Fiscal Year 22/23

2nd QUARTERLY REPORT

Strategic Resource Evaluation Study Highway Construction Materials

Contract BEC18

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The Balmoral Group

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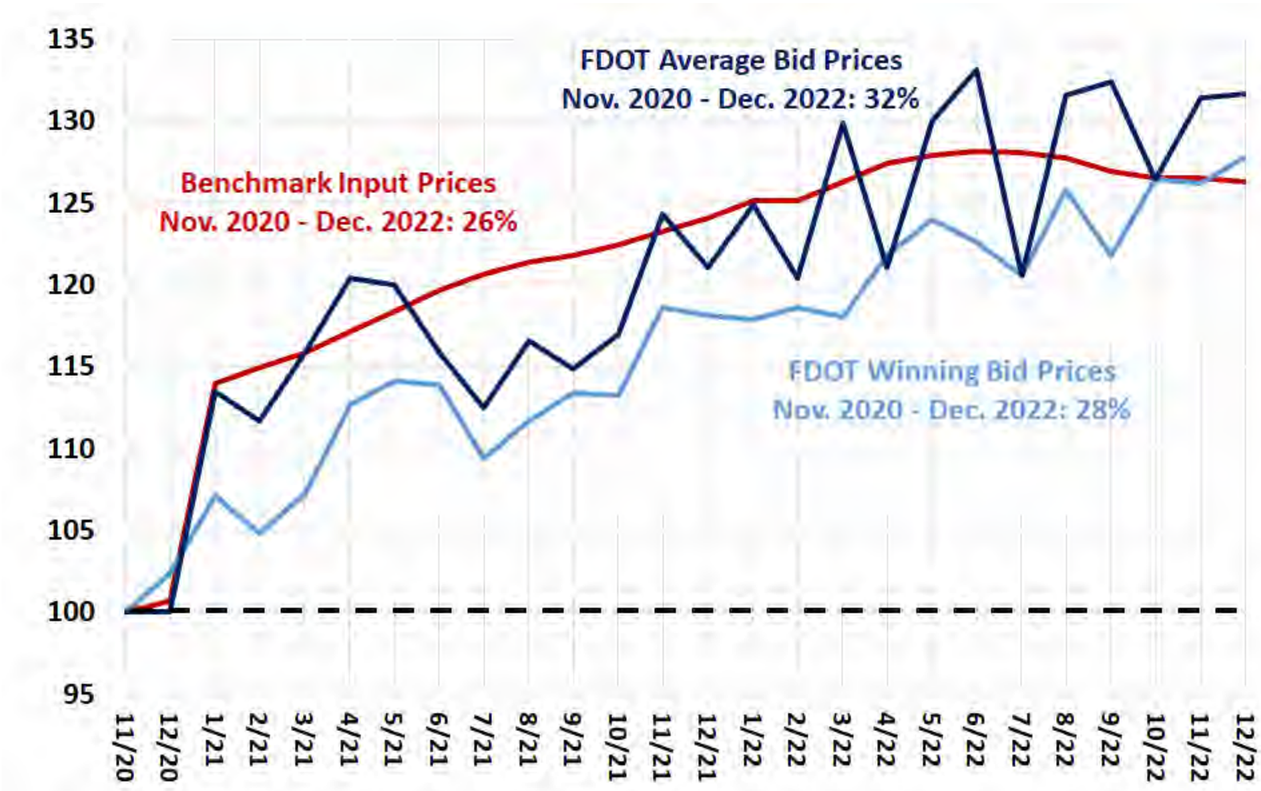
OVERVIEW ➤ FLORIDA'S HIGHWAY CONSTRUCTION MATERIALS

Construction Material	Status
ASPHALT	**Continued high rates of spending in the heavy and civil construction sector are supporting high asphalt bids and will continue to.** Binder prices, trucking, aggregate, and labor continue to contribute to high asphalt prices as well. Market variation in bids reflects larger macroeconomic conditions and competition for resources in each region. Year-to-Date activity is tracking against the higher bound of forecasted HMA costs for FY 2023, well above the medium estimate.
CONCRETE	**U.S. cement production capacity is expected to increase this spring for the first time since 2009, a reflection of high levels of economic activity supporting demand.** Competition for resources from very high funding levels while fly ash supply and other inputs are constrained is reflected in higher bids. However, insufficient data makes it difficult to meaningfully discern trends. Careful monitoring of bids over the next quarter will be necessary to determine if forecasts need to be adjusted upward. Suppliers are looking forward to a potential reclaimed fly ash plant opening in Georgia next year. Producers appear to have increased prices as of January 1st, 2023 and additional increases are anticipated for the summer.
STEEL	**With some basic steel product prices declining in recent months, FDOT will need to continue to be vigilant as many industry projections show prices potentially increasing by summer.** Interviews indicate mixed pricing, with some reporting price increases already for pipe, plate, and scrap in FY 2023, while others report improvements. Fabricators report that hardware and specialty parts are experiencing new delays and availability issues, leading to increasing lead time issues. However, lead times have improved for basic materials to almost normal. China dramatically reduced steel prices in December 2022, which will potentially add to supply for non-federally funded projects. At the same time, increased military and infrastructure funding with reduced global supply will continue to create volatility.
AGGREGATE	**Supply issues are erratic and inconsistent across the state, with more critical disruptions being reported in Districts 2 and 3.** Hurricane Ian has created additional demand for aggregates, while demand from other competing sectors is cited by suppliers as supporting higher prices despite slight economic slowdown in the commercial and residential sectors. FDOT's baseline year-to-date aggregate bids have overshot forecasts, with prices rising 17% in the first six months of FY 2023 compared to 2022. Interviews indicate mid-year price reviews, which has not been the norm historically. As additional project announcements support further increases in demand, bids in the next quarter will need to be monitored carefully. Continued issues with diesel prices are affecting bids as well as ongoing labor shortages.
EARTHWORK	**Operators indicate diesel costs, driver shortages, and parts availability issues continue to wreak havoc on service delivery and costs.** Excluding two major projects that comprise 90% of bid volumes, FDOT bids in the first six months of FY 2023 would have reflected an increase of 30%, substantially overshooting forecasts. Energy price volatility is likely to be the major driver of bid behavior in the next quarter.
	After the previous six-month waiver expired on November 10th, 2022, the U.S. DOT issued two new Buy America waiver proposals due to continued supply constraints. The first one proposes to waive the requirements for iron and steel, manufactured products, and construction materials for de minimis costs, small grants, and minor components. The second one waives the requirements for contracts entered into before November 10, 2022 or for projects that were solicited before May 14, 2022 and entered into contract before March 10, 2023. Asphalt, cement, and aggregate materials remain exempt from the requirements.

An FDOT Cost Index was calculated by assessing awarded and average bids since November 2020. The share of aggregate, asphalt, concrete, and steel dollars spent on FDOT projects was compared to a baseline industry cost index (**Figure 1**). Benchmark input prices have seen slight declines since June, but remain 26% higher than November 2020 costs. FDOT's bid prices have been affected by recent surges in asphalt and aggregate costs, with the average bid in December 2022 running 32% higher than November 2020 prices. Winning bids have also topped benchmark input costs, at 28% over November 2020 levels.

Figure 1. Florida Benchmark Input Costs vs FDOT Bid Prices



Source: TBG calculated from data provided by FDOT Office of the Work Program and Budget, TBG Work Product.

Disclaimer

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the State of Florida Department of Transportation

Prepared in cooperation with the State of Florida Department of Transportation.

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INTRODUCTION

The Florida Department of Transportation commissioned The Balmoral Group (TBG) to evaluate the availability and costs of critical highway construction materials in Florida. The evaluation includes an analysis of existing and planned supply of these materials, and an estimate of future costs and quantity requirements FDOT will face in fulfilling its five-year work program. Markets in the analysis include bituminous, cement, steel, and aggregate materials, and earthwork. The report is organized as follows:

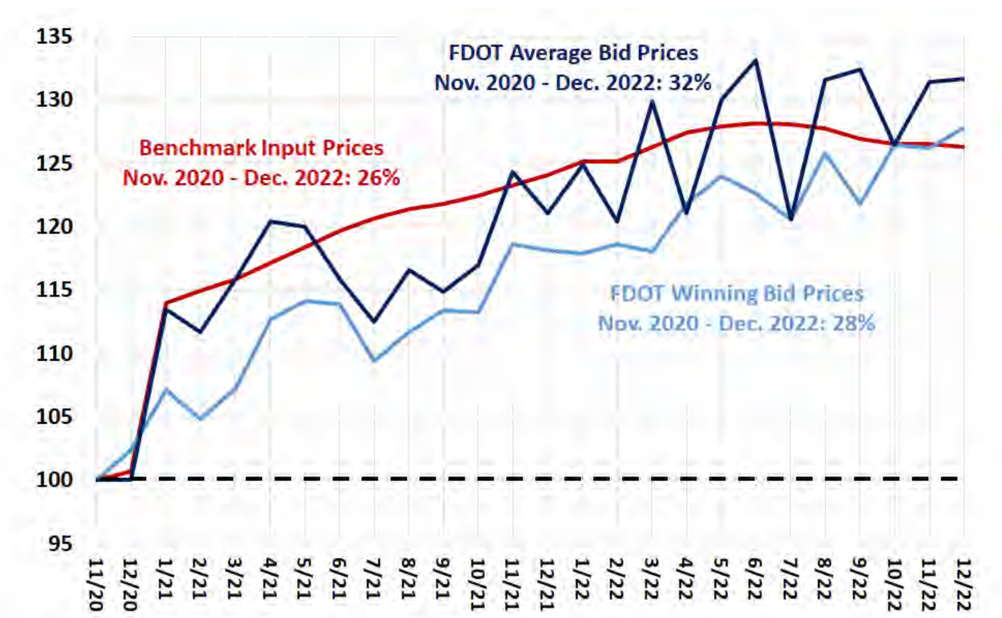
- **General Economic Landscape** for highway construction materials,
- **Work Program Work Mix** allocation and materials quantities estimates,
- **Material-specific findings** for supply chain variables, including
    - raw material sources,
    - existing and likely future transport and distribution methods,
    - potential impact of external forces including global markets, technological change, foreign materials, and environmental regulatory or permitting issues, as relevant,
    - forecasts of likely Florida supply and FDOT costs for the five-year work plan.

GENERAL OUTLOOK ➤ HIGHWAY CONSTRUCTION MATERIALS

Input Costs vs. Bid Prices

Regional industry prices declined slightly in December 2022, but are still 26% higher compared to November 2020 (**Figure 2**). For awarded (winning) FDOT bids, prices across major materials have topped industry input prices, ranging 28% higher compared to the benchmark period. For all FDOT bids (the average of all bids received), prices continued to exceed benchmark input costs at 32%. Monthly cost composition by material is provided in **Appendix A**, along with an update on the Bureau of Labor Statistics (BLS) Producer Price Index (PPI).

Figure 2. Florida Benchmark Input Costs vs FDOT Bid Prices



Source: TBG calculated from data provided by FDOT Office of the Work Program and Budget.

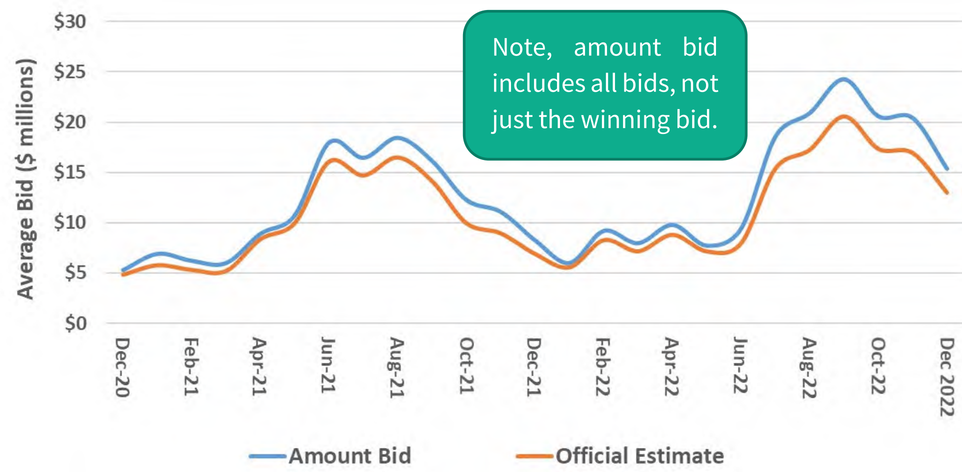
The Associated General Contractors of America (AGC) released its 2023 Construction Outlook. Overall, contractor's optimism for 2023 relies on public spending as they expect available dollars for private projects to decline. 92% of Florida's contractors expect money available for transportation and bridge/highway projects to be the same as or higher than 2022.

As the biggest challenges for 2023, the majority expect issues that have been common this past year: materials costs, supply chain issues, potential for economic slowdown and higher labor costs are the top concerns.

Bid Data

In economic terms, the expected value is the average of all bids. In this analysis, the average of all bids, or the mean, is compared to the official estimate. In the second quarter of 2023 (October – December, 2022), the average deviation of bids from the estimate was 19%. This wider spread is similar to what was seen in the summer of 2021, but higher than more recent quarters, which were around 11% (**Figure 3**). However, excluding contracts exceeding an official estimate of $100 million from the analysis finds that for the second quarter of FY 2023, the rolling average of all bids were 4% higher than the official estimate, which is a smaller spread compared to previous quarters.

Figure 3. Average Bid vs. Official Estimate, 3-month Rolling Average

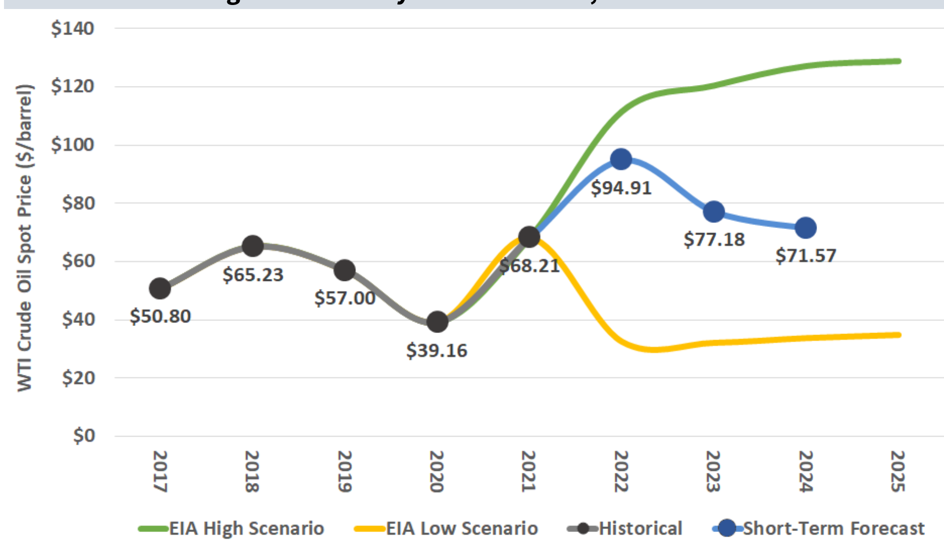


Source: FDOT; TBG Work Product

Energy Prices

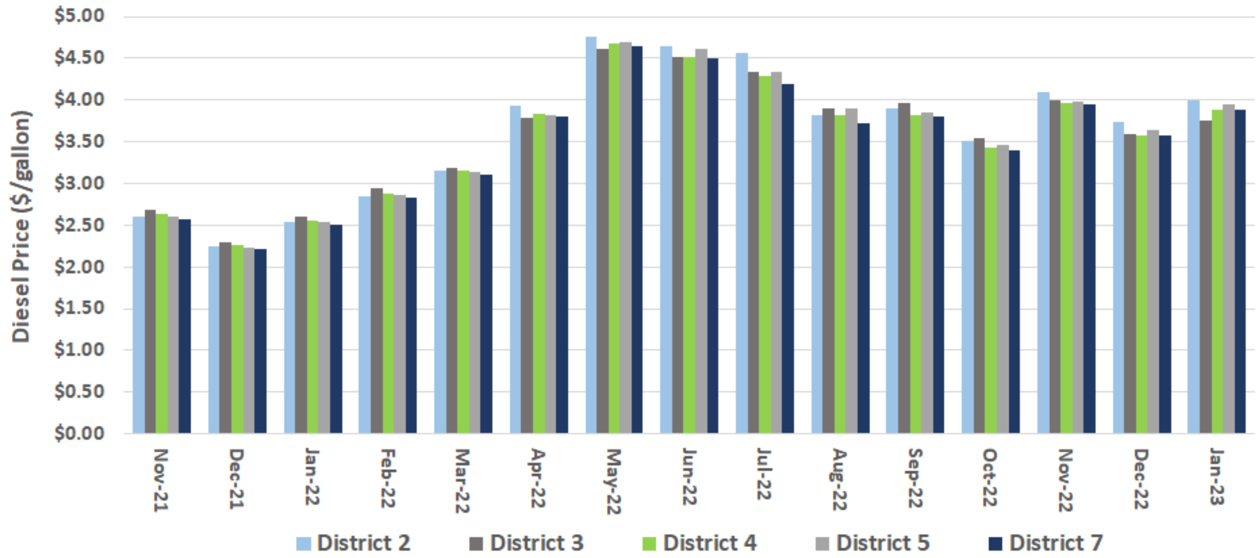
The U.S. Energy Information Administration (EIA) January 2023 Short-term Outlook adjusted U.S. crude oil prices in 2022 down slightly to $95 per barrel. Forecasted prices are expected to decline further to $77 per barrel in 2023 and $72 per barrel in 2024 under current economic conditions (**Figure 4**). Prices fell 35% in January 2023 compared to the peak in June 2022. Compared to January 2022, U.S. crude oil prices are down 11% going into 2023. Florida diesel prices crept back up during the holidays, but remain 17% below the peak of over $4.50 per gallon in May 2022. Price quotes from suppliers at terminals around the state hovered around $4.00 per gallon in January 2023 (**Figure 5**). Statewide, diesel prices rose 74% through December 2022, year-over-year, to $3.73 per gallon. Prices further increased by 8% in January 2023 compared to December 2022. From the peak in May 2022, diesel prices are down 17% in the first month of 2023.

Figure 4. Monthly Crude Oil Price, 2017 to 2025



Source: EIA Annual Energy Outlook and Short-term Forecast.

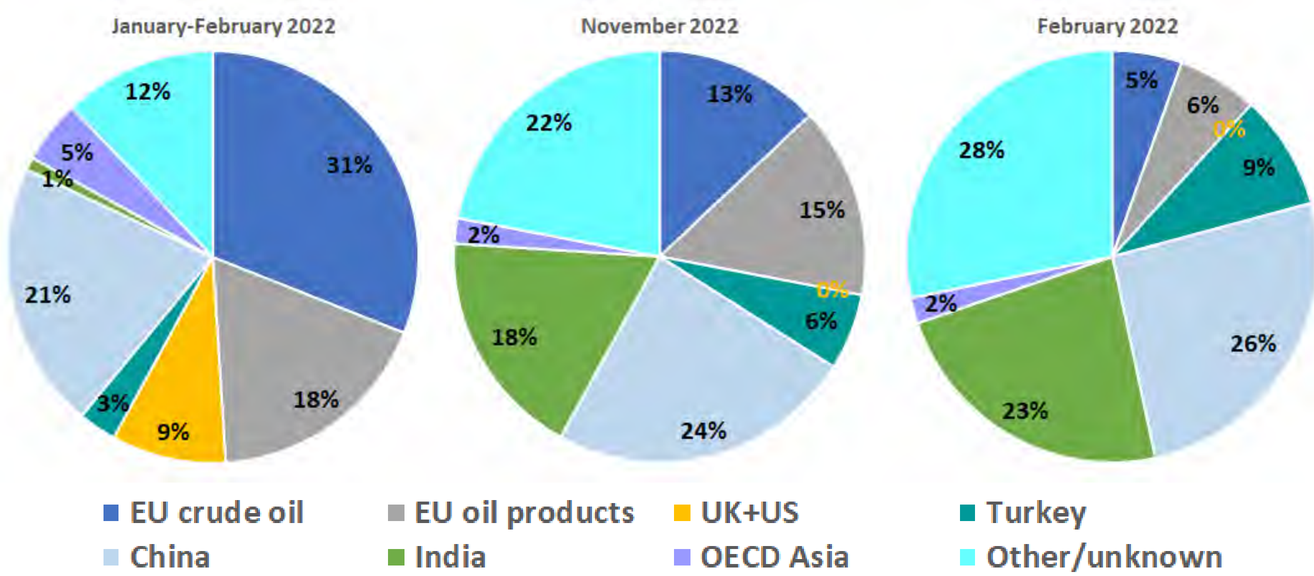
Figure 5. Average Diesel Price by District



Source: FDOT, TBG Work Product (D1 and D6 terminals did not report data).

On December 5, 2022, further sanctions adopted by the European Council against Russia went into effect, prohibiting the purchase, import, or transfer of seaborne crude oil from Russia to the EU (European Union). Similar restrictions had already occurred in the U.S. and the U.K. by November 2022. From February 5, 2023 onward, the ban on Russian exports to the EU will include other refined petroleum products, essentially removing access to Russian oil and products, like diesel fuel, from many European markets. A temporary exception allows for imports of crude oil by pipeline into landlocked EU member states that currently have no viable alternative options. The shift in Russian oil exports during the first two months of 2022 to November 2022 was drastic (**Figure 6**), and is expected to continue to be so after the full ban takes affect at the beginning of February 2023.

Figure 6. Russian Oil Exports by Destination

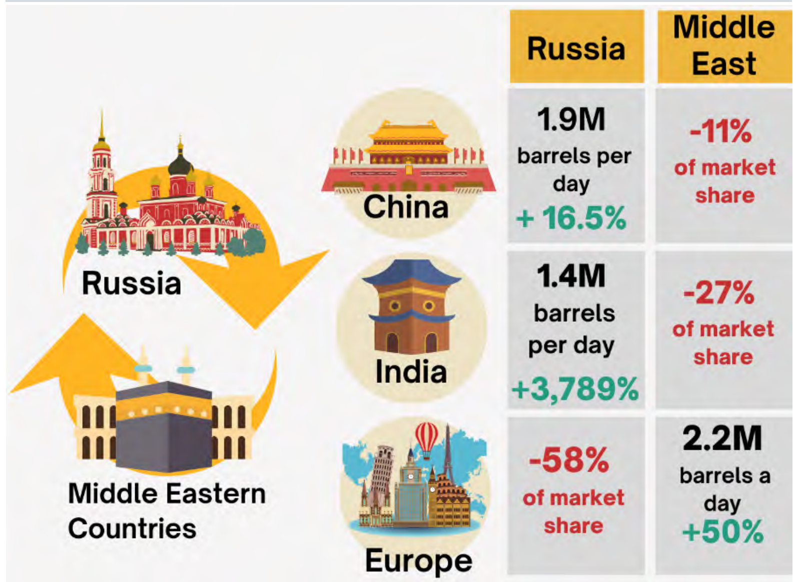


Source: Reuters, TBG Work Product based on industry data and publications.

While industry experts do not think Russia will be able to fully offset the loss of western markets, nor will the EU be able to replace all exports lost to the ban in the short-term, the shift in world energy markets is expected to reach an equilibrium in the long-term, once the logistics of flip-flopping the world's energy flows is worked out.

In the last couple months, for instance, EU member countries have increasingly contracted with Middle Eastern countries like Saudi Arabia to make up for lost Russian oil, while Russia is increasingly shipping oil to India and China, among others (**Figure 7**). While the equation isn't quite balanced yet, major inroads have been made in a relatively short time, which should help to mitigate any wild price fluctuations for diesel fuel and other products.

Figure 7. Shift in Global Energy Flows

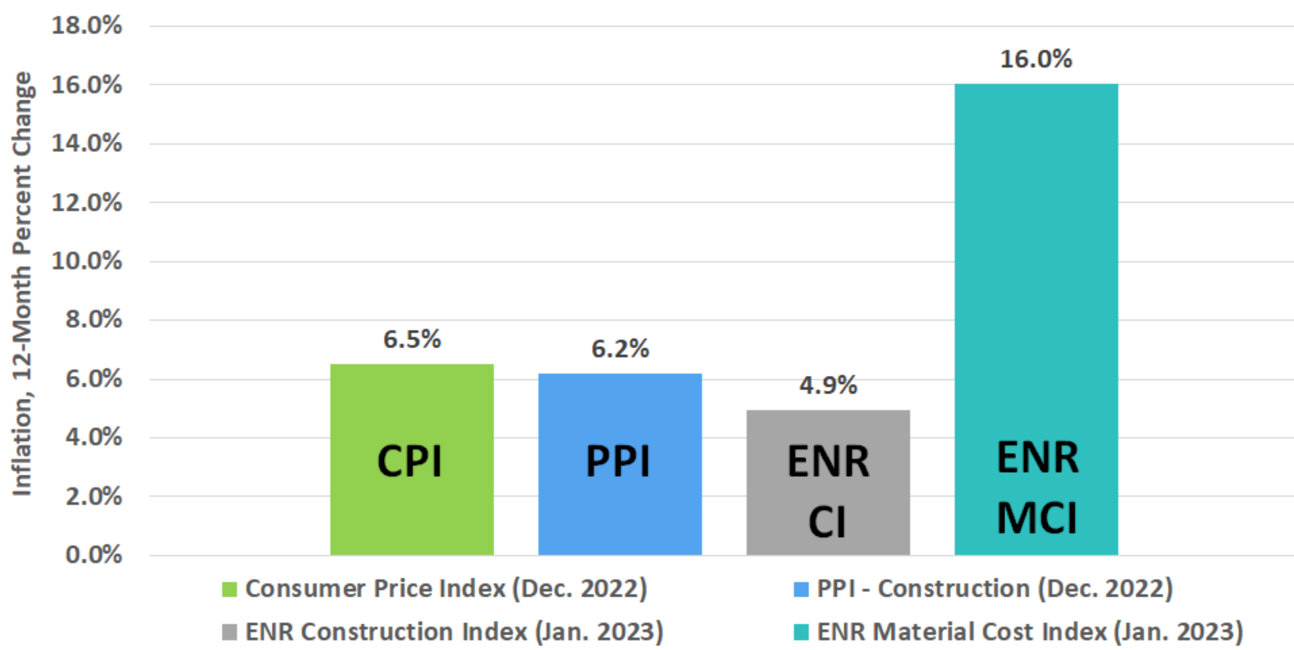


Source: TBG Work Product based on industry data and publications.

Inflation

The Federal Open Market Committee released revised economic projections in December 2022, increasing inflation estimates to 5.6% (vs. 5.4% in September's projections) for calendar year-end 2022 and 3.1% (vs. 2.8% in September's projections) for 2023. Additional inflation measures by public and private entities are provided in **Figure 8**. Inflation estimates through the last quarter ranged between 4.9% to 16.0%, depending on the source. Construction materials remain elevated compared to a year ago, while general inflation has markedly declined in the last two months.

Figure 8. Inflation Estimates, January 2023



Source: BLS, U.S. Census, ENR.

Funding and Regulation

Below are recent developments that may affect the transportation construction industry:

WATER RESOURCES DEVELOPMENT ACT

In December 2022, Congress reauthorized the Water Resources Development Act, which allows the U.S. Army Corps of Engineers to complete water infrastructure improvement studies and construction projects. In the authorized projects list, Florida has four for hurricane and storm damage risk reduction (in Monroe, Miami Dade, Okaloosa and Pinellas counties) and an additional in the Indian River Lagoon. The total value of these is close to $9 billion and as such, these projects increase competition for resources.

BUY AMERICA WAIVERS

The U.S. DOT issued two new Buy America waiver proposals after the six-month waivers expired on November 10th. The first one proposes to waive the requirements for iron and steel, manufactured products, and construction materials for de minimis costs, small grants, and minor components. The second one waives the requirements for contracts entered into before November 10, 2022 or for projects that were solicited before May 14, 2022 and entered into contract before March 10, 2023. Asphalt, cement, and aggregate materials are exempt from the requirements.

WATERS OF THE UNITED STATES

In December 2022, the Environmental Protection Agency (EPA) published the final rule that is based off the pre-2015 regulations. Roadside ditches, which is a concern for transportation organizations were added back (although there are exemptions for them). Several industry organizations sued the EPA over the ruling. They oppose the new rule not only because it expands the protected waters, but also because it was published before the Supreme Court ruled in the Sackett v. EPA case, which aims to determine the extent of Federal authority under the Clean Water Act. Depending on the outcome, the EPA may have to write a new rule, increasing uncertainty for producers.

MOVING FLORIDA FORWARD INITIATIVE

The Governor announced a plan to invest $7 billion over the next four years to expedite 20 priority infrastructure projects into the existing Work Program.

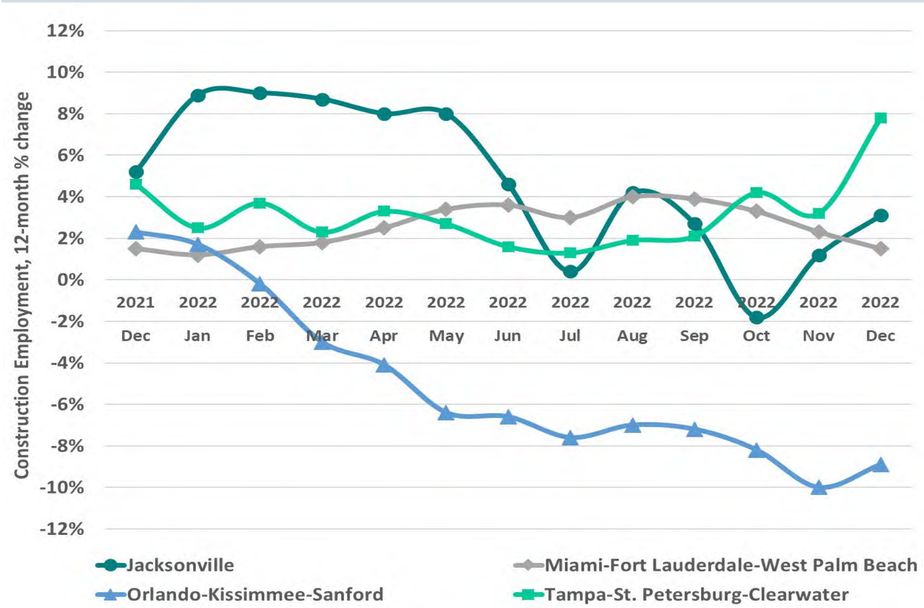
OTHER REGULATIONS

The EPA recently proposed tightening federal standards for particulate matter. The American Road & Transportation Builders Association opposes this change as counties don't have enough time to adopt the changes and could see their highway funds withheld if they are out of compliance. The Council on Environmental Quality released interim guidance on the effects greenhouse gas emissions would affect project reviews under National Environmental Policy Act (NEPA). Industry organizations also oppose this as they argue that it would cause further project delays. Additionally, new regulations in relation to shipping are discussed in the supply chain tables.

Construction Employment

Statewide construction employment increased 4.4% in December, year-over-year (**Figure 9**). Construction employment growth rebounded in Jacksonville in November and continued the trend in December. The Tampa metro area has had the largest employment growth, while the Orlando metro area is still close to a 10% decline. These declines are potentially due to workforce availability e.g., increasingly unaffordable housing, which has driven successive declines in construction employment in Central Florida despite record levels of construction spending. The Miami metro area continued fluctuating

Figure 9. Changes in Construction Employment in Major FL Markets



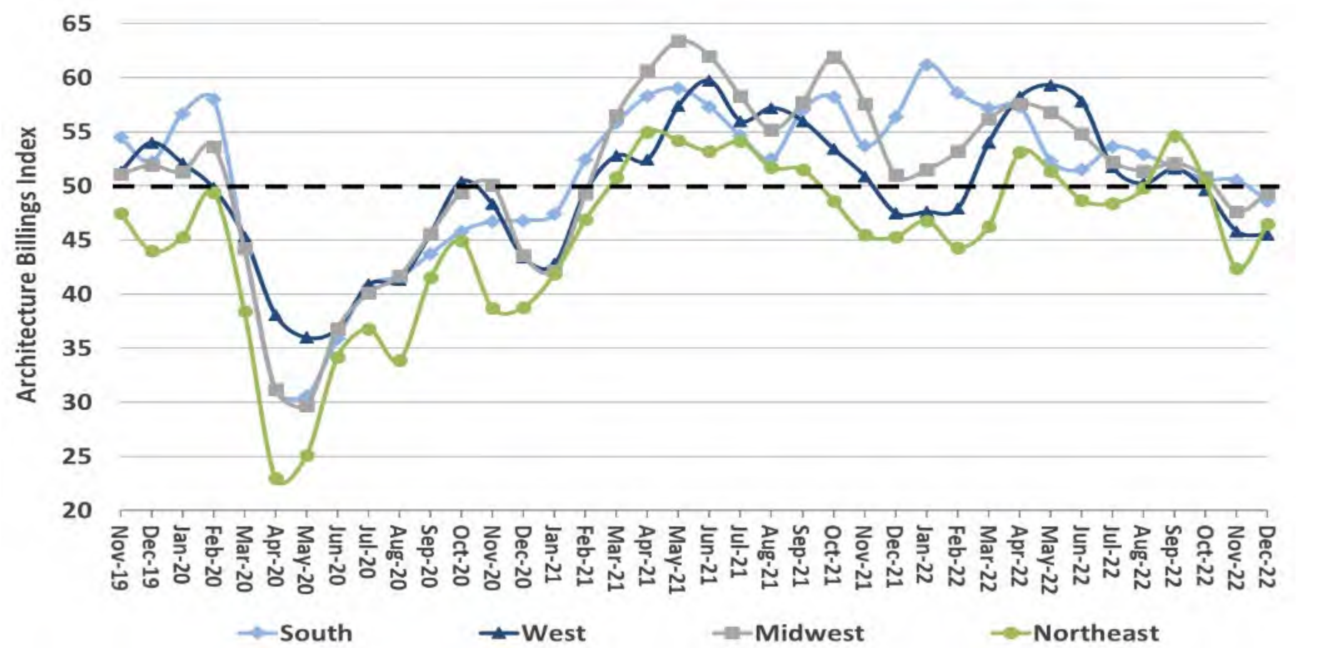
Source: Bureau of Labor Statistics

around the 2% to 4% growth seen in 2022. Additional information on economic conditions and employment forecasts is provided in **Appendix A**.

Billings

The Architecture Billings Index (ABI)[1] is a lagging indicator (between 9 to 12 months) of nonresidential construction activity. Nationally, the ABI score was 47.5 in December, indicating that a majority of architecture firms saw declining billings at their firms. It is the first time since January 2021 that all regions saw declines, indicative of the overall slowdown of the economy (**Figure 10**).

Figure 10. ABI Billings Index, Nov. 2019 – Dec. 2022



Source: American Institute of Architects, Architecture Billings Index.

Rail

Nationally, Congress intervened in rail union contract negotiations in order to avoid a strike, imposing a new 5-year contract on workers despite their objections. President Biden signed the congressional resolution in early December, ending negotiations for the time being.

In District 1, Seminole Gulf Railway indicated the need for funding to be able to complete repairs from Hurricane Ian damage within six months. Without assistance, it could take them more than a year to restore service. In response, the Short Line Railroad Relief Act was introduced in Congress in December 2022. The bill would authorize funds for short line equipment and facilities that suffered or are at risk of suffering catastrophic damage due to an emergency. It is unclear whether the bill will pass.

Through the end of 2022, carriers continued increasing headcount for train & engine employees. CSX increased its workforce by 11% year-over-year to just above 7,500. The company had previously reported that they needed to be around these number of workers to address service and demand issues.

[1] Architecture Billings are considered an important indicator of future construction activity, which generally follows 9-12 months after billings activity is reported. An index score below 50 indicates a decline in firm billings, while a score above 50 indicates an increase.

Asphalt

Summary

- Binder prices continued decreasing through the end of 2022, but are still high compared to pre-pandemic levels. Prices have decreased with lower crude oil prices, and supply has been higher than normal for this time of year.
- Binder imports decreased 12% through November 2022 as imports since August have been close to zero. New restrictions to the shipping industry could slowdown future cargo.
- Industry outlook for 2023 is positive as public highway funding is expected to offset a slowdown in private projects.

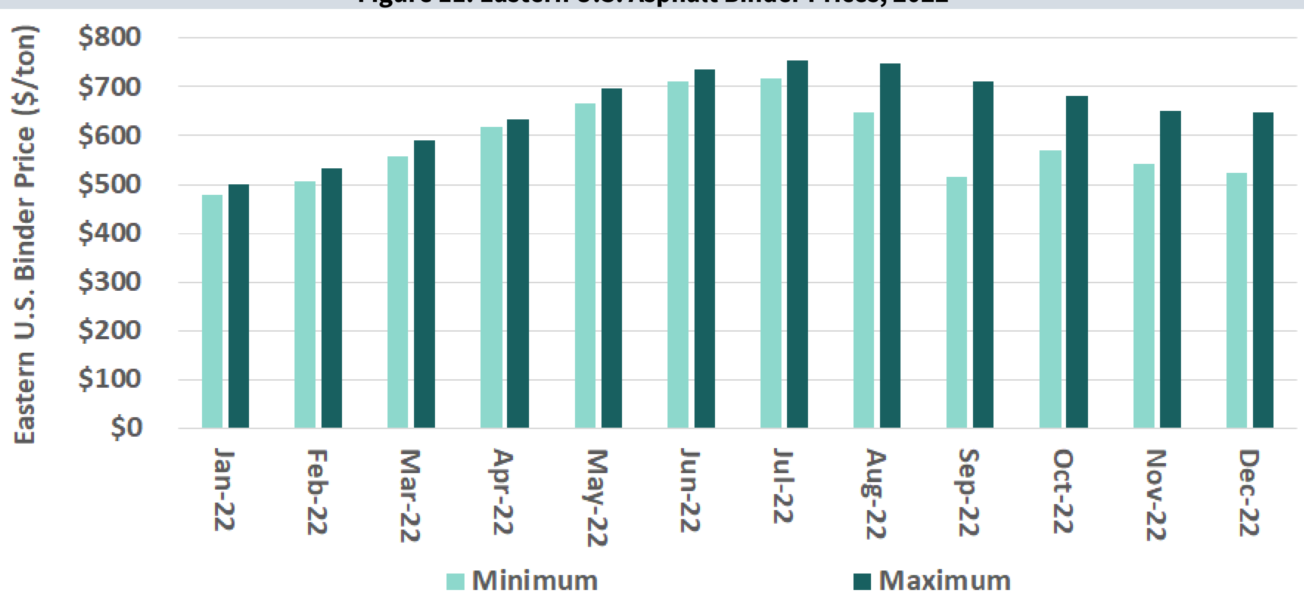
FDOT impacts

- Continued high rates of spending in the heavy and civil construction sector are supporting high asphalt bids and will continue to.
- FDOT HMA bid prices are up 15% through the first six months of FY 2023 after rising 21% in 2022. Bid prices are reflecting market variation around the state. For example, the slowing Central Florida market has constrained some bids in District 5, but the booming economic activity in the Tampa area has led to increased bid costs in District 7.
- Suppliers report trucking and aggregate supplies as the greatest sources of concern this quarter, with binder costs and labor shortages an ongoing issue.

General Trends

Average asphalt binder prices in the Eastern U.S. were 26% higher in December 2022 compared to the beginning of the year (**Figure 11**). However, binder prices did decline 16% in December compared to the peak in July. If global fuel markets continue to moderate, further decreases in binder costs are expected.

Figure 11. Eastern U.S. Asphalt Binder Prices, 2022

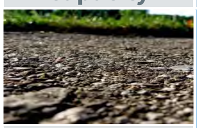
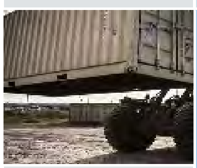


Source: TBG work product, U.S. DOT Federal Highway Administration.

SUPPLY CHAIN VARIABLES > **ASPHALT PAVEMENT MATERIALS**

Table 1 provides the current status of selected variables of interest.

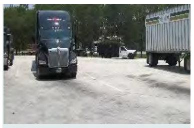
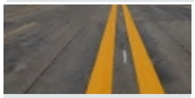
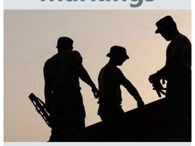
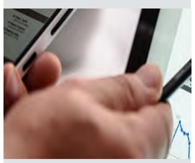
Table 1. Supply Chain Summary: Asphalt Materials

 **Aggregate**	USGS reports that Florida's crushed stone production rose 13% through September of 2022. Nationally, production grew 3% again. Securing raw materials in a reliable manner is still an issue. Some suppliers reportedly announced significant price increases effective in January 2023. Interviews indicated aggregate supply to be a major concern.	
 **Refinery Capacity**	With the exception of one week, refinery utilization in the Gulf Coast was between 92% and 98%. The last week of 2022 it dropped to 78% as refiners were forced to shut down due to freezing temperatures. Costs declined as heavy crude prices did, but they will continue to be affected by geopolitical factors. In November 2022, the U.S. eased sanctions on Venezuela, allowing Chevron to import Venezuelan oil. Reports indicate that two tankers each with a capacity of 250,000 barrels arrived in Venezuela late in December and are expected to go to a refinery in the Gulf.	
 **Asphalt Binder**	While unmodified (PG 67 & lower) asphalt binder prices increased 25% in 2022 and are still high compared to 2021, they have declined 15% since August 2022. Argus reports that U.S. asphalt inventories are higher than usual at this time of the year. While refining economics still disincentivize asphalt production, refiners have also been producing more heavy crude, which results in more binder production even if the share is lower. Through the end of 2022, inventories were 14% higher than the 5-year average. Reports expect no issues with supply during the first half of 2023. Rack binder prices[2] in Jacksonville, Miami and Tampa declined 2% since October 2022. Compared to January 2022, they are still significantly higher in all three areas: 32%, 31% and 23%, respectively. Global oil supply-demand dynamics might change with oil sanctions to Russia.	
 **Polymers**	With very few suppliers, polymers are a source of vulnerability. Slowdown in other sectors have decreased demand and prices. U.S. production of resins continued its downward trend with production declining 1.9% in November vs. the previous month and 5.4% year-over-year[3]. The Chemical Regional Production Index also fell in all regions in November, with the largest declines seen in the Gulf Coast for competing products but not polymer, so increased availability should constrain polymer prices. Price decreases seen in 2022 were due to reduced demand from the housing sector and oversupply. Reference prices and volumes from Q3 earnings of a publicly traded company for many polymers saw single digit to double digit declines. The average cost per ton of ethylene[4] production also declined 5% in the quarter. However, compared to the same timeframe of 2021, they were still 84% higher. The outlook for 2023 is mixed as some expect demand and prices to rise in the second half of 2023 as producers deplete inventory.	
 **Imports**	While freight costs have limited imports, they have decreased enough to create opportunities to import product from the Mediterranean. Data from the U.S. International Trade Commission shows that while imports in 2022 were higher early in the year compared to 2021, they were 12% lower through November. Miami continues being the main destination. Reports indicate that congestion at ports in both coasts eased significantly through the end of 2022. However, on January 1st 2023, the International Maritime Organization (IMO) began enforcing two new regulations aimed to measure and control carbon emissions. This is expected to reduce the availability of ships as older vessels are decommissioned or retrofitted, and to delay imports as ships go slower to limit emissions. In late December, the threshold to waive Jones Act requirements was increased in the most recent defense bill; the effects, if any, on asphalt pricing will not be known for several quarters.	
	As mentioned in the rail section, CSX continued increasing headcount for train & engine employees. In the third quarter of 2022, tons of asphalt products shipped declined 13% and revenue declined 3%, year-over-year. Year-to-date, tons shipped declined 10%, but revenues rose 1%. Both indicate an increase in prices.	

[2] Argus' asphalt rack prices reflect trades of different grades of asphalt within a defined region, which include where the seller commits to deliver to the buyer's truck, typically at a truck-loading rack

[3] ACC = American Chemistry Council

[4] Ethylene is part of the process to make different types of polymers, so higher ethylene costs will lead to higher polymer prices.

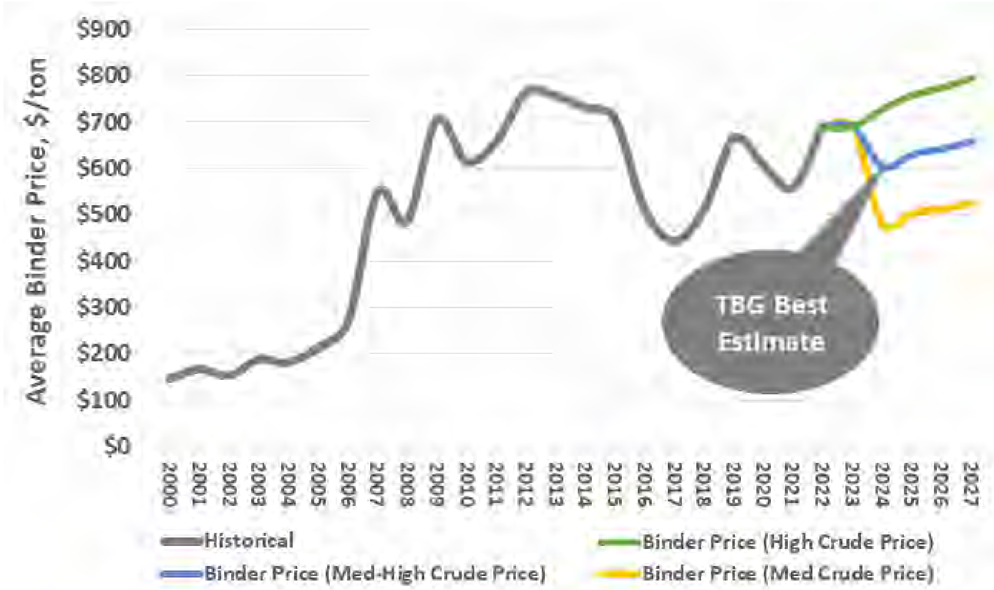
Rail	Additionally, CSX's average weekly terminal dwell time in Jacksonville and Waycross, GA fluctuated within similar times in November and December. 20 hours for Jacksonville and 24 for Waycross. However, both increased sharply the first week of 2023, possibly as a result of weather-related backlogs, but they have returned to similar levels.	
 **Trucking**	Asphalt suppliers continue facing issues with driver availability and transportation costs. Diesel prices have increased once again late in 2022 with reports of a shortage of diesel around the country. Spot rates in 2023 continued declining year-over-year, but are still 6% above the 5-year average. Trucker shortages still persist, but overall demand has decreased as the economy slows. The American Trucking Association trends report indicated that there's still a 78,000-driver shortage nationwide, down from 81,000 in 2021.	⬆
 **Pavement Markings**	As mentioned in the polymers section, overall demand for plastics have eased, something that could benefit the industry as prices continued decreasing. Overall, pavement markings and other plastics-based/petroleum-based ancillary products remain vulnerable to current supply chain issues, production adjustments and crude oil markets. No changes during this quarter.	⬆
 **Labor**	Skilled labor is an ongoing concern for asphalt plant operators and additional workers will be needed as increased funding for transportation and infrastructure projects boosts demand over the next few years. Statewide construction employment has increased 4.4% year-over-year, but not all metro areas are experiencing the same conditions as mentioned in the construction employment section. In AGC's 2023 outlook survey, 96% of construction firms in Florida indicated having difficulties filling positions. 63% think it will continue to be hard to hire and only 15% think it will become easier. Interviews confirmed this perception and noted that conditions haven't had much change.	⬆
 **Competition**	In FDOT's approved producer list one plant was recently inactivated in District 1 and two were approved in 2023 (one in District 3 and the other in District 4). FDEP's air permitted facilities show one asphalt plant under construction in Alachua County and an additional plant that recently permitted in Orange County. Additional plants would increase competition for FDOT projects. While competition from other sectors has slowed down, it is full-force in nonresidential, creating competing demand for resources.	=

⬆ **Exerting negative influence on FDOT's costs; monitor.**
= **Currently stable; not influencing FDOT's costs.**
⬇ **Exerting positive influence on FDOT's costs.**

Asphalt Binder

Although crude oil prices have declined rapidly over the last few months, some products like diesel fuel and asphalt binder have lagged behind. The global crude oil market is still in a fragile state, and while the switch over of oil supply streams in Europe and Asia are going much smoother than anticipated, renewed disruptions are still likely. Using a variety of models for fit, average historical FDOT binder prices were forecasted to 2027 under medium to high crude oil price scenarios. A low crude price scenario is not considered likely at this time. Statewide binder price outlooks are shown in **Figure 12**.

Figure 12. FDOT Average Binder Cost, FY 2023 Q2 Forecast



Source: TBG calculated from FDOT Fuel & Bits Index.

Asphalt Forecast

Asphalt prices are projected in **Table 2** for the five-year construction work program. Regression modeling was performed using pay item data, supply chain variables, and other macroeconomic indicators to identify models that best predicted FDOT's materials costs and quantities. The Year-to-Date Track (July 2022 through December 2022) for prices shows how preliminary FY 2023 costs compare to the forecasted FY 2023 scenarios (**Figure 13**).

Updated binder price forecasts and macroeconomic variables show that volatility is projected to continue over the next few years. The current best estimate predicts HMA weighted average prices topping fiscal year 2022 record highs in 2023, followed by a decrease in 2024 due to recessionary conditions. Prices are forecast to rebound with demand in subsequent periods. It should be noted that asphalt bids during the first six months of fiscal year 2023 increased 15% according to preliminary data, tracking higher than the best estimate at this time. Bids should be monitored over the next quarter to access the permanence of recent cost increases given a potential recession this year.

The lower bound scenario reflects drastic recessionary conditions, with asphalt prices resetting to 2021 levels. According to a recent National Association of Business Economics (NABE) survey, 57% of economists[5] think the U.S. may enter a recession in 2023. The upper bound estimate relies on crude, rather than binder prices, ends at $185 per ton, reflecting increased uncertainty in the market.

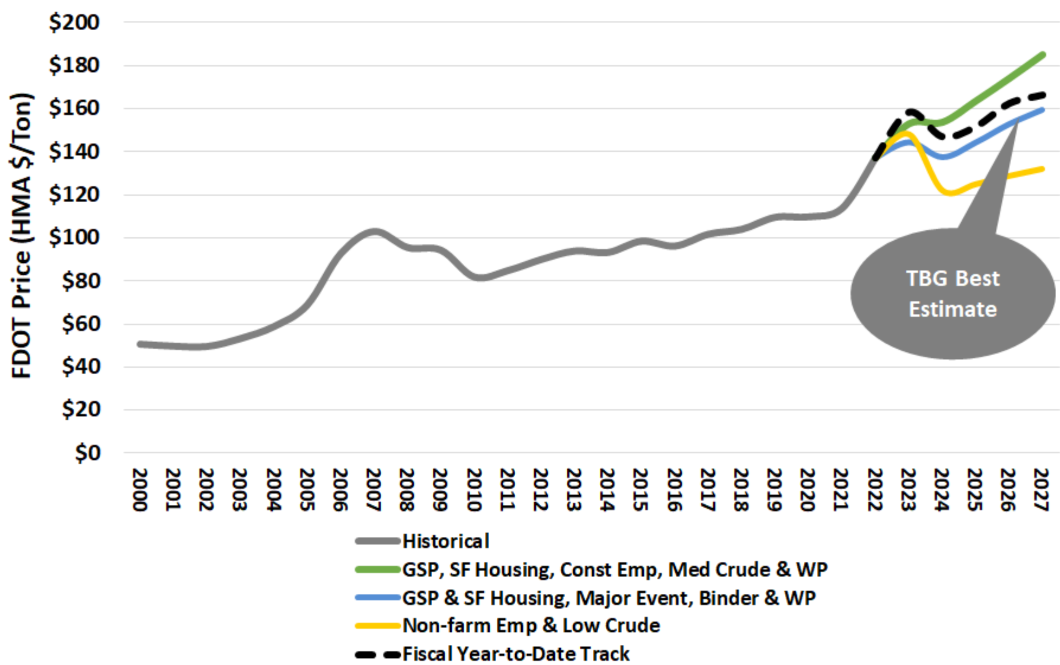
Table 2. FDOT HMA Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price HMA, $/Tons	$137.27	$144.29	$137.34	$144.14	$152.60	$159.26
Percent Change, %	20.6%	5.1%	-4.8%	4.9%	5.9%	4.4%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

[5] December 2022 NABE Outlook Survey

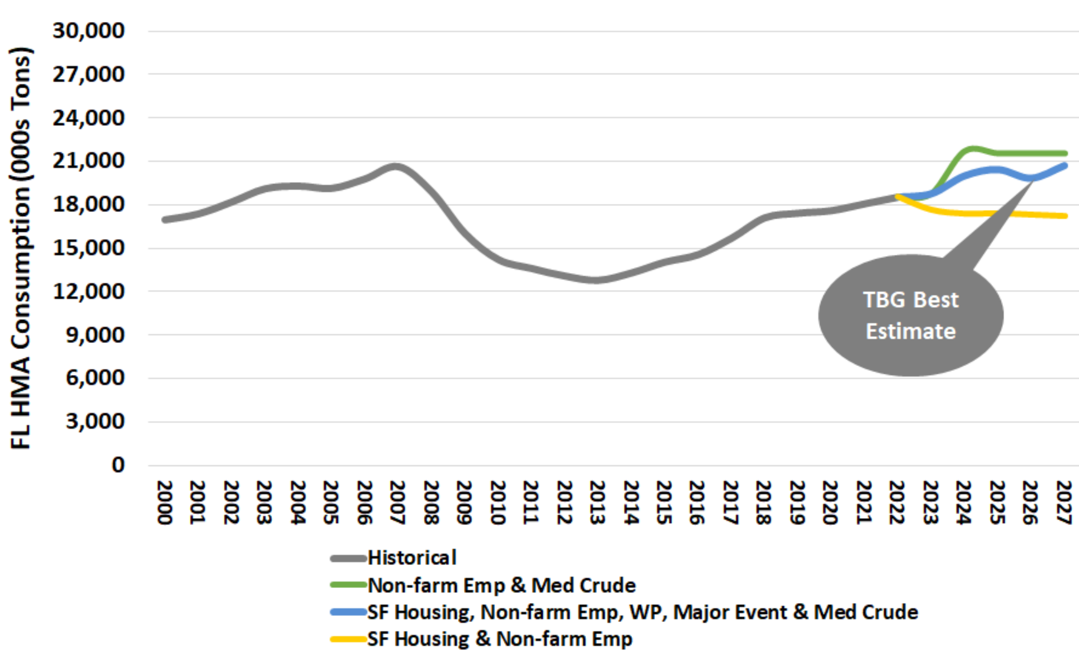
Figure 13. FDOT HMA Price, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Figure 14 provides a forecast of Florida HMA consumption. The best estimate is based on current economic outlooks, with infrastructure demand driving increases in production. The recent slowdown in some residential and commercial construction markets is still expected to be offset by increases in state and federal infrastructure funding over the next few years. While unlikely at this time, severe recessionary conditions would shift the trajectory downward, however, following the lower bound.

Figure 14. Florida HMA Consumption, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

CONCRETE

Summary

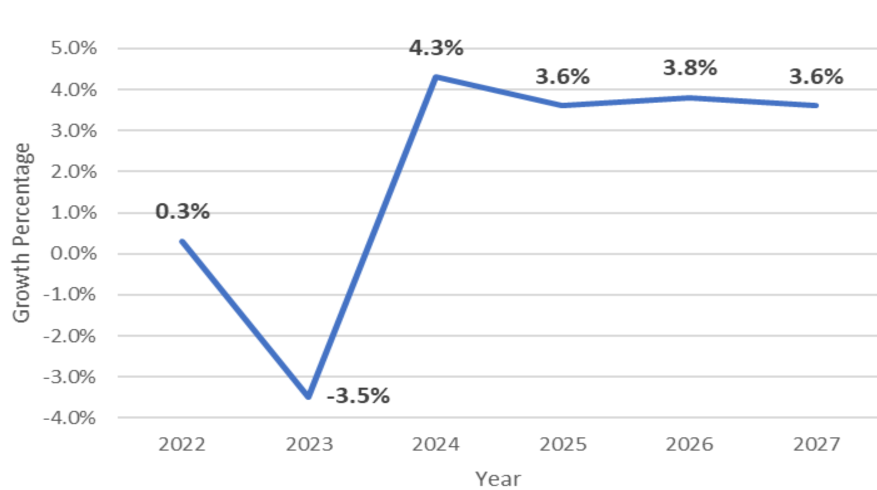
- In December 2022, U.S. highway and bridge starts rose 10%. Residential building starts were down 3% last year nationwide. In contrast, nonbuilding starts are up 19% and nonresidential building starts increased 38%.
- U.S. cement production capacity is expected to increase this spring for the first time since 2009. In the meantime, imports from Mexico are expected to increase.
- However, availability will likely tighten further as demand increases from projects funded by the Infrastructure Investment and Jobs Act of 2021 come online (on top of already planned for state projects and adjacent industry competition).

FDOT Impacts

- FDOT's bids for structural concrete pay items are overshooting forecasts, but limited bids and several low volume projects make it difficult to meaningfully discern trends. Careful monitoring of bids over the next quarter will be necessary to determine if forecasts need to be adjusted upward.
- Suppliers are looking forward to a potential reclaimed fly ash plant opening in Georgia next year. In the meantime, concrete producers are increasingly turning to slag as an alternative. Availability of fly ash is about the same as a year ago.
- Suppliers report steel costs affecting them through yellow-iron equipment and specialty item cost and availability.

General Trends

Figure 15. Portland Cement Association's Fall 2022 Forecast



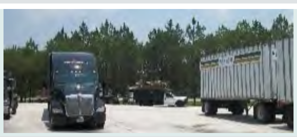
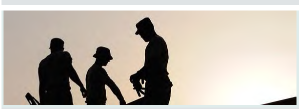
Source: Portland Cement Association.

While overall cement consumption is expected to decline in 2023 (**Figure 15**), public construction consumption will remain steady as the declines will mainly occur in nonresidential and residential construction. This is due to the decline in affordability of residential housing (increasing housing prices and mortgage rates), as well as declining demand for office space as a result of remote work and other trends leftover from the pandemic. The majority of public construction cement consumption is expected to go towards highway and street projects. Although an overall decline is projected, PCA Economist Ed Sullivan is comparatively optimistic about the economic future. PCA expects, after a weakening of the economy in the second half of 2023, cement consumption will rebound in 2024 when the spending impacts of the infrastructure bill begin to realize and interest rate increases ease.

SUPPLY CHAIN VARIABLES ➤ **CONCRETE MATERIALS**

Table 3 provides an overview of supply chain variables and a summary of their current status; items with current issues are further detailed in the subsequent text.

Table 3. Structural Concrete Supply Chain Variables & Current Status

 **Cement**	Cement prices have increased and availability continues being an issue as previously reported. Suppliers announced significant price increases for January 2023. The combination of fly ash shortages and very large projects is driving localized price spikes, and is expected to worsen by summer 2023. Interviews indicated that cement is still the preferred option to replace fly ash, but the costs are still much higher.	
 **Aggregate**	Aggregate availability, increased pricing, and transportation continue being an issue. General issues are covered in the Aggregate section.	
 **Fly Ash**	Fly ash costs increased during the quarter. Fly ash supply issues continue. With expected cement price increases this summer, producers previously using additional cement to supplement fly ash shortages will see their costs increase, making this a less viable option. Suppliers report that a new supply of reclaimed fly ash is expected to come online in Georgia in 2024, which may help alleviate the situation in the long-run. The southern districts will likely need to rely on increased imports, if available.	
 **Rail**	Producers report continued issues with rail reliability. During the first three quarters of 2022, CSX tons shipped of cement products declined 3% year-over-year, but revenues rose 2%. CSX continued increasing headcount for train & engine employees and terminal dwell times were at similar levels for most of the quarter, as mentioned elsewhere in the report	
 **Truck**	As with other industries, trucking availability is an issue for producers and diesel prices have increased in December and January 2023. Spot rates in 2023 continued declining, but are still above the 5-year average. Heavy and tractor-trailer truck driver employment has continued its upward trajectory, with 9% growth year-over-year in December 2022. The American Trucking Association reported an improvement in nationwide trucking shortages for 2022.	
 **Labor**	Although producers are offering higher wages, skilled labor availability in Florida continues being an issue. Statewide construction employment increased through December 2022, but growth is uneven across the State. Construction contractors expect issues with finding qualified labor to continue in 2023.	
 **Competition**	Two new plants are under review in FDOT's producer approved list, another was recently approved in District 1 and another was inactivated in District 6. Smaller suppliers are increasingly reporting that they are having difficulty in securing materials. Larger firms with longer relationships who are able to order product in larger quantities appear to be taking precedence. This situation could lead to less competition in the long run.	

Exerting negative influence on FDOT's costs; monitor.
Currently stable; not influencing FDOT's costs.
Exerting positive influence on FDOT's costs.

Raw Materials

Shortages of cement and concrete products has persisted across the country, limiting supply to 43 of the 50 states by October of last year. Concrete producers in the southeast confirm this and believe the material shortages they experienced last year will continue this year. According to PCA, additional cement production capacity in the U.S. is expected to come online this spring for the first time since 2009. According to AGC[6], persistent low water levels in the Mississippi River have limited shipments of cement and other products in the middle of the country. Some states on the Gulf Coast, like Florida, may be able to receive more cement from Mexico in the meantime.

Supply of other cementitious materials like fly ash and slag have continued to diminish with the shutdown of coal-fired power plants as well. Fly ash shortages are affecting other industries like wallboard manufacturing; suppliers east of the Mississippi River report that it may take five to seven years to fully address the issue. In addition, glass supplies are at risk because of sand shortages, manufacturing constraints, and competing demand from other industries like solar and automotive manufacturing.

Concrete producers in Alabama and Georgia report that fly ash availability looks about the same as last year, but hope to see some relief as reclaimed fly ash becomes available in Georgia in about a year. They also report that while slag cement is historically more expensive than fly ash, Florida most likely pays less for the material than surrounding areas due to freight costs. The slag cement facility Alabama and Georgia producers import from is located in Florida, so they have to transport it.

Concrete Forecast

Regression modeling was performed using pay item data, supply chain variables, and other macroeconomic indicators to identify models that best predicted FDOT's materials costs and quantities. **Table 4** provides the updated forecast weighted average price for concrete. Previous forecasts expected fiscal year 2023 prices to end up around $900 per cubic yard, but recent changed in input costs have increased the estimate to about $968 per cubic yard. While the model still predicts a dip in 2024 due to potential recessionary conditions, prices are likely to remain high with anticipated increases in infrastructure spending.

According to limited data, several low volume projects are weighting concrete prices much higher than anticipated for 2023 year-end estimates (represented by the black dot on **Figure 16**, which estimates the mid-2023 fiscal year bid price calculated from July 2022 to December 2022 data), making it difficult to meaningfully discern trends at this time. Careful monitoring of bids over the next quarter will be necessary to determine if forecasts need to be adjusted upward.

The lower bound scenario reflects recessionary conditions, which a majority of U.S. economists expect to occur in 2023. The upper bound reflects worsening input cost scenarios and continuing supply chain disruptions, ending up over $1,200 per cubic yard by 2027. **Figure 17** shows the output of several quantity models forecasting statewide consumption of concrete and the scenario identified as the best estimate.

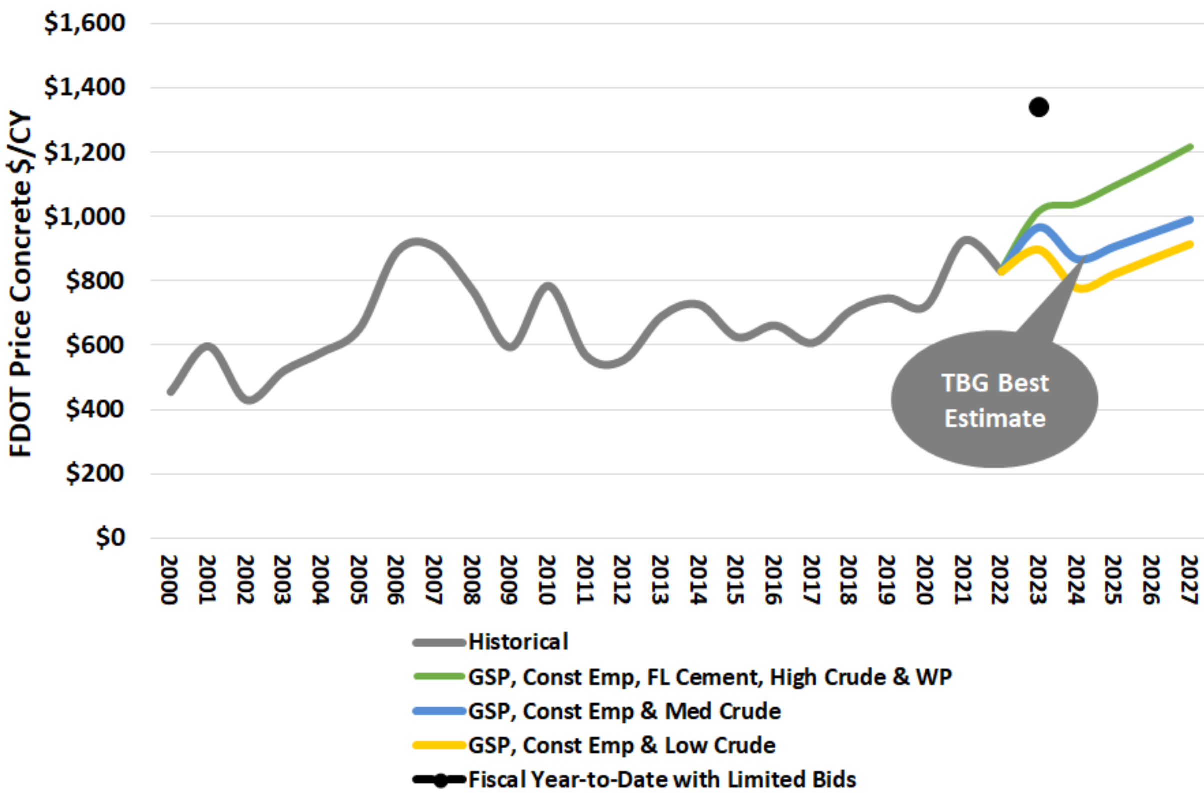
Table 4. FDOT Concrete Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price Concrete, $/CY	$829.82	$967.89	$868.72	$907.36	$949.64	$991.36
Percent Change, %	-10.4%	16.6%	-10.2%	4.4%	4.7%	4.4%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

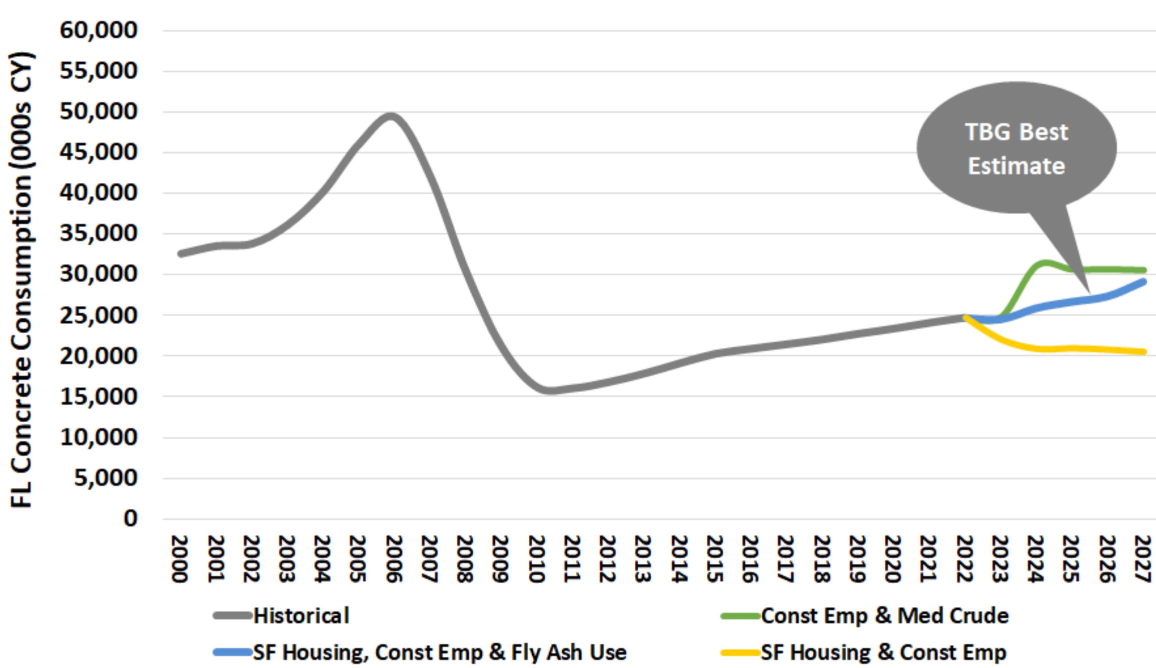
[6] Construction Inflation Alert Dec 2022_V4.pdf (agc.org)

Figure 16. FDOT Concrete Price, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Figure 17. Florida Concrete Consumption, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Steel

Summary

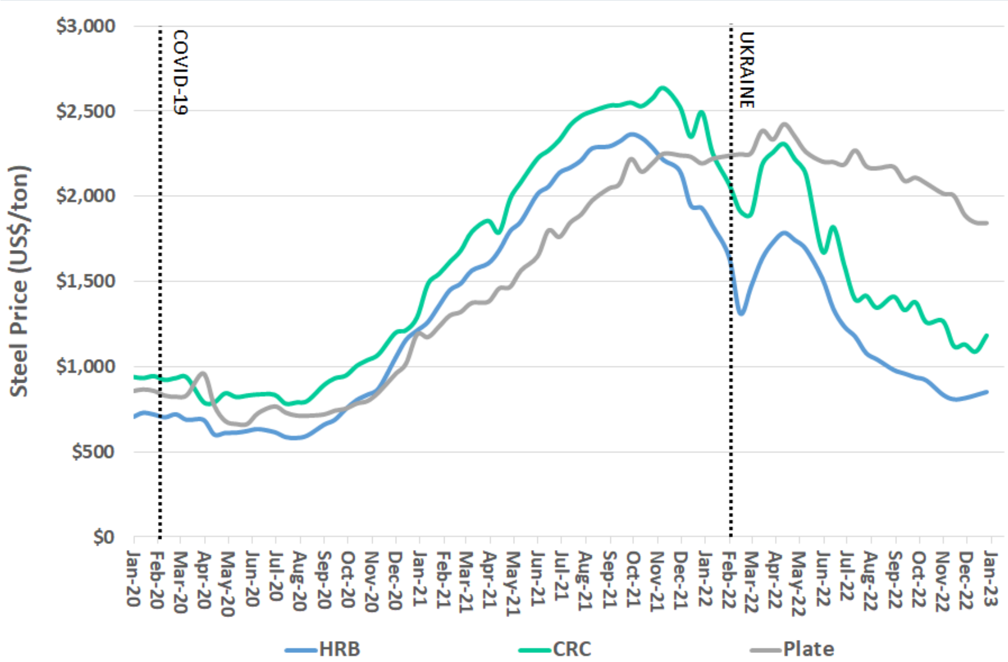
- Prices for different steel products continued declining through the end of 2022. However, some producers announced price increases in December 2022 and January 2023. There are mixed perceptions about where prices are going for 2023. Lead times haven't worsened.
- National steel production and utilization rates continued with the downward trend by being 8% lower compared to January 2022. However, producers are expected to increase production in the upcoming months. Worldwide, production has also declined.

FDOT Impacts

- With some basic steel product prices declining in recent months, FDOT will need to continue to be vigilant as many industry projections show prices potentially increasing in the summer. Interviews indicate some price increases already in FY 2023 for pipe, plate, and scrap, while others report improvements. Expect continued volatility.
- In anticipation of recessionary conditions, steel mills and distributors are reportedly adjusting prices and inventories downward.
- Fabricators report that hardware and specialty parts are experiencing new delays and availability issues, leading to increasing lead time issues. However, lead times have improved for basic materials to almost normal.

General Trends

Figure 18. U.S. Steel Pricing, 2020 – 2023



Source: Steel Benchmarker.

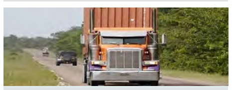
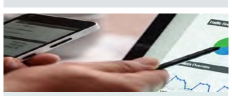
U.S. steel prices continue to decline through December 2022 for most products (**Figure 18**). However, there was a slight increase in hot-rolled band and cold-rolled prices in early January 2023 according to preliminary data. However, hot-rolled band prices are now close to benchmark prices in January 2023, while cold-rolled coil are still about 12% above November 2020 prices. Current steel plate prices declined 40% in January 2023 compared to the same month last year, but remain 123% higher than November 2020 levels.

Reports are mixed on lead times, with some suppliers indicating that lead times for basic products have begun to shrink to more normal time periods, but others noting hardware and specialty items (connection bolts, welding flux, machine parts) have become increasingly difficult to source, extending lead times.

SUPPLY CHAIN VARIABLES > **STEEL**

Table 5 shows a summary of select variables that impact the steel supply chain and their current status.

Table 5. Supply Chain Variables for Structural Steel

 Raw Materials	Prices for hot-rolled steel and iron declined significantly through the end of 2022. Hot-rolled products have declined 18% since September 2022 and 56% year-over-year. However, they are still much higher than in previous years and several steelmakers announced price increases in December 2022. Iron has returned to around 2019 levels. Rebar prices have also declined, but not to the same extent as hot-rolled. Reports also indicate an increase in imports of rebar to the U.S., which would help to lower prices. Competition for resources may be exacerbated by increased military demand.	↑
 Scrap Steel	Scrap steel prices declined 32% in 2022 and while they are still high, they are no longer at the highest point they've been since the 2008 peak. Similar to hot-rolled prices, scrap prices also increased in December 2022 and January 2023 after months of continued declines. Some expect these to be temporary as there are no signs of increased demand; producers in interviews indicated the same trend of prices being on the rise in recent weeks.	↑
 Galvanizing Steel	Global zinc prices fell 8% in the second quarter of fiscal year 2023 compared to the previous quarter and the whole year; but they increased 6% in December 2022 compared to the previous month. Prices are still high compared to pre-pandemic levels and inflated prices for galvanized products like bolts and hardware are expected to persist. Interviews indicate that lead times have improved.	↑
 China	Chinese steel prices were reduced to $560 per ton in December 2022, a 23% decline year-over-year. China's domestic demand for steel is expected to increase in 2023 as the government issued measures to stimulate the real estate sector and eased COVID restrictions.	↑
 Transportation	Overall costs for producers remain higher than in the past. Driver shortages persist, diesel prices have increased, but spot rates have declined in recent weeks. Issues with trucking are expected to continue.	↑
 Rail	As mentioned elsewhere in the report, Congress was able to avoid a strike by passing the deal proposed last September; however, this is unlikely to address worker shortages.	=
 Milling Capacity	Nationally, capacity utilization rates and production started 2023 in the same downward trend they ended 2022. Utilization is at 71%, down from 80% a year ago; production is down 8% from 2022.	=
 Labor	Unfilled job openings remain an issue for suppliers, which have led to production and revenues lost. Labor costs have increased in an attempt to attract workers. Interviews indicated mixed perceptions of the labor market as some believe conditions have improved, but others believe that conditions are getting worse.	↑
 Competition	Lower competition for resources from other sectors like commercial and residential may potentially bring down costs for specific products. However, steel products will continue being influenced by global markets. Production in Europe has been affected by weaker demand and high energy prices. India removed a 15% export tax for some steel products, which could add additional supply to the world. Additionally, the WTO[7] determined that U.S. tariffs on steel and aluminum are inconsistent to its obligations under the GATT[8] and it recommends them to be amended. However, the Office of the US Trade Representative indicated that there are no plans to modify them.	↓

↑	**Exerting negative influence on FDOT's costs; monitor.**
=	**Currently stable; not influencing FDOT's costs.**
↓	**Exerting positive influence on FDOT's costs.**

[7] WTO = World Trade Organization
[8] General Agreement on Tariffs and Trade. https://www.wto.org/english/tratop_e/dispu_e/544r_conc_e.pdf

Raw Materials & Scrap Steel

According to industry forecasts, U.S. steel input prices are expected to decline sharply over the next two years. Although the invasion of Ukraine briefly halted market corrections during the summer, steel prices are falling, albeit above their long-term average. Industry experts recommend waiting to lock in contracts as long as possible to take advantage of lower prices to come. Scrap steel and iron ore are also forecast to moderate in 2023. However, scrap prices are not expected to return to the historic mean in the short-term.

Instability in Europe, including a potential recession, is expected to impact steel demand in 2023. The current fuel and energy supply chain reshuffle in Europe due to the war in Ukraine is happening much faster than expected, with middle eastern countries like Saudi Arabia stepping in to replace lost Russian oil. However, steel production in the region is unlikely to recover in the short-term due to the destruction of Ukraine's steel production supply chain. Before the war broke out, Ukraine was one of the largest steel suppliers in the world.

Steel Survey

The most recent survey of FDOT steel fabricators finds that price changes were better than expected in December 2022, with only slight variations for most products (**Table 6**). With the exception of square tubing, production for steel products is expected to increase by as much as 8% in the next quarter. The primary drivers of production changes in December were infrastructure demand and lower materials costs.

Table 6. January Steel Producer Survey Results

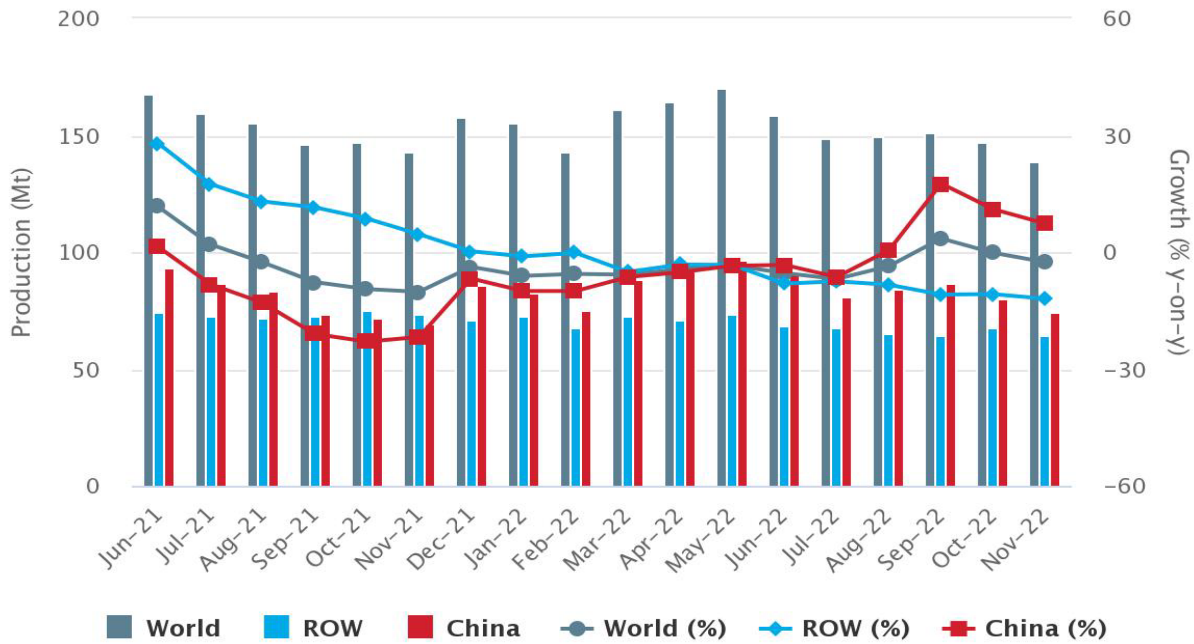
Material	Structural Steel	Steel Plate	Steel Pipe	Round Bar	Square Tubing	Galvanizing
Price Change, December 2022	-2.8%	-8.0%	8.0%	2.5%	-2.5%	0.0%
Expected Price Change, January 2023	-2.8%	-8.0%	8.0%	2.5%	-2.5%	0.0%
Expected Price Change This Quarter (End of March)	-2.8%	2.5%	2.5%	2.5%	-5.3%	0.0%
Bid Price Change, December 2022	-2.8%	-2.5%	8.0%	2.5%	-2.5%	0.0%
Production Change, December 2022	-2.8%	8.0%	-2.5%	2.5%	-7.8%	2.8%
Expected Production Change, January 2023	-2.8%	8.0%	-2.5%	2.5%	-7.8%	2.8%
Expected Prod. Change This Quarter (End of March)	0.0%	8.0%	2.5%	2.5%	-5.3%	2.8%

Source: TBG Work Product.

Global Production

According to the World Steel Association, global crude steel production was 139.1 million metric tons in November 2022, a 2.6% decrease compared to November 2021 (**Figure 19**). China produced 53% of global steel in November 2022, up 7%, year-over-year. It is expected that China's demand will increase in 2023 with policy changes implemented by the government. On the other hand, production in Europe has decreased drastically. In November 2022, production of countries in the European Union fell by 18% year-over-year and production of other Eastern European nations declined 25% over the same timeframe.

Figure 19. Crude Steel Production, China vs the Rest of the World



Source: World Steel Association.

Steel Forecasts

Prices and consumption are forecast for the five-year work program. Regression modeling was performed using pay item data, supply chain variables, and other macroeconomic indicators to identify models that best predicted FDOT's materials costs. A year-to-date price comparison was not included in the steel forecasts due to limited bid data and continued volatility.

Compared to the current best estimate, which predicts a slight rise in costs in 2023 due to continued uncertainty in the market, actual structural steel bids declined 15% through the first six months of fiscal year 2023 according to preliminary data. Interviews with fabricators indicate a wide range of experiences over the last quarter, with some benefitting from price decreases, while others still see their costs rising. As with other materials, bids should be monitored over the next quarter to judge whether forecasts are on the right track.

In the event of a deep recession, the lower bound scenario would set prices back to pre-2016 levels, but this scenario is considered unlikely at this time. The upper bound reflects continued very high levels of supply chain disruptions and input costs. **Table 7** provides the updated forecast weighted average price for structural steel.

Table 7. FDOT Structural Steel Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price Structural Steel, $/lb.	$4.47	$4.58	$3.85	$3.99	$4.07	$4.18
Percent Change, %	16.4%	2.5%	-15.8%	3.4%	2.2%	2.5%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Contrary to structural steel, actual reinforcing steel bids increased 27% according to preliminary data. Current models show reinforcing steel costs reaching $1.53 per pound in 2023, a 1% decrease from the previous estimate (**Table 8**). The best estimate shows a dip in 2024, which may occur due to cheaper steel from China being made available to non-federal projects and minor recessionary conditions in 2023. The lower bound shows further disruption in construction employment, lower crude prices, and severe recessionary conditions. The upper bound includes influences of continued high demand and geopolitical uncertainty, ending around $1.67 per pound.

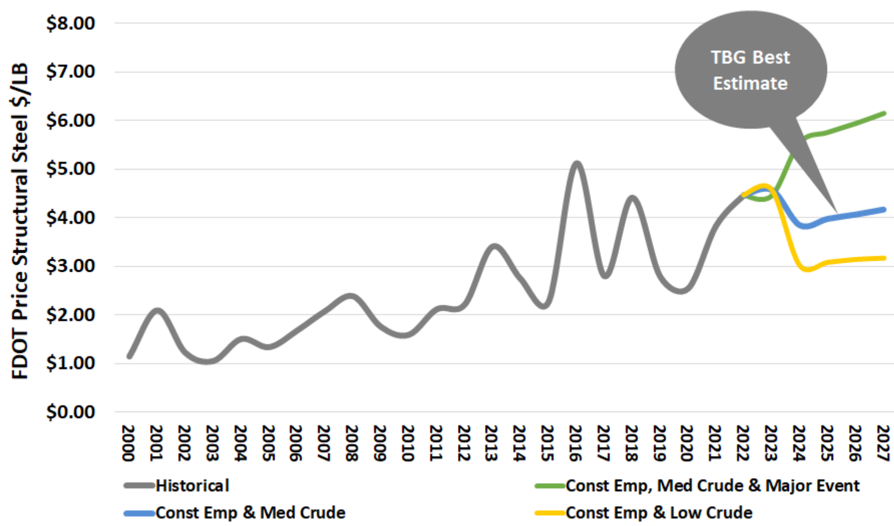
Table 8. FDOT Reinforcing Steel Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price Reinforcing Steel, $/lb.	$1.49	$1.53	$1.27	$1.32	$1.35	$1.39
Percent Change, %	24.1%	2.4%	-17.1%	3.9%	2.7%	3.0%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

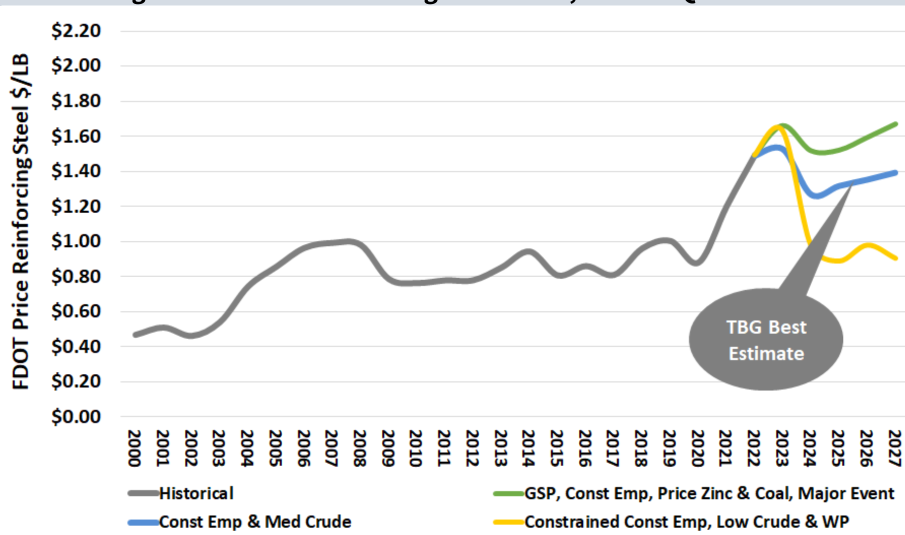
Figure 20 and **Figure 21** show the output of several price models and the scenario identified as best estimate for structural steel and reinforcing steel, respectively.

Figure 20. FDOT Structural Steel Price, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.
(Variable descriptions available in the **Appendix**.)

Figure 21. FDOT Reinforcing Steel Price, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.
(Variable descriptions available in the **Appendix)**

AGGREGATE

Summary

- Crushed stone production in Florida increased by 13% year-over-year through September of 2022.
- Prices increased as anticipated on January 1st, 2023, and are likely to continue increasing this year. Producers expect demand from public infrastructure to offset any slowdown from the residential sector.
- Additional overseas supply is expected with new product arriving to Port Canaveral from Canada and to the Gulf Coast from Honduras. There has been no update on Vulcan's situation in Mexico.

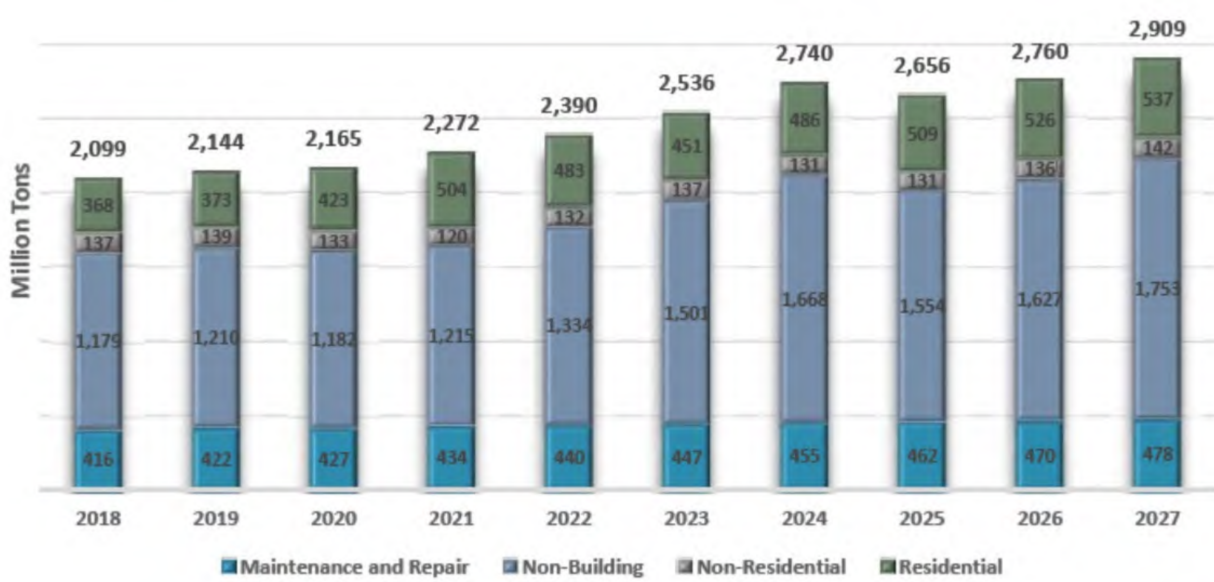
FDOT Impacts

- FDOT's baseline year-to-date aggregate bids are currently overshooting forecasts; prices vary depending on project volume and district. Interviews indicate mid-year price reviews, which has not been the norm historically.
- Demand from competing sectors is cited by suppliers as supporting higher prices despite slight economic slowdown in the commercial and residential sectors.
- Continued issues with diesel prices are affecting bids, as are ongoing labor shortages.

General Trends

According to quarterly data released by the USGS crushed stone production in Florida rose 13% to 71.4 million metric tons. Production continues showing a higher growth rate than the national average (2.5%). In the third quarter, publicly traded companies showed flat to a 9% growth in aggregate shipments. Prices grew between 9% and 16% year-over-year. These were aligned to the companies' higher bound expectations for 2022. For 2023, they expect flat to low increases in volume, with public infrastructure and non-residential offsetting weaker residential demand. For prices, they expect similar growth trends, with some announced price increases beginning on January 2023. Dodge & Data Analytics expect U.S. aggregate demand for 2023 to increase 6%, with the non-building sector increasing by 13% and the residential sector decreasing 6% (**Figure 22**).

Figure 22. U.S. Construction Aggregates Demand

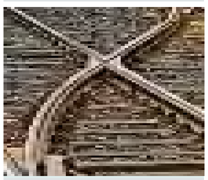
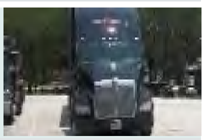
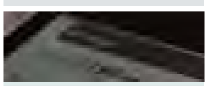


Source: Dodge & Data Analytics; Rock Products

SUPPLY CHAIN VARIABLES ➤ AGGREGATE

Table 9 provides current status of selected supply chain variables.

Table 9. Aggregate Supply Chain Variables

 Raw Materials	The USGS shows that Florida's crushed stone production grew 13% through September 2022. A ruling on Vulcan's Mexico operations is expected to be made in 2023. On the other hand, Vulcan reported a purchase of a quarry in Honduras that transports additional material to the Gulf coast. Congestion at ports have eased through the end of 2022. Port Canaveral announced an agreement with Blue Water Industries to import 400,000-800,000 metric tons of aggregate per year.	↑
 Access to Land	Access to land with suitable deposits is key to cost-effective material extraction for FDOT Aggregate. As mentioned elsewhere in the report, there were changes to regulations during this quarter that aggregate industry organizations believe will negatively impact producers by increasing uncertainty and causing delays in the permitting process. These issues are expected to continue through next year, with the industry monitoring carefully to understand the potential impacts. Interviews indicated that environmental or land use rules are currently one of the concerns for producers, especially in relation to county permits. Further, Fish and Wildlife permits are not bound to specific turn-around times, leading to uncertainty and delays. Critically, Hurricane Ian recovery may be hampered by extended permitting delays.	=
 Rail	Rail is the primary transportation for aggregates from Georgia, and from Lake Belt to Central and Northeast Florida. The poor and deteriorating service of freight rail shippers has critically strained companies supplying customers in Florida. With new coastal protection projects expected to come online over the next few years, requiring gondola cars with enough capacity to move 1 to 2-ton boulders, competition for engines and track time will likely increase. During the first three quarters of 2022, CSX shipments of aggregate products rose by 5%, year-over-year, while revenues rose 21%; indicating significantly higher prices.	↑
 Trucking	Constrained truck/driver availability and increased fuel costs are a major cost factor as mentioned throughout the report. Spot rates have also declined in 2023, but are still above the 5-year average. Heavy and tractor-trailer truck driver employment has continued its upward trajectory and the American Trucking Association reported an improvement in nationwide trucking shortages for 2022.	↑
 Labor	Labor demand is high as aggregate demand continues being high across different construction sectors and producers continue struggling finding qualified candidates and the perception is that it is getting worse. Statewide construction employment has continued increasing year-over-year, but growth is uneven across the State. Nationally, nonmetallic mineral mining and quarrying employment was up 1% year-over-year.	↑
 Competition	Competition has been steady. No new ERPs for mines have been approved during this quarter. In FDOT's approved producer list, two new mines (in Georgia and Nova Scotia, Canada) are under review and four were approved in December 2022 (one in Alabama).	=
 Capital Costs	Some reports indicate that investments for new equipment and maintenance are expected in 2023 with strong demand for aggregates. However, in AGC's 2023 outlook survey 60% of contractors in Florida indicated that they don't plan to spend on this for this year. Further increases to interest rates are expected for 2023, which will increase costs. Interviews indicated that availability and lead times of parts haven't improved.	↑

↑ **Exerting negative influence on FDOT's costs; monitor.**
= **Currently stable; not influencing FDOT's costs.**
↓ **Exerting positive influence on FDOT's costs.**

Aggregate Base-Course Forecast

Regression modeling was performed to estimate aggregate base costs using pay item data, work program funding, and supply chain variables and other macroeconomic indicators. The Year-to-Date Track (July 2022 through December 2022) shows how preliminary FY 2023 prices compare to the forecasted FY 2023 scenarios. **Table 10** provides the forecast average price for aggregate base. **Figure 23** shows the output of several price models and the scenario identified as best estimate for aggregate base.

Industry price increases went into effect on January 1st, 2023. Preliminary fiscal year 2023 data shows a 17% increase in aggregate bid prices through December 2022, coming in above the current best estimate. FDOT producers have indicated that aggregate cost and supply is a major concern heading into the next quarter. The most likely trajectory reflects continued low construction employment growth, increased crushed stone pricing, and infrastructure demand as heavy influences in 2023, with a dip in pricing in 2024 due to a potential economic slowdown predicted by numerous economists.

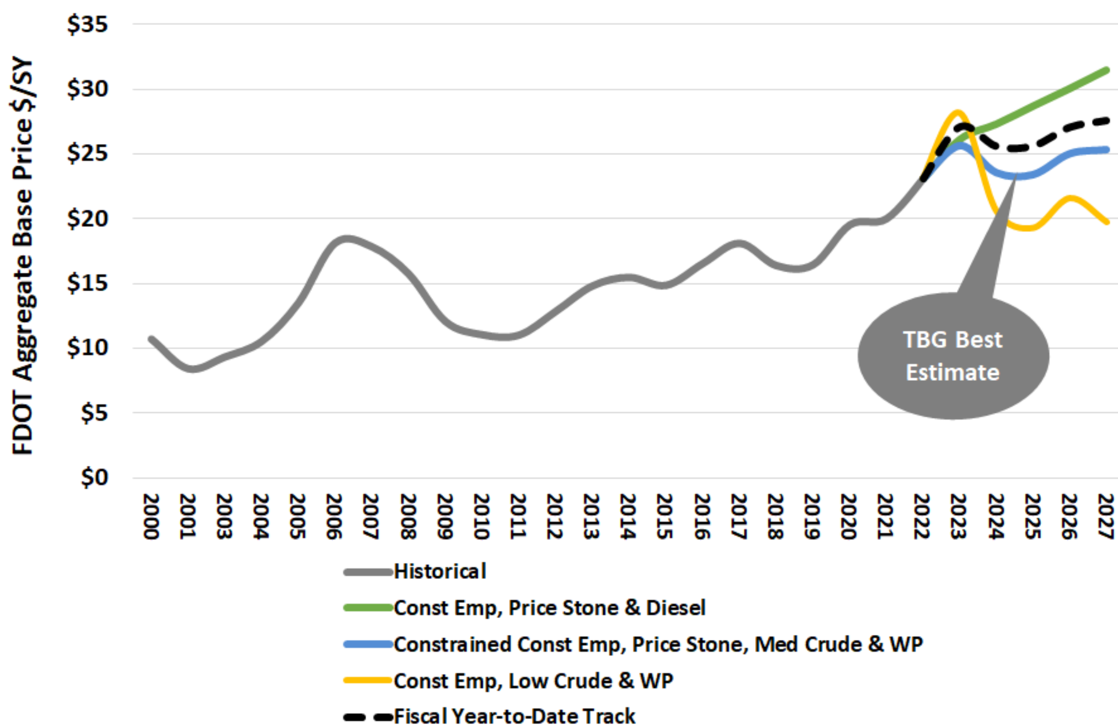
The upper bound measures unconstrained construction employment, crushed stone pricing, and continued energy cost instability. Finally, the selected lower bound model shows that energy price declines, attributable to recessionary conditions, would yield lower aggregate base prices throughout the five-year work program.

Table 10. FDOT Aggregate Base Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price Aggregate Base, $/SY	$23.11	$25.65	$23.56	$23.42	$25.03	$25.34
Percent Change, %	15.5%	11.0%	-8.1%	-0.6%	6.9%	1.2%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Figure 23. FDOT Aggregate Base Price, FY 2023 Q2 Forecast



Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.
(Variable descriptions available in the **Appendix**.)

EARTHWORK

Summary

- Truck driver employment in Florida continues increasing.
- While fuel costs have declined from highs seen during the summer of 2022, they ended 2022 and began 2023 on the rise. These negatively affect earthwork contractors' costs and as a result, producers continue reporting higher overall costs.
- Equipment and truck costs continued declining, ending with little or no year-over-year gains.

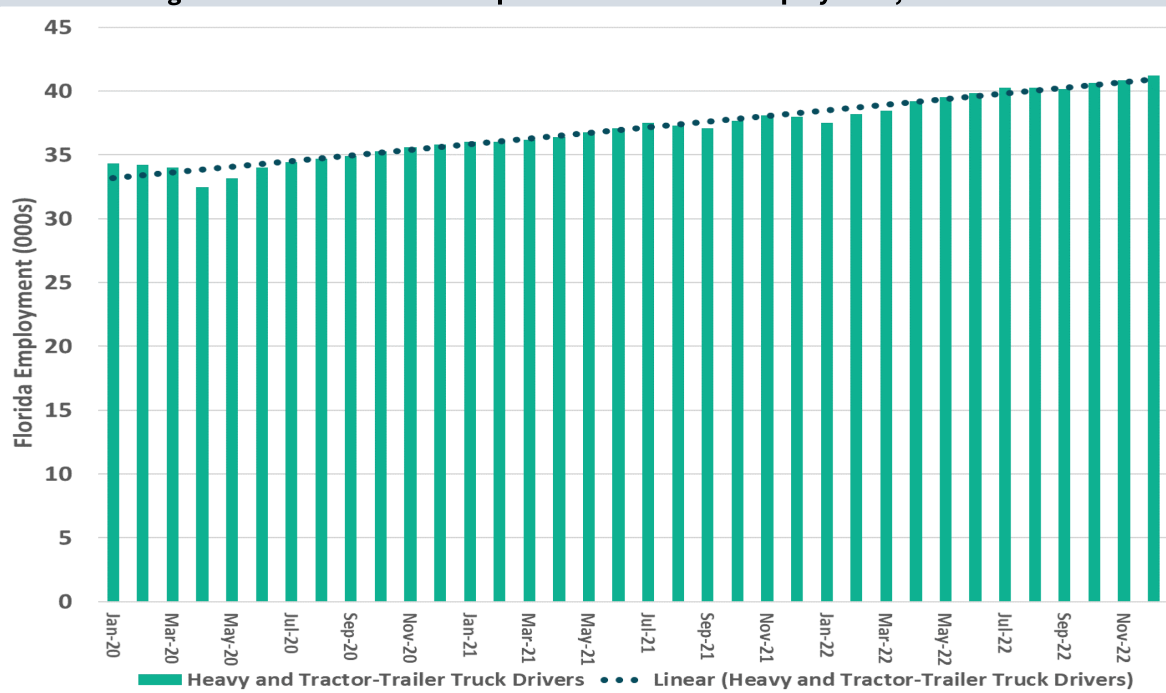
FDOT Impacts

- While overall weighted average prices show little increase in FY 2023, two projects comprise 90% of the volume of bids at very low prices. Excluding these two projects, the remaining 100+ bids would average closer to $26 per cubic yard, a substantial increase.
- Operators indicate diesel costs, driver shortages, and parts availability issues continue to wreak havoc with service delivery and costs.

General Trends

Overall truck transportation employment continued its steady growth through the end of 2022. In December 2022, employment rose 9% year-over-year and 19% since 2019. Heavy and tractor-trailer truck driver employment, which accounts for approximately 57.8% of truck transportation according to BLS, has followed an upward trajectory since 2020 (**Figure 24**). Additional truck drivers will be needed to adequately staff construction projects as state and federal funds are injected into the industry over the next few years. As demand for drivers have softened, the rise in trucking employment is a positive indicator and should make it easier for producers to find drivers from what they have experienced these past years.

Figure 24. Florida Truck Transportation and Driver Employment, 2020 – 2022

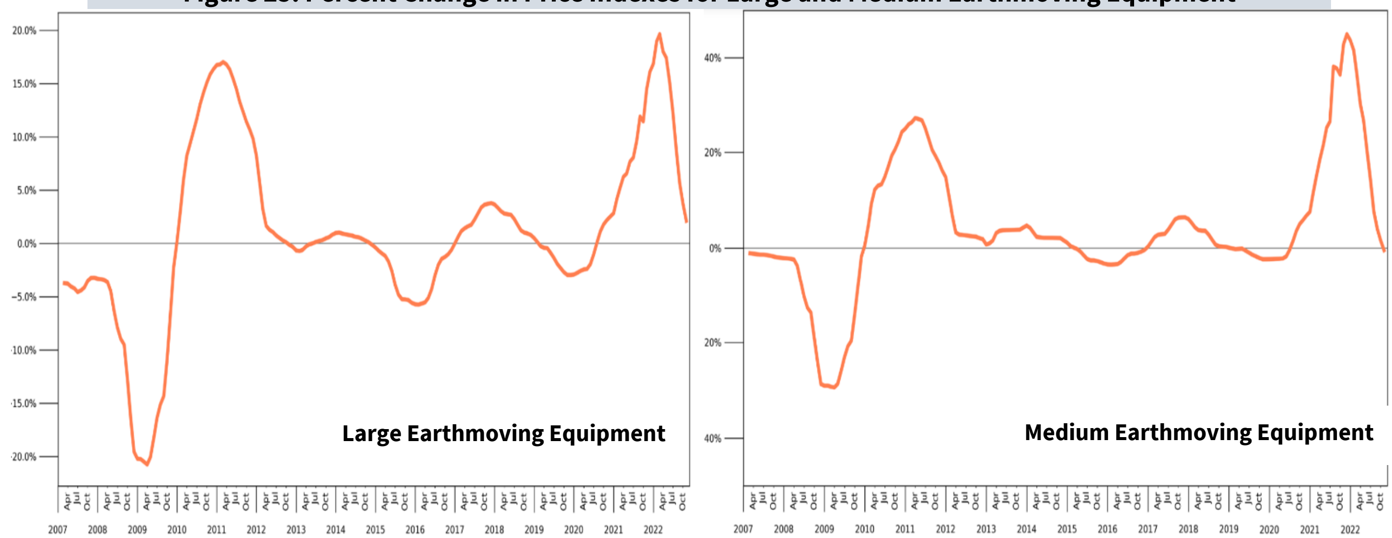


Source: TBG work product, BLS.

Equipment

Inflationary pressures continue to affect the construction equipment industry, but prices continued having steep declines. Ritchie Bros.' December 2022 used equipment market trends report shows that the 3-month average prices for large earthmoving equipment were up 2% year-over-year. However, used medium earthmoving equipment prices were flat year-over-year. (**Figure 25**).

Figure 25. Percent Change in Price Indexes for Large and Medium Earthmoving Equipment

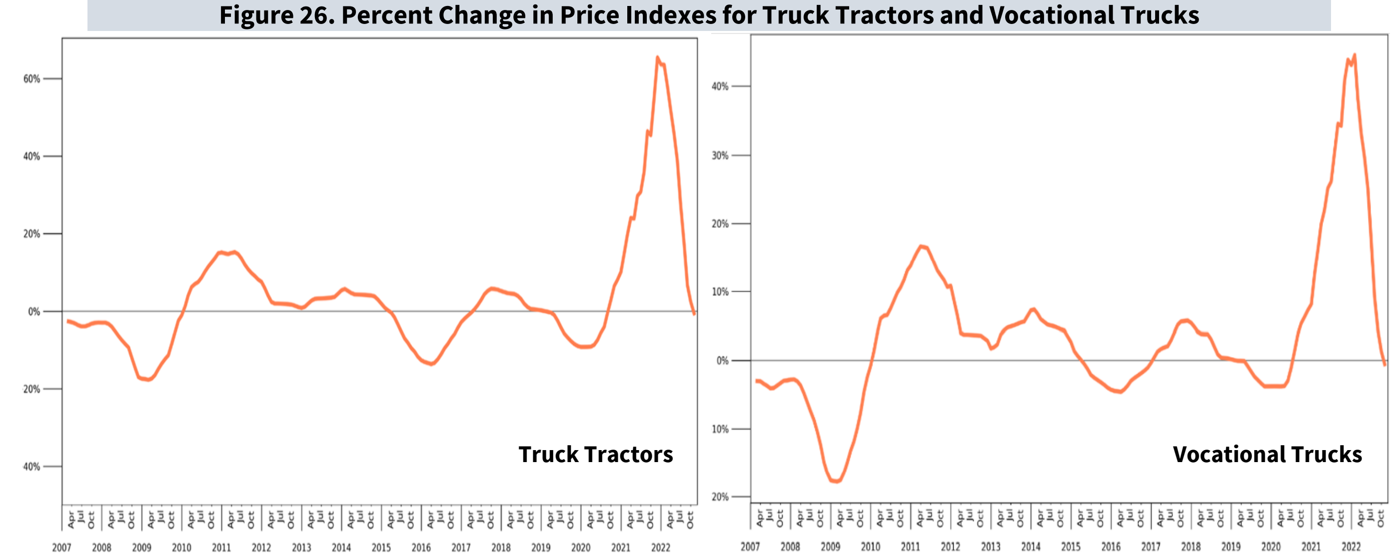


Source: Ritchie & Bros. Used Equipment Market Report.

Trucking

Used trucks prices continued their downward trend late in 2022. The 3-month average cost of truck tractors and vocational trucks[9] were down 1% in November 2022, year-over-year. Increased supply of new trucks and lower demand has caused the decreased in prices (**Figure 26**).

Figure 26. Percent Change in Price Indexes for Truck Tractors and Vocational Trucks



Source: Ritchie & Bros. Used Equipment Market Report.

[9] including bulk hauling, heavy hauling, and other construction vehicles

Earthwork Forecast

Regression modeling was performed to estimate Earthwork costs using pay item data, supply chain variables, and other macroeconomic indicators. As two major projects account for about 90% of bid volumes through the first six months of fiscal year 2023, a year-to-date price comparison was not included in the earthwork forecast. **Table 11** provides the forecast average price for earthwork. **Figure 27** shows the output of potential price models and the scenario identified as best estimate for earthwork.

In the Best Estimates scenario, costs are expected remain high in fiscal year 2023 before correcting slightly in 2024 due to recessionary effects. However, infrastructure construction demand is not likely to wain due to record levels of funding over the next few years, sustaining higher than normal costs for many industries. The trajectory follows similar patterns to the prior forecast, driven by decreasing competition from housing, lower construction employment growth, and mid-range fuel cost outlook through the end of the year.

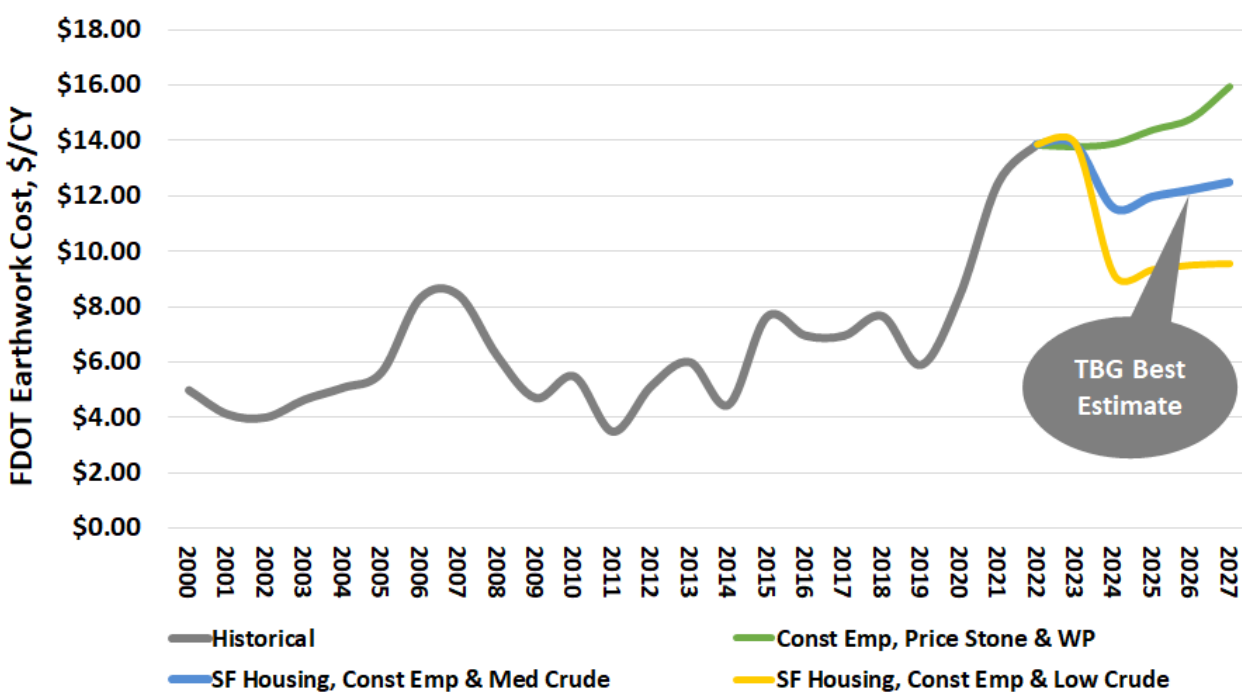
The lower bound estimate is based on reduced housing starts, low crude forecasts, and construction employment, while the upper bound is driven by steady work program spending and adjacent industry demand for the same resources.

Table 11. FDOT Earthwork Price Forecast Results

Fiscal Year	2022	2023	2024	2025	2026	2027
Price Earthwork, $/CY	$13.84	$13.85	$11.58	$11.98	$12.22	$12.50
Percent Change, %	11.1%	0.1%	-16.4%	3.4%	2.0%	2.2%

Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Figure 27. FDOT Earthwork Price Estimates, FY 2023 Q2 Forecast



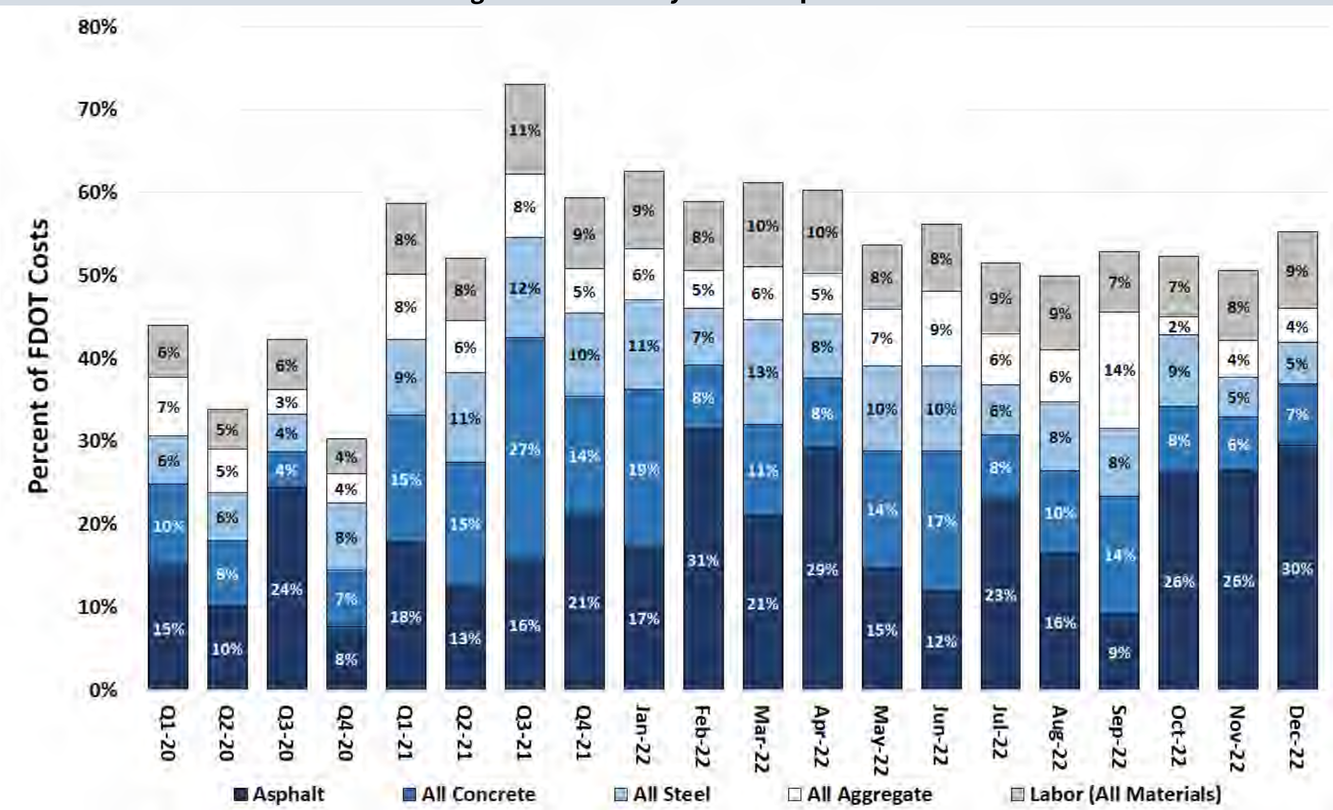
Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.
(Variable descriptions available in the **Appendix**.)

APPENDIX A ➤ UNDERLYING ECONOMIC CONDITIONS

FDOT Cost Composition

Tracking FDOT's costs by month shows how the cost composition may shift depending on project type, scheduling, and material costs (**Figure A-1**). Aggregate, concrete, and steel costs as a share of total costs moderated in the last three months of 2022. Asphalt maintained the historical majority of total dollars. Labor costs have remained stable over the last two years at about 8%, indicating that the labor market has reached a new normal.

Figure A- 1. Monthly Cost Composition

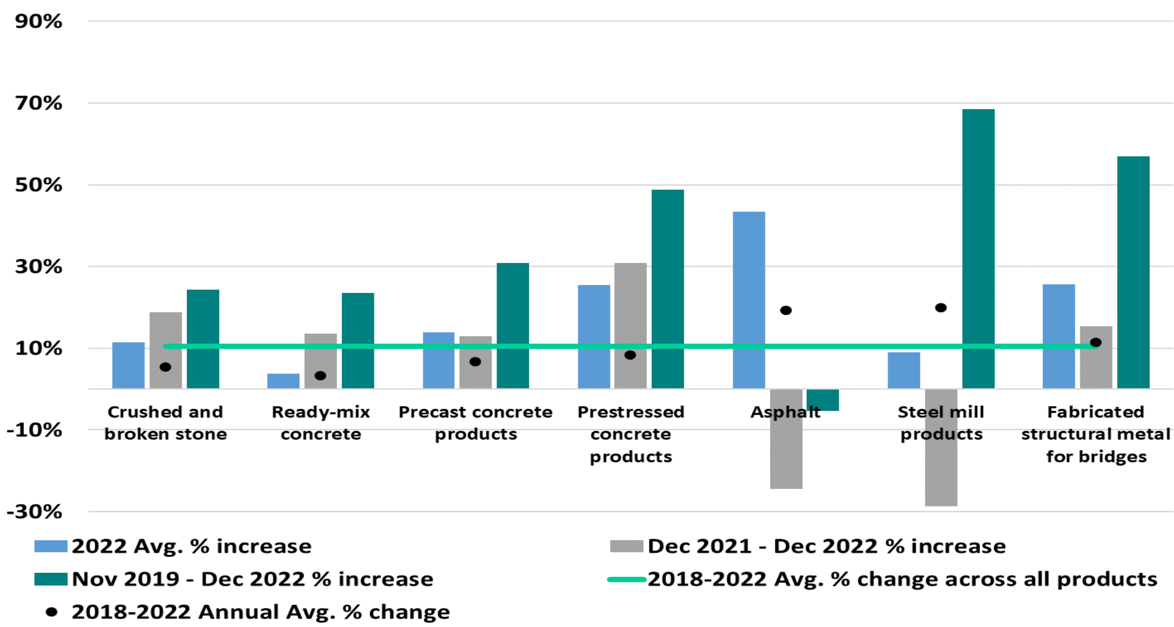


Source: TBG calculated from data provided by FDOT Estimates Office.

U.S. Inflation

Another measure of inflation for the construction industry is the BLS PPI by commodity type. Nationally, asphalt had the largest increase in 2022 with 43%. While ready-mix concrete had the lowest with 4%. However, in December 2022 asphalt's PPI decreased by 24% year-over-year and steel mill products decreased by 29%. Overall, aggregate and concrete had the lowest price increases in 2022. **Figure A-2** illustrates select PPI in the U.S. for relevant commodity types.

Figure A- 2. Producer Price Index Percent Change by Commodity

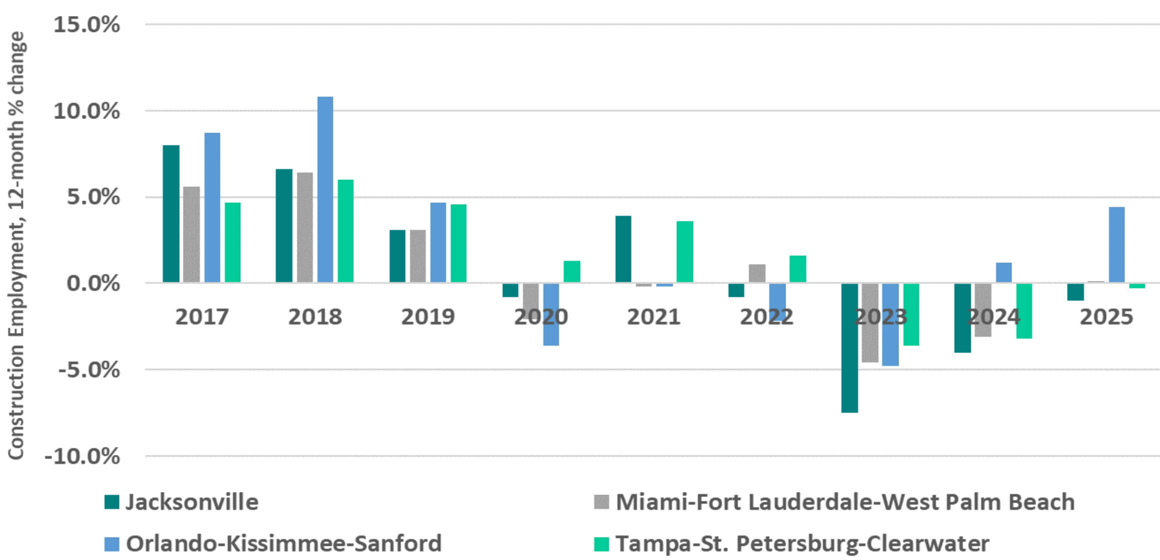


Source: BLS (Producer Price Index, not seasonally adjusted); TBG Work Product.

Construction Employment Forecast

According to the Institute for Economic Forecasting's (IEF) most recent Florida & Metro Forecast, statewide construction employment is expected to average a growth rate of 2% in 2022, revised downward from the previously reported 2.6%. IEF expects construction employment growth to decline over the next three years, with 2023 declining 3.7%. More construction workers will need to be recruited to Florida in order to support transportation and infrastructure demand through the end of the five-year work program. At the metro level, IEF projects construction employment declines in most major markets throughout the forecast period, with the biggest loses seen in 2023 (**Figure A-3**).

Figure A- 3. Historical and Forecasted Changes in Employment in Major Florida Markets, 2017 - 2025

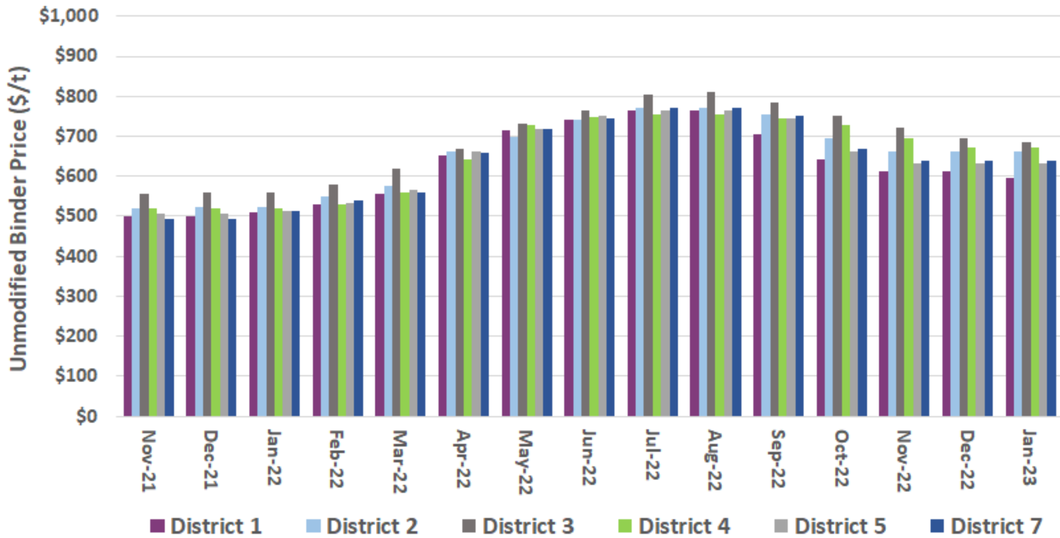


Source: UCF Institute for Economic Forecasting Summer 2022 Florida & Metro Forecast.

Binder Prices by District

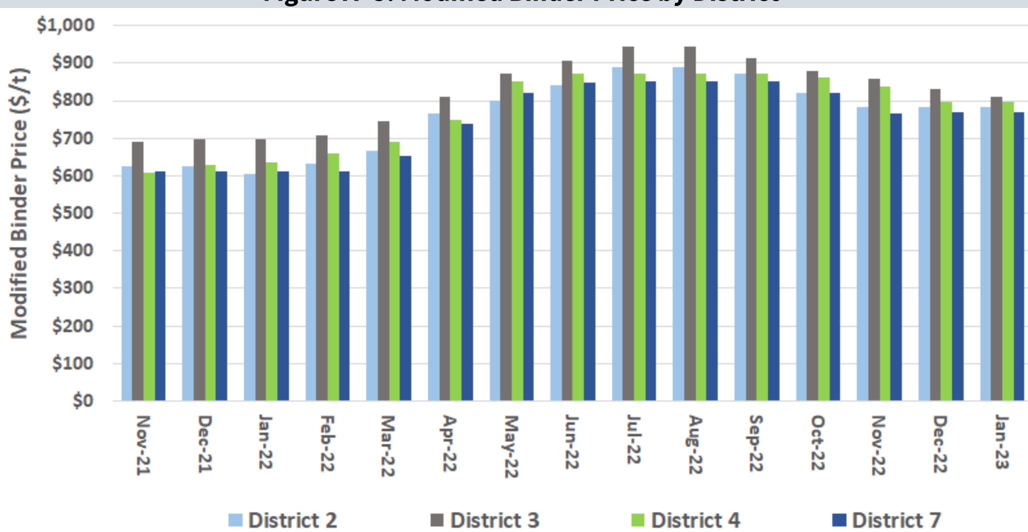
Where available, the average prices for unmodified (**Figure A-4**) and modified (**Figure A-5**) binder were calculated from monthly terminal price quotes at the district level. Unmodified binder is the average of PG 52-28 and PG 58-22 prices, while modified binder is a quote for the price of PG 76-22 (PMA) in the dataset. While unmodified binder prices are between 17% and 29% higher year-over-year, they have declined between 14% and 22% since August 2022. District 3 still has the highest prices, but District 4 has seen the largest percent increase. Prices in all districts have decreased since August. Modified binder prices have showed a similar trend, decreasing since August to an average of $791 per ton. District 3 is the only area where prices have remained above $800 per ton.

Figure A- 4. Unmodified Binder Price by District



Source: FDOT, TBG Work Product (D6 terminals did not report data).

Figure A- 5. Modified Binder Price by District



Source: FDOT, TBG Work Product (D1, D5, and D6 terminals did not report data).

APPENDIX B – FORECAST DETAILS

A description of the variables used in forecasting are provided in **Table B-1**.

Table B- 1. Forecast Variable Descriptions

Variable Reference	Description
Const Emp	Baseline FL construction employment forecast.
Constrained Emp	Lower (less optimistic) FL construction employment forecast.
Diesel	Average diesel price.
GSP	FL Gross State Product.
Historical	Historical pricing or quantity.
Housing Starts	FL housing starts.
Low/Med/High Crude	Average crude price (low, medium, or high forecast).
Major Event	Major geo-political, health, or weather-related events that strongly affect market forces; i.e. 9/11, the Great Recession, Hurricane Katrina, the COVID-19 pandemic.
Non-farm Emp	FL Non-Farm employment.
Price Binder	Average price of HMA binder (PG-76 & higher).
Price Cement	Average price of cement.
Price Coal	Average price of coal.
Price Iron Ore	Average price of iron ore.
Price Stone	Average price of crushed stone.
SF Housing	FL Single-Family housing starts.
WP	FDOT Five-Year Work Program.

Pay items that are partially or wholly used in the analysis are listed in **Table B- 2. Asphalt Pay Items** in the FDOT SRES 2022 July Final Report[10], starting on page 80. It should be noted that the lists may include some pay items that are no longer in use by FDOT, or are not represented in the lettings data every year, but are retained for historical record.

[10] Main page: https://www.fdot.gov/programmanagement/estimates/documents/sresreports

References

American Institute of Architects. (2023). Architecture Billings Index (ABI). Retrieved from https://www.aia.org/resources/10046-architecture-billings-index-abi

American Iron & Steel Institute. (2023). U.S. Steel Production, Capacity, Utilization, and Consumption.

Association of American Railroads. (2023). Rail Traffic Data. Retrieved from https://www.aar.org/data-center/rail-traffic-data/

Argus Media Group. (2023). “Americas Asphalt Weekly Reports”

Florida Department of Transportation. Five-Year Work Program, FY2023-2027. Office of Work Program and Budget.

Florida Department of Transportation. Fuel and Bituminous Average Price Index. Retrieved from https://www.fdot.gov/construction/fuel-bit/fuel-bit.shtm

Florida Department of Transportation. Historical Project Extract. Estimating Systems Support.

Florida Department of Transportation. Long Range Estimates Future Project Extract. Estimating Systems Support.

Florida Department of Transportation. Approved Producers List. Materials Acceptance and Certification System.

Florida Highway Safety and Motor Vehicles. Licensed Driver by Type and County. Retrieved from https://www.flhsmv.gov/resources/driver-and-vehicle-reports/

MEPS International Ltd. (2023). World Steel Prices. Retrieved from https://www.meps.co.uk/gb/en/products/world-steel-prices

Office of Economic and Demographic Research. (2022). Florida Economic Estimating Conference: Long Run Tables. Retrieved from http://edr.state.fl.us/Content/conferences/fleconomic/index.cfm

Portland Cement Association (Fall, 2022). U.S. Forecast.

Ritchie & Bros. (2023). “Market Trends Report Used Equipment & Trucks.”

SteelBenchMarker. (2023). “Price History: Tables and Charts” [Data set].

Surface Board Transportation (2023). “Carloads & Volume Quarterly data”. Retrieved from: https://www.stb.gov/reports-data/economic-data/

Surface Board Transportation. (2023). “Rail service data”. Retrieved from: https://www.stb.gov/reports-data/rail-service-data/

U.S. Bureau of Economic Analysis. Gross Domestic Product: All Industry Total in Florida [FLNGSP], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/FLNGSP

U.S. Bureau of Labor Statistics. Construction, Heavy and Civil Engineering Construction and Total Non-Farm State and Area Employment, Hours, and Earnings for Florida [Data files]. Retrieved from https://data.bls.gov/cgi-bin/dsrv?sm

U.S. Bureau of Labor Statistics. Mining Employment, Hours, and Earnings National [Data set]. Current Employment Statistics Survey. Retrieved from https://data.bls.gov/cgi-bin/dsrv?ce

U.S. Bureau of Labor Statistics. May 2022 State Occupational Employment and Wage Estimates for Florida [Data set]. Occupational Employment Statistics. https://www.bls.gov/oes/tables.htm

U.S. Bureau of Labor Statistics. Producer Price Indexes Commodity Data. Retrieved from https://data.bls.gov/PDQWeb/wp

U.S. Census Bureau, New Private Housing Units Authorized by Building Permits for Florida [FLBPPRIV], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/FLBPPRIV

U.S. Census Bureau, New Private Housing Units Authorized by Building Permits: 1-Unit Structures for Florida [FLBP1FH], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/FLBP1FH

U.S. Energy Information Administration. Cushing, OK WTI Spot Price FOB Weekly [Data set]. Retrieved from https://www.eia.gov/dnav/pet/hist/RWTCD.htm
U.S. Energy Information Administration. (2023). Annual Energy Outlook.
U.S. Energy Information Administration. (2023). Short-term Energy Outlook.
U.S. International Trade Commission. Materials Imports for Consumption [Data set]. Retrieved from https://dataweb.usitc.gov/
United States Geological Survey. (2023). Cement Statistics and Information. Mineral Industry Surveys. Retrieved from https://www.usgs.gov/centers/nmic/cement-statistics-and-information
United States Geological Survey. (2023). Crushed Stone Statistics and Information. Mineral Industry Surveys. Retrieved from https://www.usgs.gov/centers/nmic/crushed-stone-statistics-and-information
United States Geological Survey. (2023). Iron Ore Statistics and Information. Mineral Industry Surveys. Retrieved from https://www.usgs.gov/centers/nmic/iron-ore-statistics-and-information
World Bank. (2032). Commodity Market prices and forecasts [Data set]. Retrieved from https://www.worldbank.org/en/research/commodity-markets
World Steel Association. (2023). Monthly Steel Production. World Steel Association Yearbook. Retrieved from https://www.worldsteel.org/steel-by-topic/statistics.html
World Trade Organization Data Portal. (2023). International Trade Statistics. World Trade Organization. Retrieved from https://data.wto.org/