Update on Highway Construction Cost Trends in Florida

Florida Department of Transportation
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For more information, please contact:
W. David Lee, Administrator, Statewide Planning and Policy Analysis
Florida Department of Transportation
605 Suwannee Street – MS 28
Tallahassee, Florida 32399
(850) 414-4802

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Update on Highway Construction Cost Trends in Florida

Introduction

The Florida Department of Transportation (FDOT) has experienced dramatic increases in highway construction costs over the past three years. More than a year ago FDOT realized that the increased construction costs posed a significant threat to its ability to deliver on its 'commitments made are commitments kept' philosophy, and indeed, FDOT has been forced to announce a number of project deferrals as a result. In February 2006, FDOT convened a summit in Orlando that bought together a variety of key partners and stakeholders to begin to address the challenges associated with delivering the program in light of increasing construction costs. Since this summit, several activities have been undertaken to better understand what caused these increases and to better anticipate future costs. This report presents the key findings to date, provides a summary of the activities undertaken, and identifies a number of continuing actions that are designed to help FDOT keep track of the current state and direction of Florida's construction market, and enhance its planning and decision-making ability moving forward.

Key Findings

Finding 1 – FDOT Continues to Experience Higher Construction Costs

A major component of the increased costs are material prices. Table 1 shows the weighted average bid unit prices received by FDOT for five major material types over the past three years and eight months. At this time, the cost associated with these five major material types account for approximately 30 percent of total project cost, up from a little over 15 percent during 2000.

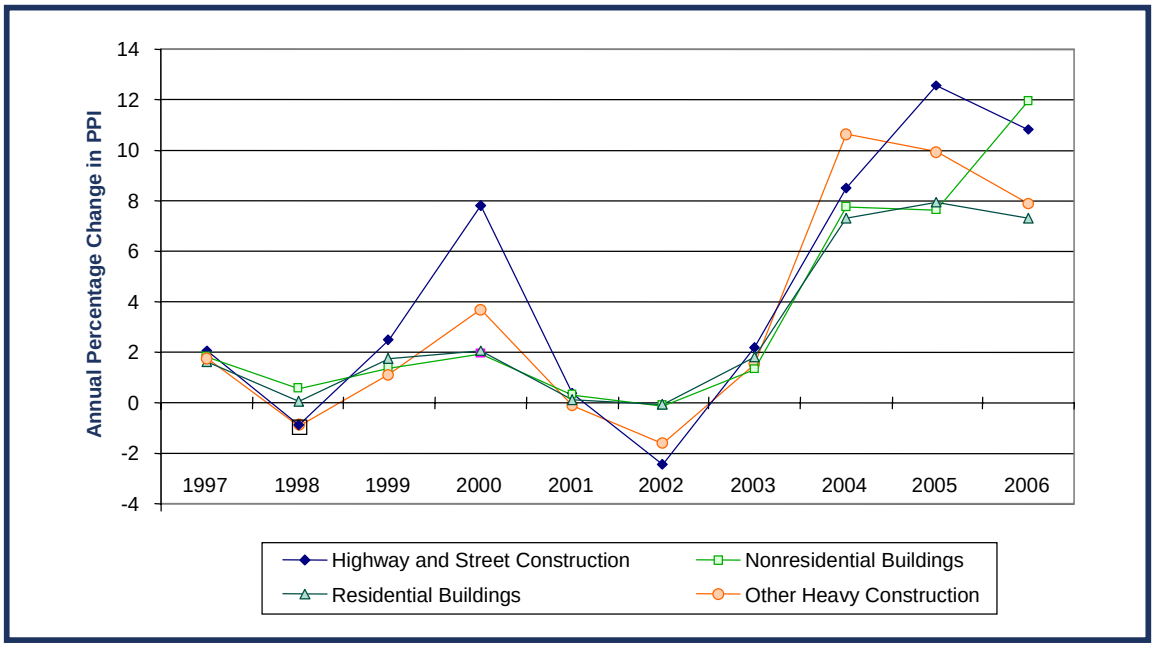
Table 1. FDOT Summary of Statewide Unit Prices for Selected Material Types

		Fiscal Year				Total
Pay Item Group	**Unit**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007 (Jul – Feb)**	**Percent Change**
Earthwork	Cubic Yard	$4.73	$5.66	$7.93	$7.43	57%
Asphalt	Ton	$57.62	$68.49	$90.81	$103.58	80%
Structural Concrete	Cubic Yard	$546.32	$653.43	$892.89	$778.40	42%
Structural Steel	Pound	$1.51	1.34	$1.68	$2.08	38%
Reinforcing Steel	Pound	$0.67	$0.86	$0.96	0.95	42%

Finding 2 – Increases in Construction Costs have Accelerated Nationally

Figure 1 illustrates the annual growth in the Producer Price Index (PPI) for four different types of construction in the United States. A PPI is a measure of the current average price of products or services in a particular market segment. Over the four-year period (2003-2006), costs for these types of construction increased by an average of 7.3 percent per year versus 1 percent per year for prior six years (1997-2002). The national average price of each of the material groups presented in Table 1 contributes to varying degrees to the PPI for each of these types of construction.

Figure 1. Annual Change in Producer Price Indexes for Four Types of Construction



The logical question that emerges from Findings 1 and 2 is 'what is driving the cost increases?' and the answer to this question is one of the fundamental objectives of FDOT's recent activities. The effort to date has revealed that a number of factors have contributed to FDOT's construction cost increases. Findings 3 through 5 will address three of these factors as follows:

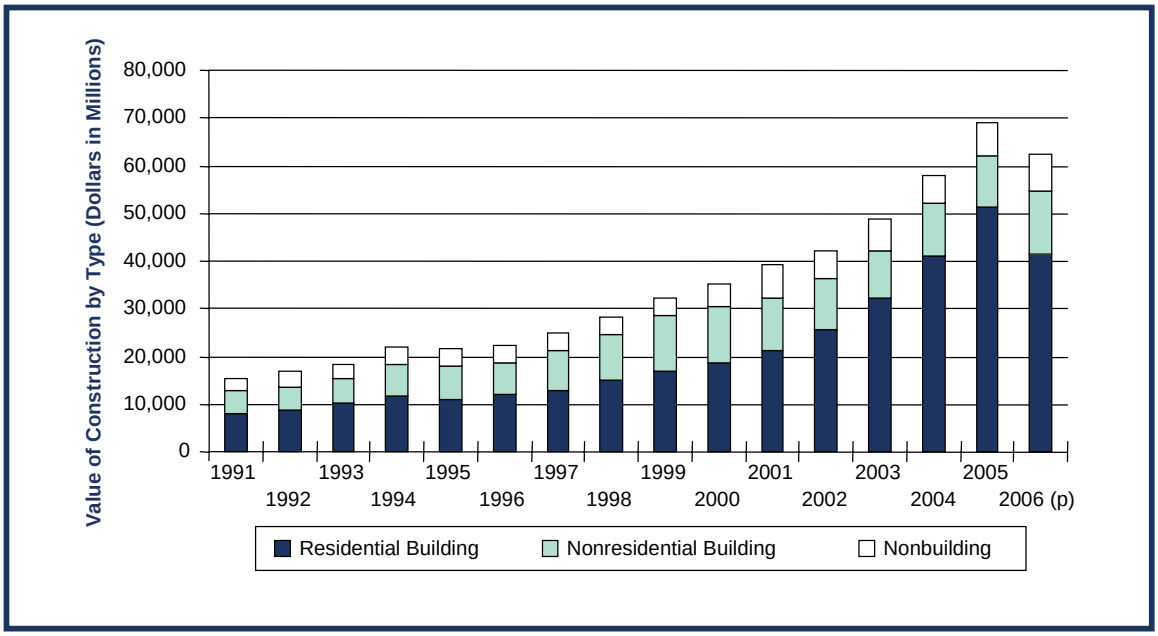
- Strong growth in Florida's construction activity, especially residential construction;
- Florida's construction market is operating at, or close to, capacity; and
- Global material price increases, for example, oil.

FDOT does not believe that these are the only factors that have contributed to construction cost increases, but that they are some of the more significant ones. In addition, these factors are themselves derivative of multiple inputs and there are some inputs that feed into more than one of the three factors this report addresses. For example, the record hurricane season of 2005 caused significant damage to residential and nonresidential buildings and other infrastructure. This undoubtedly placed even greater demand on the construction market in Florida, as elsewhere, impacted U.S. oil refining operations and therefore fuel prices, and placed yet further demand on already stretched material supplies.

Finding 3 – Florida's Construction Growth was Double the National Average and Focused in the Residential Market Segment

Figure 2 shows the growth in construction activity in Florida since 1991. During this period, the rate of growth in construction in Florida outpaced the national growth rate by a factor of two. Growth in construction in Florida has been predominantly in the residential segment, which grew by 100 percent, from $25 billion to $50 billion in the four years (2002-2005). By comparison, the nonbuilding construction segment, of which FDOT's program is a component, grew by only 11 percent over this same four-year period.

Figure 2. Annual Construction Value in Florida



Finding 4 – Florida's Supply of Labor and Material Struggled to Satisfy Demand

Florida's construction employment and material production rates exhibited considerable growth. However, there are a number of indicators which suggest that supply has struggled to keep pace with demand, and this places further upward pressure on prices. Consider the following:

- FDOT experienced a 53 percent decline, from 4.3 to 2.3, in the average number of bidders on the major class of its construction contracts between July 2002 and June 2006. Over this same timeframe the percent of these construction contracts which received low numbers of bids (zero, one, or two) increased from 14 percent to 47 percent. These facts, combined with FDOT observations that no major new contractors have entered the market recently, suggest that highway contractors in Florida already have close to as much work in hand as they can deliver, and that they can therefore afford to be more selective about bidding on additional work.
- The contribution of construction employment in Florida as a percentage of total nonagricultural employment has grown by approximately 25 percent since 2001, and now represents 8 percent of total employment in Florida versus 5.6 percent at the national level. However, this growth in employment occurred primarily to serve the residential building market, as demonstrated by the fact that the percentage of nonagricultural labor engaged in heavy and civil engineering construction in Florida has remained constant at 1 percent since 1991.
- FDOT contractors interviewed in relation to the increasing costs stated that they are being forced to increase wages and/or benefits in order to simply retain existing employees, and reported significant difficulty in adding new personnel.
- Over the past three years, FDOT has experienced a significant increase in the number of construction projects that are not completed on time. Contractors noted that recent shortages in supply of material and labor have required that they must now often assume they

will be unable to meet FDOT's schedule requirements, and they therefore include liquidated damages in their project bids.

- Between 1995 and 2005 the production rates of aggregate (crushed stone, sand, and gravel) and Portland Cement have grown by 60 percent and 81 percent respectively. These growth rates are three times the national averages. Despite the significant growth in production, Florida continues to import up to 40 percent of the Portland Cement it consumes on an annual basis.

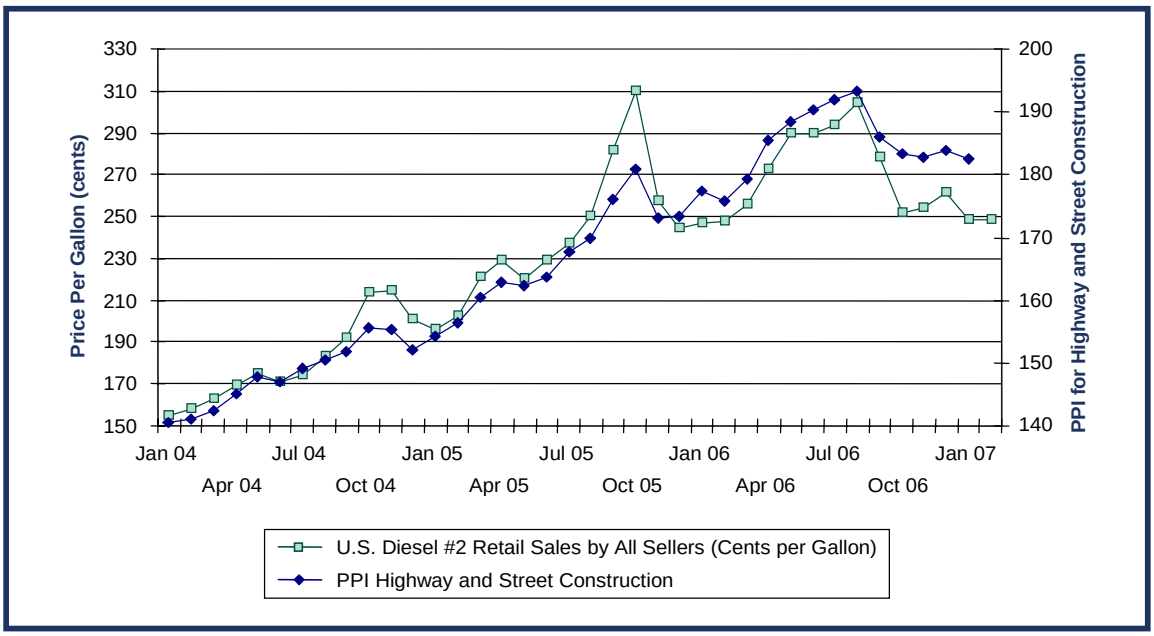
Finding 5 – Soaring Oil Prices have a Significant Impact on Highway Construction Costs

Over the past five years, 2001-2006, the average annual increase in the price of a barrel of oil was 33 percent. This rate of increase is 10 times the annual rate of increase that occurred in the 10 prior years (1991-2001).

As noted earlier, higher rates of cost increase have been experienced in all types of construction and in all regions of the United States. However, a closer inspection of the Producer Price Indexes (PPI) for different types of construction shows that the greatest increases in 2004, 2005, and 2006, were experienced in the heavy civil and the highway and street construction types. Further analysis of the factors that contribute to the different PPIs shows that fuel costs in these types of construction make the greatest relative contribution to overall cost (for the transportation of raw materials to project sites and for the operation of heavy equipment). As a result, the costs of these types of construction are particularly sensitive to fluctuations in the price of diesel fuel, which is closely related to the price of oil. Finally, the majority of highways in the United States are surfaced using asphalt, and since a key component of asphalt, liquid asphalt, is produced from oil, its price is sensitive to fluctuations in the price of oil.

Although all types of construction will be impacted by the cost of oil, the highway and street type that best describes FDOT's construction program is impacted most by the price of oil. Figure 3 demonstrates the relationship between the price of diesel fuel and the PPI for highway and street construction.

Figure 3. PPI for Highway and Street Construction versus Average Diesel #2 Price Per Gallon



Finding 6 – Florida's Slowdown in Residential Construction is Anticipated to be Temporary

Residential construction activity in Florida fell by 20 percent in 2006, as demonstrated by Figure 2. However, current projections of Florida's population growth, by as much as 1,100 people per day, suggests that this slow down will be temporary and that increased upward pressure on construction prices will return. What is uncertain at this time is just how long the residential slowdown will last. Given the impact that residential construction has had on the overall construction market in Florida in recent years, it is considered vital that FDOT carefully monitor residential building activity and any indicators that might suggest a resurgence in its rate of growth. Good examples of such indicators (that FDOT is actively tracking) include the number and value of new residential units permitted, as well as the numbers and prices of home sales in the State. The number of residential units permitted has declined dramatically from a peak value of almost 27,000 in August 2005. However, values for the three months ending January 2007 (averaging 10,274) appear to suggest the decline has bottomed out, but what remains to be seen is how soon, and at what rate, will monthly permit volumes begin to rise again.

FDOT's Response to Date

FDOT has undertaken a variety of activities in order to better understand the causes of recent cost increases and be better positioned to anticipate and respond to future construction cost trends. Some of these activities have been completed, some are still in progress, and a number are now viewed by FDOT as part of their ongoing operational activities. These activities include:

- Convening a Construction Cost Summit – In February 2006, FDOT convened a summit in Orlando that bought together a variety of key partners and stakeholders to begin to address the challenges associated with delivering the program in light of increasing construction costs (completed);
- Conducting Regular Reviews of Material Prices and Construction Cost Indexes – FDOT routinely calculates weighted average unit prices for a number of the more common material types, as shown in Table 1. In addition, there are a variety of national cost indexes that FDOT is tracking (ongoing);
- Soliciting Input on Cost Trends from Industry – In cooperation with the Florida Transportation Builders Association, a survey was conducted of a number of contractors and material suppliers that serve the highway construction market in Florida (completed);
- Reviewing Florida's Construction Market Characteristics, History and Performing Comparison with Peer States – The review included value of construction put in place by different market segments, construction employment and numbers of businesses and comparisons with the U.S. as a whole, California, Georgia and Texas (completed);
- Conducting a Review of Estimating Procedures and Work Program Integration – FDOT today is a decentralized organization, meaning that its seven district offices have considerable autonomy with respect to their operations. Recent cost increases have heightened interest in FDOT's estimating techniques and resulted in a review of the estimating process in each district. This review resulted in the identification of a number of best practices that FDOT is pursuing statewide implementation of, as well as increasing consistency in estimating process overall, and improving the way FDOT accounts for inflation in order that it can easily determine exactly what dollar amount has been set aside for inflation (in progress);

- Performing a Strategic Aggregate Study – Recognizing the importance of aggregate to highway construction FDOT has engaged a consultant to document the importance of aggregate materials and to evaluate ways to insure the quantity and quality of materials moving forward (in progress);
- Investigating Material Supply and Consumption Statistics – In addition to the aggregate study, and given recent shortages of other materials, FDOT is attempting to develop a better understanding of the supply and demand issues related to materials commonly used in highway construction, including asphalt, cement and ready-mixed concrete, and steel products (in progress);
- Maintaining a Statewide Construction Database – In an effort to better understand the relative magnitude and timing of construction projects of other major purchasers in Florida, FDOT has implemented a web-based system that allows other organizations to enter and maintain there plans for construction activity. FDOT already has and will regularly solicit input from several hundred purchasers of construction services (ongoing);
- Tracking Outstanding Contract Values and Existing Backlog of FDOT Contractors – FDOT has begun to track relative workloads and backlogs of its contractors in order that it might better gauge overall capacity and utilization trends (ongoing); and
- Identifying and Reporting on a Series of Construction Leading Indicators – A fundamental goal of FDOT's construction cost initiatives is the monthly publication of a 'Morningstar' like report for FDOT executives that provides insight into the current state and direction of Florida's construction market (ongoing).

Conclusions

Despite recent observations that the upward pressure on highway construction costs is lessening, the indications are that FDOT will continue to face higher rates of construction cost growth moving forward than it was used to prior to 2004. Projected population growth in the State of Florida is such that the slow down in residential construction is likely to be short-lived. Recent history has demonstrated that when operating at peak levels, residential construction activity can readily consume as much growth in labor and materials supply as can realistically be expected. Therefore, as residential construction activity increases, FDOT should expect to see the return of upward pressure on its construction costs. Furthermore, it appears unlikely that oil prices, and by relationship, prices of diesel fuel and asphalt, will fall significantly any time soon. It is more likely that the price of oil will fluctuate between $55 and $65 per barrel, with occasional spikes above this range, triggered by any number of global climatic, political, and/or economic events.

As a result, FDOT must continue to monitor costs and overall construction activity in Florida very closely, and do everything that it can to ensure it adequately accounts for inflation in its program. To this end, FDOT is committed to the following actions:

- ⇨ **Improving the way FDOT accounts for inflation;**
- ⇨ **Tracking a set of construction market leading indicators for Florida;**
- ⇨ **Using leading indicators to help set and adjust project letting levels; and**
- ⇨ **Implementing recommendations of the Strategic Aggregate Study to increase the availability of raw materials in the State.**

The appendix of this report provides further detail about a number of these activities.

Appendix

Action 1 – Improving the Way FDOT Accounts for Inflation

As the rate of inflation of construction costs grows, the importance of ensuring that it is adequately accounted for in FDOT's program increases. FDOT has conducted a review of the way it accounts for inflation and has identified a number of areas in which its current process could be improved. The major areas are as follows:

⇨ Ability to Identify the Dollar Amount Set Aside for Inflation

- The recent cost increases and resulting disconnects between project estimates and award amounts have encouraged districts to attempt to increase estimates to close this gap. However, approaches vary between districts and therefore the systematic determination of precisely what dollar value has been set aside for inflation is impossible. FDOT needs to be able to identify this dollar value and would therefore benefit from increased consistency in the way in which the different districts account for inflation;

⇨ Project Unknowns and Inflation Are Separate Components of Cost

- Contingencies have been established specifically to account for project unknowns, however certain districts report increasing project unknowns to account for inflation. Project unknowns are the types of things that crop up on highway projects that it is not possible to anticipate, for example, unforeseen ground conditions that require a change in design of the footings for a bridge. Project unknowns and inflation are totally different components of cost and FDOT would benefit from accounting for them separately;

⇨ Estimate Unit Prices Must Represent Present Day Costs

- The goal of estimators at FDOT is to develop present day cost estimates for projects, i.e., the price that they might expect to get if the project were let today. A major component of the project estimate is the combination of a set of estimated material quantities multiplied by unit prices. FDOT's estimating systems provide its estimators with access to current average unit prices, however districts report the practice of increasing unit prices to account for inflation. FDOT should reaffirm its present day cost approach and resist the temptation to try to account for inflation in estimate unit prices.

⇨ Consider Impact of Project Start Date and Duration

- FDOT's current inflation policy factors present day cost estimates by the appropriate combination of annual inflation factors based upon the year in which a particular project is scheduled to be let. As inflation rates increase, and given that more than 40 percent of FDOT projects have durations of two years or more, it is recommended that FDOT consider using the anticipated mid-point of construction in determining what combination of annual inflation factors to apply to a particular project.

Action 2 – Tracking a Set of Construction Market Leading Indicators for Florida

One of FDOT's desired outcomes of the construction cost initiatives is the monthly publication of a 'Morningstar' like report for FDOT executives that provides insight into the current state and direction of Florida's construction market. The intent is that such a report might influence short-term decision-making regarding letting schedules, and offer advanced warning of the market heading back to the state where cost increases reached their peak. Many of the activities undertaken since the summit last February have offered insight into the types of measures and indicators that might comprise such a report. FDOT has been tracking a variety of indicators for six months and has recently settled on a format for monthly distribution to FDOT executive management. Although this report, the Highway Construction Leading Indicator Report, will likely continue to evolve moving forward, it is clear that it needs to draw upon information from a variety of sources and with different geographic scopes:

- At the state level, it is critical to understand overall building activity and changes in construction employment, which recent history would suggest requires staying on top of residential building activity;
- At the national level, it is important to understand the relative strength of the overall U.S. economy, since this provides valuable context for the situation in Florida, as well as insight into overall construction and fuel cost trends; and
- On a global basis, it is important for FDOT to understand the relative strength of the economies that are leading global economic expansion, notably China and India. This may offer warnings about potential global shortfalls in key materials, such as the steel shortage that occurred in 2004 that was driven by the rapid growth in demand in China which it was unable to satisfy with domestic production.

A link to the latest FDOT Highway Construction Leading Indicator Report can be found on FDOT's web site at http://www.dot.state.fl.us/planning/policy/costs/. At this time, the report is comprised of four pages and includes a total of 13 main indicators divided between four groups. The first page provides a simple statement indicating how favorable (or not) conditions are for FDOT project lettings, the direction that the market is heading, and four pertinent notes, one for each group of indicators. The second page of the report presents a table of the 13 indicators, organized into four groups: national cost indicators; residential construction and sales activity; labor statistics; and national economic drivers and indicators. The table shows the latest values, percentage changes since the last month and the same month last year, as well as the trend direction for each of the past three months. The third and fourth pages provide line graphs of four key indicators by month, and residential permit/home sales statistics by district, respectively.

Action 3 – Using Leading Indicators to Help Set and Adjust Project Letting Levels

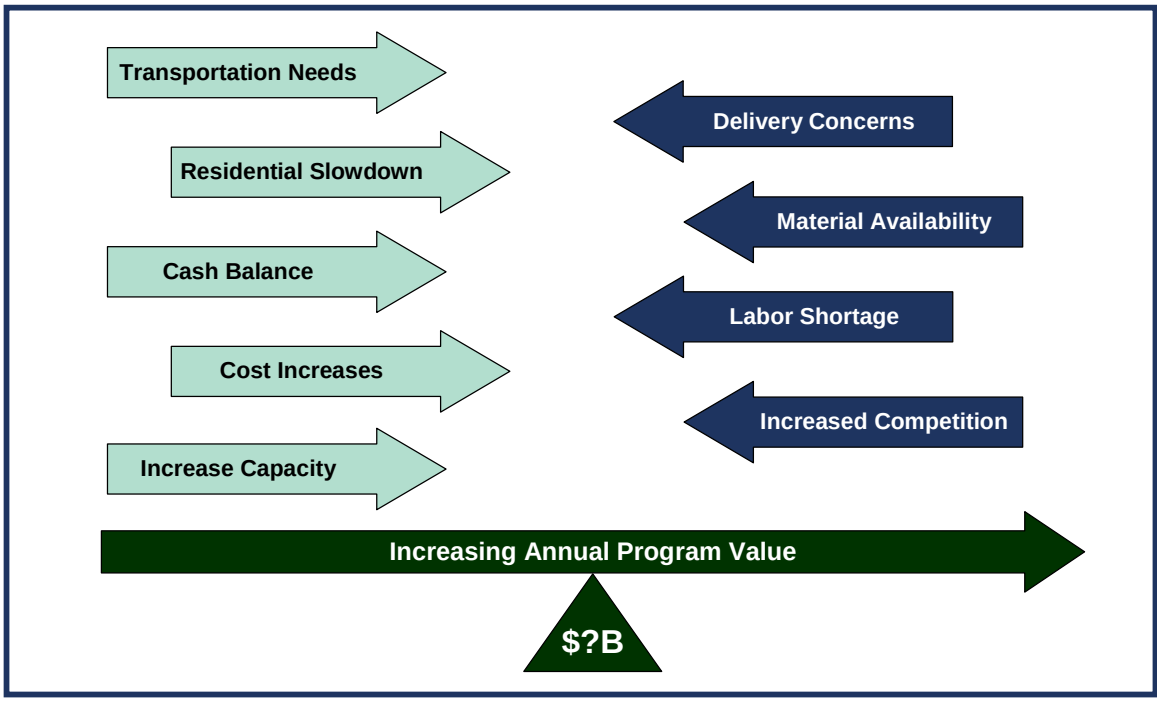
The rate of growth in construction activity in Florida over the past several years is impressive. At its peak, the annual value of construction per capita was twice that of the national average and substantially higher than other construction intensive states, including Texas and California. This rate of growth required a substantial increase in the construction workforce, as well as significant increases in the production of certain key materials in Florida. As mentioned earlier in

this report, there are a number of indications that continued growth at this rate would have been difficult to sustain, and that in effect the market was reaching, or had reached, capacity.

As a result of FDOT's improved understanding of the construction market dynamics in Florida, it now knows that it must carefully consider a number of competing factors, illustrated in Figure 4, when determining an appropriate target letting value each year. If FDOT's letting level in any given year is too high, it may contribute to returning Florida's construction market to the point at which it is close to capacity. This condition in turn stands to: negatively impact project delivery (i.e., project schedules will be longer than anticipated); overstretch the supply of key materials (i.e., forcing suppliers to institute allotments[1] and raise prices); overstretch the supply of labor, driving up labor costs; and, tend to reduce competition for its projects because of the volume of work already contracted with the qualified contractors. On the other hand, there are legitimate reasons why FDOT might want to push the target letting value up, including: the fact that transportation needs are growing; a desire to capitalize on the slowdown in residential construction, which should increase the availability of materials and labor; the risk of maintaining a high balance in the transportation account, which may be seen by the legislature as available for expenditure elsewhere; the belief that costs will continue to rise, therefore a project will cost less this year than next; and, a desire to encourage the growth of construction capacity.

This careful consideration of competing factors, combined with its improved understanding of the dynamics of Florida's construction market, were critical inputs to FDOT's decision about the target letting level for the current fiscal year (2006/2007). Furthermore, FDOT is committed to considering these same issues in determining letting levels each year moving forward.

Figure 4. Factors that FDOT must Balance when Determining the Target Value of Annual Construction Letting



[1] Allotments is a process by which suppliers restrict the days on which a particular contractor may pick up a particular material in order to keep demand in line with its production capacity.