



TC-6042

Advanced Diagnostic Laboratory
Dr. Fixit Institute of Structural Protection and Rehabilitation
Ramkrishna Mandir Road, Andheri(E),
Mumbai-400 059, Phone: 28357822

DR. FIXIT INSTITUTE

OF STRUCTURAL PROTECTION & REHABILITATION

TEST REPORT

Report No.	: TC604223000000642F	Date: 11/01/2024
Job Reference	: 2114	
Name & address of client	: National High Speed Rail Corporation Limited (NHSRCL)	
Engineer	: TCAP	
Customer Sample Reference	: Rock Boulder (Fine Aggregate Wash Sand, Ultramold Sand) Source: Waliv Nalasopara (E) Palghar, M/s Trinity Sand & Minerals Pvt Ltd RFI No. : 0000000748	
Project	: Design and Construction of 135.450 km Long Viaduct (MAHSR Ch. +21.150 km-+156.600 km) including 3 stations (Thane, Virar, Boisar), Tunnels, Earth Structures And Maintenance Depot for MAHSR Project	
Date of Sample Received	: 26/12/2023	
Description of sample	: Rock Boulder	
Duration of testing	: 08/01/2024 to 11/01/2024	
Test Method Followed	: As per IS-2386: Part VIII-1963 (Reaffirmed 2021)	
Discipline	: Mechanical	
Group	: Building Material	

1.1 Sample detail

Approximately 18 kg boulder sample was sent by M/s Kratos Concrete, Thane to Advanced Diagnostic Laboratory, Dr. Fixit Institute, Andheri (E), Mumbai for petrographic examination of rock boulders for aggregate as per IS 2386: Part VIII.

1.2 Visual/Macroscopic Observations

Rock boulders were observed to be dark grey coloured, fine grained, mafic volcanic igneous rock. Rock was identified to be basaltic rock. Particles were found to be hard,





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fresh and dense. Surface texture was found to be crystalline (**Figure-1**). Any kind of organic or inorganic coating was not found in the particles.



Figure-1: Photograph is showing basaltic rock boulders with crystalline surface texture.

1.3 Microscopic Observations

Four representative thin sections one from each boulder were prepared for microscopic observations. Microscopic analysis was performed under optical microscope using low to high magnification. Quantification (modal analysis) of the rock was done by using automatic point counter. Petrographic description of the basaltic rock is as follows.

In all four thin sections, similar mineralogical and textural characterizations were observed. Minerals in the groundmass of basaltic rock were identified to be plagioclase feldspar, clinopyroxene, olivine, altered mafic (in minor percentage) and opaque minerals (**Figure-2 A to F**). Plagioclase mineral grains were found to be most abundant in the rock. Grains were observed to be in fresh condition, lath shaped, multi-oriented,





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uniformly distributed throughout the groundmass of the rock. Clinopyroxene grains were also found to be in fresh condition. Ophitic texture was commonly observed in the groundmass that is intergrowth texture between clinopyroxene and plagioclase feldspar. Plagioclase phenocrysts were also observed in the rock. These phenocrysts represent the porphyritic texture in the rock.

Altered mafic grains were observed to be in minor percentage. These grains were formed due to complete alteration of mainly olivine minerals and converted to chlorite group of minerals. Fresh to partially altered olivine mineral grains were also observed in the rock. Opaque minerals were found cubic formed, randomly distributed throughout the rock. Grains were found to be mostly in fresh condition and mineral was identified to be iron oxide. Modal analysis of the rock is given **Table-1**.

Table-1: Modal analysis of groundmass of basaltic rocks

Mineralogy	Modal Analysis (Average of About 300 Points)	Granularity		
	Approximate %age	Maximum (μm)	Minimum (μm)	Average (μm)
Plagioclase Feldspar	42	350	25	200
Clinopyroxene	39	300	20	150
Olivine	08	-	-	-
Altered Mafic	03	-	-	-
Opaque	07	-	-	-
Others (Clays etc.)	01	-	-	-

Note: Phenocrysts were not counted in the above analysis

2. Overall Evaluation

On the basis of mineralogy, textural characteristics, microstructures and modal analysis, the summary of overall evaluation is given in Table-2.





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Table-2: Summary of observations

Aggregate Type	Boulder Sample	
Maximum Size	NA	
Particle Shape	NA	
Cementing Materials	None	
Rock Type	Basaltic rock of Basalt group of rocks as per Appendix-C of IS 383-2016.	
Surface Texture	Crystalline	
Inorganic Coating	None	
Organic Coating	None	
Deleterious Materials (Strained quartz and other reactive minerals)	None	
Expansive Mineral(s)	None	
Condition	Fresh and Dense	100%
	Slightly Weathered	None
	Highly Weathered	None
General Comment	Basaltic rock boulders were observed to be hard, fresh and dense. Grains were well interlocked through intergrowth texture. Alteration in the minerals was uncommon. Deleterious mineral/material in the rock was not found.	

Concluding Remarks

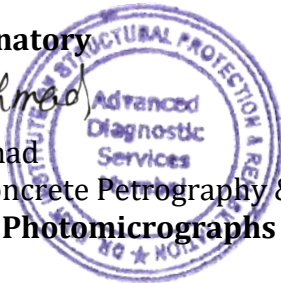
Overall, boulder sample was found in **“Satisfactory”** condition as per petrographic examination.

Authorized Signatory

Mashud Ahmad

Dr. Mashud Ahmad
Section Head-Concrete Petrography & Microscopic Services

Note: Enclosed Photomicrographs



Remarks:

1. DFI-SPR has not drawn the sample and hence does not vouch for its representativeness. The report and comments refer only to the sample tested.
2. This petrographic report shall not be reproduced wholly or in part and cannot be used evidence in the court of law without written approval of Dr. Fixit Institute, Mumbai.





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Photomicrographs

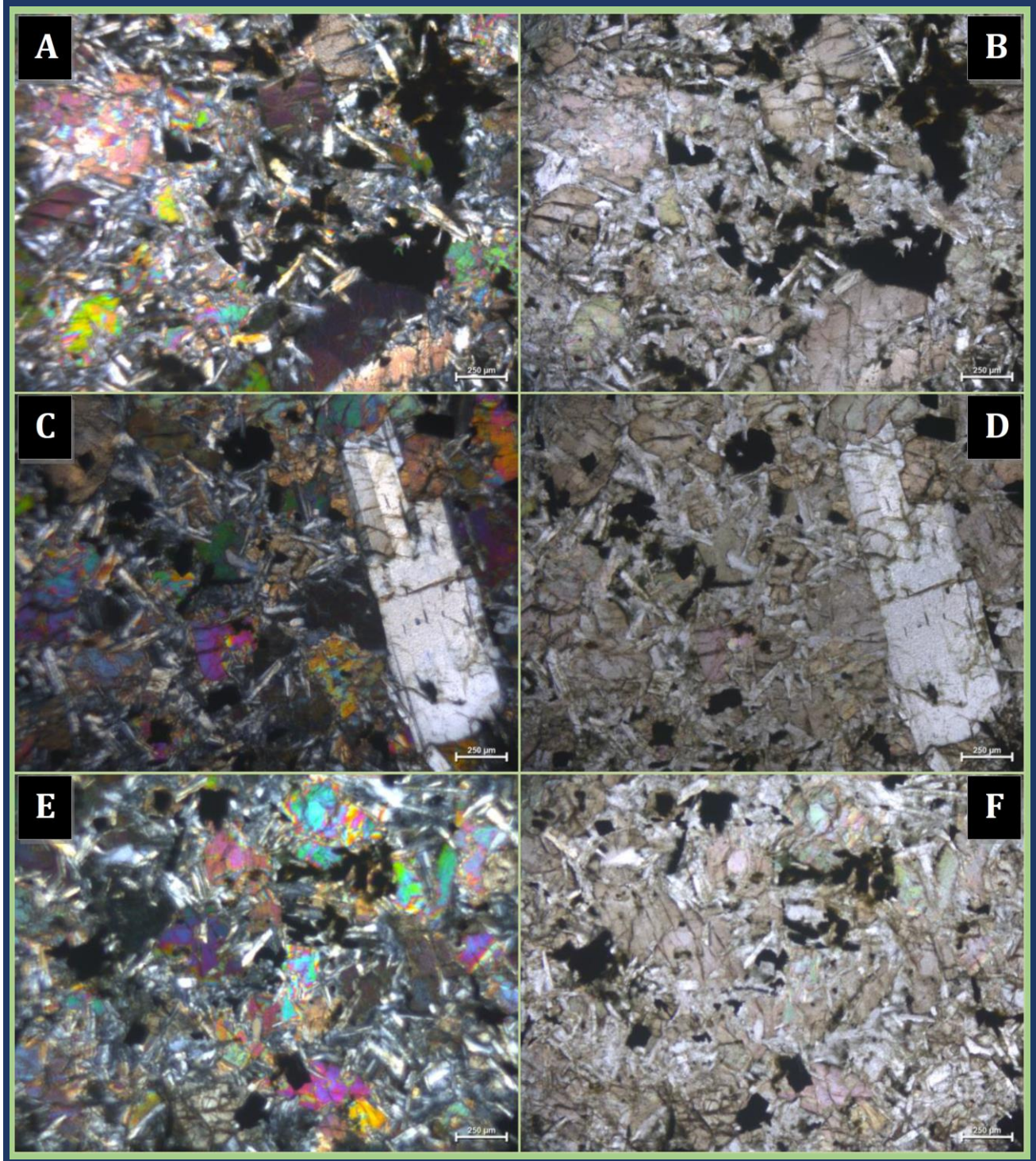


Figure-2: Photomicrographs of basaltic rock, **A to F**) Distribution of plagioclase feldspar, clinopyroxene, altered mafic, olivine and opaque minerals in the groundmass of basaltic rock. (A, C & E: 5x, XPL and B, D & F: same photomicrograph as A, C & E respectively in PPL). [XPL = Cross polarised light and PPL = Plane polarised light].

