

Next Generation RMRC

Applied Research & Outreach To Meet State Needs

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Why recycled materials?

- Quality materials are required for quality products
- Recent studies show materials control environmental footprint of a project
- Recycled materials are most effective for their
 - Economical benefits
 - Environmental benefits

Keys to Successful Recycling Based on 20 yr of Experience

1. Defining engineering properties & durability.
2. Assessing environmental safety.
3. Developing diverse suite of applications.
4. Demonstrating success in field quantitatively.
5. Ensuring material availability & economics.
6. Training technical personnel on engineering and assessment with recycled materials.

Background

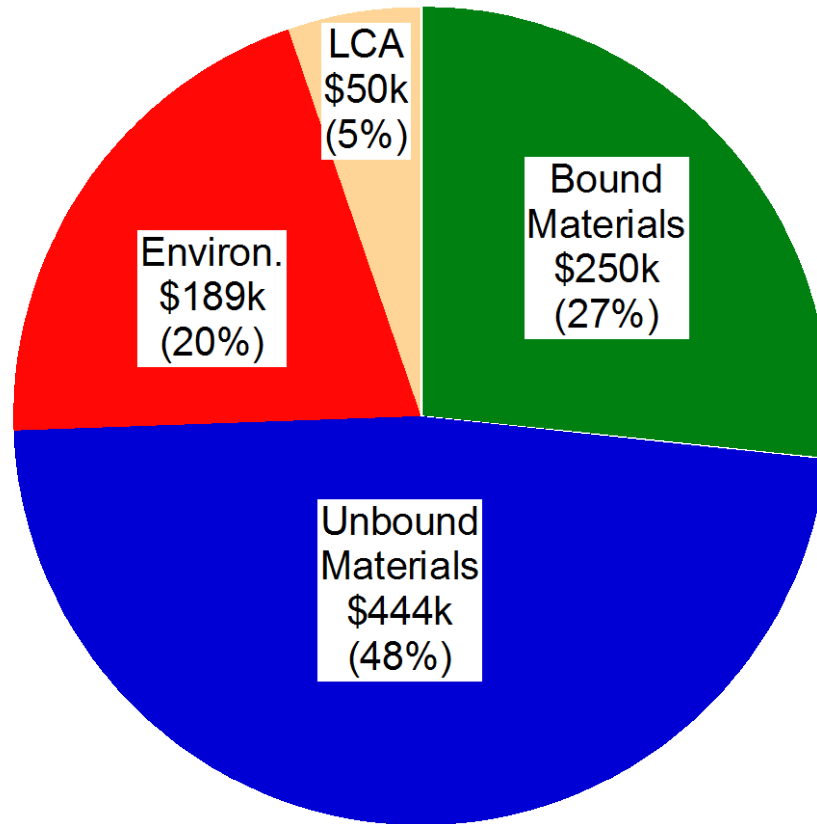
- Current RMRC is a joint venture between the the University of New Hampshire and University of Wisconsin-Madison
- Base funded by FHWA, supplemented by FHWA-administered pool fund supported by 7 states.
- Current contract ends December 31, 2011. No plans for continuation.

Accomplishments (2007-11)

- Practice oriented research on:
 - Bound Materials (4 projects)
 - Unbound Materials (8 projects)
 - Environmental Assessment (5 projects)
 - Life Cycle Tools (2 projects)
- Field demonstrations and development of design guidelines
- Standards and specifications development (AASHTO, ASTM D18.14, Int. Symposium)
- Outreach: webinars, short courses, workshops
- Website for information dissemination
- FHWA funds leveraged **1:4** from other sources

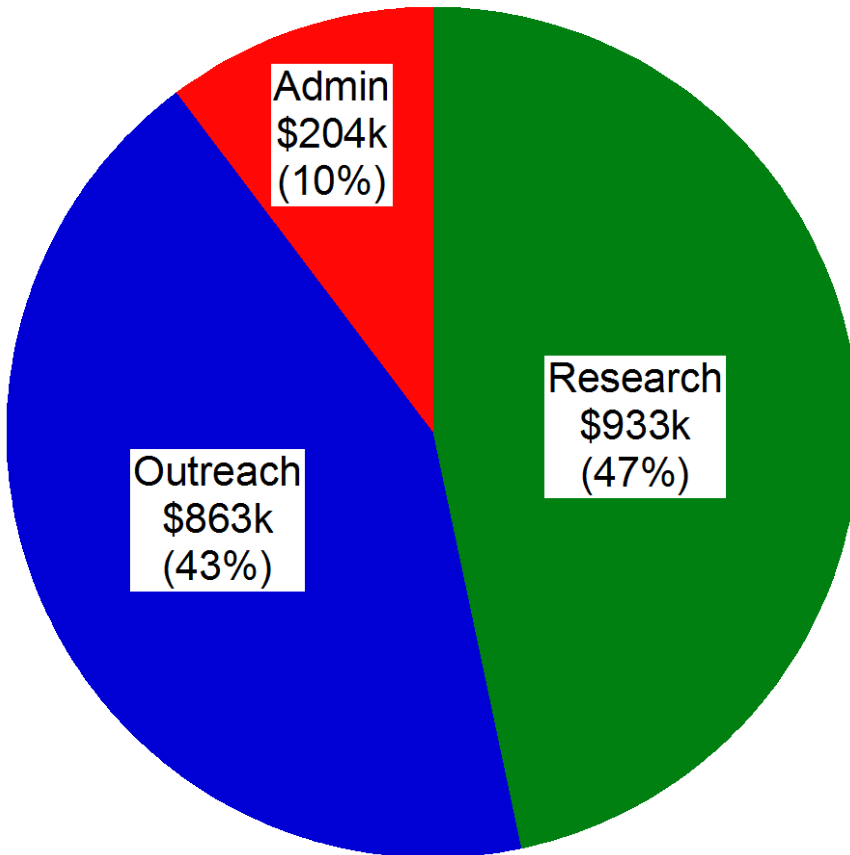
Summary of Funds Distribution

Distribution of Base Research Funds by Topic

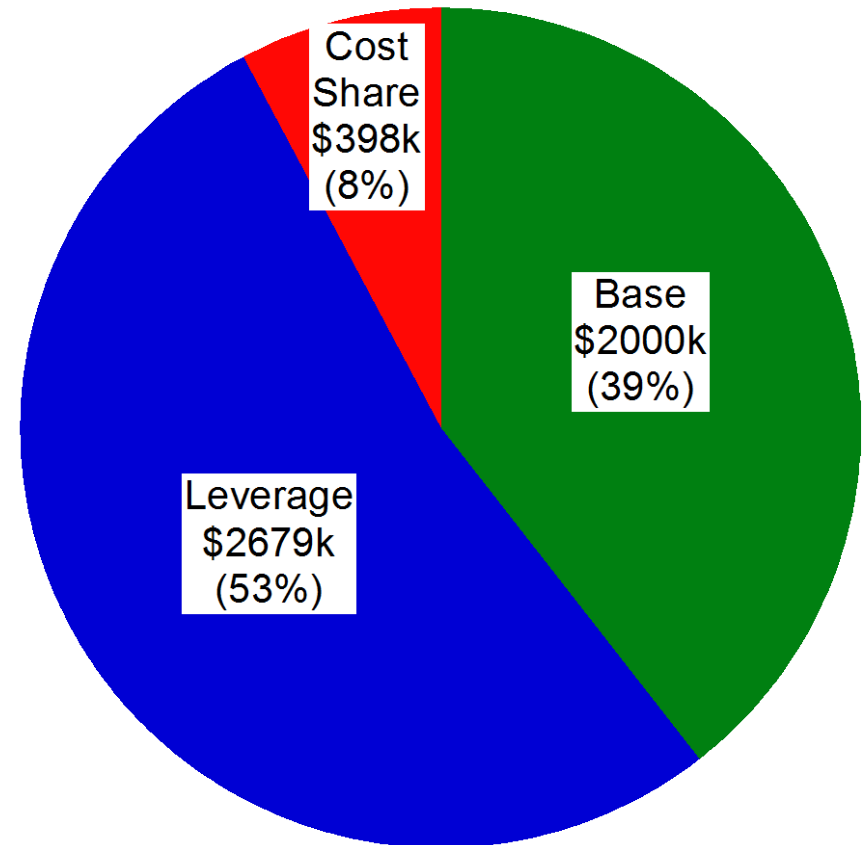


Summary of Funds Distribution

Distribution of Base Funds



Distribution of Total Funds



3-G RMRC

- RMRC is a great resource to grow with direct focus on state needs (currently no direct engagement with states)
- Proposed to establish a new Pooled Fund directly managed by states (supported by FHWA as the next logical step in providing practical information that can be directly applied by states)
- Directed by Executive Committee consisting of state participants in the pool fund
- \$25K per state per year
- Five years

For Further Information

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Bound Materials

Project	RMRC (\$K)	Other (\$K)	Other Source
Analysis of Dynamic Modulus and Binder Data for High RAP	0	33	RMRC Pooled Fund
Long Term Performance of High RAP Sections	50	0	-
Synthesis of the Use of Crumb Rubber in Hot Mix Asphalt	150	20	Modified Asphalt Research Center (MARC)
Binder Properties in Recycled Asphalt Shingles (RAS)	50	50	MARC (50), RMRC Pooled Fund (25)
Aging of Recycled Asphalt Mixtures	0	50	RMRC Pooled Fund
Total (not include 2010 pool)	250	103	-

Total projects = 4

Leveraging factor = 0.4

Unbound Materials

Project	RMRC (\$K)	Other (\$K)	Other Source
Engineering Properties of RAP and RCA for Unbound Applications	100	400	MnDOT Pooled Fund (350), RMRC Pool Fund (50, 25)
Recycled Asphalt Shingles as Structural Fill	17	33	RMRC Pooled Fund (33, 25)
Pavement Materials Stabilized with CKD*	50	99	RMRC Pooled Fund (33), PCA (66)
Dynamic Moduli and CBR for Construction and Demolition Debris	77	48	UNH
Reconstruction of Railroads and Highways with In-Situ Reclaimed Materials	50	131	CFIRE
Cracking of Stabilized Layers	50	100	NCHRP

* = completed project.

Unbound Materials - 2

Project	RMRC (\$K)	Other (\$K)	Other Source
Stabilization of Reclaimed Pavement Material and Road Surface Gravel with CCPs*	50	148	MnDOT
Using High Carbon Coal Fly Ashes to Stabilize Recycled Asphalt Pavement Materials	50	750	US DOE and MnDOT
Total (not include 2010 pool)	444	1709	-

Total projects = 8
Leveraging factor = 3.8

Environmental Assessment

Project	RMRC (\$K)	Other (\$K)	Source
Assessment of Leaching in Embankments Constructed with Coal Fly Ash	0	37	EPA (22), UNH (15)
Mechanisms Controlling Release of Trace Elements from Soil-Coal Fly Ash Mixtures*	50	106	CFIRE
Evaluation of Testing Protocols for Assessment of Fly Ash Stabilized Subgrade Materials	89	217	MD DEQ & UMD
Evaluation of the Environmental Performance of CCPs in Roadway Applications	50	86	EPA
Assessment of US EPA's IWEM Model*	0	40	EPA
WiscLEACH Update	35	70	EPA (40), JSU (30)
Total (not include 2010 pool)	189	486	-

Total projects = 5, Leveraging factor = 2.6

Life Cycle Tools

Project	RMRC (\$K)	Other (\$K)	Source
Metrics to Evaluate Sustainable Highway Construction in Wisconsin	0	100	UW & CFIRE
Evaluation of Energy, Water Use, and GHG Associated with CCPs Used in Sustainable Construction*	50	156	EPRI
Quantifying Benefits of Recycling Using Real Construction Projects	0	50	RMRC Pooled Fund
Total (not include 2010 pool)	50	256	-

Total projects = 2
Leveraging factor = 5.1

Outreach Projects

Project	RMRC (\$K)	Other (\$K)	Other Source
Green Highways Partnership Specifications Harmonization and LCA Project	0	50	EPA
Outreach Materials for the Local Technical Assistance Program	0	75	EPA
Update of the Beneficial User Guidelines	50	0	-
Total	50	125	-

Total projects = 3
Leveraging factor = 2.5

This slide summarizes specific outreach projects. Other outreach activities are summarized in the following slides.

Principles for Selecting Projects

1. Practical importance and relevance.
2. Distribution within major topics.
3. Input from advisory board (includes FHWA).
4. Availability of matching (prefer at least 1:1, required to generate \$800k by contract).
5. Ability to leverage base funds.

Outreach

Face-to-Face Tech Transfer

- Foundry sand workshop
- Shingle workshop
- NHI training program
- IMR 101 workshops
- GHP harmonization
- TDI workshop (in review)
- Talks to numerous groups (e.g., AASHTO RAC next week)

Outreach

Webinars

- Foundry sands
- CCPs in unbound materials
- HMA with recycled materials
- RAP-RCA as unbound base (11k pool)
- RAS as structural fill (11k pool)
- EPA IMR training series
- ASCE recycled materials training series
- FHWA brown bag

Outreach

Standards and Specifications

- AASHTO Specifications
- ASTM D 18.14 – Sustainable construction

ASTM Symposium

Website and IT

Total invested in outreach = \$813k
(2010 pool not included)