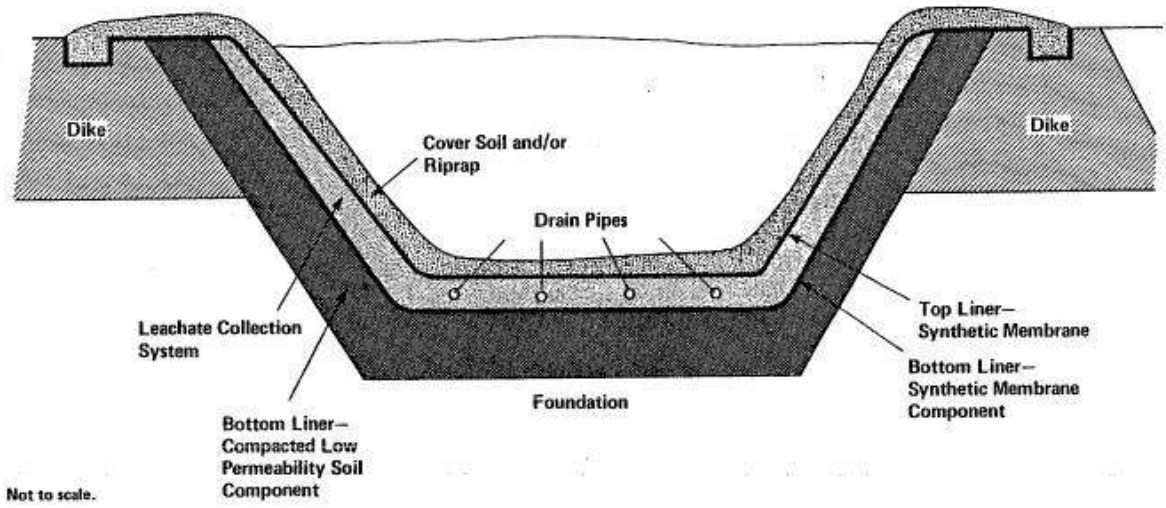
27.11.19

APPENDIX-D

REFERENCE FOR LINING MATERIAL

STATE OF MICHIGAN

Department of Environment, Great Lakes and Energy (EGLE)
(www.michigan.gov)



Cross section of an idealized clay liner system.

WASTEWATER TREATMENT AND STORAGE LAGOONS

(GUIDE SHEET IV)

GUIDESHEET IV

Wastewater Treatment and Storage Lagoons

Unless otherwise approved by the Department of Environmental Quality (DEQ) all wastewater treatment and storage lagoons associated with a discharge to the groundwaters of the State must meet the requirements specified in Rule 2237.

Dike Walls
For above-grade construction or if the lagoon liner base does not extend to the ground surface, perimeter dike walls are required to be constructed using a soil that is keyed to the natural soil base and meets the following criteria:

The relationship between hydraulic conductivity, moisture, and density is to be established with laboratory testing for the source of clay that will serve as the compacted clay portion of the composite liner. The relationship is to be determined using either the modified proctor test, ASTM D1557-91, or the standard proctor test, ASTM D698-91. And

Each lift is required to be thoroughly and uniformly compacted to achieve a hydraulic conductivity of not more than 1×10^{-7} centimeters per second based upon the density and moisture content determined as described above. The hydraulic conductivity of the soil is to be determined using ASTM method D5084-90 as modified by the department**.** If flexible wall permeameters are used, then confining pressures are required to be equivalent to the minimum pressure expected after the lagoon is placed in service. Soil is not be compacted at a moisture content that is less than optimum and is not to be compacted to less than either of the following densities:

Ninety percent of the maximum dry density, as determined by the modified proctor test, ASTM D1557-91. and

Ninety-five percent of the maximum dry density, as determined by the standard proctor test, ASTM D698-91.

Composite liners and Base
Each lagoon must have a composite liner with a base that meets the following requirements as specified in subrule (2) of Rule 2237:

The base of the composite liner is required to be a natural soil barrier, a compacted soil barrier or a geocomposite clay liner that meets the specific criteria for each of these technologies.

Natural Soil Barrier Requirements

A natural soil barrier used as a base in a composite liner system is required to meet all of the following requirements:

The natural soil shall be free of sand lenses and not less than 10 feet thick.

The soil shall have a saturated vertical hydraulic conductivity of not more than 1×10^{-7} centimeters per second.

Note: The hydraulic conductivity of the soil is required to be determined using ASTM method D5084-90, If flexible wall permeameters are used, then confining pressures are required to be equivalent to the minimum pressure expected after the lagoon is placed into service.

The natural soil liner surface is required to be properly prepared for placement of the flexible membrane liner (FML) to remove the potential for failures to the FML.

An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, otherwise known as the "Occupational Code," is required to certify to the department, that the requirements of the rule were met during installation of the natural soil base of the composite liner. The certification is to be accomplished through spatially random testing and measurements. At least 1 soil test is required to be conducted and an additional test is required for every 5,000 cubic yards placed and when the texture of the soil changes.

Compacted Soil Barrier

A compacted soil liner used as a segment of the composite liner system is required to meet all of the following:

The compacted soil liner shall have a minimum thickness of 2 feet.

The relationship between hydraulic conductivity, moisture, and density must be established with laboratory testing for the source of clay that will serve as the compacted clay portion of the composite liner. The relationship is to be determined using either the modified proctor test, ASTM D1557-91, or the standard proctor test, ASTM D698-91.

Each lift shall be thoroughly and uniformly compacted to achieve a hydraulic conductivity of not more than 1×10^{-7} centimeters per second based upon the density and moisture content determined as described above. The hydraulic conductivity of the soil is to be determined using ASTM method D5084-90, as modified by the department in R 299.4920. If flexible wall permeameters are used, then confining pressures are required to be equivalent to the minimum pressure expected after the lagoon is placed in

service. Soil shall not be compacted at a moisture content that is less than optimum and are not to be compacted to less than either of the following densities:

Ninety percent of the maximum dry density, as determined by the modified proctor test, ASTM D1557-91. And,

Ninety-five percent of the maximum dry density, as determined by the standard proctor test, ASTM D698-91.

The soil is to be placed so that each lift is not more than 6 inches after compaction.

The compacted soil liner surface is to be prepared for placement of the FML to remove the potential for failures of the FML.

The department may approve alternative test and investigative methods.

An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, otherwise known as the "Occupational Code," shall certify to the department, that the requirements of this rule were met during installation of the compacted soil base of the composite liner. The certification is to be accomplished through spatially random testing and measurements. At least 1 soil test of the compacted soil is required to be conducted and an additional test shall be conducted for every 5,000 cubic yards placed and when the texture of the soil changes.

Geocomposite Clay Liners

A geocomposite clay liner (GCL) used as a segment of a composite liner must meet all of the following requirements:

The GCL must be a factory-manufactured hydraulic barrier consisting of sodium bentonite clay supported by geotextiles that are held together by needling, stitching, or adhesives.

The GCL must be seamed according to the manufacturer's specifications to prevent leakage at the seams.

The GCL must not be laid during a precipitation event and is to be covered immediately by a flexible membrane liner or by another protective cover until the flexible membrane liner can be laid directly over the GCL.

The GCL must be installed according to the manufacturer's specifications and quality assurance and quality control plans. The installation is required to be certified by an engineer licensed under Act No. 299 of the Public Acts

of 1980, as amended, otherwise known as the “Occupational Code,” overseeing the installation of the composite liner.

Flexible Membrane Liners

A flexible membrane liner (FML) required by this rule is to be placed directly over a natural soil barrier, compacted soil barrier or geocomposite clay liner to form what is referred to as the "composite liner." The FML and its installation must meet all of the following requirements:

The liner must be a minimum of 40 mils thick polyvinyl chloride (PVC) or 60 mils thick high-density polyethylene (HDPE). Other materials and thickness may be used if the department determines before installation, that the proposed material and thickness are sufficient to ensure that the integrity of the liner is not compromised due to contact with the soil base, wastewater, climatic conditions, or the stress of installation or daily operation.

An FML is required to be covered immediately after placement. The FML is to be covered by an adequate thickness of soil or other material approved by the department to prevent puncture by equipment and to protect the exposed portion of the FML from degradation by ultraviolet light.

The FML is to be placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent slope failure and failure of the liner due to settlement, compression, or uplift.

The FML must cover the entire area of earth material that would be in contact with the treated or stored effluent.

The slopes over which an FML is to be placed may not exceed a grade of 25 percent unless the owner and operator can demonstrate slope stability for slopes with steeper grades.

FML Seams

The field seams of an FML shall meet all of the following requirements:

Seaming is to be done in accordance with the minimum industry standards. The shear strength and peel strength of the seams must be adequate to maintain the integrity of the seam under all operating conditions.

Horizontal seams are not to occur on side slopes.

Horizontal seams are to be located not less than 5 feet from the toe of the slope.

Field seams are to be installed parallel to the line of maximum slope.

The seam area shall be free of moisture, dust, dirt, debris, and foreign material of any kind before seaming.

No field seaming is to be done in weather conditions that would adversely affect the integrity of the seam.

An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, otherwise known as the "Occupational Code," must certify to the department that all necessary quality assurance testing was conducted to ensure that the FML was installed appropriately.

Quality Assurance Reporting

As indicated previously, the owner and operator of a facility must ensure that a properly licensed engineer certifies in a report to the Water Resources Division of the DEQ that the installation of the natural soil base barriers, compacted soil base, GCL and FML were completed in accordance with approved plans and that all necessary quality assurance testing was completed. The report must include:

A narrative of the results of the quality assurance tests.

Construction records for each component of the composite liner, including all field notes and results of all quality assurance tests. Drawings should be prepared which reference the location of each test to the respective result.

A summary of the testing methods used in determining quality assurance.

For quality assurance test results that did not meet specifications contained in the approved engineering plans, the methods for bringing the components of the composite liner into compliance with approved specifications.

A set of as built plans, signed and sealed by the properly licensed engineer. As a minimum, the as built plans should include the following:

- Dimensions, location, and elevation of the base of the excavation.
- Elevations of the surface and the base of the clay liner(s).
- Elevations of the surface of the protective layer.
- Cross sections of the lagoon(s), including dike locations, keying details and FLM anchor trench details.

All elevations are to be $\pm$ 0.5 feet, United States Geological Survey Datum.

A membrane panel layout drawing showing; panel and seam locations, repair locations, slope directions and slope toe locations.

Alternative Lagoon Standards

The department may approve a storage or treatment lagoon liner that does not meet 1 or more of the requirements specified in the rules if the applicant demonstrates that the requirements of either of the following provisions are met:

The lagoon holds only wastewater that meets the standards of Rule 2222.

The existing system or the proposed design provides equal or greater environmental protection to protection provided by a lagoon liner constructed according to the rules. For an existing system, the demonstration can be made by either of the following:

Through an exfiltration test that demonstrates, to the department's satisfaction, that the lagoon is not leaking at a rate likely to impact groundwater. or

Through monitoring of the groundwater and a demonstration approved by the department that the lagoon has not impacted, and is not likely to impact, groundwater**.**