

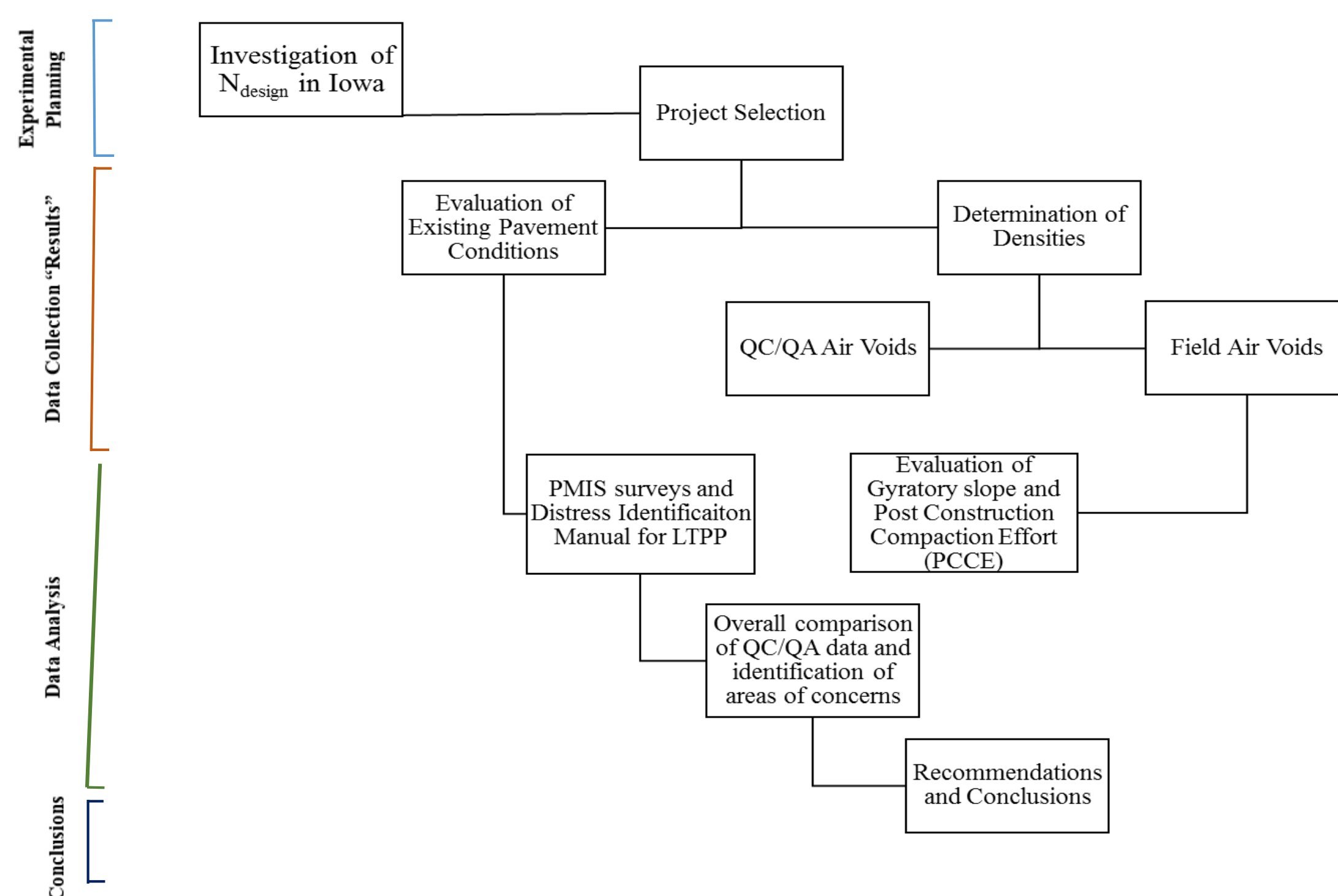


Validation of N_{design} in Iowa

Abstract

The design number of gyrations, or N_{design} in the Superpave mix design method will be validated in the State of Iowa. Pavements constructed in 2011 were randomly selected to determine if 4% air voids was achieved four years post-construction. The quality control and quality assurance (QC/QA) information at construction was matched with four year post-construction densities from field cores to determine if traffic loading is adequately compacting the surface mix. Over-compaction during design may lead to under-compaction in the field as well as reduce asphalt content and affect overall durability.

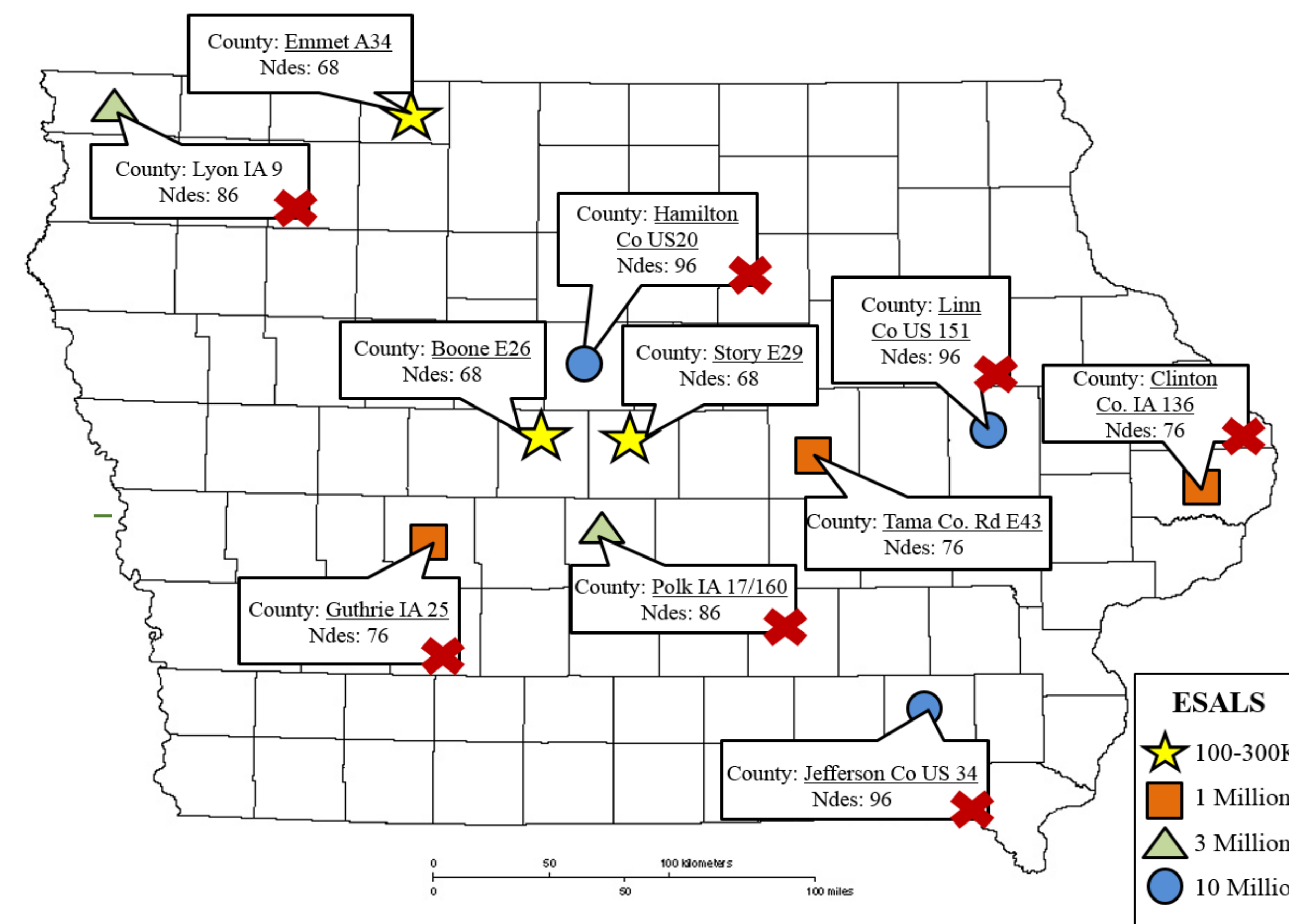
Experimental Plan



Results and Analyses

G_{mm} (QC/QA) VS. G_{mm} (T 209)

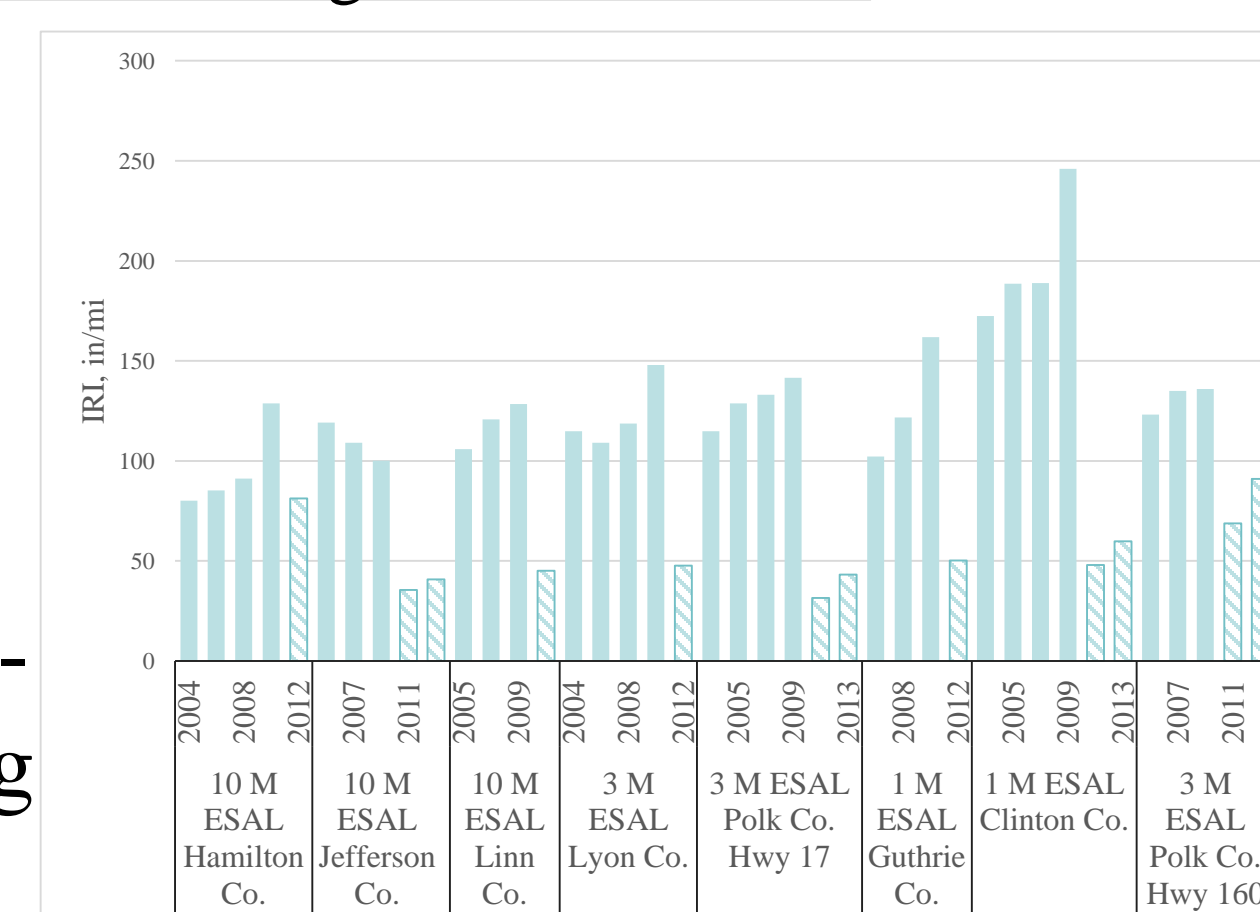
- The $G_{mm(QC/QA)}$ and $G_{mm(AASHTO T 209)}$ in the laboratory were similar.
- G_{mm} can be used from QC/QA



Results and Analyses

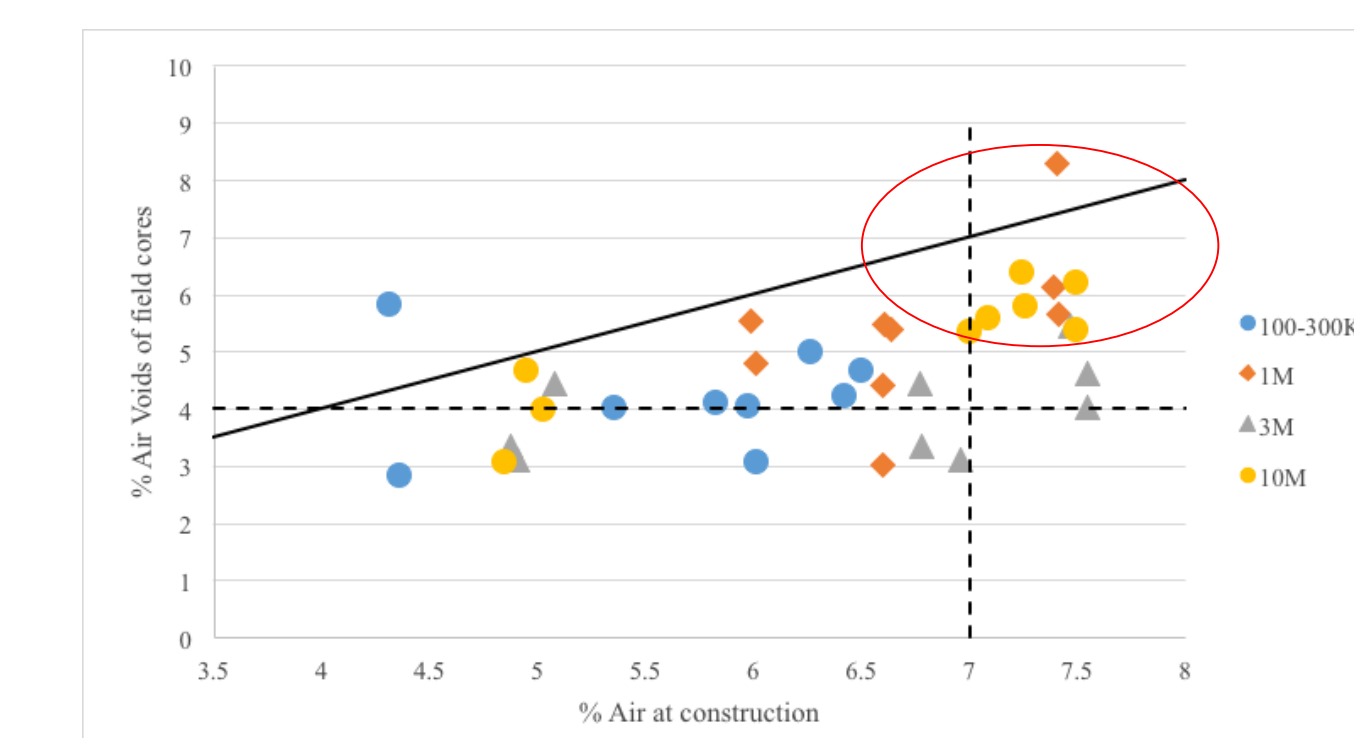
Pavement Performance Evaluation using PMIS and LTPP

- International Roughness Index (IRI) was used as an overall indicator of ride quality.
- Highest IRI was 1M ESALs located in Clinton County
- Overall, showed adequate post-construction performance using IRI metric



Air Voids at construction and four years post-construction

- 33% in 1M and 3M and 56% for 10M ESALs will never reach
- Only 11% of samples collected reached 4% target air voids (mainly from projects at 100-300K ESALs)

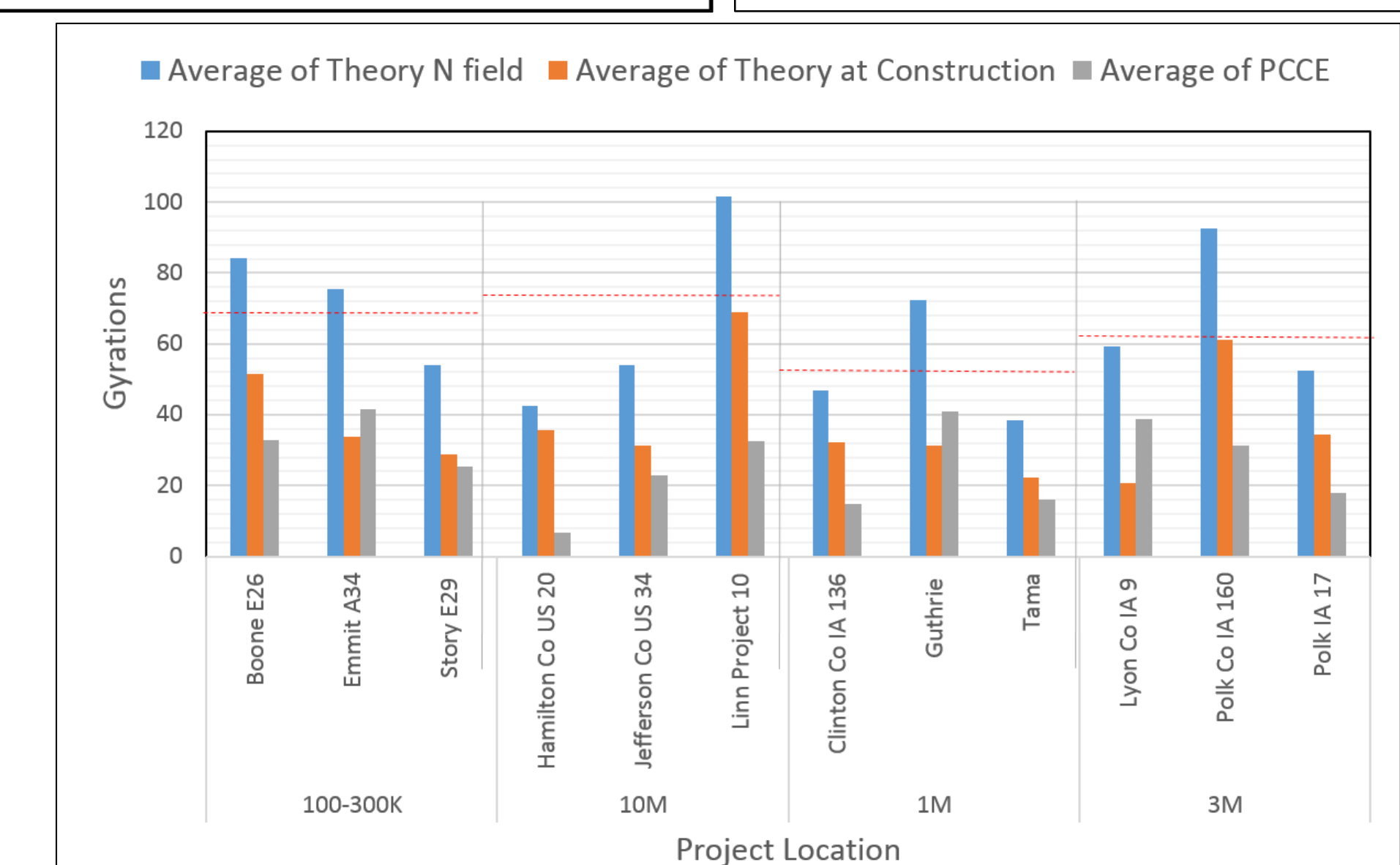
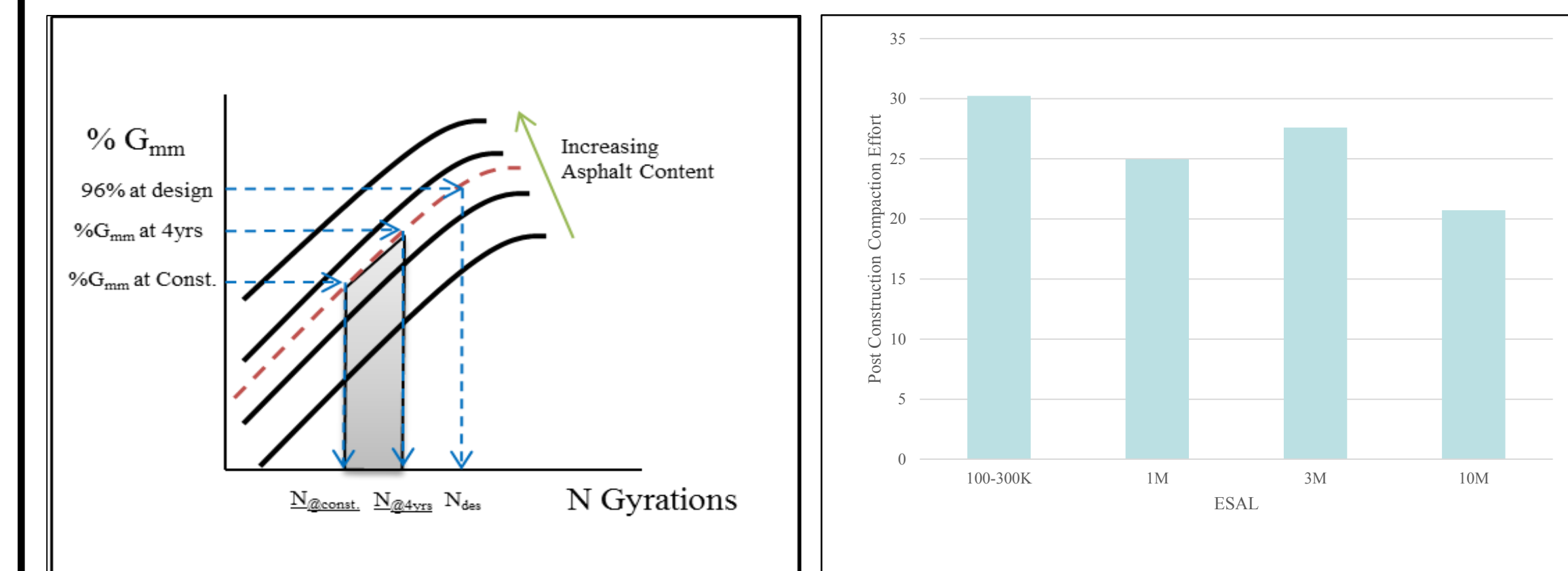


*Ultimate pavement density not achieved in majority of the projects

Results and Analyses

Gyratory Compaction Slope

- The difference in theoretical N_{design} four years post-construction and at construction indicates the applied post-construction compaction effort (PCCE)
- The least traffic volume experienced the most compaction effort due to traffic and vice versa



Conclusion

- Over-compaction during laboratory design, leads to under-compaction in the field.
- Difficulty in compaction during construction results in decreased durability and increased fatigue cracking.
- Majority of pavement sections did not reach ultimate pavement density
- PCCE decreases with increasing ESAL levels
- Require further evaluation of mix design (e.g., agg. source)