

# Laboratory Evaluation of Strength, Permeability and Durability of Recycled Concrete Aggregate (RCA) for Pavement Base Construction



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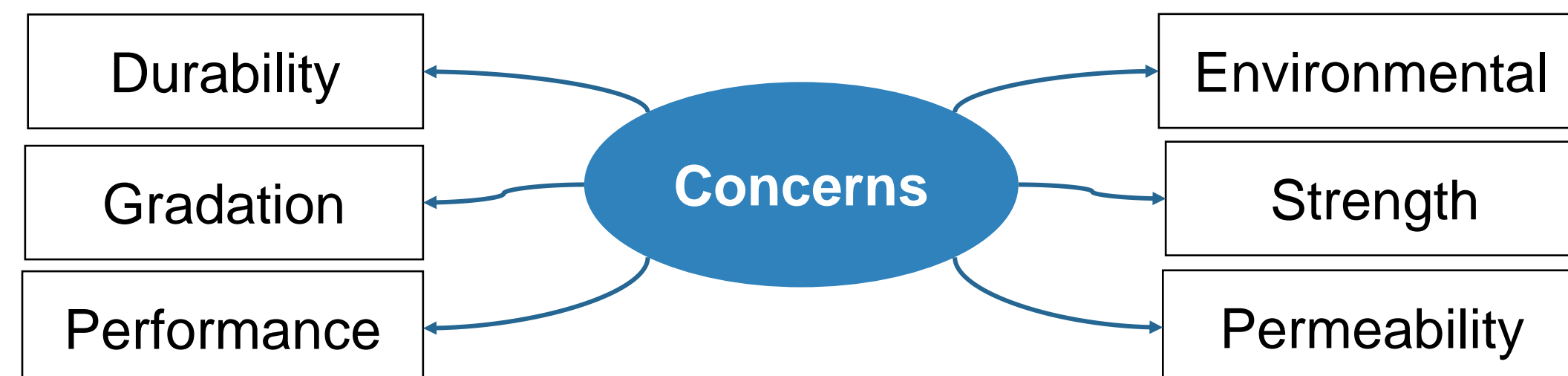
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## Introduction

- RCA is used for paving applications in at least 41 states.
- C&D average production in the US is 600 million tons in 2018.
- Used in pavements (base and Subbase), ground improvement (fills and erosion control), pipe bedding, and new concrete.



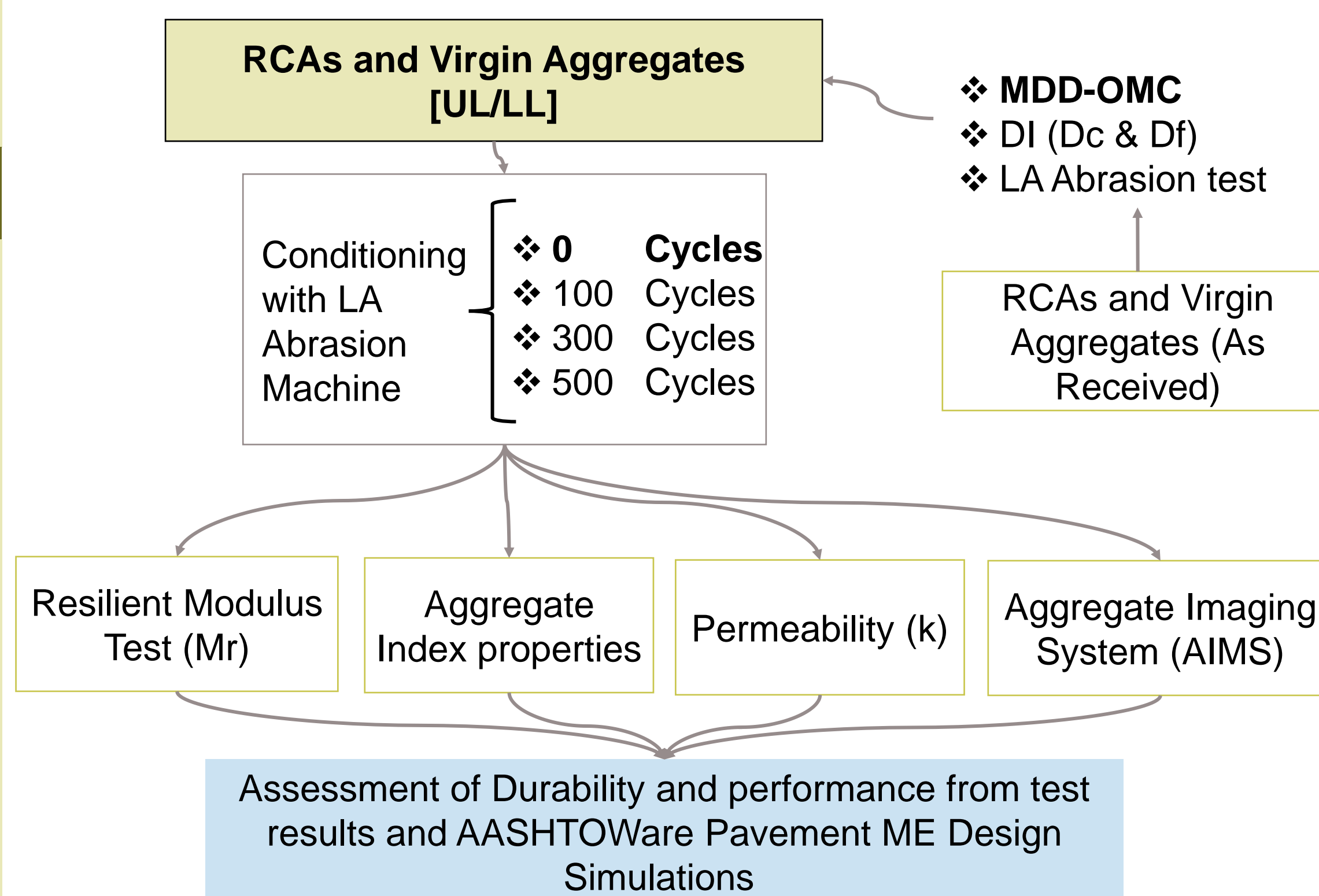
Reduced Land Disposal      Conservation of Resources      Economic Benefits



## Objectives

- Generate Resilient modulus (Mr) data of common RCAs in Oklahoma (Pavement Design)
- Evaluate Permeability (k) and Durability Index (Dc & Df) of common RCAs in Oklahoma
- Evaluate changes in properties of RCA due to loss of durability (Effect of Construction and Durability)

## Methodology

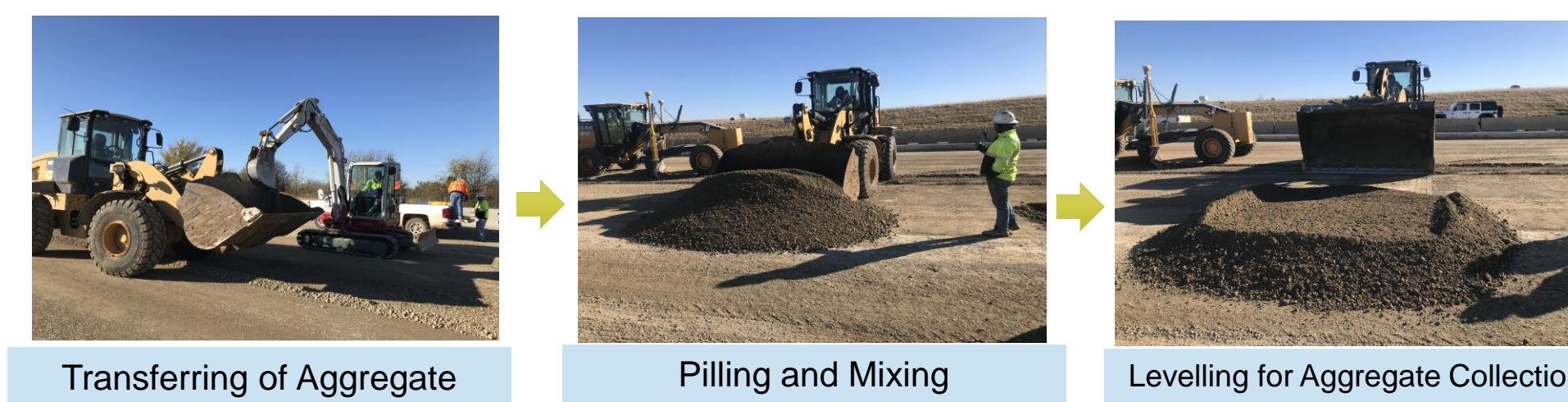


## Test Methods

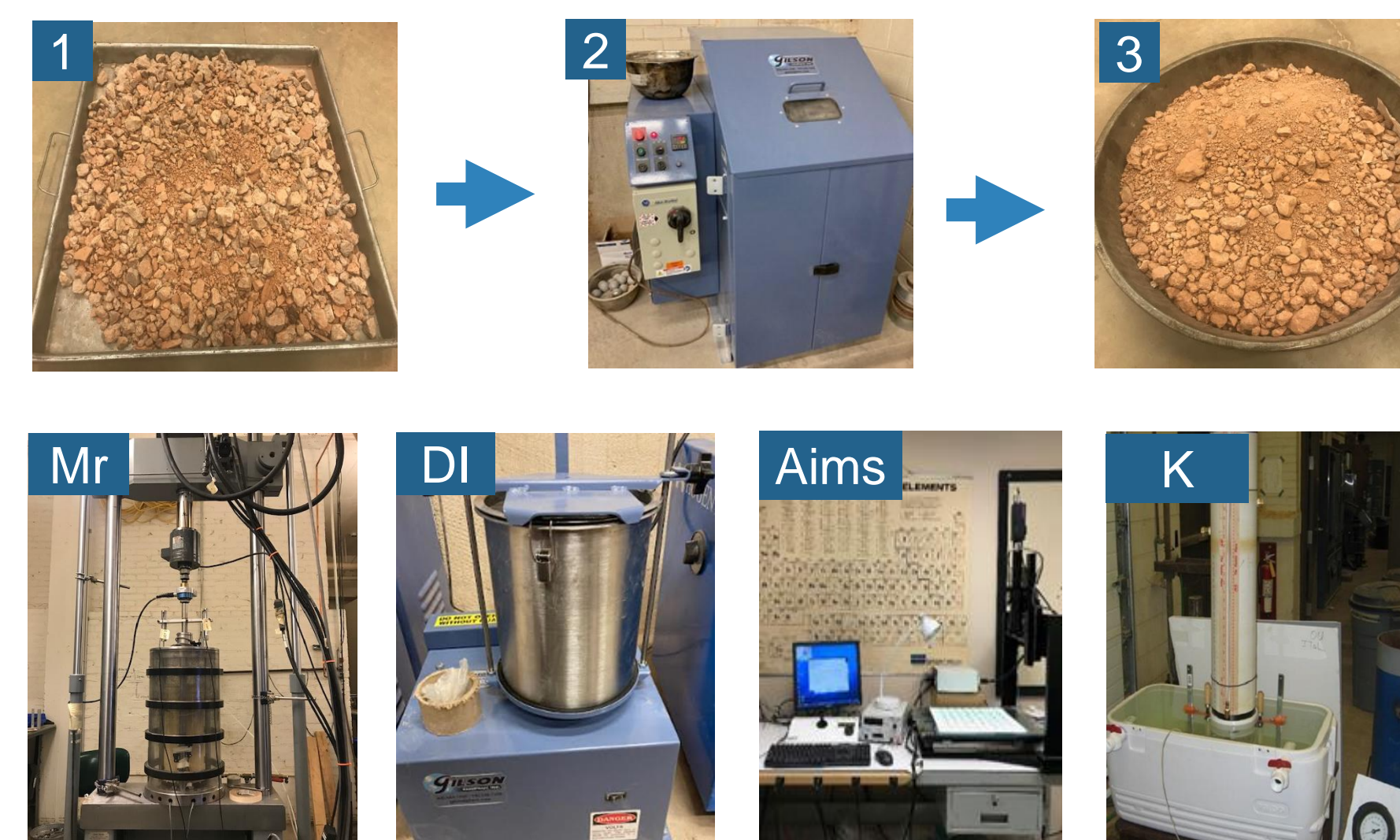
### Aggregate Sources



### Aggregate Collection

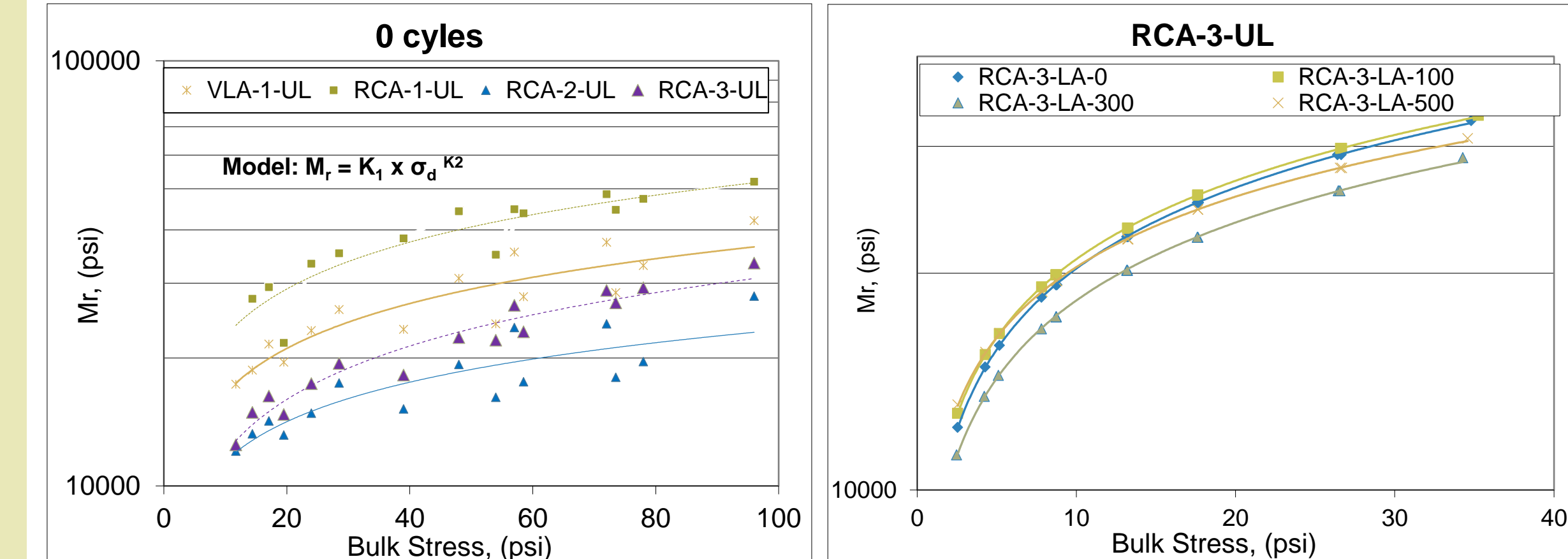


### Tests on Aggregate (Type A)

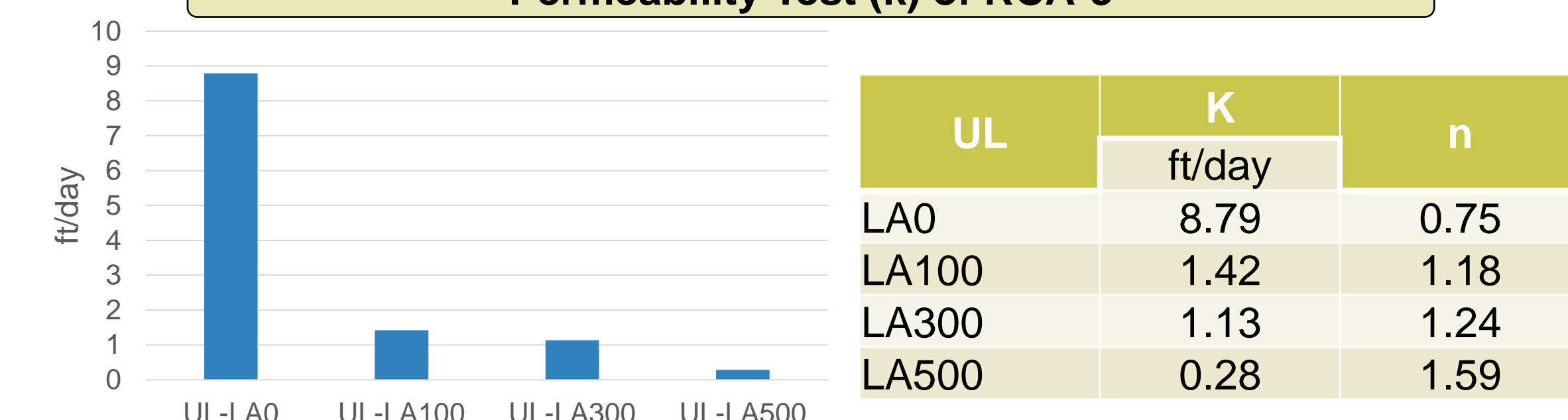


## Results

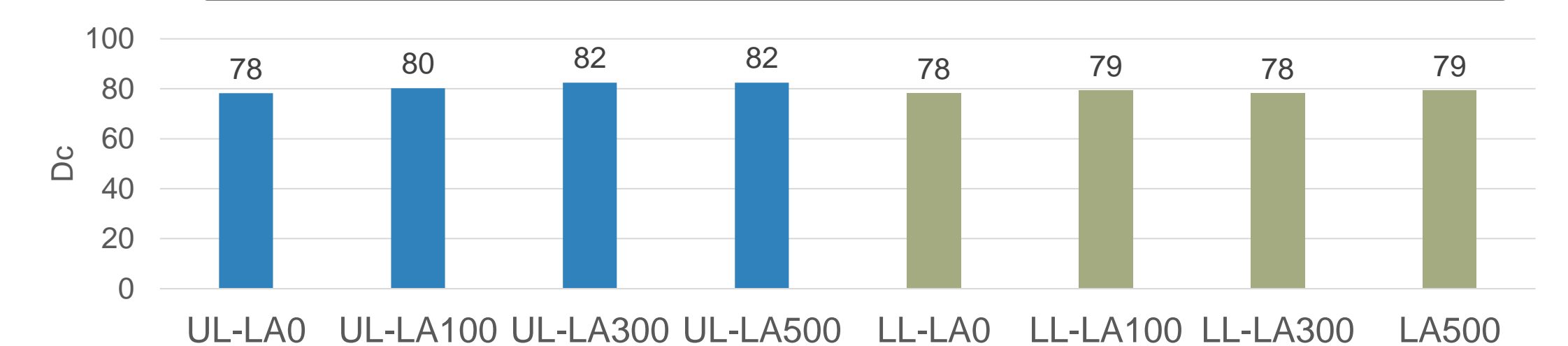
### Resilient Modulus Test Results



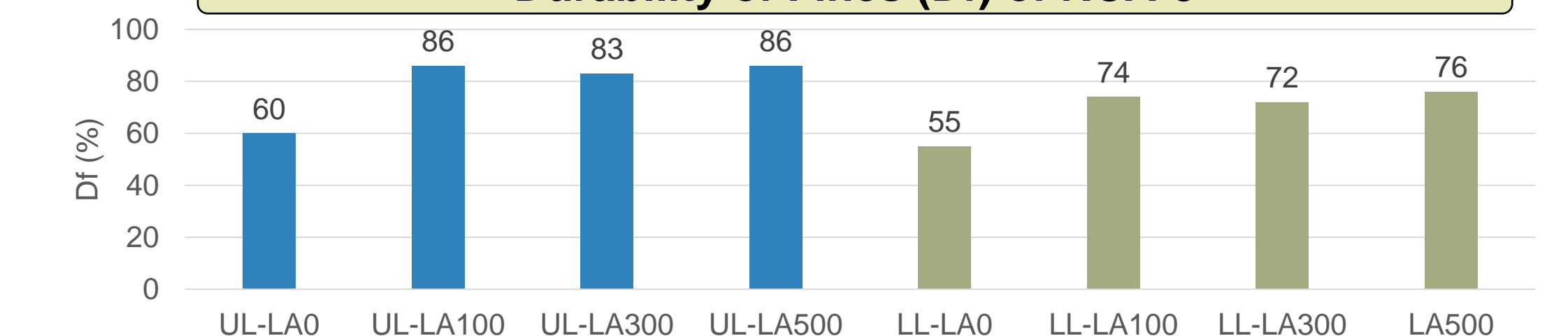
### Permeability Test (k) of RCA-3



### Durability of Coarse (Dc) of RCA-3

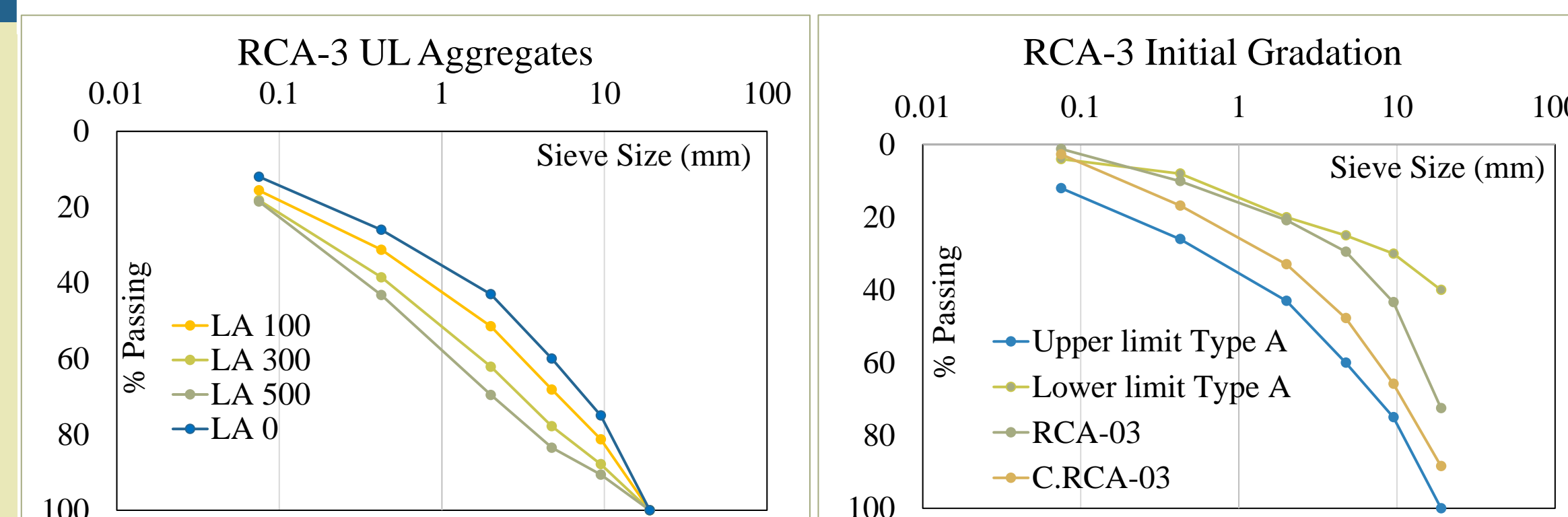


### Durability of Fines (Df) of RCA-3



## Results

### Gradation of Aggregate



### LA Abrasion Loss from Different Cycles

Aggregate	100 cycles	300 cycles	500 cycles
VLA-1 (%)	N/A	17.3	29.2
RCA-1 (%)	11.4	28.2	42.8
RCA-2 (%)	12.0	26.7	38.4
RCA-3 (%)	10.9	12.5	23.2

## Conclusions

- Mr of recycled aggregates vary with aggregate gradation and quality.
- The recycled in-place RCAs was found to have improved quality.
- Contaminants were found in all recycled aggregates.
- The Durability Index for RCA-3 shows that even as the aggregate is mechanically degraded the durability values are maintained or improved
- Field compaction during construction is similar to 200-300 LA abrasion cycles.

## Acknowledgement

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