REVIEW OF MRWA DENSITY COMPLIANCE SYSTEMS FOR SUBGRADE AND EMBANKMENT CONSTRUCTION

Review of various aspects related to density compliance of sand subgrade and embankment construction works

In an effort to assist Main Road WA find more efficient and cheaper methodologies, WARRIP reviewed several aspects of the Main Roads WA density compliance process for the compaction of subgrade and embankments to identify areas for future investigation.

Background

The current density compliance processes for subgrade and embankment construction used by Main Roads WA have operational limitations, require destructive testing and can produce varying results. This process is time consuming and resource intensive.

WARRIP reviewed several aspects related to the density compliance process to identify alternatives to the current methods which can optimise time and reduce cost, but also ensure a high-quality outcome.

Approach

- Review alternative non-nuclear alternative to the nuclear density meter (NDM)
- Review non-destructive methods for assessing dry-back moisture of a compacted sand
- Review the applicability of dry density ratio in relation to sand material
- Develop a framework to guide contractor Perth Sand Penetrometer (PSP) method specification submission
- Review intelligent compaction technologies for quality control documentation purposes

This project undertook a vast review of national and international literature on the above aspects related to density compliance to identify more efficient techniques which could be investigated further for inclusion into MRWA specifications.

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Outcome

The literature review identified some areas which warrant further investigation through separate WARRIP projects. These future projects included:

- Undertake a field trial of the light falling weight deflectometer, soil density gauge and static plate load test as non-nuclear alternatives to the NDM
- The potential use of the NDM as a non-destructive method to measure in situ moisture content
- Undertake a laboratory investigation to understand the repeatability of the density index method with modern equipment and local materials
- Undertake field trials of intelligent compaction technologies to understand barriers to implementation
- Trial the PSP framework during a future construction project to determine suitability and applicability for practical use.

In depth review of national and international practice for density compliance processes to identify improved methods

Submission of a PSP method specification framework to be trialled during a future construction project

Future WARRIP projects to be scoped based on several promising findings

FUTURE CONSIDERATIONS

Field trials of non-nuclear alternatives such as the light falling weight deflectometer, static plate load and soil density gauge

Field trials of intelligent compaction to test QA/QC documentation quality

Laboratory investigation into repeatability of density index for sands