

Quarterly Progress Report:

Project Number and Title: C7.2018: Alternative Cementitious Materials (ACMs) For Durable and Sustainable Transportation Infrastructures

Research Area: New Materials for Longevity and Constructability

PI: Professor Eric N. Landis, Ph.D., University of Maine

Postdoctoral Research Associate: Hosain Haddad Kolour, Ph.D., University of Maine

Reporting Period: Jul 2020 to Sep 2020

Submission Date: 30 Sep 2020

Overview: (Please answer each question individually)

Summary of activities during the reporting period:

- Casting new specimens for carbonation tests. Conducting compressive strength tests, shrinkage tests, bulk and surface resistivity tests.
- Designing series of tests for alkali activated slag (AAS) concrete.
- Literature review.
- Presenting our project at the 2020 TIDC Annual Conference (Wednesday, August 12th 2020)

During last three months, based on previous literature review, we designed some tests for concrete carbonation. Then we started conducting the tests. Tests include compressive strength at different ages (3, 7, 28, and 56 days). Free shrinkage tests, bulk and surface resistivity tests. Three different curing procedures have been used for curing specimens. Also, our abstract for the 2020 TIDC Annual Conference was accepted and we presented our project on Wednesday August 12th 2020. Some literature review has been done for alkali activated slag (AAS) concretes. Based on that, some test has been designed. Tests will start within next week.

| Table 1: Task Progress | | | |
|--|-------------------|-----------------|-------------------|
| Task Number | Start Date | End Date | % Complete |
| Task 1: Selection of ACM with desired workability and strength | 06/01/2019 | 12/31/2019 | 100% |
| Task 2: Shrinkage | 01/01/2020 | Continue | 40% |
| Task 3: Durability performance | 10/01/2019 | Continue | 50% |
| Task 4: Life cycle analysis | | | 5% |

| Table 2: Budget Progress | | |
|---------------------------------|----------------------------|---------------------------------|
| Project Budget | Spend Amount | Spend Percentage to Date |
| \$83,238 (from UTC) | Information is coming soon | |

Describe any opportunities for training/professional development that have been provided...

One postdoctoral research associate is working in this project. It will be a great opportunity for him to learn about writing proposals, preparing reports, participating in meeting, attending conferences, and working with professionals in UTC, UMaine Advanced Structures and Composites Center, and MaineDOT.

Two graduate students and three undergraduate students have been involved in this project. It will be a great experience for them to be familiar with ASTM tests and standards. They will learn how to conduct the experiments, how to follow the standards, and how to work in a team in a real project.

Participants and Collaborators:

Use the table below to list all individuals who have worked on the project.

| Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members | | | |
|--|--------------------------------|--|---|
| Individual Name | Email Address | Department | Role in Research |
| <i>Professor Eric N. Landis</i> | <i>landis@maine.edu</i> | <i>Civil and Environmental Engineering</i> | <i>PI</i> |
| <i>Dr. Hosain Haddad Kolour</i> | <i>hosain.haddad@maine.edu</i> | <i>Civil and Environmental Engineering</i> | <i>Perform the experiments and analysis the results</i> |

Use the table below to list all students who have participated in the project during the reporting. (This includes all paid, unpaid, intern, independent study, or any other student that participated in this project.)

| Table 6: Student Participants during the reporting period | | | | |
|--|----------------------|--------------|-------------------------------------|------------------------------------|
| Student Name | Email Address | Class | Major | Role in research |
| Parry Seddiqi | | freshman | Civil and Environmental Engineering | Help in performing the experiments |
| Kelsey Weir | | freshman | Civil and Environmental Engineering | Help in performing the experiments |
| Madison Ala | | freshman | Civil and Environmental Engineering | Help in performing the experiments |
| Justin Harris | | graduate | Civil and Environmental Engineering | Help in performing the experiments |
| Jeffrey Hollstein | | graduate | Civil and Environmental Engineering | Help in performing the experiments |

Use the table below to list organizations have been involved as partners on this project and their contribution to the project.

| Table 8: Research Project Collaborators during the reporting period | | | | | | |
|--|-----------------|------------------------------------|------------------------|-------------------|-------------------------------|----------------------------|
| Organization | Location | Contribution to the Project | | | | |
| | | Financial Support | In-Kind Support | Facilities | Collaborative Research | Personnel Exchanges |
| University of Maine | Maine | X | X | X | | |

Who is the Technical Champion for this project?

Name: *Michael.Redmond*

Title: *Concrete Quality Specialist at MaineDOT Bridge Program*

Organization: *MaineDOT*

Location (City & State): *Augusta, Maine*

Email Address: *Michael.Redmond@maine.gov*

Changes:

Professor Eric N. Landis is the new PI of this project since January 1st 2020. Both old PI (Dr. Warda Ashraf) and her graduate student (Mohammad Rakibul Islam Khan) moved to a different university.

Planned Activities:

Conducting alkali activated slag (AAS) tests.