

**Orange County Business Council
Orange County Transportation Infrastructure Construction
Cost Pressure Index
Fall 2021
Prepared for the Orange County Transportation Authority**

OCBC Research Team

Dr. Wallace Walrod – Chief Economic Advisor, Orange County Business Council
Dr. Marlon Boarnet – Professor and Chair, Department of Urban Planning and Spatial Analysis, USC

Background and Purpose

As a supplementary examination to the Next 10 Delivery Plan: Market Conditions Forecast and Risk Analysis study delivered by Orange County Business Council (OCBC) in September 2017, the Orange County Transportation Authority (OCTA) Board of Directors (Board) requested further study and exploration of potential cost fluctuations beyond existing cost analysis from the California Department of Transportation's (Caltrans) Construction Cost Index (CCI) and internal OCTA analysis. The OCTA Board requested an ongoing analysis of construction cost factors, with periodic updates. In response, the OCBC team developed the Orange County Transportation Infrastructure Construction Cost Pressure Index (ICCPI), which is updated every six months.

To develop the cost pressure index, the OCBC team analyzed annual trends in material costs, labor costs and general economic conditions to determine a range of potential cost increases with a time horizon that is typically three years into the future. The index updates begin by collecting relevant market data and indicators and then performing data analytics on to assess current cost pressure and forecast future cost pressure. In doing so, and providing these findings to OCTA's Board, more accurate budgets can be determined reducing the potential risk of cost pressure and project delivery slowdowns due to financial constraints. This September 2021 memo updates the March 2021 forecast of the Orange County Transportation ICCPI and provides annual cost pressure index forecasts for the remainder of 2021 and for 2022, 2023, and 2024.

Findings and Discussion

The most recent available input data were gathered to update the ICCPI. That includes annual 2020 data for the following index components: California's unemployment rate, California building permits, and the Caltrans index data on infrastructure construction materials costs. The 2021 values for building permits and unemployment rates were estimated from changes from second quarter 2020 to second quarter 2021 and construction wages from first quarter 2020 to first quarter 2021 – a period that spans from the coronavirus (COVID-19) recession to the 2021 second quarter recovery.

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While that is an unusual time period, we believe that that period's effects are most important for labor and materials markets that influence construction costs at the present time.

In March 2021, the Construction Cost Pressure Index predicted a low-inflation, close to zero cost-change environment for 2021, with cost pressures rising to six to 11 percent annual cost increases by 2023. The year-ago September of 2020 Construction Cost Pressure Index predicted similar low inflation (index of 1) environments in 2021 to moderate inflation by 2023 (index of 3).

Circumstances have changed substantially since the March 2021 update, as reflected in the new September 2021 index values in Table 1. Currently, with updated data, the new estimate for 2021 is an index value of 5, the highest inflation environment observed during the benchmark 1994-2017 time period, dropping to an index of 4 in 2022, 2023, and 2024.

Table 1: September 2021 Update to Three-Year Orange County Transportation ICCPI, with comparison to March 2021 and September 2020 index estimates

Year	Index (September 2021) with annual cost increase range	Index (March 2021) with annual cost increase range	Index (September 2020) with annual cost increase range
2020	not estimated	not estimated	0 (-17% to -2%)
2021	5 (11% to 40%)	1 (-2% to 1%)	1 (-2% to 1%)
2022	4 (6% to 11%)	2 (1% to 2%)	1 (-2% to 1%)
2023	4 (6% to 11%)	4 (6% to 11%)	3 (2% to 6%)
2024	4 (6% to 11%)	not estimated	not estimated

The index values correspond to ranges of forecast annual infrastructure construction cost increases, as shown in Table 2.

Forecasting Method

OCBC used a series of regression analyses and forward-looking projections to create the ICCPI. The ICCPI provides a ranking from 0 to 5, with each rank corresponding to a range of percent changes in overall construction costs. Table 2 below highlights each ICCPI ranking and the proposed range of cost fluctuations which have been provided on a low, midpoint, and high scale.

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Table 2: OCBC Orange County Transportation ICCPI Scores

Implied Infrastructure Construction Cost Change, Orange County			
Index Value	Projected Annual Cost Increase, Low	Projected Annual Cost Increase, Midpoint	Projected Annual Cost Increase, High
0	-17%	-9.5%	-2%
1	-2%	-0.5%	1%
2	1%	1.5%	2%
3	2%	4%	6%
4	6%	8.5%	11%
5	11%	25.5%	40%

The ICCPI can range from 0 to 5, with values and the range of annual construction cost changes corresponding to each index value shown in Table 2. These ranges are built to be forecasting tools, with scores indicating public construction forecast cost increase. Values of 2 and 3 indicate somewhat normal inflationary environments. A value of 4 is a high inflation environment. A value of 1 is a low inflation/deflationary environment. Values of 0 and 5 correspond to the most extreme conditions observed in Orange County over the past three decades, and hence the ranges for those values are wide due to the unusual nature of the highly deflationary environment that occurred immediately prior to and during the Great Recession and the high-cost inflation environment that occurred in the building boom years of the early 2000s.

Methodology

To determine the Transportation ICCPI, the OCBC team started by aggregating several datasets, measures, and indicators on an annual basis as far back as 1972.

The index was built with the following key data inputs:

- California's unemployment rate;
- Building permits in California;
- Selected construction materials costs for California, from Caltrans; and
- Orange County construction labor costs.

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The OCBC team examined how the various measures and indicators of construction costs varied with changes and recent past trends in construction inflation. Using statistical analyses, the research team has built a forecasting model that projects forward cost increases and predicted cost increases are grouped into the categorical ranges shown in Table 2.

Recent Data Trends

Table 3 shows the recent data trends for three key components of the construction cost pressure index. From 2018 through 2020, building permits in the state declined. That has reversed sharply in the 2021 data. The estimated increase in building permits, 45.2 percent, is based on the change in permits from second quarter 2020 to second quarter 2021. This is a “trough” to “peak” comparison and so that increase based on quarterly changes likely exaggerates the annual growth. Still, building permits, which have been positively correlated with infrastructure construction costs, have shifted into a growth mode that will create inflationary pressures. The unemployment rate increased sharply in the first half of 2020 but has since declined. That drop in unemployment has also contributed to inflationary pressures. The change in Orange County construction salaries for 2021 is based in the change from first quarter 2020 to first quarter 2021 – again a “trough to peak” measure that will exaggerate annual changes. But the increase, less than one percent, is the lowest increase observed since we began forecasting the cost pressure index. In 2021, building permit and unemployment rate trends will contribute towards inflationary pressures. Construction salaries while currently estimated to see little growth in 2021, may see additional growth in the latter part of the year.

Table 3: Infrastructure Cost Correlates, Annual Percentage Changes, 2016-2021

Year	California Building Permits	% Change Year-on-Year	California Unemployment Rate	% Change Year-on-Year	OC Construction Labor Costs (avg. annual wage)	% Change Year-on-Year
2016	102,350	4.2%	5.5%	-11.6%	\$67,179	3.8%
2017	114,780	12.1%	4.8%	-12.9%	\$71,474	6.4%
2018	113,502	-1.1%	4.2%	-12.0%	\$74,669	4.5%
2019	109,904	-3.2%	4.1%	-3.4%	\$77,288	3.5%
2020	104,544	-4.9%	10.3%	153%	\$81,460	5.4%
2021	151,850*	45.2%	5.1%*	-50.2%	\$81,656**	<1%

* Estimated from Q2 change, 2020 to 2021, converted to annualized estimate

**Estimated from Q1 change, 2020 to 2021, converted to annualized estimate

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The appendix shows annual changes in materials costs in recent years. Nearly all construction materials saw their price increase, with the most significant jump in structural steel (75.1 percent) and bar steel (62.1 percent). Only Portland Concrete Cement (PCC) pavement saw a decline in pricing of 5.3 percent. This is also a shift. In previous updates, the pattern of input costs was mixed, with some increases and some decreases. The pattern now trends more uniformly toward price increases for inputs and, in some cases (e.g., steel), large price increases. All price changes for 2021 in the appendix are also second quarter 2020 to second quarter 2021, and again while those are “trough to peak”, that reflects the current price pressure in the economy. These price increases and large swings in costs from quarter-to-quarter reflect the recent market disruptions which have been impacting many industries throughout the nation. We suggest continued modeling at sixth month intervals to keep up to date on these evolving trends.

The Caltrans CCI has experienced fluctuations in the past year largely related to the supply chain disruptions caused by the pandemic. While these fluctuations remain within past thresholds of growth and contraction experienced by the CCI, with quarter-over-quarter (measured from first quarter 2021 to second quarter 2021) at 21.4 percent and year-over-year (second quarter 2020 to second quarter 2021) growth at 12.4 percent, they are still indicative of a turbulent market and significant cost shifts.

Appendix: Changes in Infrastructure Materials Costs 2016-2020 (all values are percent year-on-year changes)

Year	Aggregate	PPC Pavement	PCC Structure	Steel Structure	Steel Bar
2016	9.4%	8.6%	7.7%	35.0%	26.3%
2017	24.2%	106.8%	26.8%	-21.0%	-51.0%
2018	18.9%	25.9%	17.2%	9.4%	-58.8%
2019	4.6%	-11.1%	-4.2%	53.6%	0.8%
2020	14.9%	-20.5%	10.0%	-9.3%	-36.2%
2021*	16.3%	-5.3%	62.6%	75.1%	9.0%

*The annual 2021 change in value represents the change between Quarter 2 2020 and Quarter 2 2021.