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A Performance Audit of UDOT Project Costs

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Table of Contents

Digest of A Performance Audit of the Utah Department of Transportation (UDOT)

Chapter I: Introduction

The Utah Department of Transportation's (UDOT) main focus is on building high quality roads that can carry heavy loads and last a long time. In contrast, local government entities tend to be more concerned about reducing the initial cost of construction than on the long-term durability of the road surface. The cost difference between these two strategies has become apparent as local entities have assumed responsibility for some UDOT projects and have built the roads at a lower cost than UDOT had projected.

On at least two occasions, local entities have built UDOT projects at a lower cost than UDOT had planned to spend on the same projects. The two projects are Antelope Drive in Layton and Adams Avenue Parkway in Weber County. In our review, we found that the roads were not built to UDOT standards and that some of the costs of construction were not reported. Both projects failed to report several hundred thousand dollars of in-house administrative costs and paid significantly less to acquire right-of-way access. In addition, the quality of materials and design standards for the local roads was less than what UDOT would allow. After accounting for these differences, the cost to the local entities was much closer to the initial UDOT estimates for the project. However, that being said, we did identify a few areas in which local entities can have lower costs than UDOT.

We used three methods to compare UDOT's road construction costs:

- Comparing UDOT overhead costs and standards to those of 35 surveyed Utah cities and counties,
- A detailed review of three state road projects and three comparable local projects, and
- Discussions with individuals in the construction industry.

Chapter II: UDOT's Material And Labor Costs Are Not High

UDOT's Road Construction Costs Are Relatively Low. Compared to both local government entities within Utah and other western states' departments of transportation, UDOT's costs for

construction are low. We found UDOT asphalt costs are reasonable compared to local asphalt costs. In fact, historically, UDOT's asphalt costs are even lower than other states' costs. We also found that UDOT pays less for other construction materials, including concrete, and, historically, structural steel.

Design Engineering Costs Do Not Seem to Be Greater For UDOT. We also looked at other costs of construction, including engineering wages and overhead rates on engineering services. We were unable to find evidence suggesting that UDOT projects are charged more for engineering wages than city projects. In five out of seven projects we reviewed, UDOT was charged wages either less than or within the same range of the city projects. In addition, a national salary survey suggests hourly wages paid by UDOT are below or in line with market. Also, it appears that engineer overhead rates have increased by 14 percent since 2000. Overhead rates are a component of a project's engineering contract.

Chapter III: UDOT Pays More To Build Better Quality Roads

UDOT Emphasizes Quality While Locals Focus on Cost. UDOT's philosophy of "good roads cost less" is a belief that building high-quality, durable roads, and regularly maintaining those roads, will provide longer-lasting, less expensive roads in the long run. First, UDOT uses higher-cost performance-grade asphalt and project specifications. We also found that local entities perform less materials testing than UDOT. We spoke with several experts who agree that UDOT's emphasis on quality is worth that added initial expense for roads that last up to 50 years.

Three Local Projects Demonstrate Tradeoff of Quality Versus Cost. First, Adams Avenue Parkway, which was designed to minimize the cost of construction, was completed at a lower cost than UDOT would have spent on the project, but excluded many design features UDOT would have required. Second, Antelope Drive in Layton was rebuilt in 1996, using lower-cost materials and recycled asphalt and road base. Third, a failed bridge structure built in Clearfield serves as a good example of a local entity going too far to minimize the cost of a project and demonstrates why proper design and testing are necessary.

UDOT Must Monitor Success of Its Road Construction Strategy. We believe that the "good roads cost less" philosophy is a viable strategy for building durable roads at a reasonable cost. Although

local entities' roads may be built at a lower initial cost, they will not likely last as long as UDOT roads.

Recommendations

1. We recommend that UDOT continue to monitor the performance of its road construction and search for better construction materials and methods of extending the life of its roads.

2. We recommend that Utah's local government entities use superior paving products such as performance based asphalt and adopt an asset management strategy similar to that used by UDOT.

Chapter IV: Local Entities Can Avoid Some of UDOT's Construction Costs

Cities Can Acquire Right of Way at a Lower Cost. Cities and towns are often able to acquire right of way land at little or no cost because Utah statute authorizes cities and towns to exact land, or require developers to dedicate land for a new right-of-way as a condition to a development request. This authorization allows cities to negotiate with local landholders for property in exchange for improvements made along the right-of-way. In contrast, UDOT has a formal process for acquiring right of way that does not allow the level of landowner negotiation granted cities.

Local Entities Can Have Lower Overhead Costs Than UDOT. Local entities can often avoid some of the administrative expenses associated with UDOT projects. UDOT relies on a highly structured, procedure-driven process to guide the construction and maintenance of state roads. In contrast, local entities do not have many construction projects and large engineering departments that rely on a long list of rules and procedures. Instead, the local entities rely more on the professionalism of their staff engineers and contractors to provide quality work. Much of UDOT's bureaucratic process can be attributed to the need to implement federal regulations that must be followed whenever federal funds are used on a road construction project. Much of UDOT's administrative costs could be reduced if state-funded projects were separated from federally funded projects.

Recommendations

1. We recommend that UDOT explore ways to avoid the cost of administering federal regulations by segregating, as much as possible, its state projects from its federally funded projects.

2. We recommend that UDOT develop a policy of allowing local entities to exchange federal funds they receive for state funds at a discounted rate.

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Chapter I
Introduction

The Utah Department of Transportation (UDOT) and local government entities generally build different types of roads because they place different demands on their roadways. UDOT's philosophy is to make high quality roads that can carry heavy loads and last a long time. Local entities tend to face lighter traffic volumes and have limited funds to put toward road construction projects. As a result, local entities tend to be more concerned with minimizing the initial cost of road construction than the durability of the road surface. The two divergent philosophies toward road construction have been more pronounced as local entities have assumed responsibility for some UDOT projects and built the roads at a lower cost than UDOT had projected.

Some Claimed that Local Entities Can Complete Local Road Projects More Efficiently than UDOT

On at least two occasions, local entities have built UDOT projects at a lower cost than UDOT had planned to spend on the same projects. Some have suggested that these and other similar projects show that local entities are more efficient at completing road projects than UDOT. The two projects are Antelope Drive in Layton and Adams Avenue Parkway in Weber County. After investigating each project, we found that the roads were not built to UDOT standards and that some of the costs of construction were not reported. While UDOT cost estimates appear appropriate, there are areas in which local entities can have lower costs than UDOT.

In some cases, if local entities had reported all actual project costs, they would have been more in line with UDOT estimates.

Layton City Rebuilt Antelope Drive for $700,000 Less than UDOT Projected. In 1996, UDOT had planned to spend between $3 and $3.6 million to rebuild Antelope Drive in Layton City. When UDOT decided to postpone the rebuilding of the road for several years, Layton City asked UDOT if they could assume responsibility for the project. UDOT agreed to give Layton City $3 million and ownership of the road if they would rebuild the road as a city road project. Layton City completed the project for $2.3 million and used the remaining $700,000 for other city road projects.

Adams Avenue Was Built for at least $3.5 Millions Less than UDOT's Estimate. For many years during the 1990s, UDOT had been asked by elected officials in Weber County to extend Adams Avenue in Washington Terrace south to the I-84 interchange. UDOT engineers had estimated that the road would cost between $12 and $15 million. However, for several years the project never received approval because it was not ranked high enough on the Transportation Commission's list of priority road projects. In order to get the road built, a group of local elected officials and a private landholder asked the Legislature if they could build the Adams Avenue extension as a toll road. The Legislature supported the plan with a $2 million loan to the newly created Adams Avenue Parkway Inc. which then built the road for only $8.5 million—a full $3.5 million less than UDOT's projection.

Unaccounted for administrative costs, the acquisition of right of ways at reduced costs, and inferior material and design standards reduced local project costs.

Local Entities Did Not Report All Costs and had Less Demanding Specifications. Some have suggested that the Antelope Drive and Adams Avenue projects demonstrate the ability of local entities to build roads at a lower cost than UDOT. However, after thoroughly examining both projects, we found several explanations why these local entities were able to spend so much less than the amounts that UDOT had planned to spend. First, the two entities did not report all of the costs of construction. The costs for both projects did not include what likely amounted to several hundred thousand dollars of in-house administration costs. In both cases, the local entities were able to acquire the right of way at a much lower cost than UDOT would have had to pay. Furthermore, the local entities did not use the same quality of materials and design standards that UDOT would have used for those roads. If all of the construction costs had been reported, and if the roads had been built to UDOT standards, we believe the local costs would be approximately the same as the UDOT estimated costs.

Local Entities Spend Less for Right of Way and Administration. On the other hand, our review of state and local road projects revealed that cities and counties do have certain cost advantages over UDOT. For example, cities can exact property from developers and use other methods to obtain the right of way that UDOT is not legally able to use. Furthermore, cities seem to be able to avoid much of the bureaucratic "red tape" that the federal government imposes on state and federal road projects. However, local entities typically do not build roads to the same specifications and standards used by UDOT. While local entities tend to focus on minimizing the initial cost of a road project, UDOT tends to

focus on building quality roads and on minimizing the cost over the 40-year life span of the road.

Scope and Methodology

Legislators asked that the audit focus on three areas: (1) a comparison of materials and manpower costs at the state and local levels, (2) a comparison of the construction standards and specifications used by state and local entities, and (3) a review of UDOT's administrative costs.

Three different methods were used to compare UDOT's road construction costs, administrative costs, and standards to those of local entities. First, a telephone survey was conducted of 35 city and county engineers and public works directors throughout the state. Entities were randomly selected from the list of cities and counties receiving Class B and C road funds. The selection was weighted according to the amount of B and C road funds paid to each entity.

Second, a detailed review was made of three state road construction projects and three comparable local projects. For each project, the plans and specifications were examined and compared to national standards, core samples were taken from the road and examined, and interviews were conducted with the engineers and project managers who oversaw each project.

Third, auditors spoke with many individuals in the construction industry. These included materials experts, representatives from the state's largest general contracting firms, university professors, and other state and local officials involved in local road projects. Each person was asked to compare their experiences working with the Utah Department of Transportation to their experiences working with local entities.

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Chapter II
UDOT's Material and Labor Costs Are Not High

The direct construction costs of the Utah Department of Transportation (UDOT) projects are in line with, if not slightly below, those of Utah's local governments and are generally less than those of other western states. There is also no evidence to suggest that UDOT pays more for the design and engineering of roads than do Utah's local governments; however, engineering overhead rates appear to be increasing. We were asked to analyze and compare state and local material costs and labor costs. In road surfacing project through, material and labor are billed as a single unit. Therefore, we conducted the analysis in terms of construction costs and design costs.

UDOT's Road Construction Costs Are Relatively Low

UDOT pays less for asphalt than local entities and other states' departments of transportation.

The costs incurred by UDOT for road construction are comparatively low. The costs of construction for UDOT are low when compared with both local government entities within Utah, as well as other western states' departments of transportation. When basic construction costs are compared head to head, UDOT incurs slightly less cost for asphalt than local governments and other states. Furthermore, UDOT's costs are historically more economical than other states' for concrete pavement, structural concrete, and structural steel. UDOT has paid somewhat more, though, for reinforcing steel.

Higher quality materials and construction standards increase UDOT project costs.

The construction contractors we spoke with, who frequently contract with UDOT, said that they do not bill UDOT differently than others governmental entities. One said that they "don't treat their clients differently." However, he added that each entity is unique because they have "unique [construction] standards." Because UDOT often demands higher quality materials and construction standards, and requires that those materials comply with a tighter set of specifications, UDOT may at times be paying more for better quality materials and installation. The following section describe UDOT material cost in roughly descending order of importance.

UDOT Asphalt Costs Are Reasonable

UDOT asphalt costs are competitive.

The costs incurred by UDOT for equivalent quality bituminous mix (asphalt) is generally the same or less than that incurred by local governments in Utah, and generally less than that incurred by other western states for the same product. However, the price of asphalt, in general, has increased in recent years, significantly outpacing inflation rates. This increase is largely due to the rising price of oil. Oil is a primary ingredient in the creation of asphalt. Bitumen is the black tar-like substance that is mixed with small rocks to create asphalt, or *bituminous mix*. The price per ton of asphalt has increased recently.

Local Asphalt Costs Are Equal to or Greater than UDOT's for Equivalent Materials. A variety of factors influence the price of asphalt. These include:

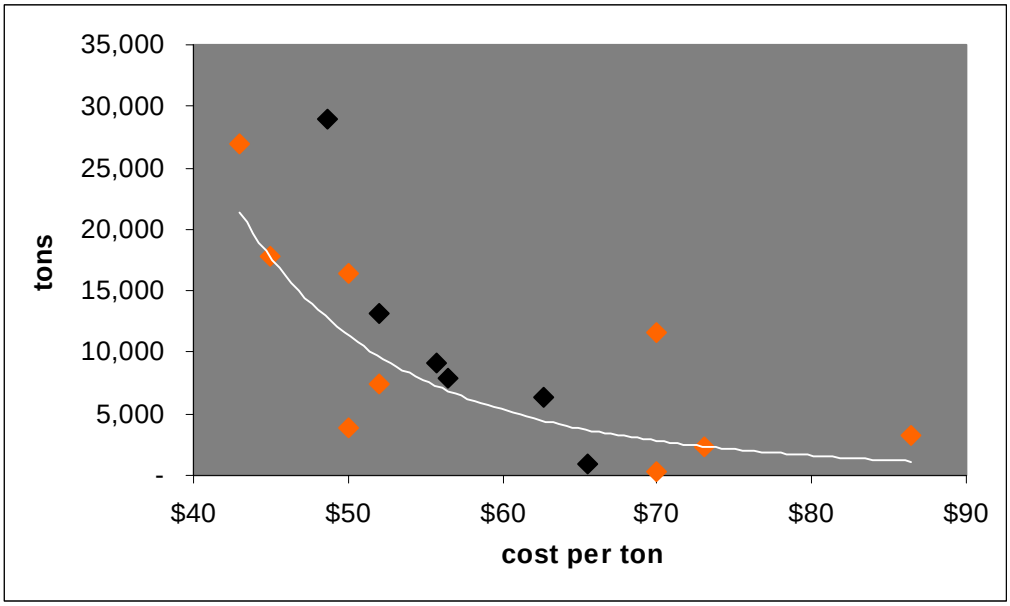
- Price of crude oil
- Time of year
- Location of project
- Quantity (# of tons)
- Quality of asphalt formulation

The cost of asphalt is affected by several factors: time of year, the quantity purchased and the quality or grade of oil specified.

Reviewing these factors and accounting for their variances shows that the difference between UDOT and local material costs is primarily due to choice in quality of material. Many local government entities use a lower quality asphalt than does UDOT, such as AC-10 or AC-20. UDOT uses *performance-grade* asphalt. UDOT roads and local roads are not made for the same traffic volumes or vehicle weights and are rarely comparable. When needs are similar, similar materials are used and cost can be compared.

We surveyed cities and counties throughout the state to determine the prices that they pay for asphalt. Some of these local entities do not use comparable asphalt or do not have a recent road construction project in a comparable period of time. Figure 2.1 illustrates the relative efficiency of UDOT asphalt costs. All of the projects analyzed are in the same time period, all using performance-grade asphalt. The figure demonstrates how quantity can affect the unit price. Generally speaking, both UDOT and local entities pay lower unit costs when they purchase larger quantities of asphalt.

Figure 2.1 Asphalt Costs Not Higher for UDOT than for Local Entities. ***(Orange = UDOT projects; Black = local projects)*** UDOT asphalt costs are not high compared to local road construction costs. (March - April 2006)

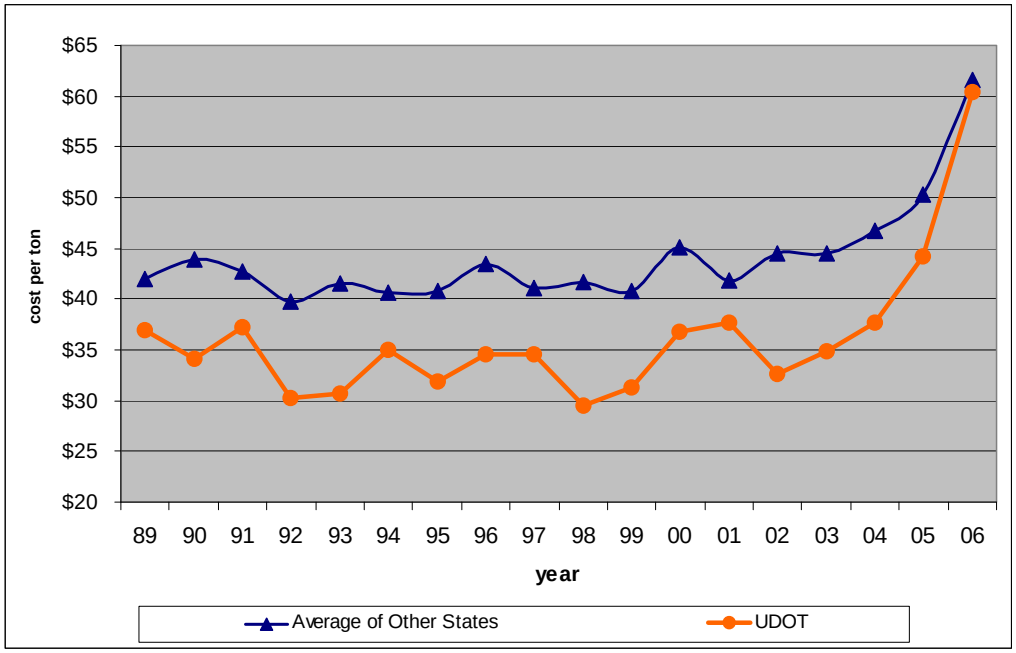


Five out of nine UDOT projects follow or fall below the cost trend for asphalt.

As the figure shows, five of the nine UDOT projects (white) are on or below the trendline. However, only one of the six local government projects, in the same time period, are on or below the trendline. The most significant high outlier is a UDOT project for $70 per ton, for 11,648 tons of asphalt. In this case the location of the project appears to have played a factor in the cost of asphalt since it was in Carbon County, which can affect transportation costs since it is further away.

UDOT Asphalt Costs Are Historically Lower than Other States' Costs. Since the late 1980s, UDOT's costs for asphalt have been lower than other states' costs. Even with asphalt prices significantly increasing over the last two years, UDOT asphalt costs have remained slightly lower than other states' during the same years. This is demonstrated in Figure 2.2.

Figure 2.2 UDOT Asphalt Costs Less Than Other States'. UDOT asphalt costs, per ton, are lower than other states' asphalt costs per ton, but growing faster, thereby closing the gap. (1989 -2006) *(Adjusted for inflation, base year 2006)*



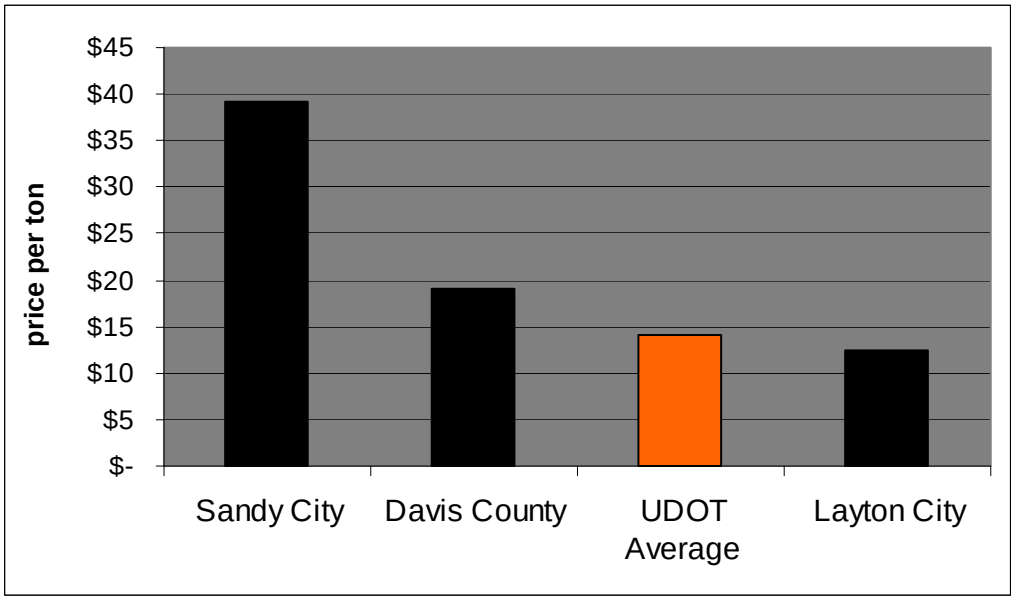
Note: Other states are California, Colorado, Oregon, Washington, Wyoming.

Historically, five states' average price for asphalt was 22 percent higher than UDOT's – now UDOT pays only about 2 percent below other states' costs.

Since 2004, the price of asphalt has generally increased, but it increased more for UDOT, thereby equalizing costs. Since 1989 the average price that UDOT has paid for each ton of asphalt is $36.09 (inflation adjusted). The average price for five other states over the same period is $44.05 per ton (inflation adjusted), 22 percent greater than UDOT's average. Currently, the price of asphalt for UDOT is $60.36, while the average for the other states is just slightly higher at $61.65; only about 2 percent greater.

Roadbase Prices Do Not Appear Higher for UDOT. Prices for roadbase are more difficult to analyze because the data is not as readily available. States' departments of transportation do not track a price index for roadbase as they do with asphalt and other materials. Therefore, the only comparison is with local government construction projects. So we compared the roadbase unit prices from construction projects of the surveyed local entities with those of specific UDOT projects. The following figure demonstrates the results.

Figure 2.3 UDOT Roadbase Prices Not High. This is the average UDOT price compared to specific project prices for local entities. (2006 prices)



Prices paid by UDOT for roadbase are reasonable.

The average price for roadbase that UDOT has paid in 2006 appears to be consistent with the prices paid by local government entities. Data regarding roadbase prices paid by local government entities is not as readily available because local governments do not utilize roadbase to the same extent as UDOT. Local government entities are more likely to reuse existing roadbase, or recycle previously used asphalt into roadbase. For these reasons, only a few data points from larger local entities could be used in the analysis.

UDOT Pays Less for Other Construction Materials

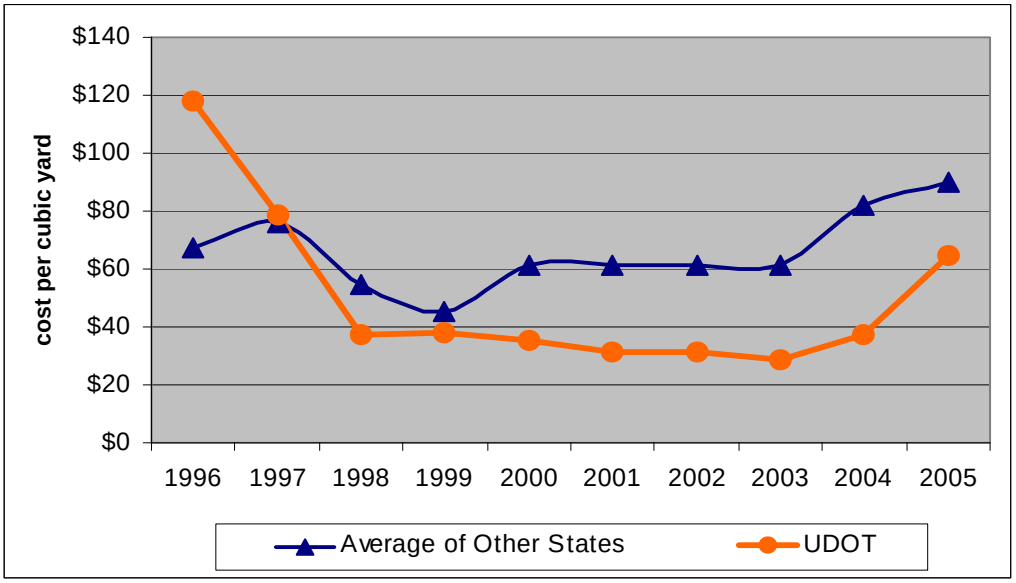
In general, UDOT pays less than other states for concrete and steel.

UDOT's other construction material costs are also less than those incurred by local entities and other states' respective departments of transportation. Because states generally have larger projects than local governments, more data from other states is available for comparison to UDOT material costs. As a result, we were able to conclude that UDOT generally incurs less cost than other states with respect to concrete and steel; and, that UDOT incurs less cost than local governments for concrete.

Concrete Is Less Expensive for UDOT. Concrete is generally less expensive for UDOT than other states' departments of transportation from whom data could be gathered. Concrete prices are divided into two categories: concrete pavement and structural concrete. Concrete pavement is the type of concrete that is used for surfacing. Higher quality, more costly concrete is used for support structures.

However, concrete pavement is used more by UDOT, such as on I-15, than by many local governments. Because of this, comparison with other states, rather than local governments in Utah, became necessary. As the following figure demonstrates, UDOT generally pays less for concrete pavement than do other states.

Figure 2.4 UDOT Pays Less for Concrete Pavement Than Other States. Though concrete pavement costs have risen since 2004, UDOT still pays less per cubic yard than other states. (1996 - 2005)
Inflation adjusted, base year 2006



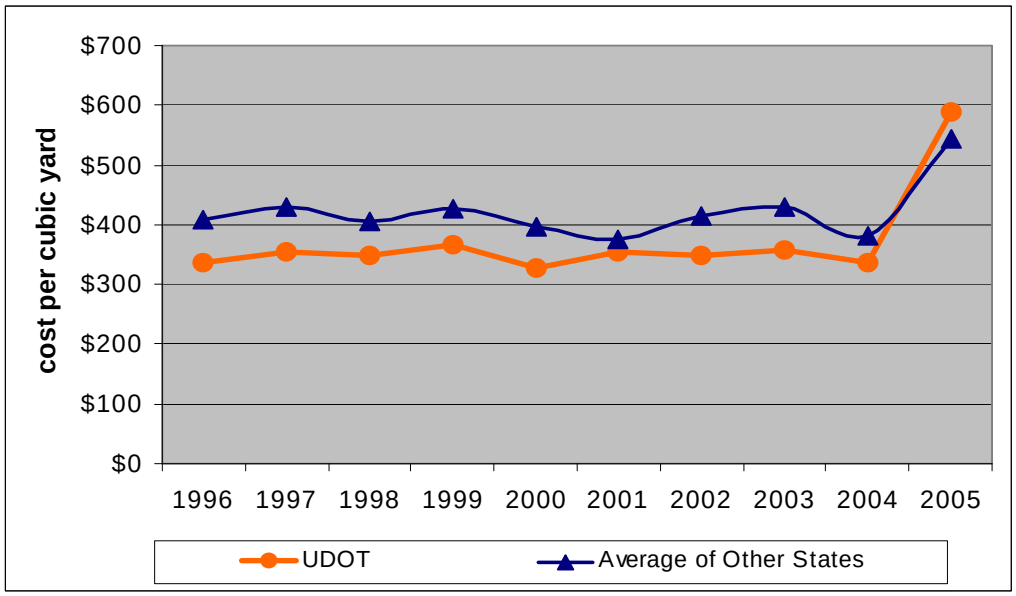
An increase in demand has caused concrete pavement prices to increase, but UDOT is still paying less than other states.

Note: Other states are California, Colorado, Oregon, South Dakota, Washington.

The price of concrete pavement for the other states, since 1996, averages $66.07 per cubic yard; the UDOT average is $50.06. The increase in prices for concrete pavement since 2004, for both UDOT and the other states, has been attributed to increased demand.

The price of structural concrete has also risen, as illustrated in Figure 2.5. UDOT has historically incurred less cost than other states for this type of concrete, but the cost has recently risen.

Figure 2.5 Structural Concrete Prices Increased. UDOT has paid slightly less for structural concrete than other states, but currently pays slightly more. (1996 - 2005)
Inflation adjusted, base year 2006



Note: Other states are California, Colorado, Oregon, Washington.

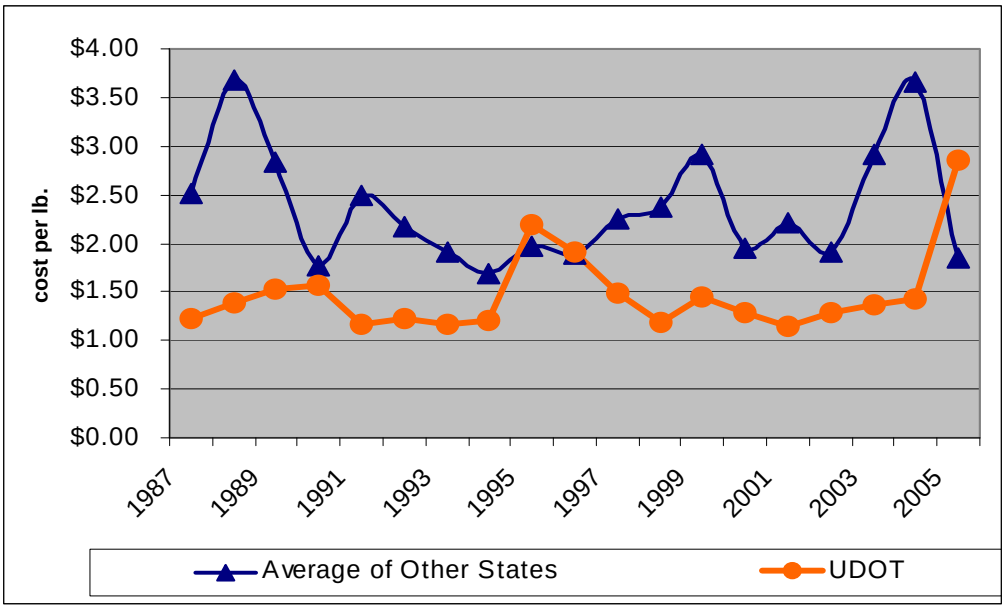
During the period shown on the above figure, UDOT's average cost per cubic yard for structural concrete was $371.89. The average cost for the other states during this same period was $420.65 per cubic yard. The recent increase in this material has also been attributed to the increased demand.

Currently UDOT is paying more for structural concrete than other states, but historically they've paid less.

UDOT Has Paid Less for Structural Steel and More for Reinforcing Steel. UDOT currently pays more per pound of steel than the average of the others states surveyed. It should be noted, though, that UDOT has historically paid less for structural steel than these other states but has paid more for reinforcing steel. Overall, UDOT has paid less for steel.

Structural steel costs more per pound than reinforcing steel because it is a higher quality steel that is used for a different purpose. As Figure 2.6 demonstrates, the price of structural steel has fluctuated, and UDOT has historically paid less than others for structural steel until 2005.

Figure 2.6 Structural Steel Prices Fluctuate. Though prices for structural steel seem to fluctuate more, UDOT has historically paid less than other states. Recently, however, UDOT's costs have increased. (1987 - 2005)
Inflation adjusted, base year 2006

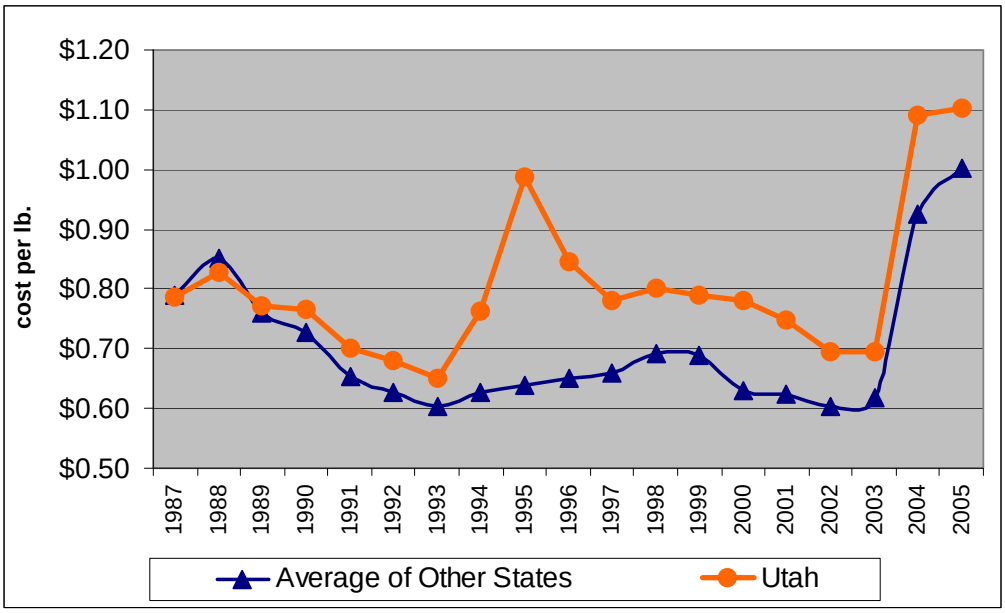


Note: Other states are California, Colorado, Oregon, Washington.

Furnished and installed reinforced steel costs UDOT more than other materials.

The average price of structural steel for the other states since 1987 is $2.37 per lb. The average price for UDOT during the same period is $1.48 per lb., 38 percent less than the average. Recently, steel prices for UDOT have increased above the average of the other states from whom cost data could be gathered. Reinforcing steel has cost UDOT comparatively more than the other materials, furnished and installed, as shown in Figure 2.7.

Figure 2.7 Reinforcing Steel Is More Expensive for UDOT. Though reinforcing steel prices are about half that of structural steel, UDOT has paid more for this than other states. (1987 - 2005) *Inflation adjusted, base year 2006*



Note: Other states include California, Colorado, Oregon, Washington

The other states' average cost per pound of reinforcing steel since 1987 is $0.70 per pound. UDOT's average cost per pound is $0.80 for the same period. And even as the average price of the other state's reinforcing steel increased to $1.00/lb., UDOT's average price also increased to $1.10/lb. This price increase has also been attributed to the increased demand for steel.

Road Design Costs Do Not Seem to Be Greater for UDOT

In addition to examining construction materials and labor costs, we also looked at some other costs that affect UDOT projects. First, we did not find evidence suggesting that UDOT projects are charged more for engineering wages than city projects. Also, it appears that engineer overhead rates are increasing.

Evidence Suggests UDOT Is Not Charged More for Engineering Wages

In over 70 percent of the projects we reviewed, UDOT was charged wages either less than or within the same range as the city projects.

Evidence we reviewed indicates that UDOT projects are not being charged more in engineer hourly rates than city projects. We surveyed seven engineering firms' 2005 wage rates provided for city road projects. We compared those rates to the rates those same firms charged UDOT for road projects during the same period of time. In our opinion, in five out of the seven projects, UDOT was charged wages either less than or within the same range as the city projects. Our review included six different types of positions, from principal and project manager to clerical staff.

For example, on one project the engineering firm charged rates below or within the same range as city project rates to a UDOT project by charging between $90.02 and $126.72 per hour for work attributable to project managers. This same firm charged a city project between $100 and $145 for project managers. Another firm we reviewed had UDOT project rates below or within the city's range for two of the three positions we examined. In this second firm, a quality assurance manager's rate for the city project was $90 per hour, whereas UDOT's rate for this position was $103.78. The rate charged to UDOT for this position was above the city rate.

A national salary survey shows that wages paid by UDOT to private engineering firms are not excessive.

Salary Survey Also Suggests Hourly Wages Paid by UDOT Are Below or in Line with Market. We reviewed a national salary survey by a private organization focused on providing management tools to design firms as well as other types of professional organizations and found that wages paid by UDOT to private firms for engineering work appears comparable. Figure 2.8 is a comparison of the average hourly wages charged for some engineering firm position salaries listed in the survey to private engineering firms in our survey for both UDOT and city projects.

Figure 2.8 Engineering Firm Salary Survey Averages Show Utah Engineering Contract Wages Are Not Out of Line. The average cost of outside engineering services, charged for both city and UDOT projects, do not appear to be above market. All the rates are per hour and include overhead and profit.

Title	National Survey Rates	Private Engineers - City Projects	Private Engineers - UDOT Projects
Principal	$153.50	$155.00	$128.50
Project Manager	115.00	117.50	108.37
Engineer Positions	96.50	92.50	92.03
Drafter	73.50	59.50	61.65
Clerical	51.00	40.00	33.36

In addition to reviewing engineering firm rates for both cities and UDOT, we reviewed a salary survey conducted by Utah's Department of Human Resource Management (DHRM). This survey shows that in 2005 UDOT's in-house engineer positions' pay range, on average, was more than 30 percent below market. A 2006 survey shows that UDOT's in-house engineer positions' pay range, on average, was more than 20 percent below market. Therefore, engineering wage rates paid to internal UDOT staff is below or within market and would not inflate project costs. According to DHRM, the survey was taken from a random sampling of 400 businesses and agencies in Utah, including private and public.

UDOT staff wages, being below or in-line with market, do not inflate project costs.

UDOT Projects Use More Contracted Hours. Although hourly rates may be similar, we do not know if contracted hours are comparable. We have observed that when the contract is negotiated, the project's hours, not hourly rates, are negotiated. Therefore, while the rates appear comparable, the project hours and ultimately project engineering costs may differ between UDOT and local projects.

Per project, federal regulations increase project time, in turn, increasing project hours and costs.

Three engineering firms told us that UDOT projects are more costly because they are more involved. Extensive federal regulations require extra steps, such as environmental studies, that increase project time and costs. UDOT also expressed frustration about federal requirements

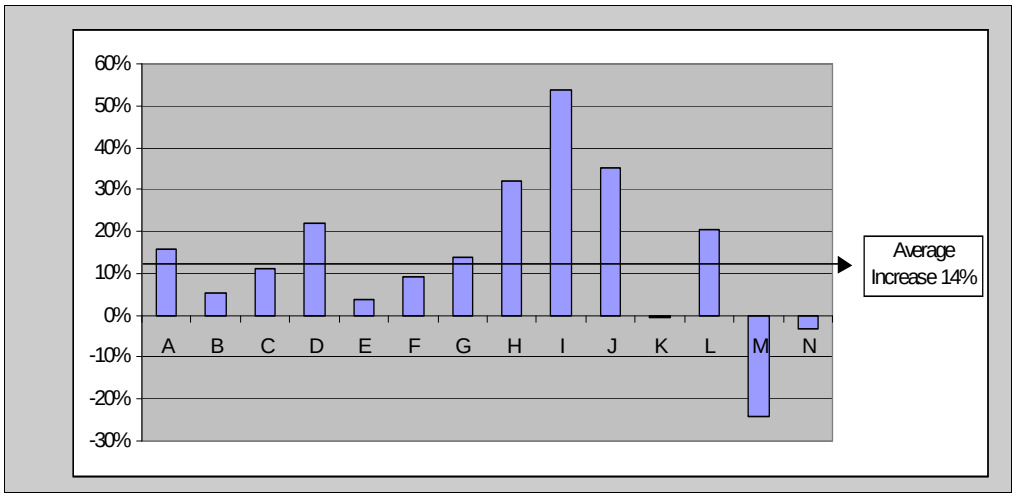
adding extra steps and time to projects. One firm believes that smaller firms do not submit proposals for UDOT projects because they do not have the staff to handle all of the extra paperwork required for federally supported UDOT projects. It appears that the extra steps necessary, when performing a UDOT contract, may increase the "man hours" allocated to the project to handle the additional processes.

Engineering Overhead Rates Appear to Be Increasing

On average, the overhead rate has increased 14 percent since 2000.

We also reviewed engineer overhead rates and found that they are increasing. Since 2000, the sampled average overhead rate increased by about 14 percent, as shown in Figure 2.9. A project's engineering contract is made up of direct labor costs, the engineer's overhead rate, profit margin, and direct costs (such as equipment and travel directly related to the project).

Figure 2.9 Overhead Rate Percentages Appear to Be Increasing since 2000. The fourteen engineer overhead rates we reviewed have increased by 14 percent from 2000 to 2006.



The overhead rate is a federally driven program for projects receiving federal funds which also applies to state-only funded projects. Overhead rate is a function of indirect expenses, benefits, and related costs, divided by direct labor costs. To get the overhead rate, UDOT first reviews the overhead rate the engineer submits. Then, UDOT recalculates the firm's rate, using the firm's allowable and unallowable expenses, as defined by

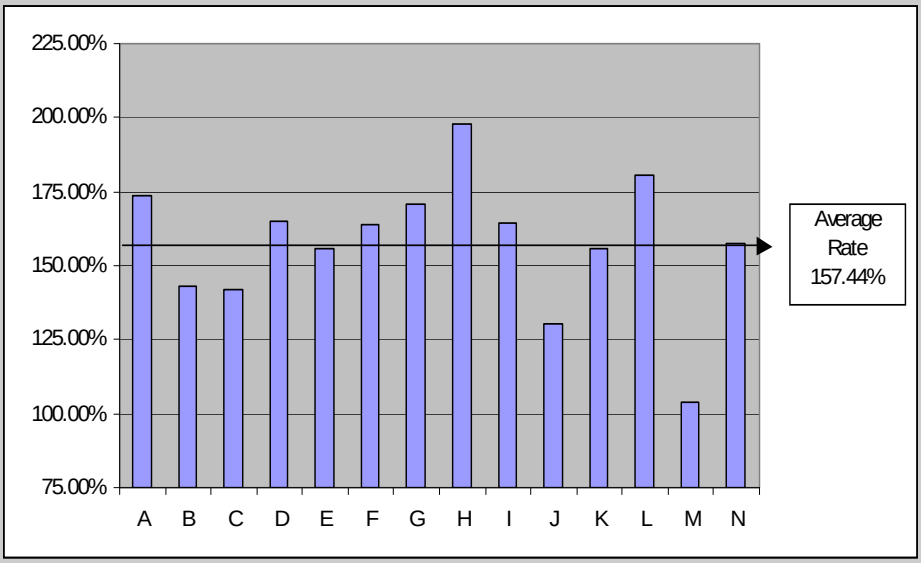
federal law. UDOT may amend the engineer's rate if they come up with a different calculation than the engineer originally submitted.

UDOT and Cities Appear to Pay Similar Contract Engineer Hourly Rates. Many of the cities we spoke to use in-house engineers. This is most likely a function of the smaller size of the city projects compared to UDOT projects. Therefore, we could not compare overhead rates charged on UDOT projects. However, when a city does hire an outside engineer, it pays an hourly rate that often covers salary, overhead, and profit. Some cities utilize a salary multiplier to account for the firm's overhead and profit. For example, one city submitted rate information to us showing the firm's billing rates, noting that staff not listed on the rate sheet will be billed out at a rate 2.9 times that of the direct labor cost. Another city told us they use a multiplier of 2.85. Using this methodology, we determined that UDOT's multiplier ranges from 2.26 to 3.15. Therefore, whether the multiplier or overhead rate is used, it appears that UDOT and the cities' total engineer cost, per hour, is similar.

UDOT's contracted overhead rate is comparable to that of city projects.

Average Overhead Rate Charged to UDOT Is 157.44 Percent. Figure 2.10, below, shows the average overhead rate for 2006 for all 14 engineers we looked at is 157.44 percent per hour billed. This means that, on average, 157.44 percent is multiplied by the result of the hours spent on a project times the employee's hourly rate. For example, if an engineer charges $45 per hour and works 50 hours on a project, the result would be $2,250. However, after applying the overhead rate of 157.44%, the actual cost of the engineer is $115.85 per hour, for a final cost of $5,792.40. This does not include direct costs and profit, which UDOT permits between 9 and 12 percent.

Figure 2.10 Overhead Rates for 2006 Average 157.44 Percent. The chart shows the overhead rate for 14 engineering firms for 2006.



Engineer	2006 Rate
A	173.88%
B	143.19
C	141.76
D	164.84
E	155.86
F	163.85
G	170.55
H	198.02
I	164.49
J	130.31
K	155.63
L	180.51
M	104.04
N	157.24
Average	**157.44%**

Overhead rate includes such allowable expenses as indirect labor, depreciation, insurance, taxes and licenses, office supplies and telephone, etc. Therefore, overhead rates differ depending on the engineering firm.

Chapter III
UDOT Pays More to Build Better Quality Roads

While some local entities may have been able to build roads at a lower initial cost than the Utah Department of Transportation (UDOT), they are not built to the same quality standards as UDOT roads. It is generally believed by the industry that UDOT's use of higher quality materials and design standards makes state roads safer and more durable than comparable local roads. In addition, UDOT follows an aggressive road maintenance program that helps state roads last longer than local roads built for the same conditions. When considering a road's 40- or 50-year life span, UDOT's investment in quality construction and its regular expenditures on road maintenance appear to be an effective strategy.

UDOT Emphasizes Quality While Locals Focus on Cost

"Good roads cost less" is a phrase often used by UDOT's managers to describe their philosophy of pavement management. UDOT believes that if it builds high-quality, durable roads, and regularly maintains those roads, they will last longer and, in the long run, cost less than roads built with lower-quality materials and which receive less maintenance.

UDOT builds high quality roads that are designed to last. Local roads are not expected to carry as heavy loads as UDOT roads.

In contrast, local governments focus more on lowering the cost of construction because they face a different set of challenges than does UDOT. Cities and counties have roads that carry lighter loads and do not need to be built to the same strength as state roads. In addition, local entities often face tight budgets which may force them to take a short term view towards expenditures on road construction. While some cities and counties have adopted the same philosophy as UDOT and build high quality roads that will last, most local entities choose to use less costly materials and sometimes make compromises in the construction methods and design choices in order to minimize the initial cost of construction.

UDOT's "good roads cost less" strategy appears to be more efficient when costs are considered in terms of the total life cycle of a road. However, UDOT's strategy has not been in place long enough to

determine whether its initial investment in high-quality roads will, in fact, cost less in the long run. We interviewed many experts in the road construction industry, including an engineer from a private materials lab, a university professor, officials from the Federal Highway Administration within Utah and from other states, a consultant in road construction engineering, and several representatives of the local construction contracting firms. Each of the experts that we spoke with agreed that UDOT's emphasis on quality is providing Utah residents with safe, durable roads, and they predict the strategy will cost less over the 40-year life cycle of a road.

Experts agree that UDOT's focus on quality provides Utah citizens with safe, durable, longer lasting roads.

UDOT Uses Higher Quality Materials and Project Specifications

UDOT follows a national trend and places most of its emphasis on building high quality, durable roads while local entities are more concerned about the initial cost of construction. Our findings are based on: (1) a detailed review of three state and three local road projects, (2) interviews with dozens of engineers from UDOT and from local cities and counties, and (3) interviews with industry representatives. Two examples of UDOT's focus on quality are its use of high-quality asphalt and its insistence that contractors build precisely to UDOT's specifications.

Most Cities Use Lower Cost Materials than UDOT. One example of UDOT's emphasis on building high-quality roads is its use of a performance-grade asphalt commonly called "Superpave." Performance-grade asphalt is a precise mixture of crushed rock, asphalt binders, and polymers. The formula gives the asphalt enough strength to resist rutting at higher temperatures but also enough flexibility to resist cracking under cold temperatures. Performance-grade asphalt costs more than traditional hot-mix asphalts commonly used by cities and counties. On average, it costs $7-15 more per ton, or approximately $16,000-34,000 more per lane mile.

UDOT uses performance-grade asphalt which is stronger and costs more than traditional asphalt.

In addition to costing more, performance-grade asphalt requires a higher level of skill and construction precision to properly apply the product to the roadway. The added cost and the difficulty of installing performance-grade asphalt has resulted in resistance from some local city engineers in using the product. We surveyed 35 randomly selected city and county public works departments to determine the type of asphalt they use and found:

Performance-grade asphalt requires more skill to properly apply.

Most local entities we spoke to use the traditional asphalt.

- 19 do not use performance-grade asphalt but instead use the traditional asphalt generically called Marshall Mix.

- 9 have not rebuilt a road for several years and could not provide a response.

- 7 used performance-grade asphalt in at least some circumstances, such as on roads with high traffic volumes.

Those using performance-grade asphalt were primarily the larger cities and counties in our survey: Orem City, Sandy City, West Valley City, Salt Lake County, and Utah County. However, two smaller entities also reported using performance-grade asphalt. These were Sunset City and Wayne County.

Analysis of Six Projects Reveals UDOT Pays More for Better Quality Asphalt. We also examined three local road projects and three UDOT road projects in some detail. These include Antelope Drive in Layton City, Adams Avenue in Weber County, and 1600 North in Orem City. They were compared to three similar UDOT projects: 9400 South in Sandy, 3200 West in West Valley City, and 700 North in Payson. We obtained the engineered drawings and specifications for each project so we could compare the quality of the materials used and the design. We also took core samples from each road and compared them to the specifications with the assistance of a materials expert from UDOT and an engineer from a private materials lab.

Three local entity projects we reviewed did not use performance-grade asphalt, nor would they have met UDOT specifications on asphalt depth.

We found that each of the UDOT roads were built with performance-grade asphalt and had the type of aggregate which is best for maintaining strength—larger rocks with the rough, cragged surface necessary to bind the pavement together. In addition, the depth of the asphalt layers either meet or exceed the depths required by UDOT specifications for the projects. In contrast, a Marshall Mix was used on each of the local road projects. The surfaces of both Antelope Drive and Adams Avenue are of a traditional Marshall Mix, and the asphalt depth, according to the experts, does not meet UDOT standards. Sections of the Antelope Drive asphalt are even less than project specifications, and Adams Avenue has an asphalt design that is much thinner than UDOT specifications allow. The experts who helped us examine the core samples suggested that the size and composition of the aggregate in the local asphalt roads are not the quality normally required for UDOT roads.

When we discussed with each local project engineer their reasons for not using performance-grade asphalt, they said that their prime concern is to minimize the initial cost of road construction. For example, the engineer for the Antelope Drive project indicated that he did not want to invest in the more expensive asphalt because the utility companies would most likely be installing new utilities to properties along Antelope Drive and would be making cuts in the road. His position is that, since the city would need to repave the road in a few years anyway, it is pointless to invest in high-quality materials. His focus is clearly on minimizing costs.

Though cost was the main consideration, other project concerns, compelled local projects to use a traditional asphalt mix.

Adams Avenue, another local road that we evaluated, was not built to the same specifications that UDOT would have required for a road at that location. We invited two materials experts to examine core samples from Adams Avenue and the specifications. They concluded that the road's design, with only two inches of Marshall Mix asphalt covered by a one-inch chip seal, is not appropriate for what UDOT sees as a major arterial road. They said that road depth would be more appropriate for a road in a residential neighborhood. On the other hand, Adams Avenue was never intended to handle the traffic volumes of a UDOT road. Adams Avenue was built as a toll road and, as a result, generates much lower volumes of traffic. Although UDOT planned to build a road at that location that would handle 18,000 vehicles per day, Adams Avenue carries only 2,000 to 3,000 vehicles per day and relatively few heavy trucks. As a result, our materials experts concluded that the design is probably adequate.

Although Orem City normally uses performance-grade asphalt for its larger road projects, the city's contractor had difficulty obtaining enough of the material for the 1600 North project. For this reason, the city allowed the contractor to install one three-inch layer of performance-grade asphalt and one three-inch layer of Marshall Mix asphalt. The two materials experts that was consulted with pointed out that UDOT might also allow the use of a Marshall Mix in a situation when better asphalt is in short supply. However, they also indicated that they would have required that the depth of the Marshall Mix be increased by one-half inch to one inch in order to compensate for its load-bearing weakness. This case further demonstrates UDOT's focus on quality. UDOT would require a contractor to compensate the agency for using a poorer performing material while the local entity would not.

Local Entities Perform Less Materials Testing than UDOT

UDOT's testing programs allow them to fine contractors that deliver asphalt below the required performance specifications.

The survey of 35 cities and counties also revealed that few local entities do as much as UDOT to control quality. UDOT has a fairly aggressive testing program to make sure that the quality of the materials used on a road project meet UDOT specifications. For example, they use a systematic method of collecting random samples of asphalt as it arrives at a project site. If an asphalt mix does not meet the specifications or is not properly compacted, UDOT contracts require that the contractor replace the product. Even when a product meets UDOT's minimum specifications, the department may still impose a financial penalty on the contractor if the asphalt tests below a certain performance threshold.

The quality control done by most local entities is not as thorough as that done by UDOT.

In contrast, our survey of 35 cities and counties in Utah revealed that many cities rely on the vendors to perform quality assurance on their own products. Except when they receive state or federal funding, few cities perform as much testing of materials as UDOT. A few local entities told us that they will test the compaction of the road base and asphalt. Others said they examine the density and gradation of the asphalt. However, most local engineers acknowledged that they do not perform the same range of tests on project materials as UDOT does.

In fact, some cities report that they rely on UDOT's quality control by purchasing materials from UDOT's suppliers. Several local entities told us that they assume that if they order asphalt or road base from the same vendors that supply state road projects, they will get the same quality of materials as does UDOT. This reliance may not be sufficient as UDOT's tests occasionally reveal that substandard product has been delivered to a project site. In at least eight projects during 2006 contractors were required to remove concrete asphalt and other materials because UDOT tests determined that they did not meet specifications.

Experts Agree that UDOT's Emphasis on Quality Is Worth the Added Initial Expense

Experts from a private materials laboratory and two state universities, agreed that UDOT's asphalt specifications and designs, while initially more expensive, are worth the added cost. If properly maintained, the materials experts told us, UDOT roads will last longer and avoid the rutting and cracking that is observed in roads built of traditional asphalt

mixes. A cost estimator for one of the region's largest construction contractors made an observation that was typical of many of the experts we interviewed. He said that he has done work for UDOT and for the surrounding states' Departments of Transportation and expressed the opinion that UDOT is "...one of the best in the inter-mountain region. UDOT is on top for quality. No question about it. They concentrate more on the life of the road." Other experts that we interviewed also indicated that UDOT's emphasis on quality is the best strategy for UDOT's needs and will minimize cost of construction in the long-run.

The construction of high quality roads and regular maintenance can extend the road's life to over 40 years.

UDOT's Construction and Maintenance Program Helps Roads Last Longer than Most Local Roads. UDOT's "good roads cost less" strategy has two components: (1) construction of a high quality road, and (2) regular maintenance to prevent deterioration. UDOT requires that its roads be built to exacting specifications. Road base materials are of sufficient depth and are adequately compacted in order to create a solid foundation. Performance-grade asphalt is used to minimize the amount of rutting and cracking. Then, periodically, perhaps every four years or so, a treatment is applied to prevent water penetration of the base which can lead to road deterioration.

Every 17 to 21 years, depending on the traffic volume, UDOT will mill down the road surface and apply a new structural, asphalt overlay. Regular maintenance will then continue for another 17 to 21 years until another structural overlay is applied. Experts said that UDOT's pavement strategy is sound. One stating that Utah "is leading the nation in pavement management." Another, a professor of civil engineering at the University of Utah, is beginning a formal study of the durability of UDOT's roads in general and the performance of UDOT's performance-grade asphalt specifically. His analysis should provide evidence as to whether UDOT's "good roads cost less" strategy has been successful.

An expert in road construction and maintenance from Utah State University says that many cities try to minimize the initial cost of construction and use less than optimal grades of asphalt. They then neglect to maintain the road until it begins to show signs of deterioration. He said they are "too busy filling potholes" to provide the kind of maintenance that is necessary to prevent deterioration. Eventually, the damage is too far progressed and the cities will typically place a two or three inch overlay on top of the damaged structure. In a matter of a few

years cracking in the foundation will reflect through the overlay and the city or county will need to rebuild the road.

Figure 3.1 compares the cost of building and maintaining a low-volume, arterial UDOT to a similar use local government road.

Figure 3.1 UDOT's Good Roads Policy Costs Less. Two hypothetical road building and maintenance strategies are compared. UDOT's strategy of building high-quality roads, combined with an aggressive maintenance program, costs less over the 50-year life span of a road than the reactive approach used by many local entities.

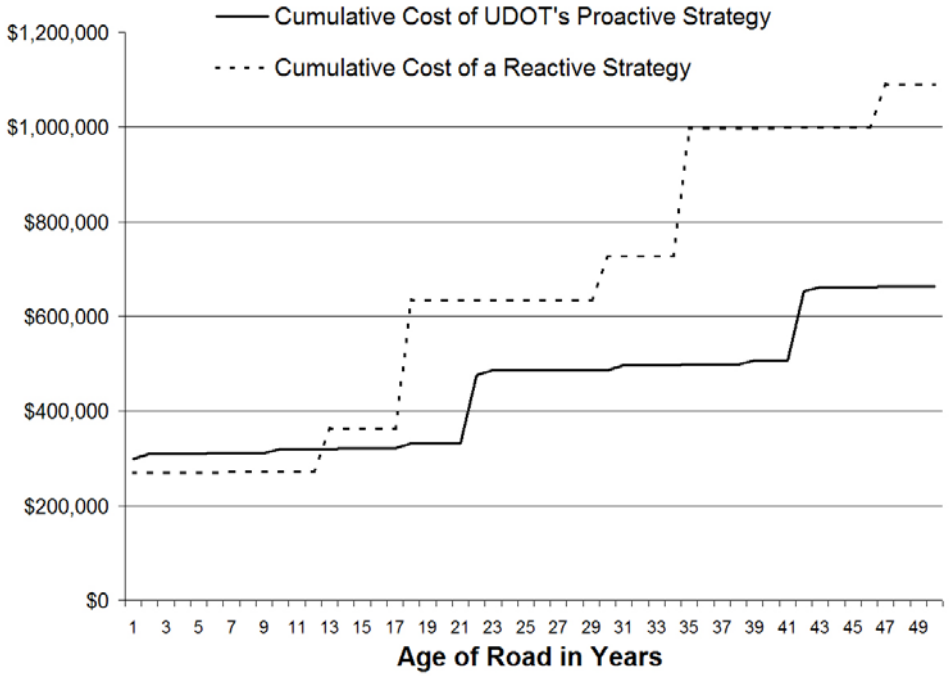


Figure 3.1 compares the cost of UDOT's pavement management strategy for asphalt roads with low-volume traffic to the approach used by most local government entities. The figure shows that UDOT's roads typically cost somewhat more to begin with because UDOT uses higher quality materials, such as performance-grade asphalt. UDOT then maintains its roads by applying a surface seal coat or a rejuvenation treatment every four years and a surface mill and new structural overlay every 17 to 20 years. UDOT projects its pavement management system should allow a road to last up to 50 years.

In contrast, local entities can save money up-front by using less durable and less costly asphalt mixes and implementing a reactive management strategy. A reactive management strategy means that road maintenance is only done when problems develop. When cracking occurs, most local entities apply a joint seal to the cracks to prevent further damage. Then after a few years, when the cracking becomes more severe, they may apply a three-inch structural overlay.

Many local entities have a reactive maintenance program, fixing the problem after it surfaces – this can cut the life span of a road in half.

However, once a road structure has been damaged, an overlay merely covers up the problems. Cracks beneath an overlay will reflect through to the road surface at a rate of about one year for every inch of asphalt surface coat. So if a 3-inch surface coat is applied, cracks in the road's foundation will surface in about three years. When the necessary steps to prevent the deterioration of the road structure are not taken, the roads need to be rebuilt every 15 to 20 years.

Locals Moving Toward Wider Use of Performance-Grade Asphalt. The standards followed by UDOT are becoming more widely accepted, and some local entities have begun to follow UDOT's pavement management strategy. For example, the group that develops the construction standards used by most cities in Utah has begun to promote the use of performance-grade asphalt. The latest standards issued by the Utah Chapter of the American Public Works Association specifies the use of performance-grade asphalts, such as Superpave, for heavily traveled roads. In addition, the Utah Technology Transfer Center at Utah State University is also working closely with local government engineers to improve their use of technology in road construction. The center supports and promotes the use of high-performing products such as performance-grade asphalt. As a result, many cities in Utah have adopted standards and road maintenance strategies that are similar to those used by UDOT.

The latest standards by the Utah Chapter of the American Public Works Association specifies the use of performance-grade asphalt for heavily traveled roads.

Three Local Projects Demonstrate Tradeoff of Quality Versus Cost

We identified three road projects that demonstrate the difference between UDOT's "good roads cost less" strategy and the emphasis that some local entities place on minimizing the initial cost of construction. First, the Adams Avenue Parkway was completed at a lower cost than UDOT would have spent on the project, but it also excluded many design

features that UDOT would have required. Second, Antelope Drive in Layton was rebuilt in 1996, and many strategies were used to minimize the cost of that project. Third, a failed bridge structure built in Clearfield is a good example of what can happen when local entities go too far in their efforts to minimize the cost of a project.

Adams Avenue Was Designed to Minimize the Cost of Construction

The Adams Avenue project demonstrates how an emphasis on cost containment can affect a roadway design. Adams Avenue Parkway has received attention because the road was built at a lower cost than UDOT planned to spend on the project. However, the toll road lacks many of the design features that UDOT normally requires for such roads. It appears that many decisions regarding the road design were made with the aim of minimizing the cost of the project. This case demonstrates how a focus on cost containment can produce a road structure that may lack the safety features and durability that UDOT builds into its roads. The stated cost savings are a reflection of eliminating these road features rather than increased construction efficiency.

Adams Avenue lacks many of the design features that UDOT usually requires, such as insufficient shoulder space on the bridge.

Minimal Shoulders Installed on the Road and Bridge. The Adams Avenue project includes a bridge over the Weber River that is wide enough to carry two lanes each direction and a center lane but did not include sufficient width to provide shoulders on the bridge as shown in Figure 3.2.

Figure 3.2 Bridge over Adams Avenue Lacks Shoulder for Emergency and Pedestrian Use. UDOT engineers indicated that their standards require that the bridge include enough width for a shoulder on each side of the road.

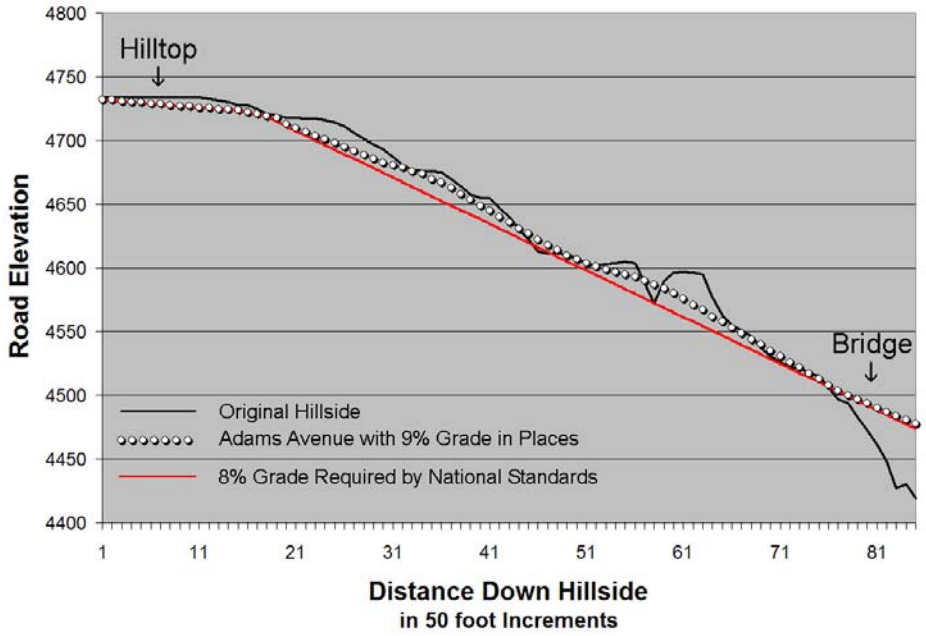
UDOT specifications require at least a six-foot shoulder on each side of a bridge to allow for stalled cars and pedestrian access. We calculated that adding six feet to each side of the bridge would have increased the cost of the project by $760,000.

Road Designed to Minimize Excavation Costs. With the assistance of UDOT engineers, we identified three things that would have increased the cost of excavating the hillside if UDOT had done the project. First, there are several places along the Adams Avenue Parkway where the road descends at a 9 percent grade. According to UDOT engineers who examined the engineered drawing for the road, UDOT would have allowed a slope of no greater than 8 percent and an even lower slope in some locations, such as in front of the bridge where icy conditions may exist. The 8 percent standard is required by the American Association of State Highway and Transportation Officials (AASHTO). UDOT's approach would have required a much longer, deeper cut into the hillside that would have increased the cost of the project.

On portions of Adams Avenue the slope exceeds AASHTO standards.

Figure 3.3 shows the difference between the hillside grade prior to construction and the grade of the road after it was built. A third line shows the straight line grade that is closer to the 8 percent grade that UDOT might have used if it had built the road.

Figure 3.3 Adams Avenue Should Not Have Had More than an 8 Percent Grade. According to national road construction standards, the downward slope of a mountainous road such as Adams Avenue, should have a slope of no greater than 8 percent.



To meet AASHTO standards, UDOT would have had to spend about $400,000 more to fix the original.

An 8 percent grade slope could have been achieved with some additional excavation. However, the road appears to have been designed to minimize the cost of excavation on the site. As a result, there are several points where the slope of the road is at a 9 percent grade, including the area just above the bridge. Figure 3.3 also shows a straight line descent from the edge of the hill to the bridge with no more than an 8 percent grade which is required by the AASHTO standards. UDOT estimates the additional cost to achieve an 8 percent grade would have been $400,000.

The original plans for the parkway also included sidewalks on each side of the road. During construction, the sidewalks were eliminated for a savings of $60,000. More importantly the elimination of the sidewalks allowed for a narrowing of the road width which, in turn, allowed for a

minimum amount of excavation into the hillside adjacent to the road. UDOT would have likely kept the sidewalks and eight-foot shoulders on the roadway as well. The result would have been a much greater width to the road which, in turn, would have required a deeper horizontal cut into the hillside.

UDOT engineers, who originally estimated the cost of the project, had serious concerns with the stability of the steep hillside above the road. There have been sliding problems in the vicinity, and UDOT anticipated having to excavate the hillside in order to prevent sliding. Although the builders of Adams Avenue installed a drainage system to minimize the water in the hillside and the risk of landslides, they did not excavate the hillside above the road. In order to stabilize the hillside and to provide additional road width for the shoulders, we determined that UDOT would have spent roughly $1.16 million in additional excavation costs that were not spent on the original construction of Adams Avenue.

UDOT excavation requirements would have cost an additional $1.85M.

UDOT Would Have Used a Different Pavement Design. The roadway for Adams Avenue includes four inches of asphalt plus a one-inch asphalt seal coat. That design, according to UDOT engineers and an outside expert in roadway design, is adequate for a road such as Adams Avenue that carries 2,000 to 3,000 vehicles a day. However, if the road had been built by UDOT without a toll, it was expected to carry about 18,000 vehicles per day. UDOT would have required a six-inch asphalt pavement made of a performance-grade asphalt and a sturdier grade of aggregate. Moreover, UDOT standards would have required eight-foot shoulders on the road, adding to the overall width of the pavement. Due to the added width, depth, and quality of asphalt we determined that UDOT would have spent roughly $510,000 more on the pavement.

Heavier use as a UDOT road would have required an additional $400,000 in pavement design.

Design Changes Explain Most of the Cost Difference. In summary, the design changes that UDOT would have made and the cost of excavating the hillside explain much of the difference between the $8.5 million spent privately to build Adams Avenue and UDOT's estimated $12.5 to $15 million. In addition, $1.26 million more could be added for the cost of acquiring the right of way. The right of way was not included in the cost of the project because the land was already owned by the family who built the road. On the other hand, UDOT would not have spent the $500,000 that was the estimated cost of the toll equipment and the administrative office. The following summarizes the differences

between the actual cost of building Adams Avenue Parkway Inc. and UDOT's cost estimate.

Figure 3.4 UDOT Would Have Incurred Additional Costs on the Adams Avenue Project. Cost of UDOT's design standards, the cost of excavating the hillside and the cost of right way explain the difference between UDOT's cost estimate for the Adams Avenue and the actual cost to build the road.

Actual Cost to Build Adams Avenue Parkway:	**$ 8,500,000**
Additional Costs UDOT Would Have Incurred or Avoided:	
Expanded Bridge Structure	760,000
Deeper Excavation of the Road	400,000
Wider Excavation into Hillside	1,160,000
Sidewalk	60,000
Additional Pavement Width and Depth	510,000
Acquisition of Right of Way	1,260,000
Construction of Tollbooth, Office Building	(500,000)
Total	**$12,150,000**

Once the cost of essential design features are added, the total cost of Adams Avenue is within UDOT's original estimate for the project.

By adjusting the actual cost of construction by the additional costs UDOT would have incurred, we estimate that UDOT's total cost of construction would have been at least $12.15 million. That figure is within UDOT's original prediction that the project would cost between $12 million and $15 million. The difference between UDOT's estimated cost and the actual cost of the project is largely explained by UDOT's more demanding standards for design and construction.

Layton City Cut Costs by Using Lower-Cost Materials and Recycled Asphalt and Road Base

Many city engineers we interviewed identified creative ways that they have found to minimize the cost of road construction. UDOT engineers, however, were reluctant to use some of the same cost-saving techniques because they make it difficult to maintain a high quality of construction.

A good example is Layton City's use of recycled material in the road base for its Antelope Drive project.

One of the reasons that Layton was able to minimize the cost of construction of Antelope Drive is that they allowed the contractor to use recycled asphalt and road base from the existing site in the construction of the new road. Asphalt from the existing road was ground up and used to create the asphalt for the new road surface. In addition, some asphalt and existing roadbase was reused to form the new road base. By using recycled materials in the road base, Layton City was able to avoid the cost of hauling the old road base material to another site and bring in new road base material.

Layton City's use of recycled materials is considered a questionable practice.

UDOT Engineers Are Mostly Concerned About Quality of Construction. Although UDOT allows up to 15 percent of recycled materials in their asphalt, the UDOT engineers and materials experts we interviewed expressed reluctance to use recycled material. Their primary concern is with the quality of construction and that the project meet UDOT's demanding specifications. They emphasize that the road base needs to achieve a certain level of compaction before it meets UDOT's specifications. However, it is difficult to gage the level of compaction if there is asphalt in the road base. In addition, before a road is dug up, it is difficult for UDOT contractors to be certain that the existing asphalt or road base material will be of sufficient quality to be included in the new project. They could risk having the project delayed if the existing asphalt or road base were of a poor quality.

Some of the differences between UDOT's focus on quality and local entities' concern about costs are demonstrated by Layton City's use of recycled materials. Because of UDOT's focus on quality control, some contractors may be reluctant to use recycled materials in this way. While the material may be adequate, local contractors would rather not risk having a material rejected and the project delayed because it did not meet specification. For contractors to successfully complete a UDOT project, they need to have reliable sources of materials for both their asphalt and their road base.

Local Entities Focus More on the Initial Cost of Construction. In contrast to UDOT's focus on quality, local entities tend to operate under tight budgetary constraints and are more concerned than UDOT about the initial cost of a road project. For this reason, they are more willing to

try innovative construction techniques that can reduce the cost of construction. However, they also risk premature failure of their roads by not using the same high construction standards and not doing the regular maintenance that UDOT does.

Antelope Drive required repaving only seven years after construction.

Antelope Drive may be a good example. Just seven years after its initial reconstruction, Layton City repaved Antelope Drive at a cost of $220,000. We interviewed materials experts from within and outside UDOT, and they said that Antelope Drive, if properly constructed, should not have required repaving after just seven or eight years. Materials experts suggested that the new surface layer would only have been necessary if the road were beginning to show signs of premature failure. However, they could not speculate as to whether the use of recycled material may have contributed to the premature failure of the road.

UDOT Should Continue to Investigate Creative Construction Techniques. In the past, UDOT has done pilot projects to test new and creative construction techniques, such as the use of recycled material in road construction projects. They have also tested a wide range of construction materials techniques to lower the cost of construction and improve roads. However, the department appears to be less aggressive than some localities in pursuing construction methods that may reduce costs. This may be due to the department's commitment to quality construction and the need to make sure that construction meets specifications. We believe a careful study of the use of recycled materials, as well as other methods can help the department reduce costs.

Failed Bridge Demonstrates Why Proper Design And Testing Are Necessary

Only one week after completion, the Clearfield bridge ramps began to fail.

Perhaps the best example of the hazards of improper design and testing is a bridge in Clearfield City. Compromises were made in both the design and the testing of the materials that were used to construct the bridge. A week after the bridge was completed, the bridge structure ramps began to show signs of failure. As a result, the Federal Highway Administration has withheld $600,000 of funds approved for the project, and Clearfield City must also pay the cost of rehabilitating the structure.

According to officials at UDOT and the Federal Highway Administration (FHWA) who examined the project, the ramps to the Clearfield bridge were designed in such a way that they required a very

steep embankment. As a result, the ramp needed to be made of the highest quality fill material rated "A-1." However, a consultant hired to do value engineering on the project successfully suggested that the fill could be of a lower grade A-4 material.

In addition, an FHWA audit of the project showed that inadequate testing was done on the fill material as it was brought to the project site. Recent tests conducted of the embankment material revealed that the ramp was actually constructed of material rated as poorly as grades A-5 to A-7. According to a federal review of the project, other materials, such as asphalt and the road base, were also not properly tested and may also have contributed to the failure of the structure. The ramps have continued to sag during the five years since the project was completed. Figure 3.5 shows how the concrete barriers have separated from the bridge as the ramp structure has sagged.

Due to a lack of testing, substandard materials were used, contributing to the bridge's failure.

Figure 3.5 Failed Ramps on Bridge on 200 South in Clearfield City. The designs for the 200 South bridge in Clearfield were changed in order to reduce costs, and the materials used did not meet specification. As a result, the ramps to the bridge began to sink a week after the bridge was opened.

In addition to showing the concrete barriers have pulled away as the entire ramp structure has sagged, Figure 3.5 also shows the additional asphalt needed to bring the ramp to its original height where it abuts the bridge.

In summary, UDOT's "good roads cost less strategy" is a viable strategy for building durable roads and at a reasonable cost. Comparable roads built by local entities may be built at a lower initial cost, but they will not likely last as long as UDOT roads, especially if they are not maintained. UDOT needs to continue to monitor the performance of its road construction and search for better construction materials and methods of extending the life of its roads. Local entities need to consider using superior paving products such as performance-based asphalt on high-traffic roads. Local entities should also adopt an asset management strategy similar to that used by UDOT.

Recommendations

1. We recommend that UDOT continue to monitor the performance of its road construction and search for better construction materials and methods of extending the life of its roads.

2. We recommend that Utah's local government entities use superior paving products such as performance based asphalt and adopt an asset management strategy similar to that used by UDOT.

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Chapter IV
Local Entities Can Avoid Some of UDOT's Construction Costs

Locals can avoid some right-of-way and administrative costs.

There are two areas in which local entities' road construction projects can have a cost advantage over projects administered by UDOT. First, local entities often have lower right-of-way acquisition costs than UDOT. This lower cost can be either a result of cities exercising their right to exact property from developers or being able to convince land holders to donate property. In contrast, UDOT's procedures require that the agency pay at least the appraised value of the land it acquires. As a result, UDOT might pay more for right-of-way than a local entity would for a similar project.

A second area in which local entities have a cost advantage is that they can often avoid some of the administrative expenses associated with UDOT projects. Local entities are not subject to all of the state and federal regulations that UDOT must follow. Following these regulations can add to the cost of state or local projects that receive federal funding.

Cities Can Acquire Right of Way at a Lower Cost

Cities and towns are often able to acquire the land needed for a right of way at little or no cost because Utah statute authorizes cities and towns to require developers to dedicate land for a new right of way. This authorization allows cities to negotiate with local landholders for property in exchange for improvements made along the right of way.

UDOT pays appraised values for land.

In contrast, UDOT has a formal process for acquiring right of way that does not allow the level of landowner negotiation granted cities. As a result, UDOT may pay more to expand a road than a city or town would pay. For example, when Layton City needed to expand the right-of-way along Antelope Drive, they obtained a significant portion of the additional frontage through both exaction and donations. Because almost half of the land was obtained at no cost, Layton City only paid $298,000 for the right-of-way needed to expand the road. If UDOT had done the project, UDOT would likely have followed a more formal process guided by its

right-of-way acquisition rules and would have paid about $459,000 (the appraised value of the land necessary for the expanded right-of-way).

Cities May Exact Land from Developers

When a developer approaches a city for a permit to build a new subdivision or retail project, the city may grant the permit on the condition that the developer dedicate some portion of his or her frontage to widen the road. "Exaction" is the legal term for placing such conditions on a development request. The law requires that the amount of property exacted from the developer be comparable to the impact of the project on the city.

Locals, unlike UDOT, may "exact" land from developers.

UDOT Is Not Authorized to Exact Land from Developers. Instead, UDOT follows a process that is largely dictated by both the U.S. Uniform Relocation Act and ***Utah Code***. UDOT's process requires that they first notify the private landholder of their intent to acquire property for a right of way. UDOT then has an appraiser estimate the value of the land to be acquired. If the landholder does not agree with the appraisal, a second appraisal is performed. UDOT then negotiates a payment for the land using the appraised value as a starting point.

Utah's Local Entities Differ in Their Use of Acquisition Rights. Of the 35 Utah counties, cities, and towns surveyed concerning their policies and practices regarding right-of-way acquisition, 20 had not acquired any right-of-way in recent years and could not respond to our questions. However, of the remaining 15 entities, seven followed processes similar to UDOT's as described in a publication by the Federal Highway Administration titled *Real Estate Acquisition Guide for Local Public Agencies*. They use an appraisal as a starting point for negotiations and generally pay at least the appraised value. These local entities said that their aim was to avoid the use of condemnation and that they were quite careful in using the city's authority to exact property from developers.

The eight remaining local entities reported that they would not use an appraisal as a starting point of the negotiations, but would begin by engaging in direct discussions with the property owners regarding the price they would be willing to accept. Most of these cities also reported that they would use exaction to acquire the needed right-of-way. In fact, one city official told us that his city needed to build a major arterial road

in the area but was going to wait until a local landholder decided to develop the adjacent land so the city could acquire enough ground to expand the right-of-way without paying for it.

Some surveyed cities said that they might also require those wishing to annex into their cities to dedicate enough land to expand the roads through the area. Several cities also reported that they have been able to convince local land holders to dedicate a portion of their street frontage in exchange for the improvements that the city planned to make as it expanded the road.

An example of a local entity's acquisition abilities is Layton City's Antelope Drive project. Three of the 16 properties acquired along the right of way were either donated to the city or dedicated in exchange for the approval of a commercial development. In fact, of the 92,000 square feet that the city acquired, 36,000 of it was either donated or dedicated without any cost to the city. The value of the donated land is estimated to be $161,000 for this $2.3 million project. Most of the frontage donated to Layton City came from a retail development that was being built at the same time that the road project was underway. The developer dedicated 23,000 square feet of ground to the city as a condition for the city's approval of a commercial development permit. Two other landholders either dedicated the land to avoid the cost of an inconsequential land sale or for other considerations.

Cities Relationship with Landholders Makes Them More Effective Negotiators

Residents are more willing to donate land to cities than to the state.

Some sampled local entities believe that UDOT pays more for its right-of-way because they are not as effective as city officials at negotiating with local property holders. Their belief is that local entities have a closer relationship with local residents that allows them to negotiate more effectively.

Some Residents Donate Land to Support Their Communities. One of the common observations made by both state and local officials that we interviewed is that UDOT is perceived to have "deep pockets" while local entities are not perceived that way. Several local officials told us that they noticed that local residents have more of a community spirit when negotiating with city and county officials and may agree to donate a

portion of their frontage in order to help improve the appearance of the neighborhood in which they live or do business. One local official said:

> I don't know that UDOT could cut the same deal as the city. Often the residents agree to trade the property so the improvements can be made. They do it in an attitude that this transaction will help beautify the city. The cost of the transaction would just burden the city with more expense. Why not trade the land for the improvements. In the long run those costs just come back to the taxpayer, why not give the city the land and allow for more improvements to the neighborhood.

Local Entities Can Have Lower Administrative Costs Than UDOT

UDOT has more rules and regulations than local entities.

Local entities can often avoid some of the administrative expenses associated with UDOT projects. UDOT relies on a highly structured, procedure-driven process to guide the construction and maintenance of state roads. UDOT has developed rules and standards that affect almost every phase of a well-documented construction project. In contrast, local entities do not have many construction projects and large engineering departments that require the adoption of a long list of rules and procedures. Instead, the local entities rely more on the professionalism of their staff engineers and contractors to provide quality work.

UDOT also relies heavily on federal funding to support its road construction program. When federal road construction funding is used, the cost of federal regulations cannot be avoided. In fact, the cost of complying with the federal regulations is estimated to add 6 to 15 percent to total project cost. However, UDOT can minimize the effect that federal rules have on state and local road projects by doing as much as possible to segregate federal road construction projects from state-funded projects. In addition to this separation, UDOT should also consider addressing its own administrative procedures and rules to eliminate unnecessary restriction and controls.

UDOT Requires More Detailed Engineered Drawings

We compared the drawings and specifications of several UDOT projects to those of local road projects of similar size and scope. We found that for practically every aspect of a UDOT road project, the specifications contain more detail than those of local projects. For example, UDOT plans and specifications exceed those of even the most comprehensive set of plans and specification of a local entity.

UDOT has more detailed environmental controls.

One specific area in which we compared state and local specifications was environmental controls. Environmental controls are the techniques used on a construction site to prevent soil erosion, dust, and pollution from contaminating the water systems and adjacent land. We found that the UDOT specifications were quite detailed, containing six pages of requirements. By comparison, a local entity's specifications eliminated specifics and devoted only one and a half pages to environmental controls.

As an example, both state and local specifications have sections identifying the different techniques that can be used to prevent erosion. The local entity's entire specification for erosion control consists of the following statement:

Erosion Control:

A. Use measures such as berms, dikes, dams, sediment basins, fiber mat netting, gravel, mulches, slopes, drains and other erosion control devises of materials to prevent erosion and sedimentation.

In contrast, UDOT's specifications contain a more detailed description of each type of erosion control measure. In place of simply listing "fiber mat netting" as an option, UDOT specs expound:

Silt Fence Slope Barrier:

1. Intercepts and ponds sediment-laden sheet flow runoff from slopes.
2. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle out.
3. Water exits by percolating through the silt fence.

Silt Fence:

1. **Hardwood Post:** 2 inch square (nominal) by 4 feet in length.
2. **Free Draining Granular Backfill Borrow:** refer to Section 02061.

3. **Filter Fabric:** Synthetic, pervious sheet of propylene, nylon, polyester, or ethylene yarn. AASHTO M 288.
    a. Allows a flow rate of 0.067 gal/yd^2/min.
    b. Filter efficiency of 97 percent.
    c. With ultraviolet ray inhibitors and stabilizers.
    d. Provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees F. To 120 degrees F.
4. **Fasteners:** Staples, wire, zip ties, or nails.

Clearly, the amount of detail described in the state specifications above is much greater than the comparable requirements in the local specifications of "fiber mat netting".

UDOT requires strict compliance to its specifications.

The level of detail is important because UDOT requires strict compliance with its specifications. For example, on one state project the contractor used a silt fence that was not of the specific type required by the UDOT specifications. The contractor was not reimbursed for the cost of the fence. Such tight controls can add to the cost of administering projects. In comparison, local entities rely on their contractors to decide which erosion control methods are best suited to any given project site and do not provide quite as much detail in the specifications.

Local Entities Can Approve Change Orders More Quickly than UDOT

UDOT change orders take more time than local project change orders.

Another example of UDOT's focus on rules and procedures is its approach for approving change orders. In fact, the delays caused by change orders was one of the most common concerns expressed by many of those responding to our survey of 35 city and county officials. A change order is required when an unanticipated event requires an alteration to the specifications or to the original contract agreement. Many of the contractors and local officials that we interviewed expressed frustration about how difficult and time consuming it can be to obtain approval for a change order on a state or federally-funded project. In contrast, the local officials said that on local projects that do not involve state or federal oversight they can get a change order approved on the same day or in just a few days after a problem has been identified.

One UDOT change order took three months.

One example was relayed to us by the project engineer of a local road construction project which was funded in part by the federal government and administered by UDOT. The engineer said that during construction

a soft spot of soil was discovered in the road's right-of-way. It was concluded that the soil would not adequately support the road. One option, he said, would have been to remove the soil and bring in new material at a cost of $50,000 to $60,000. The alternative he proposed was a technique often used in such situations of treating the earth with a concrete mix that helps firm up the soil so it can support the road. The standard road base and asphalt is then applied on top of the soil treated with concrete. This alternative would cost between $12,000 and $15,000. The engineer stated that because of the "bureaucratic red tape" the state took three months to send the request up the "chain of command" to receive approval for the lower-cost procedure. The city engineer said that if it were a city project, the change order would have had approval within a day or two.

City and county engineers, as well as some UDOT engineers, reported many instances in which road construction projects were held up because a state requirement was not properly carried out or because the process of approving a change order delayed the project. The rules are designed to help the state achieve a greater degree of compliance with UDOT standards and, in turn, achieve a better built, more durable road. However, there is a cost to administering a program which demands such strict compliance with rules and standards.

Federal Requirements Add to the Administrative Burden of UDOT Projects

Federal rules add to project costs.

Like the state, the federal government has developed a set of rules designed to make sure that roads are built to federal construction standards and that they achieve certain public policy goals. However, one of the costs of achieving those standards and policy goals is the added administrative burden of complying with a long list of rules and regulations. UDOT officials have told us that the cost of complying with the federal rules is the single largest reason why local projects may cost less than UDOT projects. In fact, it is estimated that the added cost of complying with the federal rules adds about 6 to 15 percent to a project's total costs.

Whenever federal funds are used on a road project, even if it is a state or local road, federal rules must be followed. These requirements also apply to any state-funded road project connecting into the interstate highway system and can apply to state road construction projects that may eventually quality for federal funding. Federal rules regulate many

different aspects of road projects. The following lists some of the federal laws that must be followed whenever federal funds are used on a road construction project.

Federal funding requires compliance with federal rules.

- **Brooks Act.** Requires agencies to select contractors based on demonstrated competence and qualifications for the type of engineering and design services being procured, and at a fair and reasonable price.
- **Davis Bacon Act.** Requires that federal construction contractors pay their workers "prevailing wages" which usually mirror local union wages.
- **Disadvantaged Business Enterprises Act.** Requires that a certain percentage of contracts go to women or minority owned businesses.
- **National Environment Policy Act.** Places limits on the impact that road projects can have on environment. Requires a thorough examination and mitigation of any affects a project may have on the environment.
- **National Historic Preservation Act.** Proscribes methods for preserving and mitigating historic sites affected by a road construction project.
- **Uniform Relocation Act.** Proscribes rules for acquiring real property for federally funded road projects. Ensures land holders are treated fairly and equitably and receive assistance in moving from the property they occupy.

Each of the above federal laws are designed to achieve certain public policy goals. Each act comes with a lengthy set of specific regulations and procedures which must be followed in order to avoid penalties or the loss of the federal funding for a project.

Federal Regulations Add Many Administrative Procedures to a Road Construction Project. Federal regulations require a state or local entity to carry out many additional administrative procedures that they would not otherwise perform. In addition, the need to carefully document compliance with the procedures also adds to the cost of administering the regulations. Finally, the regulations also require that project managers spend time resolving disputes when compliance is in doubt. Officials from both UDOT and from local government told us that these activities add significantly to the cost of administering a federally funded project.

As an example, an environmental impact study was required for the construction of a round-about at a local intersection. This city construction project demonstrates the type of tasks that add to the administrative costs of a project when federal funds are involved. The project, the redesign of an intersection where five roads meet, was partially federally funded, and thus required an evaluation of the environmental impact.

As required, the city submitted an environmental impact study to UDOT for a federal compliance review. UDOT staff identified 12 specific areas where the study did not adequately address federal requirements and returned the document to the city with a request that the deficiencies be corrected. UDOT review comments on the adequacy of the study include:

Federal requirements are challenging to meet.

- Are you sure this project doesn't have the potential to increase noise? How do you know? Especially if the project will "substantially change the layout or function of the roadway."
- This section needs to describe any measure considered to avoid or minimize harm to the park. Is there a reason why the alignment couldn't be shifted south to avoid the park?
- Why is "no" checked for the potential to cause effects on historic properties? ... Just because there aren't any historic properties doesn't count.
- ...a public hearing is necessary. Why was there not at least an open house or neighborhood meeting?

UDOT's review staff, being more familiar with the federal regulations, identified a number of areas that, although unimportant to the actual project, still had to be addressed. The city's engineer could not see the sense in addressing issues that were not part of the project, federally funded or not.

One area of concern was that the city had not properly notified the public that they would have an opportunity to comment on the new design for the intersection. According to the city engineer, the intersection was discussed at a meeting of the city planning commission and there were many people in attendance who asked questions and gave their comments. That meeting, as UDOT staff pointed out, did not meet the federal requirements. Federal procedures required that the city post notice of the hearing in a newspaper with statewide circulation for two

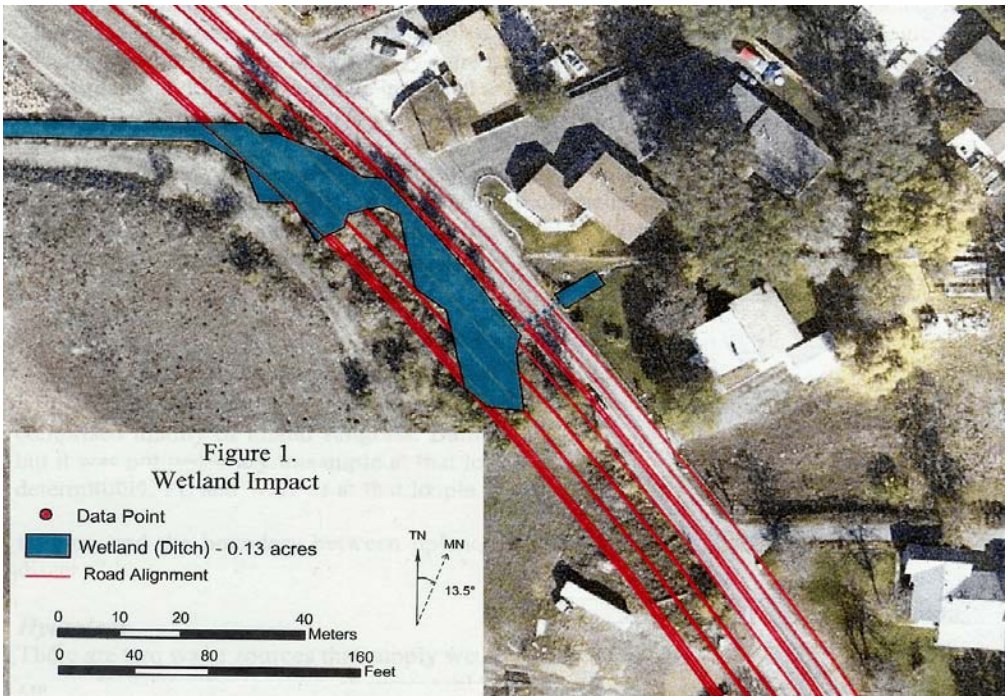
weeks. Because the city did not comply with this requirement, it risked losing federal funding unless another meeting was held.

This example demonstrates the type of procedural missteps that can occur when a state or local entity is involved in a federally funded project. Unfortunately, a significant amount of a project manager's time and energy can be spent trying to meet the demands of specific procedures that may not have been handled exactly according to the federal regulations. When asked, each of the city engineers we interviewed said they would not implement the federal procedures if they were not required to do so.

Local Entities Can Avoid Some Administrative Costs When They Use their Own Funds. A road widening project in Utah County demonstrates the difference between how the state and local governments handle environmental issues. Although the project involved a local road, it was administered by UDOT because federal funds were involved. In addition, because federal funds were used, the project fell under the regulations established under Section 4(f) of the Department of Transportation Act, the National Environmental Policy act, and the National Historic Preservation Act.

In keeping with the requirements of section 4(f), the city was obliged to hire a consultant to conduct a "class III cultural resources inventory" which is one of the more moderate environmental impact studies. The consultant found that a ditch within the road's proposed right of way could qualify as a wetlands area. Specifically, surface drainage backup occurred when a section of pipe became plugged and the water expanded outside the ditch. Figure 4.1 describes the proposed right of way and the area which had backed up behind the adjacent ditch.

Figure 4.1. Area Determined to Be Wetlands Area Along a Local Road Project. An environmental study of a proposed roadway classified a faulty drainage system as a wetlands area.



The consultant recommended that the city mitigate the damage that the new road would cause to the two sites. Specifically, he recommended that the city build a wetlands park next to the new road. According to one of the city's engineers, the environmental work added $40,000 to the cost of the project. This included a donation to a wetlands mitigation bank which added $25,000 and the environmental study which cost $15,000.

A federal rule added $40,000 to one project.

We asked the city preconstruction engineer how he would have handled the environmental work if it were not a federally funded project. He said that if it were a city project, the city would have considered it to be a situation involving a faulty drainage system that needed improving. They would have unplugged the pipe, allowed the area to drain, and we assumed, they would have installed a new pipe as part of the construction project. In fact, the city has since cleaned out the pipe and the ditch is dry. Yet they will still be building a wetlands park next to the new road.

Compliance with the Regulations May Equal 6 to 15 Percent Of a Project's Total Cost. It is commonly accepted that federal regulations

add between 6 and 15 percent to the cost of a road construction project. Some states, including Utah, have recognized that there is a cost to implementing federal regulations that can have an exaggerated effect on smaller, particularly locally-controlled, projects. To address this situation, several states have adopted policies allowing local entities to exchange federal funding for state funds, thus helping locals avoid the difficulty of complying with the federal rules and regulations.

Some states have put a dollar value on the cost of using federal funds.

We found seven western states allow local entities the possibility to reduce expenses by exchanging their federal funds for state funds. As an example, since 1992 Oregon has had a policy of allowing local entities to exchange federal funds from certain categories for state funds. Oregon's exchange rate is $0.94 state funds for every $1.00 in federal funds. They report that their policy "helps local agencies avoid complicated federal contracting regulations." Also, by pooling the federal funds, they are able to use the money more effectively at the state level.

Since 1997 Arizona has also allowed local entities to exchange federal funds for state funds. The exchange rate is $.90 state funds for each $1.00 in federal funds. As in Oregon, the program is limited to certain types of federal funds. One official from Arizona said that their program is designed to help local entities avoid the cost of following the federal requirements.

Utah's pilot exchange rate places a 15 percent cost on federal funds.

Utah currently has a pilot project underway in Utah county in which state and federal funds are exchanged at a rate of $.85 to the $1.00. That exchange rate is based on UDOT's determination that the there are certain costs associated with the use of federal dollars and that exchange rate reflects those higher administrative costs. By discounting the federal dollars, Arizona, Utah, and Oregon, as well as South Dakota have placed a value on the cost of complying with the federal regulations. The implication is that local entities that use state and local funding for road construction are spending from 6 to 15 percent less than UDOT would on federally funded projects because they are able to avoid some administrative expenses.

Segregation of State and Federal Projects Should be Explored. UDOT may be able to reduce its administrative costs by minimizing the amount of state funds that are spent on federally regulated projects. UDOT could also minimize the amount of federal funds spent on small local projects. UDOT receives approximately 30 percent of its funding

from the federal government. Through better planning, UDOT may be able to segregate its federal and state funded projects.

Segregation of federal funds should be explored.

While segregation of federal and state funds clearly demonstrates a cost savings at the local level, it is more difficult for UDOT. Whenever federal funds are used on a project, UDOT must adhere to federal regulations. Often, UDOT feels obligated to apply the same regulations to state funded projects because there is uncertainty as to whether a state funded project may one day become eligible for federal funding.

It is important to recognize the difficulty UDOT faces as it attempts to know ahead of time which projects will be eligible for federal funding and which might be paid through state funding. Decisions regarding a project's funding needs occur years before the project is completed. However, UDOT does not always know how much federal and state funds will be available in the years to come. Nevertheless, UDOT should explore the cost/benefit of segregating its state-funded and federally-funded projects.

Recommendations

1. We recommend that UDOT explore ways to avoid the cost of administering federal regulations by segregating, as much as possible, its state projects from its federally-funded projects.

2. We recommend that UDOT develop a policy of allowing local entities to exchange federal funds they receive for state funds at a discounted rate.

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Agency Response

January 11, 2007

Mr. John M. Schaff, CIA, Auditor General
Office of the Legislative Auditor General
W315 Utah State Capitol Complex
P.O. Box 145315
Salt Lake City, UT 84114-5315

Dear Mr. Schaff:

SUBJECT: Response to A Performance Audit of UDOT Project Costs (Report No. 2007-03)

Thank you for your letter dated January 8, 2007, and the opportunity to respond prior to release of this audit report. Below is our response to Chapters III & IV recommendations of the draft report:

Chapter III Performance Audit Recommendations

1. We recommend that UDOT continue to monitor the performance of its road construction and search for better construction materials and methods of extending the life of its roads.

   UDOT Response: We agree with the findings of the Auditor General. We believe asset management, life cycle costing, and adherence to our "Good Roads Costs Less" strategy will ensure the quality of our transportation system. Our goal will be to continue improving the quality of the state's roads, while lowering the overall cost.

2. We recommend that Utah's local government entities use superior paving products such as performance based asphalt and adopt an asset management strategy similar to that used by UDOT.

   UDOT Response: We agree with the findings of the audit.

Chapter IV Performance Audit Recommendations

1. We recommend that UDOT explore ways to avoid the cost of administering federal regulations by segregating, as much as possible, its state projects from federally funded projects.

   UDOT Response: We agree with the findings of the Auditor General.

2. We recommend that UDOT develop a policy of allowing local entities to exchange federal funds they receive for state funds at a discounted rate.

UDOT Response: We agree with the findings of the Auditor General.

The Department recognizes that continuous improvement occurs from both self-evaluation and external reviews. We appreciate this critical analysis of the Department's operations and look forward to implementing the recommendations of the audit.

Sincerely,

John R. Njord, P.E.
Executive Director

JRN/SB/jbl

cc: Carlos Braceras, UDOT Deputy Director