BOONE COUNTY PUBLIC WORKS MAINTENANCE OPERATIONS 2015 YEAR IN REVIEW

New Low Water Crossing on Wren School Rd

Presented to the
Boone County Commission

Inside this issue:

New Hallsville Facility
Leveraging In-House Talent to Maximize Resources

Opportunity knocked when the Highways and Transportation Commission decided to close their "brand-new" facility on Hwy 124 & 63 as part of a plan to downscale and consolidate MoDot highway maintenance operations. Boone County had purchased the old MoDot facility (Barnes and Hwy 124) in 2010, and it had provided some logistical improvements to service in the northern part of the County, but had a number of shortcomings. Weighing the expense of funding the necessary upgrades to the older facility against the cost of purchasing the "nearly move-in ready" new facility, it was determined that the new facility represented the best long term value and opportunity for the County to enhance services.

PW Crew extending pad to accommodate larger fuel tank

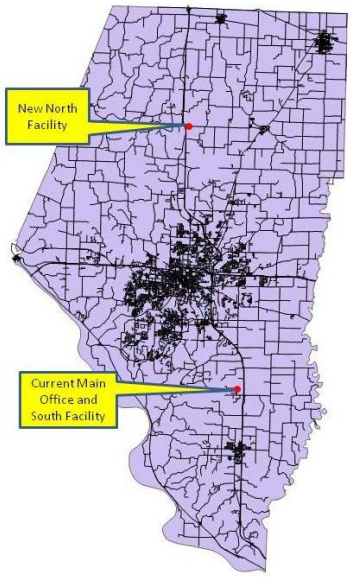
The addition of a salt storage structure was the only major improvement necessary to the new Hallsville facility. Researching options for salt storage structures to meet needs, but minimize costs, led to a decision to pursue a fabric and steel salt storage building. Leveraging the expertise and skills of our Public Works staff to erect the building with in-house labor saved approximately 40% of the total costs (including the costs of materials, rented equipment for construction and regular employee wages). Utilizing a crew of 5-6 employees, construction took less than 2 weeks and was completed during the winter when scheduling was least disruptive to the established work plan. Public Works staff also did the concrete pad extension necessary to accommodate a larger fuel tank for this facility.

New Hallsville Facility Meets Many Needs

What does the purchase of this new facility mean for Boone County Public Works?

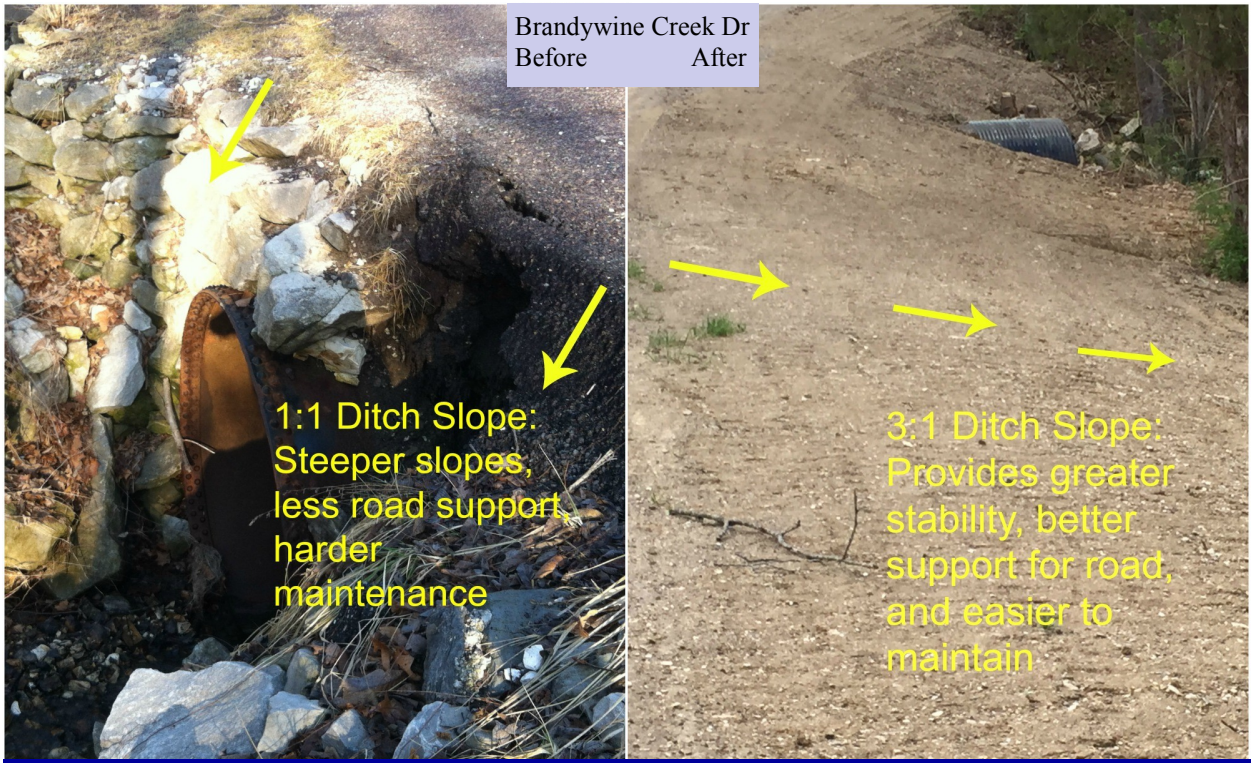
Boone County purchased the MoDOT facility for $450,000. We are confident that this expenditure represents a very good value and investment for the citizens of Boone County. The costs to build a new facility like this would be approximately $2 million. The facility meets our needs extremely well and offers many advantages and recurring annual savings such as:

- Reduced truck mileage (commuting from South Facility)—estimated savings of $62,850
- Reduced travel time—labor costs savings of $16,800
- Central location in northern district that will house almost 1/3 of BCPW workforce and fleet, resolving space needs
- Faster response time during urgent operations such as storm events
- Large on-site wash bay for all equipment, reducing time and expense of queuing at commercial wash bays
- Dedicated bay for mechanic to work on-site
- Storage space for culverts and other materials



Large-Diameter Culvert Replacement
Inspection Data Drives Prioritization

The ongoing collaboration with the Resource Management Engineering Division to target locations for major drainage work has continued to evolve. RM inspectors have nearly completed the initial task of conducting a comprehensive inspection of all large drainage culverts (4' diameter and larger) in the County. Data which projects performance and useful life allows Road Maintenance Superintendents to more accurately prioritize and schedule large culvert replacements. The initial comprehensive study will provide the information needed to establish a systematic re-inspection schedule.



A recycled tank car had been used for crossroad drainage on Brandywine Creek Dr for years. Since the tank car could not be extended, each overlay created a steeper/weaker slope. Replacing the tank car with an extended pipe allowed crews to create a much safer slope that supports the road and helps with drainage and erosion control.

Large Diameter Culvert Replacement Continued

Remie Rd Tank Car Project

Remie Rd - Due to excessive rainfall during the spring and summer of 2015, the old crossroad pipes were unable to handle the volume of water flowing through Cedar Creek.

As a temporary fix, the 3 old culverts were removed and replaced with 8 ft train cars. The ditches were also re-shaped to keep water off the road and to keep rock from running in the creek bottom.

Eventually the train cars will be replaced with a permanent drainage structure better suited to this flood prone location.

Comprehensive Large Diameter Culvert Inspection Prompts 2015 Replacements in the Following Locations:

- Willett Rd
- Owens School Rd
- Bethlehem Rd
- Boothe Ln
- Remie Rd
- Hartley Rd
- Carter School Rd
- Ginlet Ln
- Reames Rd
- Friendship Church Rd
- Brandywine Creek Rd

Recoverable Slope: *A slope on which a motorist may, to a greater or lesser extent, retain or regain control of a vehicle by slowing or stopping.*

Source: Clear Zones and Roadside Terrain, safety.fhwa.gov

Rural Road Maintenance

Calvin Dr Reconstruction Addresses Drainage Issues

Due to an increased volume of traffic and persistent drainage issues on Calvin Dr, the section of road between Hwy M and Wren School Rd was identified for re-construction. This included re-shaping the surface and shoulders of the road, installing new cul-verts, and adding magnesium chloride to help stabilize the base.

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Culverts are strategically placed to allow water to collect into a side ditch and then to flow into a crossroad pipe to outlet away from the road, thus preventing water from flowing over the road and causing damage to the sub-grade.

ROCK BLANKET
The graded rock configuration pictured just to the left, will spread the outlet flow and act as an energy dissipater.

Rural Road Maintenance

Low Water Crossings Provide Best Option in Some Locations

In addition to the extensive ditching and pipe replacements along Calvin Dr, this slope was cut back to improve site distance and drainage. The material removed from the slope was used on other parts of the road to build out the shoulders.

Low Water Crossings

A Reasonable Option on Some Low Volume Roads

Above: Planned replacement of LWC on Wren School Rd had to be expedited due to heavy spring and summer rainfall which caused it to collapse.

Left: Crew finishes concrete on Vemers Ford Low Water Crossing

Pavement Preservation
Protecting the Investment in our Paved Surface Roads

*You change the oil in your car before you see smoke because you know the cost of a new engine is much greater than the costs of regular oil changes. This same concept of "treatment" **prior to a problem** applies to pavement preservation.*

A rating system, developed by Public Works and Resource Management is used to determine when a particular preservation treatment will provide the most BANG (or MILES) for the buck. The appropriate preservation treatment is scheduled at the point in time necessary to extend the life of the road at the lowest cost. With the data provided by this evaluation process, preservation treatments can be anticipated and scheduled several years in advance. Public Works crews are able to work ahead of the scheduled preservation treatment to do all the prep work needed to maximize the lasting effect of the surface treatment. Prep work for an asphalt overlay is more extensive than prep for chip seal or fog seal treatments. All drainage issues are addressed, including culvert pipe replacements and ditching. Any failed areas in the road surface have to have "dig out repairs" to remove weak sub grade and replace with a foot or more of 1½" surface rock. Cracks in the existing pavement are sealed and trees are trimmed before an overlay or any other type of preservation treatment. By utilizing Public Works staff to complete all of this advance work during the winter months, the County saves money and time by having the roads ready to go for contractors who can come in just to apply the surface treatment.

Prep Work for Asphalt Overlay

Upper Right: Culvert pipes are replaced

Lower Right: Ditching to improve drainage

Pavement Preservation

Bank Stabilization and Dig-Out Repairs Support Paved Road Surfaces

Before | During | After

BANK STABLILIZATION - Over time, settling, erosion and pavement build-up can create the type of drop-edge pictured in the first photo. Not only is this undesirable for those using the road, it can also result in stress points which undermine the integrity of the road surface. Where possible, banks are shaped to a gentle 3 to 1 slope which provides support for the road bed and enhances safety as a "recoverable slope."

DIG-OUT REPAIRS
When the subgrade of any road fails due to poor soils, excessive moisture or erosion, the weak sections of the road are dug out and reinforced with rock. Prior to any preservation treatment, roads are evaluated to identify areas that require dig-out repairs.

Preventive Maintenance Cycle

"Why is Public Works working on a road that is in very good condition?" Since we often receive this question, we'd like to explain a bit about our pavement preservation program. While people understand that gravel roads require ongoing maintenance with grading and rocking, many people are under the false impression that once a road is paved, it doesn't require additional maintenance. To protect the investment in a paved surface road, it's critical to apply *the right treatment at the right time*. Just like changing the oil in your car - wait too long and the damage is done. Three years after an asphalt overlay, the road receives a chip seal treatment which fills in any small cracks and seals out moisture. The following year, a fog seal treatment will be applied to further protect the pavement. This work is done on roads that appear to be (and are) in very good condition. This treatment, along with the extensive drainage and other prep work that is done prior to an overlay, can dramatically extend the life of the road and save money in the long run. Due to preservation efforts over the past several years, nearly all of the County's asphalt roads are in acceptable or excellent condition.

Ongoing Maintenance Programs and Activities
Crack Sealing, Tree Trimming and Bridge Deck Sealing

BRIDGE DECK SEALING—Since the 2010 implementation of a preventive maintenance program to protect Boone County bridges from deterioration caused by weather and ice control chemicals, the department has maintained a regular 3-year rotation cycle of cleaning and sealing bridge decks. During 2015, the bridges in the SE and SW quadrant of the County were sealed.

CRACK SEALING—Probably the most cost effective preventative maintenance activity available for paved surface roads. Sealing the cracks that develop in paved surface roads helps prevent moisture from seeping in and undermining the road bed.

VEGETATION CONTROL is an ongoing maintenance challenge in this Mid-Missouri environment. Vegetation that begins to encroach on the right-of-way, can interfere with safe traffic movement and practical road maintenance. On the other hand, we love our trees in Boone County and appreciate the natural beauty they lend to our landscape along County roads. Public Works crews have the challenge of walking that fine line that provides safe and practically maintained roads, but preserves the appearance of trees and shrubs growing near the right-of-way. Members of our tree trimming crew have been trained by a certified arborist and are knowledgeable of proper pruning techniques. To provide the clearance required in our subdivisions (14' above the road and 4' from the edge of the street), the crews prune the limbs to promote future growth up and away from the street. This practice helps maintain the health and appearance of trees and shrubs and keeps them from obstructing the road. Dead or dying trees in the right-of-way must be removed when they begin to pose a hazard. In rural areas, away from landscaped properties, much of the vegetation control is done with mowers and boom shears. With approximately 800 miles of right-of-way to manage, vegetation control is a year-round activity.

Emergency Storm Response -Wind, Rain, Snow and Ice

Boone County Weather Events Require Year-Round Response from Public Works Crews

PRIORITY ROUTES AND EMERGENCY RESPONSES

During the initial phase of a major snow event, nearly all resources are dedicated to keeping priority roads (paved surface roads that serve critical facilities and provide access between state highways and communities) open.

- Paved roads are treated with a salt mixture that prevents the snow and ice from bonding and sticking to the road surface.

SUBDIVISIONS

The main streets within the subdivisions are often cleared by our large dump trucks with follow-up on the side streets and cul-de-sacs with our one-ton trucks.

GRAVEL ROADS

Gravel roads are primarily cleared by graders, which operate during daylight hours. Once snow has stopped, it takes approximately 3 complete 12-hour shifts to make a pass over all gravel roads.

- Motor grader operators take windrows of excess rock and distribute it along the roadway creating more traction for motorists.

CUL-DE-SACS AND DEAD-END STREETS

Cul-de-sacs are at a disadvantage when it comes to snow removal because snow plow drivers are faced with the problem of maneuverability within the cul-de-sac as well as limited options for depositing the extra snow. These streets are addressed after the higher volume roads.

A milder winter in 2015 allowed crews more time than usual to address non-critical maintenance tasks. It also provided some savings on materials (fuel, salt and sand) as well as overtime expenses.

Mild or harsh winter, the maintenance staff still have to be ready with a response plan. When a winter storm is forecast for the area, BCPW will have employees and equipment staged and ready to begin clearing the 800+ miles of county roads. For a major snow/ice event, all 40 drivers are scheduled to work 12-hour shifts around the clock. Equipment available for snow removal includes: 16 dump trucks, 6 one-ton trucks, and 8 graders. The overall effectiveness of the snow removal effort is enhanced by an organized, consistent approach to the task.

Wind and Rain Can Wreak Havoc with Boone County Roads

Left: Strong wind along Old Plank Rd left a path of damaged trees along the road and right-of-way.

Right: Wren School Rd Low Water Crossing collapsed during heavy rains.

Sign Shop and Fleet Operations

Left: The sign shop received a thorough cleaning and reorganization after foam insulation was added in late 2014. The new insulation has resulted in an approximate 75% savings in heating cost for the facility.

Progress on meeting new MUTCD (Manual on Uniform Traffic Control Devices) industry standards for traffic signs: The sign crew has now completed upgrading all 9,378 signs in the County with high intensity prismatic (HIP) sheeting. This highly reflective sheeting makes signs more visible both day and night.

Attention is now focused on meeting another new MUTCD standard regarding curve signs. Boone County has 40 roads that are covered by this standard due to a traffic count of more than 1,000 cars per day. The sign crew has begun conducting the horizontal alignment study required to complete this conversion. The MUTCD has established a due date for meeting this standard by December of 2019. The Boone County sign crew expects to have this project completed well ahead of that date.

FLEET OPERATIONS: The Department has continued it's vehicle replacement strategy to maximize useful life, minimize downtime, and maximize trade or sales value utilizing a strategic 10 year life cycle plan. The fleet software purchased in 2014 is a tool which allows managers to monitor expense and repairs for each vehicle so adjustments can be made if warranted.

Due to changes in technology, a new AVL (Automatic Vehicle Locator) system was bid in 2015. The new system will offer additional features and was bid at a much lower monthly cost. The AVL provides a record of each vehicle's location as well as certain information about its operation. This information is particularly helpful as a management tool during snow fights and other operations, as well as a useful tool in risk management.

Major Purchases in 2015:

2 Graders
1 Mower
1 Wood Chipper
2 Tandem Dump Trucks
1 Single Dump Truck
1 Pickup Truck

Two new variable message boards were purchased in 2015 providing an effective way of communicating to motorists.

Community Connections

TIRE PICK-UP: Boone County Public Works along with the Mid-Missouri Solid Waste Commission hosted a used tire pickup event on November 16th and 17th. Surrounding counties and cities participated. Most tires in the event were cleaned up from illegal dumping along the right-of-way.

RIGHT: GOOD GOVERNMENT DAY
Posing in front of Mount St Salt, Boone County 4-H'ers visited Public Works to see, first-hand, some of the preparations and planning that are required to maintain County roads.

BELOW: ROAD SCHOLAR PROGRAM - Boone County continues to host this training program sponsored by the Missouri Local Technical Assistance Program (MO LTAP) through the Federal Highway Administration and MODOT. Boone County employees, as well as employees from neighboring communities attend classes to enhance road maintenance skills.

CONSTRUCTION MATH
A new training program for BCPW in 2015 was provided by Linn State Technical College. This 10 hour course focused on mathematical operations and their practical application to solving trade problems. The class covered percents, decimals, conversions, fractions, etc. used for calculations of areas, volumes and sizes.

Competitive Skills Challenge

Safety Day Provides an Opportunity to Test Operator Precision

Break Some Eggs to Make an Omelette
Fall Safety Day 2015

Superintendents set up a friendly, but competitive Skills Challenge that allowed operators to test their precision by lifting an egg with a teaspoon attached to the end of a backhoe or excavator bucket and placing it on top of a cone. It was a very challenging maneuver and needless to say, some eggs were broken.

Meet the Crews

Ryan Bennett, JC Nichols, Brandon Heyen, Chris Jennings, Neal Roberts, Corey Bolles, Caleb Okeefe, Isaiah Harmon, Nick Fairley, Price Nichols and Brandon Bennett

ABOVE LEFT: Mark Rowland and Bobby Craig and ABOVE RIGHT: Gordon McCune and Neal Roberts (working primarily in the northern part of the County.

ABOVE: Dustin Friedli and Darren Evans

ABOVE: Caleb Rouse, Dason Klund, Brady Weter, and Frankie Davis

LEFT: Management Crew: Jane Telander, Chet Dunn, Greg Edington, Rickey Harvey, Darren Kimbrel, Bryan Boyce, and Mike Glascock

RIGHT: Lincoln Smith

Meet the Crews

BELOW Mechanic Shop: Robbie Sapp, Terry Knight, Billy Montgomery and Tony Crocker

Sign Shop: Teresa Shaw and Raenell Mackey

Mowers: Robert Hostetter, Alan Eberwein, Dwayne Kimbrel, and Tod Chandlee

ABOVE Grader Operators: Jeff Wren, Adam Lewis, Roland Wren and Randy Garrett (working primarily in the southern part of the County)

RIGHT Tree Crew: Bud Ditzfeld, Adam Reddick, and Scott Harmon

BELOW Drivers: Codie Snodgrass, Raymond Hackmann and Joe Reddick

Fond Farwell and Best Wishes:

Charly Clendenning
JC Csolak
Mark Donoho
Justin Quick
George Thurman
Joey Winn