ATTACHMENT B

Orange County Business Council
Orange County Transportation Infrastructure Construction Cost Pressure Index
Fall 2020
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, University of Southern California.
Benjamin Palmer – Research Associate, Orange County Business Council.

Background and Purpose

As a supplementary examination to the Next 10: 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, 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 the 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 memo describes the September 2020 update, with annual cost pressure index forecasts to 2023.

Findings and Discussion

OCBC has updated the Orange County Transportation Infrastructure Construction Cost Pressure Index forecast for the remainder of 2020 and for 2021, 2022 and 2023. Results, and a comparison to the previous February 2020 forecasts, are shown below.

Year	Index	Cost Increase Range (annual)	Index (Feb. 2020) with annual cost increase range
2020	0	-17% to -2%	3 (2% to 6%)
2021	1	-2% to 1%	2 (1% to 2%)
2022	1	-2% to 1%	2 (1% to 2%)
2023	3	2% to 6%	not estimated

Orange County Business Council
Orange County Transportation Infrastructure Construction Cost Pressure Index
Fall 2020
Prepared for the Orange County Transportation Authority

The cost pressure index value for 2020 has dropped precipitously, from a 3 (2% to 6% annual cost increases) in February to a 0 (a deflationary cost environment, -2% to -17% annual cost changes) in the current update. Note that an index of zero corresponds to the most extreme deflationary time periods observed in the infrastructure construction environment in California in the past 30 years. For the balance of 2020, the cost pressure index predicts a deflationary environment. Following that, the index rises to a 1 for the next two years (annual cost changes from -2% to 1%) and then recovers to a more normal value of 3 (2% to 6% annual cost increases) in 2023.

The key model inputs for this update are being driven by the 2nd quarter (Q2) of 2020. Key data items, including the unemployment rate in California and the cost of infrastructure building materials, are based on the most recent data which compares Q2 2020 with Q2 2019. Those data reflect the pandemic-related recession during Q2 but do not reflect any economic recovery after June 2020.

All key index values, but especially California's unemployment rate and building materials cost values, dropped on an annualized basis based on changes from Q2 2019 to Q2 2020. Orange County construction wage data post-pandemic are not yet available – the most recent wage data are for the 1st quarter (Q1) of 2020.

The cost pressure index model shows clear declining cost pressure, with a predicted deflationary cost environment for the balance of 2020. Note the quadrupling of the California unemployment rate (Table 1), which is based on changes in Q2 of 2020. Moving forward, the unemployment rate in the state could decline as the economy recovers. The model is built to be robust to large movements in the input data, but we recommend continued monitoring to assess the effect of future changes in the economic environment. If the Q2 2020 data which are currently driving the model improve as the economy reopens, the construction cost environment may continue to change.

The key structural change in the past six months is the shift from a low unemployment to a high unemployment economy. Housing production continues to slow statewide. Materials costs, as of Q2 2020, were down (see the appendix.) The key question is whether the unemployment rate changes will persist and how economic factors will translate into construction wages.

Overall, the model suggests the county is currently in, on average, a deflationary environment for infrastructure costs, with a near-zero inflation environment forecast for 2021 and 2022, with modest deflation possible in those years. There is no sign of upward cost pressure as of the most recent data. Given the rapid changes in economic conditions, frequent updates to the model are recommended.

Orange County Business Council
Orange County Transportation Infrastructure Construction Cost Pressure Index
Fall 2020
Prepared for the Orange County Transportation Authority

Recent Data Trends

Table 1 shows the values for 2016 through 2019 and the 2020 values based on projections from quarterly data. The construction wage data for 2020 are based on projections from the 1st quarter of 2020, with other 2020 values are based on Q2 2020 data. Building permitting in California is slowing and the unemployment rate quadrupled on an annual basis from Q2 2019 to Q2 2020. Building materials costs have fallen for all tracked materials with the exception of Portland Cement Concrete (pavement).

Table 1: Infrastructure Cost Correlates, Annual Percentage Changes, 2016-2020

Year	California Building Permits	% change year-on-year	California Unemployment Rate	% change year-on-year	OC Construction Labor Costs (average 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%	-12.1%	$74,669	4.5%
2019	109904	-3.2%	4.0%	-4.8%	$77,289	4.5%
2020*	84,707	-23%	16.6%	315%	$80,743 **	3.7%

* 2020 values projected from year-on-year changes in quarterly data, Q2 of 2019 to Q2 of 2020.

** Based on Q1 2020 data.

The Caltrans Construction Cost Index (CCI) dropped 25% from Q1 to Q2 of 2020 – a large decline but not unprecedented. The Caltrans CCI dropped by 20% quarter to quarter in Q2 2014, Q2 2015, and Q4 2019.

Forecasting Method

OCBC used a series of regression analyses and forward-looking projections to create the Infrastructure Construction Cost Pressure Index. This Index 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 Index ranking and the proposed range of cost fluctuations which have been provided on a low, midpoint, and high scale.

Orange County Business Council
Orange County Transportation Infrastructure Construction Cost Pressure Index
Fall 2020
Prepared for the Orange County Transportation Authority

Table 2: OCBC OC Transportation Infrastructure Construction Cost Pressure Index Score Ranking

Implied Range of Construction Cost Change

Index Score	Low	Midpoint	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%

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 Infrastructure Construction Cost Pressure Index, the OCBC team started by aggregating several datasets, measures, and indicators on an annual basis as far back as 1972. Among others, these measures included the Caltrans CCI, state-level building permits and unemployment rates, material costs, and construction labor costs.

The OCBC team examined how the various measures and indicators of construction costs varied with changes in (1) building permitting activity, (2) unemployment rates, (3) materials costs, (4) labor costs, 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 above.

Orange County Business Council
Orange County Transportation Infrastructure Construction Cost Pressure Index
Fall 2020
Prepared for the Orange County Transportation Authority

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%	8.5%	7.6%	26.3%	35%
2017	24.2%	106.8%	26.9%	-51.0%	-21%
2018	18.9%	25.9%	17.2%	-58.8%	9.4%
2019	4.6%	-11%	-4.2%	0.8%	53.4%
2020*	-15.9%	58.8%	-24.5%	-51.9%	-75.2%

* 2020 values projected from year-on-year changes in quarterly data, Q2 2019 to Q2 2020.