Florida Department of Transportation Construction Cost Index

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THE BALMORAL GROUP, LLC
200 W Welbourne | Winter Park, Florida

FLORIDA DEPARTMENT OF TRANSPORTATION CONSTRUCTION COST INDEX

EXECUTIVE SUMMARY

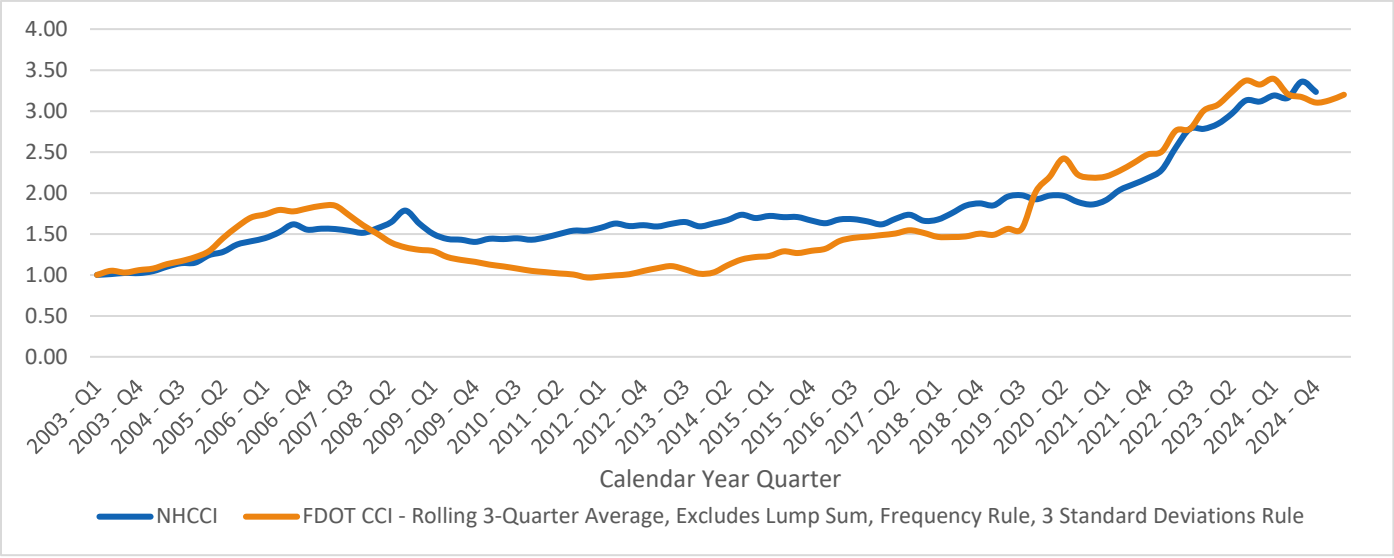
The Florida Department of Transportation (FDOT) tasked the Balmoral Group (TBG) with developing a Florida-specific quarterly construction cost index. This index reflects market conditions for the State and supports timely updates of FDOT project costs and other decision making. TBG developed a Florida-specific Construction Cost Index (CCI), which is a tool used to track and measure the change in construction costs over time. FDOT has historically used The National Highway Construction Cost Index (NHCCI) prepared by the Federal Highway Administration.

The Florida Index developed by TBG used an approach similar to the NHCCI, which uses the Chained Fisher Ideal Index[1]. To develop the FDOT CCI, bids were compiled across pay items between 2003 and 2025. Several iterations were tested using the NHCCI methodology to assess and remove outliers. The statistical testing resulted in the construction of the FDOT CCI with the Fisher Ideal Index method. Results from this method were then chained and are shown in (**Figure 1**).

The technical memorandum is structured with the following sections:

- Background
- Overview of the Chained Fisher Ideal Index
- Developing the FDOT CCI
- Final FDOT CCI
- FDOT CCI Compared to Other Indices

Figure 1. FDOT CCI



Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

[1] The Fisher Ideal Index can be chained or unchained. The NHCCI uses the Chained Fisher Ideal Index.

BACKGROUND

A Construction Cost Index (CCI) is a key tool used to track and measure the change in construction costs over time. The National Highway Construction Cost Index (NHCCI) prepared by the Federal Highway Administration manages a national index to estimate changes in construction costs nationally. However, the index tends to be too broad to capture state-specific market conditions and typically lags current pricing data by about six months. The Balmoral Group (TBG) was charged with developing a Florida-specific quarterly cost index, allowing for more timely application of results that better reflect market conditions for the state of Florida to support updating of project costs and other decision making.

OVERVIEW OF THE CHAINED FISHER IDEAL INDEX

The NHCCI uses the Chained Fisher Ideal Index, which is the geometric mean of two other price indices that is then chained to form a time series through consecutive multiplication; the Laspeyres Price Index and the Paasche Price Index (**Figure 2**). Since construction materials are measured in many different units, a price index for all construction materials is calculated as the weighted average of price indices of individual cost items. The Laspeyres Price Index and the Paasche Price Index are similar in that they both use quantities of individual cost items as weights to their respective prices to calculate the overall index.

However, the Laspeyres Price Index uses the base period quantities as weights while the Paasche Price Index uses the current period quantities as weights. Separately, each of these indices is biased either upward or downward depending on the period they are weighted by due to the substitution effect (as prices change, quantity demanded changes). However, when these two indices are combined, the effects of their biases can be mitigated.

Figure 2. The Laspeyres, Paasche, and Fisher Price Indices

Laspeyres Price Index	Paasche Price Index
$L(p) = \frac{\sum_{j=1}^{N} p_{j,t}\, q_{j,0}}{\sum_{j=1}^{N} p_{j,0}\, q_{j,0}}$	$P(p) = \frac{\sum_{j=1}^{N} p_{j,t}\, q_{j,t}}{\sum_{j=1}^{N} p_{j,0}\, q_{j,t}}$

Fisher Ideal Index

$$F(p) = \sqrt{\frac{\sum_{j=1}^{N} p_{j,t}\, q_{j,0}}{\sum_{j=1}^{N} p_{j,0}\, q_{j,0}} \times \frac{\sum_{j=1}^{N} p_{j,t}\, q_{j,t}}{\sum_{j=1}^{N} p_{j,0}\, q_{j,t}}}$$

Source: Federal Highway Administration

The equation calculates changes in price between adjacent periods with quantity and price data at the pay item level. The results from the unchained Fisher Ideal Index are then chained together through consecutive multiplication to form a time series price index.

DEVELOPING THE FDOT CCI

REVIEW OF BID DATA

TBG compiled a dataset of 499,169 bids that included 7,063 different pay items spanning the time period from 2003 to 2025. As the first step in developing the FDOT CCI, TBG completed a comprehensive review and cleanup of the data. The Balmoral Group:

1. Reviewed Basis of Estimates and Standard Specifications for Road and Bridge Construction documents for several periods to reconcile pay item descriptions and logically group them into material categories
2. Combined varied item descriptions into a single item description per pay item number, with input from FDOT
3. Matched historical metric unit pay items with their corresponding current non-metric pay items and converted to non-metric units. Unit prices were recalculated by dividing awarded amount by updated quantities
4. Reviewed FDOT Prequalification pay item groupings for further insight and to assist with assigning pay items to NHCCI categories
5. Workshopped several elements with FDOT: how to address outdated units and pay items, whether or not to exclude experimental pay items, and how to handle lump sum items. These decisions were informed by thorough analysis of the data and are described further in the following section.

ITERATIONS OF THE FDOT CCI

Using the NHCCI methodology as a guide, TBG applied different methods of identifying outliers in the dataset. These rules were designed to removed rare, erratic, or unstable data points and keep data that are both frequent and statistically normal within their group. Descriptions of each rule are provided below:

Frequency Rule: This rule removes pay items that appear too rarely, regardless of cost. If a pay item appeared less than 1% of the time within a group for any given year, that pay item was removed for that year. For example, the MILLING EXISTING ASPHALT PAVEMENT, 3 1/4" AVG DEPTH pay item accounted for 3 bids out of the total 862 asphalt bids in 2007, or 0.36%. Under this rule, this pay item was removed for 2007.

Consecutive Quarters Rule: This rule removes pay items if they don't appear consecutively in the data. If a pay item didn't appear in a block of consecutive quarters, it was removed for that period. Additionally, a pay item was also removed if it didn't have a previous quarter of data to compare to. Blocks of 8 consecutive quarters and 3 consecutive quarters were tested. The NHCCI uses 8 quarters, however this was deemed too restrictive for the size of FDOT's dataset. Ultimately this rule was not used to exclude outliers from the dataset.

3 Standard Deviations Rule: This rule removes bids with a weighted average price outside of the normal range for that pay item in that year. If the weighted average price fell outside of 3 standard deviations away from the mean weighted average price for that pay item in that year, it was removed from the dataset. For example, the MILLING EXISTING ASPHALT PAVEMENT, 3 1/4" AVG DEPTH pay item had an average weighted average price of $4.40/SY in 2022. One bid had a weighted average price of $13.05/SY for this pay item in 2022, which is greater than 3 standard deviations away from the mean. Therefore, this bid was removed from the dataset.

Coefficient of Variation (COV) Rule: The coefficient of variation (COV) rule removes pay items with excessive variability. Coefficients of variation (standard deviation/mean) were calculated by pay item by year.

If a COV for a pay item for any given year was greater than the 95th percentile of the COVs for the entire dataset, that pay item was removed for that year. For example, in 2008 the MILLING EXISTING ASPHALT PAVEMENT, 1 3/4" AVG DEPTH pay item had a coefficient of variation of 116.2. This was greater than the 95th percentile for coefficients of variation across the entire dataset. Under this filter, bids for this pay item would be removed in 2008. Ultimately this rule was not used to exclude outliers from the dataset.

TBG tested the various rules on datasets with and without the lump sum pay items. Each iteration informed decisions that influenced the final methodology for the FDOT CCI. TBG tested more combinations of these rules than are described in the table below, however, **Table 1** walks through the main iterations that informed the FDOT CCI.

Table 1. Iterations of the FDOT CCI

Rules Applied	Description	Result	Decision
None	No Outliers Removed – Includes Lump Sum Pay Items See **Figure 6**.	Index increased steadily and significantly from 2013 to 2023, with some quarters reaching values over 11. This is consistent with the timing of when FDOT increased their use of Lump Sum pay items.	Test without Lump Sum Pay items, consistent with NHCCI methodology.
Excluding Lump Sum	No Outliers Removed - Excludes all Lump Sum Pay Items See **Figure 7**.	2013 to 2023 values declined significantly, with the index maxing out at 4.64 in 2023. Values oscillate more significantly than the NHCCI, but follow a similar trend.	Continue with process of removing outliers. Exclude lump sum pay items.
Excluding Lump Sum Frequency Rule – 1%	Removed pay items for that year if they appeared less than 1% of the time in that pay item group for that year. See **Figure 8**.	Lowered values over all periods, but especially for 2004 through 2008 to where they more closely align with the NHCCI.	Use the frequency rule for removing outliers. Continue excluding lump sum and move forward with the process of removing outliers.
Excluding Lump Sum Frequency Rule – 1% Consecutive Quarters Rule	In addition to 1% by pay item by year rule, removed pay items for that period if they weren't part of a consecutive block of quarters with data for that item (tried 8 consecutive quarters and 3 consecutive quarters) and if there wasn't a previous period of data for comparison. See **Figure 9**.	**Brought the index values to be far below the NHCCI in all periods.**	The consecutive quarters rule is not suitable for the size of FDOT's dataset; omitted this filter. Continue excluding lump sum and move forward with outlier removal process.

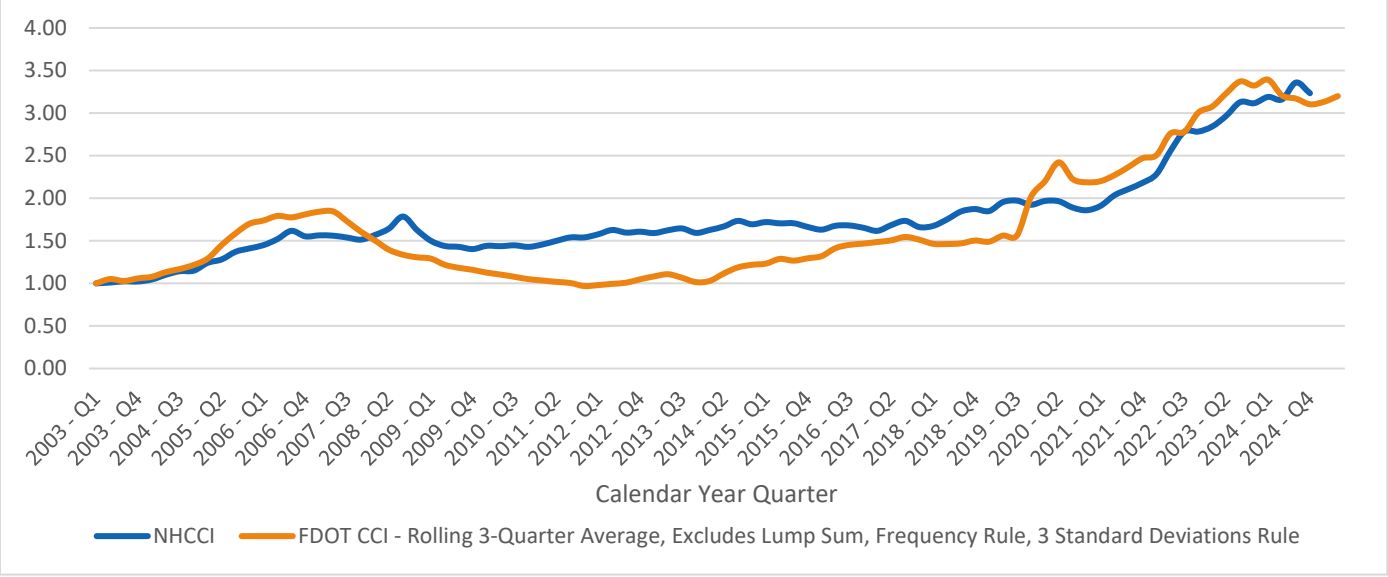
Rules Applied	Description	Result	Decision
Excluding Lump Sum Frequency Rule – 1% 3 Standard Deviations rule	In addition to 1% by pay item by year rule, removed bids that were greater than 3 standard deviations away from the mean for that pay item for that year. See **Figure 10**.	Brought the index values down slightly.	Use the 3 standard deviations rule to remove outliers. Continue excluding lump sum and move forward with the outlier removal process
Excluding Lump Sum Frequency Rule – 1% 3 Standard Deviations Rule COV Rule	In addition to 1% by pay item by year and the 3 standard deviations rules, Coefficient of Variation (COV) outlier removal. See **Figure 11**.	Smoothed large fluctuations. The COV rule primarily removed grassing, traffic control, and grading/excavation bids.	The COV rule removed too many items in specific groups that influence overall pricing for Florida. Excluded this filter for the FDOT CCI.

Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost

FINAL FDOT CCI

The final version of the FDOT CCI used the Chained Fisher Ideal Index method, excluded lump sum pay items and applied the frequency and 3 standard deviations outlier filters. The FDOT CCI also applies a three-quarter moving average to the final result (**Figure 3**). Each quarter is an average of the current and previous two quarters. NHCCI methodology cautions users directly comparing indices to the NHCCI as different indices use different methodologies and present different pictures. The FDOT CCI, while based on NHCCI methodology and is similar, differs in some data treatments.

Figure 3. FDOT CCI

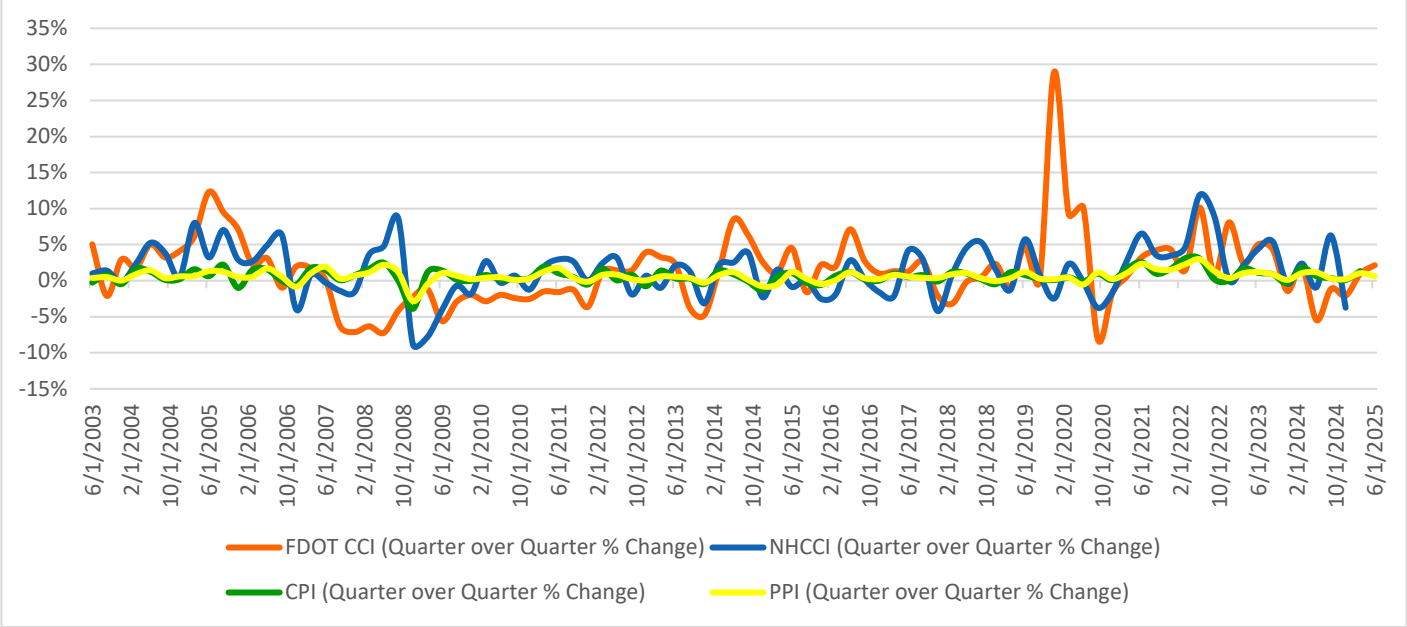


Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

FDOT CCI COMPARED TO OTHER INDICES

The NHCCI methodology suggests comparing percent changes is the best tool for comparison, as indices often have different methodologies and measure varying baskets of goods. **Figure 4** shows quarter-over-quarter percent changes of the FDOT CCI, the NHCCI, the Consumer Price Index (CPI) for all items, and the Producer Price Index (PPI) for all commodities. None of the indices are seasonally adjusted.

Figure 4. The FDOT CCI Compared to Other Indices – Percent Change

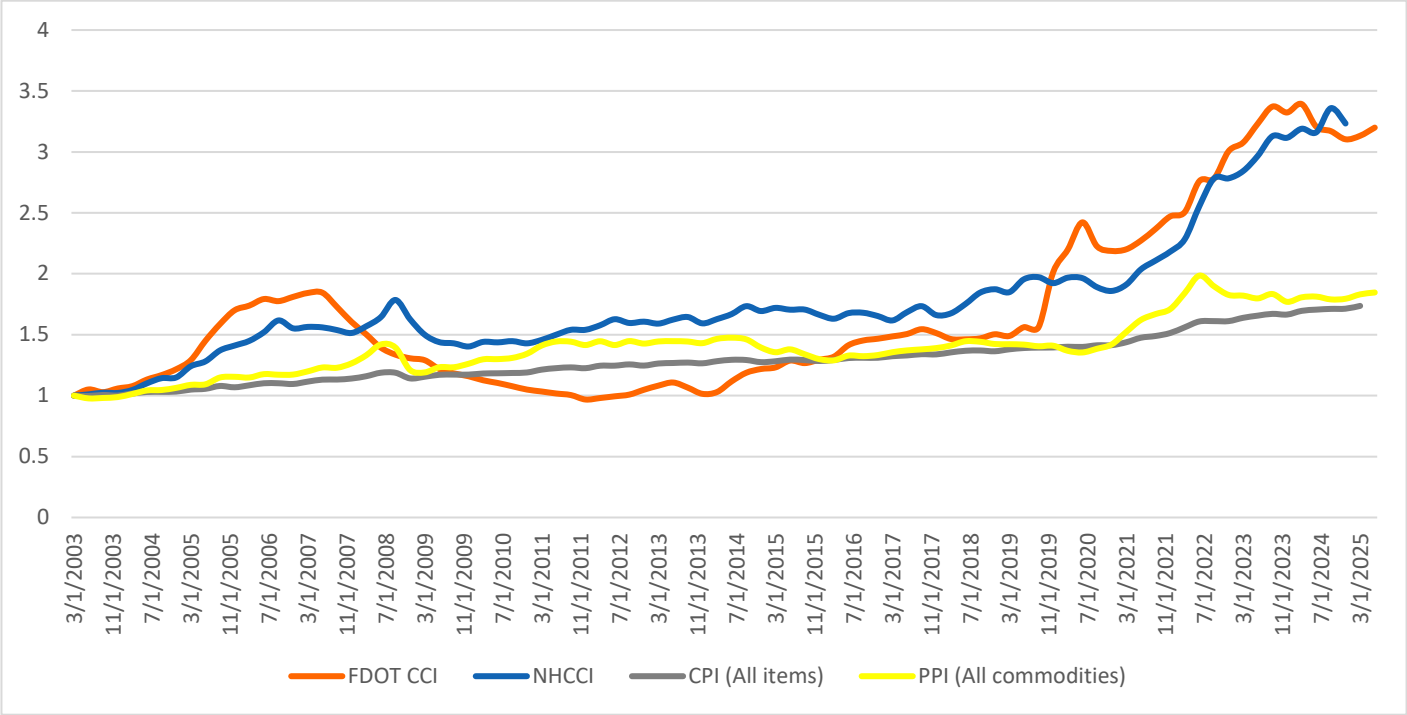


Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration, Bureau of Labor Statistics

The FDOT CCI largely follows NHCCI patterns but with timing that more closely reflects Florida specific macroeconomic trends. In the housing boom period, Florida construction costs exceeded NHCCI until the housing "bust." From 2008, prices in Florida lagged national costs for a decade. In late 2019 and early 2020, higher bids brought Florida's index above the national index. In fiscal year 2019/2020, bridge funding increased to $1.1B from $215M, with ripple effects on demand for construction materials and crews. This trend continued through the post-COVID construction booms throughout the state through late 2024.

Figure 5 shows the FDOT CCI, NHCCI, CPI all items and PPI all commodities in their raw index values with the same 2003 Q1 base year.

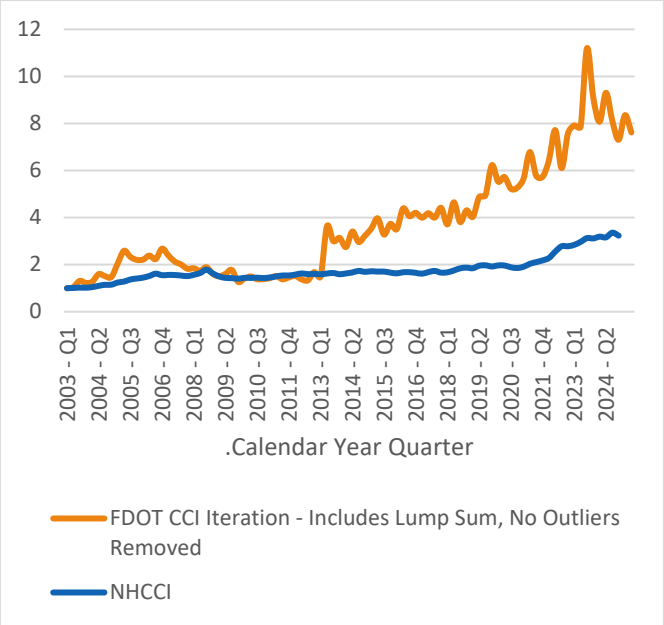
Figure 5. The FDOT CCI Compared to Other Indices - Raw Values



Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration, Bureau of Labor Statistics

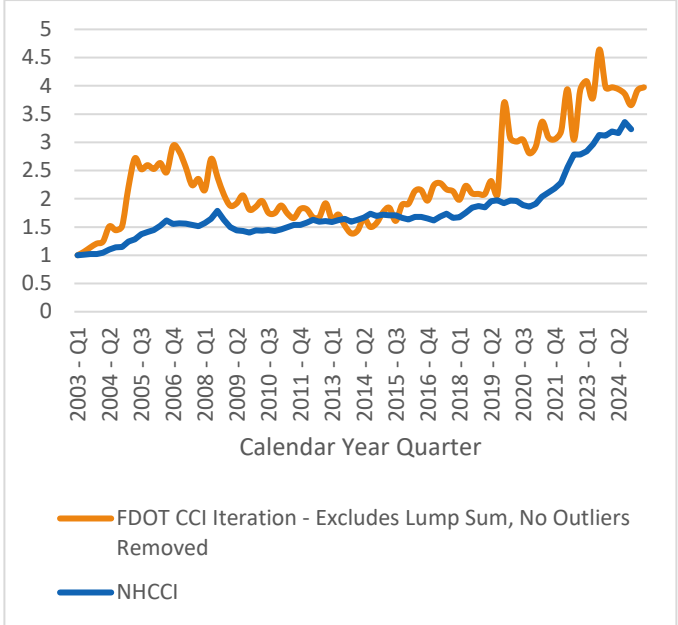
APPENDIX

Figure 6. FDOT CCI Iteration - Includes Lump Sum, No Outliers Removed



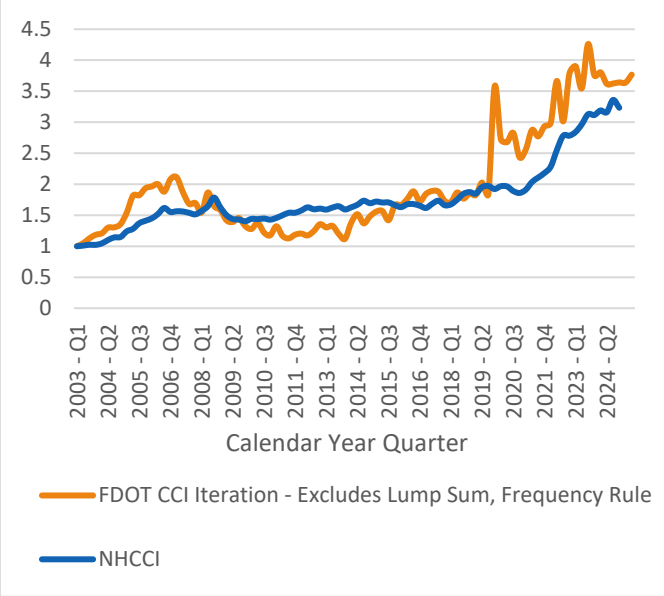
Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

Figure 7. FDOT CCI Iteration - Excludes Lump Sum, No Outliers Removed



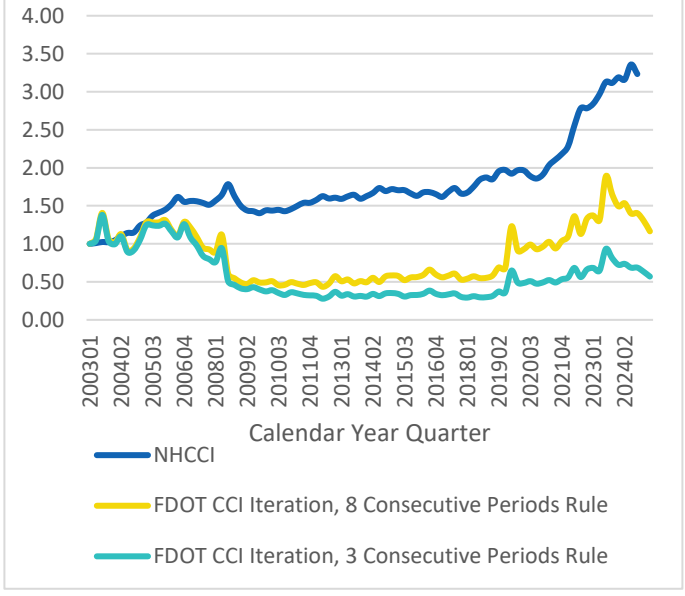
Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

Figure 8. FDOT CCI Iteration - Excludes Lump Sum, Frequency Rule



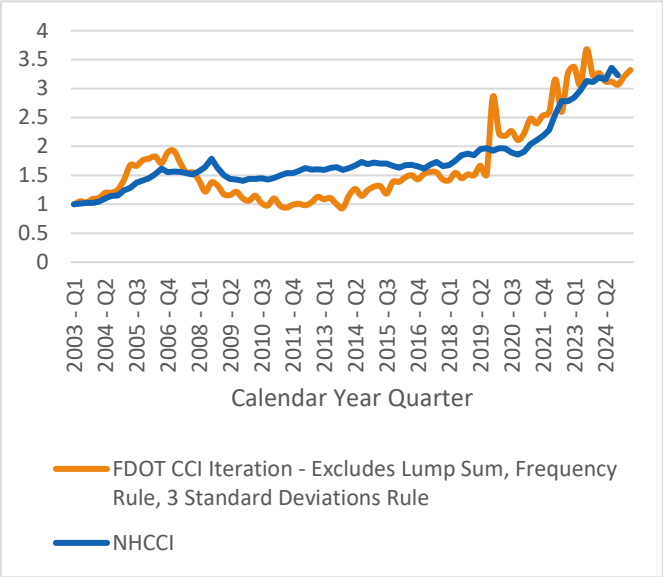
Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

Figure 9. FDOT CCI Iteration - Excludes Lump Sum, Frequency Rule, Consecutive Quarters Rule



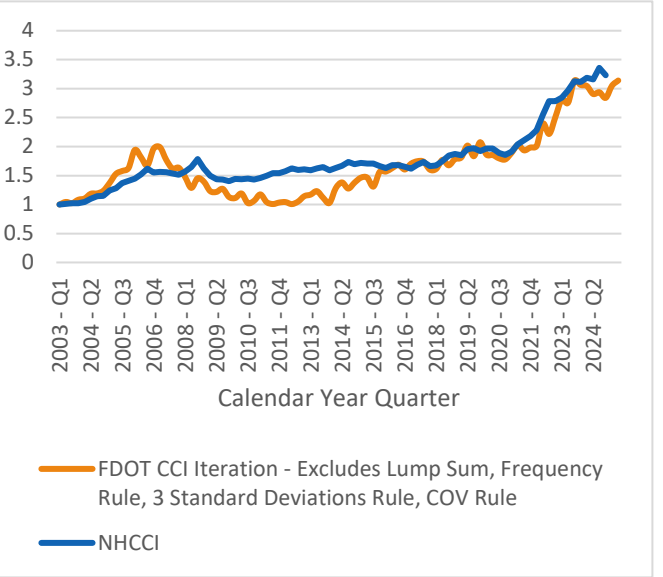
Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

Figure 10. FDOT CCI Iteration - Excludes Lump Sum, Frequency Rule, 3 Standard Deviations Rule



Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration

Figure 11. FDOT CCI Iteration - Excludes Lump Sum, Frequency Rule, 3 Standard Deviations Rule, COV Rule



Source: TBG calculated from data provided by FDOT Office of Forecasting and Project Cost, Federal Highway Administration