Improvement of Road Aggregates Testing in New Zealand

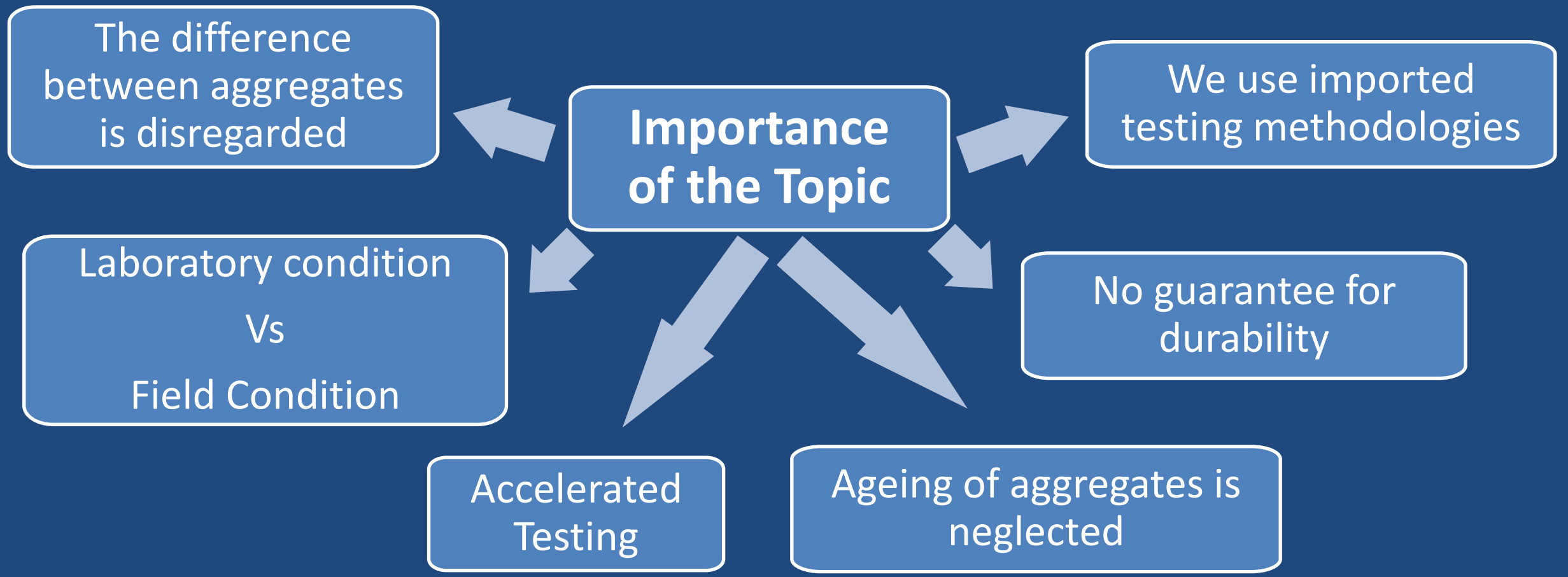
Ebrahim Sangsefidi

Graduated PhD student, University of Auckland

Outlines

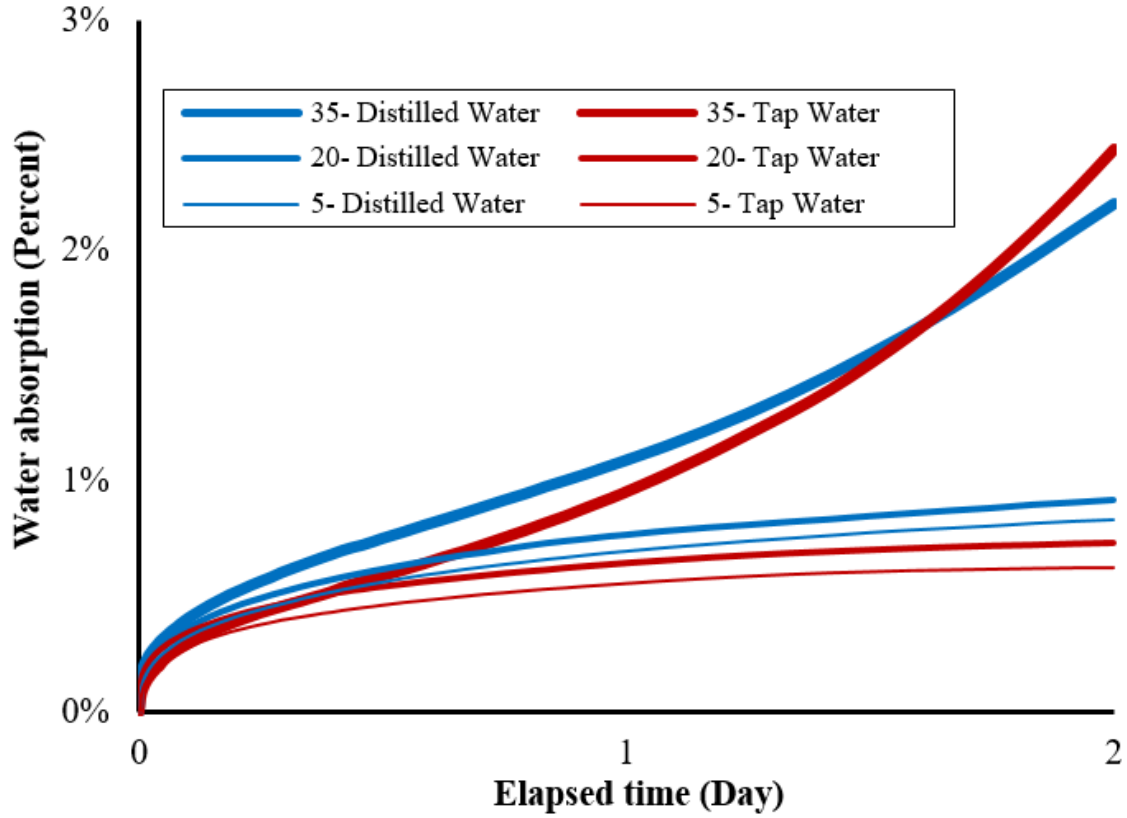
- Problem Statement
- Introducing
  - Continuous Water Absorption (CWA) Test
  - Modified WQI
  - Field-based Testing
- Weatherability of aggregates in the compacted condition
- Conclusion

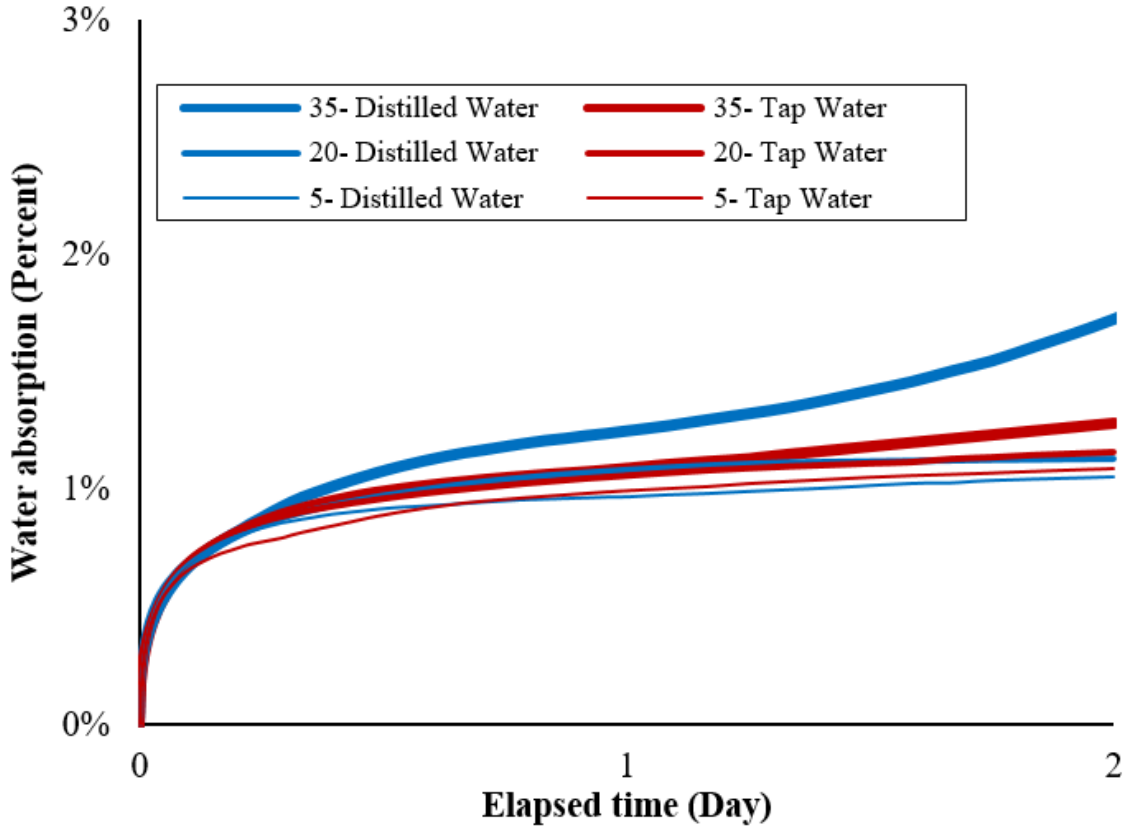
Problem Statement



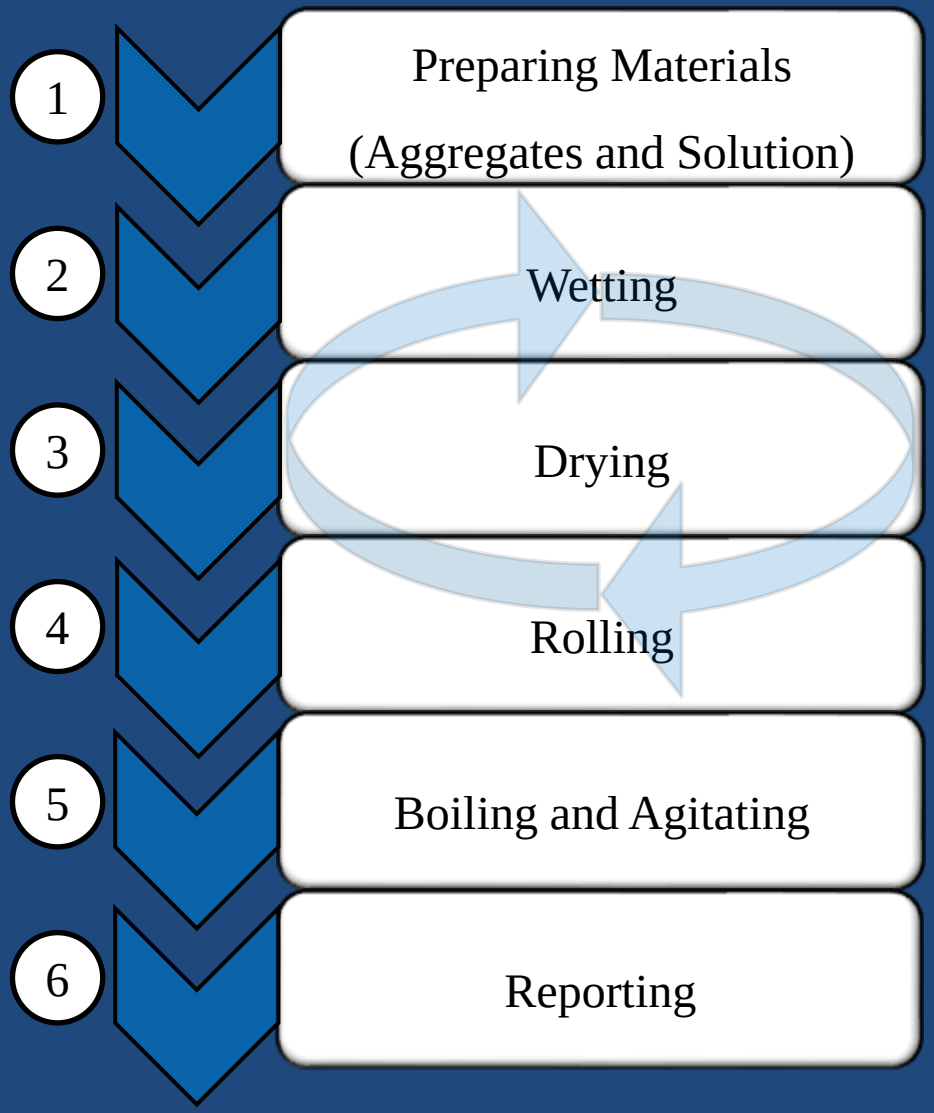
CWA testing Methodology

CWA Testing Results





Weathering Evaluation in Laboratory



Modifying Tradition WQI Test

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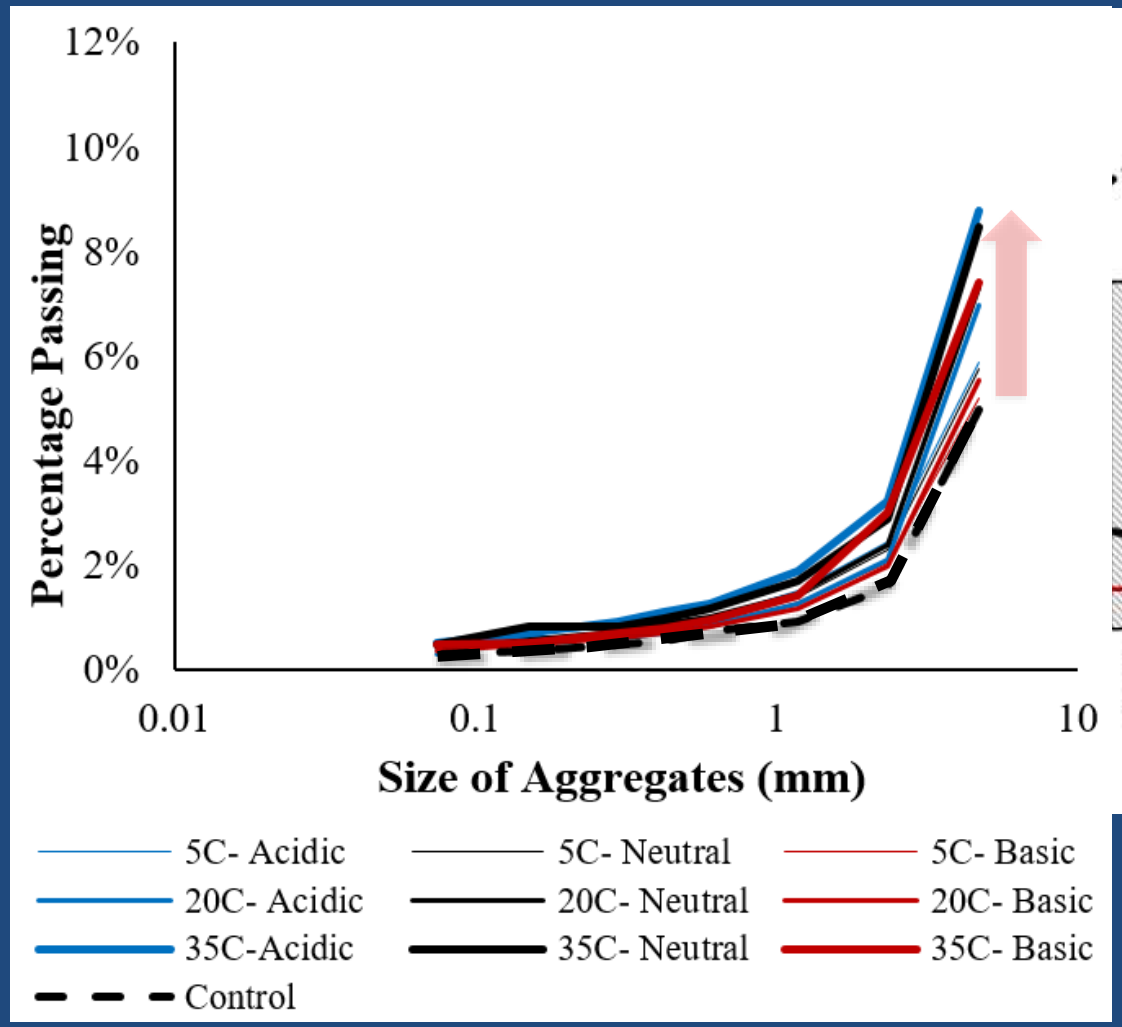
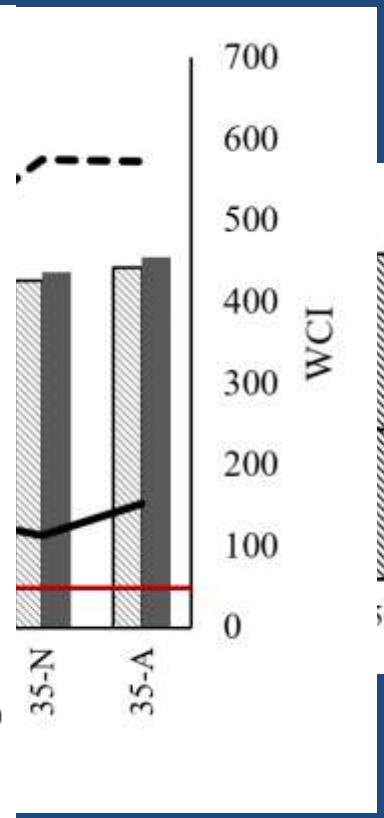
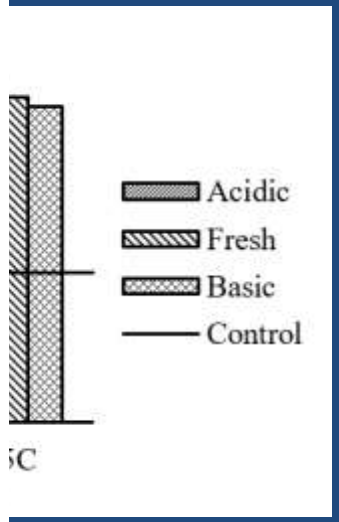
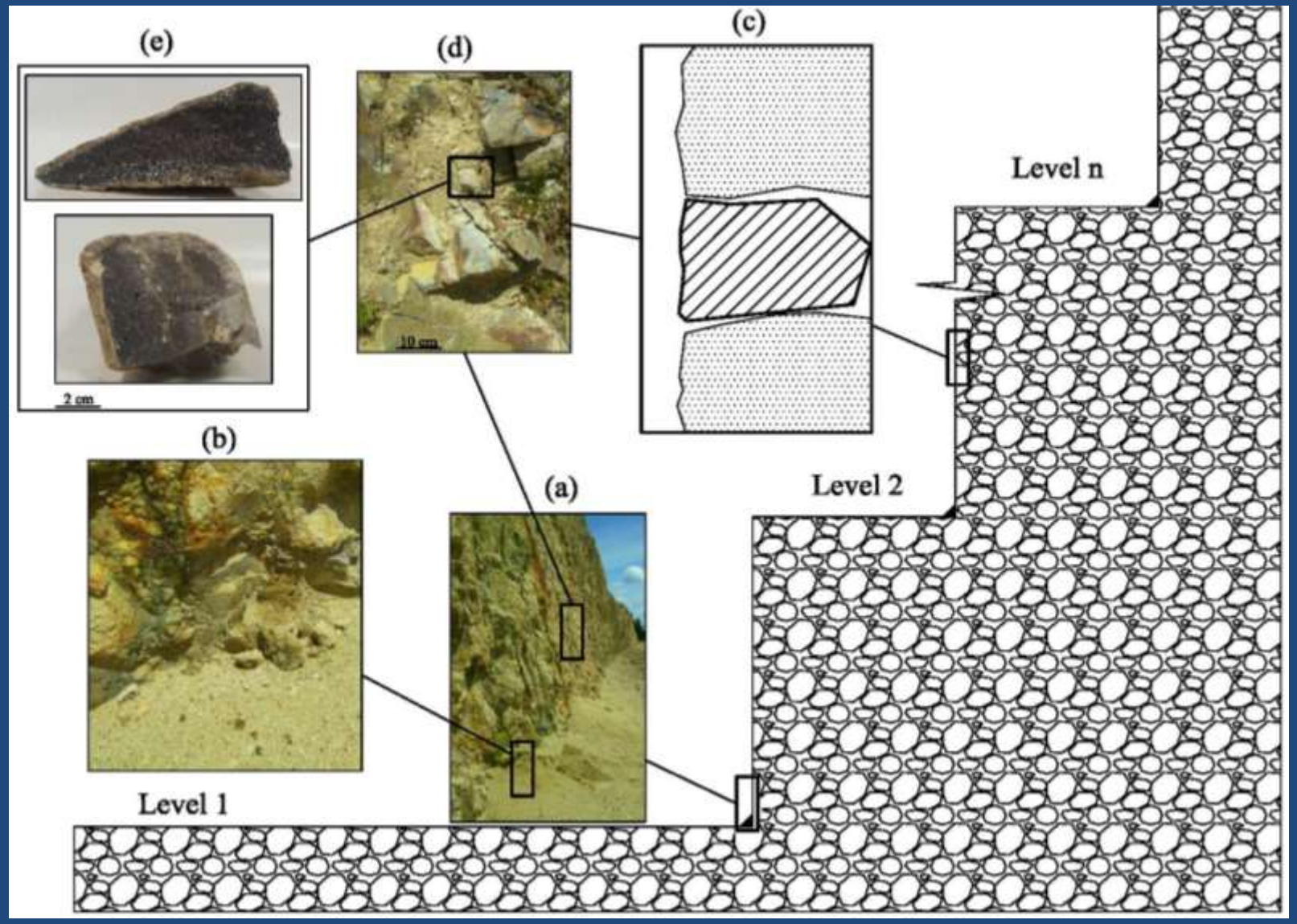
- Produced Fines
- Gradation of aggregates
- Micro-Deval







In- Situ testing:
Quarrying sampling methodology



Weathering process of road aggregates in the quarry

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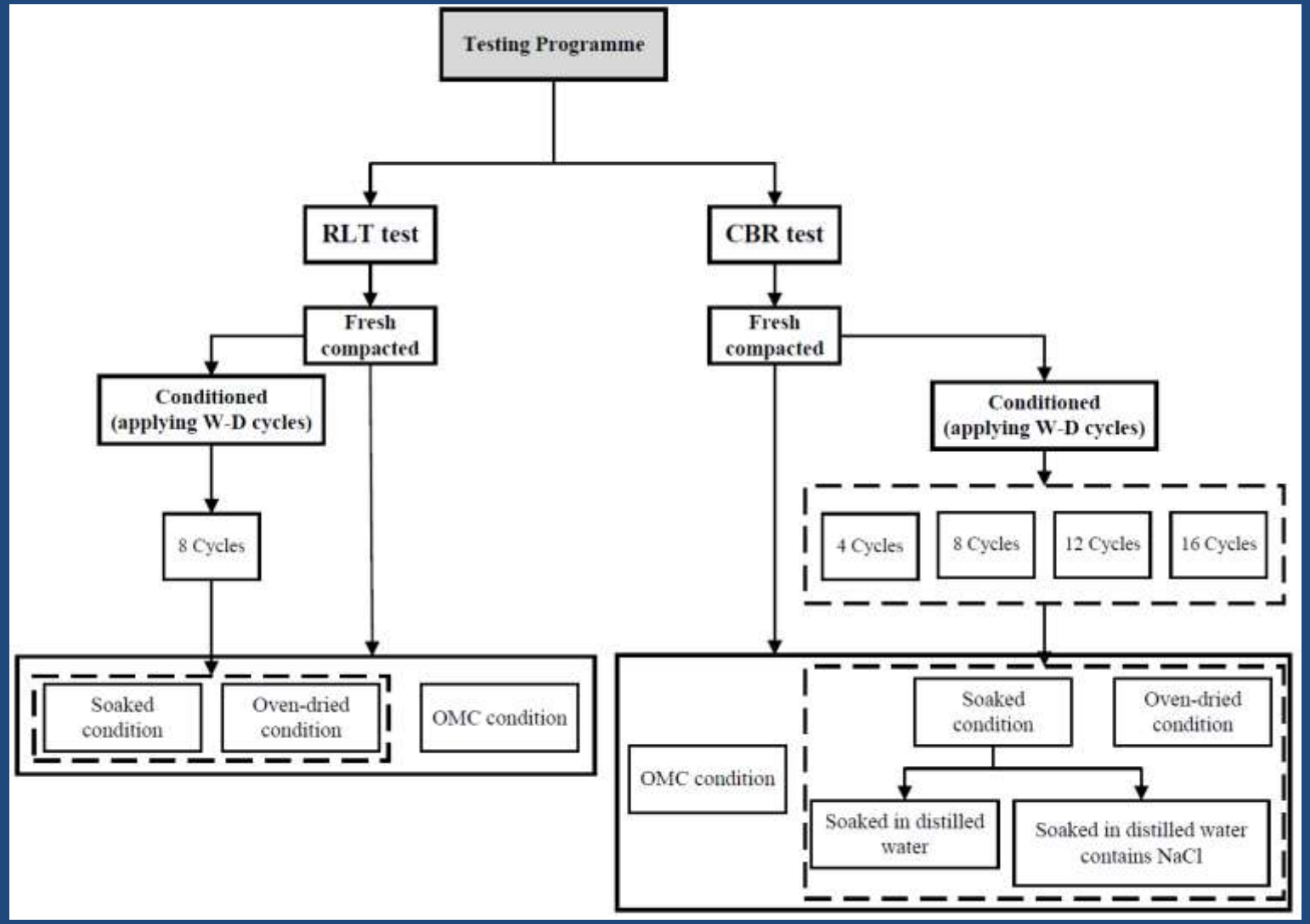
- CI
- Image Processing
- XRD
- XRF
- Thin Section

a)

Textural Features	Contrast		Entropy		Energy		Homogeneity	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Premium aggregates								
Unweathered	220.98	89.25	6.57	0.79	0.00330	0.00533	0.2790	0.1065
Stage- I	375.19	119.94	7.30	0.27	0.00047	0.00030	0.1827	0.0333
p-value ** (t-test result)	0.000028 (H_0 is rejected)		0.000442 (H_0 is rejected)		0.024681 (H_0 is rejected)		0.000602 (H_0 is rejected)	
Marginal aggregates								
Unweathered	220.73	50.65	5.89	0.42	0.00896	0.0080	0.3629	0.0840
Stage- I	434.21	283.11	6.97	0.58	0.00350	0.0085	0.1912	0.0667
p-value (t-test result)	0.0084 (H_0 is rejected)		0.000016 (H_0 is rejected)		0.116 (H_0 is not rejected)		0.000017 (H_0 is rejected)	

b)

Effect of Weathering on Compacted Aggregates



Effect of Weathering on Compacted Aggregates

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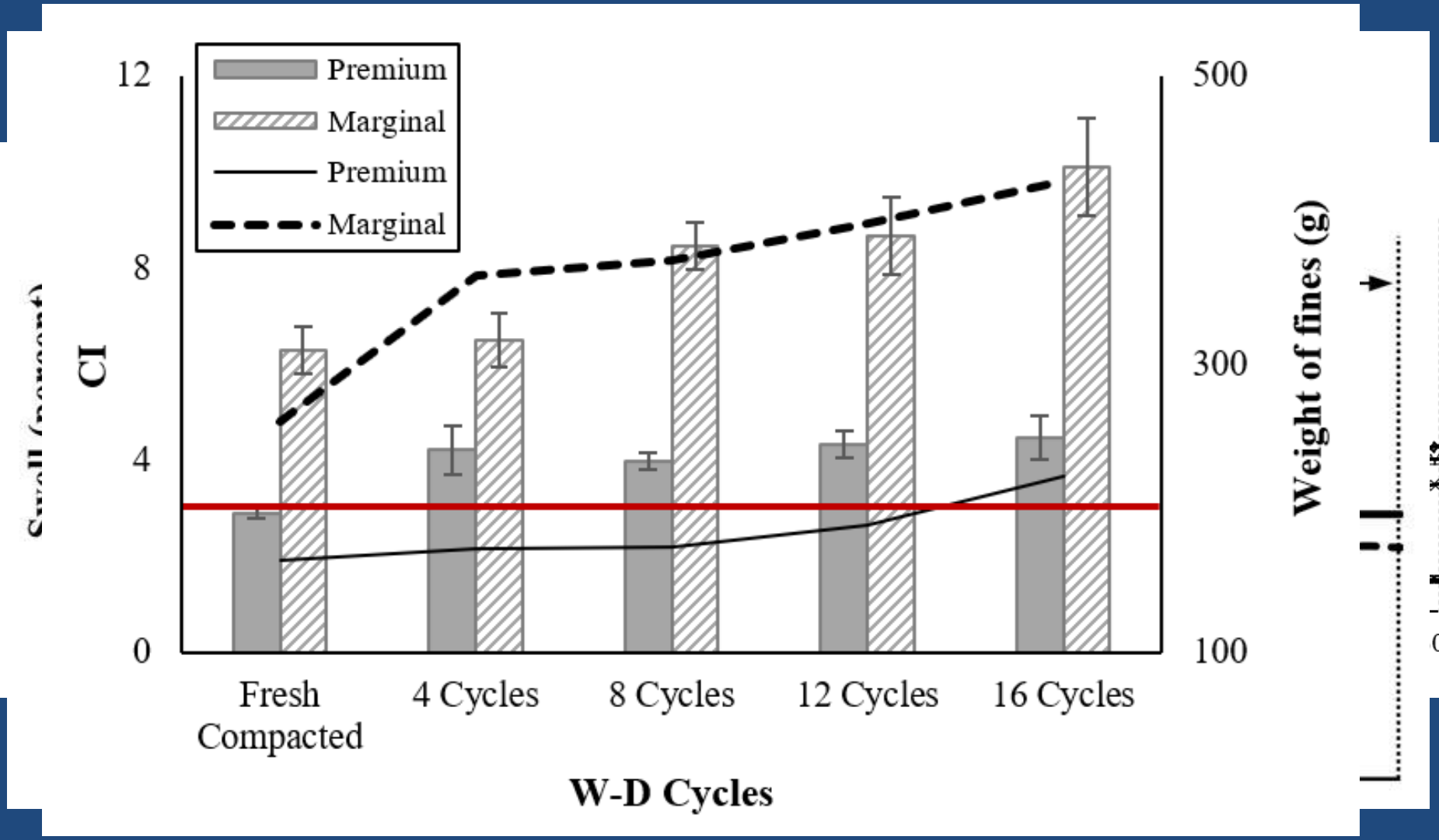
- Produce fines
- CBR Results
- Swelling properties
- RLT results



Conclusion

- UGMs do not have constant properties.
  - Change the properties of fines
  - Weaken coarse aggregates
- Pass/Fail Criteria do not consider the durability of aggregates.
  - Properties of aggregates
  - Environmental condition
- Old-traditional testing methodologies need to improve.
  - More detailed testing
  - New laboratory equipment

Thank you for your attention

Contributions

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Problem Statement