

CP Tech Center
Recycled Concrete Aggregate (RCA)
Survey Results
Training & Technical Assistance



April 26, 2016



Recycling Benchmarking Survey

- ACPA Surveyed Contractor Members
- State responded to Survey Request through NCC list serve
- Survey conducted Q1 2016



Recycling Survey Update

➤ 16 DOT Responses to Date

Q 2: What are you agency's current goals regarding the use of RCA?

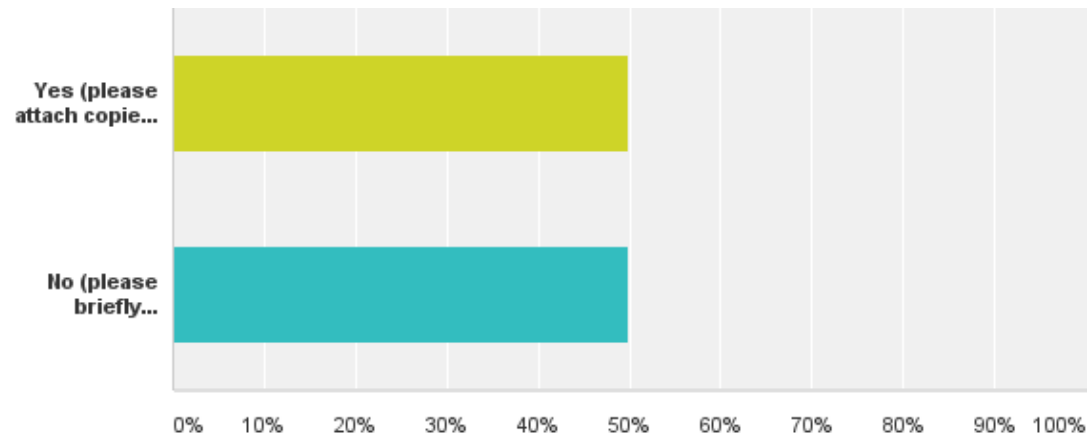
- No goals: 3
- Increase Use: 11
- No Change: 2

Q4: On a scale of 1 to 5, please rate the importance (or magnitude) of the following potential barriers within your agency to using recycled concrete aggregate (RCA) in pavement foundations (1 = no significant barrier or importance, 5 = critical barrier or very high importance):

- Answered: 16 Skipped: 0
 - Durability 1.9
 - Gradation 2.4
 - Foundation strength/stability 1.8
 - Environmental 2.3
 - Economics 2

Q6: Do you permit the use of recycled concrete aggregate (RCA) in concrete mixtures?

- Answered: 16 Skipped: 0

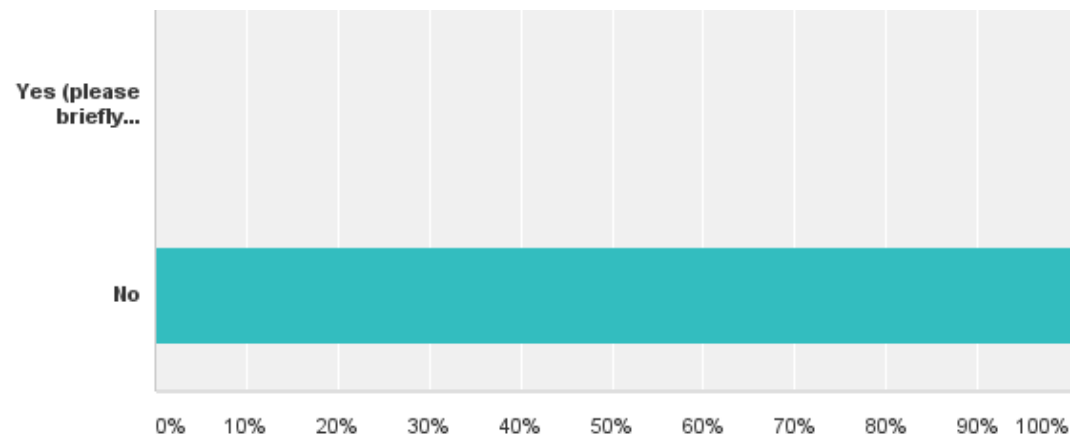


Q7: On a scale of 1 to 5, please rate the importance (or magnitude) of the following potential barriers within your agency to using recycled concrete aggregate (RCA) in new concrete mixtures (1 = no significant barrier or importance, 5 = critical barrier or very high importance):

- **Answered: 16 Skipped: 0**
 - ASR/D-Cracking 3.6
 - Shrinkage 2.6
 - Workability 3.1
 - Strength 2.4
 - Lack of guidance 2.8
 - Economics 2.9
 - Good local sources 3.1

Q8: If your agency allows the use of RCA in new concrete pavement surface materials, are any adjustments made to the design inputs in the state pavement design procedures for determining the thickness of the pavement surface layer (e.g., different structural layer coefficients, different E value, different design strength, different coefficient of thermal expansion, etc.) when compared to the values used when the concrete comprises only natural aggregate?

- Answered: 10 Skipped: 4



Q 9: What % of projects make use of RCA?

- Bases: 0 to 100%; avg. = 33%
- Granular Shoulders: 1-50%; avg. = 9%
- Embankment: 0 to 90%; avg. = 8%
- Erosion Control: Avg. = <1%
- Concrete Paving: Avg. = 0%

Q 11: Environment Concerns, Actual or Perceived Barriers

- Water Quality: Tufa and PH 6 states
- Air Quality: Low level of concern
- Noise: Low level of concern
- Waste Generation: Only concern in 2 states

Q 13: If your agency is currently using RCA, what measures do you require to address environment concerns related to:

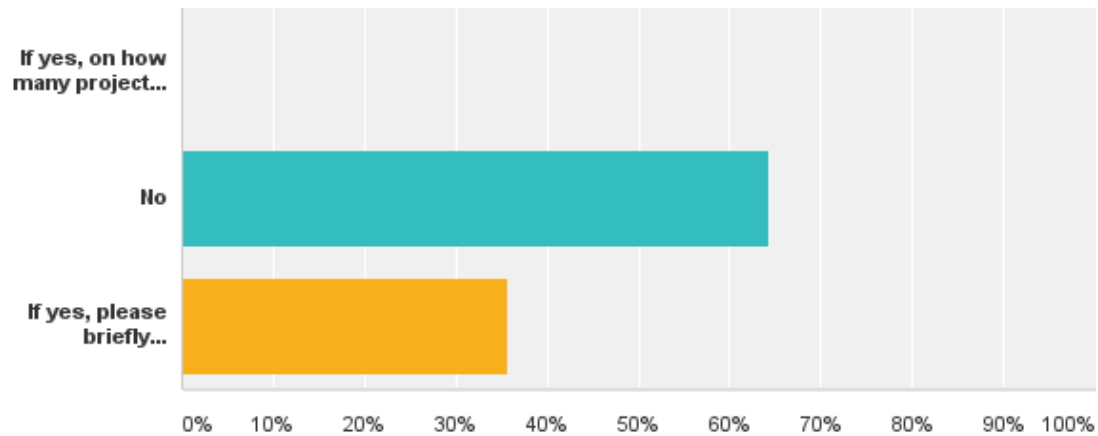
- Water Quality
- Air Quality
- Waste Generation

- State DEQ Regulates: 12
- State Specs 2



Q15: Do you consider potential saving from the use of recycled material in your economic analysis for projects?

- Answered: 14 Skipped: 0

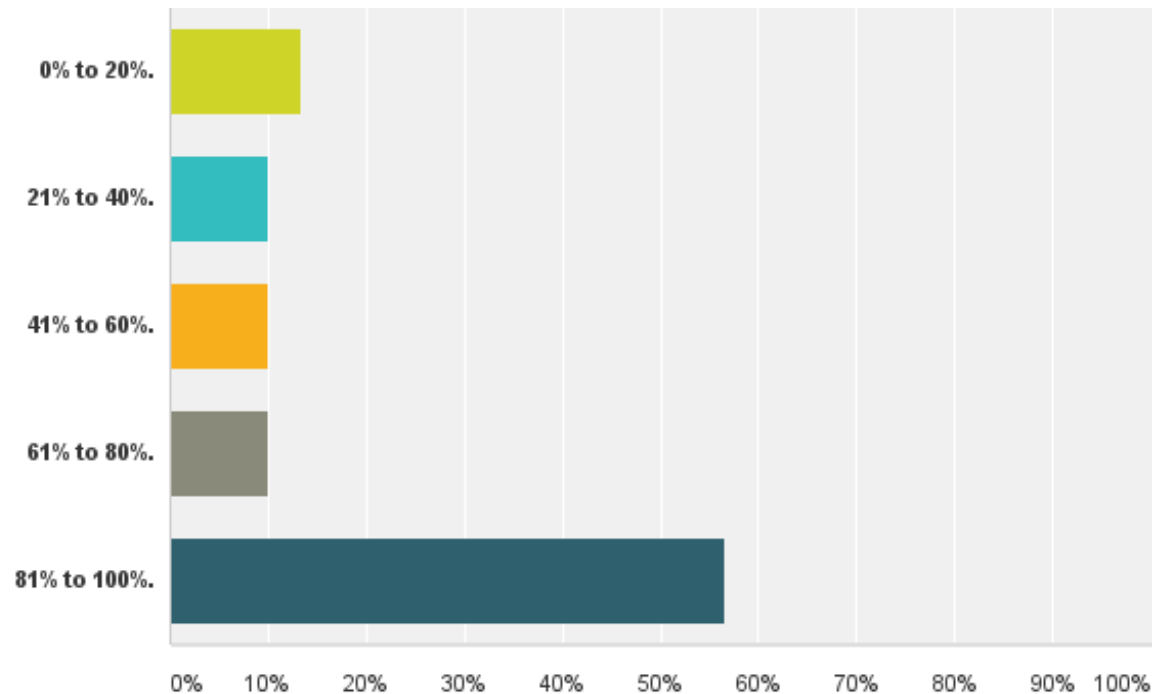


Recycling Survey Update

➤ 36 Contractor Responses to Date

Q12: For all projects awarded to your firm in 2014, what percentage of concrete removals was recycled in any manner ?

- Answered: 30 Skipped: 6

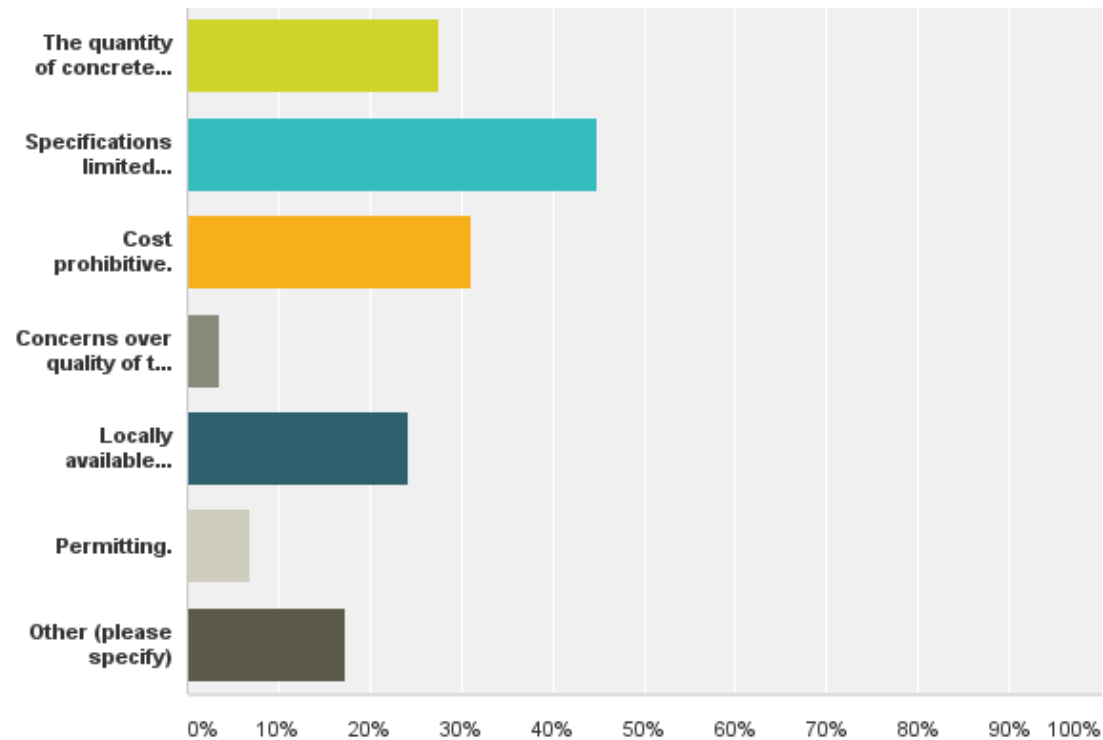


Q14: Of all RCA produced from projects awarded in 2014, estimate the percentage by product

- Answered: 29 Skipped: 7
 - **Granular Subbase**
 - **Chemically Stabilized Base**
 - **Coarse Aggregate for Concrete**
 - **Granular Shoulder**

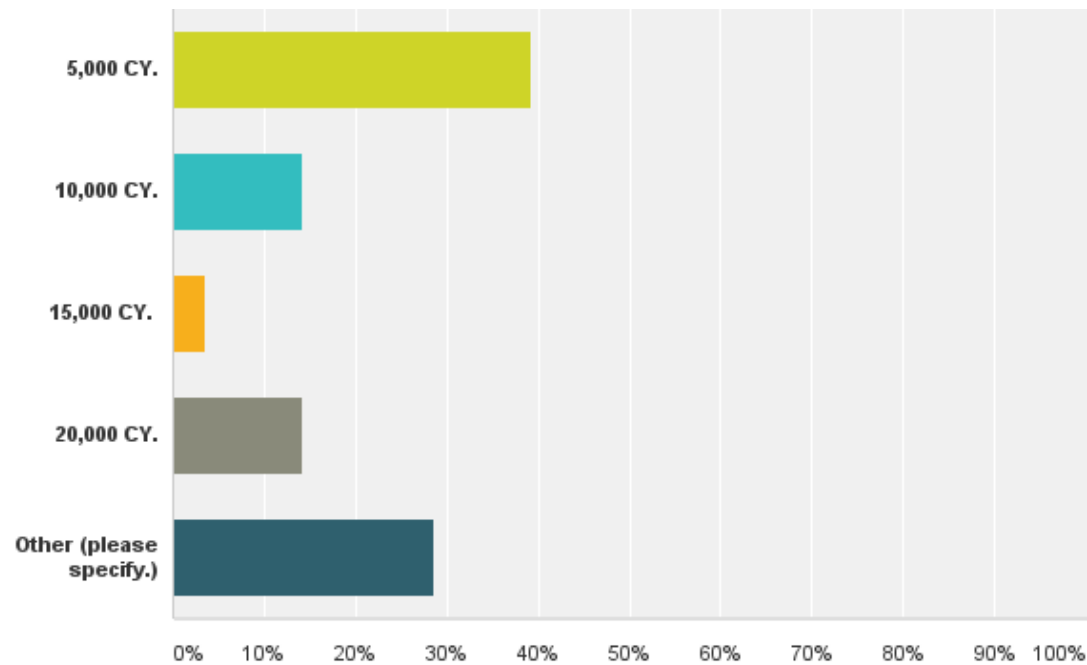
Q16: For those projects where recycling of concrete pavement was not performed, what was the primary reason

- Answered: 29 Skipped: 7



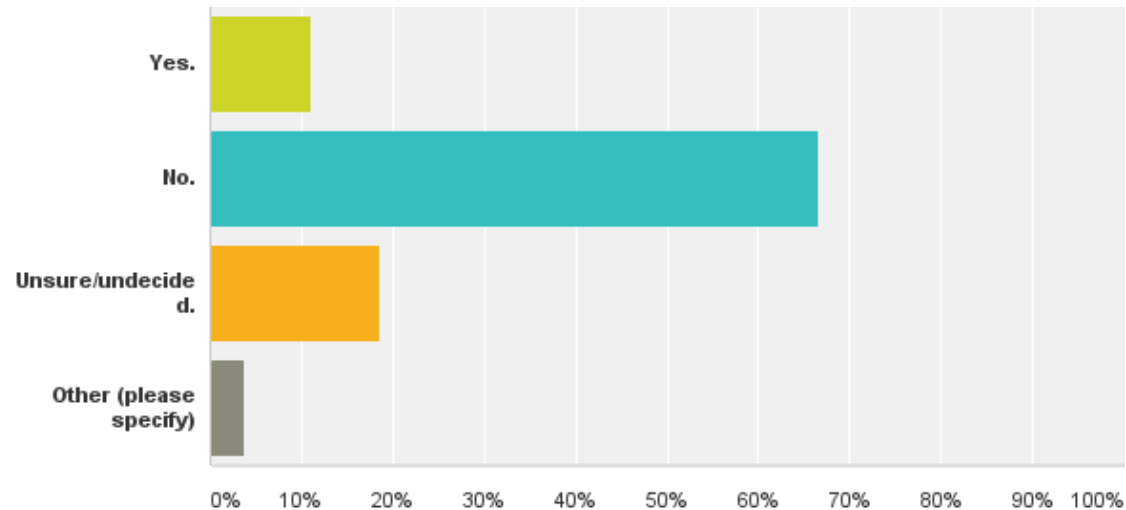
Q19: For your firm, on average what is the minimum quantity of concrete removal which justifies on-site recycling?

- Answered: 28 Skipped: 8



Q25: Did environmental concerns or barriers (either actual or perceived) actually limit or exclude RCA utilization on one or more of your projects?

- Answered: 27 Skipped: 9



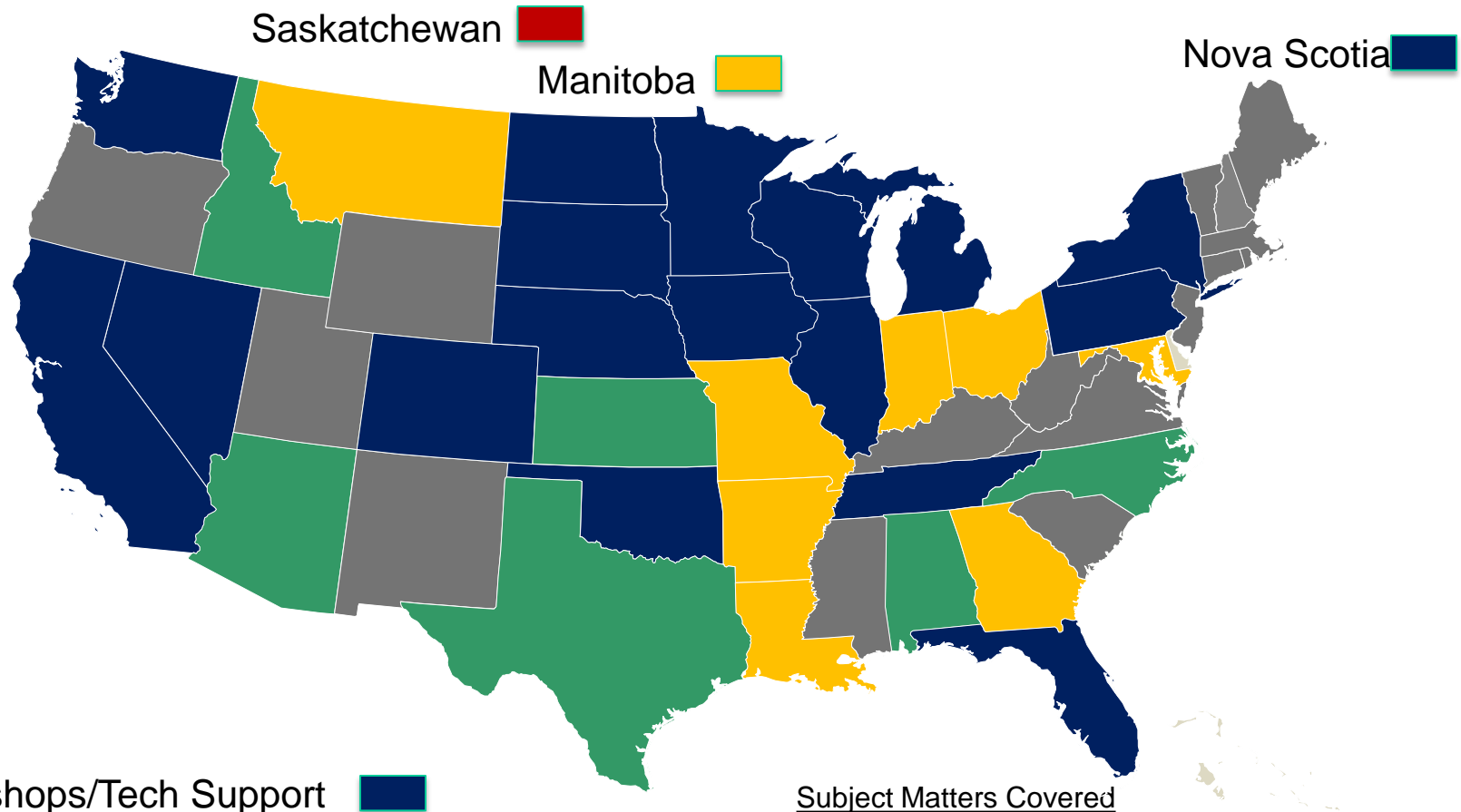
Next Steps

- Complete data analysis
- Determine % of national recycling activities represented by the survey
- Address other sustainable practices such as recycling related to:
 - Slag
 - Flyash
 - Reinforcing steel
- Publish a summary report

Training & Technical Assistance



2015/2016 CP Tech Center Technology Presentations & Workshops



45 Workshops/Tech Support ■

11 Tech Support ■

10 Webinars

40 Presentations ■

2 Terra Member Web-based Training

108 Total (average over 6 events per month)

Subject Matters Covered

- Concrete Overlays
- Concrete Pavement Preservation
- Performance Engineer Mixes
- 3D Engineered Models
- Inspectors Training
- Joint Performance
- Pavement Foundation Support Layers
- CP Tech Center Activities
- Real Time Smoothness

Internal Curing Webinar Schedule

Subject	Regions 1 & 2 Webinar	Region 3 Webinar	Region 4 Webinar
Internal Curing	March 9, 2016	March 23, 2016	April 6, 2016



Concrete Pavement Recycling Webinar Schedule

Subject	Regions 1 & 2 Webinar	Region 3 Webinar	Region 4 Webinar
Concrete Pavement Recycling	April 20, 2016	May 4, 2016	May 18, 2016



Recent Technical Documents

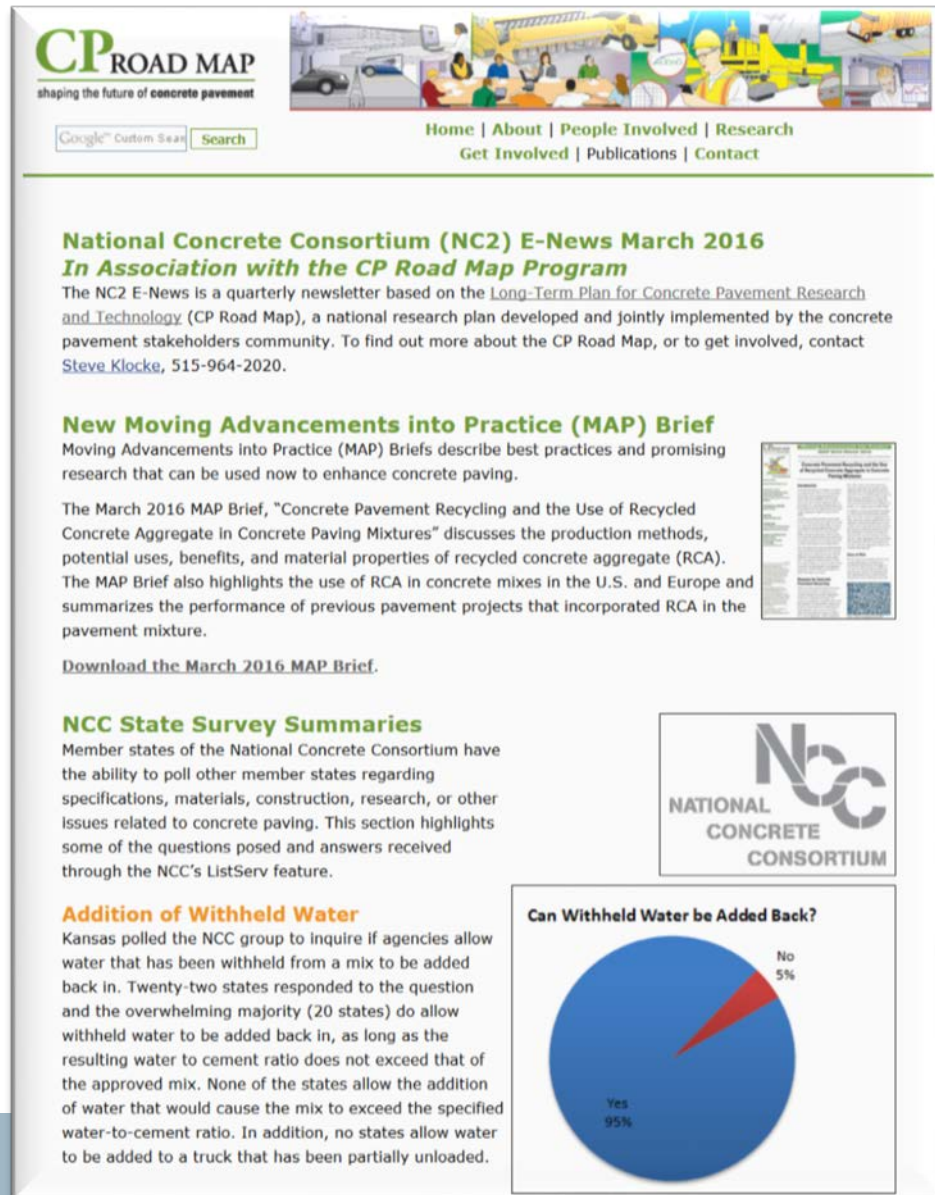
- Guide Specification for Concrete Overlays
- Field Study of Penetrating Sealers (final report)
- Conclusion from Investigation of Deterioration of Joints in Concrete Pavements (final report)
- Comparison of Setting Time Measured Using Ultrasonic Wave Propagation with Saw-Cutting Times on Pavements (final report and T2 summary)



CP Road Map

E-News

- Quarterly newsletter highlighting research in the PCC paving industry
- Each newsletter now includes:
 - Research summaries
 - Called News from the Road
 - MAP Brief



The screenshot shows the CP Road Map website homepage. At the top left is the CP Road Map logo with the tagline 'shaping the future of concrete pavement'. To the right is a navigation menu with links: Home | About | People Involved | Research | Get Involved | Publications | Contact. Below the navigation is a search bar with a 'Search' button. The main content area features a headline for the 'National Concrete Consortium (NCC) E-News March 2016' and a sub-headline 'In Association with the CP Road Map Program'. The text describes the NCC E-News as a quarterly newsletter based on the Long-Term Plan for Concrete Pavement Research and Technology. Below this is a section for 'New Moving Advancements into Practice (MAP) Brief' with a sub-headline 'Moving Advancements into Practice (MAP) Briefs describe best practices and promising research that can be used now to enhance concrete paving.' This section includes a paragraph about the March 2016 MAP Brief, 'Concrete Pavement Recycling and the Use of Recycled Concrete Aggregate in Concrete Paving Mixtures', and a link to 'Download the March 2016 MAP Brief.' To the right of this text is a small thumbnail image of the MAP Brief document. Below the MAP Brief section is a section for 'NCC State Survey Summaries' with a sub-headline 'Member states of the National Concrete Consortium have the ability to poll other member states regarding specifications, materials, construction, research, or other issues related to concrete paving.' To the right of this text is the NCC logo. Below the NCC State Survey Summaries section is a section for 'Addition of Withheld Water' with a sub-headline 'Kansas polled the NCC group to inquire if agencies allow water that has been withheld from a mix to be added back in.' To the right of this text is a pie chart titled 'Can Withheld Water be Added Back?' showing that 95% of states allow it (Yes) and 5% do not (No).

CP ROAD MAP
shaping the future of concrete pavement

Home | About | People Involved | Research
Get Involved | Publications | Contact

National Concrete Consortium (NCC) E-News March 2016
In Association with the CP Road Map Program

The NCC E-News is a quarterly newsletter based on the [Long-Term Plan for Concrete Pavement Research and Technology](#) (CP Road Map), a national research plan developed and jointly implemented by the concrete pavement stakeholders community. To find out more about the CP Road Map, or to get involved, contact [Steve Klocke](#), 515-964-2020.

New Moving Advancements into Practice (MAP) Brief
Moving Advancements into Practice (MAP) Briefs describe best practices and promising research that can be used now to enhance concrete paving.

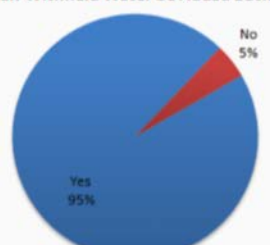
The March 2016 MAP Brief, "Concrete Pavement Recycling and the Use of Recycled Concrete Aggregate in Concrete Paving Mixtures" discusses the production methods, potential uses, benefits, and material properties of recycled concrete aggregate (RCA). The MAP Brief also highlights the use of RCA in concrete mixes in the U.S. and Europe and summarizes the performance of previous pavement projects that incorporated RCA in the pavement mixture.

[Download the March 2016 MAP Brief.](#)

NCC State Survey Summaries
Member states of the National Concrete Consortium have the ability to poll other member states regarding specifications, materials, construction, research, or other issues related to concrete paving. This section highlights some of the questions posed and answers received through the NCC's ListServ feature.

Addition of Withheld Water
Kansas polled the NCC group to inquire if agencies allow water that has been withheld from a mix to be added back in. Twenty-two states responded to the question and the overwhelming majority (20 states) do allow withheld water to be added back in, as long as the resulting water to cement ratio does not exceed that of the approved mix. None of the states allow the addition of water that would cause the mix to exceed the specified water-to-cement ratio. In addition, no states allow water to be added to a truck that has been partially unloaded.

Can Withheld Water be Added Back?



Response	Percentage
Yes	95%
No	5%

CP Road Map Briefs

Completed since September 2015

- October 2015: Curing
- December 2015: Internal Curing
- March 2016: Concrete Pavement Recycling

Planned for Remainder of 2016 (Quarterly)

- May 2016- RCC Accelerated Loading Project
- August 2016- Real-time Smoothness
- November 2016- **Would Welcome Suggestions**



Future Technical Documents

- Full Depth Reclamation of Asphalt Pavements with Cement- Spring 2017
- PEM Guide Specifications
- Investigation of Deterioration of Joints in Concrete Pavements- Fall 2016
- Internally Cured Contraction on Joint Spacing Winter 2016
- Implementation of Thin Bonded Concrete Overlays of Asphalt (BCOA)- Summer 2017

