Department of Civil Engineering (CED)

UNIVERSITY OF ENGINEERING & TECHNOLOGY (UET) LAHORE – 54890 (PAKISTAN)



Phone: 092-42-9929202 Cable: UNIVENGTECH Fax: 092-42-9922566

Ref.-----

Date:-----

Mr. Muhammad Iqbal Project Manager, BARQAAB, Consulting Services (Pvt.) Limited.

Subject: <u>Testing of Coarse and Fine Aggregates</u> ADB-300C-R-2020 Design, Manufacturing, Supply, Installation, Testing and Commissioning of 220 kV Jauharabad Grid Station

Dear Sir,

It is with reference to your letter No. BQB/220kV/GS/JHR/294 dated 28-02-2025. Please find below the results for the tests conducted on the aggregate samples provided to this laboratory on 04-03-2025 through your representative.

Coarse Aggregate (Sargodha)

1. Sieve Analysis (ASTM C-136)

Sieve Size	1 1⁄2"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	100	89.80	8.16	0	0

2. Specific Gravity & Water Absorption (ASTM C-127)

Specific Gravity (oven dried condition)	2.83
Specific Gravity (saturated surface dry condition)	2.84
Apparent Specific Gravity	2.86
Water Absorption (%)	0.42

3. Sodium Sulphate Soundness (ASTM C-88)

Sieve Size	Weight of	Weight of	Percentage	Weighted
	Fraction	Fraction	Passing	Percentage
	Before Test	After Test	Designated Sieve	Loss
1/2" + 3/2"	(gm)	(gm)	After Test	
/2 /8	1002.4	991.9	1.05	0.94
			Total = 0.94%	

4. Los Angeles Abrasion Value Test (ASTM C-131/535)

Grading Used	Los Angeles Abrasion Value (%)
В	16.20

5. Flakiness & Elongation Index (BS 812: Part 105)

Sieve Size		Individual	Weighted	Individual	Weighted	
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation	
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)	
1	3/4	13.65	1.39	21.27	2.17	
³ / ₄	1/2	3.83	3.13	7.94	6.48	
¹ / ₂	³ / ₈	6.47	0.53	12.29	1.00	
		Flakiness Inc	lex = 5.05%	Elongation Ind	ex = 9.65%	

Coarse Aggregate (Mianwali)

1. Sieve Analysis (ASTM C-136)

Sieve Size	1 1/2"	1"	³ /4"	1⁄2"	3/8"	#4
%age Passing	100	100	89.47	8 <mark>.42</mark>	0	0

2. Specific Gravity & Water Absorption (ASTM C-127)

Specific Gravity (oven dried condition)	2.72
Specific Gravity (saturated surface dry condition)	2.74
Apparent Specific Gravity	2.79
Water Absorption (%)	0.85

3. Sodium Sulphate Soundness (ASTM C-88)

Sieve Size	Weight of	Weight of	Percentage	Weighted
	Fraction	Fraction	Passing	Percentage
	Before Test	After Test	Designated Sieve	Loss
1/2" + 3/2"	(gm)	(gm)	After Test	
/2 /8	1004.3	989.0	1.52	1.36
			Total = 1.36%	

4. Los Angeles Abrasion Value Test (ASTM C-131/535)

Grading Used	Los Angeles Abrasion Value
	(%)
В	22.24

Sieve Size		Individual	Weighted	Individual	Weighted	
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation	
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)	
1	3/4	14.47	1.52	23.58	2.48	
3/4	¹ / ₂	3.84	3.11	7.38	5.98	
¹ / ₂	3/8	9.55	0.80	14.09	1.19	
· · ·		Flakiness In	dex = 5.43%	Elongation Ind	ex = 9.65%	

5. Flakiness & Elongation Index (BS 812: Part 105)

<u>Fine Aggregate</u> Sand; Darra Tang (Pazzo)

1. Sieve Analysis (ASTM C-136)

Sieve Size	3/8"	#4	#8	#16	#30	#50	#100	#200
%age Passing	100	97.99	90.00	68.00	42.99	20.00	8.00	3.50

2. Fineness Modulus (ASTM C-142)

		Fineness Modulus (%)			2.1	73
3.	Specific Gra	avity & Water Absorption (AST	M C-12	8)	
		Specific Gravity (OD)		2.67		
		Specific Gravity (SSD)		2.69		
		Apparent Specific Gravity		2.73		
		Water Absorption (%)		0.85		

4. Sodium Sulphate Soundness (ASTM C-88)

Sieve Size	Weight of	Weight of	Percentage	Weighted			
	Fraction	Fraction	Passing	Percentage			
	Before Test	After Test	Designated Sieve	Loss			
	(gm)	(gm)	After Test				
#4 to #8	100	98.9	1.10	0.09			
#8 to #16	100	98.7	1.30	0.29			
#16 to #30	100	98.8	1.20	0.30			
#30 to #50	100	98.9	1.10	0.25			
Total = 0.93%							

If you have further query, please do not hesitate to contact the undersigned.

Best Regards,	Note: 1. This test report is based solely on the particular sample(s) supplied by the
Director	 client and should not be reproduced in parts. 2. Sampling has not been performed by Transportation Engineering Laboratory (TEL), UET and TEL-UET does not accept the responsibility that the sample(s) supplied is/are truly representative sample(s) of any batch or stock or entire project.
Transportation Engineering Laboratory	3. While TEL-UET agrees to take every reasonable precaution to ensure validity of its test results, it assumes no liability thereof beyond the amount of the fee charged for the analysis or test.
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Ref.-----

Date:-----

Engr. Ghulam Rasool Resident Engineer, NESPAK, MCL Nishtar Zone, Lahore.

Subject: <u>Testing of Aggregate</u> (PCC Crush) Rehabilitation/Improvement of Streets (P.C.C). Sewerage/Drainage Gulshan-e-Ahbab Colony & Rakh Chandrai Village, UC-241, Nishtar Zone MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/NZ/04/179 dated 03-02-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 13-02-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size 1 " $\frac{3}{4}$ " $\frac{1}{2}$ " $\frac{3}{8}$	" #4
%age Passing 100 100 38.08 7.4	2 0

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

B 16.19		Grading	Used		Los Angeles Abrasion Value (%)
		В			16.19

Sieve	e Size	Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
3/4	¹ / ₂	18.60	11.52	23.74	14.70
¹ / ₂	³ / ₈	12.41	3.81	12.98	3.98
³ / ₈	1/4	6.84	0.51	7.69	0.57
		Flakiness In	dex = 15.84%	Elongation Ind	ex = 19.25%

Best Regards,

Director Transportation Engineering Laboratory

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Ref.-----

Date:-----

Engr. Ghulam Rasool Resident Engineer, NESPAK, MCL Nishtar Zone, Lahore.

Subject: <u>Testing of Aggregate</u> (Granular Sub-base) Rehabilitation/Improvement of Streets (P.C.C). Sewerage/Drainage Gulshan-e-Ahbab Colony & Rakh Chandrai Village, UC-241, Nishtar Zone MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/NZ/04/173 dated 03-02-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 13-02-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	1 ½"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	83.69	68.12	46.37	36.06	29.42

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

	Grading I	Used	Los Angeles Abrasion Value (%)
	А		27.64

Sieve Size		Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
1 1/2	1	15.69	3.63	20.14	4.65
1	3/4	19.92	4.39	23.53	5.19
³ / ₄	¹ / ₂	22.10	6.81	23.79	7.33
1/2	³ / ₈	21.40	3.13	28.47	4.16
³ / ₈	1/4	26.04	2.45	33.30	3.13
		Flakiness Inc	dex = 20.41%	Elongation Ind	ex = 24.46%



Best Regards,

Director Transportation Engineering Laboratory

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Phone: 092-42-9929202 Cable: UNIVENGTECH Fax: 092-42-9922566

Ref.-----

Date:-----

Mr. Atta Farid Resident Engineer, NESPAK, Pakpattan.

Subject: <u>Testing of Sub-base Material</u> Rehabilitation of Okara (Satghara More to Syed Wala Bridge via Satghara), Length = 30.50 km Tehsil & District Okara (ADP 2024-25) Road Rehabilitation Programme-II (GS No. 1799)

Dear Sir,

It is with reference to your letter No. 4834/Okara/Rehab-II/RE/07 dated 10-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 13-02-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	97.72	80.08	63.26	50.77	40.45	33.87

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

Grading Used	Los Angeles Abrasion Value (%)
A	28.06

Sieve Size		Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
2	1 1/2	16.23	0.56	24.29	0.84
1 1/2	1	22.48	6.00	27.29	7.28
1	3/4	25.08	6.38	33.71	8.58
3/4	1/2	30.27	5.72	39.17	7.40
¹ / ₂	³ / ₈	35.16	5.48	46.85	7.31
³ / ₈	1/4	25.85	2.58	33.25	3.31
		Flakiness Inc	dex = 26.72%	Elongation Ind	ex = 34.72%



4. Specific Gravity & Water Absorption (ASTM C-127)

Specific Gravity (oven dried condition)	2.66
Specific Gravity (saturated surface dry condition)	2.71
Apparent Specific Gravity	2.78
Water Absorption (%)	1.63

If you have further query, please do not hesitate to contact the undersigned.

Note:

Best Regards,

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Phone: 092-42-9929202 Cable: UNIVENGTECH Fax: 092-42-9922566

Ref.-----

Date:-----

Mr. Atta Farid Resident Engineer, NESPAK (Job # 4834), Highway Division, Okara.

Subject: <u>Testing of WBM Material</u> Rehabilitation of Okara (Satghara More to Syed Wala Bridge via Satghara), Length = 30.50 km Tehsil & District Okara (ADP 2024-25) Road Rehabilitation Programme-II (GS No. 1799)

Dear Sir,

It is with reference to your letter No. 4834/Okara/Rehab-II/RE/08 dated 10-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 13-02-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	3"	2 ½"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	91.89	64.39	22.23	0.94	0	0	0	0

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

	Los Angeles Abrasion Value (%)	gUsed	Grading		
20.89	20.89		1		

Sieve	e Size	Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
3	2 1/2	15.38	1.25	11.29	0.92
2 1/2	2	6.82	1.88	18.90	5.20
2	1 1/2	0.15	0.07	1.00	0.42
1 1/2	1	0.23	0.05	1.58	0.34
1	3/4	0	0	19.43	0.18
		Flakiness Inc	lex = 3.25%	Elongation Ind	ex = 7.06%



4. Specific Gravity & Water Absorption (ASTM C-127)

Specific Gravity (oven dried condition)	2.72
Specific Gravity (saturated surface dry condition)	2.74
Apparent Specific Gravity	2.77
Water Absorption (%)	0.68

5. Sodium Sulphate Soundness (ASTM C-88)

Sieve Size	Weight of	Weight of	Percentage	Weighted
	Fraction	Fraction	Passing	Percentage
	Before Test	After Test	Designated Sieve	Loss
$2" + 1 \frac{1}{2}"$	(gm)	(gm)	After Test	
	5010.4	4987.3	0.46	0.32
			Total = 0.32%	

If you have further query, please do not hesitate to contact the undersigned.

Best Regards,

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Ref.-----

Date:-----

Engr. Ghulam Rasool Resident Engineer, NESPAK, MCL Nishtar Zone, Lahore.

Subject: <u>Testing of Aggregate</u> (Granular Sub-base) Rehabilitation/Improvement of Streets (P.C.C). Sewerage/Drainage, UC-196, Nishtar Zone MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/NZ/04/79 dated 07-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 04-03-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	1 1/2"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	87.52	53.90	24.73	13.48	5.76

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

Grading	Used	Los Angeles Abrasion Value (%)
A		26.11

Sieve	e Size	Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
1 1/2	1	8.63	1.14	5.54	0.73
1	3/4	16.71	5.96	17.82	6.36
3/4	¹ / ₂	11.00	3.40	15.82	4.90
¹ / ₂	³ / ₈	5.53	0.66	6.57	0.78
³ / ₈	1/4	7.90	0.65	14.78	1.21
		Flakiness Inc	dex = 11.81%	Elongation Ind	ex = 13.98%

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Director Transportation Engineering Laboratory

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Ref.-----

Date:-----

Engr. Ghulam Rasool Resident Engineer, NESPAK, MCL Nishtar Zone, Lahore.

Subject: <u>Testing of Aggregate</u> (PCC Crush) Rehabilitation/Improvement of Streets (P.C.C). Sewerage/Drainage, UC-196, Nishtar Zone MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/NZ/04/76 dated 07-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 04-03-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	94.53	5.08	0	0

2. Los Angeles Abrasion Value Test (ASTM C-131/535)

B 15.81		Grading	Used	T	Los Angeles Abrasion Value (%)
		В			15.81

Sieve	e Size	Individual	Weighted	Individual	Weighted
Passing	Retained	Flakiness	Flakiness	Elongation	Elongation
(in.)	(in.)	Index (%)	Index (%)	Index (%)	Index (%)
1	3/4	0	0	23.77	1.30
³ / ₄	¹ / ₂	4.66	4.17	11.47	10.26
¹ / ₂	³ / ₈	7.57	0.38	13.12	0.67
		Flakiness In	dex = 4.55%	Elongation Ind	ex = 12.22%

Best Regards,

Director Transportation Engineering Laboratory

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Ref.-----

Date:-----

Engr. Ghulam Rasool Resident Engineer, NESPAK, MCL Nishtar Zone, Lahore.

Subject: <u>Testing of Sand</u> Rehabilitation/Improvement of Streets (P.C.C). Sewerage/Drainage, UC-196, Nishtar Zone MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/NZ/04/78 dated 07-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 04-03-2025 through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	#4	#8	#16	#30	#50	#100	#200
%age Passing	100	98.85	97.39	96.40	88.75	7.40	1.26

2.71

1.11

2. Percentage of Fines (ASTM D-1140) *Wet Sieving*

	S	ilt	and Cla	y (%)			
	/				6				

3. Fineness Modulus (ASTM C-142)

Fineness Modulus (%)

If you have further query, please do not hesitate to contact the undersigned.

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Ref.-----

Date:-----

Mr. M. Armughan Khan Deputy Director (QCD), WASA, LDA, Lahore.

Subject: <u>Testing of Sub-base</u> Tender No. XEN(O&M-I)/ST/05/2024-2025 Improvement of Water Supply/Sewerage System in UC-129, Shalimar Zone, Lahore (M/s Mian Hayat & Sons)

Dear Sir,

It is with reference to your letter No. QCD/1746 dated 21-04-2025.

Please find below the results for the tests conducted on the aggregate sample provided to this laboratory through your representative.

1. Sieve Analysis (ASTM C-136)

Sieve Size	1 1/2"	1"	3/4"	1/2"	3/8"	#4
%age Passing	100	84.86	68.48	54.30	45.94	39.38

2. Sodium Sulphate Soundness (ASTM C-88)

Sieve Size	Weight of	Weight of	Percentage	Weighted			
	Fraction	Fraction	Passing	Percentage			
	Before Test	After Test	Designated Sieve	Loss			
$1" + 3/_{1"}$	(gm)	(gm)	After Test				
- /4	1502.1	1479.2	1.53	0.48			
		Total = 0.48%					

3. Los Angeles Abrasion Value Test (ASTM C-131/535)

Grading Used	Los Angeles Abrasion Value (%)
А	27.82

Best Regards,

Director Transportation Engineering Laboratory

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