DIVISION OF RESEARCH, INNOVATION & SYSTEM INFORMATION
Research Initial Scope of Work
SUBMITTAL FORM - FY 19/20

Researchers with relevant Transportation Ecology research background are highly encouraged to apply

I. Project Number: P1396
Project Title: Greenhouse Gas Mitigation Measures

II. Task Number: 3695p
Task Title: Greenhouse Gas Mitigation Measures

III. Project Problem Statement:
Currently there is a lack of comprehensive, systematic methods to quantify potential greenhouse gas (GHG) reduction measures that are available for implementation at an individual transportation project level. The goals of this research are to investigate the feasibility, efficacy and the ability to quantify or evaluate various greenhouse gas reductions or mitigation measures and provide a database or catalog of those measures with evidence to support their use.

Greenhouse gases absorb infrared radiation, trapping heat in the atmosphere and warm the planet. The scientific community recognizes that GHGs emitted by human activities (primarily carbon dioxide [CO_2] from fossil fuel combustion) have changed naturally occurring GHG concentrations in the earth's atmosphere and led to global climate change (EPA 2018: ES-2). The effects of climate change include warmer temperatures, changes in precipitation amounts and storm intensity, and sea-level rise.

California has enacted laws, issued executive orders, and developed regulations targeting the reduction of statewide GHG emissions to combat the effects of climate change. Transportation is the primary source of GHG emissions both nationwide and in California (U.S. EPA 2018; ARB 2018). As the owner-operator of the State Highway System (SHS), Caltrans facilitates and oversees projects that affect GHG emissions.

All transportation projects emit some level of GHG emissions from sources such as, tailpipe emissions from construction vehicles and long-term operational use of the SHS. The amount of emissions varies depending on the type of project. Because GHGs mix in the atmosphere and persist for decades or centuries, both short-term (construction) and long-term (operational) emissions contribute to global climate change. As a state agency, Caltrans is obligated to reduce or mitigate the environmental impacts of its projects, including those resulting from the emissions of GHGs, in accordance with the California Environmental Quality Act (CEQA) and other state laws and policies.

The challenge in project-level analysis of GHG emissions associated with transportation projects is the lack of comprehensive ability to quantify the amount of emissions reduction that would be required to reduce the impact to less than cumulatively considerable, and to determine what measures would achieve the required reduction.

IV. Project Benefits:

- Provide supporting documentation for transportation-related GHG reduction measures proposed for CEQA mitigation and application of best practices for project-specific implementation.
- Caltrans would be able to support or document efficacy of proposed GHG reduction measures.
- Caltrans would also be able to demonstrate and quantify its contribution to statewide GHG reduction goals.
- Caltrans will be able to prioritize reduction measures that will realize the greatest GHG reduction.
- Climate change analyses will become more efficient if planners and consultants have a ready-made list of feasible and effective GHG reduction measures to include as environmental commitments in environmental documents.

V. Goals and Objectives:

The primary goal of this research is to establish a catalog or library of GHG reduction measures that could be incorporated into projects to reduce GHG emissions and/or to mitigate GHG impacts determined to be significant pursuant to CEQA. This database would include a standardized methodology for evaluating each of the various GHG mitigation measures. This would include a description of the measure, its potential for GHG reduction in terms of unit of carbon dioxide equivalent (i.e. metric ton of CO_2e) reduced or avoided, documentation or sources to support the validity and efficacy of the measure, and limits of applicability. Ideally, the project would allow Caltrans to quantify the anticipated levels of GHG reductions, or qualitatively justify with substantial evidence, the effectiveness of each measure.

Goal 1: Identify a framework to systematically compare and present information related to the efficacy and ability to quantify GHG reduction benefits from each proposed measure (see attached list of measures). This methodology shall be developed to provide for the ability to apply the same approach for evaluation of any GHG reduction measures proposed in the future. Expected outcomes from Goal 1 would be an outline of the approach/framework (data sheet, access database or excel spreadsheet format).

Assumptions: Work with Caltrans to develop the variables to be analyzed for each potential reduction measures.

Goal 2: Identify project-level GHG reduction measures that Caltrans could feasibly implement.

Objective 1: Review available information/ data to determine the extent of information already developed to support demonstrated effectiveness and ability to quantify GHG reduction measures. (this should include a scan of other tools and metrics available or in use by other agencies, such as California Air Resources Boards (CARB quantification methodologies for Climate Investments)
Assumptions: Caltrans will provide an initial list of measures for consideration.

Objective 2: Conduct full lifecycle emissions calculations for each measure to quantify GHG reductions it could achieve.

Objective 3: Identify data gaps where necessary.

Objective 4: Conduct interviews with construction professionals to determine practicability, risks, and cost impacts of each strategy. (Practicability: types of projects or geographies where the measure might not work or be practical. These limitations would have to be included in the final product.)

Goal 3: Examine the potential for determining a per-ton cost of CO_2 that could be applied towards Caltrans projects or off-site or in-lieu fee strategies to offset project-level GHG emissions

Objective 1: Establish a pricing structure to pay for offsetting a ton of CO_2

Objective 2: Determine the feasibility of setting aside funding to enhance climate change adaptation measures for Caltrans projects or programs to reduce GHG emissions or to fund external adaptation projects.

Goal 4: Assess the feasibility of implementing performance-based GHG mitigation when measures cannot be adequately quantified.

Objective 1: Determine performance-based standards and criteria for success.
Objective 2: Determine how progress or success would be monitored and measured and over what timeframe.

Goal 5: Establish a system for updating the database as technology and research advance.

VI. Background:

Currently Caltrans lacks a comprehensive, systematic methods to quantify GHG reduction measures that are available for implementation at an individual transportation project level. The goals of this research are to investigate the feasibility, efficacy and the ability to quantify or evaluate various GHG reductions or mitigation measures and provide a database or catalog of those measures with evidence to support their use.

VII. Estimate of Duration:
3 years

VIII. Deployment Potential:
The deployment potential for this research is high. The newly defined methodologies, practices and procedures will be used by Caltrans and our resource partners to streamline State and Federal Consultations thereby efficiently delivering projects. Additionally, the methodologies would allow efficient and effective monitoring of mitigation projects.

Date: 08/28/19

Research Initial Scope of Work Guidelines
FY 2019/20

INTRODUCTION:

The Project Manager/Task Manager (PM/TM) who decides to advertise their FY19/20 **approved** task(s) should follow the guidelines below. The completed Initial Scope of Work Submittal Form and any back-up documents should be forwarded to Yvonne Cooks **on or before April 25, 2019.**

GUIDANCE ON INITIAL SCOPE OF WORK SECTIONS:

I. **Project Number and Title:** (Limit titles to *no more than 60 characters*.)

II. **Task Number and Title:** (Limit titles to *no more than 60 characters*.)

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III. **Project Problem Statement:** (Describe the project problem statement.)

IV. **Objective:** (Describe the overall task objective(s).)

V. **Task Description of Work and Expected Deliverables:** (Optional section for the PM/TM to provide specifics about work requested in the proposal.)

VI. **Background:** (A brief background statement or description of how the task relates to the project, and to departmental operations.)

VII. **Estimate of Duration:** (Duration estimate for *this task*. Please align the schedule with the RPMD.)

VIII. **Related Research:** (Results of PM/TM's literature review and/or Preliminary Investigation for new projects, or research results from previous tasks in this project. Also include additional research results/data and relevant literature.)

IX. **Deployment Potential:** (Is this an incremental part of a larger research project? What stage of research is this project in now? What might be the eventual deployable product? What division/office/entity is the identified sponsor?)

X: **Author and Date:** (Self-Explanatory)