

Impactful Resilient Infrastructure Science and Engineering (IRISE)

-Project Scope of Work- (FY 2022-23 (IRISE Year 5) Annual Work Program)

SUMMARY PAGE

Project Title: Asphalt Pavement Seal-Coats: Best Practices and Experience

Person Submitting Proposal: Eshan V. Dave

Proposed Funding Period: 01/01/2023 – 03/31/2024

Project Duration: 14 months

Estimated Project Cost: \$97,904

Project Title: Asphalt Pavement Seal-Coats: Best Practices and Experience

Research Problem: Seal coat, a common type of surface treatment for asphalt pavements, involves the application of emulsified asphalt binder and optionally aggregates directly on the existing pavement surface. While application of seal coats and other asphalt pavement surface treatments typically does not increase bearing capacity or structural capacity of a pavement, it is well established that application of seals at the right time can serve to extend pavement service life due to preservation benefits. Proper material selection, application timing, and construction selection can have significant effects on the ability of seal coat to rejuvenate the pavement surface and in improving functional performance by adding a high friction waterproof membrane over the existing asphalt. Due to variations in seal coat materials, timing of seal application and depending on quality of construction practices, the performance of seal coats varies greatly. While several Departments of Transportation have high success for this technique others report poor experiences. Satisfactory seal coat performance depends on the construction, environment, traffic, conditions of the existing pavement, and properties of the asphalt binder/emulsion and aggregates. In addition, it is common to make “on the fly” material and construction practices alterations during installation of seals based on in-situ conditions of existing pavement, this can often make it challenging to track potential failures. Therefore, there is a need to define uniform guidelines for an effective use of seal coats as well as to provide consistent guidance for material selection and application timing to maximize preservation advantages of seal coats.

Research Objectives: Our objective is to develop best practices guidance with respect to specifying seal coats and their construction practices for successful and uniform use of seal coats in Pennsylvania. This will involve gathering both positive and negative experiences with seal coats from different parts of the US and contrasting these experiences with current Pennsylvania practices.

Project Scope: The project will focus on the collection and analysis of best practices and experiences with the use of seal coats for asphalt pavements. We will collect this information from various Departments of Transportation and experienced contractors with emphasis on the “do’s and don’ts” regarding selecting projects to use seal coats and their construction and inspection. We will also assemble current practices from PennDOT, Allegheny County and State contractors conducting visual surveys and forensic analysis of sections presenting seal coat performance issues. Finally, we will compare these experience datasets to develop an interview questionnaire and conduct interviews with various stakeholders to develop best practices guidelines for improving seal coat quality in Pennsylvania.

Task Statements:

The objectives of this project will be achieved through the completion of the following tasks:

Task A: Literature review of seal-coat material selection, construction, and performance

We will conduct a comprehensive literature review on the current seal-coat material specifications, construction guidelines as well as research studies discussing performances of seal-coats. Material specification review will focus on review of current Pennsylvania practices as well as those of other state transportation agencies as well as pavement preservation oriented professional societies and associations (such as, Pavement Preservation and Recycling Alliance, American Emulsion Manufacturer's Association, and National Pavement Preservation Partnership). The outcomes of the recent NCHRP efforts on developing construction guidance document for various asphalt pavement surface treatments will be included in the review of literature.

Task B: Development and Administration of Survey for Pennsylvania Entities

In this task, we will develop a survey to be administered to Pennsylvania DOT districts as well as Pennsylvania's local transportation agencies (such as, cities and counties) to gather information on current Pennsylvania practices for seal-coat material selection, construction specification and inspection, application timing decisions and longevity of treatment. The survey will be developed using Qualtrics survey system to ensure user-friendliness for survey takers and to support ease of data analysis. Task A will provide the necessary basis for development of specific survey questions under each of the categories of material selection, construction, application timing and treatment life expectancy. For entities that indicate extensive experience in use of seal-coats, specific questions will also be asked with respect to the performance of seal-coats on pavement managed by those entities, especially on their experiences with application cycle times.

Task C: Interview Select Agencies and Contractors

In this task, select number of Pennsylvania agencies will be interviewed to gather further insight on seal-coating practices (materials, construction, application timing, project selection) that have worked well and ones that have not worked well. Interviews will also focus on impacts of using of seal coating on pavements with terminal or close-to terminal conditions and corresponding impact the deterioration of overall pavement structure. We will also conduct limited interviews with contractors and consultants who have been involved in previous evaluations of seal-coat performance on behalf of PennDOT and Pennsylvania local agencies.

Task D: Draft final report

Results and observations from all previous tasks will be compiled in a form of best-practices guidebook on seal-coating project selection, repeat application cycle times, material selection, construction quality assurance process, and pavement life cycle cost impacts. These guidelines as well as the summary results of other project activities will be included in a draft final report.

Task E: Final report

A Final Report will be prepared by taking into consideration various comments received on the Draft Final Report. Once again, final report will be in form of a seal-coating best practices guidebook. In addition to the guidebook, a recorded web-based seminar will be prepared for agency and contractor personnel to adopt best practices on seal-coating.

Deliverables:

The following deliverables will be provided based on completion of the above tasks:

- Deliverable #1 – A memo report summarizing the literature review, due 5 months from project initiation.
- Deliverable #2 – A memo report detailing the results of the survey due 8 months from project initiation.
- Deliverable #3 – A memo report detailing the interview results due 10 months from the project initiation
- Deliverable #4 – A draft final report, due 12 months from project initiation.
- Deliverable #5 – Final report, due 24 months from project initiation.

Key Personnel:

Principal Investigator: Dr. Eshan Dave is to provide the technical expertise, project management, and oversight on all project activities.

Co-Principal Investigator: Dr. Jo Sias is to provide the technical expertise on tasks A thru E of this project and assist the Principal Investigator in project management and oversight on all project activities.

Other Personnel:

Grad Assistant 1 (TBN) is a graduate student who will assist in tasks A through E

Proposed Person-Hours by Task:

Team Member	Task A	Task B	Task C	Task D	Task E	Total
Dr. Eshan Dave, PI	12	12	8	10	5	47
Dr. Jo Sias, co-PI	8	8	10	10	4	40
TBD, Grad Student 1	280	320	240	120	76	1036
Total	300	340	258	140	85	1123

Schedule:

Tasks	Time (months)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	X	X	X	X	X									
B				X	X	X	X	X						
C								X	X	X				
D											X	X		
E													X	X

Budget: The total project cost is estimated to be \$97,904.