Fiscal Year 21/22

FINAL REPORT

Strategic Resource Evaluation Study Highway Construction Materials

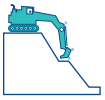
Contract BEC18

July 2022

The Balmoral Group

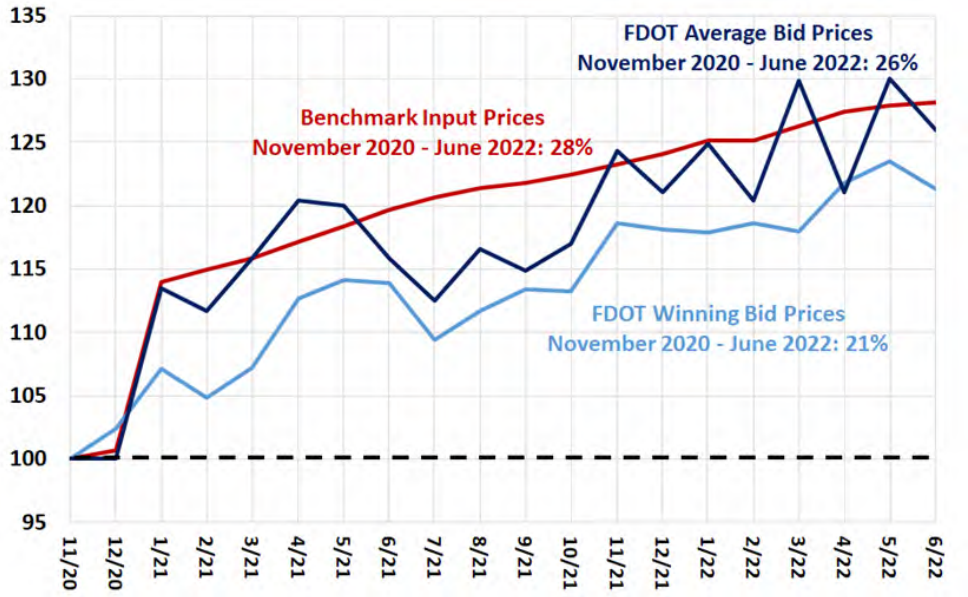
165 Lincoln Avenue
Winter Park, FL 32789

OVERVIEW ➤ FLORIDA'S HIGHWAY CONSTRUCTION MATERIALS

Construction Material	Status
 ASPHALT	**Asphalt suppliers are experiencing record high binder prices and forecasts anticipate maintaining record levels this year.** Producers report high operating capacity utilization, with the majority expecting issues to meet increased demand, citing trucking, labor and aggregate as constraints. As a result of higher costs, they are expecting continued price pressures and are no longer absorbing the majority of these increases. Our forecasts show prices reaching their peak this calendar year, and some contractors anticipate significantly higher bid prices by the end of 2022. The industry is subject to unstable conditions in the crude oil market, and depending on Ukraine war developments, we anticipate another 12-18 months of volatility.
 CONCRETE	**Concrete production is at its highest levels. Competition from the residential sector has started to ease but supply chain issues continue, constraining production and consumption**. Higher trucking costs, issues with rail deliveries, longer lead times for aggregate and reinforcing steel might negatively affecting project schedules and costs. Aggregate disruption owing to the closure of a key Mexican source has created issues in specific districts. Overall, FDOT's weighted average prices fell in fiscal year 2022, but this was not statewide as districts 2, 3 and 8 saw prices rise. With new supply disruptions and increased infrastructure spending, prices are expected to increase by 14% next fiscal year barring a significant recession.
 STEEL	**Prices for some steel products are declining in 2022, but are still significantly higher than in previous years.** Production and utilization rates are closer to "normal" levels than they have been since the COVID-19 pandemic, but producers continue trying to catch up from backlogs and meet demand. Long lead times, skilled labor shortages and issues with trucking are predominant and put pressure on costs. Producers anticipate higher bid prices through end of 2022; forecasts estimate FDOT's weighted average prices 4-5% higher than current high prices. Steel and metal products are expected to continue being a volatile market.
 EARTHWORK	**Earthwork costs are feeling the impact of higher trucking and equipment costs as well as labor availability.** While equipment costs have eased from highs seen earlier in 2022, trucking costs have increased rapidly and are a major concern. Earthwork prices rose 18% in 2022 to almost double the price of five years ago, an unsustainable trajectory that is expected to hold for the current fiscal year before correcting in subsequent fiscal years.
 AGGREGATE	**Aggregate costs are at record highs for FDOT; even though production increased in 2022.** Transportation hiccups continue occurring as trucking costs have increased due to higher fuel costs and rail deliveries have been inconsistent. Disruption of imports from Mexico have caused higher than expected price increases and further increases (up to 9% in weighted average costs) are expected this fiscal year.
	**Buy America Build America** provisions passed in 2022 that would expand materials used by FDOT, but USDOT has obtained a 6-month waiver of the provisions. Per USDOT, "During this time period, DOT expects States, industry, and other partners to begin developing procedures to document compliance. DOT will continue its engagement through the waiver period to help facilitate the creation of robust enforcement and compliance mechanisms and to rapidly encourage domestic sourcing of construction materials for transportation infrastructure improvements." Estimates of the impacts range from 9% for asphalt products to 29% for aggregate, on top of increases already estimated herein for each material.

An FDOT Cost Index was calculated by accessing 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). Input prices rose about 28% up to June 2022 as pent up demand flooded the market and conflicted with supply constraints, labor availability issues, material costs and geopolitical instability. Bid prices have had similar increases, with the average bid being 26% higher in June 2022 and the winning bid being 21% higher in June 2022.

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. Materials in the analysis include the bituminous, cement, steel, aggregate and earthwork markets. An annual assessment of the materials markets and significant trends affecting FDOT's supply availability and costs is included in this report.

The report is organized as follows:

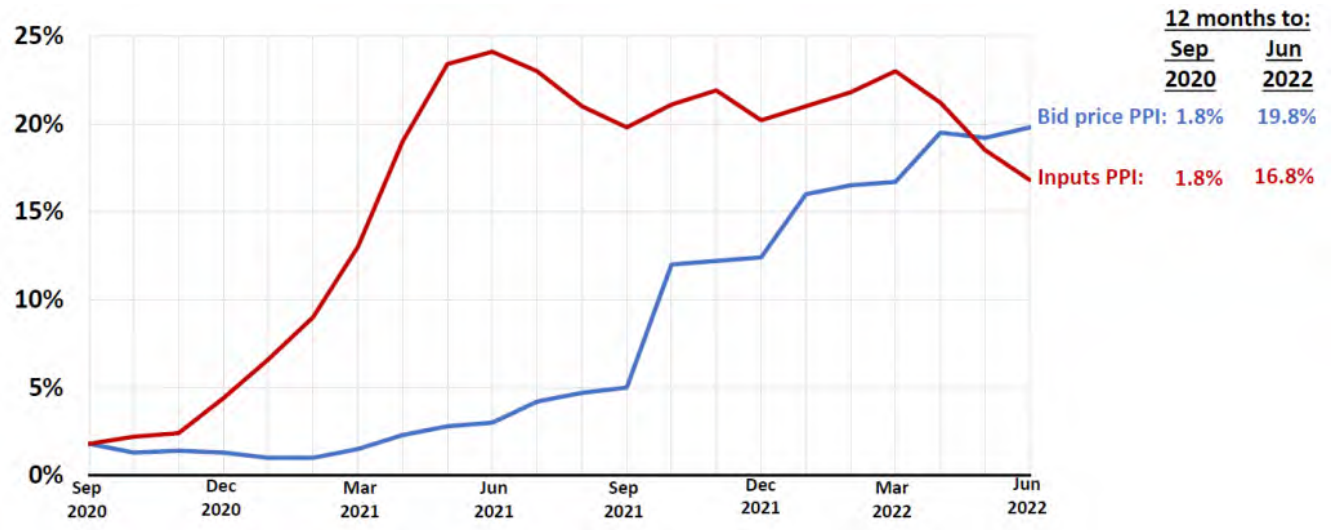
- **General Economic Landscape** for highway construction materials,
- **Work Program Work Mix** allocation and materials quantities estimates,
- **Material-specific findings** for supply chain variables, including
  - raw material sources,
  - existing and likely future transport and distribution methods,
  - 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, and
  - GIS maps of existing supplier locations.

GENERAL OUTLOOK ➤ HIGHWAY CONSTRUCTION MATERIALS

Input Costs vs. Bid Prices

Using data from the Bureau of Labor Statistics (BLS), the Associated General Contractors (AGC) July inflation alert shows a different pattern than was seen in 2021. While inputs costs rose rapidly, bid prices rose slowly for most of 2021. However, in 2022 bid prices have been catching up to the point that they were higher in May and June and inputs have been declining since March. Overall, both are still significantly higher over a year ago (**Figure 2**).

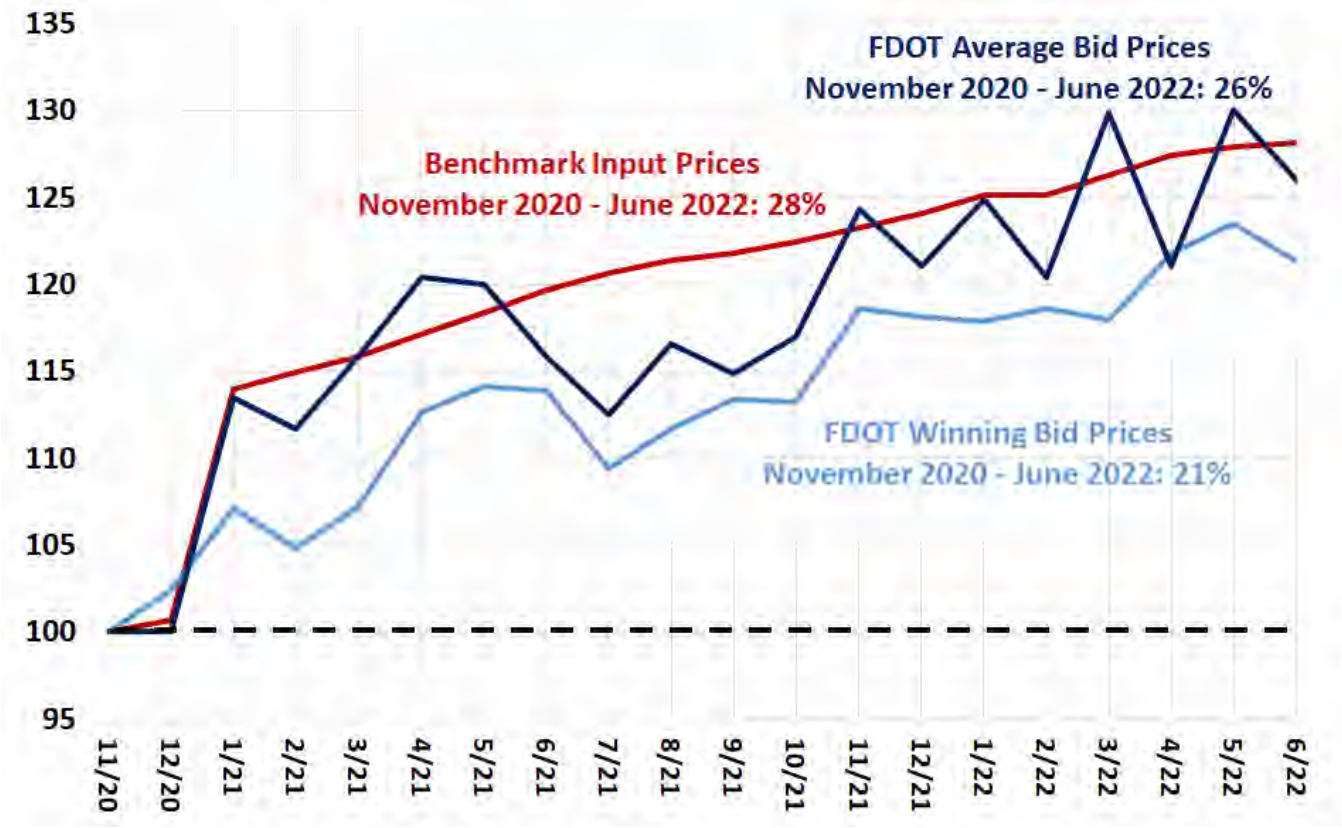
Figure 2. Change in Construction Input Costs and Bid Prices



Source: AGC

In Florida, regional industry prices jumped in June 2022 by about 28% compared to November 2020 levels (**Figure 3**). For awarded (winning) FDOT bids, price increases across all materials have increased about 21% through June 2022 compared to November 2020. For all FDOT bids (meaning the average of all bids received), price increases have tracked closer to benchmark input costs at 26%. Monthly cost composition by material is provided in **Appendix A**, along with an update on the BLS Producer Price Index (PPI).

Figure 3. Florida Benchmark Input Costs vs FDOT Bid Prices

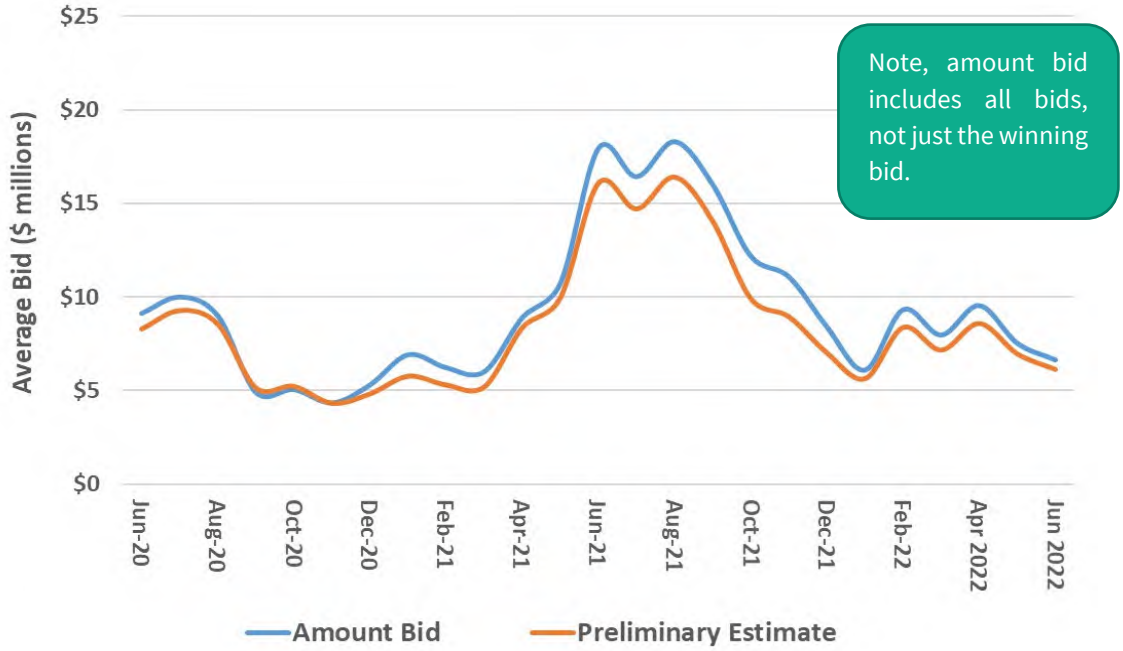


Source: TBG calculated from data provided by FDOT Office of the Work Program and Budget, TBG Work Product.

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 preliminary estimate. In the second quarter of 2022, the average deviation of bids from the mean bid was 10% (following the pattern from previous quarters), where District 1 had the largest deviation (15%) (**Figure 4**). Additionally, excluding contracts exceeding a preliminary estimate of $100 million from the analysis shows that for the second quarter the rolling average of all bids were 7% higher than the official preliminary estimate.

Figure 4. Average Bid vs. Preliminary Estimate. 3-month Rolling Average



Source: FDOT; TBG Work Product.

Table 1. Average Deviation from the Mean Bid by District

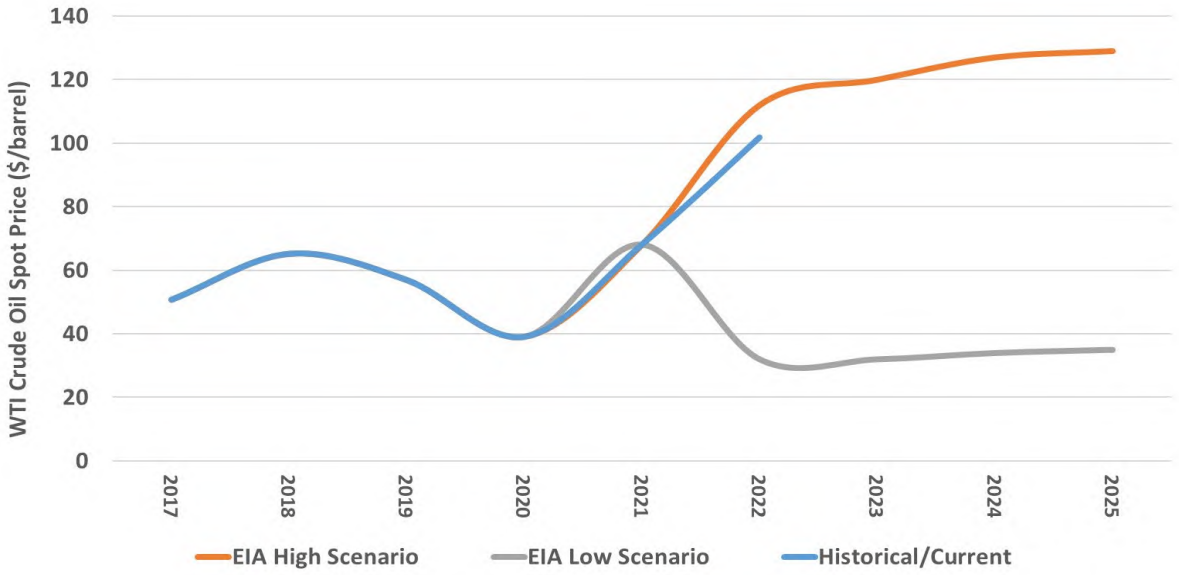
	District 1	District 2	District 3	District 4	District 5	District 6	District 7	District 8
2Q 2020	9%	13%	7%	8%	10%	11%	10%	14%
3Q 2020	10%	12%	15%	10%	11%	7%	18%	9%
4Q 2020	18%	8%	10%	6%	16%	10%	11%	13%
1Q 2021	12%	10%	11%	8%	9%	8%	14%	8%
2Q 2021	7%	11%	8%	8%	12%	7%	10%	10%
3Q 2021	9%	15%	13%	10%	9%	9%	9%	3%
4Q 2021	10%	10%	10%	13%	10%	8%	16%	4%
1Q 2022	7%	5%	17%	9%	13%	11%	14%	5%
2Q 2022	15%	8%	11%	9%	7%	8%	11%	6%

Source: FDOT; TBG Work Product

Energy Prices

The EIA July short-term Outlook projects US crude oil prices to average $99 in 2022 and fall to $90 in 2023. Under EIA's high scenario, prices will be above $120 per barrel by 2025; under the low scenario, they decline to near $40 per barrel. Current monthly crude oil spot prices continued the upward trend seen in 2021 (**Figure 5**), reaching $114 per barrel in June 2022. Year-to-date, prices have increased 38% and year-over-year they have increased 61%. Disruptions in the global crude oil market are expected to continue. In regards to U.S. crude oil production, in 2021 the total was 11.1 million barrels per day and is expected to increase 7% in 2022 to 11.9 million barrels per day. Beyond 2022, the EIA projected U.S. crude oil production to grow around 3% until 2025.

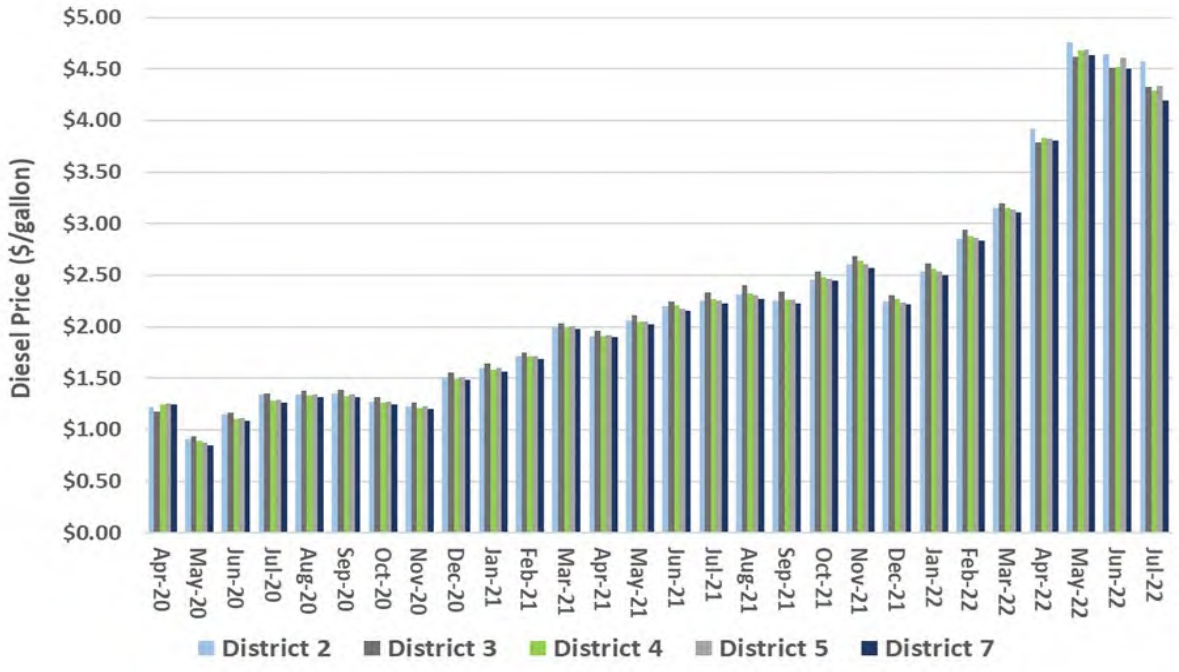
Figure 5. Monthly Crude Oil Price, 2017 to 2025



Source: EIA Average Monthly Spot Prices; EIA Annual Energy Outlook

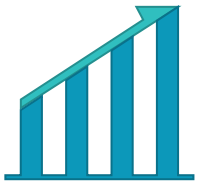
Diesel price quotes from suppliers at terminals around the state eased a bit in July, after all districts exceeded $4.50 per gallon in May 2022. (**Figure 6**). However, prices in all district are significantly higher than 2020 and 2021. Statewide, the Fuel and Bituminous Average Price Index for diesel has increased 70% year-to-date and 91% year-over-year to $4.34.

Figure 6. Average Diesel Price by District



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

Inflation



The Federal Open Market Committee (FOMC) released revised economic projections in June 2022, lowering GDP estimates in 2022 from 2.8% in March to 1.7% last month. Inflation estimates, on the other hand, are now estimated at 5.2%, up from 4.3% in March (**Table 2**). However, inflation is still expected to ease in 2023 to 2.6%, followed by 2.1% in 2024.

Table 2. FOMC Economic Projections, June 2022

Variable	Median				Range			
	2022	2023	2024	Long Run	2022	2023	2024	Long Run
Change in real GDP	1.7%	1.7%	1.9%	1.8%	1.0%–2.0%	0.8%–2.5%	1.0%–2.2$	1.6%–2.2%
March Projection	2.8%	2.2%	2.0%	1.8%	2.1%–3.3%	2.0%–2.9%	1.5%–2.5%	1.6%–2.2%
Unemployment Rate	3.7%	3.9%	4.1%	4.0%	3.2%–4.0%	3.2%–4.5%	3.2%–4.3%	3.5%–4.3%
March Projection	3.5%	3.5%	3.5%	4.0%	3.1%–4.0%	3.1%–4.0%	3.1%–4.0%	3.5%–4.3%
CE Inflation[1]	5.2%	2.6%	2.2%	2.0%	4.8%–6.2%	2.3%–4.0%	2.0%–3.0%	2%
March Projection	4.3%	2.7%	2.3%	2.0%	3.7%–5.5%	2.2%–3.5%	2.0%–3.0%	2%
Core PCE inflation[1]	4.3%	2.7%	2.3%		4.1%–5.0%	2.5%–3.5%	2.0%–2.8%	
March Projection	4.1%	2.6%	2.3%		3.6%–4.5%	2.1%–3.5%	2.0%–3.0%	
Projected appropriate policy path								
Federal funds rate	3.4%	3.8%	3.4%	2.5%	3.1%–3.9%	2.9%–4.4%	2.1%–4.1%	2.0%–3.0%
March Projection	1.9%	2.8%	2.8%	2.4%	1.4%–3.1%	2.1%–3.6%	2.1%–3.6%	2.0%–3.0%

Source: Economic Projections were provided by Federal Reserve Board members and Federal Reserve Bank Presidents.

Funding

State and federal funding is expected to increase demand for highway construction materials resources:

FLORIDA'S BUDGET FY 2022-23

Florida's budget for FY 2022-23 is $109.9 billion, with $11.7 billion being allocated for the work program ($4.4 billion for highway construction, $1.2 billion for resurfacing, $236.6 million for scheduled bridge repairs and replacements). The gas tax holiday in October was also in the final budget.

RESILIENT FLORIDA

$500 million for resiliency projects was committed by the Florida legislature and another $500 million was dedicated for targeted water quality improvements. This will largely be infrastructure spending in adjacent or competing sectors to resources needed for highway construction, which could reduce material availability for FDOT.

2022 WATER RESOURCE DEVELOPMENT ACT

The House passed the 2022 Water Resource Development Act (WRDA). Authorizes 18 projects (2 in Florida for hurricane and storm damage reduction) and advances the planning process of many others. The Senate passed its version on July 28th. Now the bill enters the negotiation phase between the two versions.

FEDERAL GAS TAX

In June 2022, President Biden called for Congress to suspend the Federal gas tax for 90 days. It is uncertain if such proposal is moving forward as nothing has happened since then.

Regulation

In 2022 there have been a number of regulatory developments that can affect the transportation construction industry.

PERMITTING ACTION PLAN

In May 2022, the White House released a permitting action plan[2] to accelerate federal permitting and environmental reviews to avoid delays in infrastructure projects under the Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act). This is the process to follow for permitting projects that qualify under the BIL.

[1] PCE inflation and core PCE inflation are the percentage rates of change in, respectively, the price index for personal consumption expenditures (PCE) and the price index for PCE excluding food and energy.

[2] Permitting Action Plan

EPA REGULATION LIMITS

In June 2022, the Supreme Court limited the EPA's ability to regulate power plants emissions under the Clean Air Act with the ruling in West Virginia v. EPA. However, the EPA is currently working on a new rule to regulate emissions from power plants that is expected to be released in early 2023, so more changes are expected. This could affect fly ash sources as well as any further climate regulations by the EPA.

OCEAN SHIPPING REFORM ACT

On June 2022, the Ocean Shipping Reform Act became law - the intent of the Act is to reduce shipping costs and improve efficiency by providing the Federal Maritime Commission with additional enforcement tools. This is intended to benefit producers that rely on shipping to source products or materials.

GREENHOUSE GAS RULEMAKING

The Federal Highway Administration recently announced a notice of proposed rulemaking that requires states and municipalities to track and reduce greenhouse gas emissions by adding a new GHG performance management measure to the existing FHWA national performance measures. The American Road & Transportation Builders Association (ARTBA) opposes it as they argue that Congress did not authorize the agency to regulate greenhouse emission when transportation performance measures were established. The rulemaking is currently in the comments phase.

ENDAGERED SPECIES ACT CHANGES

On July 2022, the Fish & Wildlife Service repealed changes made to the Endangered Species Act in 2020, which determines how critical habitats are defined. Organizations like the ARTBA and the National Stone & Gravel Association (NSSGA) oppose the changes and contend they would cause delays in the environmental review and regulatory process for construction projects.

DAVIS-BACON ACT

The comment period for the changes by the Department of Labor to the Davis-Bacon Act has ended. The changes would expand the definitions of "building or work" and "site of work" as well as updates to prevailing wage rates to address out-of-date wage determinations. This could affect contractor costs and their subsequent bids.

Production Capacity

Table 3 provides a summary of plant counts for the primary materials types. The current inventory shows that aggregate producers have been stable in the last years, with asphalt adding plants at a consistent pace. While concrete producers had significant increases in previous years, it has been flat in 2022. Approved steel plants had the largest increase in 2022.

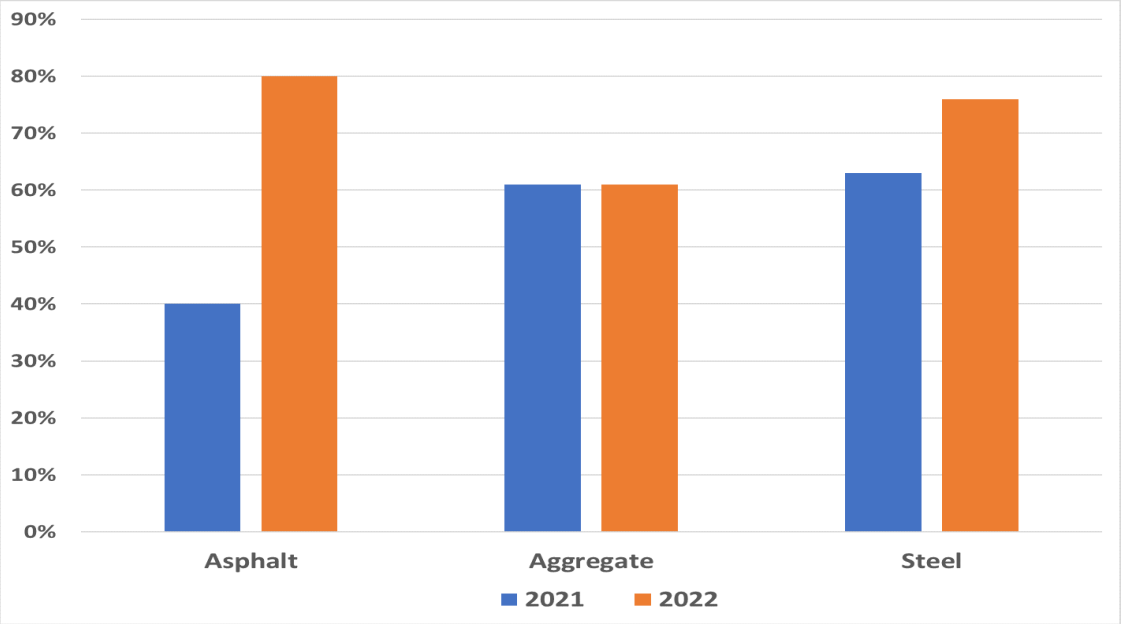
Table 3. Number of Producers by Material

Material Type	2012	2019	2020	2021	2022
Aggregate	188	242	236	238	243
Asphalt	109	107	115	116	120
Concrete (Ready-mix Plants)	327	465	486	494	496
Steel	135	116	112	113	121

Source: FDOT Approved Producer List, 2022 as of June 30st

In the 2022 TBG survey, asphalt producers are the only sector that reported a slight increase in percent of work for FDOT (33% vs. 30% last year). FDOT makes up about 17% of all aggregate work (down from 25% in 2021) and 13% of all steel work (down from 17% in 2021). **Figure 7** illustrates the changes in producers' capacity utilization rates. Asphalt and steel had higher use rates in 2022, while aggregate remained stable.

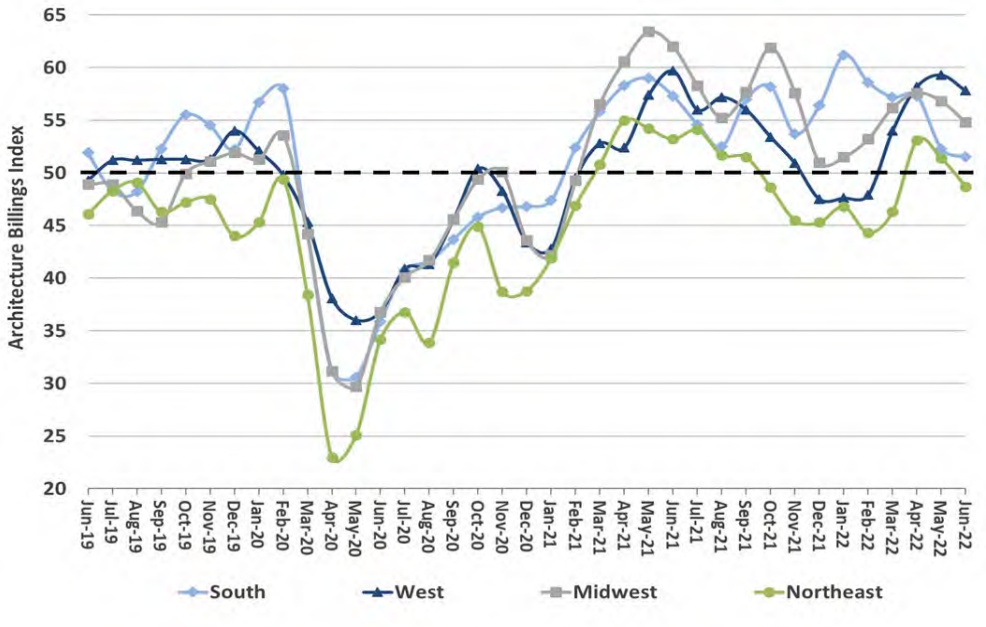
Figure 7. Capacity Utilization Rates



Source: TBG Survey

The Architecture Billings Index (ABI)[3] is a leading indicator (between 9 to 12 months) for nonresidential construction activity. All markets have deteriorated since April 2022, but most are still above 50 (indicating increased billings - **Figure 8**). The southern region is the only one that has continuously decreased since January 2022. Continued cost increases and supply chain disruptions may be limiting economic recovery.

Figure 8. ABI Billings Index, June 2019 – June 2022



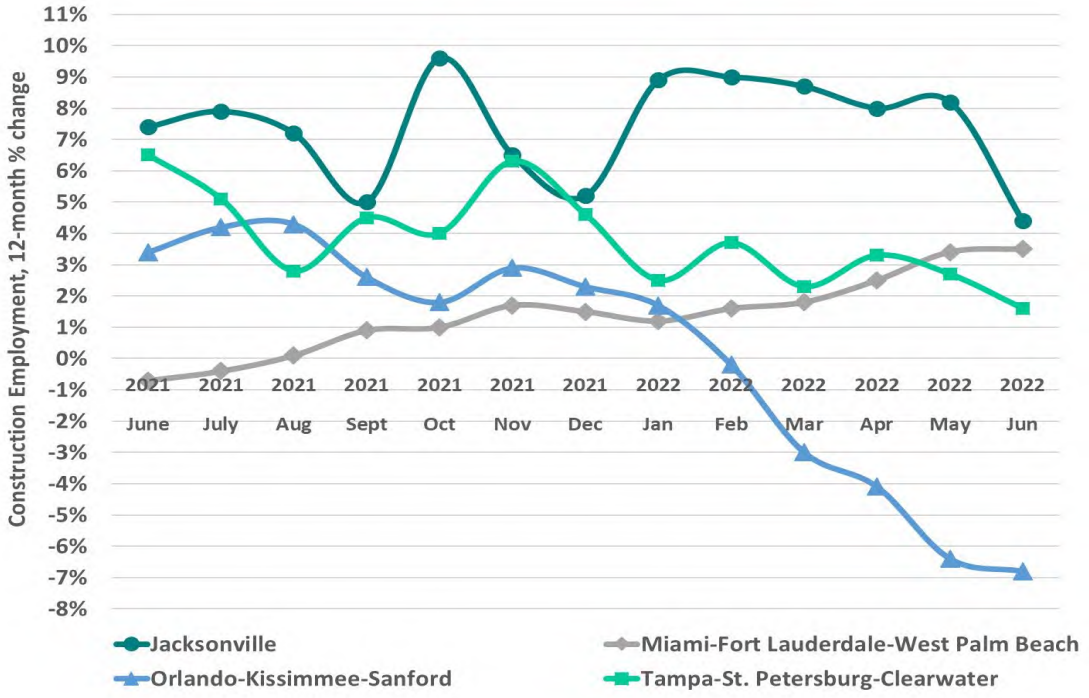
Source: American Institute of Architects, Architecture Billings Index

[3] ABI Billings are considered a leading indicator, meaning that construction activity 6-12 months from now generally follows the current ABI billings activity. A score below 50 indicates declining firm billings.

Construction Employment

Statewide construction employment increased 2.5% in June, year-over-year (**Figure 9**). However, metro areas had different growth patterns. The Orlando metro area continues the 2022 downward trend and construction employment was down 7% year-over-year in June; despite high demand, workers are simply unavailable. 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 Jacksonville metro area has grown 4%, but had a steep decline in June when compared to previous months. The Miami metro continued with steady growth over the past year and the Tampa metro area had a slight decline but it still grew close to 2%.

Figure 9. Changes in Construction Employment in Major Florida Markets, Jun. 2021 – Jun. 2022



Source: Bureau of Labor Statistics.

Additional information on economic conditions is provided in **Appendix A**.

Rail

As discussed in previous quarterly reports, rail issues were predominant in 2021 and have continued in 2022, with issues highlighted during the Surface Transportation Board (STB) "Urgent Issues in Freight Rail Service" hearing. In recent interviews, CSX executives have indicated that they have had to turn cargo away as they attempt to deal with backlogs and that congestion solutions are focused on yards and terminals. They also indicated that the company needs around 7,000 employees to meet demand. In the second quarter of 2022, they were at 6,667 (270 more than in Q4 2021) and they have 509 in training as of June 2022. As training takes several months, these issues are expected to continue in the short term. In regards to operating performance, they have deteriorated in many areas in 2022. Dwell time[4] has increased to 11.5 hours (8% decline year-over-year), and on-time originations and arrivals declined to 63% and 53%, respectively; both metrics represent a 20% decline year-over-year. In July 2022, CSX's weekly dwell time in the

[4] Average amount of time in hours between car arrival to and departure from the yard

Waycross, GA terminal (between 28 and 34 hours) is still higher than the system overall (24-25 hours). Higher dwell times means that it takes more time to get material out of the station, which could lead to project delays.

Additionally, there is a possibility that unionized workers may strike as unions and railroads have failed to reach an agreement during the contract negotiations. In a recent survey to its members, the Brotherhood of Locomotive Engineers and Trainmen indicated that 99% voted to authorize a strike. On July 18, President Biden established a Presidential Emergency Board to intervene and avoid a strike. Further rail information is in the materials' supply chain tables.

WORK PROGRAM ➤ **HIGHWAY CONSTRUCTION**

A summary of FDOT's Five-year Work Program (including P3 projects) by Work Mix Type is shown in **Table 4**. The Work Program totals in years 2026 and 2027 reflect approximately $1 billion (each year) in additional allocations for Resurfacing and Bridge Repair projects that are not yet programmed.

On the roadway maintenance side, resurfacing projects continue to lead projected allocations from 2023 to 2027. Similarly, Add Lanes construction funding is expected to hover around $1.4 billion over the first four years of the work program. Work Mix Types follow typical allocations, though New Bridge/Bridge Replace projects expenditures expected to jump in 2026 and 2027 for bridge repairs and replacements in Duval and Indian River counties, among others. Concrete requirements for FDOT are expected to increase substantially in 2026 and 2027 as a result.

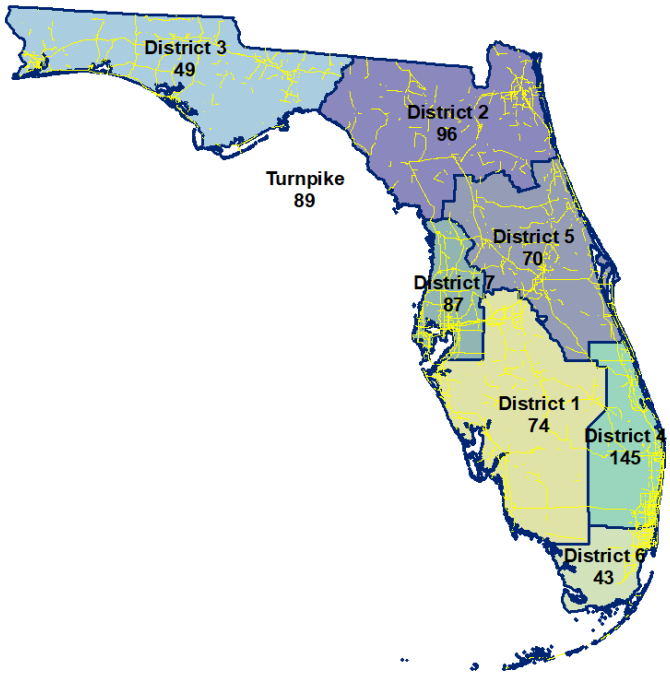
Table 4. Work Program Dollar Allocation by Work Mix Type (in thousands)

Work Mix Type	2023	2024	2025	2026	2027
Add Lanes	$1,464,516	$1,441,532	$1,422,343	$1,376,110	$502,716
Bikepath	$35,126	$53,017	$32,879	$9,232	$29,071
Bridge Replace/New	$200,473	$298,415	$99,096	$494,210	$578,862
Drainage	$24,660	$74,572	$6,862	$10,556	$27,420
Guardrail	$9,520	$4,935	$11,200	$3,408	$9,349
Interchange	$670,194	$686,866	$251,856	$67,879	$627,206
Intersection	$49,446	$22,521	$35,836	$6,086	$13,262
ITS	$108,682	$63,868	$9,940	$9,741	$1,731
Landscaping	$57,106	$38,945	$20,036	$36,869	$3,874
Miscellaneous	$203,409	$50,852	$69,907	$65,852	$26,950
New Road	$1,114,764	$27,715	$170,027	$272,772	$32,236
Resurfacing	$1,316,256	$1,179,107	$1,327,656	$1,608,502	$1,547,395
Rigidpave	$41,544	$57,382	$36,803	$42,636	$29,495
Signing/Pavement Markings	$6,277	$3,590	$1,955	$2,635	$577
Toll Plaza	$41,449	$40,777	$33,690	$37,443	$9,901
Traff Ops	$47,476	$26,162	$35,809	$28,373	$9,500
Widen/Resurface	$33,088	$5,304	$12,673	$1,737	$0
Total Work Program	**$5,423,985**	**$4,075,560**	**$3,578,567**	**$4,074,039**	**$3,449,544**

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

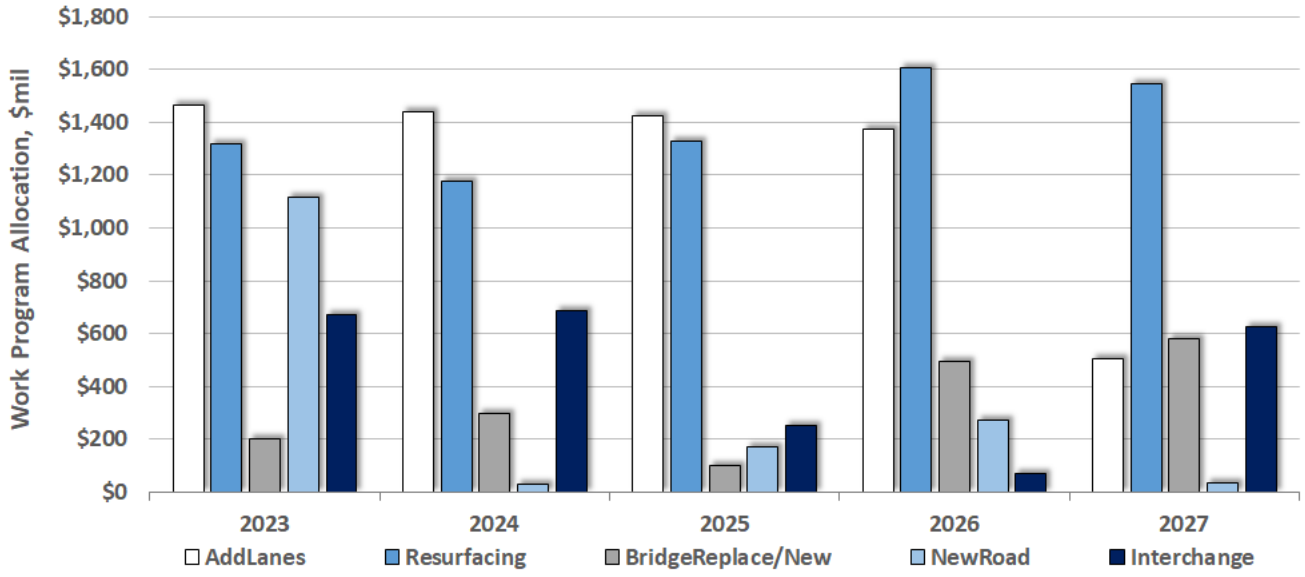
Figure 10 shows projects identified by the FDOT Five-year Work Program and bridge counts derived from Work Program data by district. **Figure 11** provides a comparison by Work Mix type of allocated work program funds for major projects over the five-year work program.

Figure 10. Work Program Roads and Bridges Count Estimates by District



Source: TBG calculated from data provided by FDOT Office of Program Management.

Figure 11. Work Program Allocation by Work Mix Type, Average Allocation > $250 million



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

Estimates of Future Quantities

Materials quantities estimates are provided in **Table 5**. Resurfacing projects for the out years of the work program as currently reported result in large asphalt expenditures.

Table 5. FDOT Future Material Requirements

Material	Units	2023	2024	2025	2026	2027
FDOT Work Program[5]	$ millions	$5,367	$4,037	$3,559	$4,037	$3,446
Asphalt	000s TN	6,632	5,305	5,305	6,066	5,252
Concrete						
Structural Concrete	000s CY	553	845	293	1,585	1,820
Ancillary Concrete		715	669	552	556	315
Total Concrete		1,269	1,515	845	2,141	2,135
Steel						
Reinforcing Steel	TNs	14,735	10,656	9,033	9,854	8,087
Structural Steel		15,015	10,859	9,205	10,041	8,240
Other Steel		103,746	75,029	63,599	69,379	56,936
Total Steel		133,496	96,545	81,837	89,274	73,263
Aggregate						
Base Material/Other Aggregate	000s TN	2,754	2,158	2,020	2,409	1,760
Aggregate for Asphalt[6]		4,841	3,766	3,660	4,125	3,519
Aggregate for Concrete		1,739	2,076	1,157	2,933	2,925
Total Aggregate		9,334	7,999	6,838	9,467	8,204

Source: Calculated by TBG, from FDOT Work Program & Estimates data.

Based on survey/interview results and data from current year lab volumes received for testing by FDOT, estimates of likely scenarios for binder demand were prepared. **Table 6** provides a breakdown by type of estimate binder demand for the five-year work program.

Table 6. FDOT Future Requirements of Asphalt Binder

Asphalt Binder (Tons)	2023	2024	2025	2026	2027
PG 52-28	38,526	32,005	32,601	34,561	28,159
PG 58-22	31,096	26,062	26,657	27,765	22,275
PG 67-22	10,101	8,080	8,080	9,240	8,000
PG 76-22 (PMA)	209,012	162,435	160,065	187,111	164,358
High Polymer	8,359	9,062	10,251	13,081	12,502

Source: Calculated by TBG, from FDOT Work Program & Estimates and SMO data.

[5] Excluding landscaping. Refer to Table 4 for landscaping allocations.

[6] Tonnage for aggregate in asphalt was previously estimated at 94.54% of total asphalt and reduced by another 10% for RAP. The latest FDOT data shows that RAP usage has increased to about 21% of total asphalt, reducing the share of aggregate in asphalt to 75% as of fiscal year 2022. This analysis assumes that RAP usage will continue to increase by 1-2% annually over the next few years due to aggregate shortages and higher prices.

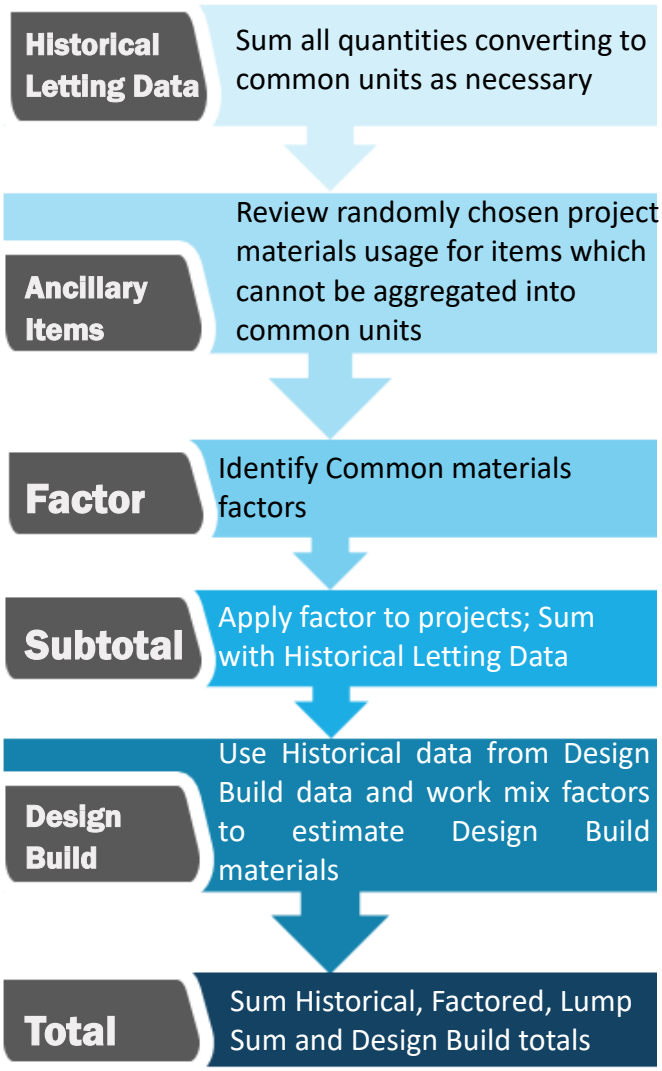
FDOT Data

Future quantities are estimated for the five-year work program (**Figure 12**). Historical Lettings and LRE data are received from the FDOT Offices of Work Program and Budget and Program Management/Estimates. Historical Lettings data contains pay item level lettings data from July 2009 through June 2022 (FDOT fiscal years 2010 – 2022) and LRE pay-item level data from July 2022 through June 2027 (fiscal years 2023 – 2027). FDOT Work Program and P3 data was received from the Office of Work Program and includes 2,328 unique projects.

Quantities are estimated using a factor approach. The factors were calculated by Balmoral economists and roadway engineers after evaluating several statistical relationships, including historical share of dollars spent for different project types, length of project and other variables depending on work mix type. The factors were originally created in 2007 from pay item data and most recently updated using pay item data through 2022 for the current study.

Raw Five-year Work Program data includes work mix level dollars for fiscal years 2023 – 2027. LRE data provided to Balmoral contains 1,467 unique projects. LRE price estimates for 2023 through 2027 were based on project types and used in conjunction with Work Program dollars to estimate future material quantities.

Figure 12. Basis of Calculations



ASPHALT

Summary

- Binder prices continued increasing significantly in 2022 due to higher oil prices and higher production costs. Current market conditions have discouraged refiners to produce more asphalt; for the first time, Florida binder prices exceeded the rest of the East Coast.
- 87% of producers anticipate the industry having difficulties meeting demand. Trucking and aggregate availability are their main issues.
- Producers are using a high percent of their capacity, on average 80%, which could make it difficult to further increase production to meet demand.

FDOT impacts

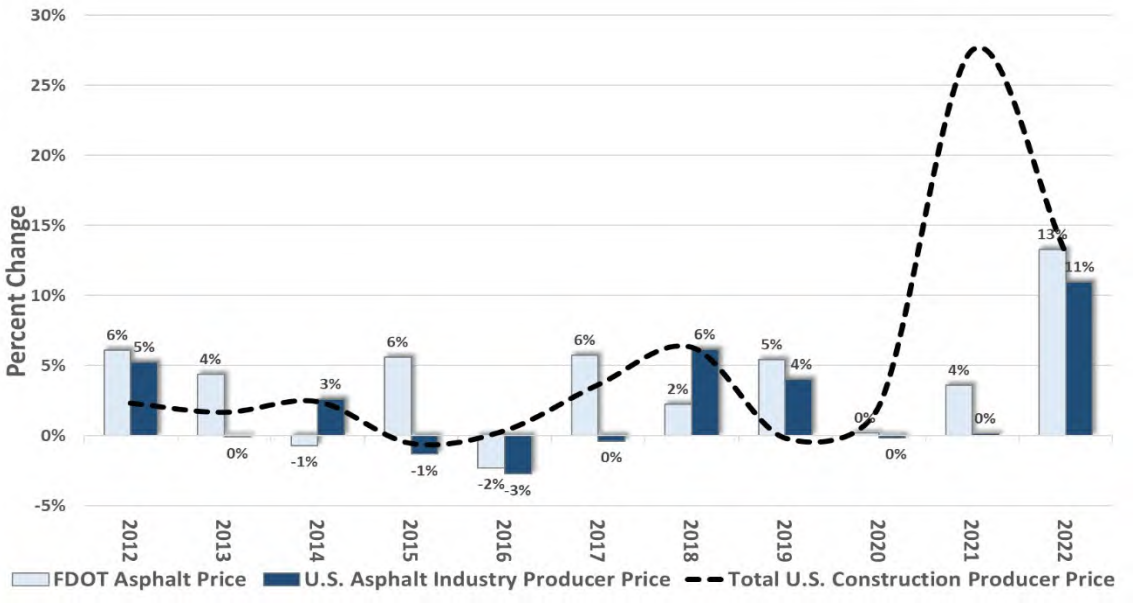
- FDOT HMA prices have increased 13% in fiscal year 2022, and are expected to maintain current record levels for most of the current fiscal year before climbing a further 3-6% in the next two years.
- While last year competition constrained cost increases, this year producers indicated they have passed some of the costs to consumers. On average, they have passed 43% of the costs, but some have been as high as 80%. Some producers expect further bid increases by end of 2022

Asphalt prices are currently at record highs for the period of FDOT data available (dating to 1993), reaching a weighted average price of $129 per ton in 2022. A series of factors are supporting high prices, the major being crude oil prices, which in return leads to higher binder prices. Supply of asphalt is also tighter and imports of binder had significant declines in 2021 due to higher shipping costs.

General Trends

Nationally, while construction producer prices fluctuated between 0 and 5% in most years, they drastically increased in 2021 and have slightly eased in 2022. Meanwhile, FDOT's asphalt prices have increased 13% in 2022. A comparison of changes in producer prices since 2010 as well as FDOT's asphalt price is provided in **Figure 13.**

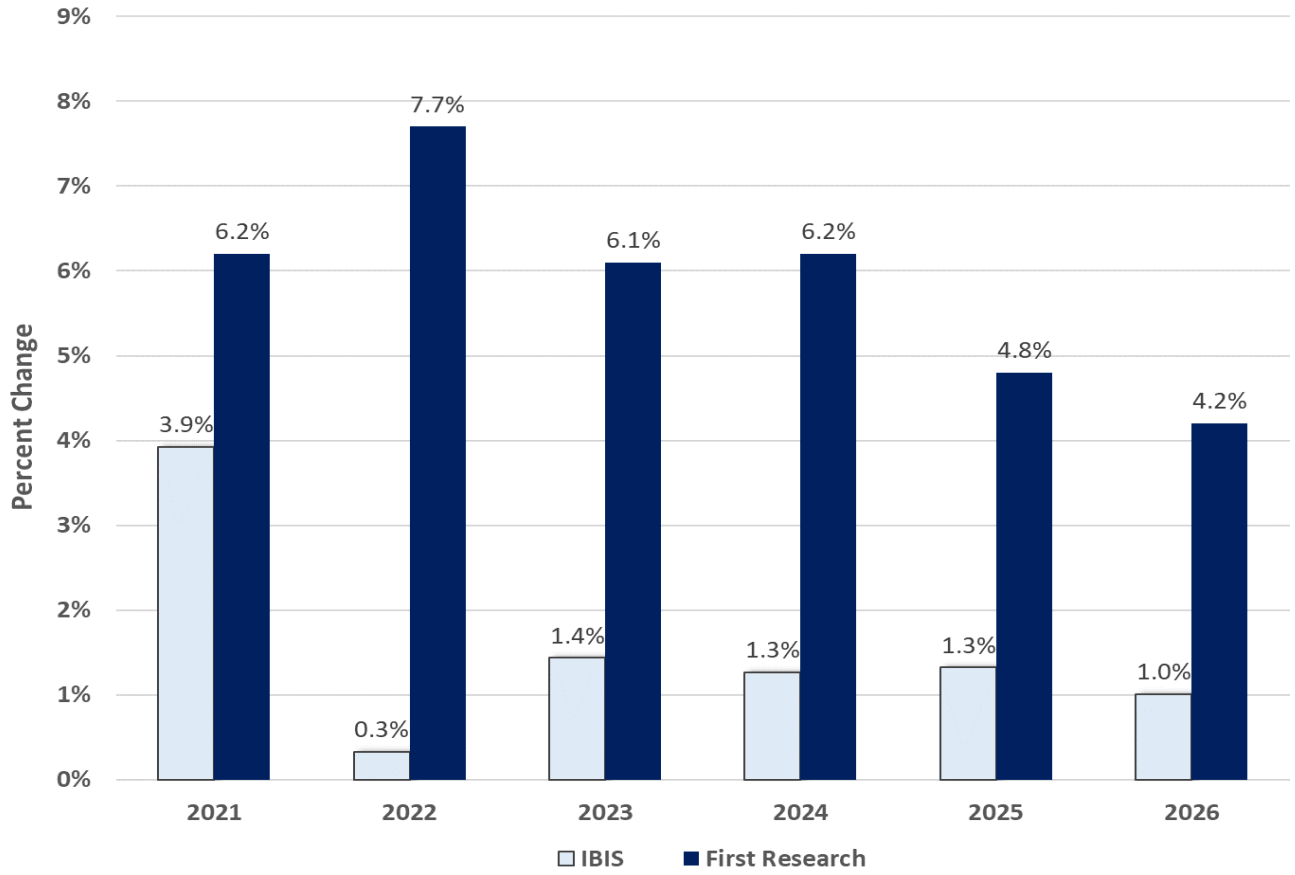
Figure 13. Change in Producer Prices, Asphalt Industry



Source: FDOT, U.S. Federal Reserve

Recent revenue projections through 2026 differ in the growth rate for the asphalt industry. While some expect slow growth around 1%, others show steady growth closer to 6% (**Figure 14**). Florida tends to have a hangover effect from the rest of the U.S., and projected infrastructure spending, barring a significant recession, would tend to support higher growth estimates for the next two years.

Figure 14. Asphalt Manufacturing Industry Revenue Outlook



Source: IBIS January 2022 Asphalt Manufacturing Report; First Research Industry Report May 2022

During the peak of the housing boom, Florida asphalt production exceeded 20 million tons annually. While it was expected to decline in 2020, HMA production actually grew 3%. Growth rates for 2021 and 2022 are similar, closing in on 19 million tons annually – almost back to housing boom levels.

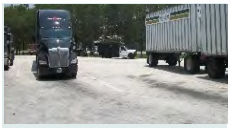
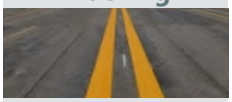
SUPPLY CHAIN VARIABLES ➤ **ASPHALT PAVEMENT MATERIALS**

Table 7 provides the current status of selected variables of interest. **Table 8** provides a summary of relevant variables that have been found in the past to influence FDOT's costs at a statistically significant level from 2011 - 2022.

Table 7. Supply Chain Summary: Asphalt Materials

 Aggregate	Sources for HMA are dominated by Georgia granite shipments and rock from South Florida's Lake Belt mining area. Several HMA suppliers are vertically integrated to better manage their aggregate supply. Producers indicated in interviews and survey issues with securing raw materials and aggregate as unpredictable. The United States Geological Survey (USGS) revised Florida's production for 2021, now showing a 7% decline for crushed stone. However, production in the first quarter of 2022 started strong as crushed stone produced rose 11% year-over-year.	=
 Refinery Capacity	Refinery utilization in the Gulf Coast has recovered in 2022, with utilization being above 95% since May and reaching a high of 98% in July. Production costs continue to be affected by higher crude oil prices and geopolitical factors. Oil & Gas Journal (OGJ) and EIA asphalt refinery capacity data shows that 2021 capacity in the Gulf coast was down 1% compared to 2019 levels and EIA shows a 6% increase for 2022. On the other hand, EIA shows a refinery opening in Galveston, TX that will add 45,000 bpd. No additional capacity is expected in the short term, but capital projects expected to be completed by 2023 should add 350,000 b/d of capacity in Texas. The crude oil market is expected to continue being volatile in the months ahead. While talks with Iran and Venezuela continue, no agreement is expected in the short term.	↑
 Asphalt Binder	Unmodified (PG 67 & lower) asphalt binder prices have increased 46% in 2022 and 52% year-over-year. Crude oil prices have increased and production costs have followed. Additionally, Argus reports that current market conditions continue incentivizing refiners to focus on transportation fuels and use asphalt as feedstock rather than produce it, with asphalt coker yields[7] reaching its highest point in June 2022 ($695/t). Even though yield eased a bit in July, they have increased 49% year-over-year. Competition for material is expected to increase as the demand increases during the summer months and supply continues being tight. Producers did not indicate binder availability as a top issue.	↑
 Polymers	While producers did not indicate issues with polymers, with very few suppliers, they are a source of vulnerability. Earning releases continued end of 2021 trends, with a decline in prices compared to previous quarters, but with small gains year-over-year across different chemicals segments. There have been reports that demand is still high, but it has recently weakened from other industries on fears of a recession happening, which has contributed to lower prices. The recent volatility in the crude oil market can negatively impact pricing, availability and lead times as refiners adjust production.	↑
 Imports	While freight costs have limited imports for producers, reports indicated that recent cost increases in the U.S. have created opportunities to import product from Europe and the Mediterranean. Data from the U.S. International Trade Commission shows imports from Canada, Colombia, Turkey and Venezuela to Miami and Tampa in 2022. Other districts along the east coast show Canada as the main source, with Greece, Turkey and Saudi Arabia as other sources. In general, prices are expected to be high with supply chain issues and volatility in crude oil.	↑
 Shipping	Marine fuel oils were hit with the recent rise in global fuel prices, impacting shipping rates. High shipping rates continue to constrain imports from Europe and the Mediterranean. The Ukraine war has also disrupted supply routes. Shipping issues are not expected to ease in the short run although fuel prices are falling.	↑
 Rail	More shippers have used rail rather than trucking to stockpile inventories due to a tight trucking market. While in 2021, CSX shipments and revenues of asphalt products rose, during Q1 2022 shipment fell 6% and revenues increased 7%. CSX also reported a 92% increase in locomotive fuel costs. As of this writing, commodity specific data for the second quarter has not been published.	↑

[7] Argus' coker yields reflect the value of a short ton of asphalt after it has been processed in a delayed coking unit

 Trucking	Asphalt suppliers may continue to face driver shortages as demand for drivers from various industries continue to be high. Fuel costs and trucking availability are a major concern for most producers which will keep costs high. According to the American Association of State Highway and Transportation Officials (AASHTO), more than 100 employers launched Registered Apprenticeship programs in 90 days, CDL licenses issued in January and February 2022 increased 112% compared to 2021.	↑
 Pavement Markings	A nationwide shortage of paint, resin, and glass has persisted into 2022, leading to higher prices and tighter supply. Pavement Markings and other plastics-based/petroleum-based ancillary products remain vulnerable to current supply chain issues and crude oil markets.	↑
 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. Producer sentiment regarding labor issues is divided between has worsened and hasn't changed in the last year. Some indicated that there are other, more important, concerns at the moment.	↑
 Competition	According to FDOT's approved producer list, two plants in Leesburg and Brooksville that were acquired by Superior Asphalt are expected to come back online as of June 2022. The number of asphalt producers in FDOT's approved list has increased by 3% in 2022. FDEP's air permitted facilities shows 3 asphalt plants under construction (in Alachua, Brevard and Hillsborough counties). Additional plants would increase competition for FDOT projects.	=

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

Table 8. Historical Asphalt Data, 2013 –2022

*(Maximum values indicated with *)*

Asphalt	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crude Oil (WTI Spot Price)[1]	$/Barrel	$97.98	$93.17	$48.66	$43.29	$50.80	$65.23	$57.00	$39.16	$68.13	$101.78*
Total Chinese Imports[2]	Billions of $	$1,950	$1,959	$1,680	$1,588	$1,844	$2,136	$2,078	$2,066	$2,688	$2,782*
Refinery Capacity for U.S. Refineries[3]	000s Tons/Year	31,973	31,803	31,933	37,803	44,316*	41,811	39,405	38,555	38,969	39,338
Florida Diesel Prices[4]	$/Gallon	$3.16	$3.00	$1.84	$1.44	$1.78	$2.22	$2.04	$1.78	$2.15	$3.71*
Estimated FDOT HMA Requirements[5]	000s of Tons	4,179	3,255	3,914	4,457	2,978	4,140	6,034	3,981	3,700	6,567*
Estimated Statewide HMA Produced[6]	000s of Tons	12,952	13,687	14,442	14,727	16,710	17,546	17,339	17,907	18,282	18,834*
FDOT's Estimated Consumption of HMA Production[7]	%	32.27%	23.78%	27.10%	30.26%	17.82%	23.59%	34.80%	22.23%	20.24%	34.87%*
FL Heavy & Civil Engineering Employees/ All FL Construction Employees[8]	%	12.95%	12.56%	12.28%	12.33%	12.90%	12.45%	12.73%	13.01%	12.94%	13.17%*
FL Construction Employees/All FL Non-Farm Employees[8]	%	4.83%	5.08%	5.33%	5.65%	5.89%	6.16%	6.32%	6.61%*	6.46%	6.33%
Annual FDOT Work Program Allocation[9]	Billions of $	$2.59	$3.29	$3.18	$3.51	$4.00	$3.82	$3.83	$3.72	$2.66	$4.17*
Asphalt Binder Imports Serving Florida[10]	Tons	68,137	120,932	312,817*	169,918	227,656	204,525	183,255	226,507	86,109	92,347
Average Asphalt Binder Price[11]	$/Ton	$736.88	$748.99	$602.30	$450.45	$460.74	$610.86	$641.94	$566.62	$600.52	$770.79*
FDOT HMA Cost[12]	$/Ton	$93.91	$93.25	$98.49	$96.22	$101.73	$104.01	$109.63	$109.83	$113.81	$128.90*

Sources: 1. EIA – Annual Average Spot Price. 2. WTO's World Trade Statistical Review. 3. EIA, Oil & Gas Journal. 4. FDOT Construction Office. 5. Calculated, from data provided by FDOT Estimates Office. 6. Historical FDEP and EIA forecast. 7. Calculated from 5 & 6. 8. Bureau of Labor Statistics - State and Local Employment. 9. FDOT Office of Work Program. 10. U.S. I.T.C. 11. FDOT Office of Construction, Fuel and Bituminous Price Index; Modified Binders 76 & Higher. 12. Calculated weighted average, from data provided by FDOT Estimates Office.

Aggregate

Aggregate sources for HMA are dominated by Georgia granite shipments and rock from the South Florida Lake Belt mining area. Producers indicated that on average 53% of their production uses fine aggregate and 47% is coarse aggregate. However, several factors warrant monitoring. Some producers indicated issues securing material. While production in the State decreased in 2021 and Lake Belt region continued the downward trend that started in 2018, it is near 100 million tons annually. Rail and trucking issues seen by aggregate producersare impacting asphalt producers also. Further information can be found in the Aggregate section.

Polymers

Globally, polymer production has been affected by supply chain disruptions with all other petrochemical products. Due to increased demand nationwide for petrochemical products, which are used to make plastics, rubbers, resins, synthetic fibers, and petroleum-derived paints and coatings, Chevron Phillips Chemical announced in December 2021 that they will be constructing a new C3 splitter unit in Baytown, Texas. The expansion is projected to be completed in 2023. Alpek, Indorama Ventures and Far Eastern New Century will continue the construction of a 1.1 million tons per year polyester plant in Texas. This is expected to be completed by 2025. Additionally, Baystar Polymers recently started up a new ethane cracker in Port Arthur, TX. It has production capacity of one million tons of ethylene per year. On the other side, LyondellBasell announced that it will either sell or stop operations in its Houston refinery by 2024

Because the number of suppliers is still low, suppliers hold pricing power and this is still a point of vulnerability. Earning reports from publicly traded companies show strong year-over-year increases in volumes and prices. For reference, **Table 9** shows reference prices and volumes from the Q1 2022 earnings report of a publicly traded company. Year-over-year prices had small gains, sales increased and production decreased. The average cost per ton of ethylene production in Q1 2022 rose 72% year-over-year to $491. Ethylene is part of the process to make different types of polymers, so higher ethylene costs will lead to higher polymer prices.

Table 9. Petrochemicals, 2021 vs 2022

Type	Q4 2021	Q1 2021	Q1 2022	Y-o-Y Increase
Ethylene produced (ktons)	1,345	1,133	1,100	-3%
Propylene produced (ktons)	327	300	258	-14%
Polyethylene sold (ktons)	818	756	798	6%
Polypropylene sold (ktons)	226	213	218	2%
U.S. weighted average cost of ethylene production (USD per metric ton)	$459	$286	$491	72%
U.S. ethylene (USD per metric ton)	$895	$902	$942	4%
U.S. polyethylene [high density] (USD per metric ton)	$1,830	$1,521	$1,617	6%
U.S. propylene (USD per metric ton)	$1,448	$1,609	$1,396	-13%
U.S. polypropylene (USD per metric ton)	$2,491	$2,315	$2,234	-3%

Source: Lyondellbasell Q1 Earnings Report.

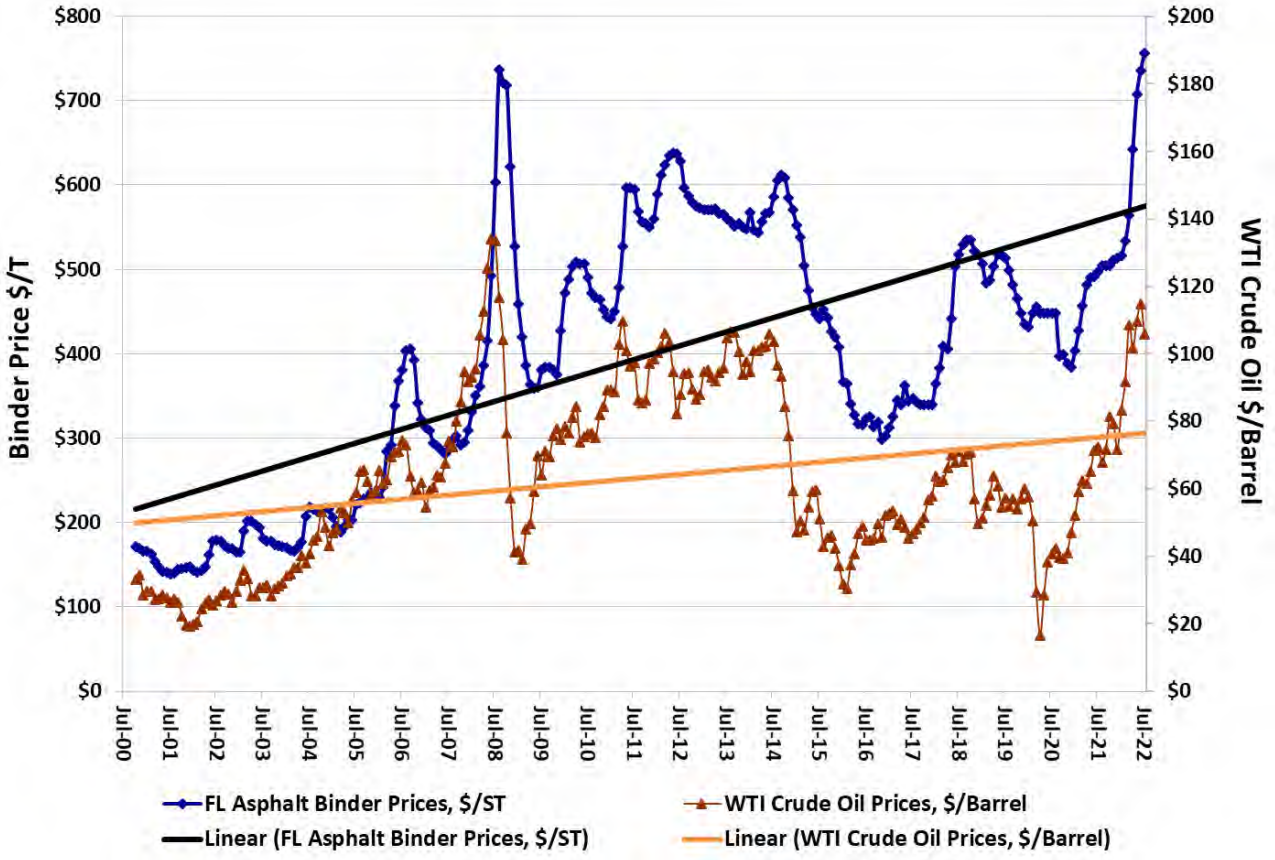
Asphalt Binder

With the Russian invasion of Ukraine, crude supply and higher prices have been a concern around the world. In the June meeting, OPEC+ members agreed to accelerate monthly production increases for July and August from 432,000 bpd to 648,000 bpd. This would complete the scheduled increases, and while there is a cooperation agreement until December 2022 so that countries that are lagging can catch up, it is unknown what will happen next.

Until the Great Recession, asphalt binder prices were closely correlated with crude oil prices. **Figure 15** shows the relationship between crude oil and Florida asphalt binder prices dating to 2000. The deviation between asphalt binder

and crude continues to widen, with binder price increases outpacing oil prices. Increases in rack binder prices[8] have been similar around the state in 2022, with lowest prices seen in Panama City ($700 per ton) and the highest in Jacksonville, $752 per ton. Miami has had the largest increase at 53% followed by Jacksonville at 52%. Prices in Tampa and Panama City have increased 49% and 44%, respectively. Producers indicated that they have, on average, seen a 33% price increas from suppliers since January 2022. These have been as high as 60%. Producers have also passed 43% of these to customers, but some have passed the majority if they had the possibility to do so. As a result, producers also expect bid prices to rise for the remaining of 2022. Traditionally, Florida prices were lower than elsewhere along the East Coast. This is no longer the case, with Florida prices exceeding northern destinations by more than 20%, driven by heavy demand.

Figure 15. Crude Oil and Asphalt Binder Price Comparison



Source: EIA, FDOT

In order to forecast future pricing, TBG researched asphalt binder prices from various locations in the southeast United States[9]. Using price ratios, further analysis was performed to estimate quarterly PG 76-22 Binder prices until the end of 2022 for Miami, Tampa, and Panama City over the last few years (**Table 10**). Temporal averages were found using estimated prices from all three locations to yield estimates.

An analysis of weekly binder prices from July 2018 to July 2022 weighs heavily on the point of entry; all ports report varying levels of prices with significant increases over the past months. Using a variety of models for fit, historical FDOT

[8] 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.

[9] 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.

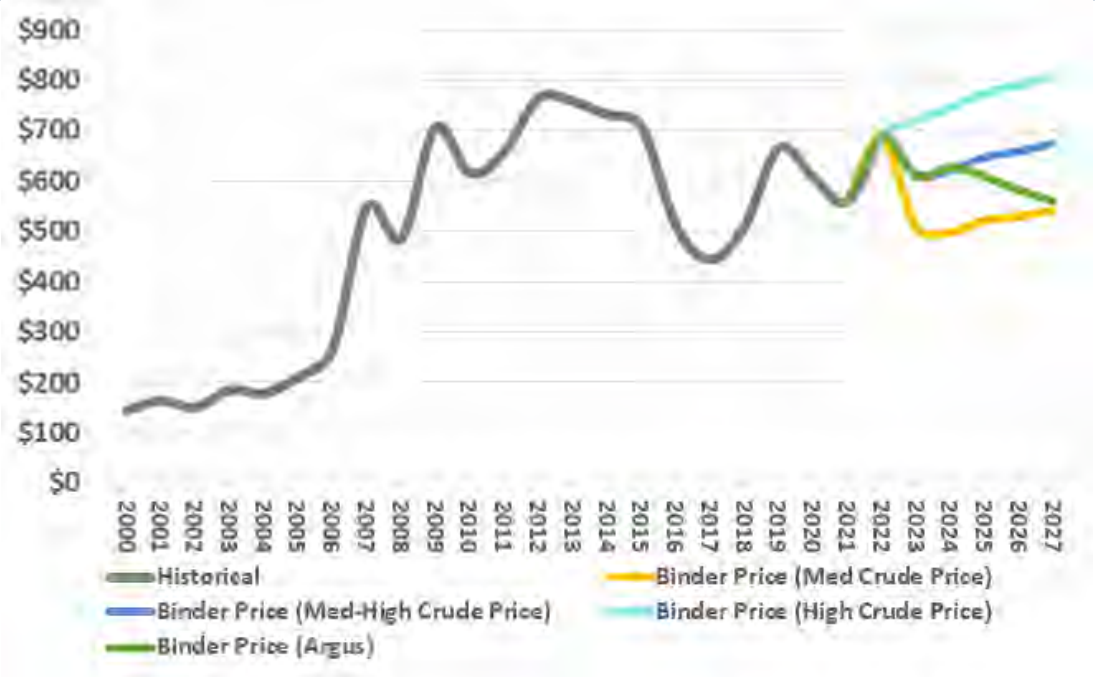
binder prices were forecasted to 2027 under a medium crude oil price scenario and a low crude price scenario resulting from the pandemic. Statewide binder price outlooks are in **Figure 16**.

Table 10. Average Binder Prices

Quarter	Historical	Lower Bound Forecast	Midpoint Forecast	Upper Bound Forecast
Q1 2020	$561.25			
Q2 2020	$511.37			
Q3 2020	$488.65			
Q4 2020	$491.93			
Q1 2021	$532.16			
Q2 2021	$583.22			
Q3 2021	$603.34			
Q4 2021	$607.45			
Q1 2022	$655.40			
Q2 2022	$804.64			
Q3 2022		$731.34	$798.08	$864.83
Q4 2022		$747.11	$864.17	$981.23

Source: TBG calculated from Argus Binder Price Reports.

Figure 16. Average, PG 76-22 Binder



Source: TBG calculated from Argus Binder Price Reports.

Imports

As global supply of binder tightens as demand for fuel increases, options for imports are limited. U.S. sanctions to Iran and Venezuela are still in place. While there have been talks to ease the sanctions, these are not expected to be lifted in the near future. Data from the U.S. International Trade Commission shows that binder imported fell 62% in 2021 and were below 100,000 tons for the first time since 2013. Port Everglades and the Port of Tampa have the largest estimated petroleum storage capacity in the State. In fiscal year 2021, asphalt imports to Port Everglades fell 36%. Port of Tampa reports petroleum products cargo and they were up 9% in 2021.

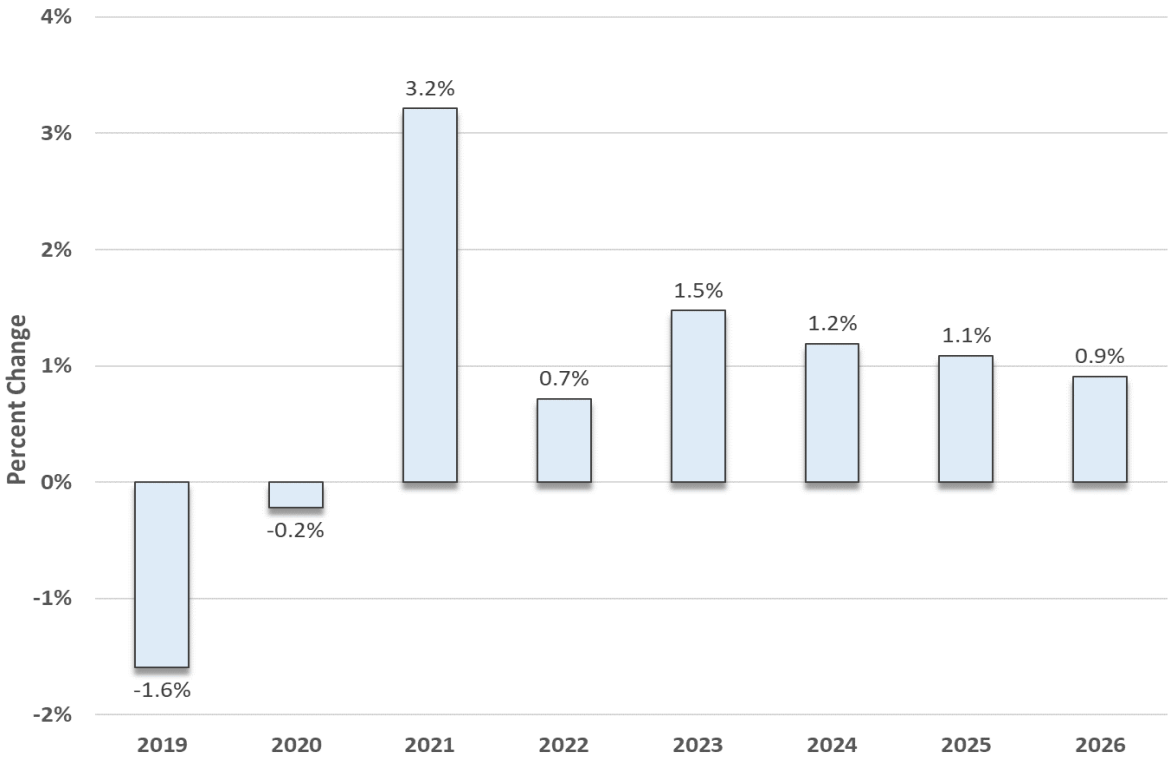
While Argus reported in 2021 that imports from Europe and the Mediterranean were unviable for most of producers on the east coast due to higher prices and costs, in 2022 these have improved, creating import opportunities. Canada, Colombia, Turkey and Venezuela have been sources of imports in 2022. Producers did not indicate in the survey that binder availability is a primary concern.

Labor

Availability of skilled labor has been a challenge for the asphalt industry in recent years. In TBG's 2021 survey, 70% anticipated the industry having difficulties meeting demand, where labor and trucking are the main factors. However, in this year's survey the majority of producers expect issues meeting demand (87%) but labor is no longer listed as a top concern. Instead, raw materials and trucking are more commonly listed issues.

Figure 17 shows national trends in employment growth. Employment for the asphalt sector as a whole grew 3% in 2021 and is expected to grow 1% annually up to 2026, with wages showing a similar pattern.

Figure 17. Asphalt Industry Employment Growth



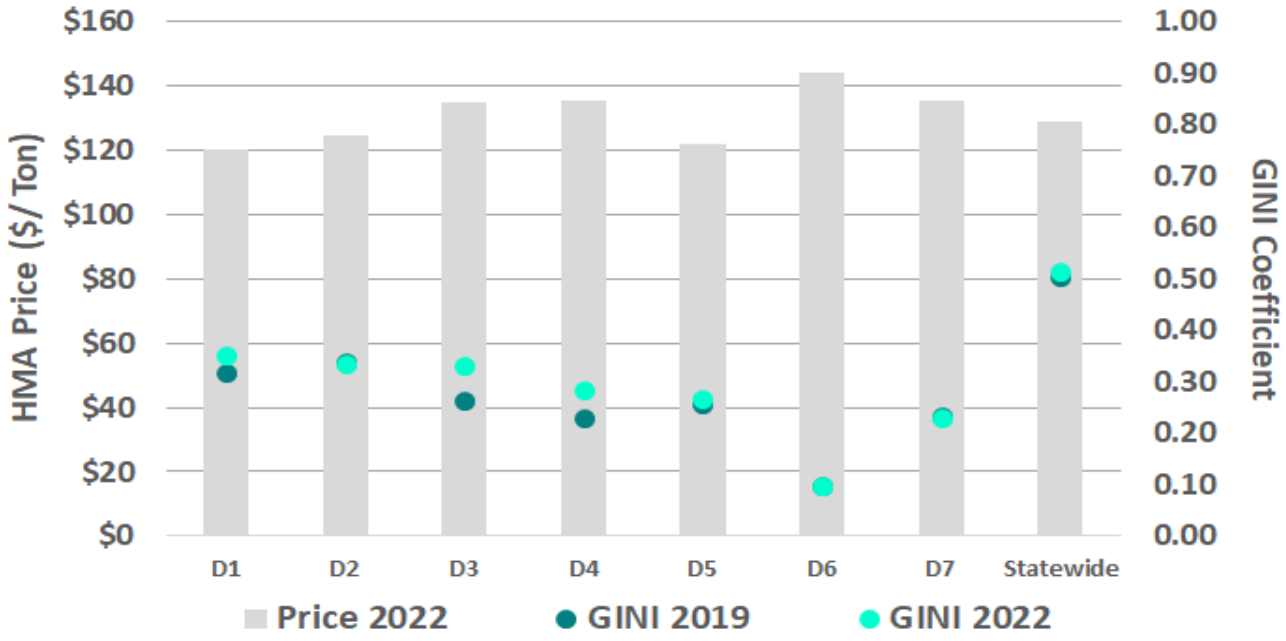
Source: IBIS Industry Reports, Asphalt Manufacturing, January 2022

Competition

FDOT's HMA costs vary by District across Florida, which reflects varying levels of work program as well as competition. **Figure 18** compares the level of competition in each District currently and in 2019 (pre-pandemic), including the price and market share across Florida. A measure of competition is the Gini coefficient; if market share is perfectly distributed, the Gini coefficient would be 0 (perfect equality), and if monopoly conditions exist, the Gini would be 1 (perfect inequality) – the higher the Gini, the less competitive the industry. Most districts showed no major changes between 2021 and 2022, with districts 3 and 4 being less competitive

The statewide Gini coefficient estimates market competition for all plant activity in Florida, aggregated to the company level. When added up statewide, 16% of the companies account for 59% of active plants, the same as activity in 2021. This consolidation of owners leads to a higher statewide Gini coefficient than seen in the Districts, since the entire list of companies is considered instead of being divided relatively more evenly over the Districts.

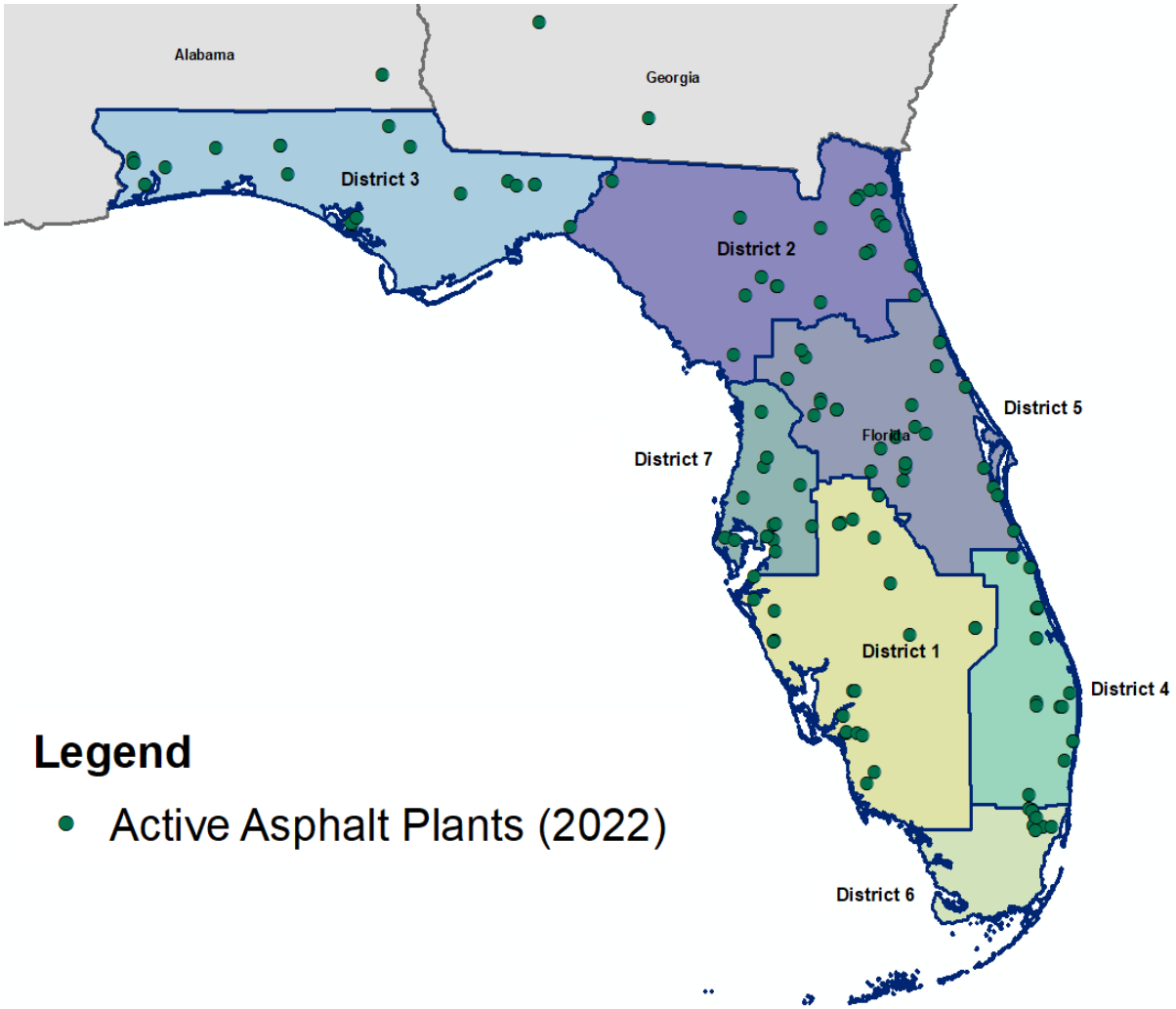
Figure 18. HMA Price and Market Share by District



Source: FDOT, TBG Work Product.

The majority of plants are situated in Central to North Florida. **Figure 19** shows the dispersion of active asphalt plants across the State, based on permit activity and/or survey updates. Additionally, FDEP's facilities list show 103 active plants and 3 plants under construction in districts 2, 5 and 7.

Figure 19. Active FDOT- Approved Asphalt Producer Facilities



Source: TBG, prepared from data provided by FDOT Office of Program Management

Current Pricing

FDOT's HMA costs reflect a unique combination of asphalt binder costs, FDOT-specific requirements regarding manufacturing and installation, and non-FDOT competition for contractors and materials. Asphalt prices have continued increasing in fiscal year 2022, rising 13% to $129 per ton according to year-end bid data (**Table 11**).

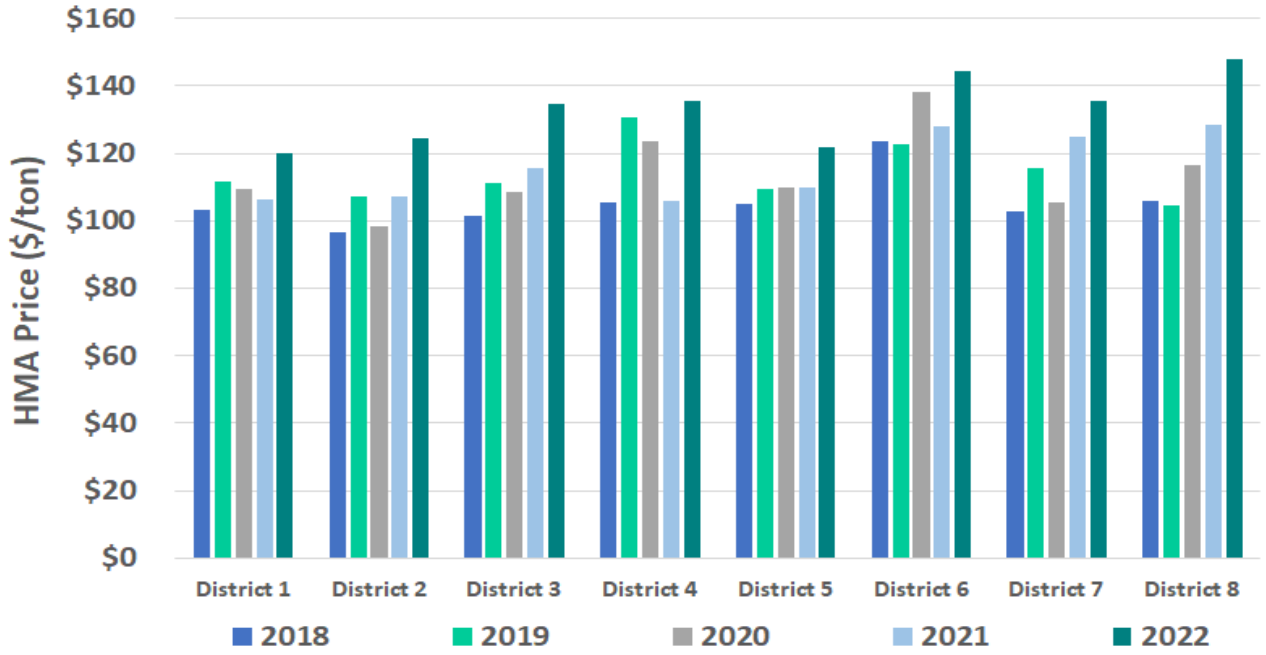
Table 11. HMA Price, 2018 - 2022

Year	2018	2019	2020	2021	2022
Price HMA, $/Ton	$104.01	$109.63	$109.83	$113.77	$128.90
Percent Change, %	2.2%	5.4%	0.2%	3.6%	13.3%

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

Consolidation of the asphalt industry in Florida has led to less competition and higher pricing in some districts. Since 2019, weighted average HMA prices have risen between 8 to 21% in all districts. In 2022, all districts are above $120 per ton and districts 6 and 8 have the highest prices, both above $140 per ton. (**Figure 20**).

Figure 20. HMA Price by District, Dollars per Ton



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

Material Quantities

Balmoral has forecast FDOT's HMA Future Requirements, based on LRE and Work Program data. HMA Projections are shown in **Table 12**.

Total asphalt requirements for the Five-year Work Program are shown in **Figure 21** by District, with and without Turnpike allocation. Quantities are estimated using a factor approach as discussed in the FDOT Data section. The factors were calculated by Balmoral economists and roadway engineers after evaluating several statistical relationships, including historical share of dollars spent on HMA for different project types.

Table 12. FDOT Future Requirements of Hot Mix Asphalt (in thousands)					
District	**2023**	**2024**	**2025**	**2026**	**2027**
D1	897	721	781	858	880
D2	1,822	715	1,059	654	944
D3	847	463	660	448	386
D4	641	1,018	536	879	504
D5	763	507	777	687	691
D6	188	158	302	415	283
D7	655	759	357	797	527
D8	818	963	831	1,330	1,037
Total Tons	**6,632**	**5,305**	**5,305**	**6,066**	**5,252**

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

Forecast

Asphalt prices are projected in **Table 13** 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.

Table 13. HMA Price Forecast Results						
Year	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Price HMA, $/Tons	$128.90	$128.12	$131.80	$138.74	$147.28	$154.25
Percent Change, %	13.3%	-0.6%	2.9%	5.3%	6.2%	4.7%

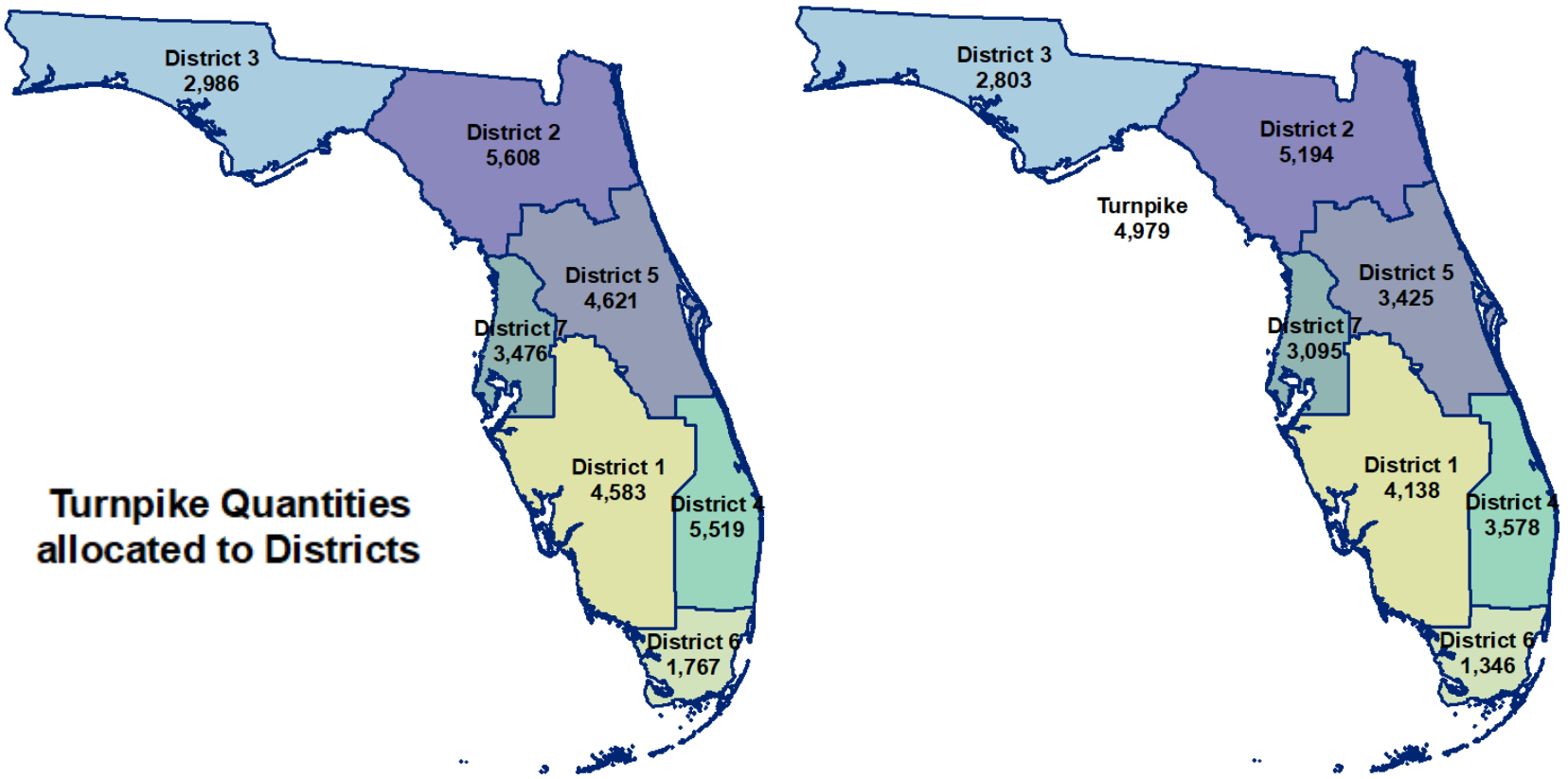
Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Previous forecasts expected a slight jump in asphalt costs during the current fiscal year, to about $130 per ton, which occurred. With updated work program data, housing starts, and binder prices, the forecast is now flatter than previously shown – the dip anticipated in 2024 is now flattened out. The best estimate shows HMA weighted average prices essentially maintaining at current record levels this fiscal year, followed by 3% to 6% increases in subsequent fiscal years. The estimates are based on continued high levels of infrastructure funding and input costs.

The lower bound scenario reflects recessionary conditions, which are still considered equally likely and unlikely by U.S. economists[10]. The upper bound relies on crude, rather than binder prices, reset with updated projections for construction employment and ends at $180 per ton rather than $160 per ton as in previous forecasts.

[10] NABE May 2022 Quarterly Survey

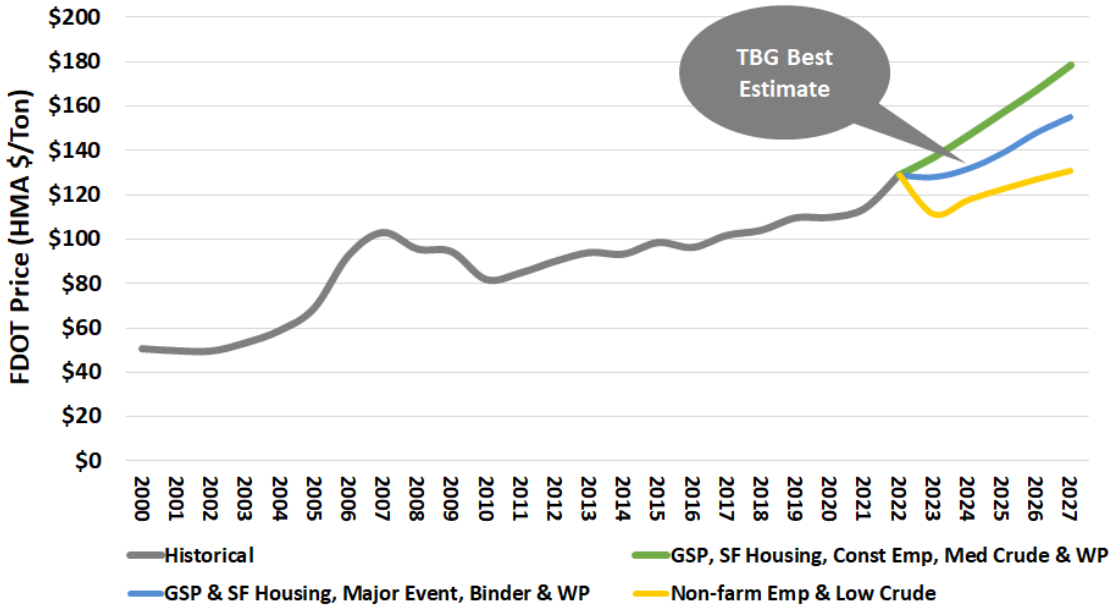
Figure 21. Total Asphalt Quantities for Five-year Work Program (000s of Tons)



Source: TBG calculated from data provided by FDOT Office of Program Management.

Figure 22 shows the potential range of estimates over the five-year work program.

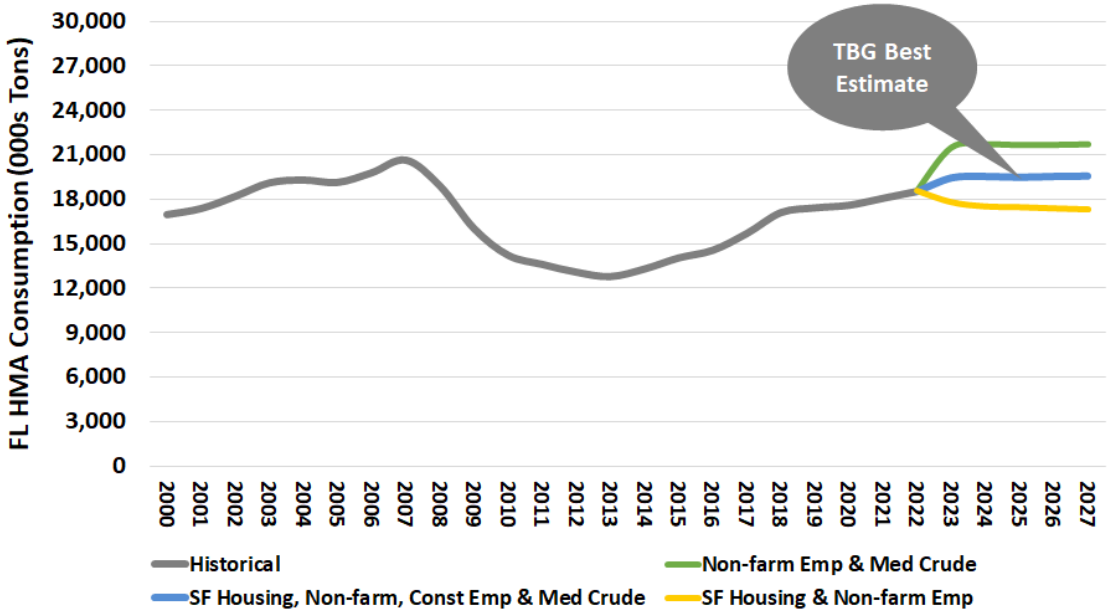
Figure 22. HMA Price, 2022 Forecast



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

Figure 23 provides a forecast of Florida HMA consumption. The best estimate is based on current economic outlooks, which show stable employment, medium crude oil price projections, and declining housing starts. The dip in residential construction is expected to be more than offset by state and federal infrastructure funding. If supply chain disruptions worsen in 2023, or recessionary factors are at play, the trajectory would likely shift downward, following the lower bound.

Figure 23. Florida HMA Consumption, 2022 Forecast



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

CONCRETE

Summary

- Despite rising demand, cement consumption may be suppressed over the next year due to supply constraints. However, disruptions are not expected to continue into 2024, barring a major recession.
- While some Florida concrete producers intend to expand production capacity within the next five years, others report that their facilities are currently closed due to material shortages. It's been reported that some cement suppliers are rationing purchases.
- Concrete-heavy resiliency projects are likely to compete with highway construction in the near future as federal funding from the Bipartisan Infrastructure Law (BIL)Infrastructure Program becomes available to the states. Residential competition is easing, however.

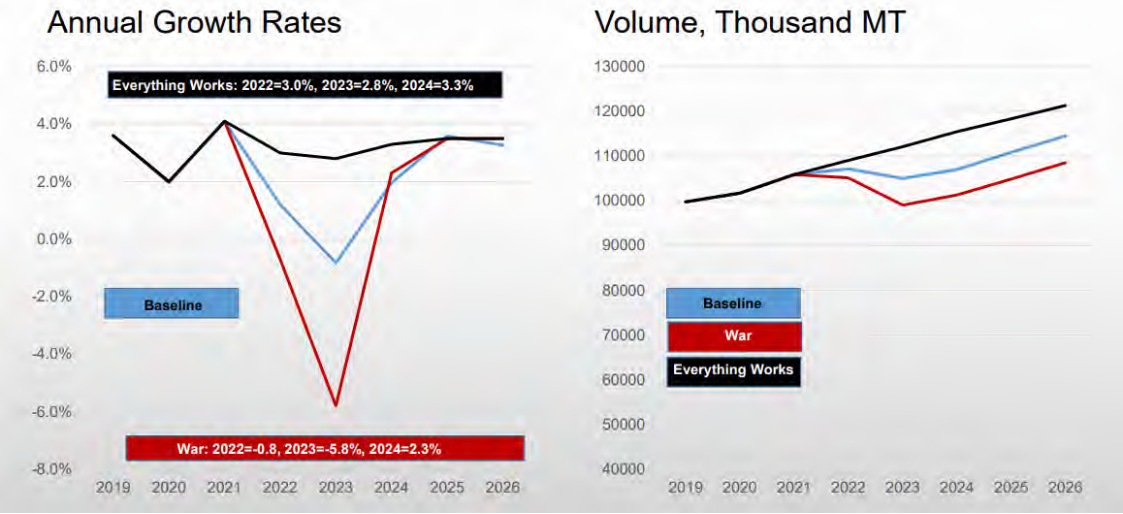
FDOT Impacts

- Disruptions in aggregate production and imports are resulting in longer lead times for some districts, which may impact project schedules and costs.
- With reinforcing costs not projected to decline until 2024, precast concrete is vulnerable to price hikes within the steel industry.
- Producers are reporting a 20% increase in prices year-over-year, and an additional 30% increase just last quarter. Producers are passing it all off to customers, sometimes increasing prices as much as 35% to compensate. FDOT's weighted average price for structural concrete pay items is forecast to have more painful increases, up to 13% based on current and forecast economic conditions.

General Trends

According the Portland Cement Association (PCA), US cement consumption is expected to dip in 2023 due to continuing supply chain disruptions across the globe (**Figure 24**). PCA reports several potential forecast scenarios in which cement consumption growth expands or slows down through 2026, with a baseline scenario of -0.8% and a worst-case scenario of -5.8% in 2023. Production is similarly projected by PCA, with declines expected due to higher inflation and lower global growth.

Figure 24. Portland Cement Association's Spring 2022 Forecast

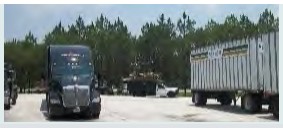


Source: Portland Cement Association.

SUPPLY CHAIN VARIABLES ➤ **CONCRETE MATERIALS**

Table 14 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. Current and historical data has been prepared for selected variables that have historically influenced FDOT's costs for concrete products, including ready-mix and precast products. **Table 15** provides selected data for the period 2013 - 2022.

Table 14. Structural Concrete Supply Chain Variables & Current Status

 Cement	According to producers cement prices are increasing dramatically and are more than 20% higher than last year. Prices continue to rise; a 30% increase was reported just over the last quarter. Producers have significantly increased prices for cement, have reported passing the costs to customers and some reported issues with availability.	↑
 Aggregate	In the survey and interviews, producers indicated difficulty in obtaining raw materials, citing both availability and transportation issues. General issues relating to aggregate availability or cost are covered in the Aggregate section.	↑
 Fly Ash	Fly ash supplies are constrained and will continue to be as some coal units are expected to be shut down or converted in 2023. Producers report less availability of slag as well. Some producers are using 100% cement instead of substituting a portion with fly ash because of availability and cost issues.	↑
 Rail	During the first quarter of 2022, shipments of cement products rose by 4% and shipments of aggregates by 9%. Revenues of both increased by 6% and 25%, respectively. CSX also reported a 92% increase in locomotive fuel costs. As of this writing, commodity specific data for the second quarter has not been published. Bottlenecks are still being reported through the end of the fiscal year. Anecdotally, producers are reporting problems with rail as CSX and North have decommissioned rail cars, which is causing delays in receiving rock.	↑
 Truck	As with other industries, trucking availability is an issue for producers. Additionally, increased fuel costs are putting additional pressure to producers' overall trucking costs. Producers continue to report a lack of mixer drivers and other CDL drivers to meet demand.	↑
 Labor	Although wages appear to be increasing, skilled labor availability in Florida remains stagnant in much of the state. The exceptions are in major metropolitan areas aside from Central Florida, which primarily affects labor availability in District 5.	↑
 Competition	Cement producers are still operating at high utilization levels. The number of approved producers was flat in 2022 and FDEP's permitted facilities shows one Portland cement plant under construction in Manatee County as well as two concrete plants (in Hillsborough and Orange Counties). As it was previously reported that they are passing costs to customers, these won't help decrease FDOT's costs.	↑

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

Table 15. Historical Concrete Data, 2013 – 2022

*(Maximum values indicated with *)*

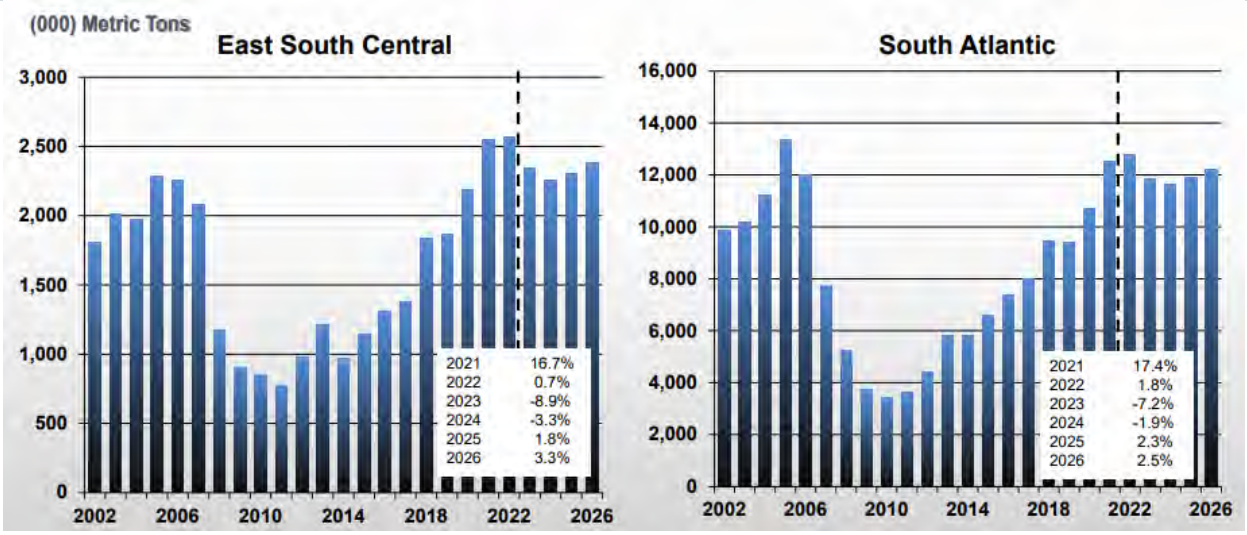
Concrete	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Chinese Imports[1]	Billions of $	$1,950	$1,959	$1,680	$1,588	$1,844	$2,136	$2,078	$2,066	$2,688	$2,782*
Florida Diesel Prices[2]	$/Gallon	$3.16	$3.00	$1.84	$1.44	$1.78	$2.22	$2.04	$1.78	$2.15	$3.71*
Florida Portland Cement Year End Stocks[3]	000s of Tons	279	360	338	322	307	493*	363	394	407	415
U.S. Portland Cement Capacity[3]	000s of Tons	121,000	121,000	121,000	118,967	121,000	121,000	123,000	123,000	123,000	123,000*
Average Price of Portland Cement, U.S.[3]	$/Ton	$88.58	$89.94	$95.07	$99.88	$104.70	$108.62	$103.94	$112.52	$113.43	$116.52*
Average Price of Portland Cement, Florida[3]	$/Ton	$77.98	$82.37	$91.00	$92.96	$97.71	$99.13	$100.67	$101.54	$103.78	$105.75*
Florida Cement Production[3]	000s of Tons	5,157	5,496	6,060	6,455	6,548	7,035	7,042	7,014	7,557	8,223*
Florida Cement Capacity[3]	000s of Tons	10,601	10,767	11,130*	8,447	8,447	8,447	8,447	8,447	8,447	8,447
Florida Ready-Mix Production[4]	000s of Cubic Yards	12,952	12,952	13,858	14,829	15,081	15,714	15,305	14,571	15,707	17,027*
Annual FDOT Work Program Allocation[5]	Billions of $	$2.59	$3.29	$3.18	$3.51	$4.00	$3.82	$3.83	$3.72	$2.66	$4.17*
Cement Imports Serving Florida[9]	000s of Tons	274	662	799	1,385	1,319	1,635	1,962	2,155	3,402	4,492*
Estimated FDOT Concrete Consumption[6]	000s of Cubic Yards	982	1,318	1,405	1,556	1,832*	1,615	1,256	1,080	619	1,103
Estimated Statewide Concrete Consumption[7]	000s of Cubic Yards	18,301	19,969	20,642	21,199	21,750	22,359	23,164	23,628	24,596	24,891*
FDOT Structural Concrete Cost[8]	$/Cubic Yard	$691.03	$727.03	$625.70	$662.68	$608.14	$708.11	$746.88	$722.69	$926.47*	$792.07

Sources: 1. WTO's World Trade Statistical Review. 2. FDOT Construction Office. 3. USGS. 4. PCA, First Research. 5. FDOT Office of Work Program. 6. Calculated, from data provided by FDOT Estimates Office. 7. PCA and USGS. 8. Calculated weighted average, from data provided by FDOT Estimates Office. 9. US ITC

Cement

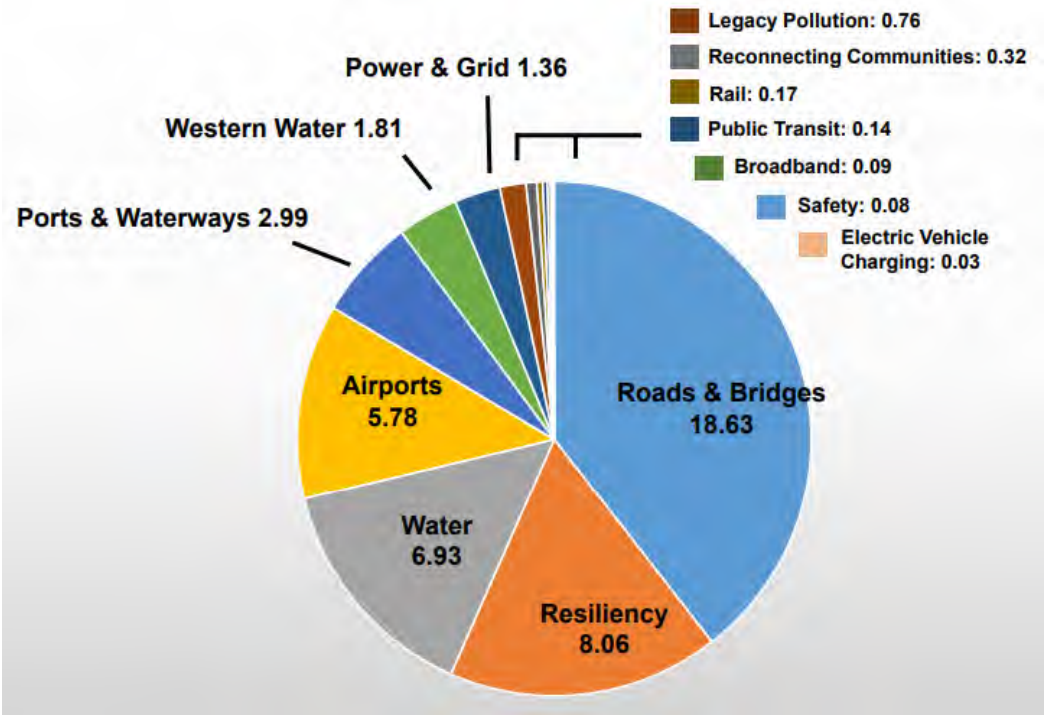
Residential demand for construction is starting to taper off as housing prices soar in the Southeast, particularly in Florida. According to PCA's May 2021 Southeast Forecast, residential cement consumption is expected to decline in 2023 and 2024 (**Figure 25**). However, the decrease of cement consumption in the residential sector will likely be offset by increases in non-residential sectors. PCA estimates that the five-year federal Infrastructure Program will necessitate about 46 million metric tons of cement. Consumption by construction sector is outlined in **Figure 26**. The largest share of cement is expected to be used in road and bridge projects, resiliency work, water system upgrades, and airport expansion and refurbishment.

Figure 25. Southeast Residential Cement Consumption Forecast



Source: PCA.

Figure 26. Cement Consumption by Construction Sector, 2022 - 2026



Source: PCA.

Clinker Capacity

An analysis of FDEP Air Permits was conducted to identify changes to statewide clinker capacity through July 2022 (**Table 16**). The Argos Newberry plant has additional capacity for a second kiln according to recent permitting data, increasing available clinker production capacity to 9.6 million tons per year from 8.5 million tons in 2021. Two inactive kilns at CEMEX Brooksville North could increase annual capacity by an additional 1.56 million tons if they were to become operational in the future.

Table 16. Active Cement Kilns in Florida (Reported Capacity)

Plant Name		Current Clinker Capacity	
		tons/hour	tons/year
American Cement Sumterville Plant		135	1,186,250
American Cement Suwannee Plant		120	965,425
Argos Newberry Cement Plant	**Kiln #1**	125	880,000
	Kiln #2	125	1,095,000
CEMEX Brooksville South	**Kiln #1**	83	727,800
	Kiln #2	156	1,277,500
CEMEX Miami Cement Plant		169	1,300,000
Titan Florida Pennsuco Cement Plant		250	2,190,000
Total Producing in 2021		**1,163**	**9,621,975**

Source: FDEP, TBG Work Product

Fly Ash

Fly ash availability continues to be tight as coal-powered plants close or convert their power generating units to natural gas. In 2021, Tampa Electric followed through with a planned shutdown of one coal-fired unit and is expected to shift the remaining unit to natural gas by the end of 2023. Similarly, Seminole Electric is expected to shutter one of their coal-fired units in 2023.

Table 17 provides a synopsis of likely impacts by FDOT district. Districts with access to the remaining coal-fired power plants in Florida are less impacted by in-state fly ash shortages. As such, Districts 4 and 6 are more highly impacted from shortages due to a lack of local coal capacity (**Figure 27**). Further, the recent coal-fired unit closure in Tampa will affect concrete producers in Districts 1 and 7. Many producers have already created partnerships with out-of-state or international suppliers of fly ash to offset shortages. This practice will likely become the norm for most producers if shipping in fly ash remains cheaper than using alternative materials.

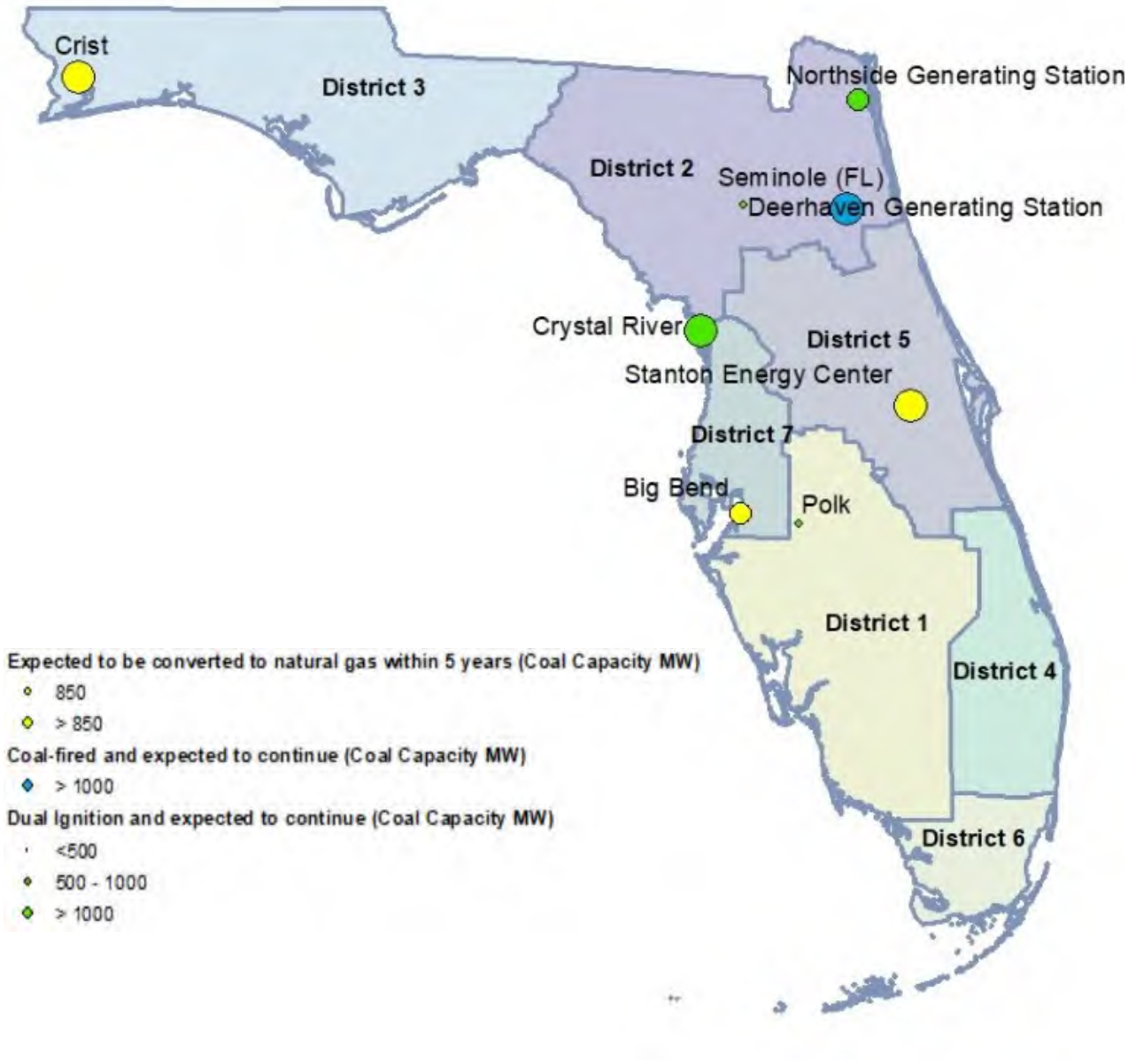
Table 17. Projected Impact from Potential Fly Ash Sources by District

District	All Concrete Plants*	Impact from Fly Ash Shortages
1	86	Medium
2	62	Low
3	76	Medium
4	74	High
5	102	Medium
6	56	High
7	39	Low
Total	**494**	**494**

Source: Estimated, The Balmoral Group 2022. *Includes both active and idle plants.

Some producers have still found access to fly ash but have had to change who or where they get their fly ash from depending on the variability of the market. Guarantee of material supply is no longer assured, but companies can still get fly ash if they search for it and they have affordable access. Despite this, some producers have been able to maintain their usual supply of fly ash depending on where they are and the economic strength of their company.

Figure 27. Coal-Fired Power Plant Capacity



Source: FDEP, TBG Work Product.

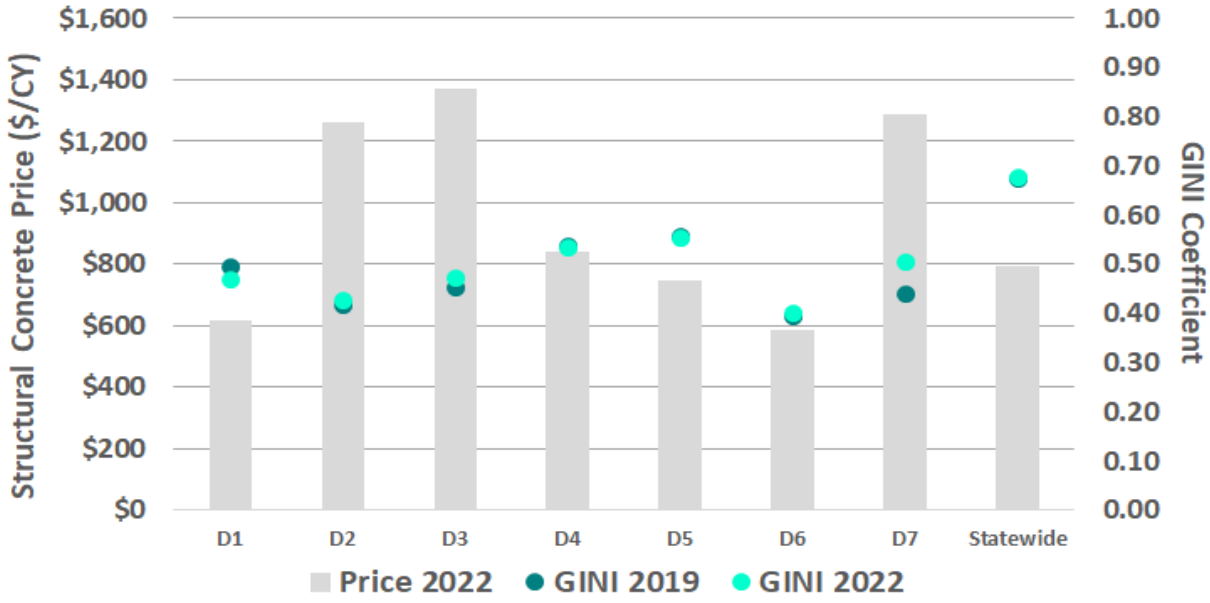
Alternatives to Fly Ash

Fly ash is not being used by some producers at all due to cost and availability. Instead, producers are increasingly using slag or just straight cement. Typically, 15% to 30% of Portland cement is replaced with fly ash (or more for mass concrete placements), but the lack of availability has made replacing cement a non-starter for some producers, even with cement prices currently soaring. In recent months, fuel costs have made transportation of materials even more expensive, limiting the quantity of available materials. Until supply increases and fuel costs decline, producers will continue to look for alternatives to fly ash or be forced to limit production all together.

Competition

Concrete producers did not note significant changes in competition within the past year. The number of ready-mix plants has steadily increased since 2013, with 496 active plants currently reported, providing substantial competition at the plant level. Statewide, 11% of the companies account for 69% of active plants. The Gini coefficient, a metric of diffuse versus concentrated market power based on ownership shares, is shown for FDOT approved concrete suppliers by district in **Figure 28**. Most districts show minimal changes, with a slight decrease in competition in District 7.

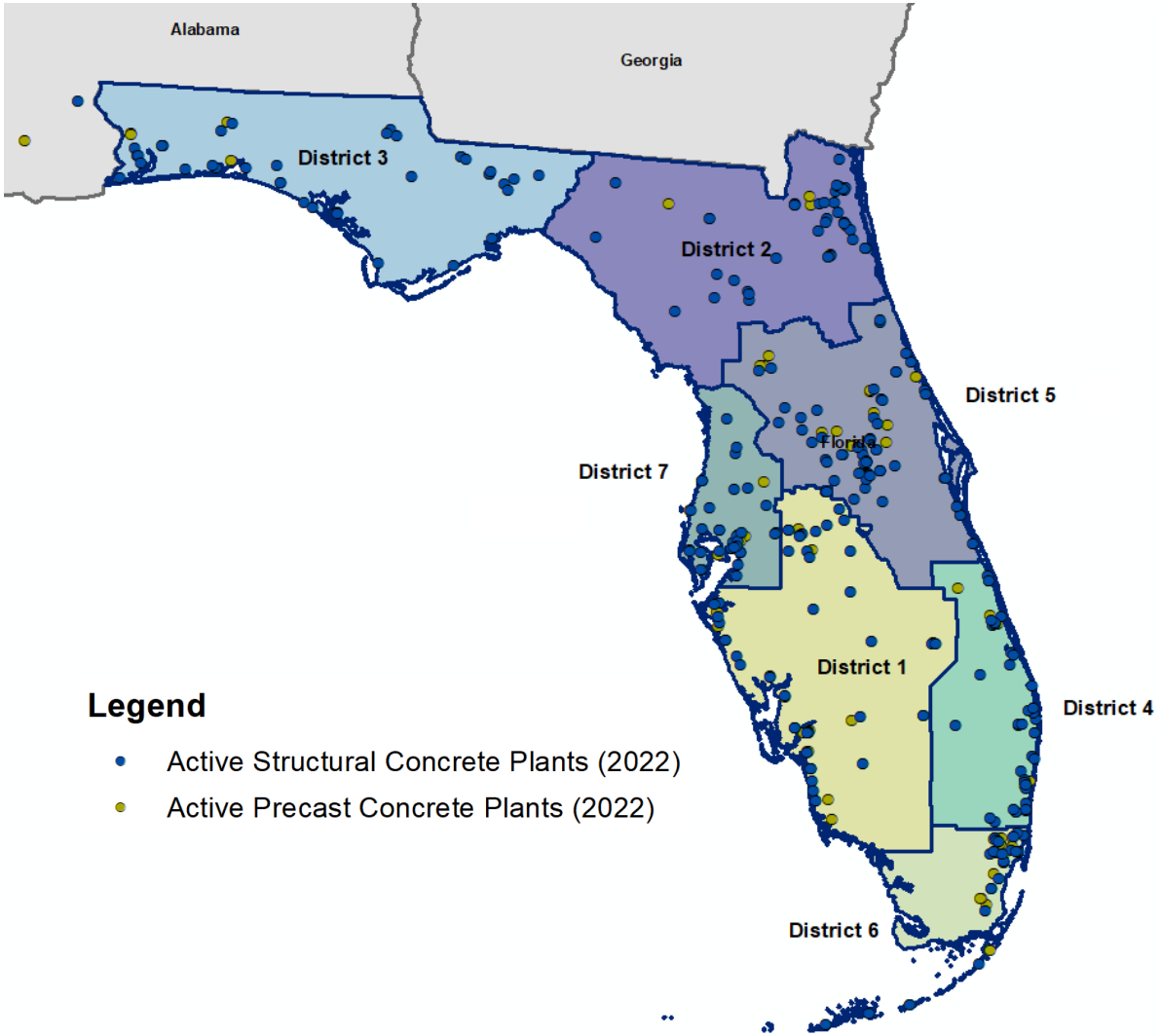
Figure 28. Concrete Competition Gini by District



Source: FDOT, TBG Work Product.

In 2012, FDOT approved facilities numbered 327 plants with 55 owners, while current data reflects 363 active plants with 90 owners. Cemex is still by far the largest firm, controlling about 89 active plants in 2022. Argos Ready Mix also owns about 47 plants, but has recently sold a few to smaller enterprises. **Figure 29** provides a location map of active approved concrete plants.

Figure 29. Ready-Mix Plants 2022



Source: FDOT, TBG Work Product

Current Pricing

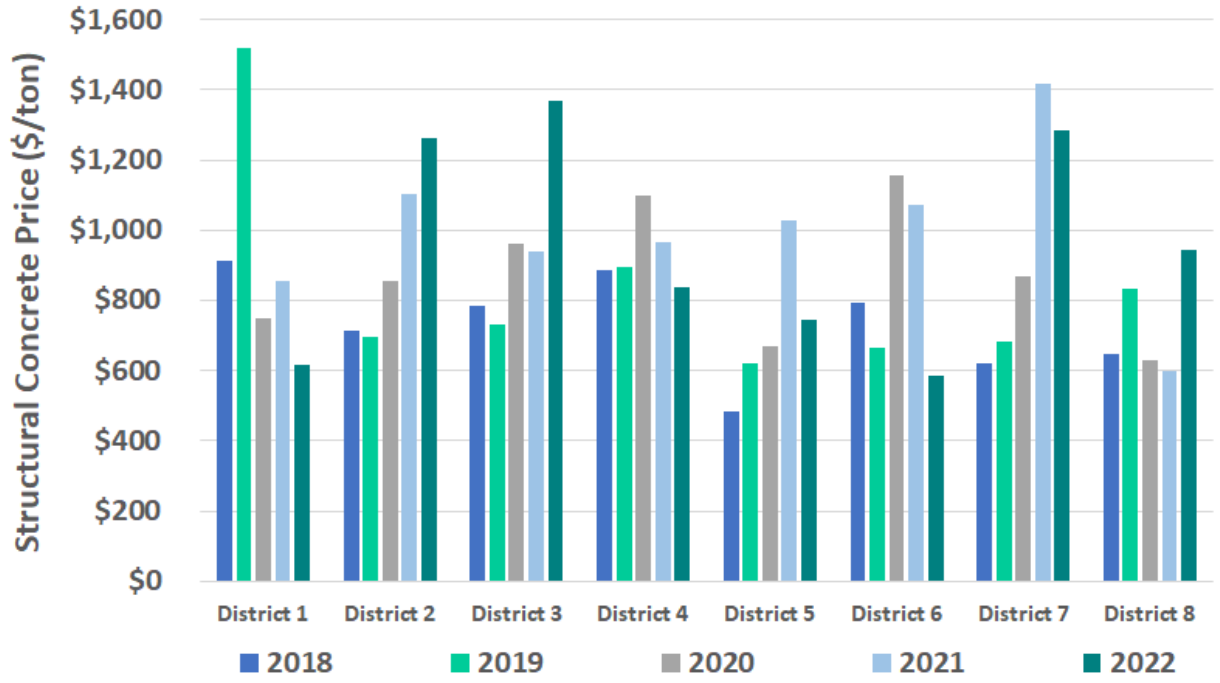
According to FDOT lettings data, concrete prices reached record levels in fiscal year 2021, but have since declined by 14.5% in 2022 (**Table 18**). Districts 2 and 3 had the steepest price increase in 2022, likely due to rising fuel costs, while district 6 had the steepest decline (**Figure 30**). Aggerate, fly ash, and cement spot shortages are expected to persist into 2023, while reinforcing steel costs continue to be an issue for precast suppliers as well. While there has been downward movement on US steel prices in the last few weeks, major market corrections are not anticipated anytime soon.

Table 18. Concrete Price, 2018 - 2022

Fiscal Year	2018	2019	2020	2021	2022
Price Concrete, $/CY	$708.11	$746.88	$722.69	$926.47	$792.07
Percent Change, %	16.4%	5.5%	-3.2%	28.2%	-14.5%

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

Figure 30. Structural Concrete Prices by District



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

Material Quantities

Preliminary estimates of materials quantities for the FDOT work program were prepared from Estimates Office data. Quantities are estimated using a factor approach. The factors were calculated by Balmoral economists and roadway engineers after evaluating several statistical relationships, including historical share of dollars spent on concrete for different project types.

FDOT Work Program requirements are estimated to average around 1.6 million cubic yards throughout the Five-Year Work Program (**Table 19**). A large uptick in concrete requirements are projected for 2026 and 2027 when several large add lanes and bridge projects begin construction.

Table 20 shows future FDOT concrete requirements by District. Differences in demand by District are reflected in pricing. **Figure 31** shows the distribution of materials requirements for the entire Five-year Work Program by District.

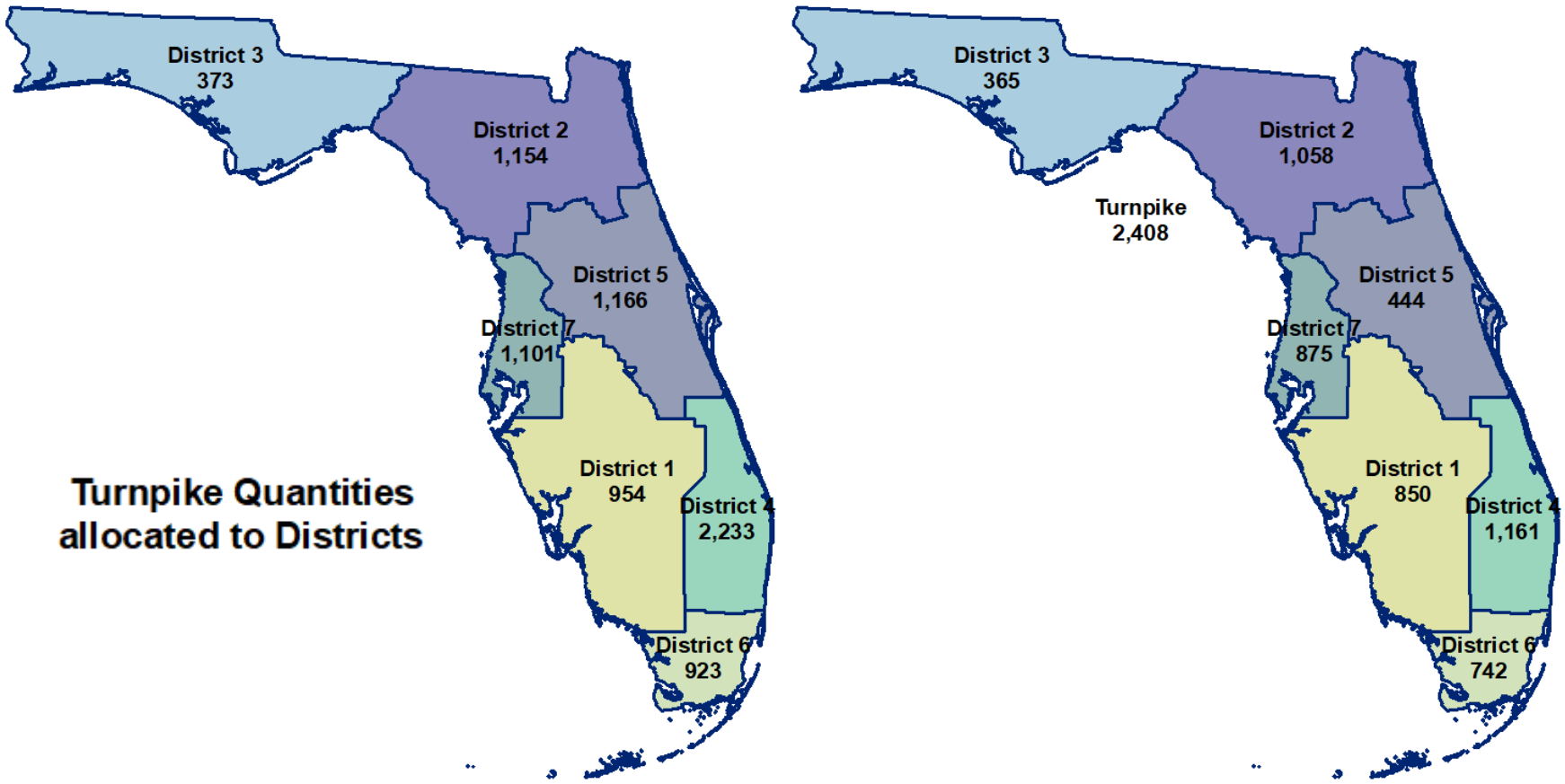
Table 19. FDOT Future Concrete Requirements (in thousands)					
Year	**2023**	**2024**	**2025**	**2026**	**2027**
Structural Concrete	553	845	293	1,585	1,820
Ancillary Concrete	715	669	552	556	315
Total Cubic Yards	**1,269**	**1515**	**845**	**2,141**	**2,135**

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

Table 20. FDOT Future Concrete Requirements by District (in thousands)					
District	**2023**	**2024**	**2025**	**2026**	**2027**
D1	99	67	36	150	498
D2	329	76	186	229	237
D3	131	123	22	41	49
D4	149	374	101	270	266
D5	105	58	57	80	145
D6	22	70	97	285	268
D7	122	259	40	364	90
D8	312	487	306	721	582
Total Cubic Yards	**1,269**	**1,515**	**845**	**2,141**	**2,135**

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

Figure 31. Total Concrete Quantities for Five-year Work Program (000s Cubic Yards)



Source: TBG calculated from data provided by FDOT Office of Program Management.

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 21** provides the updated forecast average price for concrete. Previous forecasts expected fiscal year weighted average prices to end up around $879 in 2023, but bid prices have increased in the past quarter about $20 per CY to $901 per CY for 2023. The increase reflects the influence of updated crude prices, work program activity, and general macroeconomic conditions. The updated forecast slightly accelerates the price trajectory, with a small dip in 2024 that is less favorable to FDOT than in the prior projection.

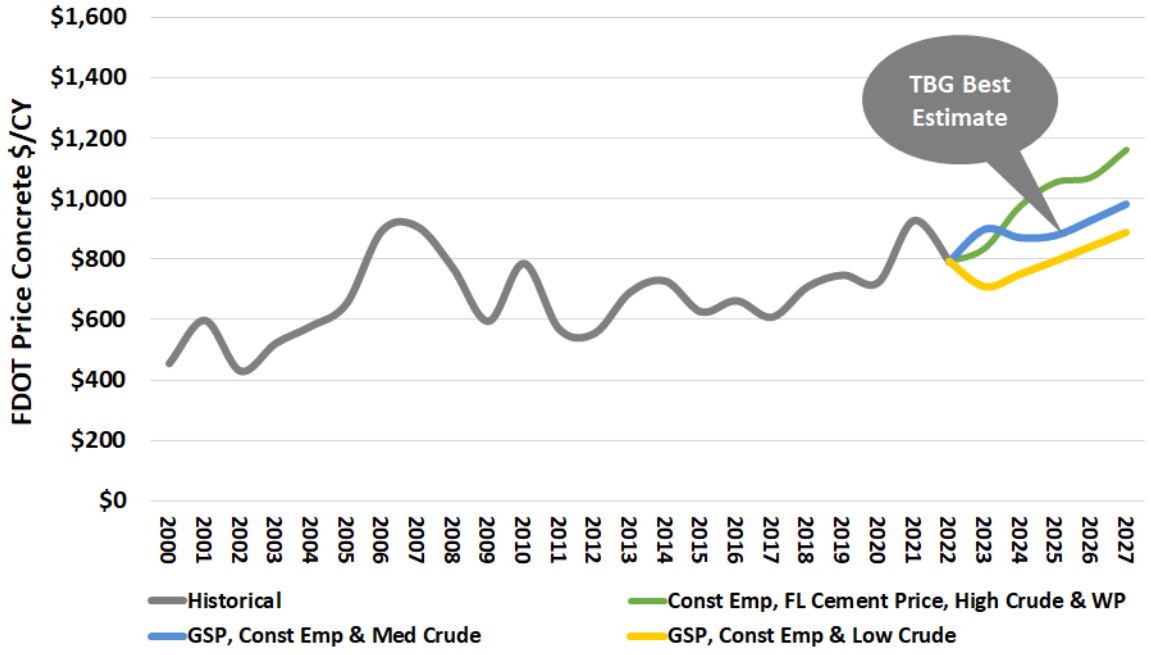
The lower bound scenario reflects recessionary conditions, which U.S. economists assign a 50/50 probability to currently. The upper bound reflects a higher crude price scenario, more constrained supply chain and shipping (rail) issues, and continued high input prices, ending up over $1,160/CY (**Figure 32**). **Figure 33** shows the output of several quantity models forecasting statewide consumption of concrete and the scenario identified as the best estimate.

Table 21. Concrete Price Forecast Results

Year	2022	2023	2024	2025	2026	2027
Price Concrete, $/CY	$792.07	$900.84	$872.96	$879.85	$929.63	$983.96
Percent Change, %	-14.5%	13.7%	-3.1%	0.8%	5.7%	5.8%

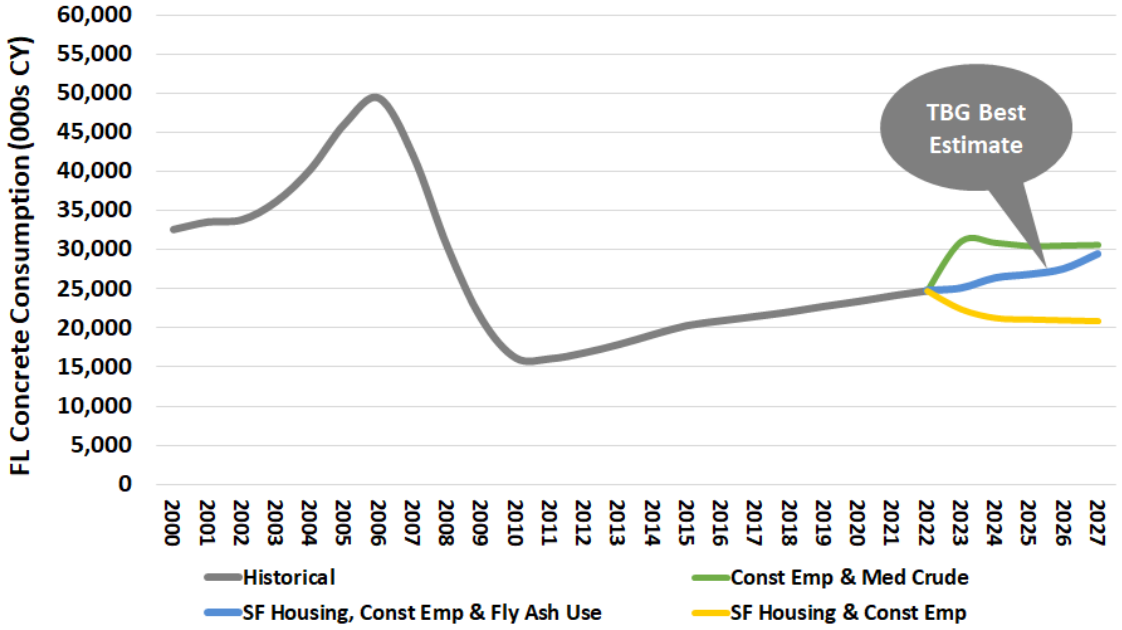
Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.

Figure 32. Concrete Price, 2022 Forecast



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

Figure 33. Florida Concrete Consumption, 2022 Forecast



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

STEEL

Summary

- A shortage of skilled labor is a concern for many steel producers and the issue appears to have worsened since last year. In the 2022 survey, 89% of respondents indicated issues with skilled labor, and on average, openings have been vacant for 5 months (ranging between 2 months to a year).
- Lead times for material have created critical path issues for items that would not have traditionally been critical path. Fabricators with high volumes and/or long working relationships enjoy more beneficial lead times.
- In addition to steel raw material cost increases, galvanizing costs have doubled along with freight. Producers expect some shop failures due to lack of capital to withstand the squeeze on operating margins.

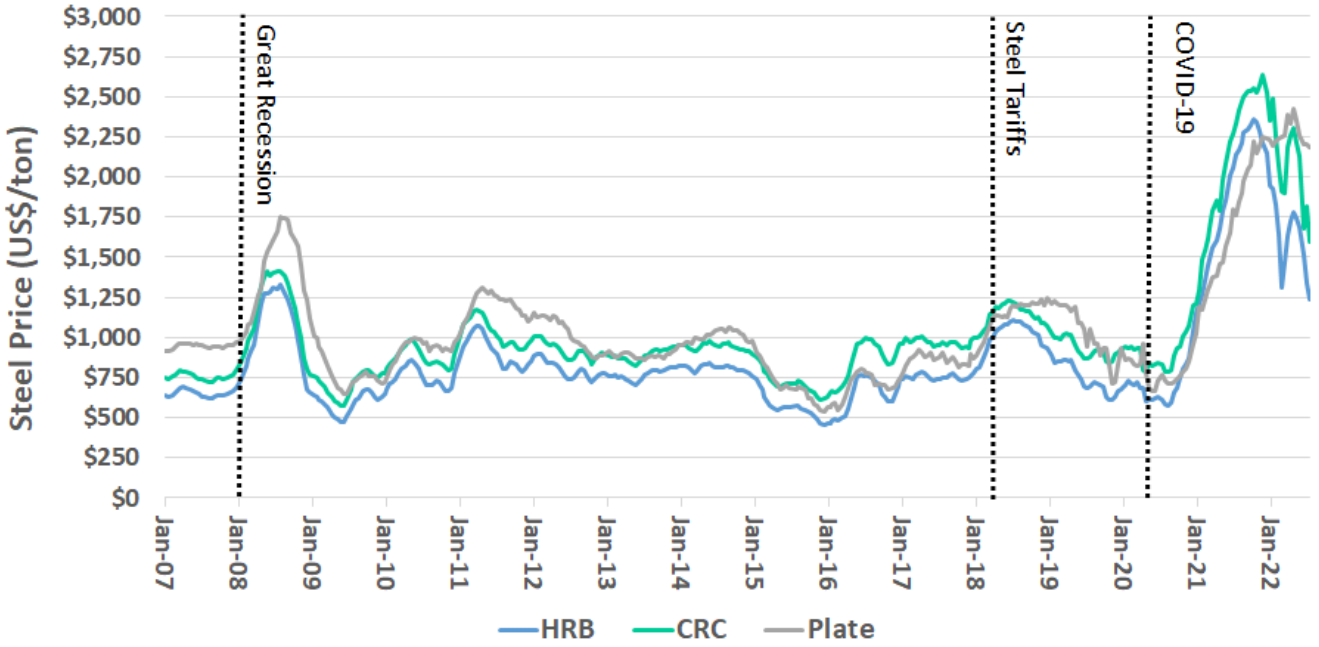
FDOT Impacts

- Fabricators have been able to recoup some losses in 2022. On average, they have been able to pass on 78% of their cost increases to customers.
- Producers appreciate FDOT efforts to address materials costs and would like to see expansion of cost escalation clauses to more pay items (for example, stay-in-place metal forms).
- On average, fabricators report bids may increase by 31.5% through the first six months of fiscal year 2023 due to high input costs. Weighted average prices for FDOT are expected to increase an additional 4-5% in fiscal year 2023 before descending to more reasonable levels.
- According to surveyed steel makers, 44% do not expect any cost impacts when Buy America waivers expire in November. Of the 56% that do, the most common expected cost increase is between 5-10%, but some expect increases higher than 15%.

General Trends

Steel prices have seen varying levels of decline, depending on the product, in the last month of fiscal year 2022 (**Figure 34**). US hot-rolled band prices are down 35% in June 2022, year-over-year, while cold-rolled coil is down 20%. Current steel plate prices remain 20% higher than June 2021, however.

Figure 34. U.S. Steel Pricing, Jan. 2007 – June 2022



Source: AISI Weekly Raw Steel Production.

SUPPLY CHAIN VARIABLES ➤ **STEEL**

Table 22 shows a summary of select variables that impact the steel supply chain and their current status, followed by historical variables in **Table 23.**

Table 22. Supply Chain Variables for Structural Steel

 Raw Materials	Even though prices for some raw materials prices have declined in 2022, they remain much higher than previous years. Prices for hot-rolled steel and iron have had significant declines in 2022, but rebar has remained steady. 44% of producers indicated bottlenecks with raw materials due to longer lead times and aluminum being a common mentioned material. 56% indicated that they are only able to lock spot prices for raw materials and while lead times vary by item, they range between 2 to 15 weeks.	↑
 Scrap Steel	While scrap steel prices have declined in 2022, they are the highest they've been since the 2008 peak. Demand remains high. Scrap prices have followed steel prices, as expected, in which prices seemed to have cooled off a bit in 2022 compared to the significant increases seen in 2021. Prices are still high compared to pre-pandemic levels.	↑
 Galvanizing Steel	As of June 2022, zinc prices have increased 23% year-over-year to $1.65 per pound. They have been above $1.50 per pound since October 2021 and a high of $1.98 per pound in April 2022. Some producers indicated long lead times for zinc and galvanizing steel.	↑
 China	China's domestic demand for steel has continued slowing down. Some facilities in China were shut for ten weeks or more due to COVID lockdowns in the country. China is a major producer of steel. It produced 57% of global steel in June 2022, down 3.3%, year-over-year.	↑
 Transportation	Transportation is a factor at all stages of steel production. FDOT products are primarily delivered through ship or truck and some fabricators have cited issues with shipping delays and trucking costs. The cost of transportation continues to rise as fuel prices continue to increase.	↑
 Rail	Interviewed producers indicated that they do not use rail and they prefer trucking for transportation. Previously, producers have not cited issues with rail, but as mentioned elsewhere in the report, other sectors have reported issues with rail deliveries.	=
 Milling Capacity	Nationally, capacity utilization rates are slightly up to where they were pre-covid-19. In 2022, they have been at 81.6%, the same as 2021 and up from 67% from 2020. Production in 2021 was 95 million net tons, 19% higher than 2020. While production is back to normal levels, it is still not enough to meet the backlog of demand. Producers indicated similar utilization rates.	=
 Labor	Producers indicated in interviews and surveys that labor shortages are one of their top issues. All have job openings that they have been unable to fill for several months, which have led to production and revenues lost. Labor costs have also increased with higher wages trying to attract labor.	↑
 Competition	After years of being stagnant, FDOT's approved producer list shows a 7% increase in steel producers in 2022. Currently, competition is not in a place to bring down FDOT's costs.	↑

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

Table 23. Historical Steel Data, 2013 – 2022

*(Maximum values indicated with *, No data available indicated with **)*

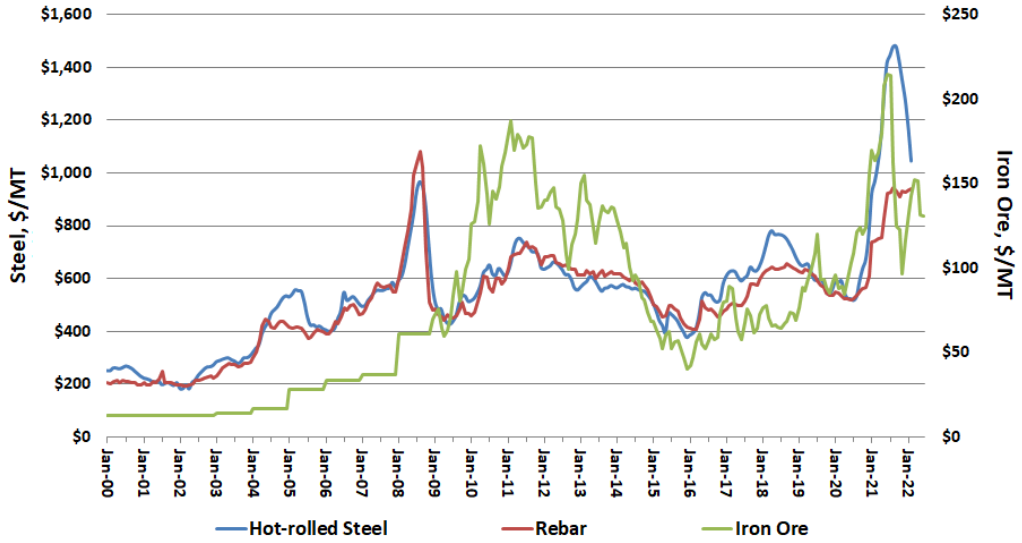
Steel	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
U.S. Price of Iron Ore[1]	$/Ton	$79.31	$77.91	$73.65	$66.32	$71.25	$84.37	$84.31	$98.79	$149.69*	$117.93
U.S. Price of Coal[2]	$/Ton	$156.99*	$151.38	$153.65	$118.31	$130.89	$149.42	$118.19	$114.34	$112.44	$103.43
Total Chinese Imports[3]	Billions of $	$1,950	$1,959	$1,680	$1,588	$1,844	$2,136	$2,078	$2,066	$2,688	$2,782*
Domestic Milling Capacity[4]	Million Tons	124.9	125.40*	124.0	122.7	121.6	122.2	120.8	119.6	66.0	66.0
World Steel Production[5]	Million Tons	1,757	1,810	1,750	1,773	1,858	1,973	2,031	2,021	2,099	2,152*
Steel Production Used in Construction[4]	%	17.77%	23.45%*	17.95%	19.77%	19.22%	19.85%	20.26%	20.34%	19.11%	19.89%
Florida Diesel Prices[6]	$/Gallon	$3.16	$3.00	$1.84	$1.44	$1.78	$2.22	$2.04	$1.78	$2.15	$3.71*
FL Construction Employees/All FL Non-Farm Employees[7]	%	4.8%	5.1%	5.3%	5.6%	5.9%	6.16%	6.32%	6.61%*	6.46%	6.33%
U.S. Price of Zinc[8]	Cents/lb.	$95.57	$107.12	$95.54	$101.37	$139.28	$141.05	$124.13	$110.79	$145.85	$201.10*
World Price of Zinc[8]	Cents/lb.	$86.64	$98.05	$87.64	$94.82	$131.25	$132.66	$115.60	$102.71	$136.29	$176.87*
Annual FDOT Work Program Allocation[9]	Billions of $	$2.59	$3.29	$3.18	$3.51	$4.00	$3.82	$3.83	$3.72	$2.66	$4.17*
Estimated FDOT Reinforcing Steel Consumption[10]	000s of lbs.	19,633	23,417	25,171	32,855	30,689	34,670	32,174	23,092	18,815	46,507*
FDOT Reinforcing Steel Cost[10]	$/lb.	$0.85	$0.94	$0.81	$0.86	$0.81	$0.96	$1.00	$0.88	$1.20	$1.41*
Estimated FDOT Structural Steel Consumption[10]	000s of lbs.	25,742	21,750	36,068	14,855	56,184*	20,893	33,435	28,979	28,122	22,471
FDOT Structural Steel Cost[10]	$/lb.	$3.41	$2.75	$2.27	$5.12*	$2.80	$4.41	$2.79	$2.55	$3.84	$4.87

Sources: 1. USGS, World Bank. 2. EIA. 3. WTO's World Trade Statistical Review. 4. Standard & Poor's Metals Industry Survey. 5. World Steel Association. 6. FDOT State Construction Office. 7. Bureau of Labor Statistics. 8. USGS. 9. FDOT Office of Work Program. 10. Calculated, from data provided by FDOT Estimates Office.

Raw Materials & Scrap Steel

Sourcing raw materials remains an issue for the industry as production lags behind demand and costs remain high. As of February 2022, hot-rolled steel prices were up about 8%, year-over-year, and 60% higher compared to February 2019. Similarly, rebar prices were 51% higher than pre-pandemic levels in February 2022, but 27% higher than they were during the same period in 2021. Iron ore prices have fallen 39% through June 2022 compared to one year earlier, but are still 20% higher than in June 2019.

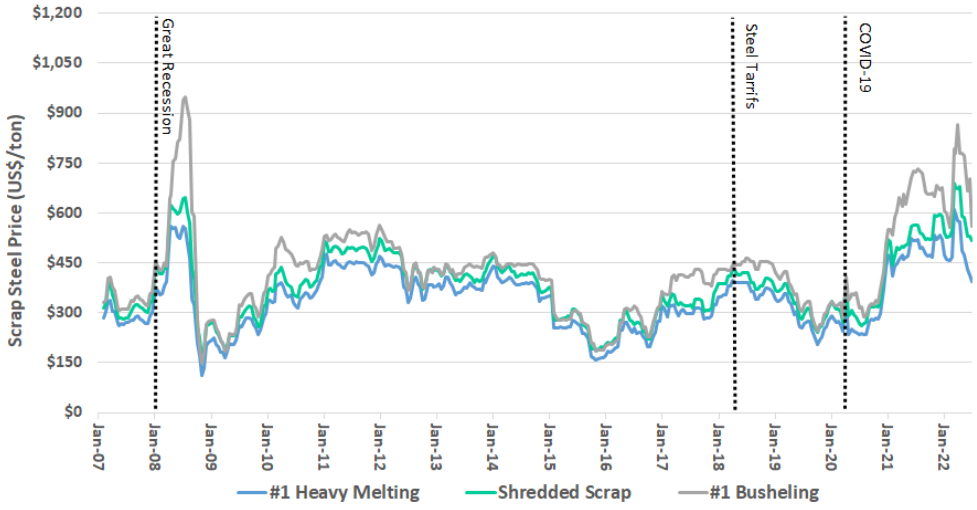
Figure 35. Historical Hot-rolled Steel and Iron Ore Prices



Source: World Bank, MEPS

After rising sharply throughout 2021 and the first half of 2022, scrap steel prices have begun to decline (**Figure 36**). However, June 2022 prices are still elevated compared to pre-pandemic levels for #1 Heavy Melting Scrap (62%), Shredded Scrap (85%), and #1 Busheling Shredded Scrap (127%). Compared to June of 2021, prices are down 20%, 6%, and 3% for #1 Heavy Melting Scrap, Shredded Scrap, and #1 Busheling Shredded Scrap, respectively.

Figure 36. Scrap Steel Prices, January 2007 – July 2022



Source: Steelbenchmarker

Capacity Utilization

U.S. steel capacity utilization rose to a high of 81.6% in 2022 based on data through May, maintaining gains seen in 2021 after dropping to 67.0% in 2020 (**Figure 37**). The rebound in capacity utilization indicates that pandemic related shutdowns have eased; however, fabricators are not yet reporting business as usual. Still, additional capacity is expected to come online throughout the country over the next couple years, including several brand-new state-of-the-art mills. With these additions, domestic capacity should be more robust in times of economic upheaval.

Figure 37. U.S. Steel Production, Capacity, Utilization and Consumption

U.S. STEEL PRODUCTION, CAPACITY AND UTILIZATION vs WORLD PRODUCTION AND USE

				TOTAL WORLD		U.S. PRODUCTION AS
	OPERATING	CAPACITY	PRODUCTION	*in millions of tons*		% OF TOTAL WORLD
YEAR	RATE (%)	*in millions of tons*		PRODUCTION‡	APPARENT USE†‡	PRODUCTION
2022r	81.6	66.0	20.3	503.3	2,028.5	4.0
2021	81.6	66.0	95.1	2,150.1	2,021.3	4.4
2020	67.0	119.6	80.1	2,054.7	1,953.1	3.9
2019	80.1	118.1	94.6	2,067.1	2,082.2	4.6
2018	78.2	122.1	95.5	2,012.3	2,023.6	4.7
2017	74.0	121.6	90.0	1,913.5	1,940.0	4.7
2016	70.5	122.7	86.5	1,799.9	1,808.2	4.8
2015	70.1	124.0	86.9	1,791.4	1,792.5	4.9
2014	77.5	125.4	97.2	1,845.3	1,850.1	5.3
2013	76.7	124.9	95.8	1,821.3	1,834.4	5.3
2012	75.2	130.0	97.8	1,722.1	1,718.4	5.7
2011	74.5	127.8	95.2	1,697.4	1,687.3	5.6
2010	70.4	126.0	88.7	1,582.1	1,564.8	5.6

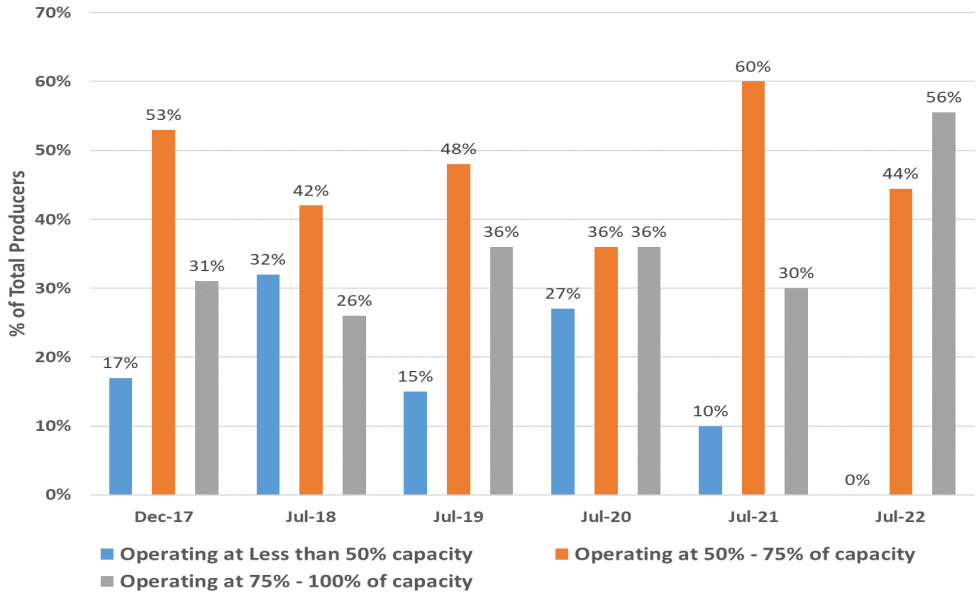
rData through May

*Consumption †Consumption; 2022 data is forecasted. ‡Original data in tonnes (metric) are converted to U.S. tons; (1 metric ton/tonne = 1.10231 U.S. ton).

Source: American Iron and Steel Institute, World Steel Association

Florida steel fabricators are operating at a higher capacity than previous years with all surveyed producers operating at 50% capacity or greater, with an average of 76% (**Figure 38**). This shows how producers have increased production to keep up with demand. Supply chain issues, shortages, and labor issues persist, however, and producers are attempting to keep up.

Figure 38. Survey Respondents' Operating Capacity: Florida Steel Fabricators

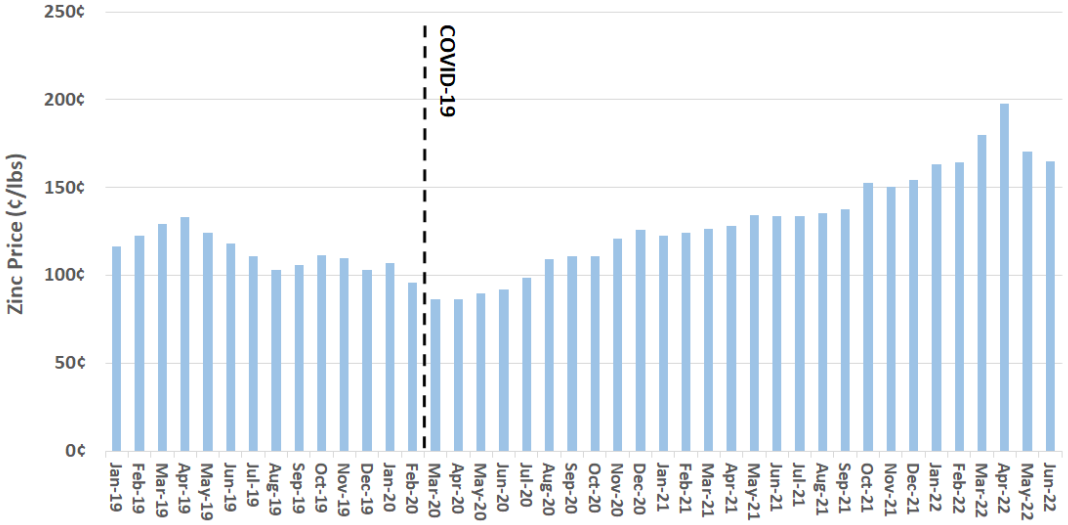


Source: TBG Survey, December 2017, July 2018, July 2019, July 2020, July 2021 and July 2022

Galvanizing Materials

World zinc prices peaked in April 2022 at $1.98 cents per pound, but have since declined to $1.65 cents per pound (**Figure 39**). Year-over-year, zinc prices are 23% higher than June 2021. Compared to June 2019, zinc prices are up 40%. As a result, inflated prices for galvanized products like bolts and hardware are likely to persist through the first six months of fiscal year 2023.

Figure 39. Zinc Prices, Jan. 2019 – June 2022



Source: World Bank

Trade

U.S. exports and imports both increased in 2021 according to the most recent data from the International Trade Administration (**Figure 40**). Total imports rose 47% in 2021, partially offsetting declines in domestic production due to shuttered steel mills during the peak of COVID in 2020. Exports were also up in 2021 by 24%, but were still tracking below historical trends.

Figure 40. U.S. Exports and Imports of Steel Mill Products, By Group

U.S. EXPORTS AND IMPORTS OF STEEL MILL PRODUCTS, BY GROUP
(in thousands of net tons)

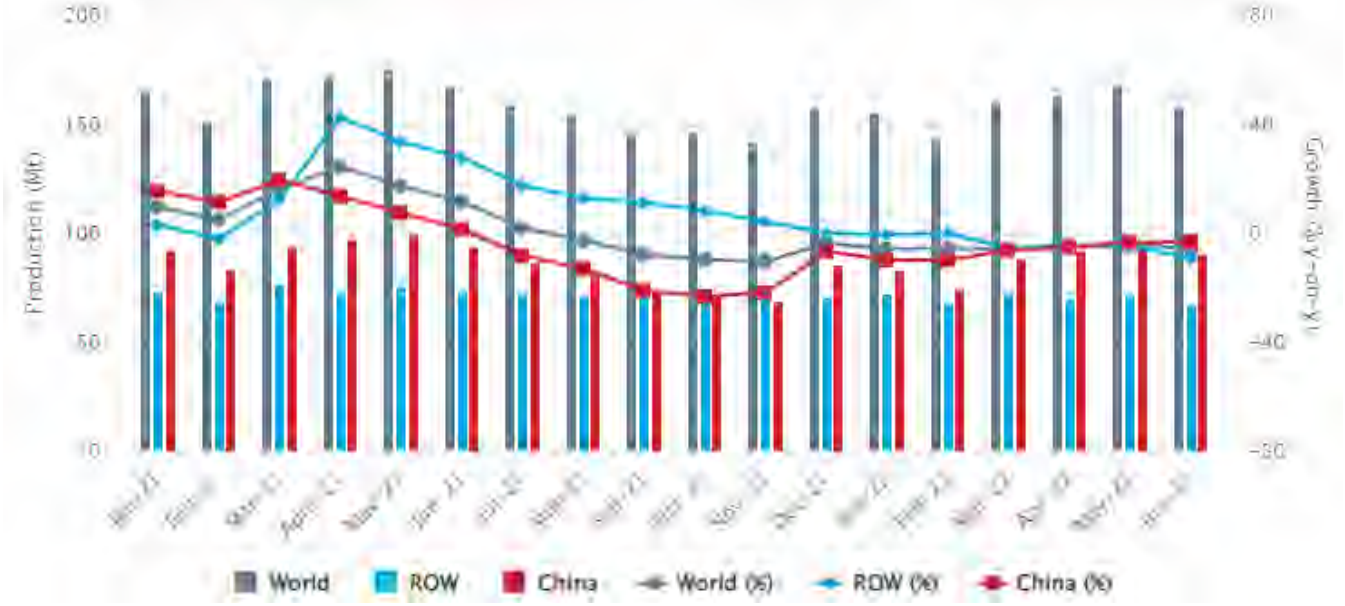
PRODUCTS	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Exports										
Flat Products	6,107	5,885	5,383	5,197	5,812	4,744	4,388	4,038	5,074	1,317
Long Products	3,023	2,763	2,025	1,826	2,028	1,950	1,391	1,336	1,693	419
Pipe and Tube Products	1,865	1,724	1,196	943	1,130	993	756	608	675	190
Stainless Products	727	884	867	855	1,011	705	468	342	384	93
Semi-Finished Products	392	245	108	84	117	68	60	119	147	36
Total exports	12,114	11,503	9,580	8,905	10,098	8,461	7,064	6,442	7,973	2,055
Imports										
Ingots, blooms, billets, slabs	6,642	9,605	6,617	6,063	7,770	7,291	6,247	5,334	7,898	1,693
Wire rods	797	1,474	1,442	1,446	1,434	1,046	856	643	1,043	410
Structural shapes & piling	634	963	950	878	881	580	586	457	608	209
Plates	1,989	3,713	3,222	2,330	1,990	2,019	1,579	1,051	2,019	498
Rails & accessories	345	338	338	324	239	178	150	69	64	19
Bars & tool steel	3,285	3,491	3,850	3,577	3,252	2,753	2,275	1,980	2,532	694
Pipe & tubing	7,044	7,998	6,473	4,199	7,617	6,595	5,516	3,157	4,086	1,218
Wire & wire products	686	810	940	907	838	740	715	705	864	212
Tin mill products	1,330	1,609	1,795	1,906	1,904	1,628	1,631	1,686	1,965	546
Sheets & strip	7,102	11,032	10,457	9,233	9,386	8,483	6,449	5,656	9,386	2,419
Total imports	29,853	41,033	36,084	30,864	35,310	31,313	26,006	20,737	30,465	7,917

*Data through March for Imports and Exports.
Source: U.S. Census, International Trade Administration

China

According to the World Steel Association, global crude steel production was 158.1 million metric tons in June 2022, a 5.9% decrease compared to June 2021 (**Figure 41**). Of the total, China produced 90.7 metric tons, or 57% of global steel in June 2022, down 3.3%, year-over-year. China's zero-COVID policy recently led the government to shut down Shanghai for over two months, with some manufacturing facilities being shuttered for ten weeks or more. As a result, China's domestic demand for steel and iron ore have suffered. As China purchases about 1 billion tons of iron ore annually, which amounts to 70% of total global seaborne trade, low demand in China will affect world markets.

Figure 41. Crude Steel Production, China versus the Rest of the World



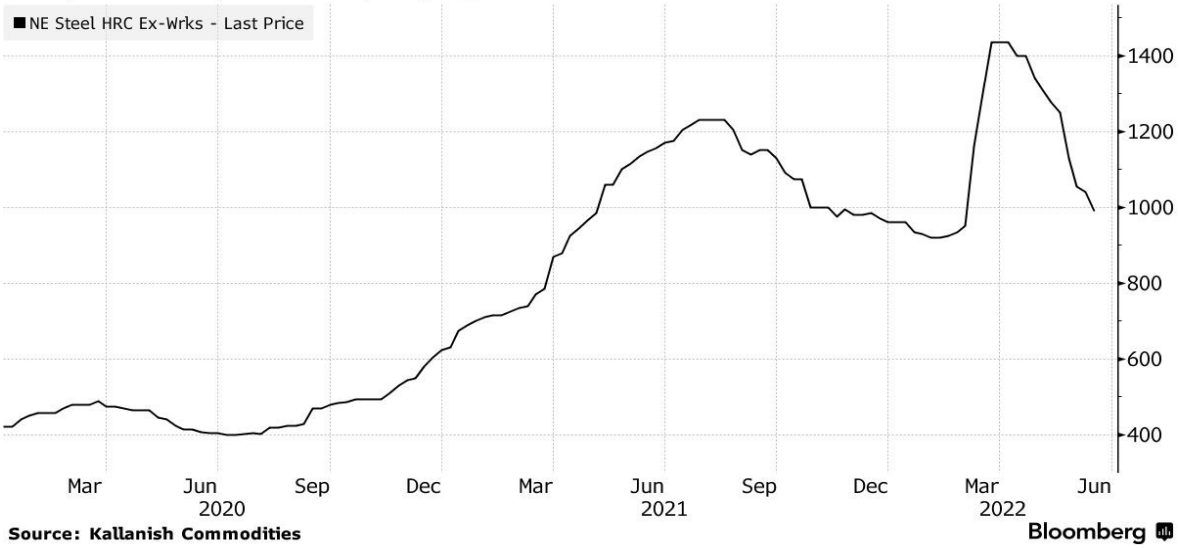
Source: World Steel Association

Europe

Crude steel production was down 12.2% for European Union member nations in June 2022 compared to the same month last year. Steel production in Russia and other eastern European nations, including Ukraine, declined 34.3% in June 2022. By comparison, North America production was down only 2.4% last month. With European economies weakening and demand slowing, steel prices are falling quickly in Europe (**Figure 42**).

In addition to China's impact on steel and iron ore prices, the war in Ukraine has been disrupting metals markets globally according to the American Journal of Transportation. In fact, Swiss-based mining company Ferrexpo, the third-largest exporter of iron ore pellets in the world, has recently declared force majeure on some contracts due to the breakdown in Ukraine's logistics networks. For Russia's part, the government is currently seeking new markets for their commodities in Asia as sanctions pile up from western nations.

Figure 42. Steel Prices in Europe, Jan. 2020 to June 2022



Competition

Despite a bump in approved facilities over the last few years, the pool of fabricators is 102 in 2022 compared to 135 in 2012 (**Table 24**). The overall number of bridge and sign structure fabricators has remained stable, while miscellaneous metal providers have decreased to 25 suppliers. **Table 25** summarizes FDOT approved steel facility concentration by location. Steel fabricators serving FDOT can be found in nearly every state, but are largely concentrated in the eastern half of the country due to transportation costs.

Table 24. FDOT Approved Steel Facilities by Type

Location and Type	2012	2022
Florida		
Bridge	5	6
Guardrail	0	0
Miscellaneous Metal	16	16
Sign Structures	6	6
Out of State		
Bridge	32	24
Guardrail	11	7
Miscellaneous Metal	44	25
Sign Structures	21	18
Total	**135**	**102**

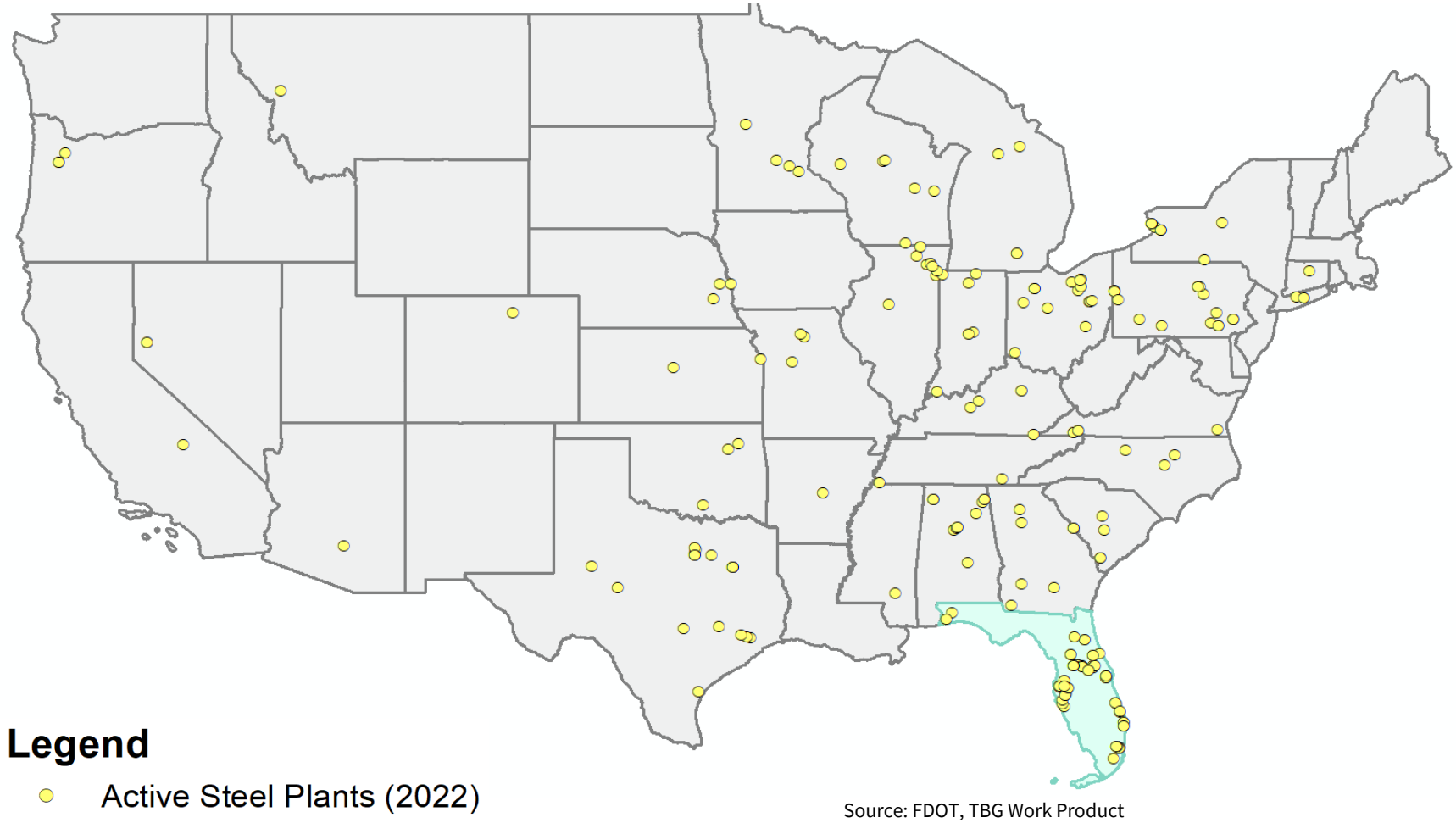
Table 25. FDOT Approved Steel Facilities by Location

Location	2012	2022
Local		
Florida	27	28
National		
East Coast*	29	26
Midwest	41	26
Gulf Coast	30	20
Rocky Mountains	3	0
West Coast	3	2
Outside U.S.		
Canada	2	0
Total	**135**	**102**

Source: FDOT Approved Producer List, 2022 as of July 1st. Note: *Excludes Florida plants.

Figure 43 maps prequalified FDOT steel plant locations as of July 1, 2022.

Figure 43. FDOT Approved Steel Producer Facilities



Source: FDOT, TBG Work Product

Current Pricing

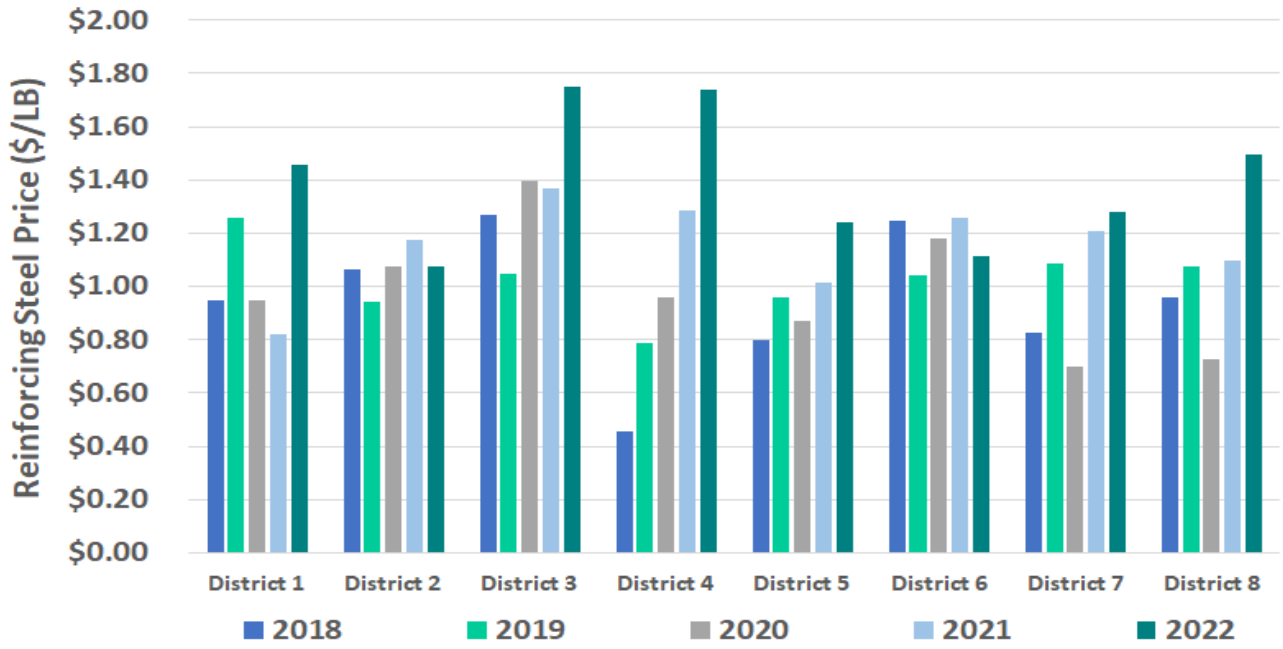
Based on FDOT bid prices, structural and reinforcing steel prices are up 27% and 17% in 2022 compared to 2021, respectively (**Table 26**). **Figure 44** shows price variation in the last 5 years by district for reinforcing steel. Districts 3 and 4 have the highest prices as well as growth rate in 2022.

Table 26. Steel Price, 2018 – 2022

Year	2018	2019	2020	2021	2022
Price Structural Steel, $/lb.	$4.41	$2.79	$2.55	$3.84	$4.87
Percent Change, %	57.4%	-36.8%	-8.6%	50.7%	26.8%
Price Reinforcing Steel, $/lb.	$0.96	$1.00	$0.88	$1.20	$1.41
Percent Change, %	18.6%	4.4%	-12.2%	36.5%	17.1%

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

Figure 44. Reinforcing Steel Prices by District



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

Material Quantities

Materials quantities estimates have been prepared for Reinforcing and Structural Steel. FDOT's overall steel consumption has been found to hold a valid statistical relationship with overall FDOT expenditures. However, there is potential for substantially higher quantities of steel and metal products to be considered, and an additional line item labelled Other Steel material is included in the Future Quantities tables herein. The "Other Steel" category is estimated from all pay items that have a steel or metal product component, that are outside reinforcing and structural steel pay items. There are about 2,250 steel pay items currently under consideration, with an accompanying total dollar amount of more than $227 million in fiscal year 2022. This total represents FDOT's exposure to global market fluctuations.

Reinforcing and Structural Steel quantities are estimated using historical ratios. Statewide results are in **Table 27**, while results by District are provided in **Table 28**.

Table 27. FDOT Future Steel Material Requirements (in thousands)					
FY	**2023**	**2024**	**2025**	**2026**	**2027**
Reinforcing Steel	14.7	10.7	9.0	9.9	8.1
Structural Steel	15.0	10.9	9.2	10.0	8.2
Other Steel	103.7	75.0	63.6	69.4	56.9
Total Tons	**133.5**	**96.5**	**81.8**	**89.3**	**73.3**

Source: TBG calculated from data provided by FDOT Office of Program Management.

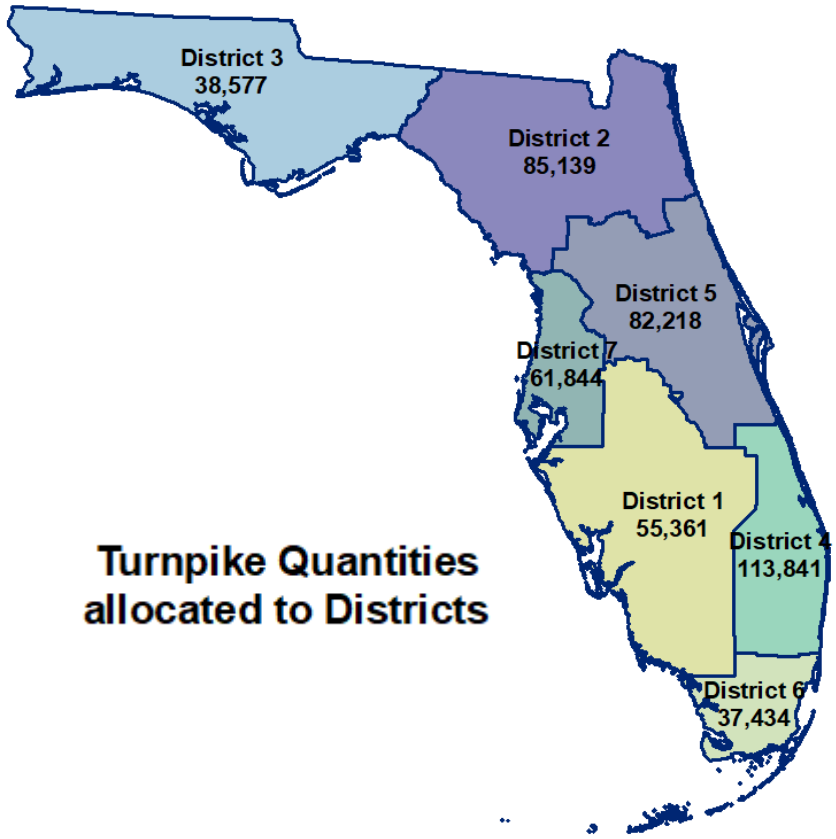
Table 28. FDOT Future Steel Material Requirements by District (in thousands)					
District	**2023**	**2024**	**2025**	**2026**	**2027**
D1	14.1	7.2	7.7	9.8	14.3
D2	32.8	7.5	16.5	11.1	10.9
D3	13.2	9.7	5.9	4.2	4.1
D4	16.3	21.9	9.9	12.1	8.3
D5	13.5	6.6	9.5	7.6	8.0
D6	3.9	2.5	6.4	8.3	6.3
D7	13.8	15.1	4.5	12.4	5.4
D8	26.0	26.1	21.4	23.8	15.9
Total Tons	**133.5**	**96.5**	**81.8**	**89.3**	**73.3**

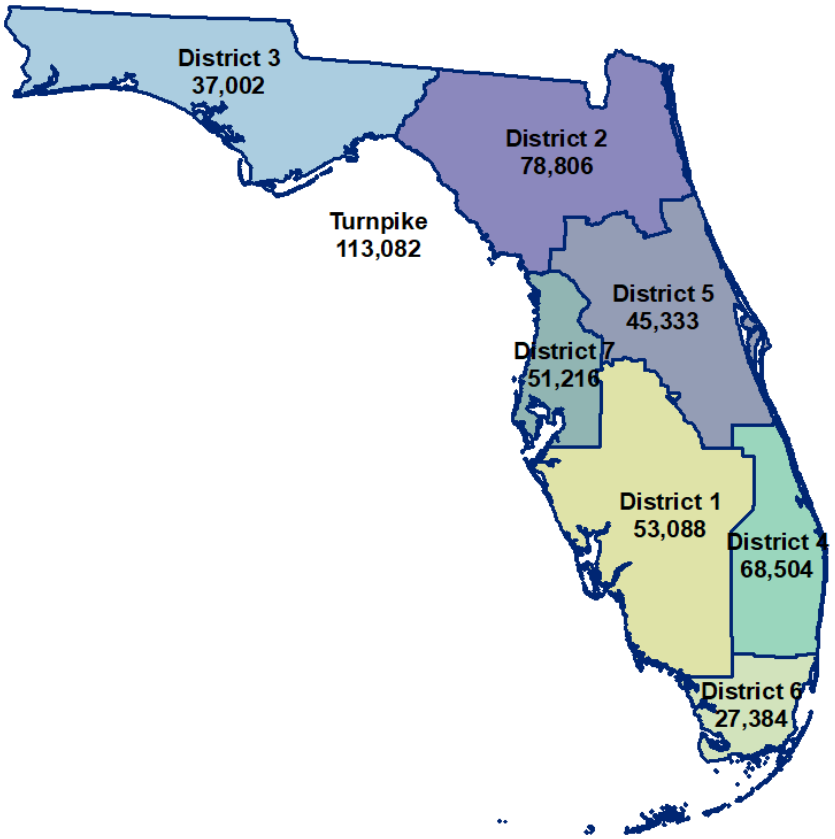
Source: TBG calculated from data provided by FDOT Office of the Work Program Budget.

Figure 45 shows total FDOT steel requirements over the Five-year Work Program.

Figure 45. Total Steel Quantities for Five-year Work Program (Tons)

Source: TBG calculated from data provided by FDOT Office of Program Management.





Forecast

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. **Table 29** provides the forecast average price for structural and reinforcing steel.

Actual bids reached an average of $4.87 to date in fiscal year 2022, which includes opt-in cost escalation clauses where contractors choose to activate. Previous forecasts found that global conditions (crude prices, COVID disruption) and Florida markets (construction employment) were driving FDOT structural steel costs with bid prices expected to achieve a weighted average price of $5.13 per pound in fiscal year 2023. With updated projections across crude prices and macroeconomic conditions, the revised 2023 estimate remains close at $5.10 per pound. However, the updated forecast estimates show a decline from current peak prices by the end of fiscal year 2024, but enough forward momentum remains from current war-related global steel disruption to maintain uncomfortably high prices over the next few years. Russia and Ukraine exports were exceeded only by China in 2020[11]. The lower bound scenario reflects a recessionary condition where high prices dampen demand for structural steel, forcing bid prices lower. The upper bound reflects continued very high levels of war-related and other supply disruptions.

Previous forecasts estimated reinforcing steel weighted average prices for fiscal year 2023 of about $1.49 per pound, followed by a dip in 2024 driven by anticipated declines in overall construction employment (potentially due to workforce availability e.g., increasingly unaffordable housing for workers, which has driven successive declines in construction employment in Central Florida despite record levels of construction spending) and flattening of crude prices. The result is that the previously projected $1.23 per pound cost for FY 2024 is slightly lower at $1.22 with gradual upward prices through the work program. The lower bound shows further disruption in construction employment, lower crude prices, and recessionary conditions. The upper bound includes influences of higher commodity prices and continued high demand, ending around $1.56.

Table 29. Steel Price Forecast Results

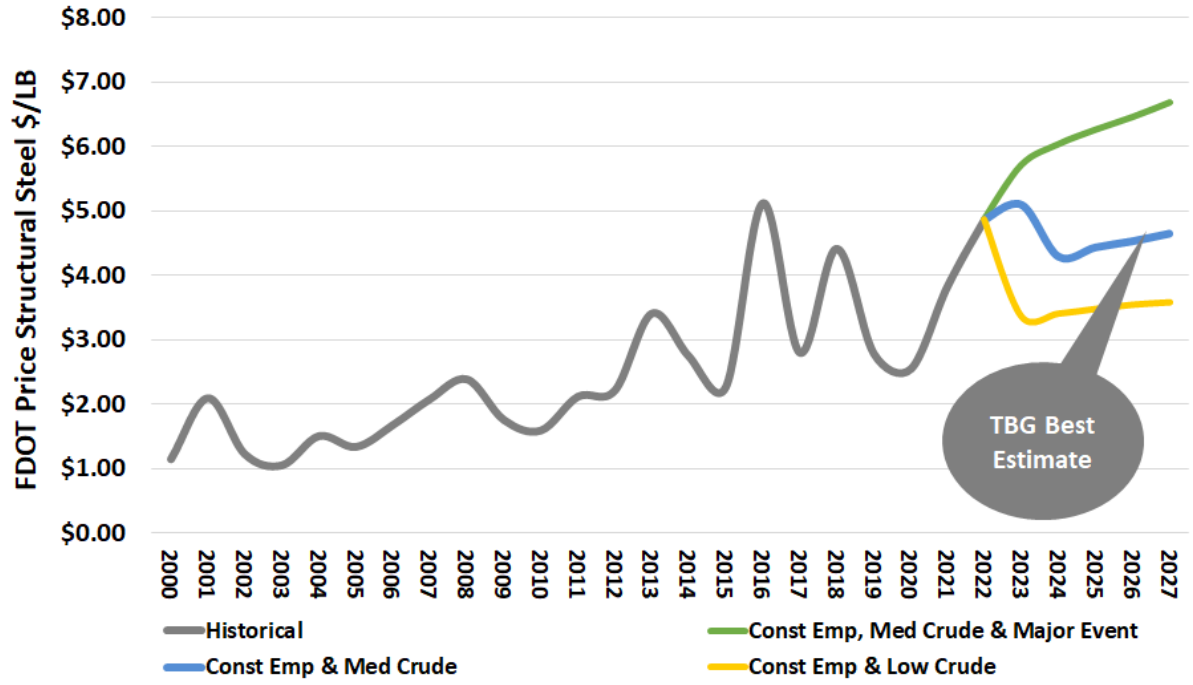
Year	2022	2023	2024	2025	2026	2027
Price Structural Steel, $/lb.	$4.87	$5.10	$4.29	$4.44	$4.53	$4.65
Percent Change, %	26.8%	4.7%	-15.8%	3.4%	2.2%	2.6%
Price Reinforcing Steel, $/lb.	$1.41	$1.48	$1.22	$1.27	$1.30	$1.35
Percent Change, %	17.1%	5.1%	-17.6%	4.1%	2.8%	3.3%

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

Figure 46 and **Figure 47** show the output of several price models and the scenario identified as best estimate for structural steel and reinforcing steel, respectively.

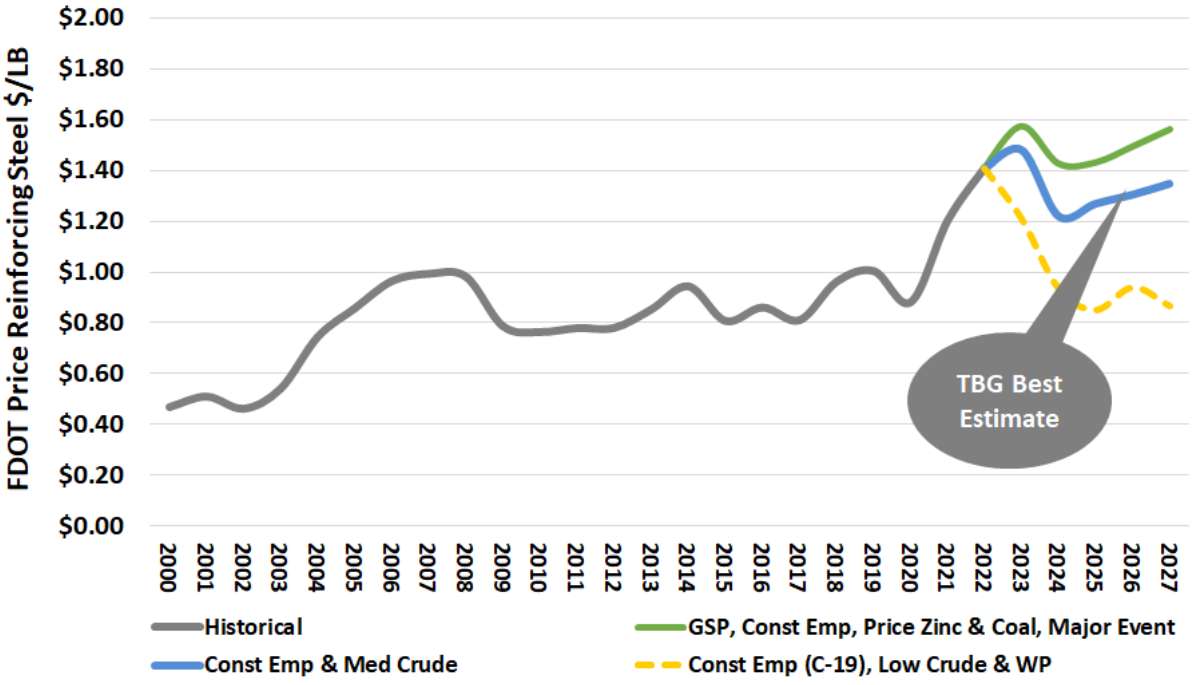
[11] World Steel Association January 2022

Figure 46. Structural Steel Price, 2022 Forecast



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

Figure 47. Reinforcing Steel Price, 2022 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 fell 7% in 2021 and construction aggregates[12] by 4%, according to revised numbers from the USGS[13]. Production in the Lake Belt followed previous year's trend with a slight decline. Producers indicate issues trying to secure and transport material; material is abundant, but delivery is not.
- The industry is optimistic because there is high demand for aggregates from multiple sectors. However, in contrast to last year's survey results, where 35% expected issues meeting demand, this increased in 2022 to 64%.
- Price increases have been higher than expected. Producers are no longer absorbing increased costs as seen in 2021, many have passed the majority to their customers.

FDOT Impacts

- Weighted Average Aggregate prices are currently at record highs for the period of FDOT data available (dating to 1993); forecasts show continued increases of an estimated 9% in fiscal year 2023 before prices begin to normalize, barring a significant recession.
- FDOT's Aggregate rock base prices are up 12% in fiscal year 2022. Producers in the survey indicated that they expect bids to be, on average, 52% higher by the end of 2022.
- Producers have reported issues with aggregate availability. Disruption to key supply sources, high demand from different sectors and issues with deliveries are limiting factors to keep up with demand.

FDOT's aggregate optional base price increased to $20 per square yard in 2021 and is at $22.5 per square yard in 2022. A series of factors are supporting high prices. Average crushed stone prices are at all-time highs as well as waterborne imports to ports serving Florida; however, issues with rail capacity and timely deliveries have constrained aggregate availability. Crude oil and diesel prices have had steep increases in 2022, but average hourly earnings of stone mining have been stabilized the last few years around $26 per hour.

Industry Outlooks

Outlook in the industry continues positive as extraordinary aggregate demand from different construction sectors continues. Generally speaking, producers indicate that labor market conditions have not improved, but trucking costs are a bigger concern at the moment due to steep increases in fuel costs. Interviewed producers indicated that prices have gone up over the past year between 10% to 25%. In regards to passing these costs, most indicated that unless a project was already underway, a significant share (if not all) is being passed to customers; a shift from last year, when producers were trying to absorb costs to secure jobs.

Additionally, publicly traded companies that have released first quarter results show strong results in their aggregate lines of business. All companies had higher volumes, but growth rates varied across geographies, some as high as 14%. In terms of prices, all reported price increases between 5% and 8%, which is the range of some of the 2022 guidance released earlier in the year. Expectations are that prices will continue increasing in 2022. Fuel costs are a major cost factor highlighted by the companies that is negatively impacting business.

Respondents in the 2022 survey expected a smaller share of FDOT work than they did for 2021. While in 2021, the share was 25%, in 2022 the share falls to 17% showing the increased competition for aggregate resources. Overall, the percent of capacity used didn't change, as the average in 2021 was 62% and in 2022 is 61%. However, half of them are over 70% utilization rates and a few are close or at 100% of capacity used. In spite of the uncertainty over changing conditions in the economy, the majority plan to expand capacity in the next 5 years. Those who reported how much these expansions are expected to add, are between 15% and 50% of additional capacity.

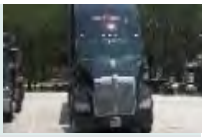
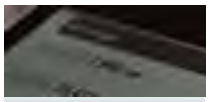
[12] The USGS defines construction aggregates as the combination of crushed stone and construction sand & gravel.

[13] United States Geological Society

SUPPLY CHAIN VARIABLES ➤ **AGGREGATE**

Table 30 provides current status of selected supply chain variables, and **Table 31** provides historical data for variables impacting FDOT's aggregate costs.

Table 30. Aggregate Supply Chain Variables

 Raw Materials	While shortages of aggregate sources had not been a concern for the industry up to this point, issues with Vulcan's Mexico operations forced producers to look for alternatives. The USGS revised Florida's production for 2021, now showing a 7% decline instead of 3% growth for crushed stone and 4% decline for construction aggregates (the largest downward revisions during the first quarter). Lake Belt production fell 3% in 2021 to 38.2 million tons. However, production in the first quarter of 2022 started strong as crushed stone produced rose 11% year-over-year.	↑
 Access to Land	Access to land with suitable deposits is key to cost-effective material extraction for FDOT Aggregate. There have been several regulation changes in the Navigable Waters Protection Rule, the NEPA rule and the Endangered Species Act. These have been negatively seen within the industry and are expected to continue through next year, with industry monitoring carefully. Some aggregate producers see permitting as one of the concerns this year. They estimate the likelihood of environmental regulations affecting production in 2022 is 24% and sentiment increases to 49% over the next 5 years.	=
 Rail	The poor and deteriorating service of freight rail shippers has critically strained companies supplying customers around the country. Rail is the primary transportation for aggregates from Georgia, and from Lake Belt to Central and Northeast Florida. During Q1 2022, aggregate shipments rose by 3% year-over-year and revenues increased by 25%. AT the same time, CSX reported a 92% increase in locomotive fuel costs. As of this writing, commodity specific data for the second quarter has not been published. Aggregate producers that use rail, continue reporting issues with services and deliveries.	↑
 Trucking	Constrained truck/driver availability is a major cost factor. Producers have reported significant increases in fuel costs have increased trucking costs, making them a major concern for this year. Aligned with sectors, producers indicated trucking availability as a top concern this year. The Federal Motor Carrier Safety Administration opened up registrations for the Safe Driver Apprenticeship Pilot Program required under the BIL, which aims to increase the pool of drivers.	↑
 Labor	While labor demand is high as aggregate demand continues being high from different construction sectors, some producers indicated that these have not worsened (or improved) and that trucking costs are a bigger concern at the moment. However, 45% of respondents still indicated issues finding skilled labor. Statewide construction employment increased 2.5% in June, year-over-year, but growth is uneven across the state. South and North Florida continue experiencing growth, while employment in the Orlando metro area has decreased 7%. Nationally, nonmetallic mineral mining and quarrying employment is down 1% in 2022 but in June was up 1% year-over-year. Producers continue experiencing issues with labor.	↑
 Competition	Competition has been steady. FDOT's approved list shows a 1% increase in aggregate producers for 2021 and a 2% for 2022. Currently, there are no applications for new environmental resource permits in 2022 for Florida, but there are three new applications from Canada.	=
 Capital Costs	Strong aggregate demand means that investments for new equipment and maintenance are still expected even with Fed rate hikes and uncertainty over the economy. In the 2022 survey the majority plans to increase capacity by as much as 30% over the next 5 years. Some producers indicated delays caused by waiting times for equipment.	↑

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

Table 31. Historical Aggregate Data, 2013 – 2022

*(Maximum values indicated with *)*

Aggregate	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crude Oil (WTI Spot Price)[1]	$/Barrel	$97.98	$93.17	$48.66	$43.29	$50.80	$65.23	$57.00	$39.16	$68.13	$101.78*
Total Chinese Imports[2]	Billions of $	$1,950	$1,959	$1,680	$1,588	$1,844	$2,136	$2,078	$2,066	$2,688	$2,915*
Florida Diesel Prices[3]	$/Gallon	$3.16	$3.00	$1.84	$1.44	$1.78	$2.22	$2.04	$1.78	$2.15	$3.71*
Estimated Statewide Crushed Stone Produced or Used[3]	000s of Tons	59,398	63,585	74,275	80,446	83,532	83,642	95,764	101,384*	94,111	97,122
Average Crushed Stone Price Florida[4]	$/Ton	$10.64	$10.71	$10.80	$11.55	$11.89	$11.92	$12.01	$12.43	$14.34	$15.68*
FL Heavy & Civil Engineering Employees/ All FL Construction Employees[5]	%	12.95%	12.56%	12.28%	12.33%	12.90%	12.45%	12.73%	13.01%	12.94%	13.17%*
FL Construction Employees/All FL Non-Farm Employees[5]	%	4.83%	5.08%	5.33%	5.65%	5.89%	6.16%	6.32%	6.61%*	6.46%	6.33%
Average Hourly Earnings Stone Mining and Quarrying[5]	$/Hour	$21.61	$21.28	$20.65	$21.41	$22.14	$23.44	$26.50*	$26.33	$26.21	$26.22
Annual FDOT Work Program Allocation[6]	Billions of $	$2.59	$3.29	$3.18	$3.51	$4.00	$3.82	$3.83	$3.72	$2.66	$4.17*
Crushed Stone Imports Serving Florida[7]	000s of Tons	5,153	6,501	6,604	6,311	7,387	8,185	8,484	8,483	8,346	8,869*
FDOT Aggregate Base Price Index[8]	$/Ton	$14.82	$15.47	$14.86	$16.55	$18.11	$16.39	$16.45	$19.53	$20.01	$22.50*
FDOT Earthwork Cost[8]	$/Cubic Yards	$6.00	$4.46	$7.64	$6.96	$6.95	$7.66	$5.90	$8.39	$12.46	$14.74*

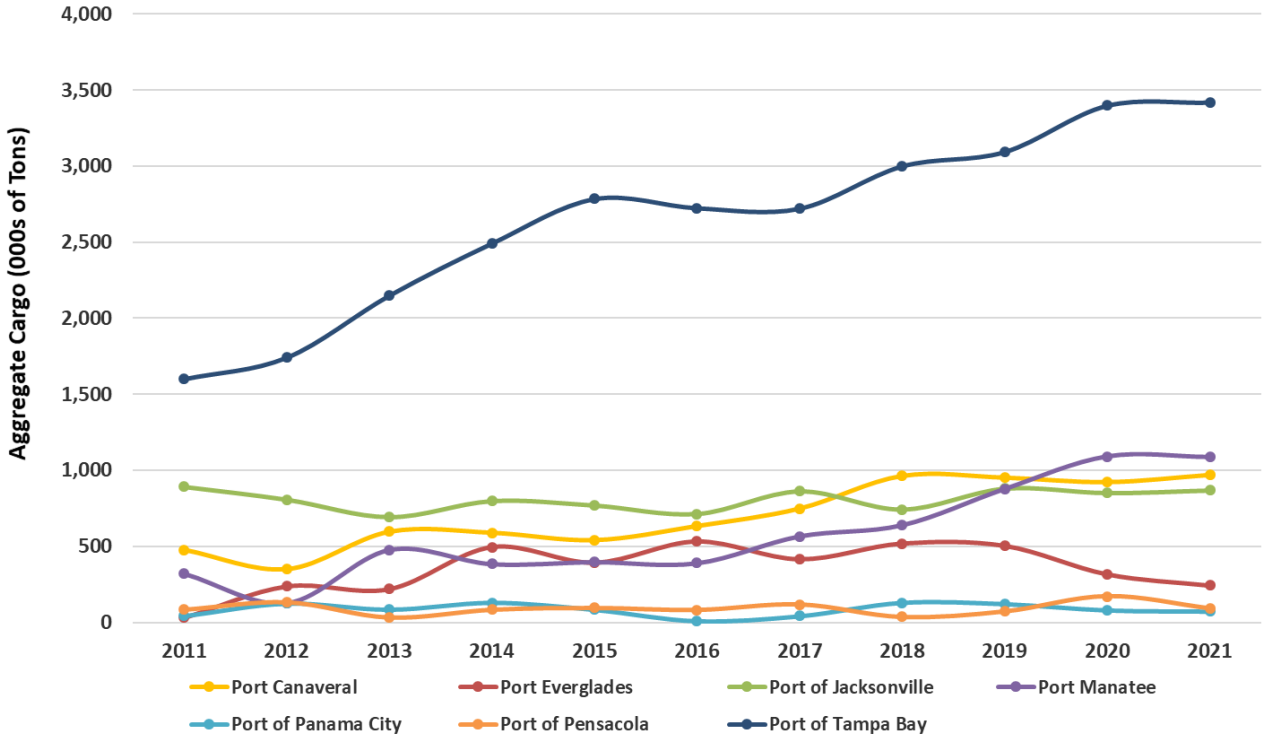
Sources: 1. EIA – Annual Average Spot Price. 2. WTO's World Trade Statistical Review. 3. FDOT Construction Office. 4. US Geological Survey. 5. Bureau of Labor Statistics. 6. FDOT Office of Work Program. 7. U.S. I.T.C. 8. Calculated from FDOT Estimates Office data.

Raw Materials

Aggregate sources for FDOT are pre-approved mining locations throughout Florida, Georgia, Alabama and a few offshore sites, including Mexico, Nova Scotia, and the Caribbean. Rock suitable for FDOT specs shipped by US companies through Canadian ports could expand aggregate supply without violating the Jones Act, which prohibits foreign built or flagged ships from coastwise trading within the US.

Import data for incoming aggregate has been compiled from each Port's annual report (**Figure 48**). Overall, aggregate imports fell by 1% in 2021 as most ports were flat or saw small increases in shipments in 2021. Port Everglades and Port of Pensacola saw the largest declines in 2021, but these ports have a small share of material imported. Shipments to Port of Tampa continued at 3.4 million tons and Port Manatee fell by less than one percent, remaining over one million tons received.

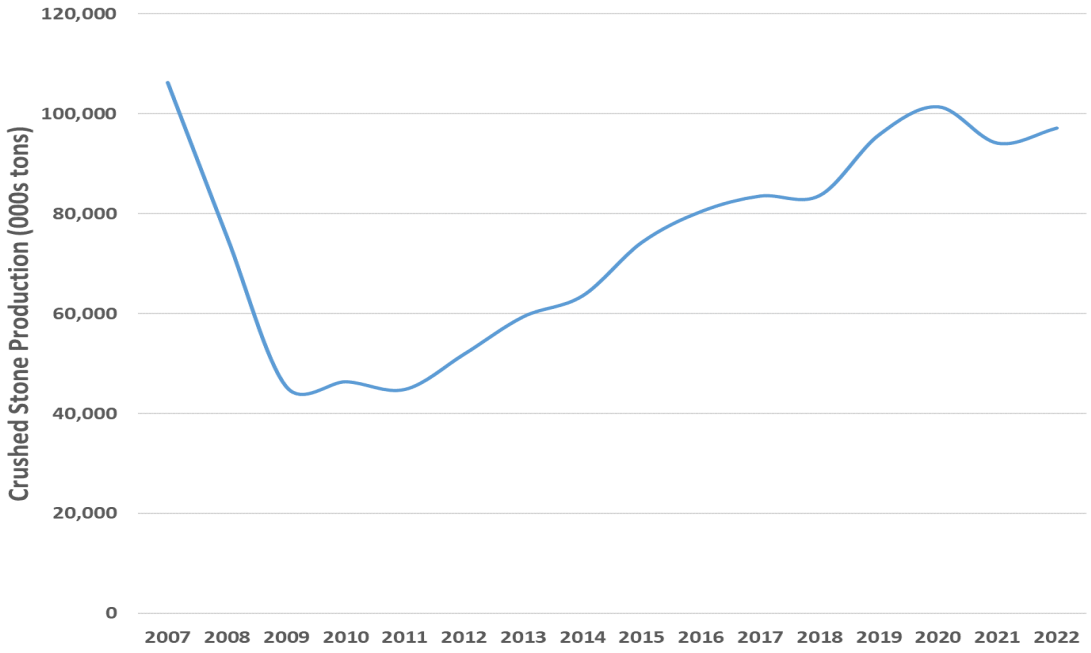
Figure 48. Aggregate Cargo through Florida Ports



Sources: 1. Canaveral Port Authority Comprehensive Financial Annual Report. 2. Port Everglades Annual Commerce Report, U.S. Army Corps of Engineers Annual Waterborne Commerce of the United States. 3. Jacksonville Port Authority Historical Bulk Information. 4. Manatee Port Authority Annual Financial Report. 5. U.S. Army Corps of Engineers Annual Waterborne Commerce of the United States. 6. Port Tampa Bay Comprehensive Annual Financial Report.

The USGS has released estimated construction aggregate produced for consumption numbers for the first quarter of 2022. Overall, while Florida's crushed stone and construction aggregates production grew by 11% and 15%, respectively; the U.S. production only grew by 3.5% and 4%. After surpassing 100 million tons in 2020, Florida's crushed stone production fell to 94 million tons in 2021 (**Figure 49**).

Figure 49. Florida Crushed Stone Production

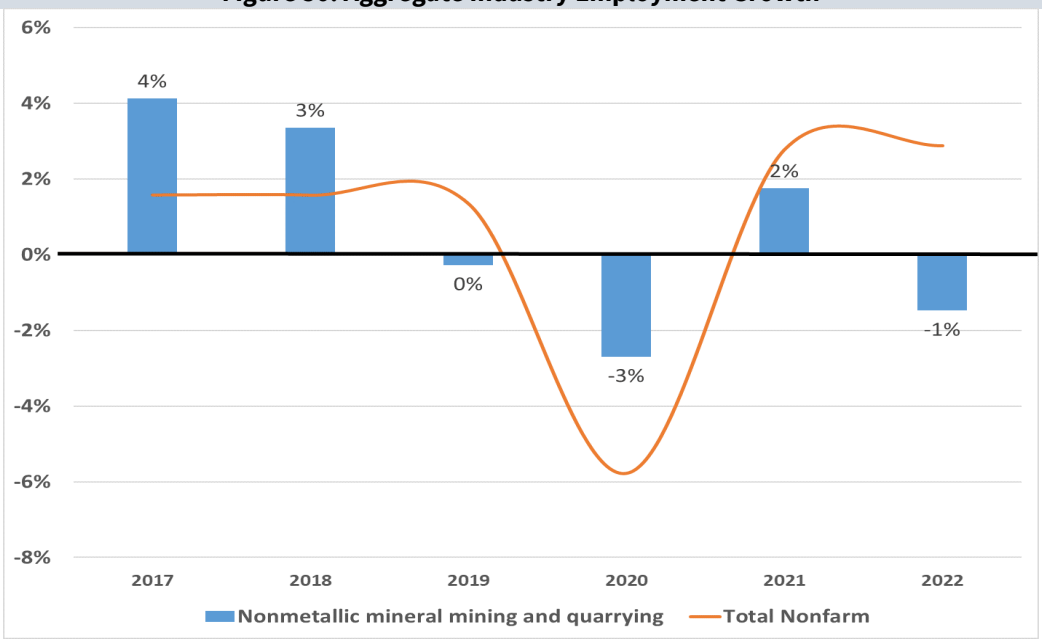


Sources: USGS; 2022 estimated

Labor

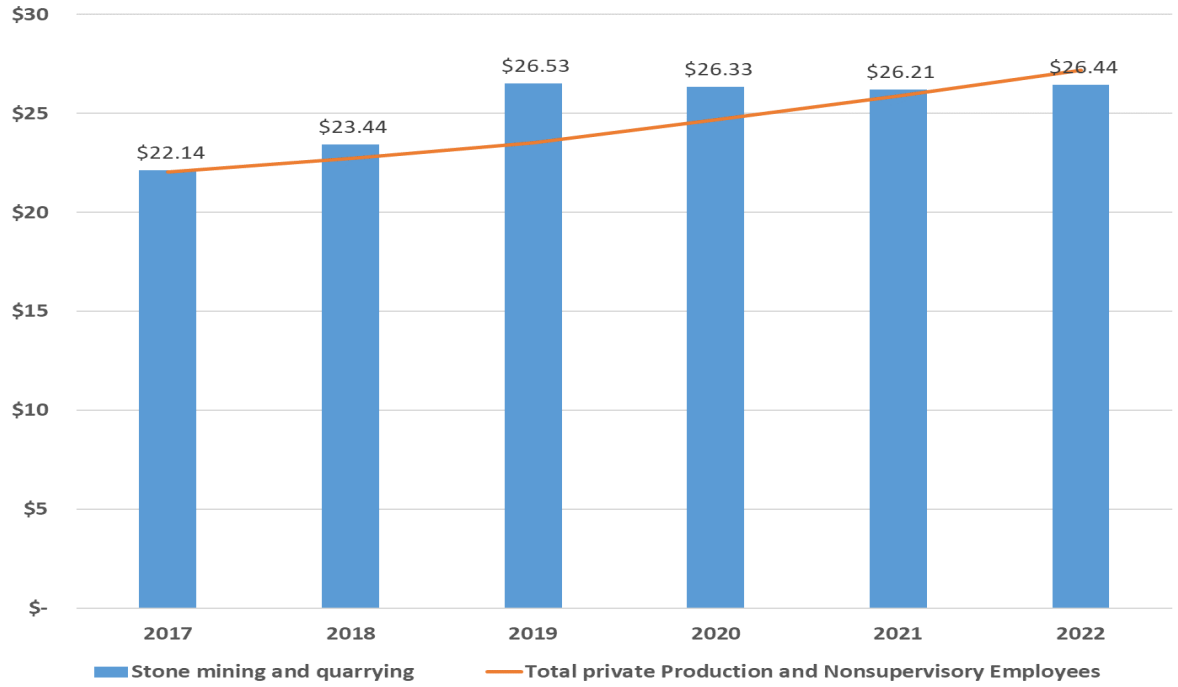
The recovery in demand for aggregate has increased demand for labor over the last few years. While in 2020 and 2021 employment had similar changes to total nonfarm employment, in 2022 employment has slightly decreased but total nonfarm hasn't (**Figure 50**). Nationally, average hourly wages remained stagnant at about $26.50 since 2019 (**Figure 51**). Wages are not expected to go down, as in some cases producers continue reporting struggles to find labor. Interviews and the survey highlight different perspectives about the labor market. Some indicate that it keeps getting worse, but is unchanged for others and that they have adjusted to these new conditions.

Figure 50. Aggregate Industry Employment Growth



Source: Bureau of Labor Statistics

Figure 51. Aggregate Industry Wages



Source: Bureau of Labor Statistics

Lake Belt

The Lake Belt region of South Florida is an important source of aggregate for FDOT. Aggregate production in Lake Belt fell in fiscal year 2020-21 by 3%, following the trend seen in 2019-20. The per ton mitigation fee rate that mines must pay in the Miami-Dade County Lake Belt Area to extract limerock and sand have decreased from a peak of $0.45 in fiscal year 2012 to $0.05 since 2017-18 (**Table 32**).

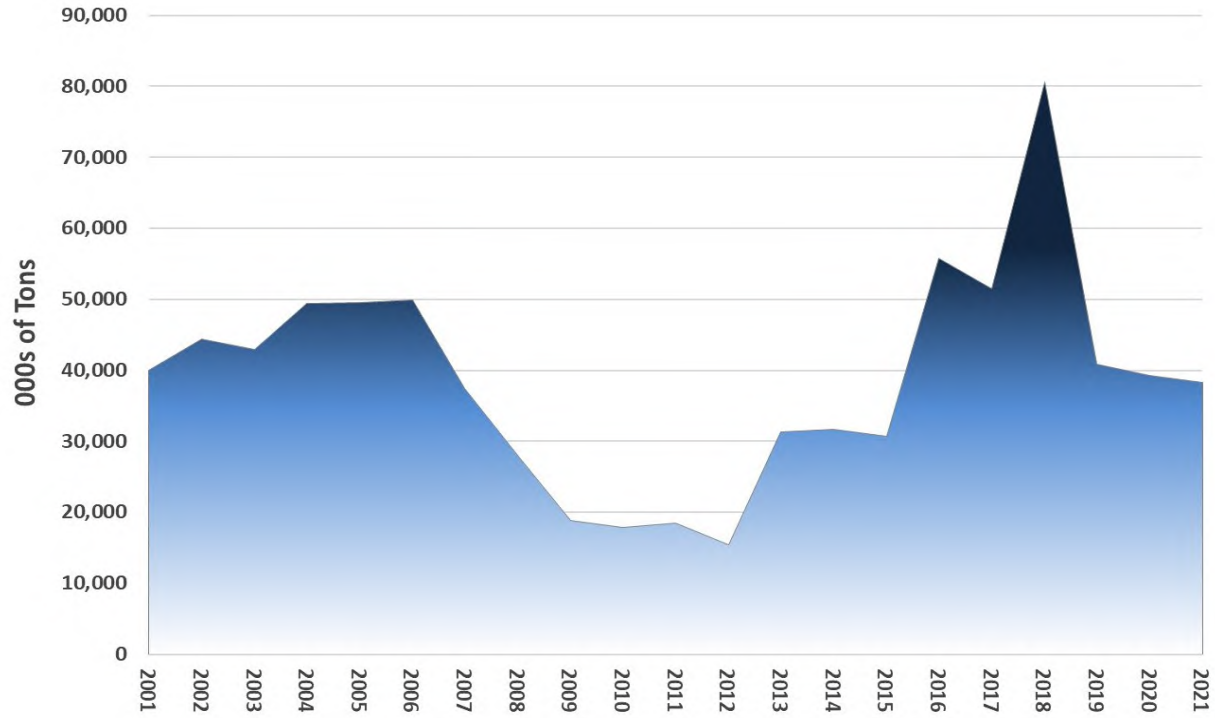
Table 32. Lake Belt Fee Rates, 2013 – 2021

Fiscal Year	Per-Ton Fee Rate	Total Collections	Percent Change	Total Tons Extracted	Percent Change
2012-13	0.45	$14,084,101	103%	31,298,003	103%
2013-14	0.45	$14,237,681	1%	31,639,292	1%
2014-15	0.45	$13,811,791	-3%	30,692,868	-3%
2015-16	0.25	$13,937,265	1%	55,749,058	82%
2016-17	0.15	$7,724,044	-45%	51,493,627	-8%
2017-18	0.05	$4,027,804	-48%	80,556,081	56%
2018-19	0.05	$2,042,183	-49%	40,843,667	-49%
2019-20	0.05	$1,962,442	-4%	39,248,843	-4%
2020-21	0.05	$1,911,975	-3%	38,239,490	-3%

Source: FL DOR

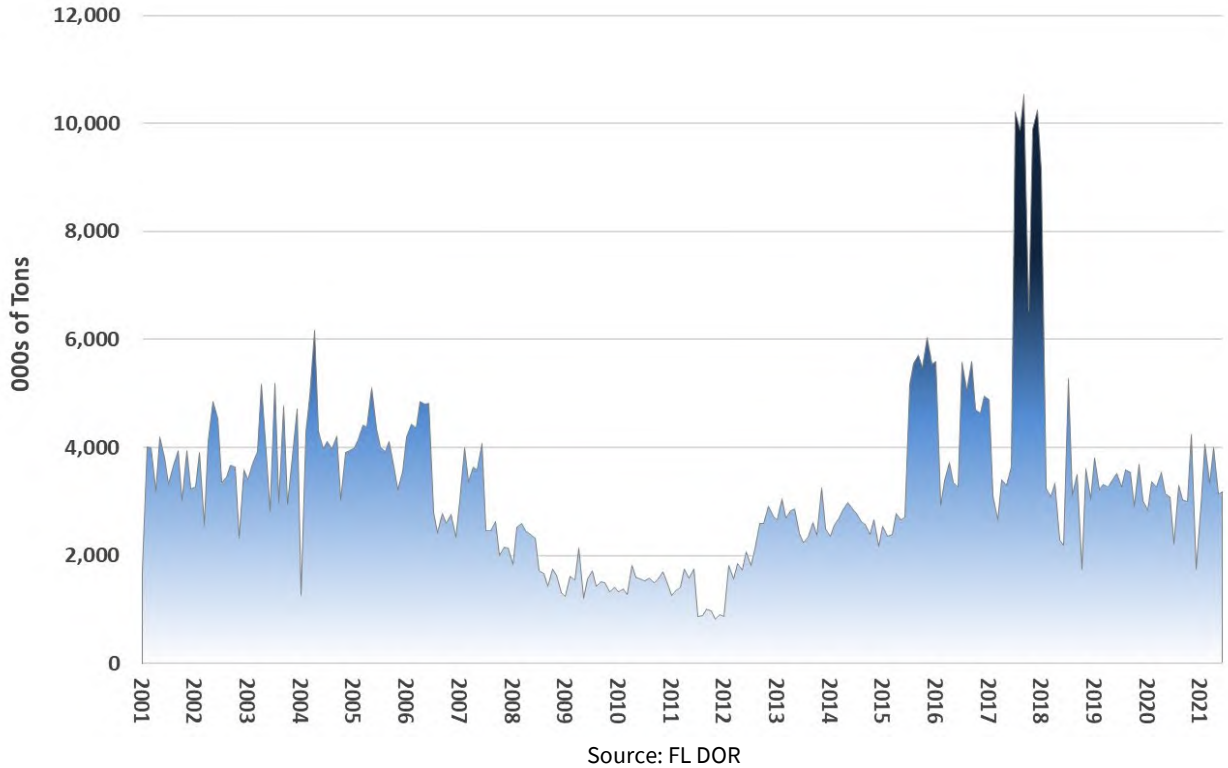
Figure 52 provides a snapshot of production over the past 20 years, followed by **Figure 53**, which shows production on a monthly basis for the same timeframe. Production in the Lake Belt Region has continued declining since 2018-19, with production being close to 38 million tons in 2020-21 (a 3% decline compared to 2019-20).

Figure 52. Annual Lake Belt Production, 2001 – 2021



Source: FL DOR

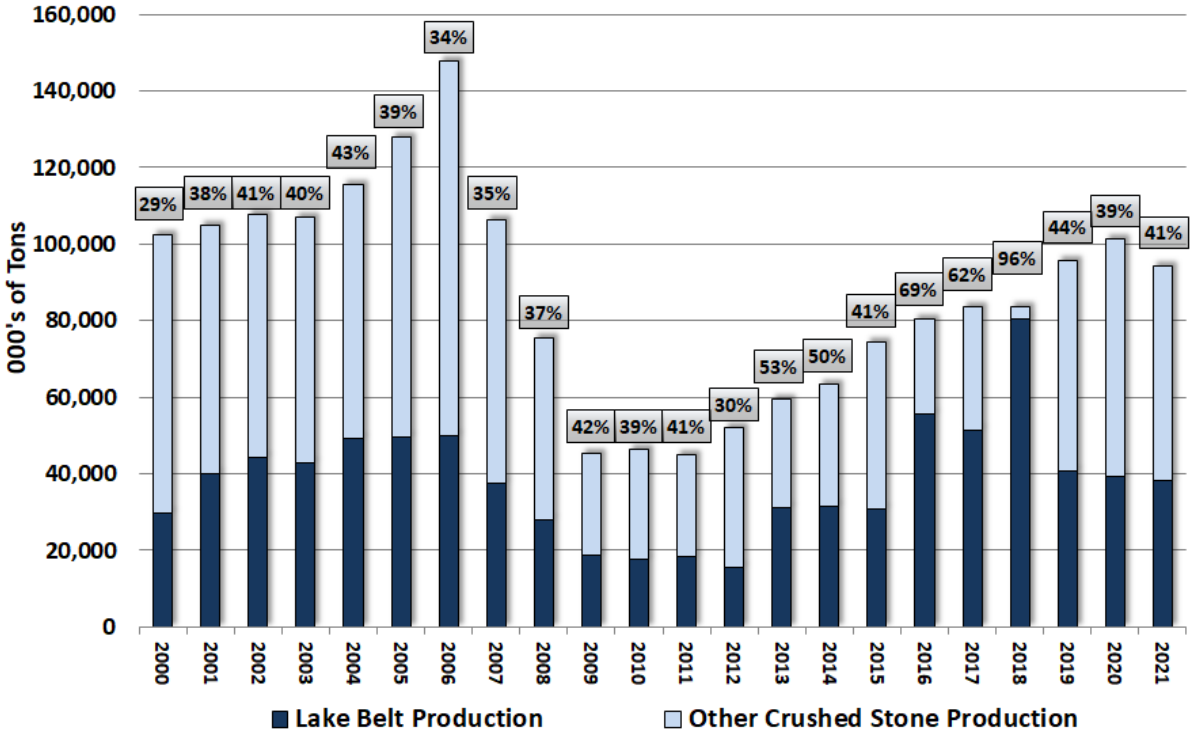
Figure 53. Monthly Lake Belt Production, January 2001 - June 2021



Source: FL DOR

Figure 54 provides a comparison of Lake Belt production to other Florida production of crushed stone. While 2017-18 exceeded peak production in the Lake Belt region, production since then has stabilized around 40%.

Figure 54. Crushed Stone Produced or Consumed in Florida, by Region (1,000 Tons)



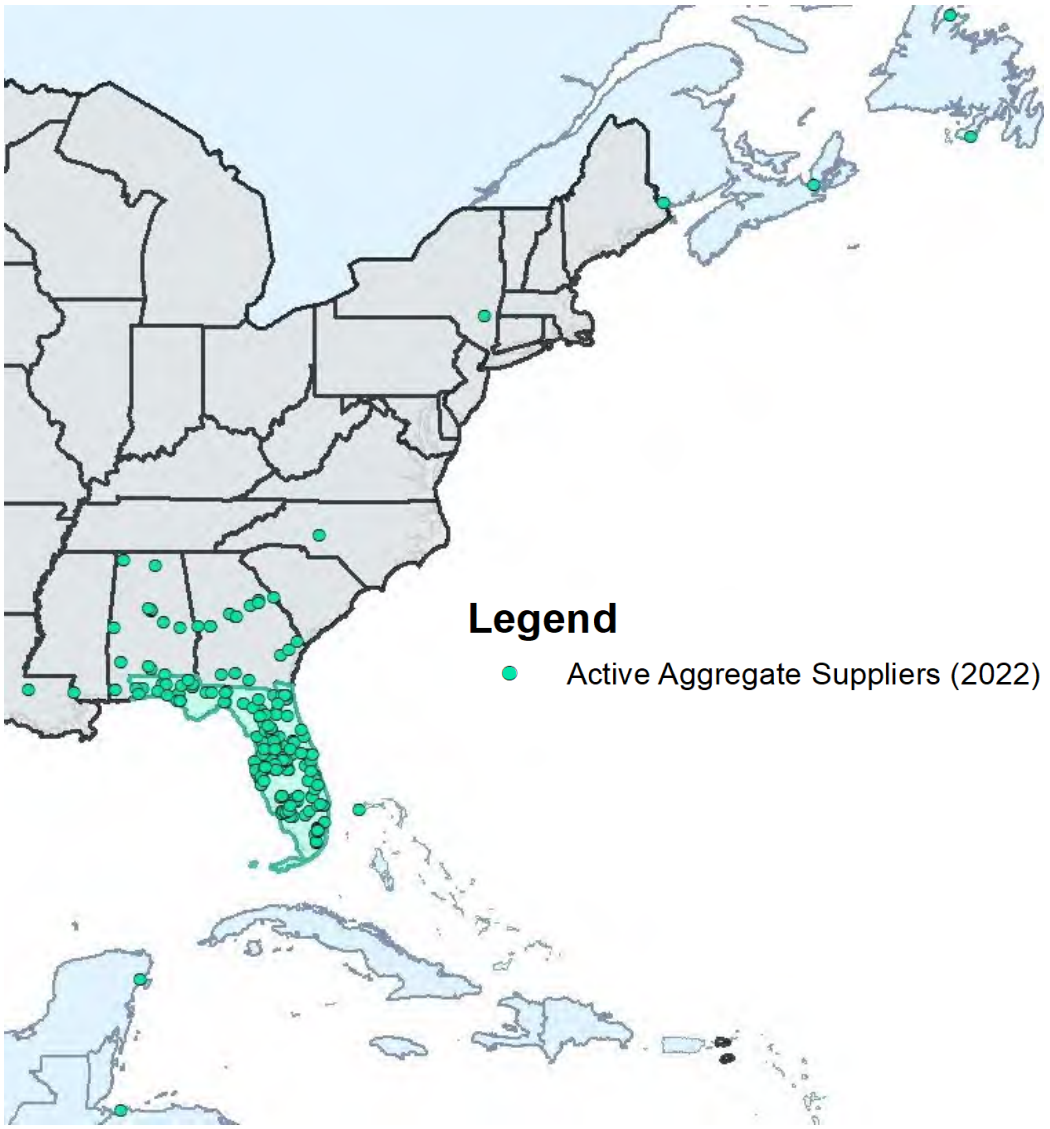
Source: USGS and FDOR

Crushed Stone Production Trends

An analysis of Florida's crushed stone supply and demand shows potential capacity issues within the next decade. The analysis used the Office of Economic and Demographic Research (EDR) December 2021 long run forecasts for different construction types. According to Pit & Quarry, in 2021, 24% of U.S. aggregate demand was for residential work, 28% for non-residential and 48% non-building work. Publicly traded companies that release this information, show similar distribution with non-building shares being slightly lower.

Forecasting to 2030, aggregate demand in Florida would be around 127 million tons using EDR's growth rates. The share of residential work would fall to 21%, non-residential would be 31% and non-building 47%. EDR estimates a drop in residential construction spending in 2023 and 2024 and then growth of 2.6% annually. On the other hand, non-residential construction spending is expected to increase 3.5% annually in the same timeframe. Some of FDOT's approved aggregate facilities are outside the U.S. (**Figure 55**). According to data from the U.S. International Trade Commission, crushed stone imports from Mexico to Tampa have averaged 1.7 million tons in the last 5 years (about one fourth of the State's imports). If the disruption of Mexican imports is extended, that loss of supply would increase demand for local sources, which are already in high demand. Therefore, while current consumption rates are trending above the 20-year average, an impending housing slowdown is expected to adjust the trajectory downward. Long-term, however, imports will likely need to increase.

Figure 55. Aggregate Approved Facilities

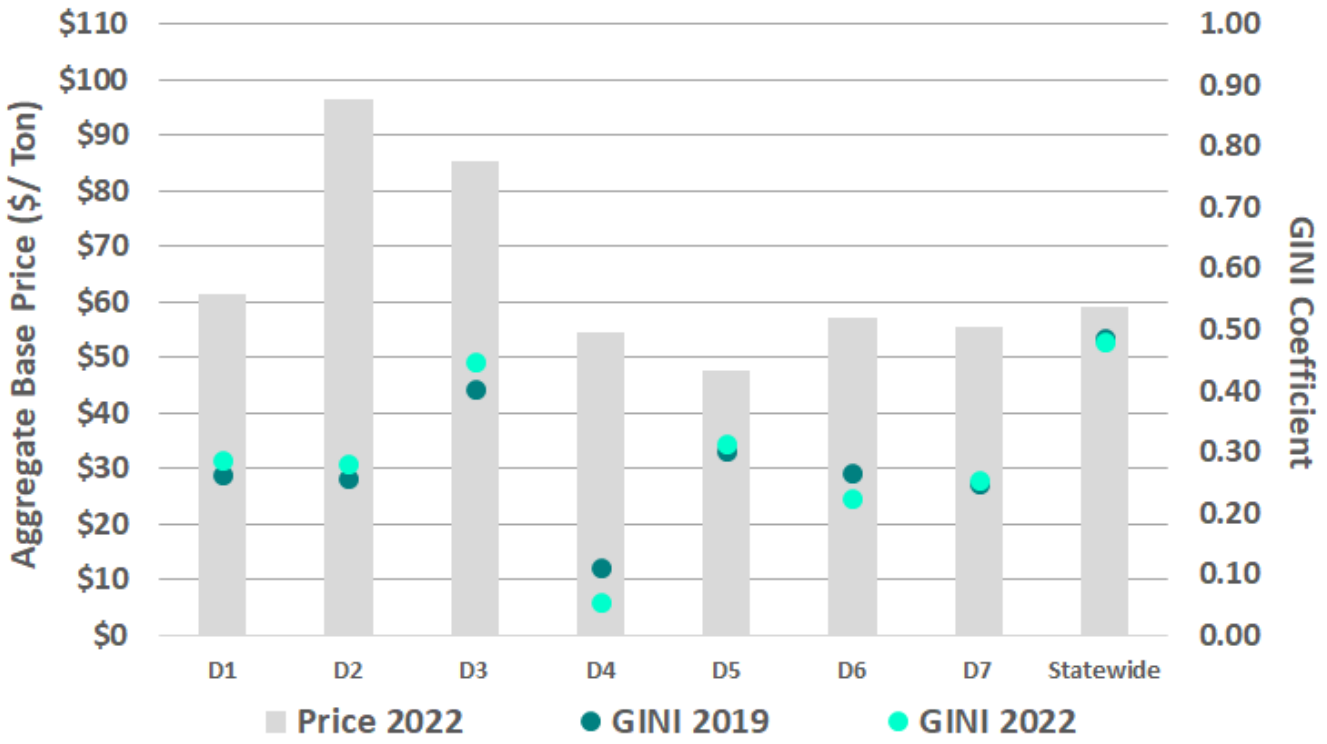


Source: FDOT; TBG Work Product

Competition

Producers did not report significant changes in competition within this past year. Statewide, 7% of the firms control 45% of the plants, about the same as the 49% seen in 2021. This competitive stability is reflected through Gini coefficients in **Figure 56**, where coefficients have remained stable for several Districts. The markets in Districts 4 and 6 have become more competitive compared to last year, while District 3 is slightly less competitive. Differences in demand are reflected in pricing.

Figure 56. Aggregate Competition Gini by District



Source: FDOT, TBG Work Product. Price is a composite of optional base and earth works.

Current Pricing

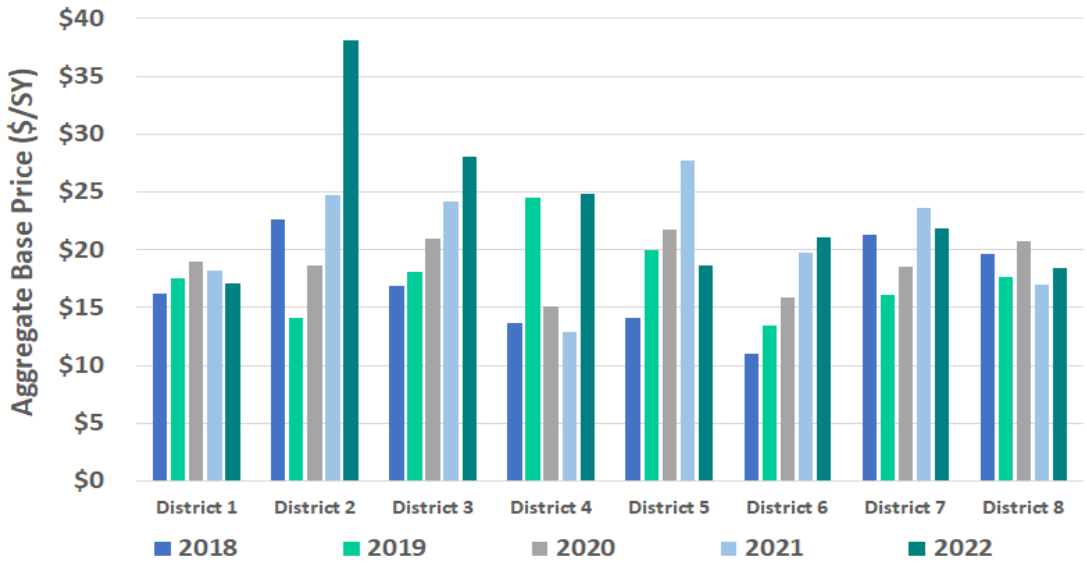
Based on FDOT bid prices, aggregate base prices are up 12.4% in fiscal year 2022 (**Table 33**). High prices are being experienced in several districts because of transportation costs and skilled labor and driver shortages (**Figure 57**). In addition, price pressures are expected to pick up in District 7 due to the closure of a major mine in Mexico. Producer interviews indicate higher prices are expected into fiscal year 2023.

Table 33. Aggregate Base Price, 2018 – 2022

Year	2018	2019	2020	2021	2022
Price Aggregate Base, $/SY	$16.39	$16.45	$19.53	$20.01	$22.50
Percent Change from Previous Fiscal Year, %	-9.5%	0.4%	18.7%	2.4%	12.4%

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

Figure 57. Aggregate Base Price by District, 2018 – 2022



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

Material Quantities

Materials requirements have been estimated for the five-year work program. Pay item data from 1994 forward was evaluated to calculate the share of project expenditures attributable to aggregate within asphalt and concrete quantities, as well as pure base requirements. **Table 34** provides the results statewide. Future FDOT aggregate requirements by District are shown in **Table 35.**

FDOT demand for aggregate for Base, Asphalt, and Concrete is expected to average 8 million tons annually over the five-year work program. Total demand of FDOT's five-year Work Program for aggregate is about 42 million tons. Total FDOT aggregate requirements for the five-year Work Program by District are shown in **Figure 58**.

Table 34. FDOT Future Aggregate Material Requirements, in thousands of Tons

Year	2023	2024	2025	2026	2027
Base Material and Other Aggregate	2,754	2,158	2,020	2,409	1,760
Aggregate for Asphalt	4,841	3,766	3,660	4,125	3,519
Aggregate for Concrete	1,739	2,076	1,157	2,933	2,925
Total Aggregate	9,334	7,999	6,838	9,467	8,204

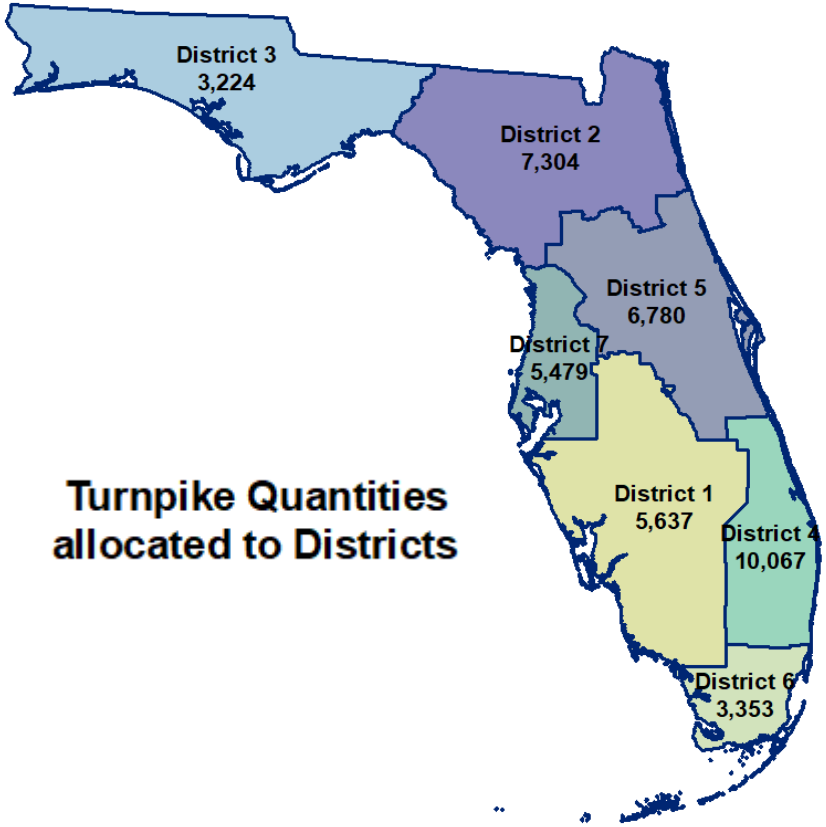
Source: TBG calculated from data provided by FDOT Office of Work Program and Budget.

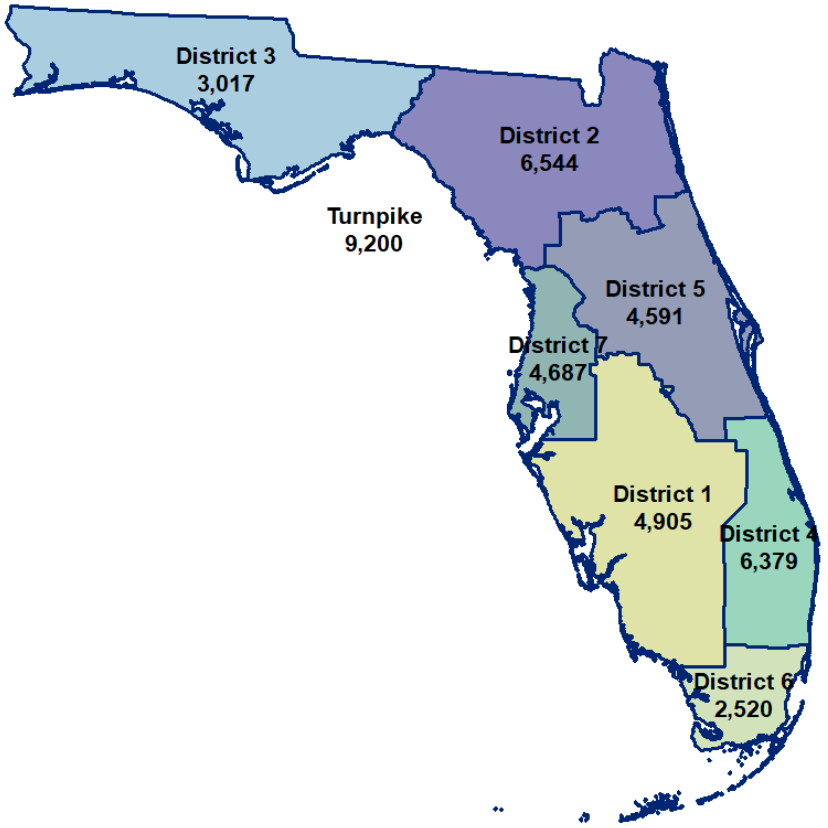
Table 35. FDOT Future Aggregate Material Requirements by District (in thousands)

District	2023	2024	2025	2026	2027
D1	1,086	765	775	817	1,462
D2	2,505	787	1,376	833	1,044
D3	1,063	647	635	358	314
D4	1,020	1,741	895	1,628	1,095
D5	1,016	838	904	709	1,124
D6	242	199	437	936	707
D7	971	1,198	398	1,609	512
D8	1,432	1,825	1,418	2,578	1,946
Total Tons	**9,334**	**7,999**	**6,838**	**9,467**	**8,204**

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

Figure 58. Total Aggregates Quantities for Five-year Work Program (000s Tons)





Source: TBG calculated from data provided by FDOT Office of Program Management.

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. **Table 36** provides the forecast average price for aggregate base. **Figure 59** shows the output of several price models and the scenario identified as best estimate for aggregate base.

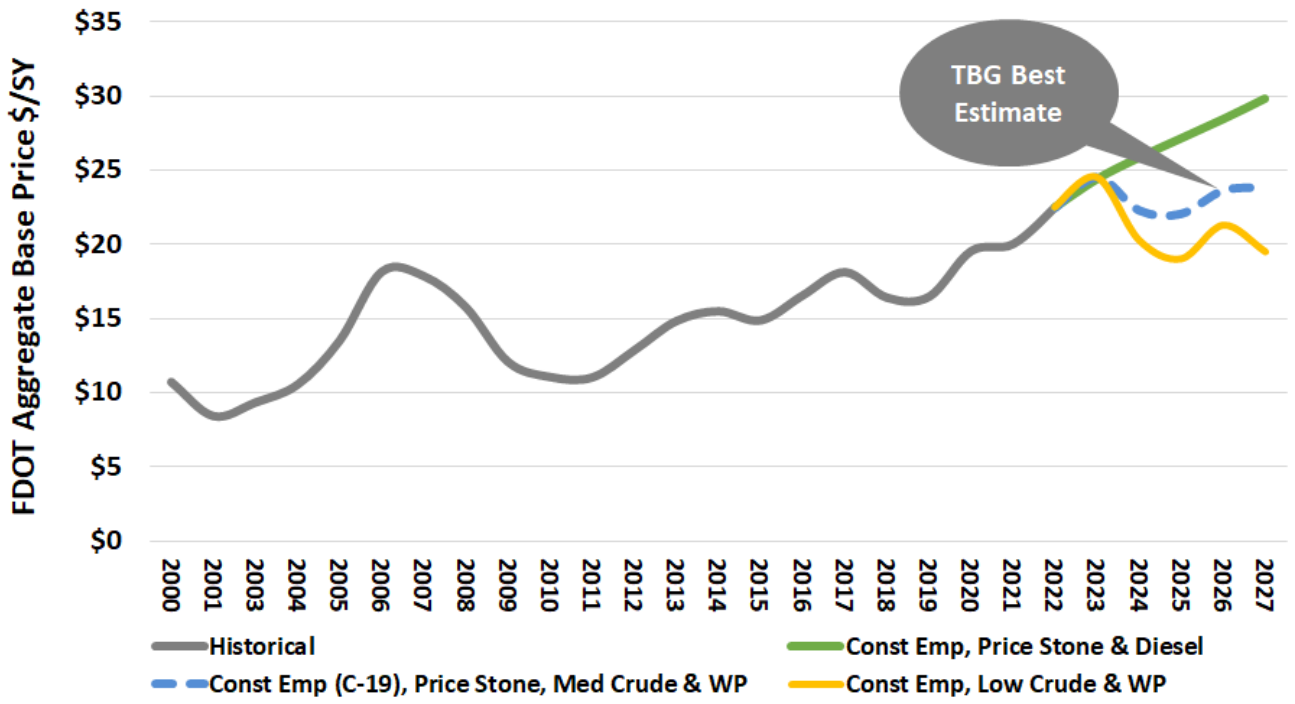
Previous estimates anticipated a 6% increase in fiscal year 2022 aggregate base prices, while actual data updated through the last quarter show that prices ended the fiscal year 12% higher. The most likely trajectory sees continued suppression of construction employment growth, increased crushed stone pricing, and FDOT work program as heavy influences into 2023, with pricing relief arriving in 2024 when supply chain disruptions are expected to lessen. An upper bound with unconstrained construction employment, crushed stone pricing, and rising energy costs results in prices that are double the 20-year average by 2027; this scenario is considered less likely as supply chain disruptions are ironed out. Finally, an alternative model with lower energy prices, attributable to recessionary conditions, would yield lower aggregate base prices throughout the five-year work program.

Table 36. Aggregate Base Price Forecast Results

Year	2022	2023	2024	2025	2026	2027
Price Aggregate Base, $/SY	$22.50	$24.55	$22.31	$22.08	$23.64	$23.88
Percent Change, %	12.4%	9.1%	-9.1%	-1.0%	7.1%	1.0%

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

Figure 59. Aggregate Base Price, 2022 Forecast



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

EARTHWORK

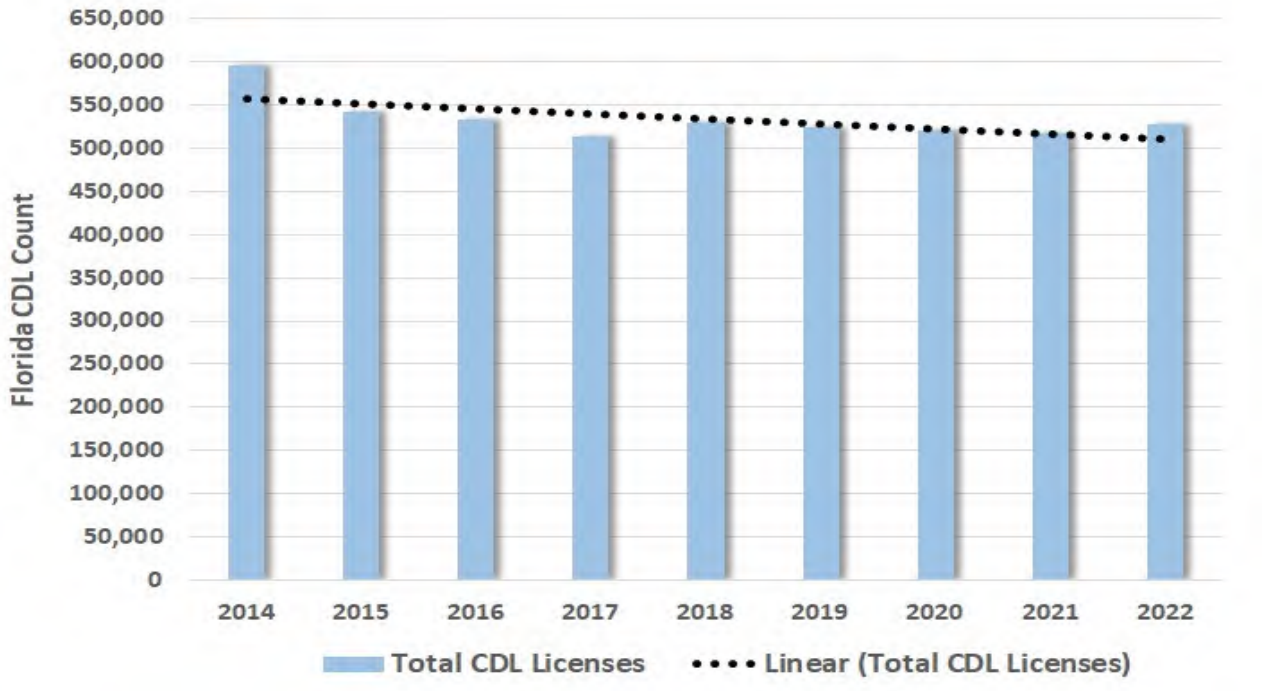
Key Findings – Earthwork

- Driver and operator shortages as well as increased fuel costs have increased trucking costs, which negatively impact earthwork contractors. Producers in other sectors indicated that they have passed these costs on in bids.
- Equipment costs are still significantly higher compared to 2021, but seem to have cooled off in the last few months.
- Earthwork Prices had steep increases in 2021 and 2022, making them significantly higher than pre-2019 levels. Under current and forecast economic conditions, weighted average prices are estimated to continue increasing, but correct for housing slowdowns by fiscal year 2024, then rising less rapidly, 2% to 3% annually between 2024 and 2027.

General Trends

Trucking and labor costs are the main factors in this sector. As mentioned throughout the report, the labor market for driver and equipment operators continues to be tight and is not expected to ease in the near term. While there are ongoing efforts by the federal government to expand the pool of drivers with the start of the Safe Driver Apprenticeship pilot program (which could go until 2025) and expedite the process of issuing CDLs, elevated competition for drivers will continue to put upward pressure on wages to attract labor. In 2022, CDLs in Florida have increased by 2% (**Figure 60**). Interestingly, while out of state licenses still represent a small share of the total, in 2022 they have increased by 234% to 7,859.

Figure 60. Florida CDL Counts



Source: FLHSMV

Fuel costs have increased significantly as a result of higher crude oil prices, but are beginning to ease. However, persistent increases in equipment costs and competition for truck drivers are continuing to contribute to elevated trucking costs. As mentioned throughout the report, the labor market for driver and equipment operators is still tight which has put upward pressure on wages to attract labor. Comparing Florida Metropolitan Areas with port cities and high trucking activity to similar locations in other states, the average hourly wage for heavy truck drivers in Florida is slightly behind. Metro areas

like Savannah and Gulfport are over $25 per hour and New Orleans and Baton Rouge not far behind with $24 per hour. On the other hand, the average across all Florida metro areas is $21 per hour, with only a few being above $22 per hour (**Figure 61**).

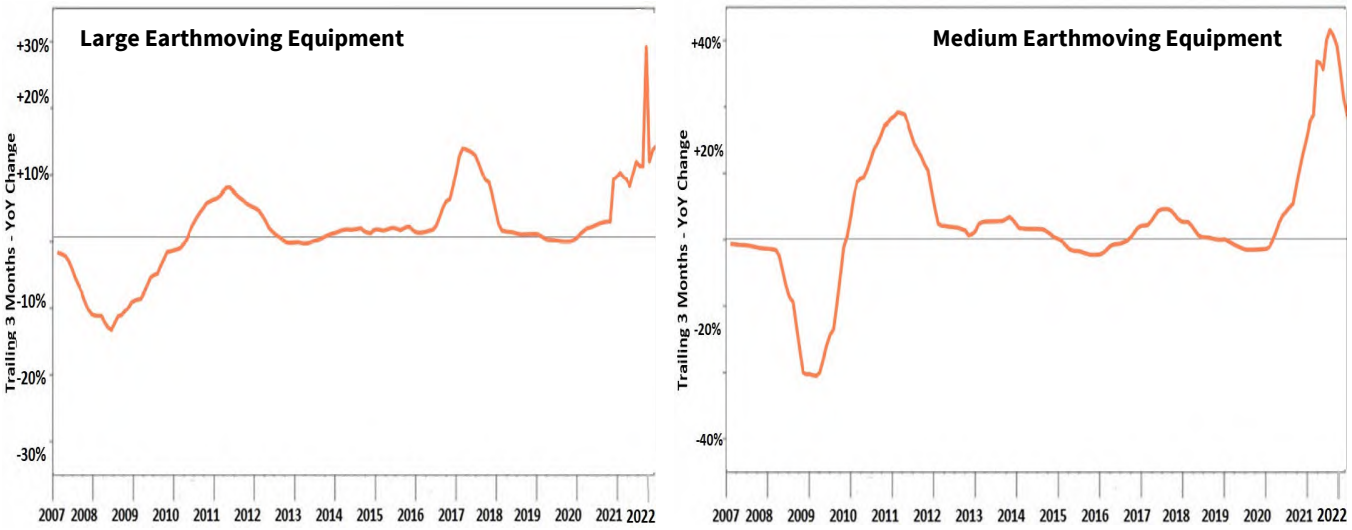
Figure 61. Hourly Average Wage for Heavy Truck Drivers by Metropolitan Area, 2021

Source: BLS Occupational Employment Statistics May 2021.

Equipment

Inflationary pressures that have been affecting other sectors are also present in the construction equipment industry. The June 2022 used equipment market trends report released by Ritchie Bros. Auctioneers shows a change in the upward trend seen in 2021 and early 2022. While price indices are still 20-30% higher year-over-year, the rate at which prices increase have declined compared to previous months (**Figure 62**).

Figure 62. Percent Change in Price Indexes for Large and Medium earthmoving equipment



Source: Ritchie & Bros. Used Equipment Market Report.

Truck tractors and vocational trucks costs show the same increase, but track tractor costs are still 46% higher year-over-year. High demand and delays in shipments have contributed to higher prices. Additionally, the Equipment Leasing & Finance Foundation reported that construction equipment investment rose by an annualized 27% in the first quarter of 2022, but the index is in a downward trend; meaning that growth could decelerate the next 6 months.

Current Pricing

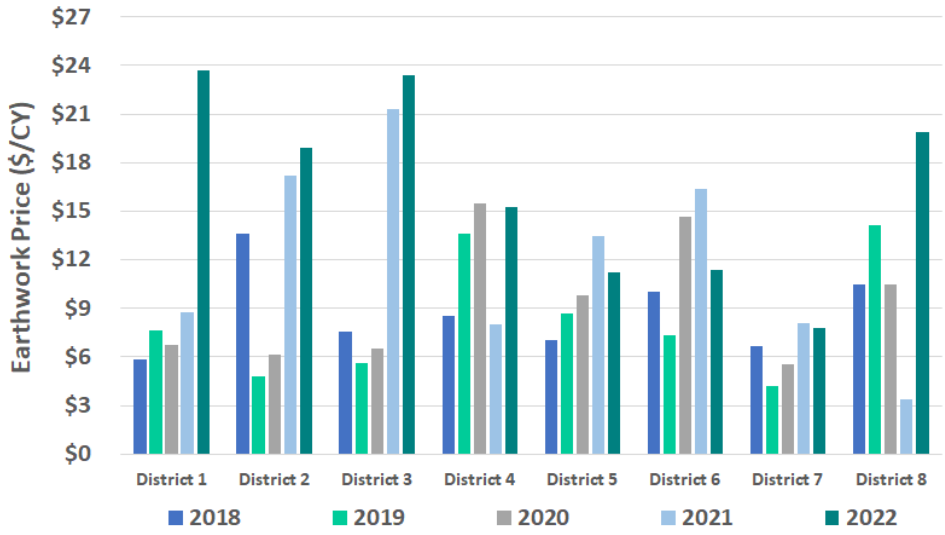
Following a significant increase in 2021, earthwork prices are up 17% year to date in fiscal year 2022 after removing outliers for very small quantity jobs (**Table 37**). The shortage in labor availability continues to be an issue, along with increases in fuel prices, equipment costs and parts availability. Based on district-level data, earthwork prices are ranging higher in districts with increased transportation costs and construction demand (**Figure 63**).

Table 37. Earthwork Price, 2018 – 2022

Year	2018	2019	2020	2021	2022
Price Earthwork, $/Ton	$7.66	$5.90	$8.39	$12.46	$14.74
Percent Change, %	10.2%	-22.9%	42.2%	48.5%	18.3%

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

Figure 63. Earthwork Price by District, 2018 – 2022



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

Forecast

Regression modeling was performed to estimate Earthwork costs using pay item data, supply chain variables and other macroeconomic indicators. **Table 38** provides the forecast average price for earthwork. **Figure 64** shows the output of potential price models and the scenario identified as best estimate for earthwork.

Previous forecasts anticipated an increase of about $1.00 per cubic yard in fiscal year 2023 followed by flattening prices for through the end of the work program. With updated bid data and dramatic increases in labor, parts and energy costs, along with availability issues, the updated forecast estimates prices may rise an additional $1.00 for the current fiscal year, topping $15 per cubic yard in 2023. In the Best Estimates scenario, costs are expected to correct in fiscal year 2024 – with supply chain issues beginning to resolve – then resuming cost increases of about 2% to 3% annually for the rest of the work program. The trajectory follows similar patterns to the prior forecast, driven by decreasing competition from housing, lower construction employment, and some moderation in fuel costs.

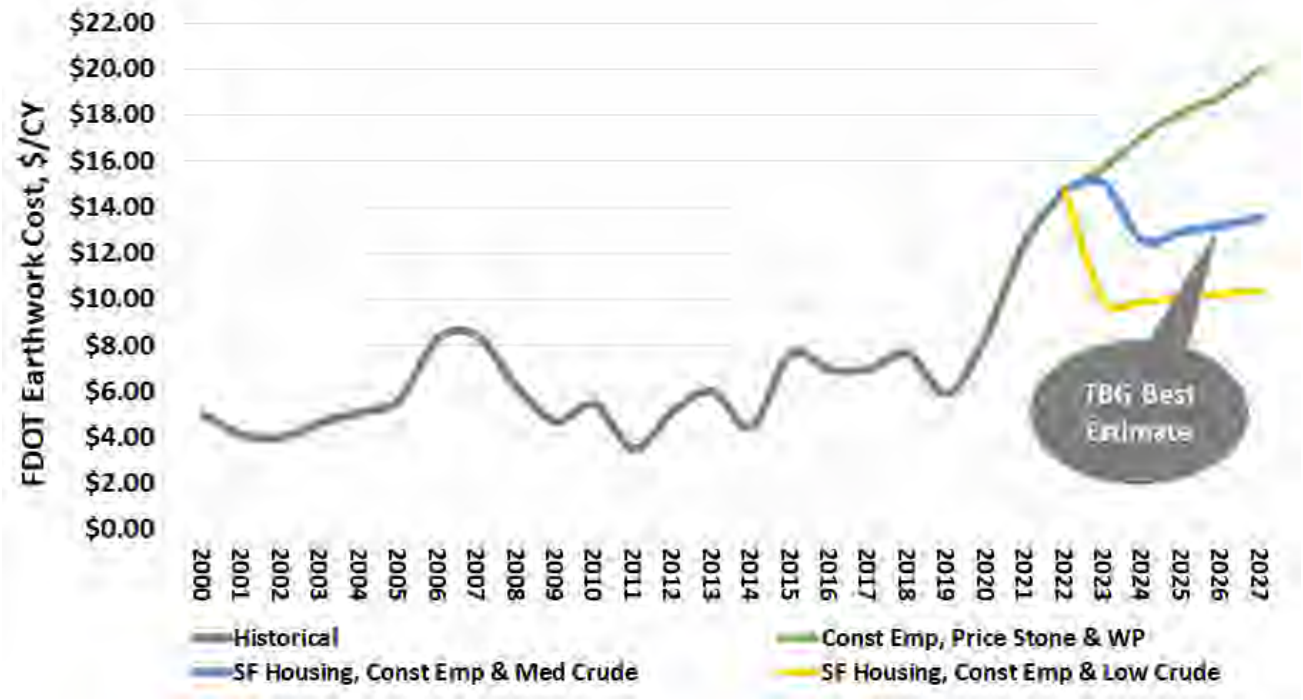
Continued infrastructure funding will constrain bid prices from falling to pre-COVID levels, barring recessionary levels of employment. In the lower bound, reduced housing, crude forecasts, and construction employment drive costs down, while the upper bound is driven by work program and crushed stone/adjacent industry demand.

Table 38. Earthwork Price Forecast Results

Year	2022	2023	2024	2025	2026	2027
Price Earthwork, $/CY	$14.74	$15.07	$12.53	$12.93	$13.19	$13.52
Percent Change, %	18.3%	2.2%	-16.9%	3.2%	2.0%	2.5%

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

Figure 64. Earthwork Price Estimates, 2022 Forecast



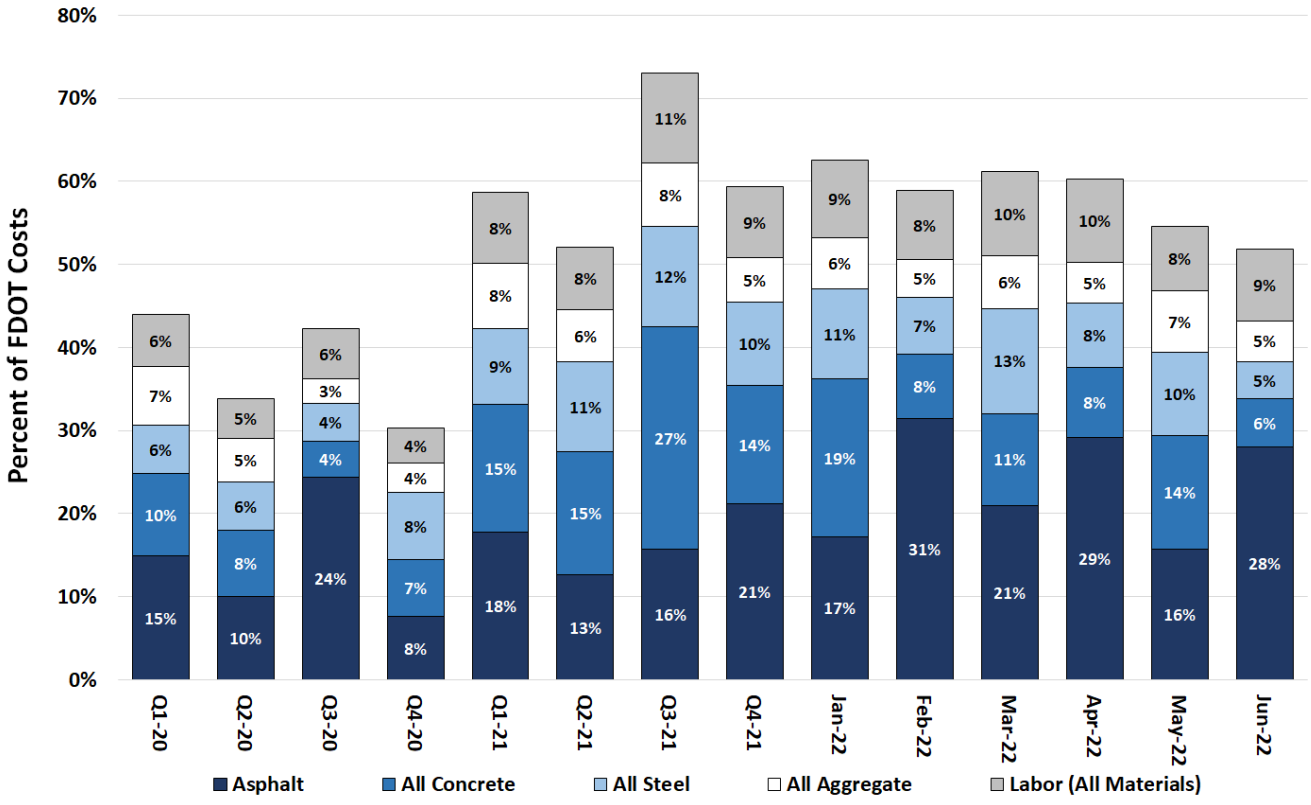
Source: TBG calculated from data provided by FDOT Estimates Office, various industry sources.
(Variable descriptions available in the Appendix.)

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 March 2021 according to preliminary data. However, steel costs are expected to remain elevated throughout 2022, which may also affect concrete products with steel components. Asphalt costs are the largest share of total FDOT costs in the most recent month of data. Labor costs remained consistent as statewide construction labor is back to pre-pandemic levels.

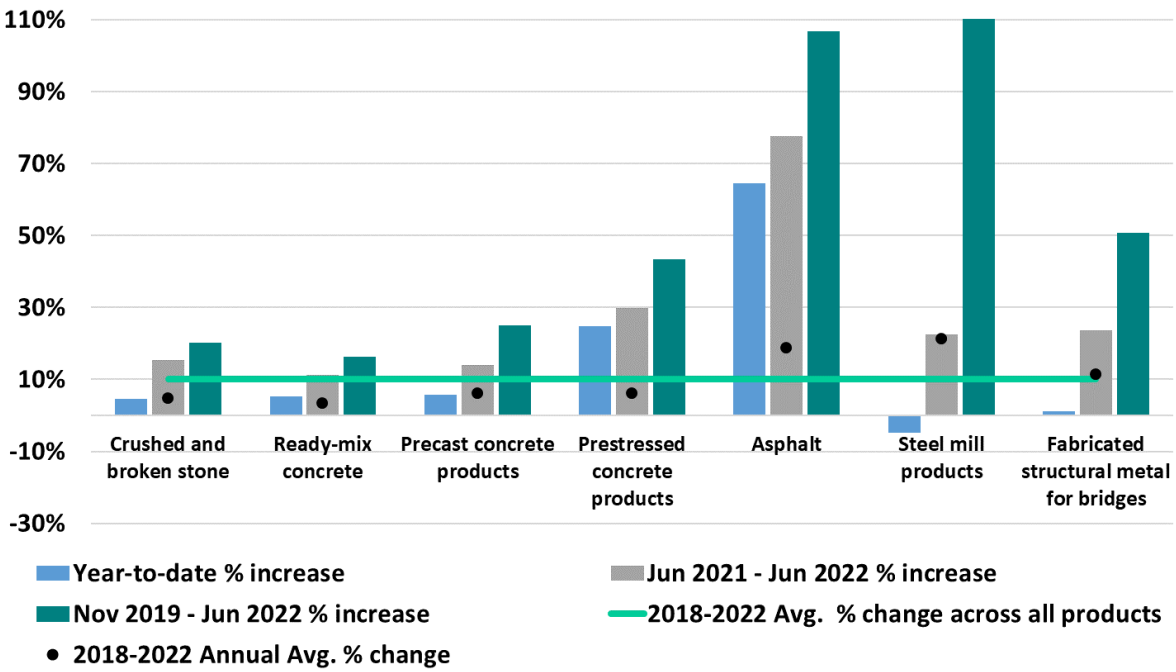
Figure A- 1. Monthly Cost Composition



US Inflation

Another measure of inflation for the construction industry is the BLS PPI by commodity type. Nationally, asphalt has increased the most with increases around 70% compared to a year ago. For steel products, while they have had significant year-over-year increases, they have been flat in 2022. Aggregate and concrete have had the lowest price increases, with a 5% increase in 2022 and 10-15% year-over-year. **Figure A-2** illustrates select PPI in the U.S. for relevant commodity types.

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

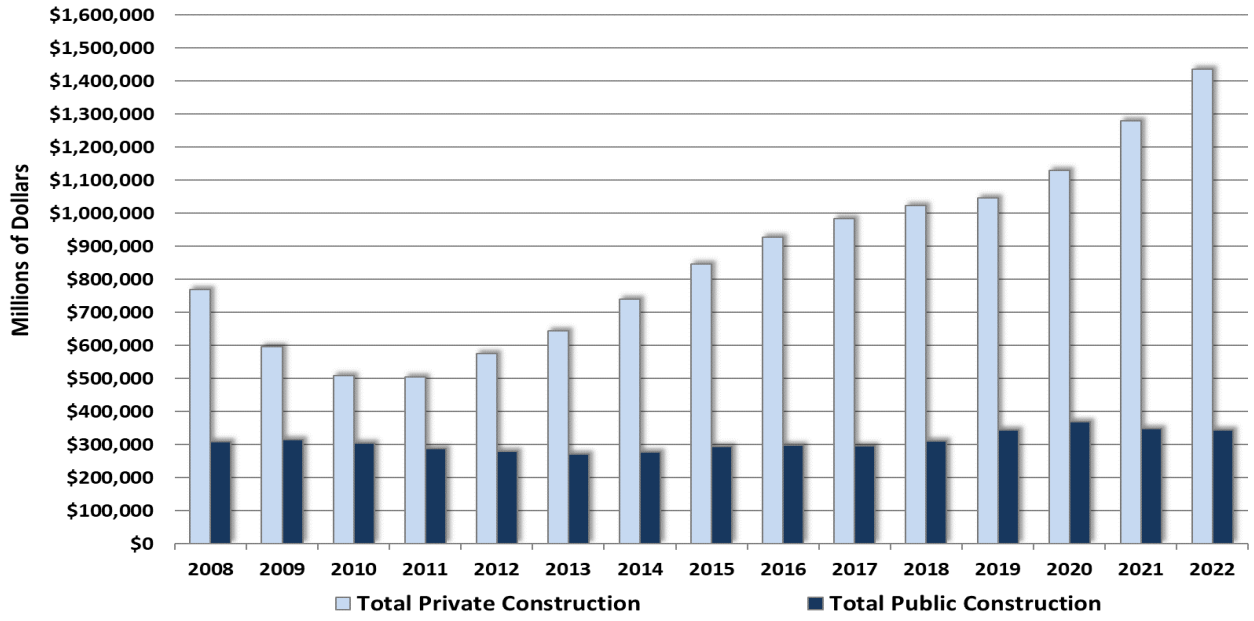


Source: BLS (Producer Price Index, not seasonally adjusted); TBG Work Product

US Construction Market

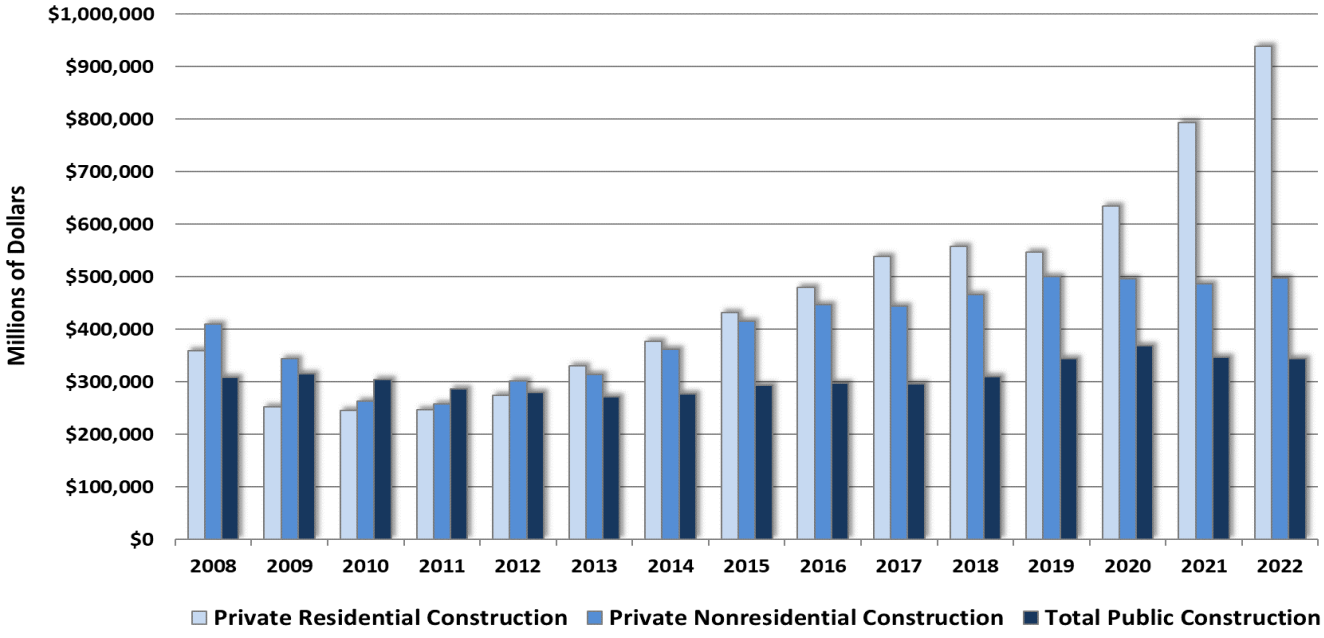
Nationally, private construction expenditures increased 8% in 2021, followed by an additional 9% in 2022. Public construction fell in 2021, but has remained stable in 2022 (**Figure A-3**). Residential construction had the largest increase in 2021 (25%) and in 2022 (18%), while non-residential construction fell 2% in 2021, but is recovering with a 2% increase for 2022 (**Figure A-4**).

Figure A- 3. U.S. Construction Put in Place, 2008 – 2022



Source: U.S. Census Bureau

Figure A- 4. Residential Construction Put in Place, 2008 – 2022

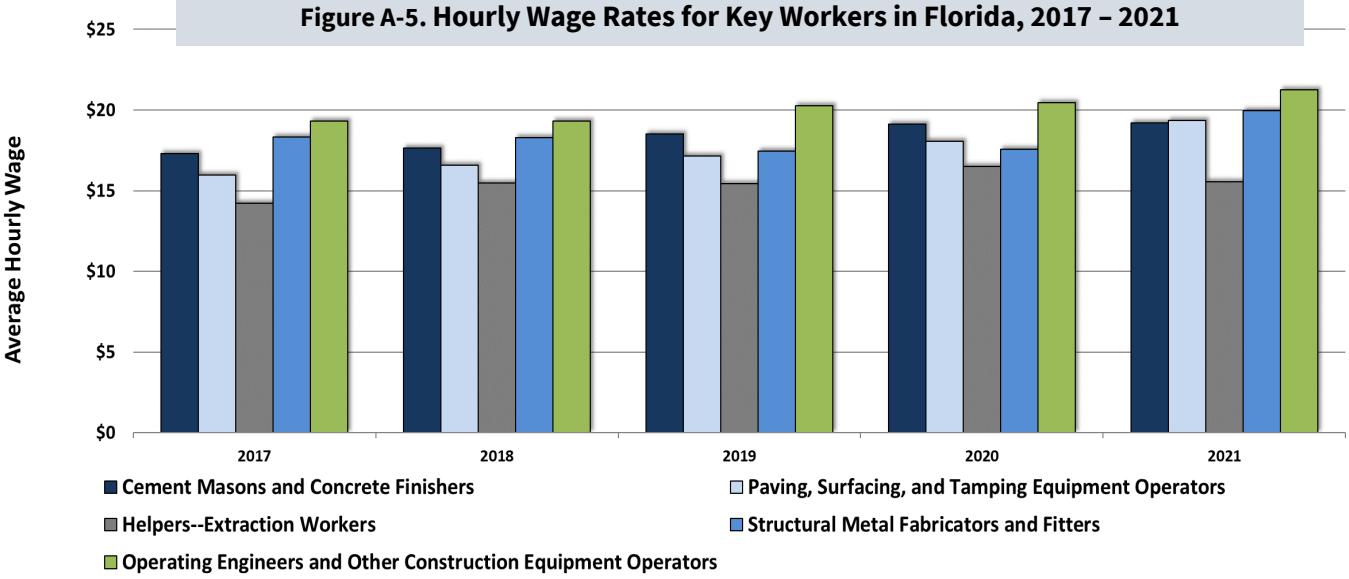


Source: U.S. Census Bureau

Relative Wages by Sector

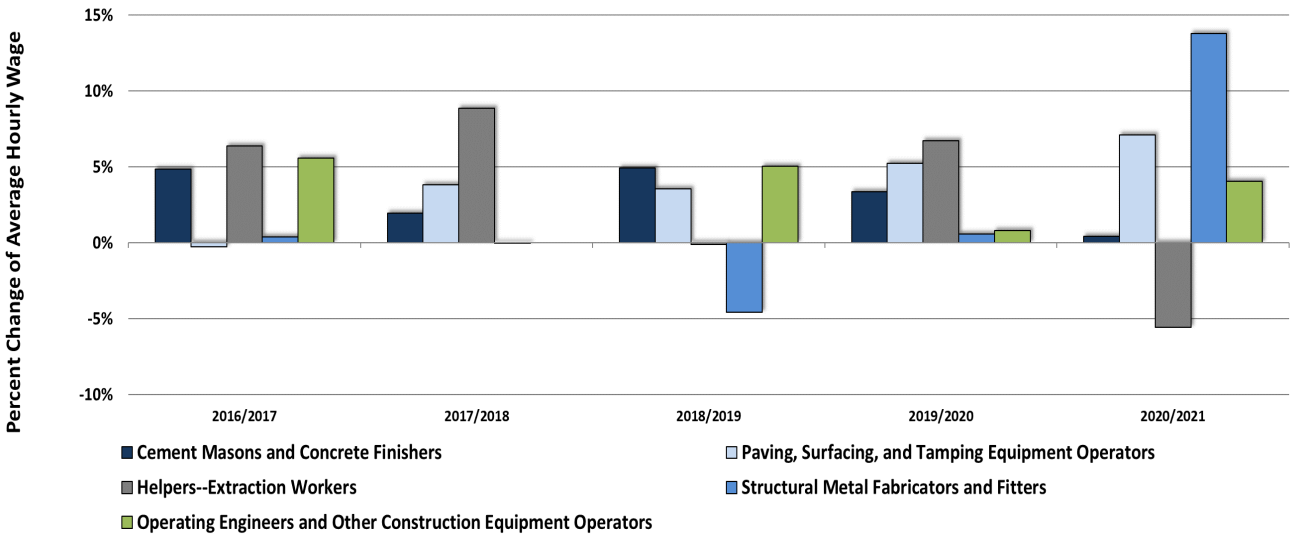
Florida average hourly wages are shown by material sector for primary labor types in **Figure A-5**, along with the annual change in wages in **Figure A-6**. In 2021, extraction workers were the only industry with a decline in wages (-5%), while structural metal fabricators grew the most (13%). Workers in the asphalt industry saw wage increases of 7%. Note, this data was just released for May 2021, which is the most recent available at this level of detail.

Figure A-5. Hourly Wage Rates for Key Workers in Florida, 2017 – 2021



Source: U.S. Bureau of Labor Statistics

Figure A-6. Change in Hourly Wage Rates for Key Workers in Florida, 2017 – 2021

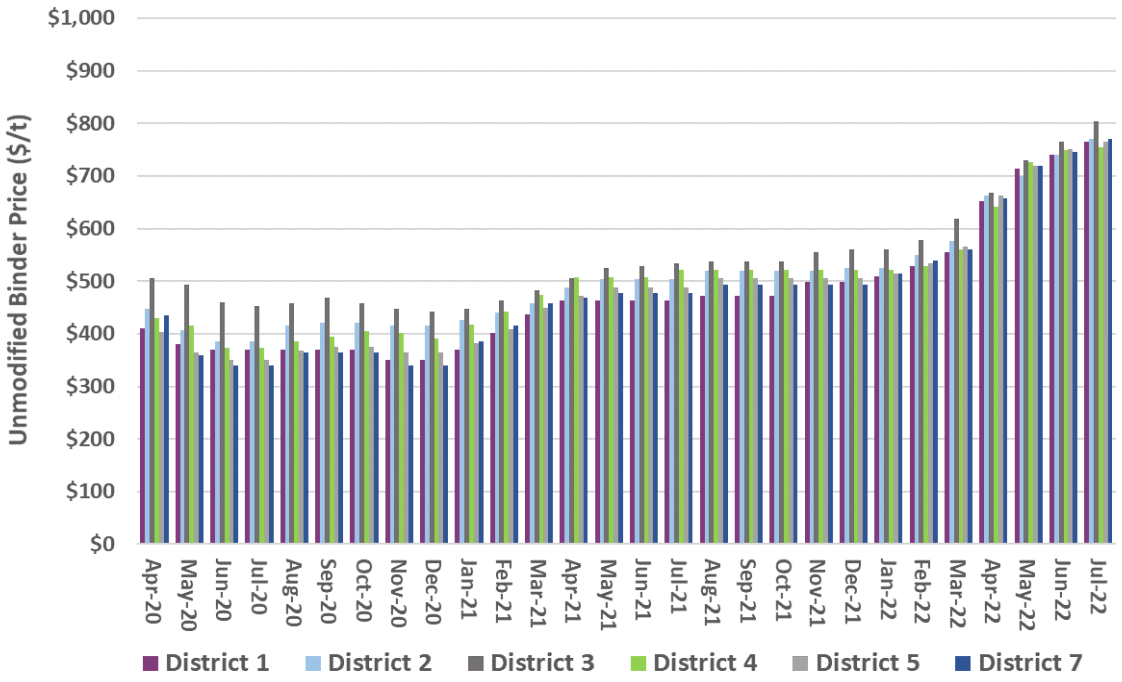


Source: U.S. Bureau of Labor Statistics

Binder Prices by District

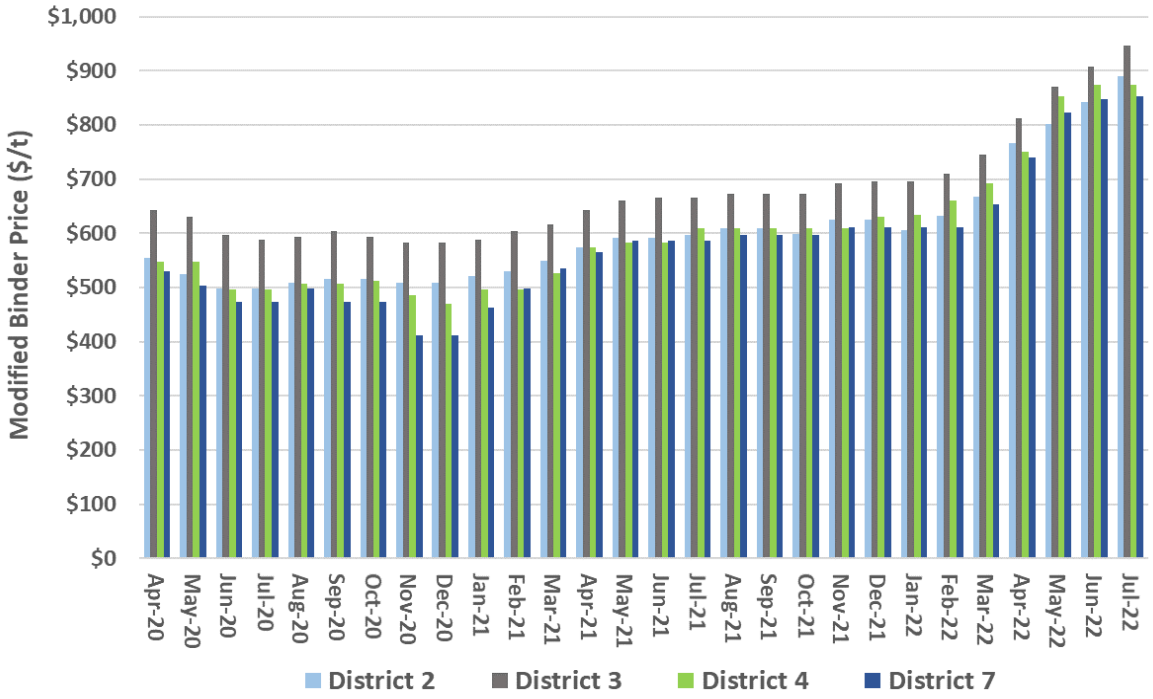
Where available, the average prices for unmodified (**Figure A-7**) and modified (**Figure A-8**) binder were calculated from monthly terminal price quotes at the district level. Unmodified binder is the average of PG 52-28 and PG 58-22 prices, while modified binder is a quote for the price of PG 76-22 (PMA) in the dataset. While unmodified binder prices were fairly stable in 2021, they have increased rapidly in 2022. In January 2022 all districts were around $500 per ton but now they are closer to $800 per ton. Prices in district 3 exceeded $800 per ton in July 2022. Modified binder prices have showed a similar trend in 2022, with prices in District 3 continuing to be markedly higher than in other areas of the State.

Figure A-7. Unmodified Binder Price by District



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

Figure A-8. 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	FL construction employment.
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.
C-19	Refers to COVID-19; some variables adjusted for pandemic impacts.

Pay items that are partially or wholly used in the analysis are listed in the next five tables by material type. 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.

Table B- 2. Asphalt Pay Items

Asphalt Pay Item Number				
0102 2200	0334 1 52	0337 7 22	0337 7 48	0337 7 93
0286 2	0334 1 53	0337 7 23	0337 7 54	0337 7 94
0287 1	0334 1 54	0337 7 24	0337 7 55	0339 1
0305 1	0334 1 55	0337 7 25	0337 7 58	0341 70
0315 1	0334 1 56	0337 7 26	0337 7 71	0525 1
0334 1 11	0334 1 57	0337 7 29	0337 7 72	0908333 1
0334 1 12	0334 1 58	0337 7 30	0337 7 73	0909335 1
0334 1 13	0334 1100	0337 7 31	0337 7 74	0909335 2
0334 1 14	0334 1101	0337 7 32	0337 7 80	0911325 1
0334 1 15	0334 1102	0337 7 33	0337 7 81	0914337 2
0334 1 22	0334 1103	0337 7 35	0337 7 82	0914337 4
0334 1 23	0334 1104	0337 7 40	0337 7 83	0914337 5
0334 1 24	0334 1105	0337 7 41	0337 7 85	
0334 1 25	0334 1106	0337 7 42	0337 7 88	
0334 1 33	0334 1107	0337 7 43	0337 7 90	
0334 1 34	0337 7 5	0337 7 45	0337 7 91	

Table B- 3. Concrete Pay Items				
Concrete Pay Item Number				
0173 79 1	0425 1584	0430721504	0521 8 1	0700 10122
0350 1 1	0425 1585	0430830	0521 8 2	0700 10123
0350 1 3	0425 1587	0430982120	0521 8 3	0700 10124
0350 1 4	0425 1589	0430982121	0521 8 4	0700 21 11
0350 1 5	0425 1601	0430982123	0521 8 5	0700 21 12
0350 1 8	0425 1602	0430982125	0521 8 6	0700 21 13
0350 1 10	0425 1603	0430982129	0521 8 20	0700 21 14
0350 1 11	0425 1604	0430982133	0521 72 2	0700 21 15
0350 1 12	0425 1605	0430982138	0521 72 3	0700 21 16
0350 1 13	0425 1609	0430982140	0521 72 4	0700 21 17
0350 1 14	0425 1611	0430982141	0521 72 5	0700 21 31
0350 1 20	0425 1619	0430982142	0521 72 6	0700 21 32
0350 2 3	0425 1701	0430982143	0521 72 7	0700 21 33
0350 2 10	0425 1702	0430982144	0521 72 10	0700 21 34
0350 3 1	0425 1703	0430982145	0521 72 11	0700 21 35
0350 3 2	0425 1704	0430982501	0521 72 20	0700 21 36
0350 3 3	0425 1705	0430982502	0521 72 21	0700 22121
0350 3 5	0425 1711	0430982505	0521 72 22	0700 22122
0350 3 7	0425 1712	0430982506	0521 72 23	0700 22123
0350 3 8	0425 1713	0430982510	0522 1	0700 22124
0350 3 9	0425 1714	0430982519	0522 2	0700 22131
0350 3 10	0425 1715	0430982623	0522 3	0700 22132
0350 3 11	0425 1719	0430982625	0522 4	0700 22133
0350 3 12	0425 1725	0430982629	0524 1 1	0700 22134
0350 3 13	0425 1801	0430982633	0524 1 2	0700 22141
0350 3 14	0425 1802	0430982638	0524 1 3	0700 22142
0350 3 17	0425 1803	0430982640	0524 1 4	0700 22143
0350 4 1	0425 1804	0430982641	0524 1 19	0700 22144
0350 4 5	0425 1805	0430982642	0524 1 29	0700 22154
0350 4 11	0425 1811	0430982643	0524 1 49	0700 22220
0350 4 13	0425 1812	0430982645	0524 2 1	0700 22250
0350 30 5	0425 1813	0430984120	0524 2 2	0700 23111
0350 30 13	0425 1814	0430984121	0524 2 4	0700 23112
0353 70	0425 1815	0430984123	0524 2 29	0700 23113
0400 0 11	0425 1841	0430984125	0524 2 49	0700 23114
0400 0 13	0425 1842	0430984129	0524 3	0700 23121
0400 1 1	0425 1843	0430984133	0526 1 1	0700 23122
0400 1 2	0425 1844	0430984138	0526 1 2	0700 23123
0400 1 11	0425 1845	0430984140	0530 4 4	0700 23131
0400 1 15	0425 1851	0430984141	0530 4 9	0700 23132
0400 1 25	0425 1852	0430984142	0530 78	0700 23133
0400 2 1	0425 1853	0430984143	0534 72101	0700 23142
0400 2 2	0425 1855	0430984144	0534 73	0700 23143
0400 2 4	0425 1861	0430984147	0536 7 3	0700 23144
0400 2 5	0425 1863	0430984504	0542 70	0700 23210
0400 2 8	0425 1865	0430984623	0547 70 1	0700 23220
0400 2 10	0425 1881	0430984625	0547 70 2	0700 38045
0400 2 11	0425 1882	0430984629	0548 12	0700 38056

Concrete Pay Item Number				
0400 2 12	0425 1883	0430984633	0548 14	0700 38057
0400 2 24	0425 1884	0430984638	0548 20	0700 38063
0400 2 25	0425 1885	0430984640	0641 1	0700 38064
0400 2 41	0425 1887	0430984641	0641 2 11	0700 38065
0400 2 46	0425 1891	0430984642	0641 2 12	0700 38066
0400 2 47	0425 1892	0430984645	0641 2 13	0700 38068
0400 3 1	0425 1893	0430990	0641 2 14	0700 38086
0400 3 8	0425 1894	0430991	0641 2 15	0700 38097
0400 3 20	0425 1895	0450 1 1	0641 2 16	0700 39 23
0400 4 1	0425 1899	0450 1 2	0641 2 17	0700 39 26
0400 4 2	0425 1901	0450 1 3	0641 2 18	0700 39 27
0400 4 4	0425 1902	0450 1 5	0641 2 19	0700 39 36
0400 4 5	0425 1903	0450 1 7	0641 3163	0700 39 37
0400 4 6	0425 1904	0450 1 78	0641 3169	0700 39 43
0400 4 8	0425 1905	0450 1124	0641 3175	0700 39 46
0400 4 11	0425 1909	0450 1130	0641 3180	0700 41 10
0400 4 22	0425 1910	0450 1201	0641 3186	0700 41 11
0400 4 24	0425 2 41	0450 1202	0641 3263	0700 43055
0400 4 25	0425 2 42	0450 1203	0641 3269	0700 44066
0400 4 40	0425 2 43	0450 1250	0641 3275	0700 45 32
0400 4 41	0425 2 61	0450 1251	0641 3286	0714 1123
0400 4 47	0425 2 62	0450 2 36	0641 14150	0715 4 11
0400 6	0425 2 63	0450 2 45	0641 14152	0715 4 12
0400 8 5	0425 2 71	0450 2 54	0641 14154	0715 4 13
0400 8 25	0425 2 72	0450 2 63	0641 14156	0715 4 14
0400 8 39	0425 2 73	0450 2 72	0641 14158	0715 4 15
0400 8106	0425 2 91	0450 2 78	0641 15150	0715 4 21
0400 8107	0425 2 92	0450 2 84	0641 15152	0715 4 23
0400 10	0425 2 93	0450 2 96	0641 15154	0715 4 24
0400 32	0425 2101	0450 3 11	0641 15156	0715 4 25
0400 72	0425 2102	0450 3 15	0641 15158	0715 4 31
0400153	0425 2103	0450 3 21	0641 17150	0715 4 32
0404 1	0425 2110	0450 3 25	0641 17152	0715 4 33
0404 5 11	0425 3 41	0450 3 26	0641 17154	0715 4 42
0404 5 12	0425 3 42	0450 3 66	0641 17156	0715 4 50
0404 5 22	0425 3 43	0450 3 76	0641 17158	0715 4011
0404 5 25	0425 3 61	0450 3 91	0641 45150	0715 4012
0405 70 1	0425 3 62	0450 3 95	0641 45152	0715 4013
0405 70 2	0425 3 63	0450 4 4	0646 1 11	0715 4019
0405 71	0425 3 81	0450 5	0646 2115	0715 4021
0407 1 11	0425 3 82	0450 6	0649 1 10	0715 4022
0407 1 21	0425 3 83	0450 6 25	0649 1 11	0715 4023
0407 1 52	0425 3 91	0450 8 12	0649 1 12	0715 4029
0425 1201	0425 3 92	0450 8 13	0649 1 13	0715 4031
0425 1202	0425 11	0450 8 21	0649 1 14	0715 4032
0425 1203	0425 78	0450 8 22	0649 1 15	0715 4033
0425 1204	0430141504	0450 8 23	0649 1 16	0715 4111
0425 1205	0430171103	0450 8 24	0649 1 17	0715 4112
0425 1209	0430171104	0450 8 33	0649 2150	0715 4113

Concrete Pay Item Number				
0425 1211	0430171125	0450 82	0649 2170	0715 4119
0425 1212	0430171140	0450 83 1	0649 2250	0715 4121
0425 1213	0430171141	0450 88 15	0649 2255	0715 4122
0425 1214	0430171142	0450 88 18	0649 21 1	0715 4123
0425 1215	0430172102	0450 88 20	0649 21 3	0715 4129
0425 1311	0430172125	0455 3 1	0649 21 4	0715 4131
0425 1312	0430172138	0455 3 2	0649 21 6	0715 4132
0425 1315	0430173112	0455 3 3	0649 21 7	0715 4133
0425 1319	0430173115	0455 3 4	0649 21 8	0715 4139
0425 1321	0430173118	0455 3 5	0649 21 9	0715 4300
0425 1322	0430173124	0455 3 6	0649 21 10	0715 10 2
0425 1325	0430173130	0455 3 8	0649 21 12	0715 19 13
0425 1329	0430173136	0455 4 1	0649 21 13	0715 19111
0425 1331	0430173218	0455 4 2	0649 21 14	0715 19112
0425 1332	0430174112	0455 4 3	0649 21 15	0715 19113
0425 1335	0430174115	0455 4 4	0649 21 17	0715 19119
0425 1341	0430174118	0455 4 5	0649 21 18	0715 19121
0425 1342	0430174124	0455 4 6	0649 21 19	0715 19122
0425 1345	0430174129	0455 14 2	0649 21 20	0715 19123
0425 1349	0430174130	0455 14 3	0649 21 21	0715 19131
0425 1351	0430174136	0455 14 4	0649 21 24	0715 19132
0425 1352	0430174142	0455 14 5	0649 21 26	0715 19133
0425 1355	0430174148	0455 14 23	0649 21 27	0715 19300
0425 1359	0430174154	0455 14 24	0649 31101	0715511315
0425 1361	0430174160	0455 34 2	0649 31102	0715511320
0425 1362	0430174172	0455 34 3	0649 31103	0715511325
0425 1365	0430174215	0455 34 4	0649 31104	0715511330
0425 1369	0430174218	0455 34 5	0649 31105	0715511335
0425 1411	0430174224	0455 34 6	0649 31106	0715511340
0425 1412	0430174230	0455 34 8	0649 31107	0715511345
0425 1415	0430174236	0455 34 23	0649 31108	0715511350
0425 1419	0430174242	0455 34 25	0649 31109	0715512315
0425 1421	0430174248	0455 34203	0649 31110	0715512325
0425 1422	0430175101	0455 34205	0649 31111	0715512330
0425 1425	0430175102	0455 34301	0649 31112	0715512340
0425 1431	0430175103	0455 88 1	0649 31113	0715512350
0425 1432	0430175104	0455 88 2	0649 31114	0715516315
0425 1435	0430175105	0455 88 3	0649 31115	0715516320
0425 1441	0430175112	0455 88 4	0649 31116	0715516325
0425 1442	0430175115	0455 88 5	0649 31117	0715516330
0425 1445	0430175118	0455 88 6	0649 31118	0715516345
0425 1451	0430175124	0455 88 7	0649 31119	0715517325
0425 1452	0430175130	0455 88 8	0649 31201	0715518315
0425 1455	0430175136	0455 88 12	0649 31202	0715518330
0425 1459	0430175142	0455 88 15	0649 31203	0751 32 11
0425 1461	0430175148	0455 88 19	0649 31204	0751 32 12
0425 1462	0430175154	0455 88 20	0649 31205	0751 32 13
0425 1465	0430175160	0455 88 21	0649 31206	0751 32 14
0425 1469	0430175166	0455112 1	0649 31207	0751 32 15

Concrete Pay Item Number				
0425 1471	0430175172	0455112 3	0649 31208	0785 1 11
0425 1472	0430175184	0455112 4	0649 31209	0785 1 13
0425 1473	0430175201	0455112 5	0649 31210	0905455343
0425 1474	0430175202	0455112 6	0649 31211	0905455345
0425 1475	0430175203	0455143 3	0649 31212	0908350 1
0425 1479	0430175215	0455143 4	0649 31213	0908350 2
0425 1481	0430175218	0455143 5	0649 31214	0908350 3
0425 1483	0430175224	0455143 6	0649 31215	0913548 1
0425 1484	0430175230	0455143 23	0649 31216	2425 1415
0425 1485	0430175236	0455143 25	0649 31217	2425 1435
0425 1489	0430175242	0455143203	0649 31218	2425 1455
0425 1501	0430175248	0455143205	0649 31219	2425 1465
0425 1502	0430175254	0455143301	0649 31299	2425 1515
0425 1503	0430175260	0519 78	0649 31301	2425 1715
0425 1504	0430175266	0520 1 7	0649 31302	2430984504
0425 1505	0430175272	0520 1 8	0649 31303	2455 3 1
0425 1511	0430200 23	0520 1 10	0649 31304	2455 3 2
0425 1512	0430200 25	0520 1 11	0649 31305	2455 3 3
0425 1513	0430200 29	0520 1 12	0649 31306	2455 3 4
0425 1514	0430200 33	0520 2 1	0649 31307	2455 3 5
0425 1515	0430200 38	0520 2 2	0649 31308	2455 3 8
0425 1519	0430200 40	0520 2 4	0649 31309	2455 4 6
0425 1521	0430200 41	0520 2 5	0649 31310	2455 4 8
0425 1522	0430200 42	0520 2 8	0649 31311	2455 14 3
0425 1523	0430200 43	0520 2 9	0649 31312	2455 14 5
0425 1524	0430600125	0520 3	0649 31313	2455 14 11
0425 1525	0430602123	0520 5 11	0649 31314	2455 14 12
0425 1529	0430602125	0520 5 12	0649 31315	2455 34 2
0425 1531	0430602129	0520 5 16	0649 31316	2455 34 3
0425 1532	0430610123	0520 5 21	0649 31317	2455 34 4
0425 1533	0430610125	0520 5 22	0649 31318	2455 34 5
0425 1534	0430610129	0520 5 26	0649 31319	2455 34 6
0425 1535	0430610133	0520 5 41	0649 31999	2455 36 1
0425 1541	0430610225	0520 5 42	0649 33000	2455 88 2
0425 1542	0430610325	0520 5 46	0649415003	2455 88 3
0425 1543	0430610329	0520 5 51	0649417006	2455 88 4
0425 1544	0430611023	0520 6	0659109	2455 88 5
0425 1545	0430611025	0520 70	0659309	2455 88 6
0425 1547	0430611029	0521 1	0700 2 11	2455 88 7
0425 1549	0430611123	0521 1 1	0700 2 12	2455 88 8
0425 1551	0430611125	0521 5 1	0700 2 13	2455 88 9
0425 1552	0430611129	0521 5 2	0700 2 14	2455 88 20
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0425 1555	0430611225	0521 5 5	0700 2 17	2455140 13
0425 1557	0430611229	0521 5 6	0700 2 18	2455140 14
0425 1559	0430611233	0521 5 7	0700 2 50	2455140 15
0425 1561	0430611323	0521 5 8	0700 4111	2455140 43
0425 1562	0430611325	0521 5 9	0700 4112	2455140 44

Concrete Pay Item Number				
0425 1563	0430611329	0521 5 10	0700 4113	2455140 56
0425 1564	0430611333	0521 5 11	0700 4114	2455143 2
0425 1565	0430612025	0521 5 13	0700 4122	2455143 3
0425 1569	0430612029	0521 5 20	0700 4123	2455143 4
0425 1571	0430612033	0521 6 1	0700 4124	2455143 5
0425 1572	0430613025	0521 6 2	0700 4125	2455143 6
0425 1573	0430613029	0521 6 3	0700 4126	2455145 1
0425 1574	0430613033	0521 6 11	0700 4127	2659109
0425 1575	0430613125	0521 6 12	0700 4128	2659309
0425 1579	0430613129	0521 6 31	0700 4132	
0425 1581	0430613225	0521 6 32	0700 10115	
0425 1582	0430613229	0521 6 34	0700 10116	
0425 1583	0430613325	0521 7 1	0700 10121	

Table B- 4. Steel Pay Items

Steel Pay Item Number				
0415 1 1	0649 31108	0700 38056	0715516240	2649121202
0415 1 10	0649 31109	0700 38057	0715516315	2649122102
0415 1 11	0649 31110	0700 38058	0715516320	2649122203
0415 1 12	0649 31111	0700 38063	0715516330	2649122212
0415 1 13	0649 31112	0700 38064	0715516340	2649122304
0415 1 2	0649 31113	0700 38065	0715516435	2649122512
0415 1 3	0649 31114	0700 38066	0715516615	2649123103
0415 1 4	0649 31115	0700 38068	0715517125	2649123105
0415 1 5	0649 31116	0700 38075	0715517135	2649123204
0415 1 6	0649 31117	0700 38086	0715517150	2649123205
0415 1 7	0649 31118	0700 38097	0715517325	2649123305
0415 1 8	0649 31119	0700 39 23	0715518120	2649124105
0415 1 9	0649 31199	0700 39 24	0715518130	2649124205
0415 2 4	0649 31201	0700 39 25	0715518140	2649124306
0415 2 5	0649 31202	0700 39 26	0715518145	2649124312
0415 2 6	0649 31203	0700 39 27	0715518150	2649124407
0415 2 9	0649 31204	0700 39 36	0715518315	2649125512
0435 22250	0649 31205	0700 39 37	0715521135	2649131008
0435 22359	0649 31206	0700 39 43	0715521140	2649132009
0435 22369	0649 31207	0700 39 44	0715521145	2649133010
0435 22445	0649 31208	0700 39 46	0715521150	2649134011
0435 22484	0649 31209	0700 39 47	0715521340	2649135012
0435 32856	0649 31210	0700 39 57	0715522140	2649135512
0435 52 1	0649 31211	0700 39 74	0715526120	2649141101
0435 52 2	0649 31212	0700 41 10	0715530100	2649143102
0435413537	0649 31213	0700 41 11	0715530101	2649145012
0435422439	0649 31214	0700 43055	0715530102	2649145512
0435522224	0649 31215	0700 44066	0715530103	2649311001
0435725675	0649 31216	0700 45 32	0715530104	2649313003
0451 70	0649 31217	0700 48 12	0715536115	2649314004
0455 3 1	0649 31218	0700 48 13	0715536340	2649345012
0455 3 2	0649 31219	0700 48 14	0715540000	2649345512
0455 3 3	0649 31299	0700 48 15	0715550000	2649411001

Steel Pay Item Number				
0455 3 4	0649 31301	0700 48 17	0715560000	2649412002
0455 3 5	0649 31302	0700 48 18	0715561140	2649413002
0455 3 6	0649 31303	0700 48 19	0715571145	2649415003
0455 3 8	0649 31304	0700 48 22	0715571150	2649416004
0455 4 1	0649 31305	0700 48 28	0715572145	2649417006
0455 4 2	0649 31306	0700 48 32	0715572150	2649422203
0455 4 3	0649 31307	0700 48 33	0715573135	2649425203
0455 4 4	0649 31308	0700 48 34	0715573140	2649425504
0455 4 5	0649 31309	0700 48 35	0715573145	2649426504
0455 4 6	0649 31310	0700 48 38	0715573150	2649440
0455 7 2	0649 31311	0700 48 39	0715574140	2649515003
0455 7 4	0649 31312	0700 48 52	0715574145	2649516004
0455 7 5	0649 31313	0700 48 53	0715574150	2649517006
0455 7 6	0649 31314	0700 48 54	0715575115	2649540
0455 7 9	0649 31315	0700 48 55	0715575125	2649711001
0455 7 34	0649 31316	0700 48 56	0715575130	2649713002
0455 8 2	0649 31317	0700 48 57	0715575135	2649715003
0455 8 4	0649 31318	0700 48 58	0715575140	2649716004
0455 8 5	0649 31319	0700 48 59	0715575145	2649717006
0455 8 6	0649 31399	0700 70	0715575150	2649721101
0455 8 9	0649 31999	0700 82	0715575210	2649723102
0455 8 34	0649 32000	0700 83	0715576135	2649724403
0455 14 2	0649 33000	0700 89 2	0715576140	2649725504
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0455 14 4	0649 36100	0700 89113	0715576150	2649731007
0455 14 5	0649 36300	0700 89121	0715577115	2649733008
0455 14 24	0649 36500	0700 89123	0715577130	2649735009
0455 17 1	0649 36700	0700 89131	0715577145	2649736010
0455 17 2	0649 38 3	0700 89141	0715577150	2649737006
0455 17 3	0649 38000	0700 89143	0715578150	2649740
0455 17 4	0649 40101	0700 90 11	0715611201	2650 51511
0455 17 5	0649111001	0700 90 12	0715611401	2650 51512
0455 17 13	0649111008	0700 90 13	0715612102	2650 51513
0455 17 14	0649112002	0700 90 14	0715612202	2650 51521
0455 17 16	0649112009	0714 1123	0715612302	2659101
0455 17 34	0649112012	0715 1 11	0715612402	2659103
0455 17 40	0649113003	0715 1 12	0715614404	2659106
0455 34 2	0649113010	0715 1 13	0715615402	2659107
0455 34 3	0649114004	0715 1 14	0715616306	2659108
0455 34 4	0649114011	0715 1 15	0715616406	2659109
0455 34 5	0649114012	0715 1 16	0715619309	2659110
0455 34 6	0649115012	0715 1 19	0715619409	2659112
0455 34 8	0649121202	0715 1 40	0715621403	2659118
0455 34 23	0649121212	0715 1 50	0715622104	2659119
0455 34 25	0649121303	0715 1 60	0715622204	2659120
0455 34203	0649121412	0715 1 70	0715622304	2659307
0455 34205	0649122102	0715 1 80	0715622404	2659308
0455 34301	0649122203	0715 1110	0715623405	2659309
0455 35 4	0649123103	0715 1111	0715624204	2676110501

Steel Pay Item Number				
0455 35 5	0649123203	0715 1112	0715624304	2715 2123
0455 35 6	0649123204	0715 1113	0715624404	2715 2131
0455 35 7	0649123303	0715 1114	0715624406	2715 2132
0455 35 8	0649123305	0715 1115	0715625107	2715 2133
0455 35 9	0649123312	0715 1116	0715625307	2715 2222
0455 35 20	0649124105	0715 1117	0715625407	2715 2231
0455 35 21	0649124205	0715 1118	0715626408	2715 2232
0455 35 22	0649124306	0715 1119	0715627409	2715 2233
0455 35 23	0649125212	0715 1121	0715628410	2715 2321
0455 39	0649125412	0715 1122	0715631305	2715 2322
0455 81	0649125512	0715 1123	0715631401	2715 2331
0455 81101	0649131001	0715 1124	0715631405	2715 2332
0455 81102	0649131008	0715 1125	0715632406	2715 2333
0455 81104	0649132009	0715 1128	0715636406	2715 2431
0455 81105	0649133010	0715 1129	0715637411	2715 2432
0455 81106	0649133011	0715 1131	0715712402	2715 2433
0455 87	0649134011	0715 1132	0730 76101	2715 2522
0455107 1	0649135012	0715 1135	0730 76102	2715 2532
0455107 2	0649141012	0715 1137	0730 76103	2715 5 11
0455107 3	0649142012	0715 1138	0730 76104	2715 5 12
0455107 4	0649145012	0715 1148	0730 76105	2715 7 11
0455107 5	0649145512	0715 2 11	0730 76106	2715 7 12
0455107 6	0649211008	0715 2 12	0730 76107	2715 11111
0455107 7	0649212009	0715 2 13	0730 76108	2715 11112
0455107 8	0649213010	0715 2121	0730 76109	2715 11113
0455107 18	0649214011	0715 2125	0730 76110	2715 11115
0455107 20	0649222102	0715 2131	0730 76111	2715 11116
0455107 21	0649222203	0715 2132	0730 76112	2715 11118
0455108	0649223103	0715 2133	0730 76113	2715 11119
0455112 1	0649223204	0715 2134	0730 76114	2715 11123
0455112 3	0649335012	0715 2135	0730 76116	2715 11124
0455112 4	0649411001	0715 2136	0730 76117	2715 11125
0455112 5	0649411003	0715 2221	0730 76119	2715 11126
0455120 3	0649411011	0715 2225	0730 76122	2715 11128
0455120 5	0649412002	0715 2231	0730 76123	2715 11129
0455120 6	0649413002	0715 2232	0730 76124	2715 11137
0455120 7	0649413003	0715 2233	0730 76125	2715 11138
0455120 8	0649413011	0715 2234	0730 76126	2715 11139
0455127 1	0649414002	0715 2235	0730 76130	2715 11212
0455133	0649415003	0715 2236	0730 76131	2715 11218
0455133 1	0649415011	0715 2237	0730 76201	2715 11219
0455133 2	0649416004	0715 2238	0730 76203	2715 11228
0455133 3	0649416011	0715 2321	0730 76204	2715 34 1
0455134	0649416604	0715 2322	0730 76205	2715 35 1
0455140 11	0649417006	0715 2325	0730 76206	2715 91 24
0455140 12	0649421101	0715 2331	0730 76207	2715 91 25
0455140 13	0649423102	0715 2332	0730 76208	2715 91 30
0455140 14	0649423103	0715 2333	0730 76209	2715 91 36
0455140 15	0649423305	0715 2334	0730 76210	2715 91 37

Steel Pay Item Number				
0455140 25	0649424403	0715 2335	0730 76211	2715 96 24
0455140 54	0649425203	0715 2336	0730 76212	2715 96 36
0455140 56	0649425211	0715 2337	0730 76213	2715 96 37
0455140 61	0649425404	0715 2425	0730 76214	2715111101
0455140 90	0649425504	0715 2433	0730 76216	2715111102
0455144 4	0649426204	0715 2434	0730 76217	2715111103
0455144 5	0649426404	0715 2435	0730 76219	2715111104
0455144 6	0649426504	0715 2436	0730 76221	2715111105
0455144 8	0649426605	0715 2437	0730 76222	2715111106
0455144 9	0649427211	0715 2438	0730 76223	2715111107
0455144 20	0649427405	0715 2535	0730 76224	2715111108
0455144 21	0649427411	0715 4 11	0730 76225	2715111109
0455144 22	0649427511	0715 4 12	0730 76226	2715111110
0455144 23	0649427604	0715 4 13	0730 76227	2715111111
0460 1 1	0649427611	0715 4 14	0730 76229	2715111112
0460 1 2	0649431007	0715 4 15	0730 76230	2715111114
0460 1 3	0649433008	0715 4 21	0730 76232	2715111203
0460 1 4	0649435009	0715 4 22	0730 76303	2715111204
0460 1 5	0649436010	0715 4 23	0730 76304	2715111205
0460 1 6	0649440	0715 4 24	0730 76305	2715111209
0460 1 7	0649611001	0715 4 25	0730 76306	2715111212
0460 1 9	0649613002	0715 4 31	0730 76503	2715111604
0460 1 11	0649615003	0715 4 32	0730 76504	2715111610
0460 1 12	0649616004	0715 4 33	0730 76505	2715111615
0460 1 13	0649617006	0715 4 35	0730 76506	2715191 20
0460 1 15	0649633011	0715 4 41	0730 76507	2715191 24
0460 1 17	0649640	0715 4 42	0730 77 01	2715191 25
0460 2 1	0649711001	0715 4 60	0730 77 03	2715191 30
0460 2 2	0649711007	0715 4 70	0730 77 04	2715191 31
0460 2 3	0649712001	0715 4 71	0730 77 05	2715191 32
0460 2 4	0649713002	0715 4011	0730 77 06	2715191 34
0460 2 5	0649713003	0715 4012	0730 77 07	2715191 36
0460 2 6	0649713011	0715 4013	0730 77 09	2715191 37
0460 2 7	0649714002	0715 4019	0730 77 10	2715191 40
0460 2 12	0649715003	0715 4021	0730 77 11	2715191 42
0460 2 13	0649715008	0715 4022	0730 77 13	2715191 43
0460 2 15	0649715009	0715 4023	0730 77 16	2715191 46
0460 2 17	0649716004	0715 4029	0730 77 19	2715411104
0460 2 18	0649717006	0715 4031	0730 77 23	2715411109
0460 2 19	0649721101	0715 4032	0730 77 25	2715411112
0460 2 20	0649723102	0715 4033	0730 82	2715411113
0460 3101	0649724403	0715 4111	0730 83 4	2715411114
0460 3103	0649725203	0715 4112	0730 83 6	2715411115
0460 3104	0649725404	0715 4113	0730 84 4	2715411212
0460 3105	0649725504	0715 4119	0730 88	2715411214
0460 3106	0649726204	0715 4121	0825132210	2715411309
0460 3107	0649726404	0715 4122	0905455343	2715411312
0460 3108	0649726504	0715 4123	0905455345	2715411314
0460 3109	0649726605	0715 4129	1634151409	2715411315

Steel Pay Item Number				
0460 3301	0649731007	0715 4131	1634151605	2715411316
0460 3306	0649733008	0715 4132	1635134415	2715412106
0460 3401	0649735009	0715 4133	1635141415	2715412112
0460 3402	0649736010	0715 4139	1635141507	2715412114
0460 3405	0649740	0715 4300	1635148455	2715412209
0460 3406	0649745011	0715 4400	1644536 91	2715413112
0460 3408	0649915003	0715 4600	1645150109	2715413114
0460 3411	0649921101	0715 5 11	1645150118	2715414114
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0460 3704	0649926605	0715 5 21	1649110107	2715415209
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0460 3806	0650 51522	0715 5 51	2415 1 2	2715416115
0460 3808	0659101	0715 7 11	2415 1 3	2715416304
0460 3811	0659102	0715 7 12	2415 1 4	2715416604
0460 5	0659103	0715 7 21	2415 1 5	2715474112
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0460 6	0659106	0715 7 41	2415 1 8	2715475112
0460 6 1	0659107	0715 7 42	2415 1 9	2715475114
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0460 9 3	0659112	0715 19 13	2435424639	2715511106
0460 10	0659113	0715 19 51	2455 3 1	2715511107
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0460 70 3	0659307	0715 19122	2455 4 8	2715511114
0460 71 1	0659310	0715 19123	2455 7 3	2715511115
0460 71 2	0659312	0715 19129	2455 7 6	2715511206
0460 71 4	0659313	0715 19131	2455 7 7	2715511208
0460 73	0659318	0715 19132	2455 7 9	2715511212
0460 81	0659407	0715 19133	2455 7 22	2715511213
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0460 98 1	0676140504	0715 21 1	2455 8 7	2715511309
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0460101	0685156	0715 26 1	2455 8 22	2715511314
0460101111	0685157	0715 26 2	2455 8 35	2715511315
0460101114	0685158	0715 34 1	2455 14 3	2715511316
0460101121	0685360	0715 35 1	2455 14 5	2715511512
0460101122	0700 1 11	0715 36 12	2455 14 11	2715511608

Steel Pay Item Number				
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0460101124	0700 1 13	0715 36 62	2455 17 1	2715512105
0460101221	0700 1 14	0715 36100	2455 17 2	2715512106
0460101321	0700 1 18	0715 36101	2455 17 4	2715512109
0460101411	0700 1 21	0715 36102	2455 17 5	2715512111
0460101421	0700 1 22	0715 36103	2455 17 16	2715512112
0460104	0700 1 23	0715 37 1	2455 17 33	2715512113
0460106	0700 1 25	0715 37 5	2455 17 35	2715512114
0460108 1	0700 1 31	0715 50	2455 17 40	2715512115
0460108 2	0700 1 32	0715 51	2455 34 2	2715512223
0460110 1	0700 1 33	0715 52 1	2455 34 3	2715512309
0460111 3	0700 1 40	0715 52 2	2455 34 4	2715512315
0460111 11	0700 1 74	0715 91 80	2455 34 5	2715512316
0460111 12	0700 2 11	0715 91 85	2455 34 6	2715512609
0460111 13	0700 2 12	0715 91100	2455 35 4	2715513106
0460111 14	0700 2 13	0715 91110	2455 35 5	2715513107
0460112	0700 2 14	0715 91120	2455 35 6	2715513108
0460113 12	0700 2 15	0715 91130	2455 35 9	2715513109
0460113 13	0700 2 16	0715 91140	2455 35 22	2715513110
0460113 14	0700 2 17	0715 91150	2455 35 23	2715513111
0460113 15	0700 2 18	0715 91160	2455 36 1	2715513112
0460113 16	0700 2 40	0715 93100	2455 87	2715513113
0460113 17	0700 2 50	0715 93120	2455107 1	2715513114
0460113 19	0700 2 60	0715 95100	2455107 3	2715513115
0460114 11	0700 2 80	0715 95120	2455107 4	2715513205
0460114 12	0700 3101	0715 96100	2455107 5	2715513609
0460114 13	0700 3102	0715191 60	2455107 6	2715514107
0460114 14	0700 3103	0715191 65	2455107 7	2715514109
0460114 15	0700 3104	0715191 70	2455120 1	2715514112
0460114 16	0700 3105	0715191 80	2455121 1	2715514114
0460114 17	0700 3106	0715191100	2455121 3	2715514115
0460114 19	0700 3107	0715191120	2455121 4	2715515107
0460115 1	0700 3108	0715191125	2455121 5	2715515109
0460116	0700 3109	0715191130	2455133	2715515112
0460119101	0700 3201	0715191140	2455133 1	2715515114
0460120101	0700 3202	0715191150	2455133 2	2715515115
0460120103	0700 3203	0715193100	2455140 11	2715515202
0460121 11	0700 3204	0715193120	2455140 12	2715515205
0460121 12	0700 3205	0715195 80	2455140 13	2715515207
0460121 13	0700 3206	0715195100	2455140 14	2715515212
0460121 14	0700 3207	0715195120	2455140 15	2715515405
0460121 43	0700 3208	0715196 80	2455140 43	2715515609
0460121 50	0700 3209	0715196100	2455140 44	2715516103
0504 1 1	0700 3210	0715196120	2455140 56	2715516104
0504 1 2	0700 3211	0715411115	2455143 2	2715516105
0504 1 5	0700 3224	0715411120	2455143 3	2715516106
0504 1 10	0700 3225	0715411125	2455143 4	2715516109
0504 2	0700 3226	0715411130	2455143 5	2715516110
0515 1 1	0700 3227	0715411135	2455143 6	2715516112

Steel Pay Item Number				
0515 1 2	0700 3228	0715411140	2455144 4	2715516114
0515 1 3	0700 3229	0715411145	2455144 5	2715516115
0515 1 4	0700 3231	0715411150	2455144 9	2715516203
0515 1 5	0700 3236	0715411230	2455144 22	2715516204
0515 2101	0700 3237	0715411235	2455144 23	2715516305
0515 2102	0700 3238	0715411240	2455145 1	2715516403
0515 2111	0700 3239	0715411320	2460 1 1	2715516603
0515 2201	0700 3240	0715411335	2460 1 4	2715516604
0515 2202	0700 3241	0715411340	2460 1 5	2715517104
0515 2203	0700 3242	0715411345	2460 1 7	2715517106
0515 2211	0700 3245	0715411350	2460 1 12	2715517208
0515 2212	0700 3248	0715411415	2460 1 13	2715517405
0515 2213	0700 3301	0715411545	2460 1 15	2715521105
0515 2221	0700 3302	0715412120	2460 1 18	2715521107
0515 2231	0700 3303	0715412130	2460 2 1	2715521109
0515 2301	0700 3304	0715412135	2460 2 2	2715521111
0515 2302	0700 3401	0715412140	2460 2 3	2715521112
0515 2303	0700 3402	0715412145	2460 2 4	2715521212
0515 2311	0700 3403	0715412150	2460 2 5	2715521309
0515 2313	0700 3404	0715412230	2460 2 6	2715521315
0515 2321	0700 3405	0715412240	2460 2 7	2715522109
0515 2351	0700 3406	0715412350	2460 2 9	2715522112
0515 2403	0700 3407	0715412545	2460 2 11	2715522315
0515 2419	0700 3408	0715413125	2460 2 12	2715523109
0515 3 1	0700 4111	0715413130	2460 2 13	2715523112
0515 3 2	0700 4112	0715413135	2460 2 15	2715523115
0515 4 1	0700 4113	0715413140	2460 2 16	2715525109
0515 4 2	0700 4114	0715413145	2460 2 17	2715525112
0536 1 0	0700 4121	0715413150	2460 3101	2715525405
0536 1 1	0700 4122	0715414135	2460 3103	2715526104
0536 1 2	0700 4123	0715414140	2460 3104	2715526115
0536 1 3	0700 4124	0715414145	2460 3105	2715526305
0536 1 4	0700 4125	0715414150	2460 3106	2715526603
0536 1 5	0700 4126	0715415140	2460 3108	2715527405
0536 1 6	0700 4127	0715415145	2460 3304	2715531112
0536 1 8	0700 4128	0715415150	2460 3307	2715535107
0536 1 9	0700 4132	0715416110	2460 3401	2715536104
0536 1 10	0700 4140	0715416115	2460 3402	2715536305
0536 1 11	0700 4512	0715416120	2460 5	2715536306
0536 1 12	0700 5 11	0715416135	2460 6	2715571109
0536 2	0700 5 21	0715416140	2460 70 1	2715573109
0536 6	0700 5 22	0715416145	2460 70 2	2715573114
0536 7	0700 6 21	0715416150	2460 70 3	2715573115
0536 7 1	0700 6 22	0715416315	2460 71 2	2715574112
0536 7 2	0700 7131	0715416320	2460 73	2715575104
0536 7 3	0700 7132	0715416545	2460 81	2715575107
0536 7 4	0700 7500	0715416610	2460 81 1	2715575109
0536 8	0700 7600	0715416615	2460101121	2715575111
0536 8 1	0700 8115	0715421320	2460101122	2715575112

Steel Pay Item Number				
0536 8 3	0700 8132	0715422145	2460101124	2715575114
0536 8 4	0700 8134	0715426315	2460101211	2715575115
0536 8 5	0700 8135	0715426320	2460101311	2715575206
0536 8 6	0700 8136	0715431145	2460108 2	2715575208
0536 9	0700 8216	0715436315	2460111 11	2715576104
0536 75	0700 8221	0715436320	2460111 12	2715577112
0536 76	0700 8400	0715440000	2460111 13	2715577114
0536 82	0700 9117	0715450000	2460111 14	2715577115
0536 83 1	0700 9137	0715461145	2460112	2715612302
0536 83 4	0700 9400	0715461545	2460113 11	2715612402
0536 84	0700 9500	0715471130	2460113 12	2715614404
0536 85	0700 9600	0715472140	2460113 13	2715616406
0536 85 22	0700 10115	0715473145	2460113 14	2715622404
0536 85 24	0700 10116	0715474135	2460113 15	2715624206
0536 85 25	0700 10121	0715474140	2460113 16	2715625107
0536 85 26	0700 10122	0715474145	2460113 17	2715631405
0536 85 27	0700 10123	0715475125	2460113 18	2715632406
0536 86	0700 10124	0715475130	2460113 19	2715636406
0536 88	0700 10130	0715475135	2460114 11	2715712302
0536 90	0700 10140	0715475140	2460114 12	2715732406
0536 91	0700 11111	0715475145	2460114 13	2730 76101
0649 1 10	0700 11112	0715475150	2460114 14	2730 76102
0649 1 11	0700 11121	0715476135	2460114 15	2730 76103
0649 1 12	0700 11131	0715476615	2460114 16	2730 76104
0649 1 13	0700 11132	0715500 1	2460114 17	2730 76105
0649 1 14	0700 11141	0715500 2	2460114 18	2730 76106
0649 1 15	0700 11142	0715500 3	2460114 19	2730 76107
0649 1 16	0700 11151	0715500 30	2460120103	2730 76108
0649 1 17	0700 11152	0715500100	2504 1 1	2730 76109
0649 1 61	0700 11161	0715511115	2504 1 2	2730 76110
0649 1 62	0700 11162	0715511120	2504 1 4	2730 76111
0649 1 63	0700 11222	0715511125	2504 1 5	2730 76113
0649 1 65	0700 11231	0715511130	2504 1 10	2730 76114
0649 1040	0700 11241	0715511135	2504 2	2730 76116
0649 1046	0700 11251	0715511140	2515 1 1	2730 76119
0649 1101	0700 11261	0715511145	2515 1 2	2730 76122
0649 1102	0700 11262	0715511150	2515 1 3	2730 76123
0649 1146	0700 11263	0715511220	2515 1 4	2730 76124
0649 1230	0700 11321	0715511225	2515 2 22	2730 76125
0649 1232	0700 11391	0715511230	2515 2201	2730 76201
0649 1234	0700 12 11	0715511240	2515 2202	2730 76202
0649 1236	0700 12 12	0715511315	2515 2301	2730 76203
0649 1332	0700 12 21	0715511320	2515 2302	2730 76204
0649 1336	0700 12 22	0715511325	2515 2303	2730 76205
0649 1338	0700 12 31	0715511330	2536 1 1	2730 76206
0649 1340	0700 12 32	0715511335	2536 1 2	2730 76207
0649 1436	0700 20 11	0715511340	2536 1 3	2730 76208
0649 1438	0700 20 12	0715511345	2536 1 5	2730 76210
0649 1440	0700 20 13	0715511350	2536 1 6	2730 76211

Steel Pay Item Number				
0649 1536	0700 20 14	0715511435	2536 1 8	2730 76213
0649 1540	0700 20 15	0715511535	2536 1 9	2730 76214
0649 1640	0700 20 18	0715511540	2536 2	2730 76215
0649 1646	0700 20 19	0715511550	2536 6	2730 76216
0649 1734	0700 20 21	0715511610	2536 7	2730 76217
0649 1738	0700 20 22	0715511615	2536 8	2730 76218
0649 2150	0700 20 31	0715511735	2536 8 1	2730 76219
0649 2170	0700 20 32	0715511740	2536 8 5	2730 76220
0649 2250	0700 20 51	0715512120	2536 8 6	2730 76221
0649 2255	0700 20 52	0715512125	2536 9	2730 76222
0649 2605	0700 21 11	0715512130	2536 75	2730 76223
0649 11 1	0700 21 12	0715512140	2536 76	2730 76224
0649 11001	0700 21 13	0715512145	2536 82	2730 76225
0649 11160	0700 21 14	0715512150	2536 83 1	2730 76226
0649 20	0700 21 15	0715512155	2536 85 1	2730 76228
0649 21 1	0700 21 16	0715512160	2536 85 2	2730 76229
0649 21 3	0700 21 17	0715512220	2536 85 4	2730 76230
0649 21 4	0700 21 31	0715512315	2536 85 5	2730 76307
0649 21 5	0700 21 32	0715512325	2536 85 6	2730 76503
0649 21 6	0700 21 33	0715512330	2536 85 7	2730 76507
0649 21 7	0700 21 34	0715512340	2536 85 8	2730 77 01
0649 21 8	0700 21 35	0715512350	2536 85 9	2730 77 02
0649 21 9	0700 21 36	0715512610	2536 85 10	2730 77 03
0649 21 10	0700 22121	0715512615	2536 85 12	2730 77 04
0649 21 11	0700 22122	0715513125	2536 85 13	2730 77 05
0649 21 12	0700 22123	0715513130	2536 85 22	2730 77 06
0649 21 13	0700 22124	0715513135	2536 85 24	2730 77 09
0649 21 14	0700 22131	0715513140	2536 85 25	2730 77 11
0649 21 15	0700 22132	0715513145	2536 85 26	2730 77 12
0649 21 16	0700 22133	0715513150	2550 75041	2730 77 13
0649 21 17	0700 22134	0715513435	2550 75042	2730 77 14
0649 21 18	0700 22141	0715514120	2649 1024	2730 77 16
0649 21 19	0700 22142	0715514125	2649 1044	2730 77 19
0649 21 20	0700 22143	0715514130	2649 1046	2730 77 22
0649 21 21	0700 22144	0715514135	2649 1050	2730 77 23
0649 21 22	0700 22154	0715514140	2649 1438	2730 77 25
0649 21 23	0700 22220	0715514145	2649 1440	2825132110
0649 21 24	0700 22250	0715514150	2649 1442	2825132210
0649 21 25	0700 23111	0715514325	2649 1536	2825136120
0649 21 26	0700 23112	0715515115	2649 1538	2825136210
0649 21 27	0700 23113	0715515120	2649 1636	2825136220
0649 21101	0700 23114	0715515125	2649 1638	2825141210
0649 21102	0700 23121	0715515130	2649 1644	2825142210
0649 21103	0700 23122	0715515135	2649 1646	2825151210
0649 21104	0700 23123	0715515140	2649 11001	3050120415
0649 21105	0700 23124	0715515145	2649111001	3050130415
0649 21106	0700 23131	0715515150	2649111002	3050150411
0649 21108	0700 23132	0715515225	2649111003	3050150419
0649 22 3	0700 23133	0715515250	2649111004	3622536301

Steel Pay Item Number				
0649 26 1	0700 23134	0715516110	2649111012	3633131415
0649 26 3	0700 23142	0715516115	2649112002	3633145505
0649 26 5	0700 23143	0715516120	2649112012	3634141415
0649 26 7	0700 23144	0715516125	2649113003	3635122415
0649 31101	0700 23210	0715516130	2649113004	3637151606
0649 31102	0700 23220	0715516135	2649114004	3637151615
0649 31103	0700 38033	0715516140	2649115004	3637700
0649 31104	0700 38036	0715516145	2649115005	3644600
0649 31105	0700 38044	0715516150	2649115012	3694715
0649 31106	0700 38045	0715516155	2649115512	E460111900
0649 31107	0700 38048	0715516210	2649121101	

Table B- 5. Aggregate Pay Items

Aggregate Pay Item Number				
0121 70	0285701007	0285707994	0285714527	0547 70 3
0125 3	0285701031	0285708283	0285714538	0443 71 1
0210 1 1	0285701032	0285708287	0285715567	0443 72 10
0210 1 8	0285701701	0285708295	0285715982	0443 72 11
0210 1 9	0285702047	0285708991	0285716606	0443 72 12
0210 2	0285702055	0285709327	0285716610	0443 72 13
0285701	0285702999	0285709335	0285716615	0443 72 14
0285702	0285703087	0285709338	0285716631	0443 72 20
0285703	0285703095	0285709352	0285716632	0142 70
0285704	0285703703	0285709709	0285716716	0160 4
0285705	0285703984	0285709989	0285716980	0102 3
0285706	0285703998	0285709990	0285716981	0162 1 11
0285707	0285704123	0285710363	0530 1	0162 1 12
0285708	0285704127	0285710367	0530 1 1	0162 1 21
0285709	0285704152	0285710392	0530 1 2	0162 1 33
0285710	0285704704	0285710983	0530 3 3	0173 77 1
0285711	0285704985	0285711407	0530 3 4	0173 77 2
0285712	0285705166	0285711711	0530 3 5	0173 77 3
0285713	0285705167	0285711986	0530 3 8	0286 1
0285714	0285705170	0285711987	0530 3 9	0288001
0285715	0285705997	0285712441	0530 5 2	0520 7 1
0285716	0285706201	0285712443	0530 74	0530 5 1
0285720	0285706203	0285712447	0530 76 2	0530 5 12
0285721	0285706207	0285712458	0530 76 3	0549 3
0285722	0285706208	0285712472	0530 76 4	0823 11 6
0285724	0285706216	0285712712	0530 76 5	0823 11 8
0285726	0285707247	0285713481	0530 77 2	0823 11 12
0285729	0285707250	0285713487	0530 77 3	0520 7 2
0285730	0285707255	0285713498	0530 77 4	
0285701001	0285707272	0285714521	0547 70 1	
0285701003	0285707993	0285714523	0547 70 2	

Table B- 6. Earthwork Pay Items				
Earthwork Pay Item Number				
0120 71	0120 6	0120 1900	0120 5	0120 6900
0120 72	0120 2 2	0120 3	0120 6101	0120 11
0120 73	0102 2300	0120 4	0120 6102	
0120 74	0120 1	0120 4900	0120 6103	

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