Solicitation Detail View

Design Guidelines and Mitigation Strategies for Reducing Sedimentation of Multi-Barrel Culverts

General Information

Solicitation Number: 1483
Status: Solicitation posted
Date Posted: Oct 1, 2018
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Lead Agency: Iowa Department of Transportation

Contact Information:

Lead Agency Contact:

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Financial Summary:

Commitment Start Year: 2019
Commitment End Year: 2022
100% SP&R Approval: Not Requested
Commitments Required: $600,000.00
Commitments Received:

Study Description

Background:
Sedimentation at multi-barrel culverts is an ongoing maintenance and design issue along erosion-prone watersheds. Sediment deposits can develop quickly impairing the culvert capacity to convey design flows which can lead to damages to both the transportation infrastructure and upstream landowners. Typical culvert design protocols are based on the hydrologic and hydraulic analysis of the site with little attention given to the potential for sedimentation. The information and knowledge for assessing the complex erosion and transport processes leading to culvert sedimentation is limited. The methods for removing sediment from culverts are costly, labor intensive and often reoccurring.

Since 2006, the Iowa DOT has provided funding for investigating and understanding the physical processes that cause sedimentation, along with solutions to mitigate the reoccurrence and developing design guidance for reducing the potential for sedimentation at multi-barrel culverts.

The research has created a web-based program for identifying the potential for culvert sedimentation as a function of stream and culvert geometry along with landscape characteristics from a multitude of data sources (USGS, SSURGO, RUSLE, EPA SreamCat, etc.). This program can be utilized as a framework for other State DOT's to assess the sedimentation potential at any culvert location based on parameters that influence the process locally. The prototype web-platform developed for the State of Iowa is available at http://www.iowawatersheds.org/idotculverts.

Objectives:
This transportation pool fund (TPF) project will develop guidelines for the design and mitigation for reducing sedimentation at existing and proposed culvert locations. The guidelines will be developed in a web-based program with

interactive parameters that will forecast the sedimentation potential along any stream location in the U.S. prone to this process. The guiding principles and best practices for mitigating sedimentation will complete the with current hydraulic design guidelines.

Scope of Work:
Survey of partnering State DOT's on the types, extent and degree of sedimentation at multi-box culverts to account for regional issues related to culvert sedimentation.

Screening and compiling culvert-related data resources (e.g., aerial photos, culvert NBI data base information, plans, etc) for assessment of the degree of sedimentation of selected culverts in project partner states.

Extension of the Iowa DOT web platform for all partnering DOTs through integration of freely accessible federal and state data sources.

Conduct regional and global multivariate sensitivity analysis for exploration of the relationships between the sediment process drivers and degree of sedimentation.

Evaluation of self-cleaning solutions developed from previous research and investigation of other local solutions for culvert configurations that mitigate sedimentation in culverts.

Development of metrics for assessment of the sediment transfer/removal efficiency for the identified self-cleaning solutions.

Preparation of guidelines and specifications for sedimentation mitigation measures applicable to the entire range of culvert configurations and sites in partnering states.

Prescribing guidelines for best practices for preventing sedimentation at culverts in conjunction with current hydraulic design guidelines.

Design and implement the architecture of the interactive web-based program for partnering states that integrates the design specifications and best practices developed above.

Provide technical support, organize training workshops and facilitate pilot/demonstration projects to encourage and accelerate the adoption of mitigation projects for self-cleaning culverts.

Comments:
Minimum annual commitment of $20,000 for three years ($60,000 total) within Fiscal Years 2019-2022.

Travel costs are estimated at $2,500 per attendee per year. It is expected that one in-person meeting will take place each year for the three years of the project. The annual commitment of $20,000 includes travel for one attendee. Each additional attendee is welcome to attend with every additional $2,500 commitment (i.e. $22,500 for two attendees).

Subjects: Bridges, Other Structures, and Hydraulics and Hydrology

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Documents:

Title	Type	Private
SPR-B Waiver Approval Letter	Memorandum	N