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1.0 Introduction

Note: Statements of cost savings contained in this document are best estimates from the originators at the time of document preparation. For more information on a given topic, the reader is encouraged to contact the originating Region, Group, or Division.

The Utah Department of Transportation (UDOT) is required to submit a report to the State Legislature to describe the efficiencies and significant accomplishments achieved during the last year. UDOT managers will also potentially use the accomplishments for internal applications.

The Strategic Goals of the Department are described in what is known as our “Final Four”. Meeting these goals is a very demanding task in a state that is growing dramatically and with a limited tax base.

Final Four:

1. Take Care of What We Have
2. Make the System Work Better
3. Improve Safety
4. Increase Capacity

Significant progress has been made in each of these areas during fiscal year 2010. The major accomplishments and efficiencies of UDOT are described in the following chapters of this Full Internal Document. Several of these initiatives, selected by UDOT’s Executive Management, are included in a Key Initiatives Document that was also prepared as a Powerpoint presentation to share with the State Legislature in January 2011.

UDOT Use:

The efficiencies and accomplishments documented in this Internal Document will be reviewed for the following purposes:

- Develop performance measures
- Implementation initiatives
- Media Marketing topics
- Newsletter articles
- TIG submittals
- TRB papers
- Library sessions

Summary List of All Efficiency Topics:

A summary list of the efficiencies and accomplishments contained in the following chapters is located in the Appendix. Topics in the summary list are presented in the same order as they are found in the body of this report but with less detail.
2.0 Region One

Efficiencies and Accomplishments 2010

OPERATIONS

Improved Duration and Visibility of Paint Lines
Strategic Goal: Taking Care of What We Have – Signing and Striping
Improve Safety – Reduce Fatalities
Savings: Less impact to public and increased duration of more visible painted lines; approximate cost savings of $179,000 from using these methods
Efficiency: Paint does not need to be reapplied as often and retains reflectivity longer

On our normally-high usage roads, we apply water-based paint a minimum of once a year. We have used several methods to improve the duration and visibility of the paint lines we apply. These methods include:

• Tape
• Grooved-in Paint
• High-Vis Beads

Tape
On new projects using hot mix asphalt, tape is inlaid into the new pavement by rolling the tape into the road surface. The tape is placed with a 3 year bonded warranty. Since the tape is inlaid, it is not subject to the normal wear and tear of snow removal operations and traffic. This minimizes impact to the public and the markings last longer.

Grooved-in Paint
Prior to placing pavement markings, we placed a shallow groove in the pavement where the paint will go. The paint is then placed in the groove where it is not subject to the normal wear and tear from the traffic or the snow removal activities. This will allow the paint to remain in place and keep its reflectiveness for longer than normal application.

Larger Diameter Beads
In conjunction with grooved in paint markings, we have placed a larger diameter glass bead on top of the paint. The larger diameter bead provides a higher visibility for the motorist at night. This helps the driver distinguish lanes in poor visibility conditions such as at night or wet surface which increases the safety for the traveling public.
**Reducing State-Owned Equipment**
Strategic Goal: Taking Care of What We Have  
Savings: Approximately $27,800  
Efficiency: Reduction of state owned equipment that has minimal use and renting equipment as needed to replace it

We had equipment in the Region that was old and not being utilized due to its age and condition. After it was evaluated, it was determined that we could save money by reducing some of the equipment and rent the same equipment when needed. In addition to the equipment’s fixed costs, there was also savings in time spent on repair of the older equipment, as well as an increase in the productivity of the newer rented equipment.

By reducing the number of state-owned equipment that was getting underutilized and renting equipment as needed, we are able to save approximately $27,800.

**In-house Manufactured Deslicking Grit**
Strategic Goal: Taking Care of What We Have – Snow and Ice Removal  
Savings: Approximately $71,000 in FY 2010  
Efficiency: Manufacturing our own deslicking grit saves money

This year we manufactured our own deslicking grit to place on the roadway during snow events versus having a contractor do it. We were able to save $71,000. To do this, we rented the screening equipment and bought raw material from a local materials pit. We then screened out the larger sized aggregate and then hauled the material to our sheds. In addition to saving money, the Region produced material was smaller in size than the state contracted material and therefore less likely to damage windshields when used.

**North Area**

**Brine and Improved Salt Applications**
Strategic Goal: Taking Care of What We Have – Snow and Ice Removal  
Savings: $6.40 per lane mile with Brine in place of Magnesium Chloride; Department savings from fewer salt application trips  
Efficiency: More effective anti-icing with brine; less Redmond Salt needed than regular salts

Almost every station now has the ability to make brine. Our cost to make the brine is .04 cents per gallon. We are using it more and more as we are moving into a more proactive state rather than reacting to the weather. Because of Anti-Icing methods, we have a longer time to respond to a storm and less clean up time after a storm. Brine is more cost effective than magnesium chloride ($1.60 per lane mile vs. $8.00 per lane mile), and in most cases the results are the same when applied correctly. It is more user and environmentally friendly.

Redmond Salt is another tool that we are using more. With the application rate being just half of regular salt, we increase our efficiencies by reducing the number of trips and/or increasing line
miles per load. Residual effects include that it stays on the roadway better and lasts longer. It also works at lower temperatures and, due to the color, it absorbs the heat from the sun faster than regular salts. By placing less salt and material on the roadways, we have less clean up with sweeping and cleaning of drains in the spring.

**Spreader Box for Gravel Placement**

*Strategic Goal: Taking Care of What We Have*

*Savings: Cost savings from using old, altered pieces of equipment*

*Efficiency: Reduced waste during gravel placement*

We used an old windrow sizer as a spreader box. Instead of setting spread chains on each truck and guessing how much each needed to dump, by using a spreader box, it can be adjusted by the desired width and depth to be placed. You can even compensate for such things as driveways or roads. We now have much better control of the placement of our gravel and have reduced the amount of waste. There’s no cost for the equipment since they are old pieces of equipment we have altered to make our jobs more efficient today.

**Remote Cameras for Weather and Road Conditions**

*Strategic Goal: Taking Care of What We Have*

*Savings: Time and equipment savings from being able to view conditions remotely*

*Efficiency: Better level of service during winter due to better resource utilization*

Winter of 2009-2010 we began using 4 Remote Live View Cameras. These were placed in remote locations, 2 being in the North Area and 2 being in the South Area. This enabled the stations to monitor the road conditions and weather from their closest computer. We began on a small scale to check the accuracies, quality of visibility, efficiency and usability. By checking conditions from the station in Park Valley for example, it saves over 2 man hours and the equipment to physically go out and check the roads. This frees up the resources to be better utilized on other routes, thus giving us a better level of service to all of our routes. Because of the recognized benefits, we are in the process of installing several more sites. Some of these sites serve more than one station. We will have them ready for this upcoming winter.

**Combining of Special Crews for Pavement Management**

*Strategic Goal: Taking Care of What We Have*

*Savings: $126,000 from elimination of seasonal staff from crews*

*Efficiency: Better utilization of our own work force through creative scheduling*

This year we did some creative scheduling for our Pavement Management programs. We combined our Special Crews work forces along with their equipment to do our Chip Seal program in July and our Paving Betterment program in August. By doing this and altering the normal way we do business, we were able to eliminate all seasonals and utilize our own work force. Scheduling was a critical part of this program. With the help of our District Engineers, our Resident Engineers to schedule the Trans Tech’s labor, the Area Supervisors, Station...
Supervisors, Special Crew Supervisors, Suppliers and Equipment Managers, all worked together to make this possible. The outcome was outstanding work quality, high productivity and accomplishments and it helped to build morale among the crews.

**PRE-CONSTRUCTION/ MATERIALS/ CONSTRUCTION**

**Developed a Region One CADD Formatting Review Team**
Strategic Goal: Make the system work better  
Savings: Potential reduction in total resource hours used during plan set reviews  
Efficiency: Potential reduction in time spent during Plan set review meetings and improved consistency in construction plans

The CADD formatting review team consists of three reviewers and one oversight member. The direction of the team was to review and standardize as much as possible the CADD format for UDOT Plans. They were also asked to create a general checklist that could be used to provide direction for designers. Plan sets were to be reviewed using the UDOT “Plan Sheet Development Standards” and our own Region One “Plan Set Review Checklist”. The reviewer would redline a set of plans, transfer the comments to the “Review Comment and Resolution Form”, create a PDF of the redlined set of plans, and place them both into the project’s folder or e-mail them to the Project Manager and the designer. In either case, the Project Manager is notified that the “check” has been completed.

During regular design review meetings up to twenty plus Engineers, Technicians and other stakeholders spend time reviewing the design plans for projects. Eliminating the time spent to address formatting (drafting) issues makes the time spent by the project stakeholders more efficient. After the creation of the review team, over 15 projects were reviewed at their 30% or 60% completion stage. These projects reduced or eliminated drafting comments at the PS & E (79V?) level, which allowed more time to be spent reviewing the design elements of the project therefore improving the overall quality of the plan sets.

During the initial review of the CADD Standards and the creation of the Region checklist it was determined that an addendum to the UDOT CADD Standards Manual was needed to address some inconsistencies statewide. Currently the CADD Manual is being rewritten and will include the changes recommended by the Region One Formatting Review Team.

**Extending the Life of Concrete Pavements**
Strategic Goal: Take Care of What We Have  
Savings: $200,000 per lane mile using dowel bar retrofitting versus rubblization and asphalt overlay  
Efficiency: Take full advantage of existing structure in older pavements

By analyzing our existing pavements and taking full advantage of the existing structure remaining in our older pavements we are saving the tax payers money. One example of this process is using the Dowel Bar Retrofit strategy for our aging concrete pavements. To restore the
load transfer from one slab to another, this method involves sawing slots across transverse joints or cracks, cleaning the slot, injecting caulking filler, placing a reinforcing steel dowel in the slot, filling the slot with a patching material, and establishing a joint by saw cut. With this method we are extending the life of our concrete pavements by a minimum of 15 years, as estimated by the American Concrete Pavement Association. The estimated savings shown is obtained from a comparison of a Dowel Bar Retrofit pavement to a concrete pavement which is rubblized and overlaid with a Hot Mix Asphalt and seal coat. With our seal coats lasting from 8-10 years, an additional seal coat would be required in order to achieve a 15 year life cycle; therefore the cost of the additional seal coat is included.

**Reduced Concrete Testing / Better Early Strength Assessments**

**Strategic Goal:** Make the System Work Better  
**Savings:** Reduced concrete testing costs by half; $60,000 potential cost savings on a recent urban paving job  
**Efficiency:** 80%-90% reduction in early strength assessments for concrete pavements in urban environments by using maturity meters

**Maturity Meters for Early Strength Assessment:** While maturity meters have been used in building construction for years, large-scale implementation within UDOT began in force in fiscal year 2010 with state-of-the art instruments.

The strength development of concrete is highly dependent on environmental conditions, especially temperature. Accurately predicting the strength of a concrete pavement is difficult, but critical when determining when traffic can be allowed on the pavement without significant risk of damage. As we work to reduce impacts to the public, early strength assessments are critical.

The traditional method of assessing early strength involves casting multiple sets of cylinders to be cured in the field and then being broken to determine compressive strength at specified intervals, such as 3, 5, 7, 10, and 14 days. This method has two primary weaknesses:

1. The field-cured cylinders must be protected in the field and may not represent the same strength development in the pavement due to temperature differences.
2. Each cylinder must be retrieved by a technician and tested in a laboratory at specified intervals, which includes nights, weekends, and other times which add expense and inconvenience to the effort.

**A Better Way:** There is a better method, as yet underutilized by UDOT in concrete paving work. When a particular concrete mix is consistently produced and protected, the strength gain is dependant primarily on only two factors: time and temperature. Using mathematical methods and data from a trial batch, a maturity curve can be developed for a particular mix, such that when time and temperature are monitored, compressive strength can be reasonably predicted. For less than the cost of a single strength assessment, a probe can be inserted that monitors and records time and temperature. The data can be read by common equipment whenever desired.

Our experience revealed that we could reduce early testing costs on concrete cylinders by 80 to 90% in some situations. Our analysis revealed these predictions to be surprisingly accurate. Based on a very conservative cost analysis for a recent urban paving job, built in 2009 and 2010, potential cost savings for the entire job is over $60,000. Most of this was realized even though maturity measurements were implemented after the project began.

We are now well prepared to introduce these methods on future PCCP jobs with in-house expertise and control.

**Screening of our Sweepings and Reuse of the Materials**  
Strategic Goal: Take Care of What We Have  
Savings: $11,000 at Ogden Station alone  
Efficiency: Reuse of screened sweepings as pipe backfill

We were able to combine two separate problems to create a solution for both issues that saved UDOT money. The first problem was spending $8.00 per ton to buy backfill material to backfill pipe on a limited budget. Another problem our station faced is the disposal of broom sweepings from our pick up brooms, which all Regions face. To dispose of this material would cost $150.00 per load. This material is not acceptable to be placed in any backfill. To solve these issues we have combined them by screening the sweepings and placing cleaned material in backfill. This reduced both backfill material cost and land fill costs.
For the Ogden Station 1422 alone we screened 60 truck loads of material and we are able to use 50 loads for pipe backfill. Purchasing the material if it were new would cost $5,200.00. In addition to the cost for purchasing the material we would pay an additional $9,000.00 in disposal fees. Out of this material we came up with 10 loads of trash that had to be hauled to the landfill at the cost of $1,500.00. Screener rental cost is $1,370.00 per station. Ogden Station’s savings estimate is $11,000.00.

**Bridge Construction of South Layton Interchange (1754 Ogden Construction Crew)**

Strategic Goal: Improve Safety
Savings: Approx. $1.4M and 90 days in user costs and $1.4M in construction/maintenance costs
Efficiency: Reduced construction time and road closures using aggressive schedule and ABC methods

UDOT continues to build projects safer, faster, and with reduced impact to the traveling public. This project is no exception. The interchange project when complete is anticipated to reduce travel times in this area by over 12 minutes. The public is expecting more to be done in less time. It is important for UDOT to continue to deliver projects in a safe and effective manner. This project had a unique Maintenance of Traffic plan that allowed South Bound I-15 access from Layton Main Street during construction, and reduced freeway closures. This eliminated the need to detour South Bound traffic north to the Hillfield interchange reducing travel time for motorists. This was accomplished by leaving a gap between the new on-ramp and bridge. Once the new on-ramp was completed a temporary bridge was placed over the gap and the gap filled.

The construction methods of this project reduced construction time and risk to UDOT by constructing the bridge away from the traveling public. Using an Accelerated Bridge Construction method of sliding the two halves of the bridge into place reduced the number of freeway closures and slowdowns. ABC construction reduced the critical path schedule by 90 days resulting in approximately $1.4M in user costs savings ($16,000 per day for 90 days). This was accomplished by building the bridges over each abutment, lowering them and sliding them into place. To allow this method to be feasible, the bridge was constructed using lightweight concrete which enhanced long term performance and durability, saving about $220,000 in future maintenance costs. The SPUI structure utilized a two-span steel plate girder design with either curved girders or short girders framed into the exterior girder to create an hourglass bridge shape. This design along with the lightweight concrete allowed the structure to be moved more efficiently and minimized future bridge maintenance efforts with a savings of $900,000.

This bridge construction method only required one closure of South Bound and one closure of North Bound I-15. Allowing the bridges to be built only a few feet off the ground improved the safety of those working on the bridge by greatly reducing fall hazards and work near live interstate traffic. This method also reduced the time heavy equipment would need to be working near the traveling public. Building the bridges away from the interstate also decreased construction time and construction delays to the public. Since the bridges were being built away from traffic they could be constructed during the day and night without the need to route traffic around the bridge construction work. In contrast if the bridge would have been built by placing girders one at a time, and placing the deck after, the work would have to be done only at night and require traffic slowdowns and extensive traffic control changes. Each time traffic control is
changed or during any traffic slowdown, the chance for accidents increases as motorists try to adapt to the new traffic patterns. Working over the freeway during traditional bridge construction increases risks of injury to those building the bridge and to the public below.

The railroad bridge along 750 South was constructed with single-span weathering steel plate girders, reducing future maintenance and repainting with a savings of $300,000. This structure also used partial depth pre-cast concrete deck panels, reducing time over the railroad tracks with $60,000 savings in railroad flagging costs.

In summary the innovative methods of bridge construction used on this project saved approximately $1.4M in construction/maintenance costs as well as $1.4M and 90 days in user costs.

Extension of Hinckley Drive

Strategic Goal: Increase Capacity
Savings: Reduced time for motorists to access I-15
Efficiency: Increased mobility for motorists in western and northern Weber County.

This project consisted of construction of an approximate 0.75 mile extension of Hinckley Drive between SR-126 and SR-108 (Midland Drive). The new alignment also included improvements to the existing SR-126 intersection, construction of a new intersection at SR-108, and construction of a grade separated crossing of the UPRR and UTA railways. This area of Weber County has been rapidly developing, leading to an increase of traffic on existing roadway facilities. The UPRR and UTA railway corridors run generally north-south through this area. There are a limited number of crossings for east-west automobile traffic and the majority of these are at-grade. Due to the relatively large volume of railway traffic, motorists experience delays in crossing the railway corridor. The additional railway traffic created with the UTA Frontrunner service has exacerbated the problem. The extension of Hinckley Drive has provided another grade separated crossing for motorists to cross the railway corridor without delay. Additionally,
this roadway has also provided direct access to I-15 via Hinckley Drive and the 31st Street Interchange. See project area map below.

TRAFFIC AND SAFETY

Online Signals Database
Strategic Goal: Take Care of What We Have / Make it Work Better
Savings: Cost savings to the State of Utah from in-house database development and efficient data input and analysis for all users; approx. annual savings of $51,200 in Region One; annual user cost and other savings potentially greater than $250,000 for each Region
Efficiency: Coordinated preventative maintenance, performance measures, and signal deficiency correction

UDOT Region One Traffic and Safety has developed a searchable database for collecting, storing and analyzing information pertaining to traffic signals. The “Online Signals Database” was developed in house using existing FTE’s over a two year time period. Initially developed for the Region One signals team, it was presented to UDOT administration and, consequently, has been adopted by each of the other Regions.

The database is based on Google software such as Google Docs and Google Earth which yields the following benefits: it is free software, allows 24/7 access to the database from any computer or smart phone that can connect to the Internet, and is very easy to use. Additionally, each signal is scored annually on a variety of operational and hardware parameters. These score sheets are maintained in the Signals Database. Because the database allows for effective searches of any of the data input fields, deficiencies are easily located and work orders created in a manner never before available. This is invaluable in creating work load efficiencies for our signal technicians.
It also allows us to address signal deficiencies in a prioritized manner. The built-in electronic log books attest to the frequent use.

Region One initially searched the marketplace for something equivalent. Finding none, this database was developed in-house, saving the State of Utah the cost required to have such software developed through a consultant. Additionally, the usage of the database has allowed efficient data input and analysis for all users of the database. This searchable database allows for more consistent and meaningful performance measures as well as the ability to implement a long overdue annual preventative maintenance plan. This creates efficiencies and saves money in our signal maintenance program.

Estimated Cost Savings:
It cost Region One $29,775 to develop and $4,000 to implement the program in house, for a total cost of $33,775. This is compared to $184,500 estimated for a consultant to do the same work, giving an approximate cost savings of $150,725 by producing the program in-house. Annually, it costs approximately $2,700 to complete an inspection on each signal and input the results into the database. The program has been adopted on a statewide basis, so cost savings estimates would be proportional to the number of signals in each of the Regions. The database saves Region One approximately $51,200 in simple efficiency savings annually. The other savings are less easily quantified but are potentially well over $250,000 annually. They come from the following:

- The ability to defend litigation related to preventative maintenance,
- User costs associated with crashes that are prevented,
- User costs associated with delay and congestion that are prevented, and
- The ability to lengthen the lifespan of existing signals based on more effective preventative maintenance.
3.0 Region Two
Efficiencies and Accomplishments 2010

TRAFFIC OPERATIONS

**Signal System Interactive Inventory and Database**

Strategic Goal: Taking Care of What We Have, Making it Work Better

Savings: Hours of travel time by engineers and technicians; potential annual savings of $75,000 for Region Two; annual user cost savings potentially greater than $250,000 for each Region

Efficiency: Provides the Region instant access to all of the information regarding our traffic signal assets

In May 2010 the signals group proceeded with adopting an equipment inventory plan created by Region One. This consisted of a database of all the signal equipment installed in the field, geo-referenced to placemarks in Google Earth. The placemarks identify all of the signals within the Region on an aerial map. The physical inventory is nearly complete, and the use of the data is just beginning. Having all of this data readily available should increase our efficiency in troubleshooting the traffic signals in the Region.

The graphic above shows the Google Earth portion of this Tool.

Clicking on one of the placemarks brings up a spreadsheet listing all of the equipment installed at that intersection, including the controller type that is inside the cabinet. Photos of the inside of the cabinet were also collected. This allows a technician to get an idea of what troubleshooting is necessary and what tools will be needed before leaving the shop on a repair call. We also anticipate gathering performance measures from the data. If a recall is made for a particular part or brand of equipment, this database will give us a quick idea of how many we have and where that equipment is installed.
This tool can save hours of travel time by providing engineers and technicians at the Region instant access to all of the information regarding our traffic signal assets. Previously this required a trip out to each signal cabinet to obtain that information.

Since this tool is new and just being implemented, the cost savings are all potential and not realized at this point. Region One developed this tool and has more experience in its use. They estimate annual savings of $51,200 in their Region just from improving their efficiency. There are more signals in Region Two, so the potential savings are even greater, likely around $75,000. The user cost of waiting at a signal flashing all red varies widely based on the traffic at that location but is significant in an urban area. The annual user cost savings from the use of this tool and maintaining the signals in working order is potentially greater than $250,000 for each Region.

**MAINTENANCE**

**Workforce Services Road Maintenance Crew**
Strategic Goal: Take Care of what we have
Annual Savings: $49,122 (Prison Crew Cost) - $16,400 (Current Annual Cost) = **$32,722**

Efficiency: By partnering with the Department of Workforce Services, Region Two maintenance has saved costs on roadside maintenance and activities while DWS taught job skills to refugees.

This crew evolved through innovative thinking in Central Maintenance. They were looking for a solution to our litter removal problem since the Department of Corrections no longer provided this service with prison labor. Lynn Bernhard contacted the Department of Workforce Services (DWS) with a proposal to provide opportunities for employment through DWS, and that is where the Roadway Maintenance Crew was established. The crew consists of a range of refugees from a broad spectrum of countries such as Thailand, Africa, and Nepal. The RMC can be seen on the side of the road picking up trash, sweeping islands,
pulling weeds, and cleaning drains. Station 230 has found few limits to what these people are willing to learn, and they are becoming a vital asset to Region Two’s maintenance operations. Each day, huge quantities of unsightly debris are removed from Utah’s roadways as a result of this crew’s hard work. In fact, on average, 70 large orange bags of garbage are removed from the Region’s roadways each day. The RMC rotates weekly through each Region Two maintenance sheds, assisting the various crews in shed operations. Feedback from sheds around the Region has been very positive. Many refugees who have participated in this program have moved on, getting jobs utilizing the training they have received while working on the RMC. The program’s logo is “A Road to a Better Future.” This program is not just providing training, it is providing a future. Region Two looks forward to continuing this program in the future, and to the benefits it provides both agencies.

**Equipment Reductions and Efficiencies**

**Strategic Goal:** Take Care of What We Have  
**Savings:** Annual cost of reduced number of equipment, and fuel cost savings  
**Efficiency:** Reduction of state owned equipment, reduced repair time, and implementing new technologies

Region Two has made progress in reducing its fleet of vehicles and equipment while maintaining effectiveness with its remaining fleet. Reductions include 8 heavy duty compressors, 2 older crack-sealers, 2 pickups and 1 car, and 4 temporary vehicles (sent to surplus). To save costs associated with equipment repair time, we now lease 3 backhoes and 6 tractors.

In the area of fuel efficiency, we retrofitted 1 vehicle with CNG in our Region permit office. As a Region, we reduced our idle time on our fleet by 3.5%. We also downsized three ¾ ton vehicles to ½ ton vehicles for fuel savings.

Region Two is exploring new and better technologies in the following ways:

1. We have 2 tow plows, setup up in two of our metro stations, 2425 and 2427. Both of these tow plows are being pulled with Mack trucks, equipped with Muni-bodies. These bodies consist of being able to discharge material out the rear or towards the front of the bed. What is unique about these bodies is that we are able to use them year-round in summer activities and winter plowing operations.

2. Installed Preco GPS to track blade wear and material usage in our mountain stations. We are able to track plow route frequencies, material usage, and blade wear and tear and also monitor the diagnostics of the plow truck (idle time, fuel consumption, excessive over revving of the engine, etc.).

3. We have 18 light-duty GPS units throughout our Region. With these, we can track excessive braking, speeding and erratic driving behaviors. By correcting these behaviors, we are expecting to see savings in vehicle repairs, maintenance, and fuel costs.

4. We have 2 first response type units. These units give us the luxury of having a capacity of 1,600 gallons of brine and 9.5 yards of salt, all in one load. This gives us the capability of mixing a slurry type solution with our salt and brine. By doing this, we are able to speed up the activation process of our rock salt, so when it is applied to the surface, it is ready
to start the melting process quicker. These units are also equipped with directional chutes. What this means is, we can place the material specifically in a direction needed out on the roadway, without having to make another pass, which saves labor, material, and equipment costs.

5. We have installed 13 Performance chips on our Light duty and Incident Management Vehicles. With these chips, we have seen an increase up to 3.5 mpg on average on these vehicles.

**MOUNTAIN VIEW CORRIDOR**

**Mountain View Corridor Frontage Roads**

Strategic Goal: Increase Capacity  
Savings: Reduced initial construction costs and preservation of interior right of way  
Efficiency: Application of frontage roads at appropriate locations allowed initial project funds to stretch further and provide 5 more miles of roadway in the initial construction project.

The frontage road concept implements frontage roads to the outside of the right of way and allows the future freeway to be built in the center. Building the outside lanes first preserves the land in the middle where future lanes can be added. This approach allows each construction phase to build upon the next and is part of the overall MVC plan to address short-term regional transportation needs while providing a long-term solution for the future.

Frontage roads save on the initial construction by keeping the improvements near the existing elevation of the surrounding land and minimizing the need for large earthwork volumes in the early years. The future section will then be either below grade (depressed) or above grade (elevated) to allow for grade separation at the cross streets. Frontage roads work well on the southern end of the corridor where development can be encouraged to tie into the frontage road with a grid system and where wider right of way takes are not destructive to existing development.

The cost savings realized from modification to frontage roads in appropriate areas contributed to the ability to build 5 more miles of roadway for the initial build of Mountain View Corridor.

Frontage Roads (Initial Build)    Full Freeway (Future Build)
4.0 Region Three

Efficiencies and Accomplishments 2010

TAKE CARE OF WHAT WE HAVE

Thermoplastic Pavement Markings and Grooved-in Paint Striping

Savings: Significant savings long-term because of long life expectancy; up to $450,000 total projected savings in Region Three for thermoplastic markings after six years; up to $1,440,000 projected savings in Region Three for grooved-in paint striping annually after four years

Efficiency: Maintenance crews are not required to re-fresh every year, thereby reducing travel, material, labor, and equipment cost

As Region Three continues to find ways to 'do more with less' and to be fiscally conservative, we have made a conscious decision to progressively change hundreds and possibly thousands of pavement markings from highway traffic paint to thermoplastic application. Many of these changes are done through roadway projects so we can conserve precious Code 1 maintenance money. Although the initial application is more time consuming than a simple paint application (the cost break even point is about three years), there is virtually zero maintenance required from the time of initial application until all the reflective glass beads have worn away. This could take several years, thereby allowing the pavement marking maintenance crew to have enough time to repaint all the non-thermoplastic locations during each painting season and to work on other important tasks as part of their responsibilities.

With the increasing number of lane miles each year in Region Three, it is a challenge for our pavement striping crew to repaint every single mile of every road in the Region. Under certain circumstances it is possible a section of a road may not be repainted during the painting season. Therefore, Region Three has begun to implement grooved-in pavement striping where it is compatible with a new surface treatment, and has been installed as part of roadway projects. A recent example is US-89 between 100 North and 800 North on Orem. The grooved-in paint striping is barely under the surface of the surrounding pavement, which prevents it from being worn down by snow plow blades during the winter. We anticipate the paint will last at least two or three years before it needs to be repainted in order to maintain retro-reflectivity. This effort allows the striping crew a better opportunity to get all the roads painted each year in areas without grooved-in paint striping.

Estimated Cost Savings for Thermoplastic Pavement Markings:

During a typical painting season the Department’s pavement marking crew may repaint up to 15,000 individual markings, which is about the total number of markings in Region Three. The crew can repaint about 125 markings per day. The repainting cost per marking is about $10 including labor, material, and equipment. It costs an average of $30 for one thermoplastic pavement marking (a 12-ft stop bar). On this basis it takes about three years for a thermoplastic pavement marking to pay for itself when compared to traffic paint. However, the thermoplastic marking should last at least another three years, so every year after the third year the cost savings
for use of thermoplastic markings is $10 per marking x 125 markings per average day = $1,250 per day. Over the course of an annual painting season, this is a projected savings of about $150,000 in Region Three, or $450,000 total for years four through six after initial application.

Estimated Cost Savings for Grooved-in Paint Striping:
   For the longitudinal paint striping, it costs $0.17/ft to run the striping crew. Grooved-in paint costs $0.59/ft. On that basis it takes about 3.5 years to break even. Thus, after the fourth year the savings is $0.17 per foot x 5,280 ft per mile x 13.5 miles per day painting = approx. $12,000 per day. Over the course of the annual painting season this amounts to about $1,440,000 projected in Region Three after four years.

**Bonded Wearing Course**
   Savings: Delayed reconstruction costs  
   Efficiency: Extend the life of the pavement and improve the driving surface

Multiple bonded wearing course projects were completed through Region Three. They involved milling off the old open graded surface course and replacing it with a bonded wearing course. Bonded Wearing Course is a preventative maintenance treatment with the following benefits: improved skid resistance, reduced traffic noise, improved pavement condition rating and ride quality, spray reduction, and reduced impact of reflection cracking.

**Chip Seal Program**
   Savings: By implementing the chip seal program, the savings to the Department is the prolonged life of Level 2 roads.  
   Efficiency: By keeping the roads in better condition, efficiency of the transportation system is increased.

The Region Three Chip Seal Project was initiated to put chip seals on the level 2 roads throughout the Region where the pavement was in distress, but not failing. During the summer, Region maintenance forces chip sealed approximately 140 lane miles of level 2 roads where program monies can’t be spent. This saves the Department money because it is less expensive to chip seal a road than rebuild the road when it has completely failed.

**Provo Canyon Bridge De-icer**
   Savings: By keeping the structure free of ice, the expenses associated with snowplowing to clear the bridge of the ice and snow are saved.  
   Efficiency: With the new system, we are more efficient in keeping the roads clear during a snow event.

On SR-189 up Provo Canyon, there is a bridge just below the Deer Creek dam. Due to the bridge location and length, bridge icing was going to be a problem. To combat this, a de-icing system was installed. The system stopped working. This summer a new system was designed.
and installed to prevent the bridge from icing, allowing our snowplow drivers to clear all the roads in their area.

**Reducing State-Owned Equipment**

Savings: Approximately $14,700 annually  
Efficiency: Reduction of state owned equipment, more renting of equipment, and more sharing of equipment between sheds

Region Three continues to look at ways to reduce the equipment inventory in our Region without compromising our productivity. During the past year we have turned in the following equipment as a reduction to our fleet:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Annual Fixed Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck mounted broom</td>
<td>$2,520</td>
</tr>
<tr>
<td>Trip trailer</td>
<td>$1,800</td>
</tr>
<tr>
<td>Tow broom</td>
<td>$2,280</td>
</tr>
<tr>
<td>Wrecker</td>
<td>$3,600</td>
</tr>
<tr>
<td>Standard grader</td>
<td>$4,080</td>
</tr>
<tr>
<td>Side mount mower</td>
<td>$420</td>
</tr>
</tbody>
</table>

Total annual savings $14,700

We have moved some equipment around to increase the utilization and are strongly encouraging our foremen to evaluate their needs during the next year. We continue to rent more equipment and share more equipment between the sheds.

**MAKE THE SYSTEM WORK BETTER**

**Traffic Control Specification Development**

Savings: Less driver delays in construction zones  
Efficiency: Well coordinated and calculated traffic control in construction zones

The Region developed a process to develop better traffic control specifications for projects. This new process uses traffic data generated from the Traffic Operations Center to show the best times to impact traffic. The process takes earlier input from the traffic engineers and the district engineers so that possible construction sequencing is better understood. The process clearly defines roles and responsibilities. Quality control and quality assurance are built into the process to ensure that traffic control is coordinated between projects and is well managed in order to minimize driver delays in construction zones.
Signals Interconnect in Heber
Savings: Reduced roadway user costs
Efficiency: Reduction in traffic delay at intersections

Over the past few years, traffic on US-40 through Heber has grown exponentially with the development in the area. This traffic generated the need to install traffic signals at many intersections. Each one of these new signals was developed as needed and was not coordinated. This ATMS project connected each of these signals making our system work better.

Efficient use of De-icing Material
Savings: Region Three's goal is to reduce the amount of salt used in snow removal operations
Efficiency: Streamline our sander controls so that we have consistent salt patterns from each sander.

This past winter Equipment Operations, our trainer, and shop people went around and calibrated every sander in our Region. The result is even salt across all lanes and fewer strips of snow left between the trucks which decreased the need to retreat those areas. Also drivers are no longer left guessing how much salt they are using especially if they are driving someone else's truck.

IMPROVE SAFETY

Installation of Cable Barrier on I-15
Savings: Relatively low cost to improve roadway safety
Efficiency: Reduce cross-over fatal crashes

It is becoming increasingly well documented in the Traffic and Safety Division that cable barrier in the median of freeways is a relatively inexpensive treatment to significantly reduce or eliminate cross-over crashes with opposing vehicles. Region Three led the way with the first installation of cable barrier in Utah, and since then the number of cross-over crashes has virtually been eliminated where it is in place. Because of this success, more is currently being installed in southern Utah County and in Juab County on I-15. We are pleased to report that the total number of fatal crashes in Region Three each year since 2003 is typically well under the goal of 2% reduction per year. We believe a significant part of that decline is due to the presence of median cable barrier.

US-89 and SR-147 Traffic Signal and Intersection Improvements
Savings: High benefit-cost ratio to reduce crash potential and crash severity.
Efficiency: Reduced delay for through traffic on SR-147.

The Region has completed a project to construct a traffic signal at the intersection of US-89 and SR-147 in Mapleton which included roadway widening for turn lanes on SR-147. The project also consisted of roadway widening for an eastbound right turn lane, westbound left turn lane, and separate northbound turn lanes at the intersection of SR-147 and 1800 East in Utah County.
Both locations are safety improvements due to increased private vehicle and bus traffic associated with the opening of Maple Mountain High School.

The project was conceived because of the opening of the high school on 2550 East south of SR-147 in Spanish Fork. Many parents, citizens, school administrators, and local government officials were very concerned about the safety of students and staff traveling to and from the school in the morning and afternoon. It was designed to provide separate turn lanes for the major movements at the intersections to reduce vehicular conflicts between turning and non-turning vehicles. The separation of conflicts, especially at the SR-147/1800 East intersection, will reduce the potential for serious injury and fatal crashes.

**SR-191 Guardrail Project**
Savings: Although there was no monetary savings for this project; the increased safety of the guardrail will save lives.
Efficiency: This project made the overall travel on SR-191 more efficient due to increased safety.

The purpose of this project was to upgrade the guardrail on SR-191 between milepost 265 to milepost 285. Removing the existing sub-standard guardrail and replacing it with new guardrail did this. The ends of the guardrail sections were extended to meet the length of need requirements, and guardrail was added at a culvert where there was no guardrail.

**Left Turn Lane on SR-121 at 750 North, Roosevelt**
Savings: Approximately $125,000
Efficiency: Construction was done with state forces and equipment. By constructing the left turn lane, drivers traveling on SR-121 are able to complete their routes quicker because they aren’t waiting on drivers turning left onto 750 North.

The Department constructed a left turn lane on SR-121 at 750 North in Roosevelt. The project was staked by the Region design location personnel and constructed by maintenance personnel.

The work consisted of extending existing culvert, constructing a new widened pavement section, installing guardrail at the structure approach, and installing new fence on the right of way.

The left turn lane services school traffic, a residential subdivision, and the public golf course. The cost to complete the project was less than $125,000 because of the efficient use of state forces and equipment. The project would have likely cost double this amount if it were designed and sent out to bid. The project significantly improves the safety to the traveling public in the local area and is viewed as an asset by the community.
INCREASE CAPACITY

SR-189; University Avenue Widening
Savings: Reduced roadway user costs  
Efficiency: Reduced traffic delays

This project eliminates a bottleneck on University Avenue in Provo City. The project added a northbound lane for approximately one mile creating a consistent five lane cross-section from 300 South in Provo to Provo Canyon. Traffic flow along University Avenue has been greatly improved, extending the life of the corridor well past 2030.

State Route 77 Reconstruction
Savings: Reduced roadway user costs  
Efficiency: Added additional travel lanes, new bridges and freeway interchange

State Route 77 in Springville was rebuilt from Interstate 15 to Main Street. As the main corridor into Springville this two lane roadway could no longer handle the traffic volume that used it. UDOT rebuilt and widened this two mile stretch of S.R. 77 making it a four lane road with a center median. A new bridge was added at 1500 West over existing railroad tracks that eliminated a traffic bottleneck. The bridge at 400 South was replaced to accommodate the new travel lanes. A new Single Point Urban Interchange (SPUI) was built at Interstate 15 to more efficiently move traffic on and off the freeway.

State Route 198, Spanish Fork Main Street Widening
Savings: Reduced Roadway User Costs and Improved Safety  
Efficiency: Added center turn lane, widened shoulders, new bridge and traffic signals

State Route 198 in Spanish Fork was widened from the Fairgrounds to Arrowhead trail. The project installed a continuous center lane and widened shoulders. A new bridge was put in at the intersection of Arrowhead trail and eliminated an outdated bridge making the entire intersection more efficient. A new traffic signal was also installed at Main Street and Volunteer Drive making the intersection safer.

Redwood Road Widening – Bangerter Highway to 400 South Saratoga Springs
Savings: Roadway User Cost and Safety  
Efficiency: Added additional travel lanes, widened shoulders and bike lane

State Route 68 (Redwood Road) was widened from Bangerter Highway to 400 South in Saratoga Springs. This project provided two travel lanes in each direction, a continuous center turn lane, wider shoulders, dedicated bike lane, improved intersections and three wildlife undercrossings. The project will improve mobility and improve safety for Utah motorists.
5.0 Region Four
Efficiencies and Accomplishments 2010

OPERATIONS/ FLEET AND EQUIPMENT MANAGEMENT

Equipment Reduction by Code and Class for FY-10

Strategic Goal: Take Care of What We Have
Savings: Overall cost savings in FY-10 is just over $59,000 in fixed costs alone.
Efficiency: Equipment Reduction and Cost Savings

Region Four had 1,521 pieces of assigned equipment at the start of FY-10. As of July 1, 2010, (FY-11) we have 1,462 pieces of assigned equipment.

Org/unit 4411 started the year with 160 units, and now has 94. Org/unit 8741(temp, seasonal) started the year with 72 units, and now has 33. Most of these units are now assigned to Stations to create ownership, better care and utilization.

The following equipment code and class has been reduced by the following:

10-01 (tarpot) 29 units to 20 units, @ $ 190 monthly or $2,280 yearly, each.
10-04 (crack sealer) 18 units to 15 units @ $200 monthly or $2,400 yearly, each.
15-01 (compressor) 19 units to 16 units @ $160 monthly or $1,920 yearly, each.
18-03 and 18-04 have had no change, but expect to reduce in the fall.
21-01 (pull broom) 34 units to 32 units @ $175 monthly or $2,100 yearly, each.

Total loader fleet was 70 units in July 2009, we now have 67 units Region wide.

Some of the reduction was a result of combining the 3 chip seal crews into 2 crews. Most of that equipment was absorbed by Region Three to get their chip seal program running. Other reductions were to remove as many 10-01 tarpots that did not have cab actuated controls, requiring an operator to ride the tarpot while shooting oil.

We also have eliminated all but 1 temporary seasonal snow plow truck (01-04) (loaner) from our previous years’ trade-ins.

Overall cost savings in FY-10 is just over $59,000 in fixed costs alone.
Overall cost savings in FY-11 and beyond is over $105,000 per year, which allows these funds to be spent on road materials instead of equipment rental.
MATERIALS

Ultra-sonic Sieve Cleaner
Strategic Goal: Making the System Work Better
Savings: Overall cost savings in FY-10 is just over $4,268.00
Efficiency: Improved Equipment Maintenance and Cost Savings

In the spring of 2010, Region Four Materials purchased an ultra-sonic sieve cleaner for $6,200.00. This allowed Region Construction people to bring their sieves to Richfield rather than to SLC to be cleaned. Time saved in travel and wages were approximately $4,200.00. This means that the machine will pay for itself in less than 2 years. Additionally, it has allowed us to keep our sieves better calibrated and in better condition. We didn’t replace as many sieves as we have in past years. That was also a significant savings.

CONSTRUCTION

Reseeding with Wildflower Combination (Ray Bentley’s Construction Crew)
Strategic Goal: Making the System Work Better
Savings: Overall Attitude of the General Driving Public
Efficiency: Aesthetic Experience to the Traveler

The interchange at mile post ten in St. George was the recent recipient of a construction project. As part of that project, the disturbed area was reseeded with a combination of wildflower seeds. Growing conditions came together such that this spring and summer, the seeds grew and exploded in a variety of colors adjacent to the roadway. Travelers were met with an explosion of color in the normally desert conditions. UDOT personnel received a large number of compliments and travelers were exceedingly pleased with what they saw.
6.0 Project Development

Efficiencies and Accomplishments 2010

CONSTRUCTION/ MATERIALS

Materials Database Development and Implementation
Strategic Goal: Make the System Work Better
Savings: Approx. $64,000 annually to the Department
Efficiency: Central location for all test results in standardized format with easy access, reduced
time to reconcile data discrepancies, and potential reduction of required overtime

Materials used in the construction of the State’s roads are tested for design purposes and for
compliance with project requirements. Some of these include concrete, asphalt, aggregates, fill
materials, and pavement marking paint. Several parties are involved in generating and using data
resulting from these tests, and problems with the data have sometimes occurred due to the lack of
a central location for the data and consistent procedures. The Department developed and
implemented the materials database to fill this need and now has a consistent method and
database for entering materials testing results. This improves uniformity and results in decreased
time required for Agency, Contractors, and Suppliers to receive testing data and forms. In
developing the database, it became apparent that not everyone was entering data and calculating
results in the same manner. Discrepancies included: rounding errors, differences in procedure,
number of material specific gravity tests performed per production day lot, etc. It is desirable to
have a standard method, for Incentive/Disincentive calculations. The materials database ensures
that the required data is entered and that the calculations, including rounding, are performed
correctly.

Prior to the implementation of the database all test results were either handwritten or done on
individual lab computers. With the database much of this information is now available from one
source and “real time”. This minimizes the risk of loss as well as providing ease of access. It
also allows for better evaluation of test result data that can then be used to improve future
standards as well as future evaluation due to ease of access to historical information.

Some of the specific benefits realized from the database are as follows:

- Asphalt Binder Module: Sample paperwork and test reports are received “real-time”.
- Concrete Module: Cylinder tracking and e-mail reminders for 28-day breaks, mix design
  tracking and strength reporting.
- Hot Mix Asphalt (HMA) Mix Design Verification Letter: Contractor/Suppliers receive a
copy of approval letter “real-time”. Production targets are loaded in HMA field module.
  Specification enforced with Region Material Engineer’s approval with Resident
  Engineer’s approval with “minor changes” to target gradations. Tracks mix design
  history.
• T66: Automate project accounting – also used by Consultant laboratories that perform paint testing for project acceptance on UDOT projects.
• Structural Coatings, Epoxy Coating, and Cementitious: All three modules provide project paperwork.
• Equipment: Manages notification of equipment calibration requirements when equipment is due for maintenance/calibration.
• Pavement Marking Paint: Manages samples, provides project paperwork, and improves product management.
• Transportation Technician Qualification Program: Provides less time managing certification exams and improves technician status reporting for Independent Assurance, On-the-Job Training, and qualifications.
• General Pavement Issues: Identification of source and cause for pavement durability and long term distress factors.

Estimate of Cost Savings with the Materials Database:
Estimated time savings of 2,000 hrs/yr x $20/hr = $40,000/yr for uniformity. Estimated time savings of 1,200 hrs/yr x $20/hr = $24,000/yr for decreased time internally to the Department and externally to Contractors and Suppliers. The total estimated annual savings to the Department is $64,000. This estimate is based on considering the number of hours spent per project analyzing discrepancies between contractor/UDOT results and per material test and hours saved.

With the database, the following charts are examples of information that UDOT now has that UDOT did not have in years past:
CONSTRUCTION/ CIVIL RIGHTS

Electronic Certified Payroll Program
Strategic Goal: Take Care of What We Have, Increase Capacity
Savings: Reduced time required for project personnel to verify payroll compliance
Efficiency: The system helps us to be more efficient in our mission of increasing capacity and taking care of what we have via delivery of capacity, project maintenance and preservation projects.

The electronic certified payroll system has been instrumental in reducing labor time for both the contracting community as well as UDOT project personnel. In addition, if there is an issue the Civil Rights Office is able to investigate without having to burden the project office or the contractor for information, as it is all available via the system. The system has also reduced time spent tracking OJT hours as the system is designed to automatically record the information to various reports without any data entry as the contractors enter the employee time. Annual Federal Reports are very cumbersome which now are done electronically as payroll is entered and the contractors are no longer required to submit annually, as this is automatically calculated. The report is generated from the new system and submitted to FHWA.

Because of limited staffing, project personnel are now able to focus on areas that are not in compliance because the system is designed to verify payrolls meet the compliance requirements as well as provide various reports for staff to monitor for compliance electronically versus expending manual efforts.
ENGINEERING TECHNOLOGY SYSTEMS

UDOT Executive Dashboard
Strategic Goal: Make the System Work Better
Savings: Potential time and cost savings
Efficiency: Streamlined preparation and conducting of project delivery meetings

In 2010, UDOT implemented a web based dashboard for program delivery called the Executive Dashboard. The dashboard provides at-a-glance access to key measures for project delivery in the areas of preconstruction and construction. Organized by scope, schedule, budget and quality, the dashboard pulls data from the ePM and PDBS business systems and then transforms and consolidates the information into 21 key measures displayed in one easy to read interactive chart. The dashboard has improved decision making by allowing UDOT managers to access, analyze and drill down through project information important to them.

The dashboard is used daily by the Region program managers for project update meeting and performance evaluations with project managers and also at the quarterly Region Program Delivery Update meetings. Having the information readily available has allowed Program Managers more time to focus on delivery projects instead of wasting time gathering information. This has helped them spend more time making better decisions.
PROJECT DELIVERY

Project Budget Recovery and Other Efficiencies
Strategic Goal: Make the System Work Better
Savings: Potential for additional federal funds and freed-up project funds at award and closeout
Efficiency: Aggressive delivery of projects, streamlined handoff between teams, and minimized impacts of federal requirements

In order to ensure Utah taxpayers received maximum benefit from the transportation funds made available from the federal American Recovery and Reinvestment Act of 2009 (ARRA), UDOT launched and delivered a program increase unseen in recent history. Because there was potential for additional federal funds if Utah met this delivery challenge, UDOT set an aggressive delivery goal. In 2010 UDOT applied for additional federal obligation authority and received a $12.8 million distribution for pavement preservation and capacity projects. By meeting the delivery commitment, in 2010 Utah remains a lead state to deliver our projects on time (see ARRA Expenditures graphic.) We currently are a leader in the nation in the percent of transportation funds returned to the workforce and Utah’s local economy.

Along with the delivery challenge of a program of this magnitude we had to rethink how we construct, document, process and closeout projects while also minimizing the impacts of additional federal requirements. Teams analyzed how projects pass through the organization, questioning each workflow process and hand-off between teams. We’ve implemented the results of these innovations into our standard practice and policy. Following are some of the efficiencies:

- Based on budget process efficiencies developed for ARRA, we started with 90 projects planned to 128 projects constructed. At the time of construction contract award, we quickly return excess project funds to the program with a new ‘Project Budget Recovery’ process. These returned funds were promptly reprogrammed into new projects.
• The ‘Price + Time’ (P+T) bid process reduces construction traffic impacts. This contract method recognizes the impacts of construction delay to the traveler and reduces impacts by minimizing the length of time a project is under construction. Since implementation of this contract method, 37% of our contract bids have proposed the minimum time bid range for construction time. This translates into a reduced length of daily impacts to the traveling public and businesses.

![Graph showing Percent of Segments Bid within P+T Range.](image)

- Improved communications between transition teams uses live tracking through business system reports (e.g. the ‘Weekly Advertising’ and ‘Project Schedule’ reports.) These live reports run from our Enterprise Business Systems and are at each team member’s fingertips so they can view project status and prepare for the project handoff into their area.

- The new ‘Project Closeout’ business system network accelerates financial closeout of projects. This business system assists and streamlines the closeout handoff between various division team members. Faster project closeout has freed up project funds to reprogram into new projects.

![Graph showing Number of Projects Closed.](image)
7.0 Systems Planning & Programming

Efficiencies and Accomplishments 2010

ASSET MANAGEMENT

**Short-term Traffic Counting on Interstates**

Strategic Goal: Improve Safety  
Savings: Reduced crew trips for short-term counts and increased safety  
Efficiency: Traffic counting technicians are now safer and more efficient in performing Interstate short-term counts.

This year the Traffic Counting shop added three new portable Wavetronix units to the existing five units, for a total of eight. We are now able to do all short-term counts on the Interstates using non-intrusive radar detectors. Formerly, short-term counts on rural Interstates have been conducted with hose counters, while counts in busy urban areas were done with the portable Wavetronix units.

The new process is both safer and more efficient. Using trailer mounted radar detectors eliminates the need for traffic data technicians to pull hoses across rural interstates, creating a much safer operation. The entire crew now hauls all the trailers at a time to one segment of Interstate and sets up on eight short-term count stations in that segment. The next week, one or two crewmembers move the trailers to the next eight segments, leapfrogging trailers until all the counts are done. This results in fewer trips and faster results on the Interstate counts.

**Pavement Management Improvements**

Strategic Goal: Take Care of What We Have  
Savings: Time savings leading up to pavement condition modeling and project forecasting  
Efficiency: Prompt and more complete collection of pavement condition data

The pavement management group focused on updating our dTIMS pavement condition model to reflect the recommendations from the Pavement Management QIT, and included other enhancements to improve the model performance. This included updating the available funding and project costs, refining the formulas used to calculate the pavement condition, refining the formulas to select the treatments at different condition levels, refining the formulas to calculate the expected benefits from the treatments, and updating the network. This will provide a more accurate forecast of recommended projects and expected project costs.

New software went into production to replace the Plan for Every Section database. This application is being integrated with the Operations management system. This will provide a web based application with an integrated data set for use in the Regions and with our modeling.
The data collection group utilized a Vendor to collect a significant amount of our pavement condition data. Our in-house staff collected the surface friction data for one-half of the state system, and collected the deflection data for the project level requests. Using a Vendor enabled us to combine the pavement condition data collection with the Roadway image data collection. Because of the Vendor’s specialized equipment, they were able to collect pavement images and Road View images, as well as measure surface cracking, surface roughness, and wheel path rutting. All of the data was then integrated into a common database. The integrated data set can be accessed through the Internet for all of our customers, as well as through a desk top application, which our pavement management practitioners can use for a more detailed look at the condition data. This practice provided the benefit of collecting surface cracking data that we have not been able to collect in years past. This additional data will enhance our ability to model pavement condition, recommend future projects, and forecast future budget needs.

Contracting with a Vendor actually costs a little more than we were spending to collect our pavement condition data before, so the savings aren’t being realized in dollars. The contract is a 5-year renewable contract with State Purchasing using an RFQ process. The Vendor is paid by the mile for data collection, analysis, and posting to the database. We did not reduce FTEs in this process, but we did not fill the profilograph operator’s position after his retirement. Our truck and equipment previously used for data collection is still onhand for use in areas such as ramps and rest areas which the Vendor does not cover.

This change to a Vendor has allowed us to reorganize our staff to do other assignments, and has provided our pavement management group with a more complete set of data many months sooner, allowing a more effective decision making process for project recommendations and funding needs. Previously it took UDOT staff about one year to collect pavement condition data, extract useful parts, analyze the data, and publish the data. Results of analysis were often not ready in time for use in making project decisions. With the Vendor pavement condition data is collected for all state routes within 2 months and put into the database within another 2 months, enabling data modeling to be done prior to making project decisions. Now our in-house Photolog crew is freed up to do other important pavement management tasks. Regional office staff, who previously did pavement condition surveys for 500 feet at each milepost for all state routes annually, are now freed up to perform other important tasks in the Regions. The Vendor collects data for 100% of route segments, not just for 10% (500 feet at each milepost) that we previously collected.
The group added a new Bridge Engineer to develop a Bridge performance model similar to our Pavement model. The software is being enhanced to model bridge condition deterioration at a more detailed level and recommended a wider mix of preventative and rehabilitative projects.

**Pavement Condition Improvement**

Strategic Goal: Improve Safety  
Savings: Potential for reduced accidents  
Efficiency: Well defined target locations for skid condition improvement

A request this spring came forward from the Traffic and Safety Department asking to identify short segments of roadway with the following characteristics:

1. Lower skid numbers  
2. Short segments  
3. Curved alignments  
4. Lower volume roadways  
5. Locations within 60 miles of SLC.
A statewide analysis was conducted which reported areas of low skid, five-year surface friction trends, AADT, accident history, probable causes, locality factors, typical causes, possible solutions and correction priorities. This information was forwarded to Traffic and Safety to assist them in working with a contractor that will apply a new surface treatment to areas that are good candidates. The contractor, High Friction Surfacing LLC, main goal is to provide UDOT a safety device that will increase pavement surface and reduce off road skidding. Before and after skid tests will be conducted to assess the change in skid condition. Hopefully this new friction surface treatment will perform well and reduce accidents.

**PLANNING**

**Statewide Travel Demand Model**

Strategic Goal: Make the System Work Better, Improve Safety, Increase Capacity

Savings: Potential time and cost savings in allocating capacity project funds

Efficiency: Earlier decision-making for capacity projects

The Planning Division has developed a predictive traffic model that helps us ‘Make the System Work Better’. The model has the ability to evaluate traffic volumes on all state routes as a system, rather than a single roadway or corridor. It also provides analysts and decision-makers insight into current and future needs, and offers a sense of when those capacity improvements are needed. Furthermore, to ‘Increase Capacity’ of our system, the model identifies and defines our statewide capacity needs.

For the first time, the travel model has been used to identify capacity needs across the State and then identifies those needs in the Long Range Transportation Plan. The travel model provides data that can identify current and future congested areas and the required ‘Increased Capacity’ necessary to ‘Improve Safety’. The efficiency in this statement is that the model can help us with decisions earlier in time to reduce fatalities, add lanes and maintain mobility closer to an optimal level that is linked to available funding sources. These efficiencies offer the opportunity to strategically allocate resources to projects now and plan for additional resources into the future.

**Geographic Information System (GIS)**

Strategic Goal: Make the System Work Better, Improve Safety, Increase Capacity

Savings: Reduced staff time required for researching databases

Efficiency: Improved ability to address planning-phase issues at a system level

The Planning Division is utilizing and continuing to develop a GIS system that contains information from UDOT, resource agencies and other sources. The GIS system allows for a broad range of information to be analyzed and reported which can help ‘Make the System Work Better’ by allowing complex issues to be understood and acted upon. This GIS System helps the Planning Division be more efficient by addressing a variety of issues in the planning phase and at a system level. The system can also assist the Planning Division with the ability to analyze...
safety, congestion, environmental and other factors together, resulting in the ability to reduce fatalities and increase capacity.

The basis of the GIS system allows the Planning Division to be more efficient through capturing, storing, analyzing and displaying data. This increased efficiency and capability allows the Planning Division to evaluate many different pieces of information and determine and retain that information in a re-usable and efficient manner. Efficiencies continue to increase over time as the GIS system is used and more information and study of the data becomes available and is used in the decision making process. These efficiencies result in less time needed by the Planning Division staff to research and find information.

**PROGRAM FINANCE**

**Additional $12.8 Million in Federal Obligation Authority**

Strategic Goal: Take Care of What We Have

Savings: Utah was able to take advantage of an additional $12.8 million in federal obligation authority just prior to September 30, 2010. The amount distributed was $1.3 billion nationwide.

Efficiency: 100% obligation was achieved and additional construction projects were advertized with existing staff and minimal overtime.

In spite of challenges with an increased volume of contracts due to ARRA projects and unpredictably low bids for construction contracts, Program Finance pro-actively provided information to Project Development and Region Project Management in order to effectively obligate the federal program. A specific obligation report was developed allowing the team and affected divisions to see progress on projects advertized, associated funds obligated and fund balances left to obligate by September 15, 2010. This allowed UDOT to apply for the additional obligation authority and receive the $12.8 million distribution for pavement preservation and capacity projects. Even though this meant an increase of work in the area, 100% obligation was achieved and additional construction projects were advertized with existing staff and minimal overtime.

**ARRA Update**

Strategic Goal: Take Care of What We Have

Savings: Delayed reconstruction costs

Efficiency: Extend the life of pavements and bridges; support the Utah economy through jobs

Statewide, UDOT advertised 26 ARRA projects worth over $40 million in FY 2010. During this same time period, UDOT substantially completed 78 ARRA projects worth over $103 million. The majority of these projects and funds were dedicated to pavement and bridge preservation, which greatly helped one of UDOT’s primary drivers, “Taking Care of What We Have”.


**Offsetting Reduced Funding for Projects**

Strategic Goal: Take Care of What We Have, Increase Capacity  
Savings: No delay in funding planned projects  
Efficiency: Reduced the funding impact of $113 million in reduced funding without delaying planned projects

Due to a $113 million reduction in programmed state funding during the 2010 legislative session, the Department was faced with the challenge of finding other ways to deliver and not delay several important construction projects. The Department reduced the funding impact and subsequent delay of the impacted projects in three ways: $28.15 million came from good bids (lower than estimated) on projects with similar funding; $44.92 million came from project scope changes; and $39.93 million was replaced with federal funding. These efforts allowed the projects to move forward without the delay. Two efficiencies highlighted by the Central Project Delivery team for this year also relate to this accomplishment: (1) excess project funds at construction contract award time were quickly returned for re-programming; and (2) financial closeout of projects was accelerated, freeing up project funds to reprogram into new projects.

**Program Finance Team, Shared E-mail Address**

Strategic Goal: Make the System Work Better  
Savings: Staff time savings from better work distribution  
Efficiency: Work is more evenly distributed to available team members.

One efficiency strategy implemented by Program Finance this year was to establish a group shared e-Mail address. Inquiries for funding requests and STIP actions come into one address. This address is monitored by a designated administrator who makes assignments and manages the requests daily.

Work is more evenly distributed to available team members. All team members are cross trained to process any request for funding or STIP action, avoiding wait time due to someone out of the office or experiencing a time of high volume in their regular area of responsibility.

**Public Transit Team Online Application/Reporting/Database System**

Strategic Goal: Make the System Work Better  
Savings: Time savings to customers from simplified process  
Efficiency: Automatic application and reporting processes

UDOT Transit Team staff has become more efficient by the introduction of the online system by automating application and reporting processes that were previously managed in paper format. The system also provides a database and oversight capabilities allowing UDOT to be more accountable. The Transit Team customers have provided feedback through a survey that the system has simplified the process of applying, reporting and managing projects.
Two-year Transportation Enhancement Program Submitted for Commission Approval
Strategic Goal: Make the System Work Better
Savings: More time for evaluating projects prior to commission presentation
Efficiency: Better committee work and evaluation of project applications

The Local Government Team has switched from a yearly cycle to a 2-year cycle to improve efficiency in administering this program. With 50 to 75 project applications submitted each year, it was very cumbersome to bring together the committees, do the evaluations and bring the projects to the commission. This new process gives us more time and a more efficient means of completing this process.

RESEARCH

Re-structuring of Research
Strategic Goal: Make the System Work Better
Savings: Savings to the Department through sharing of staff, and approximately $3,000 saved annually through in-house report printing
Efficiency: Working smarter through staff re-assignment and use of consultants

The Research Division serves the needs of Department leaders by funding and managing applied research projects, evaluating products and processes, and transferring technology information. This is accomplished by working with FHWA, local universities, consultants, contractors, and vendors. To improve efficiency within the Research Division, several positions were eliminated or re-assigned through changing some business practices and combining some resources. During fiscal year 2010, the division went from having thirteen full-time employees and one part-time employee to six full-time employees. Following are some of the additional changes made in the division to enable more investment into applied research projects:

- The division eliminated three full-time positions and re-assigned four positions to different divisions to re-align workloads.
- The division began printing research reports in-house rather than at the State Copy Center, resulting in annual cost savings of about $3,000 through use of support staff and available resources.
- The New Product Evaluation and Experimental Features Programs were consolidated from being spread among four people to being managed and performed by two. One position and the New Product Evaluation Program were subsequently re-assigned to the Central Materials Division to place this activity closer to the primary customers.
- The division outsourced several workshop and document services to competent and specialized consultants, resulting in professional events and publications that are less expensive than if a full-time employee was used for this purpose.
**Measuring the Benefits of Research**

Strategic Goal: Improve Safety, Make the System Work Better  
Savings: Estimated benefits of $80.8 million to the Department and the public from three years of completed studies  
Efficiency: Potential for reduction in project costs, accidents, and impacts to the environment and the traveling public

University of Utah researchers and the Research Division estimated a benefit-cost ratio of 17 for the Department’s Research Program for 41 research projects completed during the years 2006, 2007, and 2008. Estimated financial benefits of $80.8 million were related to internal savings of construction projects, longer lasting materials, a reduction in accidents, reduced delays to the traveling public, and other factors. The highest benefits were achieved by studies on big-ticket items, such as highways, bridges, traffic control devices, and right-of-way. Safety related studies also showed significant benefits. The total cost of conducting the research studies, including contract costs, project management, and oversight by technical advisory committees, was estimated at $4.81 million. One recommendation from the study was for the Department to continue use of high-benefit, innovative techniques such as innovative contracting methods, accelerated bridge construction, access management, and the use of movable barrier. These benefits are in the form of reduced congestion, enhanced safety, and lower impacts to businesses.

**Transportation Web-based Seminars**

Strategic Goal: Make the System Work Better  
Savings: Reduced travel time and training costs for Department personnel  
Efficiency: Accessibility to online training to promote competency and savings through implementation

Department personnel have benefited from transportation-related, web-delivered seminars, or “webinars”, hosted by national organizations and coordinated by the Research Division. These webinars, available for free or at no additional cost based on paid membership, are an excellent source of personnel training and technology transfer while providing time and cost savings. The amount saved on travel can be significant for both attendees and training staff since they can participate at their own office locations.

Since 2007 to date, the Research Division has provided 305 webinar sessions. A total of 1,127 Department personnel from the Calvin Rampton Complex have participated in these webinars. Several Region personnel also participated in the webinars from their offices. For fiscal year 2010 alone, 138 webinars were provided and 339 people from the Calvin Rampton Complex attended these. Attendees have learned valuable information that is relevant to their work and can be implemented to provide further cost savings to the Department and the public.
Digitizing As-built Construction Plans
Strategic Goal: Make the System Work Better
Savings: Reduced time finding and disseminating as-built drawing information
Efficiency: Electronic accessibility to scanned as-built plans for re-use by designers

Prior to 2009, most of the Department’s thousands of “as-built” construction drawings were available only in Mylar hard copies in the library plans room. These record drawings contain valuable information not previously documented on the construction drawings. Traditionally, Department employees and researchers have spent significant time finding and handling plans from the library. Preservation of these plans is a challenge since the original documents may become fragile with time, damaged with repeated use, or lost. It was decided that scanning and electronically archiving the as-built documentation on a real time basis would be achievable and effective. For future projects a digital version of these plans could be edited by designers without creating the full drawing from scratch.

During fiscal year 2010, a total of 49,944 Mylar (24-inch by 36-inch) as-built plans have been digitized in color by scanning for a total cost of $45,000 and uploaded to the Department’s ProjectWise document management system. Original hard copies of these as-built plans have been shipped to the State Records Center for better preservation, and after a time of storage there they will be shipped to the State Archive.
8.0 Operations
Efficiencies and Accomplishments 2010

AERONAUTICS

Based Aircraft Database
Strategic Goal: Make the System Work Better.
Savings: There are no savings associated with this project. The new Based Aircraft Database corrects serious deficiencies identified with the original data collection process.
Efficiency: The new data collection system is web based and provides airport managers with a user friendly means to submit required information to the Division of Aeronautics. The Utah Tax Commission uses the database to mail registration notices to aircraft owners. It is anticipated the new system will significantly increase revenue to the Division from aircraft registration fees.

American Recovery and Reinvestment Act (ARRA) “Stimulus Funds”
Strategic Goal: Take Care of What We Have and Increase Capacity.
Savings: There were no State or Local funds required to match the federal funds.
Efficiency: The State of Utah has already spent 95% of the $16.1 million ARRA funds issued for airport improvement projects in Utah. Projects include:
1. $3.5 million for construction of an airport terminal at the new St. George replacement airport, scheduled to open January 2011.
2. $8.8 million for an in-line taxiway / deicing pad at Salt Lake City International Airport. This major project won’t be completed until next year.
3. $3.8 million to reconstruct the main runway at Cedar City. This project is complete.

Upgrade Engines on the King Air C90 Aircraft
Strategic Goal: Take Care of What We Have.
Savings: 10–12% reduction in fuel burn.
Efficiency: The original engines had reached their time for overhaul. The new engines are more efficient, produce more power, improve safety margin, and burn less fuel. This efficiency provides both financial and environmental savings.

EQUIPMENT OPERATIONS

Fuel Efficiency Goals
Strategic Goal: Take Care of What We Have, Make the System Work Better
Savings: Reduced fuel costs
Efficiencies:
- UDOT has purchased 2 dedicated CNG vehicles and 1 dual fuel CNG that brings the total alternate fuel vehicles up to 9 units.
• UDOT has also purchased 2 more hybrid vehicles to bring the total up to 18.
• UDOT has reduced its fuel consumption by 32,011 gallons and has increased the alternate fuel usage by 326,273 gallons in fiscal year 2011.
• UDOT has downsized 3 vehicles from a ½ ton to mini-pickups, 1 vehicle from a ¾ ton to a ½ ton pickup, 2 trucks from a 1 ton to a ¾ ton pickup and 1 full size cargo van down to a mini SUV.

**Equipment Lease and Buy-Back Cost Saving Goal**

Strategic Goal: Take Care of What We Have
Savings: Reduced upfront vehicle costs

Efficiency:
• UDOT has continued the lease and the buy-back program to save mechanic time and also down time. As of this year we have 17 leased backhoes, 12 buy-back loaders and 31 leased tractors.

**Exploring New and Better Technologies**

Strategic Goal: Take Care of What We Have
Savings: Fewer plow trips needed

Efficiency:
• Tow plow and muni-body- We purchased 4 tow plows and 4 municipal bodies to go with them to increase snow plow efficiency.

**Vehicle Reductions**

Strategic Goal: Take Care of What We Have
Savings: Potential future cost savings of $78,300.00

Efficiency:
• Reduction of permanent heavy equipment- In fiscal year 2011 UDOT has reduced its permanent heavy equipment fleet count by 40 vehicles. The estimated cost savings for future will be $78,300.00.

**Radio Conversions**

Strategic Goal: Take Care of What We Have
Savings: Retain current FCC radio licenses

Efficiency:
• UDOT has been tasked with changing out all of the 150 MHz radios to comply with the new FCC mandate of narrow banding.
MAINTENANCE

Hot Shot Road Work Crew
Strategic Goal: Taking Care of What We Have
Savings: Enhances work accomplishment by adding available work hours without adding labor cost. More roadside maintenance tasks are completed without increasing costs. $32,700 annual savings for Region Two.
Efficiency: UDOT has partnered with the Utah Department of Workforce Services (DWS) to provide work skill development opportunities for workers entering the work force. While gaining job skills, DWS clients perform valuable highway maintenance work that otherwise would be deferred due to funding and labor constraints.

A pilot program sponsored by UDOT Region Two, DWS, and Maintenance Planning Division, created a “Road Crew” and a “Hot Shot” crew at station 2430 in Salt Lake City. The new program, called Road to a Better Future is building upon the initial success of the DWS/UDOT partnership by expanding the program to include a “Hot Shot” team that will travel throughout Region Two and complete pressing maintenance tasks. The crews consist of non-compensated DWS clients who need skills and work experience to qualify for paid employment.

Both crews have an experienced UDOT Transportation Technician leading the work. Station 2430 had two trailers modified by the UDOT Heavy Equipment Shop to allow the workers to have tools, supplies, and work zone safety equipment with them as they move from work site to work site.

The Road Crew, composed of inexperienced workers, is assigned labor intensive tasks such as litter control, weed control, fence maintenance, yard cleanup, truck cleanup, lubrication, and culvert inlet and outlet cleaning.

The Hot Shot crew responds quickly to fix signs, repair guardrail barriers, respond to customer requests, remove overgrown trees, and complete other jobs that need special equipment or a more advanced skill level.

This program is a Win-Win-Win for all involved. UDOT wins in that the Road Crew and Hot Shot crew provide a tool for UDOT maintenance managers in fulfilling their responsibility at
virtually no-cost. DWS wins in having a worksite training partner to provide real world work experience. The DWS clients win by gaining skills, experience, and references that lead to full time employment.

Comparison of Hot Shot Crew vs. Previous Corrections Crews: $49,122 (Prison Crew Cost) - $16,400 (Current Annual DWS Cost) = $32,722 Savings. The prison crew costs are actual costs from the last year we had those crews. The cost of the DWS crew is supervision, van and trailer costs.

**Flexible-base Delineators**
Strategic Goal: Improving safety while conserving valuable resources.  
Savings: Saves time and materials required to repair or replace the rigid metal delineator posts, approx. $75 annually per delineator  
Efficiency: More durable delineator posts while promoting roadway safety

Standard delineator posts are made from rigid galvanized steel. When a delineator post is hit, it no longer provides visual delineation. UDOT crews either replace the damaged post or try to bend it back into shape using brute force. UDOT has used flexible shaft delineator posts, but none have proved satisfactory. SHUR-TITE Manufacturing produces a patented flexible base delineator that can sustain nearly ten times as many vehicle strikes as the other flexible shaft delineators that we have used. The entire post bends at the joint. Because of this different bending motion, the post itself does not fracture or shatter when struck at low temperatures.

A pilot installation was made in Salt Lake County. Early results showed that the delineator did not evidence fatigue failure as previous systems had done. The posts showed scuff marks from being hit, but continued to return to the vertical position. In high-hit areas the SHUR-TITE delineators do not have to be replaced after one hit (as do steel posts) or even three to five hits (as do Carsonite and Safe-Hit). Installation costs as the same as other systems we have used. The delineator post itself costs three times the cost of a steel post, but avoiding repeated service calls to replace damaged delineators substantially reduces the life cycle cost of the SHUR-TITE system.
One entire MMQA section of SR-68 in Utah County will be fitted with the SHUR-TITE delineators. Delineator maintenance records for the test period will be compared with records from FY2009 and FY2010. This particular section was selected because it has a high incidence of wide loads using the road and frequent delineator hits during peak recreation weekends, because the road serves as a primary route from Salt Lake County to the ATV recreation areas at Little Sahara and vicinity. There are what appear to be deliberate delineator hits in some areas.

For areas where delineators are frequently damaged, the lower life cycle cost of the SHUR-TITE delineator amounts to an annual savings of $75 per installation. Traffic services are improved because delineators remain serviceable, risk exposure of UDOT employees is reduced due to fewer service calls, and less scrap materials requiring disposal are created.

**Grooved Waterborne Pavement Markings**

Strategic Goal: Improving Safety  
Savings: $148,500 in total projected cost savings over 12 years on a 9-mile section of I-80 for grooved waterborne vs. normal waterborne paint striping.  
Efficiency: Grooved waterborne paint and messages are lasting as long as more expensive markings and longer than normal waterborne paint application.

Dan Betts, Region Two Pavement Marking Manager, has pioneered the use of recessed paint striping and messages below the roadway surface to protect them from winter plowing and traffic. A 1/8" deep groove is ground into the pavement surface using a diamond head grinder, after which the stripe is applied using standard waterborne paint. The benefits of the ground surface are two-fold: 1) the clean, dry surface facilitates a better bond between the marking and the road, and 2) the marking is protected from the wearing action of traffic and winter plowing.

Subjective and quantitative analyses have shown the paint can last as long as more expensive, durable markings at 1/6 to 1/3 of the cost. For example, bid prices and projected 10-year costs and performance on a recent striping project in Utah indicated that the average cost per year would be $0.12/foot for grooved waterborne paint, $0.25/foot for ungrooved waterborne paint, $0.39/foot for ungrooved epoxy paint, and $0.65/foot for ungrooved durable tape.

Besides the lower initial cost, the ability to incorporate larger beads into the paint for improved retro-reflectivity at night for wet roads is another important advantage. The wet night beads are
more expensive than regular beads but are justified in grooved pavement markings due to the wear protection provided from traffic and snow plows. Dan Betts has developed a bead gradation that mixes our regular beads with a larger wet night bead at a ratio of 1:1, now known among suppliers as the “Utah Blend”. This blend is now being used with wet night beads from three different manufacturers on three different test decks in Regions One and Two. Additional features of the blend are exclusion of waste beads, formerly a problem with some suppliers, and inclusion of three bead sizes for durability and wet night performance.

Another advantage is that the increased life of the grooved markings becomes cost effective over a short 3 to 4 year time frame and precludes the need for yearly water based paint applications, thus reducing costs and maximizing the use of resources. Grooving presents one of the largest costs involved, although costs for this step have come down over the past few years. The diamond blade method has been found by UDOT to provide the best groove over other methods. One of the main efficiencies with grooved waterborne paint markings is that when paint markings need freshening, local contractors or UDOT forces can do it, rather than relying on more expensive, out-of-state durable marking contractors.

Test areas have been installed on concrete, chip seals, and microsurfaces. Measured retro-reflectivity values and subjective analysis both show good performance over multiple winters of plowing activities. Grooved in thermoplastic messages are proving to be a durable solution in areas that are subject to wear caused by traffic turning movements. UDOT is also starting to use more inlaid tape for pavement markings.

Many states have now applied grooved in pavement messages using Dan Betts’ guidelines and recommendations.

At UDOT grooved waterborne paint markings are used mostly on construction projects for concrete pavement and also on asphalt pavement microsurfaces, chip seals, open-graded surface courses, and thin overlays. Initial grooving is seldom used on maintenance projects due to limited Code 1 funds. One rule of thumb is that if major roadwork is not planned for the pavement for the next five years, initial installation of grooved paint is a good, economical option for pavement markings.

Grooved waterborne paint markings are used extensively in Region Two. Dan Betts manages paint maintenance contracts for Region Two and serves as a resource for the whole Department on the method. The other Regions in the Department have also started to use the technique more and generally use their own crews to maintain the markings. Although the practice is not a Department policy, UDOT has a Special Provision housed in the Central Materials Division and the “Utah Blend” bead gradation specification to aid the Department on pavement marking projects and maintenance.
A grinding machine with multiple diamond heads cuts a 1/8" deep groove.

Striping applied in a shoulder line groove on I-80.

Retroreflectivity values on I-80 are still above 100 millicandela's after 3 years.

Grooved thermoplastic crosswalks, stop bars and arrows on Moab Main Street still have good presence after 3 years.
Cost Comparison of Grooved vs. Not Grooved Paint Striping:

Along a 9-mile section of I-80 from 5600 West to SR-202, the original striping cost including traffic control was $36,498 in 2007 and the original grooving cost was $59,400, bringing the first year total cost to $95,898 with grooving. Without the groove, the annual cost to stripe after year 1 would normally be $25,988 (reduction in contract price after year 1 with the groove). The grooving depth was 120 mils deep and our paint spec calls for 20 to 25 mils per application. Using 22 mils as an average we would get at least 5 applications, so we would expect 4 more applications in the groove before cleaning out of the groove. Assuming we can get 3 years per application, we could expect the savings shown in the following table for a 12-year period.

Projected Cost Savings for Grooved Paint Striping, I-80 5600 West to SR-202

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Cost with No Groove</th>
<th>Annual Cost with Groove</th>
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<tbody>
<tr>
<td>1</td>
<td>$36,498</td>
<td>$95,898</td>
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<tr>
<td>2</td>
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</tr>
<tr>
<td>3</td>
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<td>4 (2010)</td>
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<tr>
<td>5 (Projected)</td>
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<td><strong>Total Cost</strong></td>
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**Total Savings** $148,504

Creating Work Orders from a Work Plan in OMS

Strategic Goal: Making the system work better while conserving valuable resources.
Savings: Reduces the time spent scheduling and reporting work activity by nearly half.
Efficiency: This functionality takes advantage of the power of OMS to enable supervisors to develop more comprehensive schedules based on a detailed work plan, and report work activities in OMS much more quickly than ever before.
Maintenance recently finished another round of OMS training that introduced personnel to more advanced functionality in OMS and reduces time spent in front of the computer scheduling and reporting work activities.

There is a set amount of time that can be spent on any given activity based on the amount of money budgeted. An initial investment of about an hour spent distributing this activity time throughout the year in what we refer to as “balancing the Work Program”, allows personnel to schedule and report daily activities in about half the time it currently takes.

We expect to achieve this result because there are a number of steps saved in the process of producing schedules and work orders if OMS already has the basic information it needs from the initial work program.

A few minutes spent each quarter updating the work program based on work accomplished refines the plan for subsequent years. As this process is followed, less and less time is needed for refinement, budget requests are more accurate, and the yearly work program and budget only take minutes to review and make adjustments.

Once a plan is established, users can use a screen called “Work Orders from Plan” to schedule their work. This screen gives them a list of activities with the amount of work they plan to accomplish in a given month, and deducts the amount of work they’ve scheduled and completed. That way they know how much they can do the rest of that month, thus avoiding overrunning the budget.

This saves a number of steps and a great deal of time compared to creating work orders from scratch, which is the way everyone had to do it in the past.

**MOTOR CARRIER**

**Commercial Motor Vehicle Crash Fatality Rate Reduction**

Strategic Goal: To reduce crashes, injuries and fatalities involving large trucks and buses. Supports UDOT’s Final Four – Improve Safety Focus Area.

Savings: Utah received $106,795.00 in federal incentive funding as a result of its overall CMV fatal accident rate. This funding offsets state dollars and goes directly towards the development
of additional safety initiatives designed to reduce CMV related fatalities and injuries throughout the state.

Efficiency: Improves the safety of Utah’s transportation system.

UDOT’s Motor Carrier Division along with the Utah Highway Patrol has committed to a **CMV Fatality Reduction Goal** of reducing the rate of truck and bus related fatalities to **no more than 0.10 per 100 million vehicle miles traveled by 2011** from a baseline rate of 0.21 VMT in 2002. The Federal Motor Carrier Safety Administration’s (FMCSA) National CMV Crash Reduction Goal is to reduce the rate of large truck and bus related fatalities to **no more 0.16 per 100 million vehicle miles traveled (VMT) by 2011** from a baseline rate of 0.184 per million VMT in 2005. With that being said, as noted in the table below ~ **Utah’s fatality rate for 2008 is 0.15 (latest data available), exceeds the national goal set by FMCSA.**

To assist in meeting this goal, the Motor Carrier Division receives federal Motor Carrier Safety Assistance Program (MCSAP) funding that requires the state to submit an annual Commercial Vehicle Safety Plan (CVSP). This plan ensures maximum operational effectiveness and efficiency of reducing CMV injuries and fatalities crashes by identifying and implementing state specific objectives focused on identified localized problem areas.

UDOT’s Motor Carrier Division will continue its focused performance based approach to CVM crash reduction safety initiatives and has reviewed and adjusted objectives where necessary to achieve its overall CMV Fatality Reduction Goal by 2011.

```
<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities State</th>
<th>Total VMT</th>
<th>Fatality Rate</th>
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<td>2007</td>
<td>39</td>
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</tr>
<tr>
<td>2008</td>
<td>29</td>
<td>25,974</td>
<td>0.15</td>
</tr>
<tr>
<td>2009</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
```

Data Source: USDOT, FHWA, Highway Statistics (annual series); FARS.
Notes:
1. Commercial Motor Vehicles are comprised of Large Trucks and Buses.
2. The Fatalities heading includes the number of fatalities involved in large truck and Bus fatal crashes.
   Fatality Rate = the “Number of Fatalities Involved in Commercial Motor Vehicle Fatality Crashes” divided by the “State Total VMT” multiplied by 100. Fatality Rate figures represent Fatalities per 100 Million Vehicle Miles Traveled.
**Driver Focused Level III Commercial Motor Vehicle Inspection**

Strategic Goal: To reduce crashes, injuries and fatalities involving large trucks and buses. Supports UDOT’s Final Four – Improve Safety Focus Area.

Savings: Utah received $106,795.00 in federal incentive funding as a result of its overall CMV fatal accident rate. This funding offsets state dollars and goes directly towards the development of additional safety initiatives designed to reduce CMV related fatalities and injuries throughout the state.

Efficiency: Increasing Driver Focused Level III commercial vehicle safety inspections has shown a direct correlation on the reduction of CMV related truck and bus crashes

UDOT’s Motor Carrier Division along with the Utah Highway Patrol Commercial Motor Bureau continues to focus efforts on conducting Driver-Focused Level III Inspections. The Federal Motor Carrier Safety Administration (FMCSA) has made driver focused inspections a top priority and has requested states to conduct at least 30 percent of their overall inspections to be conducted as a Level III driver inspection. Once a commercial motor vehicle is stopped, a driver focused inspection can immediately identify behaviors such as fatigue that can contribute to CMV crashes. Over the past three years, Utah has consistently exceeded the national average of 30 percent as outlined in the FMCSA Planning Memo as an emphasis area. **During FY 2010, Utah conducted Driver-Focused Level III Inspections 58% of the time.** State Transportation Officials believe that this one-on-one contact with the driver directly impacts the reduction of CMV crashes by identifying driver behavior CVSA Out-of-Service violations prior to them causing crashes.
**Driver/Vehicle Inspections for FY 2009:**

<table>
<thead>
<tr>
<th>Inspection Level</th>
<th>Non-Hazmat Truck</th>
<th>Hazmat Truck</th>
<th>Motorcoach</th>
<th>Passenger Carrier</th>
<th>Other</th>
<th>Total</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I. Full</td>
<td>12,507</td>
<td>943</td>
<td>232</td>
<td>131</td>
<td>4</td>
<td>13,817</td>
<td>33.9%</td>
</tr>
<tr>
<td>Level II. Walk Around</td>
<td>2,345</td>
<td>236</td>
<td>2</td>
<td>13</td>
<td>3</td>
<td>2,599</td>
<td>6.4%</td>
</tr>
<tr>
<td>Level III. Driver-Only</td>
<td>23,362</td>
<td>178</td>
<td>8</td>
<td>49</td>
<td>13</td>
<td>23,610</td>
<td>58.0%</td>
</tr>
<tr>
<td>Level IV. Special</td>
<td>347</td>
<td>22</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>372</td>
<td>0.9%</td>
</tr>
<tr>
<td>Level V. Vehicle -Only</td>
<td>246</td>
<td>3</td>
<td>13</td>
<td>46</td>
<td>0</td>
<td>308</td>
<td>0.8%</td>
</tr>
<tr>
<td>Driver Inspections</td>
<td><strong>38,214</strong></td>
<td><strong>1,357</strong></td>
<td><strong>242</strong></td>
<td><strong>193</strong></td>
<td><strong>20</strong></td>
<td><strong>40,026</strong></td>
<td></td>
</tr>
<tr>
<td>Vehicle Inspections</td>
<td>15,098</td>
<td>1,182</td>
<td>247</td>
<td>190</td>
<td>7</td>
<td>16,724</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td><strong>38,807</strong></td>
<td><strong>1,382</strong></td>
<td><strong>255</strong></td>
<td><strong>241</strong></td>
<td><strong>21</strong></td>
<td><strong>40,706</strong></td>
<td></td>
</tr>
</tbody>
</table>

Data Source: FMCSA Motor Carrier Management Information System (MCMIS) as of 7/2/2010.

**Driver/Vehicle Inspections for FY2010 YTD:**

<table>
<thead>
<tr>
<th>Inspection Level</th>
<th>Non-Hazmat Truck</th>
<th>Hazmat Truck</th>
<th>Motorcoach</th>
<th>Passenger Carrier</th>
<th>Other</th>
<th>Total</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I. Full</td>
<td>7,912</td>
<td>579</td>
<td>175</td>
<td>86</td>
<td>8</td>
<td>8,760</td>
<td>31.2%</td>
</tr>
<tr>
<td>Level II. Walk Around</td>
<td>1,799</td>
<td>209</td>
<td>0</td>
<td>8</td>
<td>6</td>
<td>2,022</td>
<td>7.2%</td>
</tr>
<tr>
<td>Level III. Driver-Only</td>
<td>16,547</td>
<td>133</td>
<td>4</td>
<td>36</td>
<td>9</td>
<td>16,729</td>
<td>59.5%</td>
</tr>
<tr>
<td>Level IV. Special</td>
<td>329</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>341</td>
<td>1.2%</td>
</tr>
<tr>
<td>Level V. Vehicle -Only</td>
<td>57</td>
<td>14</td>
<td>164</td>
<td>25</td>
<td>0</td>
<td>260</td>
<td>0.9%</td>
</tr>
<tr>
<td>Driver Inspections</td>
<td><strong>26,258</strong></td>
<td><strong>921</strong></td>
<td><strong>179</strong></td>
<td><strong>130</strong></td>
<td><strong>23</strong></td>
<td><strong>27,511</strong></td>
<td></td>
</tr>
<tr>
<td>Vehicle Inspections</td>
<td>9,768</td>
<td>802</td>
<td>339</td>
<td>119</td>
<td>14</td>
<td>11,042</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td><strong>26,644</strong></td>
<td><strong>944</strong></td>
<td><strong>343</strong></td>
<td><strong>158</strong></td>
<td><strong>23</strong></td>
<td><strong>28,112</strong></td>
<td></td>
</tr>
</tbody>
</table>

Data Source: FMCSA Motor Carrier Management Information System (MCMIS) as of 7/2/2010.

**“Truck Smart” and “Drive to Stay Alive” Public Outreach and Education Campaign**

Strategic Goal: To improve the knowledge of Utah’s highway users to minimize the likelihood of a crashes with a large truck and reduce the consequences of those that do occur. Supports UDOT’s Final Four – Improve Safety Focus Area.

Savings: UDOT has seen savings in the form of a reduction of CMV crashes and lives saved along Utah’s highways.

Efficiency: Implementation of the Truck Smart and Drive to Stay Alive Campaigns contributed to an overall reduction of CMV crashes along six high crash corridors identified in the 2002 – 2004 Single Vehicle Crash Study.
The Drive to Stay Alive Campaign directs outreach efforts towards commercial motor vehicle drivers to buckle up, slow down, and stay alert. While the Truck Smart Campaign focuses efforts on educating the public on how to drive safely around commercial motor vehicles. These two campaigns were developed and implemented when the Motor Carrier Division realized that a number of single vehicle crashes were occurring along six high crash corridors. Specifically, crashes noted in the study identified causation factors contributing to the crashes which included speed, driver inattentiveness, and fatigue.

Utah’s efforts to reduce CMV crashes occurring on the identified high crash corridors relied heavily on the UDOT’s Drive to Stay Alive and Truck Smart Campaigns. During 2010, the Motor Carrier Division was able to analyze state crash data to make an assessment of the effectiveness of the two campaigns. The following information indicates the reduction in CMV crashes along each of the noted high crash corridors:

**Reduction in CMV Single Vehicle Crashes:**
- I-70 (MP 200+) saw an 82% overall crash reduction.
- I-80 (MP 1-50) saw an 86% overall crash reduction.
- I-80/84 (MP 91-119) saw a 2% overall crash reduction. *(Baseline included only 9 crashes in the original study)*
- SR-6 (MP 181-204; 261-270) saw a 53% overall crash reduction.
- SR-89 (MP 40-125) saw a 58% overall crash reduction.

**PROCUREMENT**

**New UDOT Procurement Process.**

Strategic Goal: Take Care of What We Have, Make the System Work Better  
Savings: Reduced time for procuring contracts and purchase orders  
Efficiency: All Title 72 procurements are handled through UDOT Procurement

Based on Title 72-Transportation Code, it was recommended by the Director of State Procurement that UDOT Procurement has authority to provide planning, research, design, construction, maintenance, security, and safety of State transportation systems for State highways as detailed in 72-2-206. This allows UDOT Procurement to prepare and adopt uniform standard plans and specifications for the construction and maintenance of state highways and will follow the Utah Procurement Code 63G-6-207, Utah Administrative Code R33-3 using Division of Purchasing Policies and Procedures.

Per the above statement, UDOT Procurement currently handles all Procurements covered under Title 72, which is about 80% of the workload no longer going thru State Purchasing. We are involved upfront in writing scope of work/specifications, going out for bid, writing purchase orders and contracts for our UDOT customers, saving about a two week turnaround time.
**Two Cost Saving /Innovative Purchases.**

Strategic Goal: Take Care of What We Have  
Savings: Approx. $600,000 from purchase of used, needed equipment versus new  
Efficiency: Department closed on great deals on a used mobile retro-reflectometer and van and two used snow blowers

First: Our Maintenance Department located a 2001 Dodge Ram 2500 van with an installed LaserLux Retro-Reflectometer mounted in the van. Our Department saved in excess of $100,000.00 versus a new vehicle with new equipment.

Second: Equipment Operations wanted to replace their heavy-duty snow blowers used for high elevation mountain snow removal. Their current models are very old and require parts to be purchased used or have them custom made when it fails. The reason why they have not been replaced is the cost, over $300,000.00 each. This is a very unique opportunity. Two snow blower units were available at TNT Auction. These were previously owned by Salt Lake City Airport, and both machines have minimal hours. UDOT was able to purchase both snow blowers for under $60,000.00.

**Re-Structuring, Awards, and Certifications**

Strategic Goal: Make the System Work Better  
Savings: Doing more with less  
Efficiency: Reduced staff and improved competency of staff

Staff has been reduced by .5 FTE (warehouse part time position); we are doing more with less.

Procurement received our 5th Consecutive Achievement of Excellence Award in 2010. In 1995, the National Purchasing Institute established a program designed to recognize organizational excellence in public procurement. The Achievement of Excellence in Procurement (AEP) is awarded annually. This prestigious award is earned by those organizations that demonstrate excellence by obtaining a high score based on standardized criteria. The criteria are designed to measure innovation, professionalism, productivity, e-procurement, and leadership attributes of the procurement organization.

Procurement has 6-Certified Public Manager’s, (CPM) graduates.  
The Utah CPM Program increases the professional performance of current and future government managers. Certified Public Manager is a professional designation granted by nationally accredited programs in state and federal governments. The CPM Program increases the capacity of its participants to effectively lead people, manage work processes, and develop self-mastery. The Utah CPM Program is co-sponsored by the Utah Department of Human Resource Management and the Utah System of Higher Education.

Five Certified Professional Public Buyers (CPPB).  
Certification requires substantial work experience in purchasing including some years of public purchasing experience. This work experience must be complemented by formal training courses
specifically in procurement as well as formal education; with some college work preferred for a CPPB designation.

**Members of National Institute of Government Purchasing (NIGP)**

Our team holds one key position in Education in our local chapter of (NIGP).

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**TRAFFIC AND SAFETY**

**Safe Routes to School Program – Reduce Pedestrian Fatalities**

Strategic Goal: Improve Safety  
Savings: Reduced pedestrian fatalities  
Efficiency: Reduced pedestrian fatalities by 37.5% from previous year.

The overall purpose of this program is to achieve a significant reduction in school age child pedestrian fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements. Infrastructure projects should directly support increased safety and convenience for schoolchildren to bicycle and/or walk to and from school. UDOT focuses its SRTS program improvements primarily on the construction of walking facilities.

An extensive review process is completed on the applications with its accompanying scoping information and rates the applications according to the following factors: 1) demonstration of need; 2) potential of proposed project to encourage increased walking and biking among students; 3) appropriate sub-sponsors/community support; 4) completed SNAP map; 5) existing programs at the school that encourage walking and biking to school; 6) confirmation to provide required information if project is selected. Once the applications have been scored a selection committee meets together under the direction of the SRTS Coordinator to discuss the applications and make a final decision on which projects to fund. The following table summarizes the SRTS funds available, programmed, and obligated during Fiscal Year 2010.

<table>
<thead>
<tr>
<th>School and Location</th>
<th>2010 SRTS Infrastructure Projects</th>
<th>Amount Awarded</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunter Elementary, West Valley City</td>
<td></td>
<td>$150,000</td>
<td>Sidewalk with curb &amp; gutter, and sidewalk w/ park strip &amp; curb &amp; gutter</td>
</tr>
<tr>
<td>William Penn Elementary, Salt Lake City</td>
<td></td>
<td>$150,000</td>
<td>Sidewalk w/ curb &amp; gutter, raised pedestrian walkways</td>
</tr>
<tr>
<td>Evergreen Jr. High, Salt Lake City</td>
<td></td>
<td>$250,000</td>
<td>Sidewalk w/ curb &amp; gutter, raised pedestrian walkways</td>
</tr>
<tr>
<td>South Clearfield Elementary, Clearfield</td>
<td></td>
<td>$81,477</td>
<td>Sidewalk w/ park strip &amp; curb &amp; gutter</td>
</tr>
<tr>
<td>Ephraim &amp; Gunnison City</td>
<td></td>
<td>$204,000</td>
<td>5’ concrete sidewalk &amp; driveway modifications</td>
</tr>
<tr>
<td>Huntington Elementary, Huntington</td>
<td></td>
<td>$250,000</td>
<td>5’ concrete sidewalk &amp; driveway modifications</td>
</tr>
<tr>
<td>Manila Elementary, Pleasant Grove</td>
<td></td>
<td>$250,000</td>
<td>Sidewalk w/ curb &amp; gutter, sidewalk w/ park strip and curb &amp; gutter, and midblock crossing w/ median island.</td>
</tr>
<tr>
<td>Bonneville Elementary, Ogden</td>
<td></td>
<td>$150,000</td>
<td>Sidewalk adjacent to existing park strip &amp; existing curb &amp; gutter</td>
</tr>
<tr>
<td>Arcadia Elementary, Taylorsville</td>
<td></td>
<td>$150,000</td>
<td>Sidewalk w/ park strip and curb &amp; gutter</td>
</tr>
<tr>
<td>Snow Horse Elementary, Kaysville</td>
<td></td>
<td>$200,000</td>
<td>Sidewalk w/ park strip adjacent to existing curb &amp; gutter, sidewalk w/ park strip and curb &amp; gutter, sidewalk w/ no curb &amp; gutter</td>
</tr>
<tr>
<td>Mountainside Elementary, Mendon</td>
<td></td>
<td>$250,000</td>
<td>Asphalt meandering pathway</td>
</tr>
<tr>
<td>Millville Elementary, Millville</td>
<td></td>
<td>$40,000</td>
<td>Sidewalk w/ curb &amp; gutter and sidewalk w/ park strip w/out curb &amp; gutter</td>
</tr>
</tbody>
</table>
The SRTS program and accompanying process has contributed to Utah experiencing a downward trend in overall pedestrian fatalities since 2008.

**Highway Safety Improvement Program – Reduce Traffic Fatalities**

Strategic Goal: Improve Safety  
Savings: Reduced traffic fatalities  
Efficiency: Reduced traffic fatalities by 11.6% from previous year.

The overall purpose of this program is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements. UDOT focuses its HSIP infrastructure improvements primarily on roadway departure crashes.

The first steps in the Planning process include collecting and evaluating crash, roadway, and traffic data, as well as solicitation of input from UDOT Region offices and other safety partners. The Traffic & Safety Division then screens the crash data, traffic data, and input from the Region offices. Potential spot safety locations are moved forward for a more extensive analysis. A three-year crash history is compiled for each candidate location. Crash characteristics are analyzed and potential measures to mitigate those characteristics are identified. Benefit-to-cost ratios are calculated for each location based on crash history, expected decrease in crashes for a potential mitigation measure, and cost of that mitigation measure. Prioritization is based on the following factors and is conducted by the Traffic & Safety Division: greatest benefit to reduce fatal & serious injury crashes, benefit-to-cost ratio, timeline to completion, and coordination with other projects. The following table summarizes the HSIP funds available, programmed, and obligated during Fiscal Year 2010.

<table>
<thead>
<tr>
<th>HSIP Project Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding Category</td>
</tr>
<tr>
<td>HSIP (Section 148)</td>
</tr>
<tr>
<td>Other Federal-Aid Funds (ARRA)</td>
</tr>
<tr>
<td>State and Local Funds</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

The HSIP and accompanying process, has contributed to Utah experiencing the lowest traffic fatality figures in 35 years. An analysis of seven reportable HSIP projects exhibited a marked reduction in fatal and serious injury crashes. The three-year period after construction had 182 fewer fatal and serious injury crashes than the three years prior to construction. The following chart demonstrates the overall downward trend since 2000.
TRAFFIC MANAGEMENT

Integrated UDOT/Provo/Orem Traffic Signal System

Strategic Goal: Make the System Work Better

Savings: Reduced travel times for the public by nearly fifty percent during large events; annual user cost savings for the taxpayer is estimated at $8,000,000 and annual cost savings to UDOT is estimated at $600,000

Efficiency: Creation of a joint traffic signal management system accessible to agencies involved

Until recently, UDOT, Provo City and Orem City had separate traffic signal management systems. The three separate systems would not allow for signal timing to be updated seamlessly across jurisdictional boundaries and was limited in its ability to effectively manage traffic from a regional standpoint. UDOT had limited ability to adjust traffic signal timing on signals in the Orem-Provo areas.

In FY 2010, UDOT, working together with the Cities of Orem and Provo implemented one centralized traffic signal management system. This project involved the conversion of 164 traffic signals within the Orem and Provo City limits to a joint central traffic signal management system that is shared and accessible by all involved agencies.

This project was implemented in order to help manage detoured traffic from the I-15 CORE project. The new centralized traffic signal management system also allows for real-time adjustment of signal timing for events at Lavell Edwards Stadium and Utah Valley University. The ability for UDOT and the cities to work together to manage large events such as the Stadium of Fire and BYU football games has provided a direct benefit to the public with travel times to and from the events that are nearly fifty percent less than previous years during these same events.

The annual user cost savings for the taxpayer is estimated at $8,000,000. The annual cost savings to UDOT from the system is based on recognizing that without the central traffic management system, it is estimated that 3 additional full-time employees (doubling the staff) would be needed for I-15 CORE to support UDOT in traffic signal operations for the Region Three area, as the employees would need to do all the adjustments with signal timing in the field. Assuming a per employee cost of $100/hr, 8 hours worked per day, and 250 working days per year, the annual
cost savings from not needing the additional employees is estimated at $600,000. This does not include the transportation cost savings from not having the additional employees, nor does it include the savings to UDOT from being able to better and more quickly manage the signal timing in the areas. This is simply a case of being able to do more with less.

Region Four Traffic Management System Implementation
Strategic Goal: Make the System Work Better, Improve Safety
Savings: Reduced traffic and accident potential during winter storms
Efficiency: Better monitoring and managing of traffic

In fiscal year 2010, Traffic Management Division added to our capabilities to monitor and manage traffic in Region Four, particularly in the St. George Area. We now have:

- 2 Variable Message Signs on I-15 northbound
- Traffic speed and volume detection from the state line to milepost 14 on I-15
- Over 50 traffic cameras in the St. George area
- One Highway Advisory Radio.

In addition, fiber-optic communications infrastructure was installed on two Region Four projects on I-15 from the state line to Milepost 16. Not only does this provide communications to all traffic cameras on I-15, but it also provides a redundant communications path to Bluff Street and St. George Boulevard for communications to traffic signals and traffic cameras on surface streets in the St. George area.
A particular benefit of the signs in St. George is the benefit for long-range travelers and truckers. The 2009-2010 winter had heavy snowfall on the high elevation portions of I-15 and I-70 in southern Utah. The Traffic Operations Center used the new signs along with enhanced media outreach to warn travelers of difficult driving conditions. For one storm we saw a reduction in traffic on I-70 of up to 30 percent. The reduced traffic reduces the chance of crashes and makes the road easier to plow.

Conversion to Digital Video

Strategic Goal: Make the System Work Better
Savings: No additional equipment cost to provide video to Region Two and Headquarters
Efficiency: Simpler video switching and less computing power required

In Fiscal Year 2010, the Traffic Management Division completed the process of converting all of our traffic video to a digital format. Prior to this, video was handled in both analogue and digital formats. By moving to digital video, video switching has become much simpler.

- Equipment has been consolidated elsewhere in the system. The equipment used to deliver video is now smaller, more capable and less expensive.
- As a result, the TOC is now using less power for computing and spending less on air conditioning to cool our computer room.

Digital video also allows us to supply video to any computer in the Traffic Operations Center via the local Ethernet rather than via coaxial video and a dedicated monitor. As a result, we have
provided video to the Region Two traffic engineers at no additional equipment cost, and have provided live video traffic feeds to the Calvin Rampton Complex.

**Traffic Analysis to Support Price-Plus-Time Bidding**

**Strategic Goal:** Make the System Work Better  
**Savings:** Approximately $5.7 million reduction in user costs to the traveling public over one year, with approx. $2 million spent by the Department on engineering and incentives  
**Efficiency:** Improved work zone design and construction phasing

To take into account the full cost of construction projects, UDOT implemented Price-Plus-Time (P+T) Bidding this year. The goals of this form of bidding are to: reduce user costs, encourage competitive innovation from contractors, and reward early completion of projects. The Traffic Management Division has been working with UDOT design teams to develop a strategy to mitigate user costs during construction for projects that have the potential to cause significant delay to the traveling public.

The Traffic Management Division developed user cost analysis for 124 projects throughout the State as part of the P+T program. Using the analysis results for each project, the Traffic Management Division worked with the design teams to mitigate potential impacts through improved design and construction phasing. For unavoidable impacts, a balance of user and construction costs was developed to determine a value of “Time” for the project schedule. This value was used for the amount of incentive/disincentive due, based on the early or late completion of a project.

The P+T program has reduced costs to drivers with relatively little cost to UDOT. Most user costs are avoided with improved design and construction phasing. For unavoidable user costs, the value of the user cost is generally more than three times the value of “Time” in the contracts. This means that every dollar UDOT spends in incentive should reduce the costs to the traveling public by at least three dollars – and often more.

The benefits of the P+T program are difficult to quantify because each construction project is unique and difficult to correlate with other projects that have been contracted with a different method; however, there have been some overall UDOT construction schedule improvements that are connected to the P+T program. When compared to 2009, there has been an average reduction in project schedules by ten days in 2010. With an average value of Time of $4,600 per day for each P+T project, the approximate reduction in user cost to the traveling public has been $5.7 million. This savings has generally been a result of increased construction efficiency with a relatively small cost to UDOT. Construction costs on UDOT projects have gone down an average of 1.3% in 2010. At this time, it is difficult to determine how much of the reduction in costs could be attributed to the use of P+T bidding as compared to the overall impact of the downturn in the economy over the same period of time. The additional preliminary and construction engineering cost to implement the P+T program has been approximately $200,000. Combining this cost with the estimated incentive cost of one-third of the $5.7 million reduced user costs results in a total cost to the Department of approximately $2 million for this year.
An additional benefit of the P+T program is that it transfers much of the risk and user cost associated with construction delays to contractors. They have a significant incentive to finish as quickly as possible and will be charged a disincentive for each day the project is late.

**Traffic Video to Utah County 911 Centers**
Strategic Goal: Make the System Work Better, Improve Safety  
Savings: Potential for reduced time to dispatch emergency responders to highway incidents  
Efficiency: Enabled 911 dispatchers to view traffic incidents on I-15 and quickly dispatch responders

The goal of this project was to provide traffic video feeds into each local 911 dispatch facility in Utah County and in turn retrieve the traffic related Computer-Aided Dispatch (CAD) information to UDOT for transportation analysis. This project was originally included in the STIP as a future project to be funded through the Metropolitan Association of Governments (MAG). It was identified as an ideal candidate for the ARRA program and was accelerated forward for construction in FY 2010.

Locations included:

- Pleasant Grove Public Works – Pleasant Grove
- Provo City Center - Provo
- UVU Campus – Provo
- BYU Campus – Provo
- Orem City Public Work – Orem
- Springville City - Springville
- Utah County Sheriff’s Office – Spanish Fork

UDOT installed fiber-optic cable to the 911 centers and installed 48” video screens with splitter technology to allow for multiple video images at each center. The traffic video allows the 911 dispatchers to view traffic incidents on I-15 and aids in quickly dispatching the necessary responders to the right location.

**Fiber Optics Partnership Agreements**
Strategic Goal: Make the System Work Better  
Savings: Millions of dollars annually in reduced infrastructure costs  
Efficiency: Telecommunication providers and UDOT can exchange conduit space or right-of-way occupancy for fiber-optic services for traffic management

The Traffic Management Division successfully negotiated partnership agreements to share fiber-optic facilities in FY 2010 with SYRINGA, Emery Telecom, and with Qwest. The fiber-optic facilities covered by these agreements are now under construction.

The partnership agreements allow private sector telecommunication providers to use spare UDOT conduit capacity or to occupy UDOT right-of-way in exchange for fiber-optic
communication services to support UDOT’s traffic management system. These agreements save UDOT millions of dollars annually in infrastructure costs.

The value of these agreements are SYRINGA $7 million, Emery Telecom – $3 million, and Qwest – $3 million.

Camera Lowering System
- **Strategic Goal:** Make the System Work Better, Improve Safety
- **Savings:** Reduced time and equipment for camera maintenance and improved safety
- **Efficiency:** Traffic camera can be lowered and maintained without closing a freeway lane

Traffic Management Division crews installed a camera lowering system on a traffic camera pole at I-215 and 4700 South on an experimental basis. The camera lowering system allows the maintenance crews to lower the camera from a 50 foot height to ground level for maintenance without the use of a bucket truck. This location had been difficult for the maintenance crews to reach safely without closing a traffic lane on I-215 and without renting special equipment. The new camera lowering device allows crews to maintain the camera quickly, efficiently and safely.
Re-useable Screw-in Pole Base Foundation

Strategic Goal: Take Care of What We Have, Make the System Work Better
Savings: Reduced time and expense for installing pole foundations
Efficiency: New pole foundations can be quickly installed using Department vehicles

Traffic Management Division crews began using a new pole foundation technology in this fiscal year in order to reduce the time and cost of repairing or replacing highway lighting and traffic detector poles. This technology allows in-house crews to install poles without the extra time and expense of forming and pouring concrete foundations. A starter hole is augured at the pole location and the pole base is then screwed into the ground using equipment available on the Division’s maintenance vehicles. Once the pole base is in place, the pole structure is bolted to the base with a standard break-away plate and bolts.
9.0 Internal Audit

Efficiencies and Accomplishments 2010

Benefits of Internal Audits
Strategic Goal: Take Care of What We Have
Savings: Potential for savings to the Department through better business practices
Efficiency: Positive tone set for internal reviews, and over billing identified in external reviews

Internal Audit Section is working hard to set a positive tone for internal reviews.

In the Traffic and Safety Audit we recommended that the Roadway Engineer establish controls for the assessment and collection of funds from Ski Resorts. An opportunity for the misuse of funds exists when one person has sole discretion for the assessment and collection of funds. Traffic and Safety should establish a policy to ensure that funds are properly handled to ensure a separation of duties, to protect employees, and accountability for the non-receipt of funds.

UDOT has worked hard to establish a close and working relationship with the people who do business with UDOT. To ensure proper business practices, a recommendation was made to have Engineers and managers complete an annual Conflict of Interest Statement and Affidavit of Non-collusion.

I-15 Core Project Office has purchased additional office furnishings and sensitive equipment that will require inventory control measures. These items include Digital Cameras, Weather Tracker, Software Licenses, Office Furnishings, Cell Phones and accessories. The existence of controls and inventory schedules for office furnishings and sensitive equipment will be important to ensure the items purchased by UDOT are identified and controlled during the project and at the conclusion of the project when the I-15 Core office is closed.

Internal Audit is working with Procurement and the Comptrollers Office to update P-Card policies to provide additional guidance to P-Card Users.

External Audit Section is working with utility companies and consultant engineers to timely complete reviews and resolve over/under billings that result from those reviews. During calendar year 2009 it was determined that UDOT was over billed $201,474.
## Appendix (Summary List)

### Summary List of All Topics

**UDOT FY 2010 Efficiencies Report**  
(Refer to body of Full Document)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Savings</th>
<th>Efficiency</th>
<th>Final Four</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Region One</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Paint Lines – tape, grooved-in, high-vis beads</td>
<td>Approx. $179,000</td>
<td>Less impact to the public due to less frequent reapplication; longer lasting reflectivity</td>
<td>X</td>
</tr>
<tr>
<td>Reducing State-Owned Equipment</td>
<td>$27,800</td>
<td>Reduction of infrequently used equipment and renting equipment instead</td>
<td>X</td>
</tr>
<tr>
<td>In-house Manufactured Deslicking Grit</td>
<td>$71,000 in FY 2010</td>
<td>Manufacturing our own deslicking grit saves money</td>
<td>X</td>
</tr>
<tr>
<td>Brine and Improved Salt Applications</td>
<td>$6.40 per lane mile with Brine vs. MgCl; savings from fewer salt application trips</td>
<td>More effective anti-icing with brine; less Redmond Salt needed than regular salts</td>
<td>X</td>
</tr>
<tr>
<td>Spreader Box for Gravel Placement</td>
<td>Cost savings from using old, altered equipment</td>
<td>Reduced waste during gravel placement</td>
<td>X</td>
</tr>
<tr>
<td>Remote Cameras for Weather and Road Conditions</td>
<td>Time and equipment savings from remotely viewing conditions</td>
<td>Better level of service during winter due to better resource utilization</td>
<td>X</td>
</tr>
<tr>
<td>Combining of Special Crews for Pavement Management</td>
<td>$126,000 from elimination of seasonal staff from crews</td>
<td>Better utilization of our own work force through creative scheduling</td>
<td>X</td>
</tr>
<tr>
<td>Region One CADD Formatting Review Team</td>
<td>Potential reduction in resource hours for plan set reviews</td>
<td>Potential reduction of time for plan set reviews and improved consistency in plans</td>
<td>X</td>
</tr>
<tr>
<td>Extending the Life of Concrete Pavements</td>
<td>$200,000 per lane mile for dowel bar retrofit versus rubblization and HMA overlay</td>
<td>Take full advantage of existing structure in older pavements</td>
<td>X</td>
</tr>
<tr>
<td>Reduced Concrete Testing / Better Early Strength</td>
<td>Reduced concrete testing costs by half; $60,000 potential cost savings on a recent urban paving job</td>
<td>80%-90% reduction in early strength assessments using maturity meters</td>
<td>X</td>
</tr>
<tr>
<td>Screening and Reuse of Sweepings</td>
<td>$11,000 at Ogden Station alone</td>
<td>Reuse of screened sweepings as pipe backfill</td>
<td>X</td>
</tr>
<tr>
<td>Bridge Construction of South Layton Interchange</td>
<td>Approx. $1.4M and 90 days in user costs and $1.4M in construction/maintenance costs</td>
<td>Reduced construction time and road closures using aggressive schedule and ABC methods</td>
<td>X</td>
</tr>
<tr>
<td>Extension of Hinckley Drive</td>
<td>Reduced time for motorists to access I-15</td>
<td>Increased mobility for motorists in Weber County</td>
<td>X</td>
</tr>
</tbody>
</table>

**Final Four:**  
1. Take Care of What We Have  
2. Make the System Work Better  
3. Improve Safety  
4. Increase Capacity
<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>Online Signals Database</td>
<td>Approx. $51,200 annually in Region One, and annual user cost savings potentially greater than $250,000 for each Region</td>
<td>Coordinated preventative maintenance, performance measures, and signal deficiency correction</td>
<td>X X</td>
</tr>
<tr>
<td>Region Two</td>
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<tr>
<td>Signal System Interactive Inventory and Database</td>
<td>Approx. $75,000 annually in Region Two, and annual user cost savings potentially greater than $250,000 for each Region</td>
<td>Provides instant access to all information regarding our traffic signal assets while saving UDOT staff time and motorist travel time</td>
<td>X X</td>
</tr>
<tr>
<td>Workforce Services Road Maintenance Crew</td>
<td>$32,722 annually</td>
<td>Partnered with DWS and saved costs on roadside maintenance and activities while DWS taught job skills to refugees</td>
<td>X</td>
</tr>
<tr>
<td>Equipment Reductions and Efficiencies</td>
<td>Annual cost of reduced number of equipment, and fuel cost savings</td>
<td>Reduction of state owned equipment, reduced repair time, and implementing new technologies</td>
<td>X</td>
</tr>
<tr>
<td>Mountain View Corridor Frontage Roads</td>
<td>Reduced initial construction costs and preservation of interior right of way</td>
<td>Allowed initial project funds to stretch further and provide 5 more miles of roadway in the initial construction project</td>
<td>X</td>
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<tr>
<td>Region Three</td>
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</tr>
<tr>
<td>Thermoplastic Pavement Markings and Grooved in Paint Striping</td>
<td>$450,000 total projected savings in Region Three for thermoplastic markings after six years; $1,440,000 projected savings in Region Three for grooved-in paint striping annually after four years</td>
<td>Crews don’t have to re-fresh every year, thereby reducing travel, material, labor, and equipment cost</td>
<td>X</td>
</tr>
<tr>
<td>Bonded Wearing Course</td>
<td>Delayed reconstruction costs</td>
<td>Extend the life of the pavement and improve the driving surface</td>
<td>X</td>
</tr>
<tr>
<td>Chip Seal Program</td>
<td>Prolonged life of Level 2 roads</td>
<td>Roads are kept in better condition</td>
<td>X</td>
</tr>
<tr>
<td>Provo Canyon Bridge De-icer</td>
<td>Reduced expenses associated with snowplowing to clear the bridge of ice and snow</td>
<td>With the new system, we are more efficient in keeping the roads clear during a snow event.</td>
<td>X</td>
</tr>
<tr>
<td>Reducing State-Owned Equipment</td>
<td>Approximately $14,700 annually</td>
<td>Reduction of state owned equipment, more renting of equipment, and more sharing of equipment between sheds</td>
<td>X</td>
</tr>
<tr>
<td>Traffic Control Specification Development</td>
<td>Less driver delays in construction zones</td>
<td>Well coordinated and calculated traffic control in construction zones</td>
<td>X</td>
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<tr>
<td>Signals Interconnect in Heber</td>
<td>Reduced roadway user costs</td>
<td>Reduction in traffic delay at intersections</td>
<td>X</td>
</tr>
<tr>
<td>Efficient use of de-icing material</td>
<td>Reduced amount of salt used in snow removal operations</td>
<td>Streamlined all sander controls to have consistent salt patterns</td>
<td>X</td>
</tr>
<tr>
<td>Installation of Cable Barrier on I-15</td>
<td>Relatively low cost to improve roadway safety; savings over other methods</td>
<td>Reduced cross-over fatal crashes</td>
<td>X</td>
</tr>
<tr>
<td>US-89 and SR-147 Traffic Signal and Intersection Improvements</td>
<td>High benefit-cost ratio to reduce crash potential and crash severity</td>
<td>Reduced delay for through traffic on SR-147</td>
<td>X</td>
</tr>
<tr>
<td>SR-191 Guardrail Project</td>
<td>No monetary savings, but life safety was increased</td>
<td>Increased safety for overall travel on SR-191</td>
<td>X</td>
</tr>
<tr>
<td>Left Turn Lane on SR-121 at 750 North, Roosevelt</td>
<td>Approximately $125,000</td>
<td>Construction was done with state forces and equipment, and drivers on SR-121 can complete their routes quicker</td>
<td>X</td>
</tr>
<tr>
<td>SR-189; University Avenue Widening</td>
<td>Reduced roadway user costs</td>
<td>Reduced traffic delays</td>
<td>X</td>
</tr>
<tr>
<td>SR-77 Reconstruction</td>
<td>Reduced roadway user costs</td>
<td>Added additional travel lanes, new bridges and freeway interchange</td>
<td>X</td>
</tr>
<tr>
<td>SR-198, Spanish Fork Main Street Widening</td>
<td>Reduced roadway user costs and improved safety</td>
<td>Added center turn lane, widened shoulders, new bridge and traffic signals</td>
<td>X</td>
</tr>
<tr>
<td>Redwood Road Widening – Bangerter Highway to 400 South Saratoga Springs</td>
<td>Reduced roadway user costs and improved safety</td>
<td>Added additional travel lanes, widened shoulders and bike lane</td>
<td>X</td>
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<tr>
<td>Region Four</td>
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<tr>
<td>Equipment Reduction</td>
<td>$59,000 in fixed costs alone for FY-10</td>
<td>Equipment reduction and cost savings</td>
<td>X</td>
</tr>
<tr>
<td>Ultra-sonic Sieve Cleaner</td>
<td>$4,268 in FY-10</td>
<td>Improved lab equipment maintenance and cost savings</td>
<td>X</td>
</tr>
<tr>
<td>Reseeding with Wildflower Combination</td>
<td>Overall attitude of the general driving public</td>
<td>Aesthetic experience to the traveler</td>
<td>X</td>
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<tr>
<td>Project Development</td>
<td></td>
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<tr>
<td>Materials Database Development and Implementation</td>
<td>Approx. $64,000 annually to the Department</td>
<td>Central location for all test results in standardized format with easy access; reduced time to reconcile data discrepancies</td>
<td>X</td>
</tr>
<tr>
<td>Electronic Certified Payroll Program</td>
<td>Reduced time required for project personnel to verify payroll compliance</td>
<td>Better delivery of capacity, project maintenance and preservation projects</td>
<td>X X</td>
</tr>
<tr>
<td>UDOT Executive Dashboard</td>
<td>Potential time and cost savings</td>
<td>Streamlined conducting of project delivery meetings</td>
<td>X</td>
</tr>
<tr>
<td>Project Budget Recovery and Other Efficiencies</td>
<td>Potential for additional federal funds and freed-up project funds at award and closeout</td>
<td>Aggressive delivery of projects and minimizing impacts of federal requirements</td>
<td>X</td>
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<tr>
<td>Systems Planning &amp; Programming</td>
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<tr>
<td>Short-term Traffic Counting on Interstates</td>
<td>Reduced crew trips for short-term counts and increased safety</td>
<td>Traffic counting technicians are safer and more efficient in performing Interstate short-term counts</td>
<td>X</td>
</tr>
<tr>
<td>Pavement Management Improvements</td>
<td>Time savings leading up to pavement condition modeling and project forecasting</td>
<td>Prompt and more complete collection of pavement condition data</td>
<td>X</td>
</tr>
<tr>
<td>Pavement Condition Improvement</td>
<td>Potential for reduced accidents</td>
<td>Well defined target locations for improving skid condition</td>
<td>X</td>
</tr>
<tr>
<td>Statewide Travel Demand Model</td>
<td>Potential time and cost savings in allocating capacity project funds</td>
<td>Earlier decision-making for capacity projects</td>
<td>X X X</td>
</tr>
<tr>
<td>Geographic Information System (GIS) for Planning</td>
<td>Reduced staff time required for researching databases</td>
<td>Improved ability to address planning-phase issues at a system level</td>
<td>X X X</td>
</tr>
<tr>
<td>Additional $12.8 Million in Federal Obligation Authority</td>
<td>Utah took advantage of additional $12.8 million just prior to September 30, 2010</td>
<td>100% obligation was achieved and additional construction projects were advertised with existing staff and minimal overtime</td>
<td>X</td>
</tr>
<tr>
<td>ARRA Update</td>
<td>Delayed reconstruction costs</td>
<td>Extend the life of pavements and bridges; support the Utah economy through jobs</td>
<td></td>
</tr>
<tr>
<td>Offsetting Reduced Funding for Projects</td>
<td>No delay in funding planned projects</td>
<td>Reduced the funding impact of $113 million in reduced funding without delaying planned projects</td>
<td>X X</td>
</tr>
<tr>
<td>Program Finance Team, Shared E-mail Address</td>
<td>Staff time savings from better work distribution</td>
<td>Work is more evenly distributed to available team members</td>
<td>X</td>
</tr>
<tr>
<td>Public Transit Team Online Application/Reporting/Database System</td>
<td>Time savings to customers from simplified process</td>
<td>Automatic application and reporting processes</td>
<td>X</td>
</tr>
<tr>
<td>Two-year Transportation Enhancement Program Submitted for Commission Approval</td>
<td>More time for evaluating projects prior to commission presentation</td>
<td>Better committee work and evaluation of project applications</td>
<td>X</td>
</tr>
<tr>
<td>Re-structuring of Research</td>
<td>Savings to the Department through sharing of staff, and approximately $3,000 saved annually through in-house report printing</td>
<td>Working smarter through staff re-assignment and use of consultants</td>
<td>X</td>
</tr>
<tr>
<td>Measuring the Benefits of Research</td>
<td>Estimated benefits of $80.8 million to the Department and the public from three years of completed studies</td>
<td>Potential for reduction in project costs, accidents, and impacts to the environment and the traveling public</td>
<td>X X</td>
</tr>
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<tr>
<td>Transportation Web-based</td>
<td>Reduced travel time and training costs for Department personnel</td>
<td>Accessibility to online training for competency and savings through implementation</td>
<td>X</td>
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<tr>
<td>Seminars</td>
<td></td>
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<tr>
<td>Digitizing As-built Construction Plans</td>
<td>Reduced time finding and disseminating as-built drawing information</td>
<td>Electronic accessibility to scanned as-built plans for re-use by designers</td>
<td>X</td>
</tr>
<tr>
<td>Operations</td>
<td></td>
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</tr>
<tr>
<td>Based Aircraft Database</td>
<td>No savings; expect increase in revenue from aircraft registration fees</td>
<td>Web-based data collection system corrects deficiencies and helps airport managers submit information to the Division of Aeronautics, and the Utah Tax Commission to mail registration notices to aircraft owners</td>
<td>X</td>
</tr>
<tr>
<td>Operations</td>
<td></td>
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</tr>
<tr>
<td>Airport ARRA “Stimulus Funds”</td>
<td>No State or local funds were required to match the federal funds</td>
<td>The State of Utah has spent 95% of the $16.1 million ARRA funds issued for airport improvement projects in Utah</td>
<td>X X</td>
</tr>
<tr>
<td>Upgrade Engines on the King</td>
<td>Financial and environmental savings from 10–12% reduction in fuel burn</td>
<td>New engines are more efficient, produce more power, improve safety margin, and burn less fuel</td>
<td>X</td>
</tr>
<tr>
<td>Air C90 Aircraft</td>
<td></td>
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<tr>
<td>Equipment Fuel Efficiency</td>
<td>Reduced fuel costs</td>
<td>Purchased additional CNG and hybrid vehicles, Department reduced fuel usage by 32,011 gallons and increased alternate fuel usage by 326,273 gallons, and downsized some vehicles</td>
<td>X X</td>
</tr>
<tr>
<td>Equipment Lease and Buy-Back</td>
<td>Reduced upfront vehicle costs and down time</td>
<td>Continued the lease and the buy-back program to save mechanic time and also down time on backhoes, loaders, and tractors</td>
<td>X</td>
</tr>
<tr>
<td>Tow Plow and Muni-body Technologies</td>
<td>Fewer plow trips needed</td>
<td>Purchased 4 tow plows and 4 municipal bodies to go with them</td>
<td>X</td>
</tr>
<tr>
<td>Reduction of Permanent</td>
<td>Future cost savings of $78,300</td>
<td>Reduced Department’s permanent heavy equipment fleet by 40 vehicles</td>
<td>X</td>
</tr>
<tr>
<td>Heavy Equipment</td>
<td></td>
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<tr>
<td>Radio Conversions</td>
<td>Retain current FCC radio licenses</td>
<td>Changing out all of the 150 MHz radios to comply with the new FCC mandate of narrow banding</td>
<td>X</td>
</tr>
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<tr>
<td>Hot Shot Road Work Crew</td>
<td>Work hours added without adding labor cost, and more roadside maintenance tasks are completed without increasing costs; $32,700 annual savings for Region Two</td>
<td>Partnered with DWS for new worker skill development and performing highway maintenance work instead of deferring the work</td>
<td>X</td>
</tr>
<tr>
<td>Flexible-base Delineators</td>
<td>Approx. $75 annually per delineator; saves time and materials required to repair or replace the rigid metal posts</td>
<td>More durable delineator posts while promoting roadway safety</td>
<td>X</td>
</tr>
<tr>
<td>Grooved Waterborne Pavement Markings</td>
<td>$148,500 in total projected cost savings over 12 years on a 9-mile section of I-80 for grooved waterborne vs. normal waterborne paint striping</td>
<td>Grooved waterborne paint and messages are lasting as long as more expensive markings and longer than normal waterborne paint application.</td>
<td>X</td>
</tr>
<tr>
<td>Creating Work Orders from a Work Plan in OMS</td>
<td>Time reduced by nearly half to schedule and report work activity</td>
<td>Enables supervisors to develop schedules based on a detailed work plan and quickly report work activities in OMS</td>
<td>X</td>
</tr>
<tr>
<td>Commercial Motor Vehicle Crash Fatality Rate Reduction</td>
<td>Utah received $106,795 in federal incentive funding as a result of its overall CMV fatal accident rate</td>
<td>Federal funding offsets state dollars and helps develop additional CMV safety initiatives</td>
<td>X</td>
</tr>
<tr>
<td>Driver Focused Level III Commercial Motor Vehicle Inspection</td>
<td>Utah received $106,795 in federal incentive funding as a result of its overall CMV fatal accident rate</td>
<td>Increasing Driver Focused Level III commercial vehicle safety inspections has shown a direct correlation on the reduction of CMV related truck and bus crashes</td>
<td>X</td>
</tr>
<tr>
<td>“Truck Smart” and “Drive to Stay Alive” Public Outreach and Education Campaign</td>
<td>Reduction of CMV crashes and lives saved along Utah’s highways</td>
<td>Contributed to an overall reduction of CMV crashes along six high crash corridors identified in the 2002 – 2004 Single Vehicle Crash Study</td>
<td>X</td>
</tr>
<tr>
<td>New UDOT Procurement Process</td>
<td>Reduced time for procuring contracts and purchase orders</td>
<td>All Title 72 procurements are handled through UDOT Procurement</td>
<td>X X</td>
</tr>
<tr>
<td>Purchase of a Used Mobile Retro-Reflectometer and Van and Two Snow Blowers</td>
<td>Approx. $600,000 saved from purchase of used equipment versus new</td>
<td>Department closed on great deals on a used mobile retro-reflectometer and van and two used snow blowers</td>
<td>X</td>
</tr>
<tr>
<td>Procurement Re-Structuring, Awards, and Certifications</td>
<td>Doing more with less</td>
<td>Reduced staff and improved competency of staff</td>
<td>X</td>
</tr>
<tr>
<td>Safe Routes to School</td>
<td>Reduced pedestrian fatalities</td>
<td>Reduced pedestrian fatalities by 37.5% from previous year</td>
<td>X</td>
</tr>
<tr>
<td>Highway Safety Improvement Program</td>
<td>Reduced traffic fatalities</td>
<td>Reduced traffic fatalities by 11.6% from previous year</td>
<td>X</td>
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<tr>
<td>Integrated UDOT/Provo/Orem Traffic Signal System</td>
<td>Reduced travel times for the public by nearly fifty percent during large events; annual user cost savings for the taxpayer estimated at $8,000,000, and annual cost savings to UDOT estimated at $600,000</td>
<td>Creation of a joint traffic signal management system accessible to agencies</td>
<td>X</td>
</tr>
<tr>
<td>Region Four Traffic Management System Implementation</td>
<td>Reduced traffic and accident potential during winter storms</td>
<td>Better monitoring and managing of traffic</td>
<td>X X</td>
</tr>
<tr>
<td>Conversion to Digital Video</td>
<td>No additional equipment cost to provide traffic video to Region Two and Headquarters</td>
<td>Simpler video switching and less computing power required</td>
<td>X</td>
</tr>
<tr>
<td>Traffic Analysis to Support Price-Plus-Time Bidding</td>
<td>Approx. $5.7 million reduced user costs over one year, with approx. $2 million spent by the Department on engineering and incentives</td>
<td>Improved work zone design and construction phasing</td>
<td>X</td>
</tr>
<tr>
<td>Traffic Video to Utah County 911 Centers</td>
<td>Potential for reduced time to dispatch emergency responders to highway incidents</td>
<td>Enabled 911 dispatchers to view traffic incidents on I-15 and quickly dispatch responders</td>
<td>X X</td>
</tr>
<tr>
<td>Fiber Optics Partnership Agreements</td>
<td>Millions of dollars annually in reduced infrastructure costs</td>
<td>Telecommunication providers and UDOT exchange conduit space or ROW occupancy for fiber-optic services for traffic management</td>
<td>X</td>
</tr>
<tr>
<td>Camera Lowering System</td>
<td>Reduced time and equipment for camera maintenance and improved safety</td>
<td>Traffic camera can be lowered and maintained without closing a freeway lane</td>
<td>X X</td>
</tr>
<tr>
<td>Re-useable Screw-in Pole Base Foundation</td>
<td>Reduced time and expense for installing pole foundations</td>
<td>New pole foundations can be quickly installed using Department vehicles</td>
<td>X X</td>
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<tr>
<td>Internal Audit</td>
<td></td>
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</tr>
<tr>
<td>Benefits of Internal Audits</td>
<td>Potential for savings to the Department through better business practices</td>
<td>Positive tone set for internal reviews, and over billing identified in external reviews</td>
<td>X</td>
</tr>
</tbody>
</table>