



FHWA Pooled Fund TPF-5(239)

NO BOUNDARIES

Roadway Maintenance Practices

Final Report

June 2015

Lead Agency:

Missouri Department of Transportation



Acknowledgements

This document was prepared for the No Boundaries Roadway Maintenance Practices Transportation Pooled Fund Study TPF-5(239). Photos used in the report are courtesy of No Boundaries member agencies.

Project Sponsor

The Missouri Department of Transportation served as the sponsor state for this effort.

Members

The No Boundaries Technical Advisory Committee consisted of representatives from each of the following member states.

- Missouri Department of Transportation
- California Department of Transportation
- Georgia Department of Transportation
- Iowa Department of Transportation
- Mississippi Department of Transportation*
- Ohio Department of Transportation
- Pennsylvania Department of Transportation
- Washington State Department of Transportation

**Mississippi was a member during project years 1 and 2.*

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Executive Summary

Increasingly, state Departments of Transportation (DOTs) are challenged to design and build longer-life facilities that result in a higher level of user satisfaction. One of the strategies for achieving this is to adopt innovative technologies and practices. Experts from the DOTs, the Federal Highway Administration, academia, and industry must work together to identify, examine, and foster these advances.

While employing cost-efficient research and new technologies can improve products and services, integrating them into day-to-day practices requires considerable DOT resources. The objective of the No Boundaries pooled fund project is to assist DOTs in working collectively to implement new technologies, *saving time and money* by eliminating separate investments in the same research.

No Boundaries pools the resources of member states to implement cost effective research and evaluation of new technologies and innovative practices that can improve the way highway maintenance agencies do business. The pooled fund facilitates a forum for sharing information, supporting technology transfer, and developing deployment plans. This collaboration provides essential verification that new products and practices can be successfully integrated into current maintenance programs and will make a positive difference.

The Missouri DOT was the No Boundaries pooled fund sponsor state. Other member DOTs included California, Georgia, Iowa, Ohio, Mississippi, Pennsylvania, and Washington State. From 2011-2015, the project's Technical Advisory Committee (TAC) identified, gathered, and documented 14 implemented maintenance methods and disseminated this information for use by other states. Details on the implemented practices, as well as annual reports and other project reporting documents, are available on the No Boundaries website, which is open to the public domain at <http://noboundaries-roadmaintenance.org>.

I. Objective

The No Boundaries pooled fund study was established in 2011 as an open and practical application of roadway maintenance practices. Its purpose is to meet the needs of highway agencies for an efficient means of identifying promising, ready-to-deploy maintenance innovations.

Over the four-year course of the contract, the consortium has served as a national forum for state involvement in the technical exchange needed to advance the application and benefits of maintenance innovations.

II. Membership and Administration

The No Boundaries pooled fund included eight state DOTs. The Missouri DOT (MoDOT) was the No Boundaries pooled fund sponsor state. Other members were the California DOT (Caltrans), the Georgia DOT (GDOT), the Iowa DOT (IowaDOT), the Ohio DOT (ODOT), the Pennsylvania DOT (PennDOT), and the Washington State DOT (WSDOT). The Mississippi DOT (MDOT) was a member in years one and two.

On July 1, 2015, sponsorship of the No Boundaries pooled fund will transfer from MoDOT to ODOT. This project is a continuation of the previous project initiated in 2011 and led by the Missouri DOT TPF-5(239).

Technical Advisory Committee Meetings

The No Boundaries Technical Advisory Committee (TAC) comprised representatives from each member state. These representatives presented maintenance practices as implemented in their state for discussion and evaluation by other TAC members to determine whether they would be beneficial to use in their respective states and others.

Conference calls and face-to-face meetings facilitated the No Boundaries TAC in reviewing and selecting implemented maintenance practices. Meeting minutes are documented and stored on the No Boundaries website at <http://noboundaries-roadmaintenance.org/Meetings.html>.

The TAC held 12 teleconferences over the course of the four-year contract. In addition, five face-to-face meetings were held in the following cities: Kansas City, MO; Seattle, WA; Sacramento, CA; Columbus, OH; and Harrisburg, PA.

Technical Advisory Committee Meeting Dates

2011

July 1, 2011	Teleconference
July 26, 2011	Teleconference
October 3-5, 2011	TAC Face-to-Face Meeting in Kansas City, MO

2012

January 5, 2012	Teleconference
April 26, 2012	Teleconference
July 16-17, 2012	TAC Face-to-Face Meeting in Seattle, WA
October 24, 2012	Teleconference

2013

January 31, 2013	Teleconference
June 18-19, 2013	TAC Face-to-Face Meeting in Sacramento, CA
September 12, 2013	Teleconference
November 19-20, 2013	TAC Face-to-Face Meeting in Columbus, OH

2014

February 5, 2014	Teleconference
May 22, 2014	Teleconference
June 18-19, 2014	TAC Face-to-Face Meeting in Harrisburg, PA
September 10, 2014	Teleconference

2015

January 27, 2015	Teleconference
May 28, 2015	Teleconference

Technology Transfer Support

MoDOT contracted with Applied Research Associates, Inc. (ARA) under contract TRyy1131 to provide administration, marketing, and information services for the No Boundaries pooled fund. This support included creating, maintaining, and hosting the No Boundaries website at <http://noboundaries-roadmaintenance.org> and scheduling and facilitating conference calls. ARA provided monthly, quarterly, and annual progress reports for MoDOT. These reports are available online at <http://noboundaries-roadmaintenance.org/Reports.html>.

III. Results and Outcomes

Implemented Innovations

Following are brief summaries of the implemented maintenance practices developed and disseminated from 2011-2015 through the pooled fund study. Further details on each is available in [Appendix A](#). This material is available on the project [website](#), along with downloadable informational flyers, for other states to utilize.

TMA-Mounted LED Panic Lights

MoDOT added white, flashing LED panic lights designed to help motorists avoid possible collisions to the back of a truck-mounted attenuator (TMA) unit. Drivers have easy access to a manual switch, and they are instructed to activate the panic lights only when a motorist shows no sign of changing lanes. Collisions have decreased significantly since the lights were installed.



Maintenance Leadership Academy

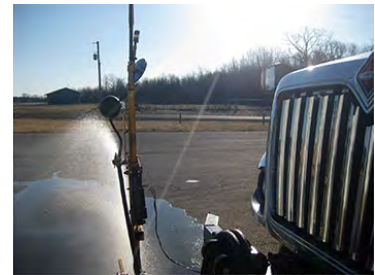


The Caltrans Maintenance Leadership Academy (MLA) is a training class designed to develop leadership skills among supervisory classifications in the Division of Maintenance. MLA was developed through a collaborative effort between Caltrans Division of Maintenance and the College of Continuing Education at Sacramento State University. MLA examines the essential elements of the Division of Maintenance business plan and how the actions of all field employees affect the success of the Caltrans departmental mission. A number of topics are covered during the

five-day sessions, including leadership, strategic planning, budgets, field safety, asset management, equipment, legal, communication, team building and collaboration, and action plans.

Advanced Control System Herbicide Sprayer

The Advanced Control System (ACS) Herbicide Sprayer is MoDOT's low-cost alternative to the high-cost injection sprayers currently used. The large tank results in less downtime for loading and mixing. The system requires fewer repairs than the older model pumps and stores application information in the onboard computer. In addition, employees familiar with the ACS system require little training.



All-Terrain Rotary Tree Trimmer

ODOT's evaluation of the Jarraff All-Terrain Rotary Tree Trimmer resulted in increased worker safety and productivity. The trimmer eliminates set-up time inherent with the typical chainsaw and bucket truck method, and the operator remains in an enclosed cab safely away from cutting blades and falling debris.

Tandem Axle Dump Truck

PennDOT's tandem axle dump truck modifications resulted in a safer, more usable design. Improvements include a fixed cab shield, a larger pre-wet tank, a new light package and paint pattern for truck visibility, a standardized pre-wet distribution line, and a Freedom ACS Control System.



Beautifying Georgia Tire Program

GDOT partnered with the state's Department of Natural Resources, Mohawk Industries, Home Depot, Liberty Tires, and Keeping Georgia Beautiful to establish a cleanup effort that included removing tire debris from roadways then storing it for recycling. Industry partners supplied trailers, and Mohawk Industries created a rubber mat design from recycled tires. The mats are now sold in all Home Depot stores across the state, and a percentage of each sale goes to the Solid Waste Trust Fund to clean more sites in the future.

Concrete Deck Repair Trailer

To improve efficiency in concrete deck repair, a WSDOT crew designed and built a self-contained surplus 25-foot tandem axle trailer with a 20-foot container, two roll-up doors, a gas-powered cement mixer, 300-gallon water tank, and bulk sand and rock bins. The trailer cost approximately \$15K to construct and outfit. It lowers the cost of the deck patching operation, resulting in more bridge decks repaired. It reduces under-utilization of equipment, and it aids in worker safety as the set-up of the trailer reduces lifting and carrying of heavy materials.



Epoxy Injection of Bridge Decks

Bridge deck overlays inhibit chloride and water intrusion into the bridge deck and have proven effective as a maintenance treatment on IowaDOT bridges. Bridge deck overlays typically last 15 to 20 years before delamination at the bond interface requires repairs to or replacement of the overlay. The delamination of the overlay is often repaired by maintenance staff by injecting the deck overlay cracks and voids with epoxy. The epoxy injections can provide an additional five to 10 years of surface life for existing bridge decks.

Gator Getter™ Debris Removal Tool

MoDOT's Gator Getter™ is a custom-built attachment for heavy-duty trucks to pick up trash and debris. It increases safety to motorists and highway employees by using a truck for trash and debris pickup instead of a highway crew working alongside traffic. Further, because the Gator Getter™ operates in the midst of traffic, MoDOT no longer has to provide traffic control or close lanes while removing debris, and highway workers normally assigned to debris removal can be assigned to other maintenance jobs.



Data-Driven Traffic Paint Reflectivity Program

IowaDOT uses data collection and performance measures to determine appropriate paint treatment for a given location. Data is used to determine high-risk locations and to justify more expensive, more durable paint treatments on those routes. The Pavement Marking Management Tool, developed by the Iowa State University Institute for Transportation, has the ability to graph data from biannual readings, display site-specific data from biannual readings, and count and display site-specific color-coded reflectivity levels.

Weed Control Barrier

Caltrans' CRMCrete Weed Control Barrier is a non-proprietary cementitious product that is more durable than asphalt concrete and physically blocks weed growth on roadsides under guardrails. CRMCrete is made of commercial concrete mix, polypropylene fibers, recycled scrap tire, crumb rubber material, and optional colorant. It is environmentally friendly and uses recycled products, and its components are readily available. CRMCrete reduces the need for recurring maintenance activities such as herbicide application, pruning, and mowing.



Contrast Striper

MoDOT modified an existing striper gun to enable placement of three independent lines simultaneously onto concrete pavement. This allows application of contrasting markings in one pass along stretches of the roadway where daytime visibility is a concern. The method is much cheaper than any other way of producing contrast striping. Impact to the public is reduced significantly by reducing a conventional two-pass operation to a one-pass. Smaller tips are used for the black paint to minimize overspray.

Truck Mounted Lifting Device

Performing the same movements repeatedly, like bending or lifting, can slowly damage a highway worker's muscles, tendons, and ligaments. To assist crews, WSDOT developed a truck-mounted lifting device that automates traffic barrel pickup operations by mechanically lifting the barrel onto the bed of the truck. This innovation has reduced sprains and strains by 50% and lessened lost work time due to injuries and potential claims. It also increases worker safety by removing crews from the path of oncoming traffic.



Balsi Beam

Caltrans is using the Balsi Beam to increase the safety of highway workers. The Balsi Beam is a trailer that consists of two rotatable telescoping beams that can be deployed to either side to provide up to 30 feet of positive protection between moving traffic and highway workers. Also, the unique design allows work zones to be narrowed, thus eliminating the need for many lane closures. (This implementation was later pulled from website by request of Caltrans).

Additional Practices Considered

Following are brief summaries of maintenance practices presented from 2011-2015 by member states to be considered for adoption by the TAC.

Centralized Organizational Structure

PennDOT modified their organizational structure around a Central Office for managing 11 Engineering Districts (Maintenance, Design, and Construction managers, and support staff). Engineering Districts consist of 67 County Maintenance Offices and County Managers.

Maintenance Procedures Training Videos

ODOT initiated a program to develop training videos as part of a Department-wide effort to develop, document and share implemented innovations. In-house staff produced the videos, which emphasize proper procedures, safety, and specification standards to work planning, scheduling, and budgeting practices. Currently the team has completed a video on crack sealing procedures and they are filming a video for culvert installation.

Incident Management Planning Strategies

PennDOT modified Incident Management planning to address pre-event planning through recovery to more efficiently return operations to normal post disaster. Planning strategies include coordination of technologies such as an automatic vehicle locating system and traffic cameras, Interstate traffic restrictions, global detour routes, an AccuWeather contract, and mobile equipment teams.

No Boundaries Website

The No Boundaries pooled fund website at <http://noboundaries-roadmaintenance.org/> was developed to share information on innovative technologies and maintenance practices as implemented by participating member states and make this information available for all other states. During the first four years, this website was hosted on ARA servers. At the close of the contract, MoDOT directed ARA to migrate the website to their MoDOT servers.



Currently accessible on the website:

- Background, specifications, and benefits on 13 innovative, state DOT-implemented maintenance practices and downloadable flyers on each
- Contact information for member state representatives
- TAC meeting minutes
- Monthly, quarterly, and annual reports
- Downloadable No Boundaries informational brochure

- Information for other states on how to participate
- Links to other organizations and resources of interest to the maintenance community

Marketing Materials

This pooled fund project has been branded and materials developed to market the effort to other states. All marketing materials were created using the No Boundaries logo and other visual branding elements. Materials produced include: a four-page brochure; a No Boundaries business card with imprinted QR code for easy website access; a thumb drive imprinted with the No Boundaries log including a flash-based menu and links to program information, marketing materials, and implemented innovation one pagers; and a trade show display. In 2014, ARA drafted a marketing plan that presented new ideas for promoting the No Boundaries pooled fund study to other states. Contacts were made with members of both the American Association of State Highway and Transportation Officials (AASHTO) and the Clear Roads Winter Highway Operations Pooled Fund to consider cross-marketing on social media and collaboration opportunities. The No Boundaries informational brochure and the 2014 Marketing Plan are located in [Appendix C](#).



IV. Funding and Expenses

No Boundaries was funded by an annual financial contribution of \$10,000 per member state DOT (some states increased their contributions) normally allocated out of State Planning and Research (SP&R) funds, for a total of \$368,000 in contributions over four years. Project funds covered administrative management, website development, documentation of implemented practices, training, marketing materials, and travel to TAC meetings. Any remaining unused funding will be reallocated back to the member states by MoDOT.

The No Boundaries pooled fund had a budget of \$368,000. The MoDOT contract with ARA was established with an initial budget of \$143,043. A contract modification for \$86,802 was executed by MoDOT in April 2013, which extended the contract end date from December 31, 2013 through June 30, 2014. MoDOT executed a second contract modification for \$29,720 in July 2014,

extending the contract period through June 30, 2015. This increased the total contract amount to \$259,565.

Table 1. Total contributions by No Boundaries member states

State	Total Contribution	Contribution Years
California DOT	\$150,000	2011, 2012, 2013
Georgia DOT	\$36,000	2011, 2012, 2013
Iowa DOT	\$36,000	2011, 2012, 2013
Mississippi DOT	\$20,000	2011, 2012,
Missouri DOT	\$30,000	2011, 2012, 2013
Ohio DOT	\$30,000	2011, 2013
Pennsylvania DOT	\$40,000	2011, 2013, 2014
Washington State DOT	\$36,000	2011, 2012, 2013
Total	\$368,000	

Annual Expenditures

Figure 1 shows total spending for Fiscal Years 1 through 4 (July 1, 2011 – June 30, 2015), and Figure 2 shows yearly expenditures as a percentage of the total budget of \$368,000.

Figure 1. Progression of Spending for Project Years 1 – 4

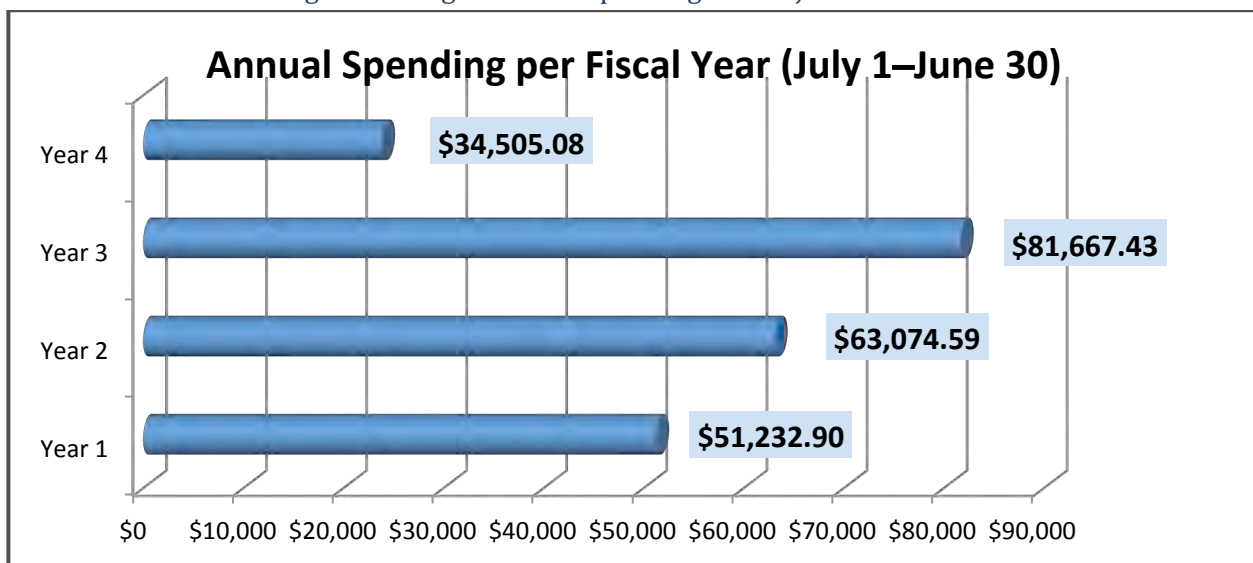
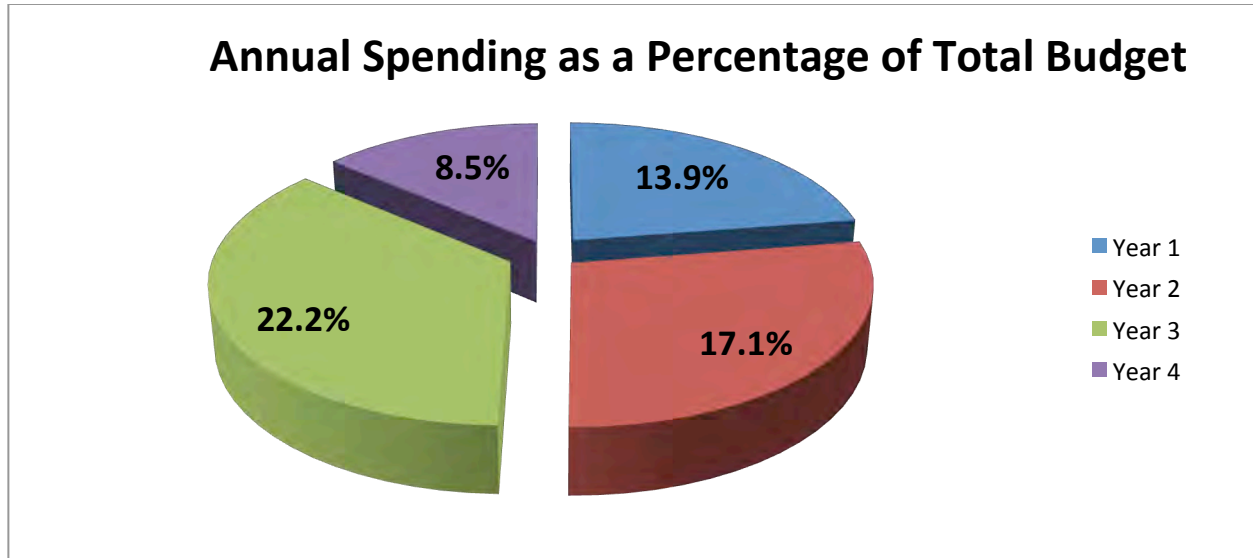


Figure 2. Expenditures Per Year as a Percentage of Total Budget of \$368,000



Appendix A – Implemented Innovations

- **TMA LED Panic Lights**
- **Maintenance Leadership Academy**
- **ACS Herbicide Sprayer**
- **All-Terrain Rotary Tree Trimmer**
- **Tandem Axle Dump Truck**
- **Beautifying Georgia Tire Program**
- **Balsi Beam**
- **Concrete Deck Repair Trailer**
- **Epoxy Injection of Bridge Decks**
- **Gator Getter™ Debris Removal Tool**
- **Data-Driven Traffic Paint Reflectivity Program**
- **Weed Control Barrier**
- **Contrast Striper**
- **Truck Mounted Lifting Device**



BACKGROUND:

The Missouri Department of Transportation's (MoDOT) use of truck-mounted attenuators (TMAs) has greatly improved work zone safety. Now, thanks to the addition of TMA mounted LED Panic Lights, work zone safety has been improved even more.

BENEFITS:

LED Panic Lights improve the safety of motorists and MoDOT crews by reducing collisions with TMA and MoDOT fleet. Collision incidents have decreased since LED panic lights have been installed. LED Panic Lights for TMA's have been installed statewide, and workers continue to research methods where LED panic lights could benefit other areas.

MISSION:

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.

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TMA Mounted LED Panic Lights

Missouri Department of Transportation



For More Information visit:
www.noboundaries-roadmaintenance.org

NO BOUNDARIES Pooled Fund Project



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or visit the No Boundaries website at:

www.noboundaries-roadmaintenance.org

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TMA Mounted LED Panic Lights

Missouri Department of Transportation



In order to improve the safety of employees and motorists, MoDOT mounted six white LED Panic Lights to the back of a TMA unit with a manual switch within easy reach of the TMA driver. The drivers are instructed to activate the panic lights only when a motorist is not showing signs of changing lanes, and then turn them off once the motorist does change lanes. The flashing lights are designed to gain motorists attention and to avoid a possible collision with the TMA unit. Since the lights have been installed, collisions have decreased significantly. The cost for each unit installed is approximately \$1,500, requiring about 8 hours of labor.



For More Information visit:

www.noboundaries-roadmaintenance.org



BACKGROUND:

Maintenance Leadership Academy (MLA) is a training class that is designed to develop leadership skills among supervisory classifications of the Division of Maintenance in Caltrans. MLA was developed through a collaborative effort between Caltrans Division of Maintenance and the College of Continuing Education (CCE) at Sacramento State University. MLA examines the essential elements of the Division of Maintenance business plan, and how the actions of all field employees affect the success of Caltrans Departmental mission.

A number of topics are covered during the five-day sessions including, leadership, strategic planning, budgets, field safety, asset management, equipment, legal, communication, team building and collaboration, and action plan.

BENEFITS:

- Improve operational alignment with Caltrans Strategic Plan
- Understand how priorities are set for the Division of Maintenance
- Gain tools and resources to help balance the division's priorities with daily work
- Foster cross-organizational networking
- Develop and improve leadership skills

MISSION:

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Maintenance Leadership Academy

for the
Division of Maintenance
California Department of Transportation



Caltrans

For More Information visit:
www.noboundaries-roadmaintenance.org

NO BOUNDARIES Pooled Fund Project



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www.noboundaries-roadmaintenance.org

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California Department of Transportation

Maintenance Leadership Academy

for the
Division of Maintenance



MLA is a five-day interactive training class, designed to prepare Caltrans leaders for the challenges of today. The program draws on the experience of Caltrans subject matter experts and renowned scholars provided by the California State University, Sacramento – College of Continuing Education (CCE). MLA includes the sharing of ideas among participants, communicating using common language and supporting the process of improving mobility across California. Through the development of key leadership skills and the integration of theory and practice, this training class equips leaders to address the critical issues impacting their organization and the state of California.

MLA focuses on the following key leadership practices:

- Model the way
- Inspire a shared vision
- Challenge the process
- Enable others to act
- Encourage the heart

For More Information visit:

www.noboundaries-roadmaintenance.org



BACKGROUND:

This innovation is a herbicide sprayer that uses the Advanced Control System (ACS) hydraulic metering systems on department dump trucks.

SPECIFICATIONS:

- Approximately 25 feet of $\frac{3}{4}$ diameter agricultural spray hose, enough to reach from the outlet on the back left corner of the truck to the front right corner.
- One $\frac{3}{4}$ " female cam lock to match the ACS outlet and attach to the $\frac{3}{4}$ hose.
- One $\frac{3}{4}$ " threaded plastic with knuckled stem to go into the hose.
- One $\frac{3}{4}$ " threaded spring check valve followed by $\frac{3}{4}$ " bushing to connect to $\frac{3}{4}$ " tee with $\frac{1}{4}$ " outlet for the pressure valve.
- Boombuster nozzle – Model 265 or 260-11. (Other nozzles can probably be used but the GPM of the nozzle is critical and dependant on the pump size of the ACS)
- Pressure gauge to register and easily read the 30 -50 psi.

BENEFITS:

The ACS Herbicide Sprayer is a low-cost alternative to the high-cost injection sprayers currently used. The large tank results in less downtime loading and mixing. The system requires fewer repairs than the older model pumps and stores application information in the onboard computer. In addition, employees familiar with the ACS system require little training.

1. Able to use the ACS for winter snow and ice removal, as well as herbicide spraying operations.
2. Components of the ACS system provide needed sprayer requirements with minor adjustments needed.
3. On any spray application, the speed and pressure are critical for proper calibration; both can be achieved through cruise control on the trucks and control settings within the ACS.
4. Ability to use large tanks in tandems reduces the time needed for spray operations plus the multi-use of tanks assures the cleaning of tanks is done routinely.
5. Year round use of the ACS reduces maintenance to the existing pump equipment by providing routine operations to the system.
6. Addition of a small tank of clean water allows the operator to clean the lines in the system in less than one minute.
7. Year round use promotes familiarity with the system reducing the need for reoccurring training.

MISSION:

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.

ACS Herbicide Sprayer

Missouri Department of Transportation



For More Information visit:
www.noboundaries-roadmaintenance.org

NO BOUNDARIES Pooled Fund Project



For More Information Contact:

Justin Sundell
(573) 729-4832

or visit the No Boundaries website at:
www.noboundaries-roadmaintenance.org



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Missouri Department of Transportation

ACS Herbicide Sprayer

The Advanced Control System (ACS) installed on the MoDOT trucks gives us the flexibility of using this system for herbicide applications. The ACS can be set up to run in two different ways – either manual or automatic on the anti-icing side of the system. The automatic setup is the preferred method because it allows for precision in application. The spray nozzle is mounted on the front of the truck, 4 feet (48") off the ground and preferable attached to an actuator allowing up and down applications. Every mile sprayed with the 260-11 nozzle at 30 psi going 10 mph treats approximately 1.33 acres.



For More Information visit:
www.noboundaries-roadmaintenance.org



BACKGROUND:

In 2011, the Ohio Department of Transportation began a grass roots effort to try new equipment funded by central funding without impacting the district budget. The goal is to ensure new ideas spread throughout state. This includes a formal but streamlined evaluation process to select and fund a researcher in order to quickly move ideas to implementation. The resulting publication is written in language common to the transportation community.

The initial idea of evaluating the Jarraff Tree Trimmer was proposed by the ODOT D-5 office (East Central Ohio) and during the course of discussion, D-10 (Southeast Ohio) expressed interest in piloting the tree trimmer as part of the new equipment internal review and evaluation effort.

SPECIFICATIONS:

- The telescopic boom extends up to 75 feet with a 90-degree range of motion, providing unmatched cutting height. The non-conductive, high tensile fiberglass construction provides shock resistance and strength while limb deflectors protect the operator from sliding branches.
- 24-inch blade with carbide tips operates at 3,200 rpm. Two specifically designed blades come with each Jarraff.
- Large rollers and an abrasion-resistant hose covering help reduce wear and extend hose life.
- Hydraulically powered turntable provides 360° range of motion and 40° lateral tilt.
- Convenient 20,000 pound pull winch is standard on every model. (includes a 150', 5/8" cable)
- Hydraulically powered push blade keeps the Jarraff's path free of obstruction.

BENEFITS:

- Provides ODOT Districts a mechanism to research new ideas and equipment that were previously unavailable.
- Central Office standardizes the process and makes findings available statewide.
- Sharing of ideas and findings benefits everyone. Safely and efficiently clear and maintain utility right-of-ways from encroaching trees and limbs.
- Features that maximize production and enhance safety.
- Self-contained and requires minimal set up time which allows smaller crews to do more in less time.
- Workers never leave the ground, which increases safety on every arbor job.

MISSION:

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ALL TERRAIN ROTARY TREE TRIMMER

JARRAFF

Ohio Department of Transportation



OHIO DEPARTMENT OF
TRANSPORTATION

For More Information visit:

www.noboundaries-roadmaintenance.org



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**OHIO DEPARTMENT OF
TRANSPORTATION**



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ALL TERRAIN ROTARY TREE TRIMMER

JARRAFF

Ohio Department of Transportation

In 2011, the Ohio Department of Transportation began a grass roots effort to try new equipment funded by central funding without impacting the district budget. The goal is to ensure new ideas spread throughout state. This includes a formal but streamlined evaluation process to select and fund a researcher in order to quickly move ideas to implementation. The resulting publication is written in language common to the transportation community.

The initial idea of evaluating the Jarraff Tree Trimmer was proposed by the ODOT D-5 office (East central Ohio) and during the course of discussion, D-10 (Southeast Ohio) expressed interest in piloting the tree trimmer as part of the new equipment internal review and evaluation effort.

Currently, a worker typically accomplishes tree trimming with a chainsaw operating in a bucket truck. This requires time for setup of the bucket truck every time it needs moved, as well as separate crews to run traffic control when a lane is shut down. It also involves several safety issues due to the worker being off the ground while operating a chainsaw. Due primarily to its size, the Jarraffe requires a two-lane roadway to be closed. However, having the roadway closed enables the operator to cut both sides of the roadway at the same time and allows the debris to fall directly on the roadway surface. No setup time is required to move the equipment, which also increases productivity. The operator can move the equipment and operate the saw without getting out of the cab. In fact, productivity is so high that the cutting capacity of the equipment exceeds the chipping crew's ability to dispose of the trimming debris. Safety issues are resolved since operator is in an enclosed cab and distanced from the cutting blades and falling debris. Finally, employee buy-in is high since workers enjoy operating the equipment for a work activity that is normally disliked.

For More Information visit:

www.noboundaries-roadmaintenance.org



BACKGROUND:

The Pennsylvania State Department of Transportation (PennDOT), has modified a tandem axle dump truck to give a safer, more usable design. Improvements include a fixed cab shield, a larger pre-wet tank, a new light package and paint pattern for truck visibility, a standardized pre-wet distribution line, and a Freedom ACS control System.

SPECIFICATIONS:

- Trucks 12.4 L engine; 430 hp, 1550 ft-lbs torque; J & J dump body and International Trucks chassis.
- 62,000 lb gross vehicle weight rating.
- 13.5' x 96" for tandem axle body dimension.
- 270 days complete build time.

BENEFITS:

Truck improvements give a safer, more usable design. The cab shield improves safety for the operator and the equipment. Improved lights, front and rear, are safer and more durable; vibrant paint increases truck visibility. A factory chassis powers rear light module and allows for easy diagnostics and schematic reference. An upgraded 25-ton pintle is recessed, raised for specialized operations, and is removable. A pre-wet distribution line will be uniform across all units thereby requiring less up-fit time for field implementation.

MISSION:

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TANDEM AXLE DUMP TRUCKS

Pennsylvania Department of Transportation



pennsylvania
DEPARTMENT OF TRANSPORTATION

For More Information visit:
www.noboundaries-roadmaintenance.org

NO BOUNDARIES Pooled Fund Project



For more information contact:

PennDOT Fleet Management Division
17th Street & Arsenal Blvd
Harrisburg, PA 17120
717-787-1567



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TANDEM AXLE DUMP TRUCKS

Pennsylvania Department of Transportation

The Pennsylvania State Department of Transportation (PennDOT), has modified a tandem axle dump truck to provide a safer more useable design. Improvements include a fixed cab shield which protects against material spillage and gives an improved mounting location for AVL antenna. Additional improvements also include a larger pre-wet tank, a combo tank for limited space, Whelen light package, a new inverted "V" pattern for truck visibility, a standardized pre-wet distribution line, Freedom ACS control System, and a completely sealed rear light module.



For More Information visit:
www.noboundaries-roadmaintenace.org



BACKGROUND:

Over the past several years you didn't have to go far to see that Georgia had a tire litter and illegal dumping problem. A short trip down one of the state's busier highways would provide a venue to showcase countless areas strewn with discarded scraps from blown-out tires. With the recent economic times, there has been an increase in illegal tire dumps because people are trying to avoid paying the fee to legally dispose of tires.

As part of a department-wide effort to improve cost efficiency of scrap rubber disposal, storage and recycling, Georgia DOT developed a public-private partnership with five other organizations. Industry partners supplied storage trailers and tire dumps were cleaned in Northwest Georgia. Mohawk Industries created a rubber mat design that is made from the recycled tire material supplied from Liberty Tire. The mats are now sold in all the Home Depot stores across the state. A percentage from the sale of each mat goes to fund the Solid Waste Trust Fund to clean more sites in the future.

BENEFITS:

- Tremendous cost savings to Georgia DOT
- Elimination of illegal tire dumps
- Proceeds benefit Solid Waste Trust Fund

MISSION:

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.

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Beautifying Georgia One Tire at a Time



GEORGIA DOT PARTNERS:

- Department of Natural Resources (DNR)
- Mohawk Industries
- Home Depot
- Liberty Tire
- Keeping Georgia Beautiful

For more information visit:

www.noboundaries-roadmaintenance.org



For more information contact:

Eric Pitts

Georgia Department of Transportation

Office Phone: 404-631-1390

epitts@dot.ga.gov

*For more information visit:
the No Boundaries website at:
www.noboundaries-roadmaintenance.org*

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Beautifying Georgia One Tire at a Time



Prior to establishing the Beautifying Georgia Tire program, GA DOT Districts 1, 6 and 7 generated over 305 tons of scrap rubber in 2011, which costs \$103 per ton to dispose of at approximately \$39,700 annually in taxpayer funds. Illegal tire dumping was also a costly issue. Previously there were 400 reported illegal dumps in Georgia with 1.5 to 2 million tires. Cleaning costs ranged from \$2 to \$10 per tire and the dumps devalued land and increased the mosquito population. The cleanup effort included removing tire debris from roadways then storing for recycling in DOT Districts 1, 6 and 7. Industry partners supplied trailers and tire dumps were cleaned in Northwest Georgia. Mohawk Industries created a rubber mat design that is made from the recycled tires, and the mats are now sold in all the Home Depot stores across the state. The design advertises the fact that the mats were made out of tires recycled out of roadways and tire dumps in Georgia. A percentage from the sale of each mat goes to fund the Solid Waste Trust Fund to clean more sites in the future.





BACKGROUND:

Due to higher traffic volumes and increased work zones putting highway workers at risk, CalTrans Division of Research and Innovation began researching concepts for a lateral protection system for temporary maintenance work zones. CalTrans Division of Equipment designed and built a mobile work zone protection system known as the Balsi Beam.

SPECIFICATIONS:

The Balsi Beam is a trailer that consists of two rotatable telescoping beams that can be deployed to either side, to provide up to 30 feet of positive protection between the moving traffic and the highway workers.

BENEFITS:

The main benefit of the Balsi Beam is that it significantly increases the safety of highway workers. Also, the unique design allows work zones to be narrowed, thus eliminating the need for many lane closures.

MISSION:

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MOBILE WORK ZONE BARRIER

BALSI BEAM

California Department of Transportation

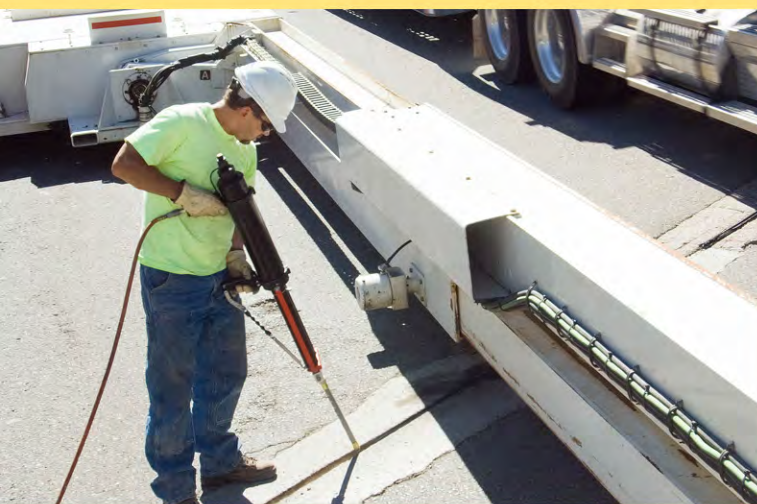


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MOBILE WORK ZONE BARRIER

BALSI BEAM

California Department of Transportation

In 2001, CalTrans Division of Research and Innovation began researching concepts for a lateral protection system for temporary maintenance work zones. CalTrans Division of Equipment designed and built a mobile work zone protection system known as the Balsa Beam. The trailer uses its own dedicated tractor truck for transport to work sites at normal highway speeds-without special permits-and can be set up from the cab of the tractor truck. Further, it has its own dedicated tractor truck for transport to the worksite at normal highway speeds without the need for special permits, and it can be setup from the cab of the tractor truck. The Balsa Beam can potentially be used on such work sites as: bridge deck repairs, guardrail work, median barrier repair, shoulder work, maintenance operations with restricted escape routes, areas with high accident history, and surveying and geotechnical work, such as drilling and soil sampling.

Currently, the safety practices for highway work zones are created with cones that warn traffic of lane closures and provide a work zone boundary. However, errant vehicles can and often do, enter the work zone area. With the Balsa Beam the cones are still used to warn traffic of the work zone area but the Balsa Beam protects the highway workers from errant adjacent lane vehicles.

CalTrans holds the patent to the Balsa Beam. They have deployed 6 Balsa Beam units and are currently working on a Request for Proposals (RFP) to sell the patent and allow the technology to be available to all. The vendor will be responsible for marketing, commercializing, delivery, training, and deployment support.



BACKGROUND:

Crew identified a way to improve efficiency by designing and building a self-contained trailer for bridge deck repairs.

SPECIFICATIONS:

- Surplus 25-foot tandem axle trailer
- 20-foot container
- Two roll-up doors (side and back)
- Bolt-down gas powered 9 CF cement mixer (on back deck)
- 300 gallon water tank with 12 volt water pump, pressure washer, air compressor, and generator
- Bulk sand and rock bins (to lower cost)
- Around \$15K to construct and outfit trailer

BENEFITS:

Lowers the cost of the deck patching operation resulting in more bridge decks repaired. Reduces under-utilization of equipment. Additional benefits include worker safety as setup of the trailer reduces lifting and carrying of heavy materials.

MISSION:

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Washington State Department of Transportation

CONCRETE DECK REPAIR TRAILER



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

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WSDOT/Spokane, Maintenance Supervisor

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Greg Selstead, P.E.

Assistant State Maintenance Engineer

Washington Department of Transportation

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the No Boundaries website at:*

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Washington State Department of Transportation

CONCRETE DECK REPAIR TRAILER

Crew members of the Washington State Department of Transportation, WSDOT, identified a way to improve efficiency by designing and building a self-contained trailer for bridge deck repair. The Concrete Deck Repair Trailer is a relatively low cost, retrofitted 25-foot tandem axle trailer with a container attached. The enclosure is 20 feet long with two roll-up doors—one on the side and one on the back. The mobile shed houses all the materials and equipment needed for on-the-spot bridge deck repair jobs including a 300 gallon water tank, a 12-volt water pump, a pressure washer, air compressor, and generator. Mounted on the rear end deck is a bolt-down gas powered 9 CF cement mixer. Rock and bulk sand bins are located inside the structure.

The outfit costs about \$15K; however, WSDOT has found its benefits well worth it. The Concrete Deck Repair Trailer lowers the cost of their deck patching operation, resulting in more bridge deck repairs annually. The Trailer has also reduced under-utilization of equipment, because crews have what they need to perform the deck repairs on-site quickly and efficiently without having to call for backup. WSDOT is currently collecting data on the amount of square feet of deck repaired using the Trailer for comparison and performance measurement documentation. WSDOT has specification and cost information available for this maintenance innovation.





BACKGROUND:

The Iowa Department of Transportation has used concrete overlays on its bridge decks since the 1970's to restore the concrete deck surface and to lengthen the service life of the bridge deck. Bridge deck overlays inhibit chloride and water intrusion into the bridge deck and have proven effective as a maintenance treatment on Iowa bridges. Bridge deck overlays typically last 15 to 20 years before delamination at the bond interface requires repairs to or replacement of the overlay. The delamination of the overlay is often repaired by Iowa DOT maintenance staff by injecting the deck overlay cracks and voids with epoxy.

SPECIFICATIONS:

The process is not formally documented. Presently, materials, equipment and procedures may vary slightly between District bridge crews.

BENEFITS:

An additional 5-10 years of surface life out of existing bridge decks. Currently, the practice is being researched in Iowa. Present research objectives cover three main focus areas:

1. Determination of the effectiveness, durability, and typical service life of epoxy injected delaminated bridge decks
2. Evaluation of the current state of the practice in the epoxy injection industry; and
3. Development of procedures and specifications for epoxy injection

MISSION:

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.

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Iowa Department of Transportation

EPOXY INJECTION OF BRIDGE DECKS



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

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the No Boundaries website at:
www.noboundaries-roadmaintenance.org*



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EPOXY INJECTION

OF BRIDGE DECKS

Epoxy injection of bridge decks is a relatively simple and cost effective procedure that provides an additional 5-10 years of service life for existing bridge decks.

The first step in the process is to sound the deck using chains and hammers in order to determine the areas needing repair. Next, an air movement process is completed in order to determine the best place to start the epoxy injection. Initially, 1/2" holes are drilled and checks for air movement between the holes are completed using compressed air. The holes are drilled 18" to 24" apart in large areas and 8" to 9" apart in small areas. In most cases, the holes need to remain 5" to 6" from the perimeter of the delaminated areas.

Once the air movement checks have been completed, a 1/4" rubber tube with a rubber stopper or cork on the end is placed in the injection port and injection is started. A two-part epoxy is used. Using an injection machine and an air compressor, epoxy is injected at 20 to 30 psi. While injecting, the movement and location of epoxy is determined by sounding the deck with a hammer and by viewing other port holes. Once the epoxy has moved through the delaminated portions, the holes are corked to prevent the epoxy from leaking out.





BACKGROUND:

The Missouri Department of Transportation, MoDOT, procured an attachment for a heavy duty truck to pick up trash and debris.

SPECIFICATIONS:

The Gator Getter™ is custom built to attach to MoDOT's heavy duty trucks.

BENEFITS:

Increase safety to motorists and highway employees by using a truck for trash and debris pickup instead of a highway crew working alongside traffic. Further, because the Gator Getter™ operates in the midst of traffic, MoDOT no longer has to provide traffic control or close lanes while removing debris. Highway workers normally assigned to debris removal can now be used on other maintenance jobs.

MISSION:

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.

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GATOR GETTER™

DEBRIS REMOVAL TOOL



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

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District Maintenance Engineer

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or visit the No Boundaries website at:

www.noboundaries-roadmaintenance.org



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Missouri Department of Transportation

GATOR GETTER™

DEBRIS REMOVAL TOOL

The Gator Getter™ is a high speed highway debris removal tool that is custom built to attach to MoDOT's heavy duty trucks. The device collects all debris from general trash, remnants of blown-out tractor-trailer tires and car tires, and even a deer carcass. Because the Gator Getter™ travels with traffic, MoDOT no longer has to provide traffic control or close lanes for debris removal.

The manual process of removing debris required workers to position themselves along the highway, sometimes just inches from on-coming traffic. In addition, manual debris removal often required lane closures in order to remove large debris. The Gator Getter™ resolves both these issues. Using a high-speed operation to remove trash and debris from the highway, not only increases safety to both the traveling public and MoDOT employees, but it is also improving efficiency, cutting what used to be a four-man operation down to one. This saves MoDOT both fuel and maintains costs, as well as increasing efficiency within its workforce.

The Gator Getter™ is also helping MoDOT increase their recycling efforts. One of the most common items found, tires and treads, is shredded and reused as tire-derived fuel for power plants or in construction projects. With the tire debris collected since 2005, MoDOT has recycled approximately 256,250 tires. That's enough tires to equip 64,063 cars!





BACKGROUND:

The Iowa Department of Transportation, IDOT, studied the relationship between 5 years of pavement marking retroreflectivity data and corresponding crash and traffic data to determine the appropriate paint treatment for a given area.

SPECIFICATIONS:

- 24,867 lane miles of State Highway
- 6 District paint crews
- 12 LTL-X Handheld Reflectometers - 2/district (long-line truck; curb painting truck)
- 1 Laserlux® CEN 30 Mobile Reflectometer *Initial van purchased in 2001 from Roadware, Ontario Canada. Present van purchased in 2009 from Road Vista, San Diego, CA (improved operating system and data collection).*

BENEFITS:

Uses data collection and performance measures to determine appropriate paint treatment for a given location. Data is used to determine high-risk locations and to justify more expensive, more durable paint treatments on those routes. The Pavement Marking Management Tool, developed by INTRANS, Iowa State University, has the ability to graph data from biannual readings, display site specific data from biannual readings, and count and display site specific color coded reflectivity levels.

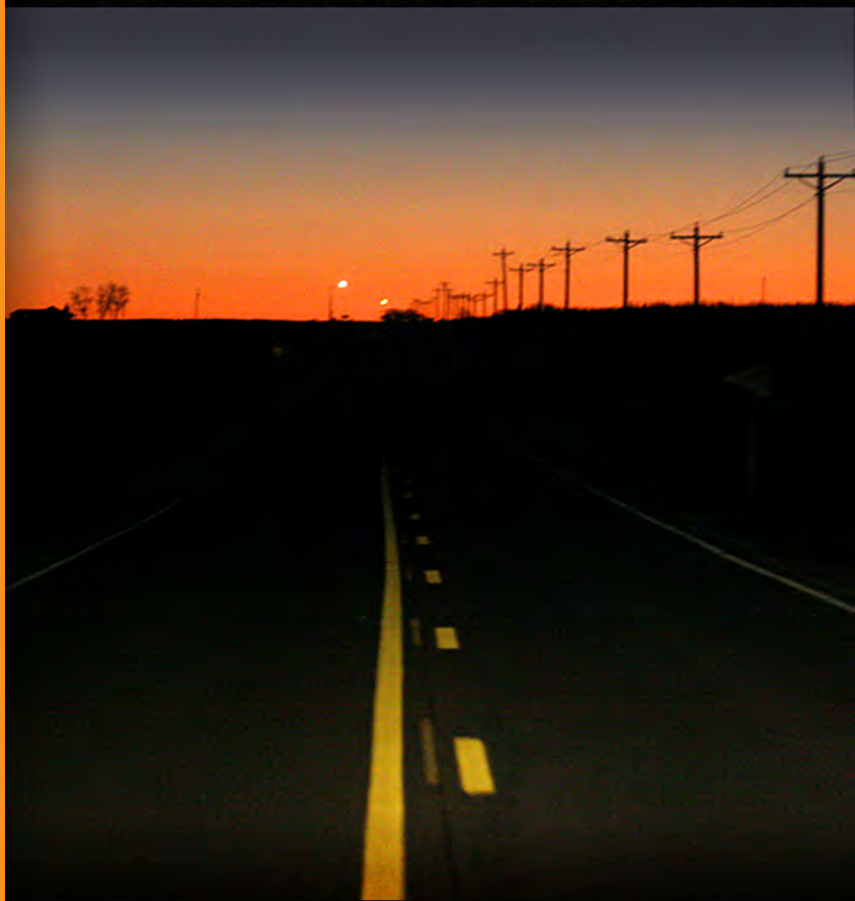
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TRAFFIC PAINT

REFLECTIVITY PROGRAM



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

*For more information visit:
the No Boundaries website at:
www.noboundaries-roadmaintenance.org*



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TRAFFIC PAINT

REFLECTIVITY PROGRAM

IDOT measured reflectivity on Interstate and higher volume 4-lane routes, recording average reflectivity on each tenth-mile section. They used the spring readings to prioritize their paint program and the fall readings as an annual performance measure. Data collection methods included the LTL-X Handheld Reflectometer, which included GPS capability and less than 1-Second per measurement reading time, as well as the ability to average multiple readings. Additionally, they used a Laserlux® CEN 30 Mobile Reflectometer, which enabled them to safely collect continuous data at highway speeds.

IDOT measured the same locations each spring and fall, averaging 12 readings for each line measured at 13 base locations on primary 2-lane routes. The measurements were taken at approximately 5-mile intervals. The spring readings were used to determine the paint loss during winter operations and to prioritize their annual paint program. The fall readings were used as a baseline for the annual spring readings, as well as an annual performance measure for paint reflectivity. The study concluded that for white edge lines and yellow center lines, crash occurrence probability was found to increase by decreasing values of longitudinal pavement marking retroreflectivity, that is to say as the retroreflectivity decreased, the probability for crashes increased.



BACKGROUND:

The California Department of Transportation, CalTrans, strives to provide roadside design solutions to reduce the need for recurring maintenance activities such as herbicide application, pruning and mowing. To assist with this effort, a new standard treatment called CRMCrete has been developed to control weed growth under guard rails.

SPECIFICATIONS:

CRMCrete Weed Control Barrier is a non-proprietary cementitious product that is more durable than asphalt concrete and physically blocks weed growth. Components of CRMCrete are: commercial concrete mix, polypropylene fibers, recycled scrap tire, crumb rubber material and optional colorant.

BENEFITS:

- Environmentally friendly
- Components readily available
- Non-proprietary cementitious product
- Non-specialized application
- Use of Recycled Products

MISSION:

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California Department of Transportation

WEED CONTROL BARRIER



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

*For more information visit:
the No Boundaries website at:
www.noboundaries-roadmaintenance.org*



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WEED CONTROL BARRIER

When faced with issues like weed growth beneath metal beam guardrails, which when dry, can provide fuel to become a starting point of a large brush fire, CalTrans came up with a solution. To minimize fire hazards along with reducing the need for recurring maintenance activities such as herbicide application, pruning and mowing, CalTrans now uses a new standard treatment called CRMCrete. CRMCrete Weed Control Barrier is a non-proprietary cementitious product that is more durable than asphalt concrete and physically blocks weed growth. CRMCrete is recommended on all installations of guard rails or their beam barrier where repetitive maintenance activity to control weeds would otherwise be required. It can also be used to provide weed control beyond the gore area, in narrow strips, on side slopes and below roadside sign posts. This product can be colored to specifically match soil color or stamped with a pattern for additional texture. Correctly designed and installed, the life cycle cost of this material should be similar to concrete paving.





BACKGROUND:

A modification has been designed that enables an existing striper gun to place three independent lines simultaneously onto concrete pavement.

SPECIFICATIONS:

- Parts for modification: \$150-\$250
- Labor: 6-8 Hours
- Getting the solenoids to fire nearly simultaneously requires minute adjustments to the spring assemblies inside the solenoids.

BENEFITS:

This process allows forces to apply contrasting markings in one pass along stretches of the roadway where daytime visibility is a concern. This method is much cheaper than any other way of producing contrast striping. Also, the impact to the public is reduced significantly by reducing a conventional two-pass operation to a one-pass. In addition, smaller tips are used for the black paint to minimize overspray.

MISSION:

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CONTRAST STRIPER



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

Paul Bryan

Assistant Maintenance Supervisor

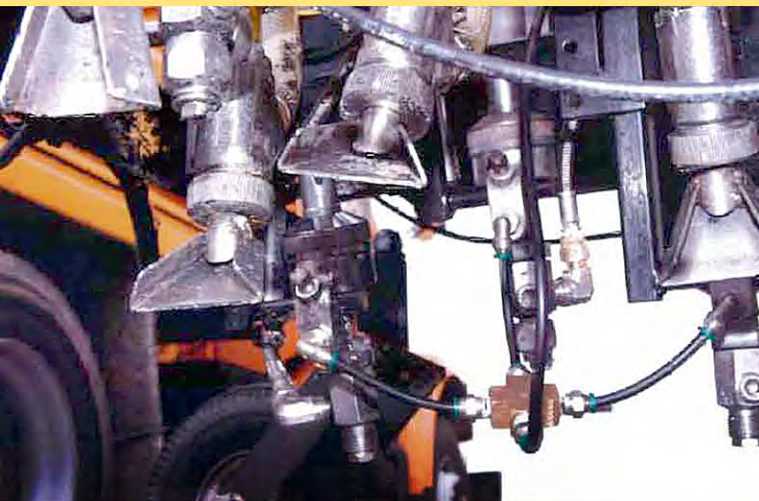
MoDOT, SW District

paul.bryan@modot.mo.gov

(417) 895-1318

or visit the No Boundaries website at:

www.noboundaries-roadmaintenance.org



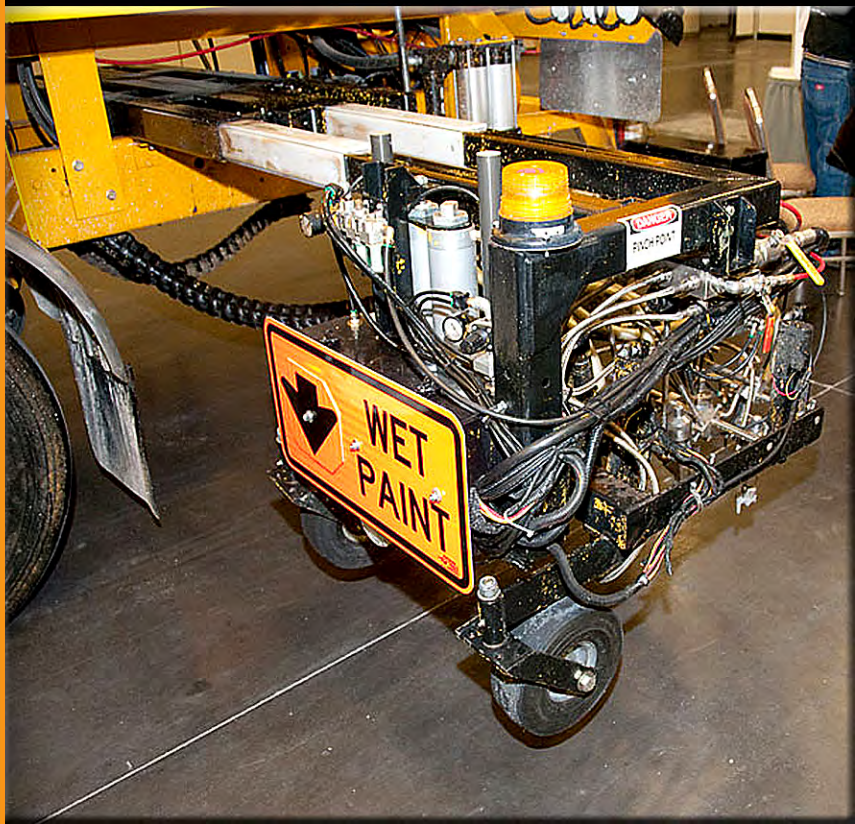
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CONTRAST STRIPER

Missouri Department of Transportation

Developed by Regional Maintenance Supervisor, Paul Bryan and the striping crew in the Missouri Department of Transportation's (MoDOT's) Southwest District, this process modifies an existing striper paint gun carriage to place three independent lines simultaneously. White centerlines can be outlined in black with just one pass and without tape. With this new system in place, MoDOT will now restripe all major roadways each year prior to Memorial Day, except on roads that have a durable marking with remaining life.

This new striping system will help MoDOT save \$1.5 million a year, while still providing safe and highly visible roadways.





BACKGROUND:

The Washington State Department of Transportation, (WSDOT) discovered that performing the same movements repeatedly, like bending or lifting, can slowly damage muscles, tendons and ligaments. Over time, this can result in very painful injuries for highway workers. To assist crews, and to significantly reduce sprains and strains, a WSDOT Maintenance Technician, devised a truck-mounted lifting device that automates traffic barrel pickup operations.

SPECIFICATIONS:

A moveable boom attached to an electric winch is installed onto the truck. When attached to the barrel by the worker, it mechanically lifts the barrel onto the bed of the truck.

BENEFITS:

- Reduces sprains and strains by 50%
- Lessens lost work-time due to injuries and potential claims
- Increases worker safety by removing crews from the path of oncoming traffic

MISSION:

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TRUCK MOUNTED LIFTING DEVICE

Washington State Department of Transportation



For More Information visit:
www.noboundaries-roadmaintenance.org



For more information contact:

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*For more information visit:
the No Boundaries website at:*

www.noboundaries-roadmaintenance.org

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TRUCK MOUNTED LIFTING DEVICE

Washington State Department of Transportation

Innovative thinking by a WSDOT Maintenance Technician helps spare fellow workers from having their jobs become a major pain in the back! Brad Kuhlman, from WSDOT's Toppenish maintenance crew, devised a truck-mounted lifting device to assist crews when they remove traffic barrels from the roadway. The device significantly reduces the risks of sprains and strains and helps avoid potential injury claims and lost days of work. Before the truck-mounted lifting device, workers would have to set up a work area consisting of approximately 50 barrels, weighing about 70 pounds each. Clearing a work zone meant disassembling barrels and tossing the barrel and its base up into the back of a truck; this could cause injuries and damage to the workers' muscles, tendons, and ligaments. With the truck-mounted lifting device, a boom is installed onto the back of a truck that moves left or right depending on the side of the truck that the barrels are on. It is attached to an electric winch that when attached to the barrel by a worker, mechanically lifts the barrel onto the bed of the truck. This truck mounted lifting device not only protects WSDOT's crews from injury, it also increases safety and efficiency.

Appendix B – Pooled Fund Policy Documents

- **Policy for Innovations Request**
- **Innovations Assessment Form**

Policy for No Boundaries Pooled Fund Project Implemented Innovations request

This policy for Implemented Innovations provides for documentation, fair consideration, and external interest. It also covers State DOTs who are not members of the Pooled fund as well as private interest groups. To resolve concerns raised by these groups a documented process on how to request an implemented innovation for No Boundaries Pooled Fund support is necessary. The following is a brief description of the requirements and procedures to be followed by the No Boundaries Pooled fund participants in requesting consideration for a particular maintenance implemented innovation.

1. Any State DOT, (member or non-member) can submit an implemented innovation. Member States can submit up to 4 innovations per year. Non-member States can submit up to 1 innovation per year.
2. Implemented innovations submitted are being used by submitting State DOT
3. Any State DOT may submit private vendor innovations. The State DOT must be a user of the product.
4. Any State DOT who wishes to submit an implemented innovation must request an agenda item on one of the conference calls or face to face No Boundaries Pooled fund meetings (Agenda Items are limited based on time constraints. State DOTs requesting agenda items will be treated on a first come first serve basis).
5. Submitting State DOTs will request consideration for a new implemented innovation from the TAC (Technical Advisory Team).
6. The submitting State DOT will present supporting information to the TAC and submit a No Boundaries innovation submission form to document the state of development, benefits, market readiness and use of the innovation.
7. After hearing the presentation the TAC will conduct an innovation assessment review to validate use by submitting State DOT. If the TAC reaches consensus on the innovation assessment review the submitted State DOT's implemented innovation will be accepted by the No Boundaries pooled fund team.
8. Once accepted for inclusion the implemented innovation is developed into a 2 sided 1 page marketing brochure and placed on the No Boundaries Web Site.
9. An implemented innovation can be removed by the submitting State DOT at any time or by consensus by the TAC.

No Boundaries Maintenance Innovation Submission Form

Maintenance Innovation Description	<ol style="list-style-type: none">1. Submitting State DOT:2. Name of Maintenance Innovation:3. Maintenance Innovation Description:
State of Development	<ol style="list-style-type: none">4. Describe development history:5. What additional development is needed to enable routine deployment of this innovation?
Benefits	<ol style="list-style-type: none">6. Describe how does this innovation help customer in your state DOT?7. What are the expected benefits from using this innovation (cost savings, safety improvements, efficiency or environmental or other benefits)?
Market Readiness	<ol style="list-style-type: none">8. How can another organization adopt this innovation?9. What is the estimated cost, effort, and time required to deploy this innovation?10. What resources such as technical specifications, training materials are available to assist its deployment?11. Describe the barriers to its implementation (legal, environmental, intellectual property, etc).
Implementation History	<ol style="list-style-type: none">12. Describe its state of use in your State DOT or other State DOTs:

TAC Innovation Assessment for Submitted Maintenance Innovation

TAC – Innovation Assessment Comments

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Appendix C – No Boundaries Marketing Materials

- **No Boundaries Brochure**
- **2014 Marketing Plan**

How to Participate

No Boundaries is an open, cooperative research program aimed at meeting the needs of roadway maintenance agencies in the U.S. and around the world by promoting promising ready to deploy maintenance innovations. This is an ongoing pooled fund project. An expanding membership helps to maintain and strengthen this ongoing commitment to identify, gather, and document State DOT implemented maintenance practices for use by other states.

To join this Pooled Fund, please visit:

<http://www.pooledfund.org/Details/Solicitation/1382>

to view the current solicitation.

Join Today!

All interested agencies are asked to make a financial commitment to No Boundaries. The project funds cover administrative management, website development and maintenance, production of marketing and training materials, documentation of implemented practices, and travel to Technical Advisory Committee (TAC) meetings. Funding to support No Boundaries normally comes out of the participating States' allocated SP&R funds.

To make your financial commitment to No Boundaries, visit the Transportation Pooled Fund web site at www.pooledfund.org or contact Kevin Chesnik, P.E. at kchesnik@ara.com.

No Boundaries is a pooled fund project currently led by the Missouri Department of Transportation (MoDOT).

Contact Us

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Member Benefits:

- Help select which maintenance innovations are added to the pooled fund.
- Have input regarding the development and implementation of marketing and training plans.
- Meet and collaborate with experts from around the country on roadway maintenance practices.
- Travel to TAC meetings with expenses paid by the pooled fund.



NO BOUNDARIES

Roadway Maintenance Practices

NO BOUNDARIES is a pooled fund project that fosters collaboration within the transportation community, academia and industry to implement innovative roadway maintenance technologies into day-to-day practices.



Vision

The No Boundaries pooled fund project is a collaboration of State DOT's, academia and industry developing, implementing and sharing maintenance products and practices designed to meet the needs of roadway maintenance agencies in the U.S. and around the world.

Mission

The No Boundaries pooled fund project fosters collaboration within the transportation community, academia and industry in order to cultivate the implementation of new technologies in day-to-day business practices.

The goals of the No Boundaries pooled fund study are to:

- Identify promising innovations and technologies ready for implementation within Maintenance activities, developed by the participating State DOTs.
- Develop marketing plans for selected ready to deploy innovations and technologies.
- Organize training classes about specific research topics for member State DOTs.

About No Boundaries

Increasingly, state departments of transportation (DOTs) are challenged to design and build longer life facilities that result in a higher level of user satisfaction for the public. One of the strategies for achieving longer life facilities is to use innovative technologies and practices. In order to foster the advancement of new technologies and practices, experts from State Departments of Transportation (DOTs), Federal Highway Administration (FHWA), academia and industry must collaborate to identify and examine new and emerging technologies and systems. Communicating successful research and implementation of products throughout the US is essential for proving that innovative products and ideas can be integrated into the day to day practices of DOTs and that they make a difference.

The implementation of cost effective research and new technologies is important to changing how we do business and improving our products and services. The No Boundaries Roadway Maintenance Practices pooled fund (<http://www.pooledfund.org/Details/Study/468>) is an open and practical application of highway maintenance practices aimed at meeting the needs of roadway maintenance agencies in the U.S. and around the world by promoting promising ready to deploy innovations. This project provides a forum for State DOTs to share their maintenance innovations with each other, support technology transfer activities and develop marketing and deployment plans for the implementation of selected innovations. State participation in this process will be through the pooled fund. For a list of maintenance innovations currently showcased, visit <http://noboundaries-roadmaintenance.org/index.html>.



FHWA Pooled Fund TPF-5(239)

NO BOUNDARIES

Roadway Maintenance Practices

Project TRyy 1131

Marketing & Training Plan
August, 2013

*Lead Agency:
Missouri Department
of Transportation*



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NO BOUNDARIES ROADWAY MAINTENANCE PRACTICES

Marketing & Training Plan

SECTION I: INTRODUCTION

Pooled Fund Member States: California, Iowa, Georgia, Mississippi, Missouri, Ohio, Pennsylvania, Washington

The No Boundaries pooled fund is an open and practical application of highway maintenance practices targeted to meet the needs of roadway maintenance agencies in the U.S. and around the world. State Departments of Transportation (DOTs) make an annual financial contribution to the No Boundaries pooled fund. This money normally comes out of the states' allocated SP&R funds. The project funds cover administrative management, website development, marketing materials, documentation of implemented practices, training and travel to Technical Advisory Committee (TAC) meetings.

Increasingly, DOTs are challenged to design and build longer life facilities that result in a higher level of user/public satisfaction. One of the strategies for achieving longer life facilities is to use innovative technologies and practices. In order to foster new technologies and practices, experts from state DOTs, Federal Highway Administration (FHWA), academia and industry must collaborate to identify and examine new and emerging technologies and systems.

The implementation of cost-effective research and new technologies is important to change how we do business by improving products and services. Implementation of innovations requires considerable resources (time and money) to integrate the technologies into the day-to-day business practices for DOTs. This project will promote promising ready-to-deploy innovations that can be used by other DOTs and hence save time and money. Communicating successful research products throughout the U.S. is essential for proving research products can be integrated into DOTs to make a difference.

An ongoing forum is needed to provide broad national leadership that can rapidly address the challenges facing DOTs with the adoption of new technologies. This pooled fund project will assist in promoting successful technology transfer among all DOTs, in which all states can contribute and identify their innovations that can be used by other DOTs. The project will increase awareness among all DOTs about promising technologies and practices and will help in the development of marketing plans for these technologies. The project may also help in identifying training classes needed for specific research topics for all DOTs.

SECTION II: NO BOUNDARIES MARKETING PLAN

The No Boundaries pooled fund project began in 2011 in response to a need for sharing of innovative practices in the field of roadway maintenance operations. This ongoing program has already attracted 8 member states (Missouri, Iowa, Pennsylvania, Washington, California, Ohio, Georgia and Mississippi) and is funding practical, usable roadway maintenance innovation adoption and deployment. The Missouri Department of Transportation (MoDOT) leads the project under TPF-5 (239).

Vision and Mission

This *No Boundaries Roadway Maintenance Practices Marketing Plan* establishes an aggressive, stakeholder-engaged strategy to rapidly accelerate the deployment of identified and proven maintenance practices. In addition, the plan also provides strategies and tools for recruitment of new states into the pooled fund project.

OUR VISION:

State DOTs and other transportation agencies adopt and implement roadway maintenance practices.

OUR MISSION:

To share roadway maintenance practices across states participating in the pooled fund study and to use this process as a model for deployment and implementation of innovation through outreach.

KEY MESSAGE:

Roadway Maintenance Innovative Practices Across State Lines.

Target Audience Description

State Highway DOT agencies are the primary target audiences for No Boundaries. Other stakeholders such as FHWA, the American Association of State Highway and Transportation Officials (AASHTO) and the Transportation Research Board (TRB) are also important partners. Secondary audiences include local/municipality construction and maintenance offices/divisions and MPOs.

Specific characteristics for the primary and secondary target audience segments are provided in Table 1 and Table 2:

Table 1. List of Primary Target Audiences

Primary Target Audience	
Direct Recipients – State Departments of Transportation	<ul style="list-style-type: none"> • State DOTs • Chief/District Maintenance Engineers • Support Offices or units (i.e. Maintenance, Construction, etc.).
Users	<ul style="list-style-type: none"> • Chief/District Maintenance Engineers • Construction and Maintenance personnel/staff
Decision-Makers	<ul style="list-style-type: none"> • Secretaries of Transportation/Chief Executive Officers • Chief/District Maintenance Engineers

Table 2. List of Secondary Target Audiences

Secondary Target Audience	
Local Agencies	<ul style="list-style-type: none"> • Local /municipality construction and maintenance offices/divisions and MPOs
Users	<ul style="list-style-type: none"> • Local /municipality construction and maintenance personnel/staff
Decision-Makers	<ul style="list-style-type: none"> • Chief/Local Maintenance Engineers • Stakeholders involved in maintenance and construction
Media	<ul style="list-style-type: none"> • Mass Media • Trade
Committees	<ul style="list-style-type: none"> • AASHTO Subcommittee for Maintenance • TRB – Maintenance and preservation • SHRP 2 • Others

Within the target audience segments, those most likely to influence the adoption of *No Boundaries Roadway Maintenance Practices* include the following:

Table 3. Target Audience Segments likely to Influence Adoption

Federal Highway Administration	State Departments of Transportation
<ul style="list-style-type: none"> • HQ Office of Asset Management, Pavement & Construction • Division Administrators • Division Engineers/Personnel for Maintenance/Construction or Asset Management • Federal Lands Highway Division Engineers for Maintenance/Construction or Asset Management • Office of Technical Services – Operations Technical Service Team (TST) • Resource Center 	<ul style="list-style-type: none"> • Secretaries of Transportation/Chief Executive Officers • Chief/District Maintenance Engineers • Construction/Maintenance Personnel • Public Affairs

Marketing Strategies and Tools

Most of the marketing materials developed will be disseminated through electronic means. The main repository of information and for the recruitment of new members to the pooled fund is the No Boundaries website located at: <http://noboundaries-roadmaintenance.org/>.

Completed:

- Web site – *currently being redesigned to include new look and functionality*
- Jump drives with flash menu of Implemented Maintenance Practices
- Implemented Maintenance Practices flyers – uploaded to web site
- No Boundaries thumbnail brochure (highlighting the 2011/2012 Implemented Maintenance Practices) – uploaded to web site
- No Boundaries business cards with QR code
- No Boundaries exhibit posters (showcasing 2011/2012 Implemented Maintenance Practices)

Under Development:

- New web site under construction – highlighting one Implemented Maintenance Practice per month on the homepage; includes tabs for easy navigation; includes a How to Participate tab for recruiting – other changes.
- New Implemented Maintenance flyers: *Caltrans Leadership Academy, MoDOT Herbicide Sprayer, Ohio Maintenance Videos, Pennsylvania Incident Management*

Proposed/To be Developed:

Electronic Marketing Tools (to be posted on No Boundaries web site):

- New Implemented Maintenance Practice Flyers
- Q&A / Overall No Boundaries Flyer
- No Boundaries Program Video
 - Create Spotlight videos that highlight practices; may be able to obtain from states versus creating (due to budget constraints); Post on U Tube and Facebook and connect to web site. Conduct data mining to determine what is available or needs to be produced.
- Other potential tools as funding becomes available: Trade Show Booth; QR code for booth that can be read via smart phones (takes to web site)
 - Develop No Boundaries overview flyer to reflect trade show booth design for electronic dissemination

Marketing Strategies:

- Identify Trade Shows and other communication opportunities (3 to 4 per year)
- Face-to-Face recruitment efforts to attract new states and strengthen existing relationships
- Internal/External Press Releases – Distribution: Trade publications, State newsletters, FHWA newsletters, NAPA newsletters, Public Roads, Industry partners' newsletters

- Partnership Opportunities (AASHTO, TRB) – Ask stakeholder organizations to put a hyperlink to No Boundaries website
- Social Media integration – Recommended post rate is at least once/week
 - LinkedIn – Research existing groups, recruit advocates to join blogs (through FHWA division offices)
 - Facebook
 - Twitter
 - YouTube
 - Place links on the No Boundaries website

Combine the power of content creation with social channel distribution:

- Use search, listening, social and other inputs to determine content areas that are both of interest to our audience and to further goals
- Forge content partnerships with Stakeholder organizations:
 - *LinkedIn:*
 - Highways Maintenance Professionals – Open group. All new discussions can be seen by non-LinkedIn members, shared on Twitter and Facebook, and indexed by search engines.
 - Lloyd Brown, Communications Director at AASHTO
 - Group: AASHTO Subcommittee on Transportation Communications
 - Clear Roads
 - *Twitter:*
 - FHWA
 - USDOT
 - DOT Secretary, Anthony Foxx
 - TRB
- Use keyword searches and tools to identify bloggers and other industry influencers

Social Media Usage Up 800% For U.S. Online Adults in Just 8 Years

Since the year 2005, the number of online U.S. adults who use social media sites has risen from 8% to 72% as it currently stands in the year 2013.

~ Per the Pew Research Center's Internet & American Life Project

SECTION II: NO BOUNDARIES TRAINING PLAN

Option I:

- *PowerPoint Presentations on Implemented Maintenance Practices for purpose of Training* – For team members to present at conferences; State DOTs, etc.

Option II:

- *Pilot Peer-to-Peer Exchange/Demonstrations regarding Implemented Maintenance Practices.*
 - This could be held in conjunction with an annual TAC Face-to-face meeting or a State DOT maintenance meeting. ARA could provide registration and meeting support (i.e., talking points, presentation support).
 - An example would be to conduct a 15 minute overview on No Boundaries and the implemented maintenance practices to date followed by one of the member states presenting a focused demonstration on one or two of their implemented practices and ending with a Q&A session.
 - The session would be no more than 60 to 90 minutes.

Option III:

- *Canned webinars** that can be presented via Adobe Connect or other WebEx platform – These could begin with a programmatic overview of No Boundaries and all the current implemented maintenance practices and then:
 - Detail one or two of the practices the attendees want to know more about. (A survey could be generated through the website, or other survey mechanism, to determine which practices the prospective audience wants to receive training on.)
 - Present a rotating schedule of practices throughout the year using the website and other outreach (social media, email, etc.) to alert agencies of upcoming training and how to register/participate.
 - Develop maintenance practice specific webinars all practices so that when states request training, it can be delivered expediently while interest is high.

*Under the current SOW (Scope of Work), Option III may only be feasible as a pilot program in which only one (or at the most two webinars) is developed during the current contract year due to cost. If the team likes this option, and it is well received, it can then be expanded under subsequent option years.

SECTION III: INTERNAL COORDINATION

In addition to executing the marketing and training strategies listed in previous sections, the No Boundaries team will coordinate with the FHWA Division Offices providing technical assistance to the State DOT's and conduct outreach to their state associations. They will also build relationships with national associations and other industry partners in order to attract new members to the pooled fund study. The recruitment goal for this contract period is shown below.

GOAL:

Three (3) State DOTs and/or Federal Lands Divisions will join the No Boundaries Roadway Maintenance Pooled Fund by Dec. 31, 2014.

Performance Measures and Frequency

Table 4. Performance Measures

Performance Measures	Frequency
Number of states joining the Pooled Fund.	Annual
Number of States hosting/attending specific training to expand knowledge of Implemented Maintenance Practices.	Semi-Annual
Number of States hosting/attending pilots of Implemented Maintenance Practices.	Semi-Annual
Number of States that express interest in joining Pooled Fund.	Semi-Annual

SECTION IV: POOLED FUND TEAM MEMBERSHIP

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Member States

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