Transportation Engineering Laboratory (TEL)

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. Jawad Qayyum Khan
Resident Engineer,
NESPAK.

Subject: **Testing of Water Bound Macadam Material**
Restoration/Improvement of Road from M. M. Road (Harnoli Morr) to Piplan, Length = 13.00 km, Tehsil Piplan, District Mianwali

Dear Sir,

It is with reference to your letter No. 4376/JQK/24/7229 dated 15-11-2024.
Please find below the results for the tests conducted on the WBM sample provided to this laboratory on 26-11-2024 through your representative.

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	3”	2 ½”	2”	1 ½”	¾”
%age Passing	100	90.99	50.00	10.00	4.00

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

Specific Gravity (oven dried condition)	2.71
Specific Gravity (saturated surface dry condition)	2.73
Apparent Specific Gravity	2.76
Water Absorption (%)	0.71

3. **Sodium Sulphate Soundness (ASTM C-88)**

Sieve Size	Weight of Fraction Before Test (gm)	Weight of Fraction After Test (gm)	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
2” + 1 ½”	5004.3	4984.9	0.39	0.32
	Total = 0.32%			

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

Grading Used	**Los Angeles Abrasion Value (%)**
1	20.89

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

Best Regards,

Director
Transportation Engineering Laboratory

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

Ref.---------- Date:----------

Mr. Muhammad Imran
Senior Project Manager,
IDAP.

Subject: **Testing of Coarse and Fine Aggregates**
Design and Construction of NETZERO Energy Building, Lahore

Dear Sir,

It is with reference to your letter No. SPM(NETZERO)/IDAP/2024/20916 dated 09-12-2024. Please find below the results for the tests conducted on the aggregate samples provided to this laboratory through your representative.

Coarse Aggregate

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	1”	¾”	½”	3/8”	#4
%age Passing	100	95.48	4.37	0	0

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

Material Finer than #200 Sieve (%)	0.10

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

Specific Gravity (oven dried condition)	2.77
Specific Gravity (saturated surface dry condition)	2.78
Apparent Specific Gravity	2.80
Water Absorption (%)	0.38

4. **Sodium Sulphate Soundness (ASTM C-88)**

Sieve Size	Weight of Fraction Before Test (gm)	Weight of Fraction After Test (gm)	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
$1/2" + 3/8"$	1002.9	993.9	0.90	0.86
	Total = 0.86%			

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

Grading Used	Los Angeles Abrasion Value (%)
B	14.86

6. **Clay Lumps and Friable Particles (ASTM C-142)**

Clay Lumps and Friable Particles (%)	0.14

7. **Unit Weight *(Loose & Rodded)*; (ASTM C 29/C 29M)**

Loose Unit Weight (g/cm^3)	1.40
Rodded Unit Weight (g/cm^3)	1.53

8. **Moisture Content (ASTM C-566)**

Moisture Content (%)	0.06

Fine Aggregate

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	½"	3/8"	#4	#8	#16	#30	#50	#100	#200
%age Passing	100	98.58	96.62	90.35	78.50	62.36	32.51	6.48	1.14

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

Material Finer than #200 Sieve (%)	1.73

3. **Specific Gravity & Water Absorption (ASTM C-128)**

Specific Gravity (OD)	2.69
Specific Gravity (SSD)	2.71
Apparent Specific Gravity	2.75
Water Absorption (%)	0.79

4. **Sodium Sulphate Soundness (ASTM C-88)**

Sieve Size	Weight of Fraction Before Test (gm)	Weight of Fraction After Test (gm)	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
#4 to #8	100	98.8	1.20	0.08
#8 to #16	100	98.9	1.10	0.13
#16 to #30	100	98.7	1.30	0.21
#30 to #50	100	98.8	1.20	0.36
				Total = 0.78%

5. **Organic Impurities (ASTM C-40)**

Organic Impurities	Nil

6. **Clay Lumps and Friable Particles (ASTM C-142)**

Clay Lumps and Friable Particles (%)	0.69

7. **Unit Weight *(Loose & Rodded)*; (ASTM C 29/C 29M)**

Loose Unit Weight (g/cm^3)	1.53
Rodded Unit Weight (g/cm^3)	1.71

8. **Moisture Content (ASTM C-566)**

Moisture Content (%)	0.16

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

Best Regards,

Director
Transportation Engineering Laboratory

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LAHORE – 54890 (PAKISTAN)

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

Ref.---------- Date:----------

Mr. Hafiz Hassan Usman
Resident Engineer,
NESPAK.

Subject: **<u>Testing of Coarse Aggregate</u> (Sargodha Quarry)**
Restoration/Improvement of Metalled Road from Kabirwala Jhang Road up to District Boundary Khanewal, Total Length = 47.00 km (Taken Length = 40.00 km), Tehsil Kabirwala, District Khanewal

Dear Sir,

It is with reference to your letter No. RE/HHU/KWL/RES/03 dated 07-12-2024.
Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 12-12-2024 through your representative.

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	1”	¾”	½”	3/8”	#4
%age Passing	100	86.99	56.00	51.00	37.00

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

Specific Gravity (oven dried condition)	2.84
Specific Gravity (saturated surface dry condition)	2.85
Apparent Specific Gravity	2.88
Water Absorption (%)	0.52

3. **Sodium Sulphate Soundness (ASTM C-88)**

Sieve Size	Weight of Fraction Before Test (gm)	Weight of Fraction After Test (gm)	Percentage Passing Designated Sieve After Test	Weighted Percentage Loss
$^1/_2$” + $^3/_8$”	1003.4	993.2	1.02	0.37
	Total = 0.37%			

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

Grading Used	**Los Angeles Abrasion Value (%)**
B	16.21

5. Flakiness Index (BS 812: Part 105)

Sieve Size		Individual Flakiness Index (%)	Weighted Flakiness Index (%)
Passing (in.)	Retained (in.)		
1	$^{3}/_{4}$	10.95	2.26
$^{3}/_{4}$	$^{1}/_{2}$	12.77	6.28
$^{1}/_{2}$	$^{3}/_{8}$	26.79	2.12
$^{3}/_{8}$	$^{1}/_{4}$	11.51	2.56
		Flakiness Index = 13.22%	

6. Clay Lumps and Friable Particles (ASTM C-142)

Clay Lumps and Friable Particles (%)	0.10

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

Best Regards,

Director
Transportation Engineering Laboratory

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Ref.---------- Date:----------

Mr. Hafiz Hassan Usman
Resident Engineer,
NESPAK.

Subject: **Testing of Bitumen – AASHTO Standard (M-20)**
Restoration/Improvement of Metalled Road from Kabirwala Jhang Road up to District Boundary Khanewal, Total Length = 47.00 km (Taken Length = 40.00 km), Tehsil Kabirwala, District Khanewal

Dear Sir,

It is with reference to your letter No. RE/HHU/KWL/RES/02 dated 07-12-2024.
Please find below the results for the tests conducted on the bitumen sample provided to this laboratory on 12-12-2024 through your representative.

Sr.#	Laboratory Tests	Results
1	Penetration (ASTM D-5)	66 Units
2	Penetration of Residue (ASTM D-5)	58 Units
3	Ductility (ASTM D-113)	Above 100 cm
4	Ductility of Residue (ASTM D-113)	Above 100 cm
5	Softening Point (ASTM D-36)	50.1°C
6	Flash Point (ASTM D-92)	310°C
7	Solubility (ASTM D-2042)	99.80%
8	Specific Gravity Value (ASTM D-70)	1.028
9	Thin Film Oven Test Value (ASTM D-1754)	0.255%
10	Loss on Heating Value (ASTM D-6)	0.241%

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

Best Regards,

Director
Transportation Engineering Laboratory

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Ref.---------- Date:----------

Mr. Hafiz Hassan Usman
Resident Engineer,
NESPAK.

Subject: **Testing of Bitumen – AASHTO Standard (M-20)**
Restoration/Improvement of Metalled Road from Kabirwala Jhang Road up to District Boundary Khanewal, Total Length = 47.00 km (Taken Length = 40.00 km), Tehsil Kabirwala, District Khanewal

Dear Sir,

It is with reference to your letter No. RE/HHU/KWL/RES/01 dated 07-12-2024.
Please find below the results for the tests conducted on the bitumen sample provided to this laboratory on 12-12-2024 through your representative.

Sr.#	Laboratory Tests	Results
1	Penetration (ASTM D-5)	89 Units
2	Penetration of Residue (ASTM D-5)	81 Units
3	Ductility (ASTM D-113)	Above 100 cm
4	Ductility of Residue (ASTM D-113)	Above 100 cm
5	Softening Point (ASTM D-36)	46.1°C
6	Flash Point (ASTM D-92)	290°C
7	Solubility (ASTM D-2042)	99.80%
8	Specific Gravity Value (ASTM D-70)	1.023
9	Thin Film Oven Test Value (ASTM D-1754)	0.228%
10	Loss on Heating Value (ASTM D-6)	0.236%

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

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Ref.---------- Date:----------

Mr. M. Hassan Khan
Resident Engineer,
NESPAK.

Subject: **Testing of Aggregate (Granular Sub-base)**
Rehabilitation/Improvement of Streets, P.C.C., UC 207, 208, 209, 210, 211, 223, 224, 225, 226 Gulberg Zone, MCL

Dear Sir,

It is with reference to your letter No. 4084/103/LDP/GULBERG/04/34 dated 07-01-2025. Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 13-01-2025 through your representative.

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	1 ½"	1"	¾"	½"	3/8"	#4
%age Passing	100	93.97	75.66	43.29	29.33	15.03

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

Grading Used	**Los Angeles Abrasion Value (%)**
A	26.03

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

Best Regards,

Director
Transportation Engineering Laboratory

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

Ref.---------- Date:----------

Mr. Saeed Afzal
Assistant Executive Engineer,
Pakistan Railways, Narowal.

Subject: **Testing of Sub-base for Construction of Road Near Narowal Railway Station**

Dear Sir,

It is with reference to your letter No. A/5 dated 28-01-2025.
Please find below the results for the tests conducted on the aggregate sample provided to this laboratory on 30-01-2025 through your representative.

1. **Sieve Analysis (ASTM C-136)**

Sieve Size	1 ½"	1"	¾"	½"	3/8"	#4
%age Passing	100	87.17	59.59	36.99	28.85	22.02

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

Grading Used	**Los Angeles Abrasion Value (%)**
A	24.28

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

Best Regards,

Director
Transportation Engineering Laboratory

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