

# **POOLED FUND PROPOSAL: RECYCLED MATERIALS RESOURCE CENTER (RMRC) – 4TH GENERATION**

## **Background**

For more than 30 years, State DOTs have made significant progress incorporating recycled materials and industrial byproducts in transportation infrastructure. Recycled materials can add economic value, enhance service life and promote sustainability by reducing emission of greenhouse gases and consumption of energy and natural resources during construction. Despite these benefits, many recycled materials remain underutilized due to technical and institutional barriers. The Recycled Materials Resource Center (RMRC) was created to assist State DOTs and FHWA in breaking down these barriers through research and outreach activities focused on the wise and safe use of recycled materials.

The initial RMRC was founded in 1998 at the University of New Hampshire through an agreement with FHWA based on a stipulation in TEA-21. From 2007-2012, the RMRC was renewed as RMRC-2 as a joint venture between the University of New Hampshire (UNH) and the University of Wisconsin-Madison. RMRC-2 was awarded competitively and funded by FHWA and by a state pooled fund, TPF5(199), supported by Alabama, Colorado, Georgia, Indiana, North Carolina, New Hampshire, New York and Wisconsin. In the summer of 2012, the RMRC was renewed as RMRC-3G as a single venture at the University of Wisconsin-Madison (UW-Madison) and funded by a pooled fund, TPF-5(270), supported by Colorado, Georgia, Illinois, Minnesota, Pennsylvania, Virginia and Wisconsin. The contract for RMRC-3G ends on September 30, 2016, and a new fourth generation RMRC (RMRC-4G) is being proposed by the Wisconsin Department of Transportation (WisDOT) building upon past strengths of the RMRC.

State DOTs have developed considerable interest in using recycled materials in transportation construction and are seeking technical information regarding appropriate uses and best practices for existing and forthcoming recycled materials. With past research and known use of recycled materials, DOTs are seeking to understand the highest and best use of recycled materials. Thus, to maintain momentum regarding the use of recycled materials in transportation infrastructure, with emphasis on enhancing sustainability, service life and cost savings, WisDOT proposes to take the lead the next generation of the RMRC.

## **Study Objectives**

The goal of the proposed RMRC-4G is to provide the resources and activities needed to break down barriers and increase utilization of recycled materials and industrial byproducts. This will be done through carefully integrated and orchestrated activities that include applied research in key areas relevant to transportation applications combined with outreach programs that provide the educational and technical resources needed to maximize the rate at which recycled materials and industrial byproducts are used in transportation applications. RMRC-4G would be supported by a new pooled fund and focus specifically on issues of direct relevance to the contributing state DOTs. The governance structure would include a pooled fund Technical Advisory Committee (the Executive Board) comprised of representatives of participating State DOTs as well as an ex-officio member as the study liaison assigned by the Federal Highway Administration. The Executive Board will have direct input on the activities and priorities of RMRC-4G through a balloting process.

Through research projects, workshops and outreach efforts, the RMRC-4G expects to achieve its goal via the accomplishment of the following objectives to:

- Define, conduct and manage critical recycled materials research that will support and improve the sustainability of transportation systems construction
- Collect and share information between state agencies that will improve the understanding of recycled materials and the appropriate applications
- Define a system of regionally significant recycled materials and establish performance expectations for those materials in various applications that will guide and enhance their use and management
- Evaluate and recommend effective technologies from a recycled materials perspective and in a manner that supports the reliable, efficient, safe and sustainable use of construction materials

## **POOLED FUND PROPOSAL: RECYCLED MATERIALS RESOURCE CENTER (RMRC) – 4TH GENERATION**

- Reach out to and share ideas with private sector producers of recycled materials on approaches to making their availability, quality control and efficient delivery possible
- Identify issues or bottlenecks that prevent the widespread use of recycled materials
- Actively contribute to the development of specifications and guidelines through AASHTO
- Coordinate along the lines of the agreement that has been established between AASHTO and ASTM
- Organize webinars and workshops on the highest and best use of recycled materials
- Maintain and continually enhance RMRC website as an up-to-date resource
- Deploy innovative solutions that enhance RMRC's availability as a resource to the highway materials and construction community on recycled materials

### **Organizational Structure**

Success of the proposed RMRC-4G will hinge directly on the ability of its Executive Board to define and tackle the most pressing barriers affecting the use of recycled materials in transportation infrastructure. The leadership team will comprise the DOT Executive Board (representatives of the states supporting the RMRC), the ex-officio FHWA representative, friends of the committee and the administrative personnel. Executive Board voting privileges will be at the discretion of each member. The collective wisdom and experience of this team will define the most important technical issues, and the best methods to address these issues. The staff of the RMRC will manage day-to-day operations of the Center and this proposed Transportation Pooled Fund, including coordinating communications, fiscal management and additional support to each of the committees as needed. This organizational structure served well in previous generations of the RMRC.

RMRC-4G will also allow non-DOT parties who express interest to become *Associate Members of the RMRC (Associates)*. Becoming an Associate Member affords an opportunity to get involved in the RMRC's activities. Associates enjoy networking opportunities with other experts in their field and are free to become actively engaged in the work of the Executive Board. They are not eligible to vote on research ideas, but are encouraged to submit them to the Executive Board for consideration. Associates would be encouraged to:

- **Contact** RMRC staff representative to learn of current activities in which they may wish to participate
- **Volunteer** to submit research ideas, to serve as a reviewer of research papers, to work on a committee project, or to give a presentation or preside at a session of the annual meeting or a specialty conference
- **Participate** in RMRC Executive Board and research meetings, which generally are open to anyone who wishes to attend. Friends must introduce themselves to the chair and other meeting members.

Both the Executive Board and the Associate Members will maintain an unbiased research base.

### **Responsibilities of Involved Parties**

#### **Lead State (WisDOT):**

- Is the agency proposing the pooled fund
- Is responsible for soliciting interest from other states.
- Will act as the sponsoring agency and will contract with the University of Wisconsin-Madison to manage the pooled fund
- Will receive invoices from the University of Wisconsin-Madison for expenses generated through the accomplishment of pooled fund tasks

# **POOLED FUND PROPOSAL: RECYCLED MATERIALS RESOURCE CENTER (RMRC) – 4TH GENERATION**

## **Participating Members will:**

- Propose research and outreach topics to be developed as proposals by the RMRC-4G staff
- Review, comment on and recommend for approval all project proposals generated by RMRC-4G staff through their participation on pooled fund Technical Advisory Committee (Executive Board)
- Through their involvement with the Executive Board, make final decisions of the approval of any project proposal recommended to them by the RMRC-4G staff and oversee the projects as needed
- Have one vote on the Executive Board

## **University of Wisconsin-Madison (staff of RMRC-4G) will:**

- Plan, coordinate and facilitate meetings of the Executive Board using teleconferencing and other available technologies as well as through face-to-face meetings
- Prepare draft proposals (including work plans and budgets) to be presented to the Executive Board for their review, comment and approval. RMRC-4G staff may propose research projects to the Executive Board in addition to those submitted by the participating states
- Prepare quarterly progress reports to be submitted to the Executive Board and the WisDOT Research and Library Services unit for posting on the TPF website and provide other interim deliverables as determined through the development of the project's work plans
- Manage the research process, including the generation of research topics, assist in the writing of research statements, soliciting proposals, contracting of external research projects, monitoring progress of projects, and coordinating review and approval of draft final reports.
- Write research summaries for each completed research project.
- Prepare invoices to be sent to WisDOT for research and administrative activities

FHWA will provide a technical liaison for technology deployment and research sharing. FHWA will also provide research project ideas and potential funding.

## **Scope of Work**

The RMRC-4G will have two main programs to advance the highest and best use of recycled materials:

- (1) Research and Development
- (2) Outreach and Technology Transfer

The RMRC-4G pooled fund will focus on recycled bound materials (e.g., asphalt and Portland cement concrete), unbound materials (e.g., base, sub-base, structural fill), the highest and best use of these materials in transportation infrastructure, stabilization of materials using industrial byproducts (e.g. fly ash, lime, other binders) and other related research projects. Factors that affect long-term physical and environmental performance of recycled materials will be evaluated using scientific principles and applied research. Additionally, a database for life cycle assessment (i.e., environmental benefits in terms of greenhouse gas emissions and energy consumption) associated with practices that use recycled materials and industrial byproducts will be updated as necessary and validated to allow for rational evaluation of material and construction options in the context of life cycle cost and sustainability.

In terms of outreach and technology transfer, the RMRC-4G staff will present RMRC research findings and continue outreach at appropriate national events per the Executive Board. RMRC-4G staff will participate in the development of new specifications, guidelines and standards related to recycled materials in AASHTO-Subcommittee on Materials (-SOM) and the ASTM Committee D18.14 in semi-annual meetings, host quarterly (or more as needed) Executive Board meetings and an annual meeting generally held at TRB in January. The team will continually update and enhance RMRC website and organize webinars or workshops as requested by the Executive Board. The Executive Board has recognized that past efforts to share RMRC research findings by conducting outreach presentations, webinars or workshops have been of great benefit to DOTs, state departments of environmental quality, the EPA and consulting engineers/contractors in industry. They will respond to any and all queries received through the website, emails, phone calls or other contacts. RMRC-4G staff will submit quarterly progress reports that will include all research and outreach/technology transfer activities.

## **POOLED FUND PROPOSAL: RECYCLED MATERIALS RESOURCE CENTER (RMRC) – 4TH GENERATION**

RMRC-4G will begin with a collaborative effort to develop ideas and define a clear vision of the most important issues affecting the use of recycled materials today and in the future. This effort will be followed by development and implementation of an integrated strategic research and outreach plan focused on developing and providing the technical information and educational resources necessary to resolve the issues. Work plans will then be developed under the auspices of the Executive Board with the ultimate objective to increase the safe and wise use of recycled materials in roadway construction and maintenance. Some examples of research efforts that could carry over (from RMRC-3G) or be incorporated into RMRC-4G may include:

- Phase II for Recycled Materials as Back Fill for Mechanically Stabilized Earth Walls – installations and field testing
- Recycled Material Web Map Network: Connecting Consumers with Producers – full scale launch
- Value of Using Recycled Materials via LCA/LCCA - State-Wide Life Cycle Benefits of Recycled Materials, documentation and presentations to DOTs
- Further development of LCA and LCCA methodologies for transportation infrastructure
- Issues associated with high pH leachate from RCA and some fly ashes – pH and Alkalinity of RCA as base course
- Enhanced friction and surface treatments using alternative materials (e.g., taconite tailings)
- Regulatory and other impediments to wider use of quarry fines

In determining the final scope and priorities and in developing work plans, tasks and timelines over the five-year life of the pooled fund, RMRC-4G staff and the Executive Board will work together to:

- Determine appropriate interim deliverables for work plans (as necessary in addition to quarterly and final reports); these may include white papers, technical briefs, specifications or guidelines, fact sheets and annual progress reports or presentations
- Ensure timely results on RMRC research projects through communication products that emphasize lessons learned and implementation
- Identify appropriate mechanisms to promote and facilitate technology transfer and the deployment and implementation of pooled fund results

### **Budget**

The budget for RMRC-4G would be based on commitments of \$40,000 per year per partner state. Future obligations during the five-year period may occur to fund further activities as decided by the Executive Board. We request the initial \$40,000 commitment for FY2016 or FY2017 (if partner state funding is no longer available for FY2016). Staff of WisDOT will provide management of the overall program while the University of Wisconsin-Madison will provide direction and management on a project level. Contributions less than \$40,000 will be considered by the Executive Board on a case by case basis.

### **Commitment**

- **Sponsoring Agency:** WisDOT
- **Lead State Agency:** WisDOT
- **Commitments Required:** \$600,000
- **Minimum State Commitment:** \$40,000 per year
- **Commitment Start Year:** FFY2016 or FFY2017
- **Commitment End Year:** FFY2020 or FFY2021
- **Duration:** 5 Years