

Memo

To: Resource Investment Council

From: John Wilson
Economic Policy Analyst

Date: Oct. 24, 2017

RE: Construction Inflation Projections for SFY 2019 - 2028

Please find attached an annual update of recommended Construction Cost Index (CCI) inflation rates covering the upcoming 10-year Work Plan, including the STIP (2019 - 2022) and accompanying 6-year planning period ending in 2028. Communication of inflation factors to District estimators will follow TPIC consideration and resolution on approved levels.

I'd be happy to answer any questions on this analysis and welcome suggestions for future inflation forecasts.

Construction Inflation Projections for SFY 2019 - 2028

based on recent trends and available forecasting through September 2017

Recommended Action: Approve inflation projections of the Construction Cost Index (CCI) for individual SFYs of 2019 - 2022 STIP and the six-year planning period which follows (2023 - 2028) in aggregate. See shaded Forecast rows of the table below—recommendations appear with **bold highlight** in the rightmost column.

Recent Context & Projection Rationale

- SFY 2017 CCI deflation of 5% stands as the second-steepest year-over-year decline registered since 2000—trailing only SFY 2016’s drop of 8%. In a rare display of uniformity, all index elements contributed to the favorable cost environment, headlined by Roadway Excavation’s retreat from its spike in SFY 2016. Secondly, Bituminous Surfacing and Structural Concrete each accounted for about one percentage point of the total reduction.
- The recommendation is derived from a bottom-up analysis of the individual CCI components, described below, and weighted according to the CCI methodology to arrive at a composite annual inflation rate. The results can be considered alongside a benchmark price index for state and local construction spending. Historically, this independent national index has tracked MnDOT’s CCI within a precision of a percentage point or two when averaged over multiyear periods.

CCI Inflation History & Projections

| | SFY | Change in Price Index for State & Local Construction Spending (Benchmark) ¹ | Actual CCI Inflation ² | Oct. 2016 STIP+6 Guidance | Oct. 2017 STIP+6 Recommendation |
|-----------------|-------------|----------------------------------------------------------------------------------------|-----------------------------------|---------------------------|---------------------------------|
| ACTUAL | 2000 – 2012 | +5% | +6% | - | - |
| | 2013 | +3% | (4%) | - | - |
| | 2014 | +2% | +12% | - | - |
| | 2015 | +2% | +7% | - | - |
| | 2016 | +1% | (8%) | - | - |
| | 2017 | +2% | (5%) | (2%) | - |
| | 2013 – 2017 | +2% | +0% | - | - |
| FORECAST | 2018 | +3% | - | +7% | +3% |
| | 2019 | +3% | - | +7% | +6% |
| | 2020 | +2% | - | +6% | +4% |
| | 2021 | +3% | - | +5% | +4% |
| | 2022 | +2% | - | +3% | +4% |
| | 2019 – 2022 | +2% | - | +6% | +5% |
| | 2023 – 2028 | +2% | - | +3% | +3% |
| | 2019 – 2028 | +2% | - | +4% | +4% |

¹ IHS Markit (history from U.S. Department of Commerce, Bureau of Economic Analysis), index = JPGLGIS

² MnDOT, Office of Project Management & Technical Support

Backdrop & High-Level Notes on Inflation

1. The trajectories for emergence from recessionary conditions earlier in the decade continue to diverge by type of construction. Calendar year to August, Dodge Data & Analytics calculates the value of construction starts nationwide has fallen 1% over the same period in 2016, with the nonbuilding sector (of which highway and bridge construction starts made up a bit over 50% in 2016) dropping most sharply, down 12%--although public works slipped just 2%. The residential construction recovery has plateaued, posting 1% growth on the strength of single-family housing, while the nonresidential building segment has gained 5%. Total starts in the Midwest region are down 14%.³
2. The minutes from the July 25-26th Federal Open Market Committee summarize the Federal Reserve's current, stable reading of broad inflationary trends,

[I]nflation this year was expected to be similar in magnitude to last year, with an upturn in the prices for food and nonenergy imports offset by a slower increase in core personal consumption expenditures prices and weaker energy prices. Beyond 2017, the forecast was little revised from the previous projection, as the recent weakness in inflation was viewed as transitory. The staff continued to project that inflation would increase in the next couple of years and that it would be close to the Committee's longer-run objective in 2018 and at 2 percent in 2019.⁴

3. Close correlations have either been confirmed (items a-c, below) or are hypothesized (newly-introduced series, items d-f) between MnDOT's CCI and several other national construction inflation indexes. The last reference (item g) is shown as a broad, local indicator—but one that has not behaved like CCI in the past. Performance in these tracking indexes suggested values for MnDOT's measure in SFY 2017 of:
 - a. National Highway Construction Cost Index 2.0⁵ (FHWA), **(3%) (deflation)**
 - b. Non-Manufacturing Prices Index (Institute for Supply Management), +2%
 - c. Goods Inputs to (All) New Construction Producer Price Index (PPI) (Bureau of Labor Statistics [BLS]), **(4%)**
 - d. Construction for Government PPI (BLS), +1%
 - e. Goods Inputs to New (Highway, Other Heavy) Construction PPI (BLS), +2%
 - f. Goods and Services Inputs to Highways and Streets PPI (BLS), +2%
 - g. *Engineering News-Record* City Construction Cost Index for Minneapolis, +1%
4. Congressional passage of the Fixing America's Surface Transportation (FAST) Act in December 2015 ensures stable federal funding levels through FFY 2020, contingent on their implementation in annual appropriations bills. The authorization schedule includes a nominal inflationary adjustment of approximately +2% each year that is not expected to keep pace with highway construction cost escalation.

³ Press release, Sept. 21, <https://www.construction.com/news/new-construction-starts-august-recede-2-percent-sept-2017>

⁴ <https://www.federalreserve.gov/monetarypolicy/files/fomcminutes20170726.pdf#Page=5>

⁵ Press release, July 19, <https://www.fhwa.dot.gov/pressroom/fhwa1710.cfm>

5. Adding to the well-publicized narrative documenting the advanced age of highways and streets around our state and country—now averaging an all-time high of 28 years nationwide—is a broader observation: across all fixed assets tracked by the Bureau of Economic Analysis, including “vertical” building construction, the current average age of 23 years holds the record dating back to 1925. Construction backlog evidently pervades the sector and is not confined to transportation assets.⁶
6. Through the second half of SFY 2019, the latest reading of nationwide transportation construction industry sentiment is the brightest it’s been in the third calendar quarter since at least 2010 (rated a 69, with 50 defined as stable prospects and a value greater than 50 indicating confidence in current/anticipated growth), though on the decline after initially rallying with President Trump’s election and apparent commitment to boosting infrastructure investment. Transportation still outperforms the all-sector construction average (66) as well as the U.S. economy itself (63).⁷
7. The national unemployment rate (not seasonally adjusted) published by BLS for those who last worked in construction was 4.5% in June 2017—a major improvement from the mark of 20.1% recorded for June 2010. Reinforcing the tightness of construction labor supply, June also saw 225,000 open construction jobs of all types go unfilled, a level more than 30% higher than the prior year.⁸ Closer to home, labor market constraints for Twin Cities work have reportedly driven increases to prevailing commercial construction costs as high as five times the background inflation rate.⁹ Concrete workers were singled out among trades beset by particular scarcity in Minnesota, with almost half (46%) of respondents to a summer 2017 Associated General Contractors of America survey saying they were struggling to backfill retirees.¹⁰

Bituminous Surfacing

1. Bituminous surfacing makes up 43% of the CCI, with fixed dollar weights established in the base year of 1987, virtually matching its share of 42% 30 years later in SFY 2017.
2. MnDOT’s inflation for asphalt was flat, against a PPI change over the past year of (4%). However, the second calendar quarter’s (April - June) PPI has traditionally been the best predictor of MnDOT inflation, and this held up in SFY 2017 with the Q2 PPI also unchanged year-over-year.
3. No direct forecast of asphalt pricing available to the public has been discovered. (IHS Markit coverage can be obtained for a separate subscription fee but is only irregularly quoted in the *Engineering News-Record*.)
4. Indirectly, the prices for asphalt and oil products are expected—and were proven—to move together for two reasons:
 - a. asphalt binder (refined bitumen) is derived from distillation of crude oil or recovered from naturally-occurring (e.g. Canadian oil sands) deposits
 - b. fuel represents a sizable fraction of the delivered price for asphalt

⁶ *Construction Executive* article, Dec. 2016, p. 24, <http://tinyurl.com/y6vpndja>

⁷ *Engineering News-Record* article, Oct. 9, p. 47 (behind subscription paywall)

⁸ *Slate* article, Aug. 28, <http://tinyurl.com/yaq5wk8a>

⁹ *Star Tribune* article, July 5, <http://tinyurl.com/yaq5ar3e>

¹⁰ *Finance & Commerce* article, Aug. 31, “Minnesota contractors look far and wide...” (behind subscription paywall)

5. Given both the manufacture and transport explanatory effects, asphalt inflation is modeled as a function of the crude oil forecast (Brent benchmark). Additional analysis by Parsons Brinckerhoff has identified overall domestic macroeconomic output (expressed by real gross domestic product) as a second important independent variable.
6. Brent crude oil spot prices rebounded 15% in SFY 2017, after tumbling by 33+% for two consecutive years. Though still supportive of restrained price increases for finished products like asphalt, raw commodity economics do not typically translate proportionately downstream. An annual Energy Information Administration (EIA) survey¹¹ showed that total national atmospheric crude oil distillation capacity, a common measure of refinery size, stood at 18.6 million barrels per calendar day as of January 2017, only modestly (1.6%) higher than the prior reading and helped by the addition of another new Texas refinery. Encouragingly for paving end use, national deasphalting (separating asphalt from crude oil) secondary unit capacity grew more quickly, up 6.1%.
7. The Flint Hills Resources Pine Bend refinery in Rosemount is now the country's top-capacity asphalt producer at 45,000 barrels per day, following the closing of a slightly larger plant in New Jersey.¹² (The other refinery in the state, located in St. Paul Park and now owned by Tesoro Corp., can make just 1/3 of Pine Bend's volume.)
8. Asphalt and road oil output in the Minnesota-Wisconsin-Dakotas refining district notched up 3% in SFY 2016, but pulled back over SFY 2017 [(10%)], possibly dampened by recent weak pricing signals. Adding to this tightening, Midwest demand climbed 7% in SFY 2017. The ongoing regional recalibration is exemplified by the August sale of a minor asphalt-yield refinery in Superior, Wisconsin to Husky, an expanding Canadian oil sands producer looking to further vertically integrate downstream while quadrupling maximum seasonal (starting in late spring) asphalt output at the facility to around 35,000 barrels per day by 2018.¹³
9. The bituminous inflation forecast tied to GDP growth and crude pricing shows potential for a rapid double-digit rise in the fiscal year now underway (SFY 2018), before subsiding to a level of 4% for much of the 2020s.

Structural Concrete & Concrete Surfacing

1. All concrete applications constitute 31% of the CCI, split roughly 1/3 pavement, 2/3 structures. Concrete's total rose to 39% while the use profile tilted towards paving (40%) in the past fiscal year. However, as forecasted in last year's guidance notes, concrete pavement shrank to just a 27% dollar-share of all surfacing work in SFY 2017, down 15 points from the prior year statistic.
2. Both surfacing [+2%] and structural [(4%)] concrete experienced little (or negative) inflation in SFY 2017, potentially helped by heightened competition among contractors seeking to avoid idle capacity during a lower-volume construction season. The change in prices received by MnDOT undercut the moderately positive inflation published for the national ready-mix concrete PPI as well as the Midwest regional ready-mix sub-PPI [both +4%].

¹¹ Energy Information Administration "Today in Energy" article, July 12, <http://tinyurl.com/ycb3vbbg>

¹² Bloomberg News article, Feb. 3, <http://www.ttnews.com/articles/basetemplate.aspx?storyid=44811&page=1>

¹³ S&P Global Platts article, Aug. 15, <http://tinyurl.com/ya4ftqn4>

3. With respect to forecasting procedure, year-to-year variability around the long-term average inflation rate for concrete surfacing is governed by diesel (delivery) prices. Structural concrete continues to be handled separately through a regression relationship formulated by Parsons Brinckerhoff that weights component pricing changes in cement (primary) and rebar (secondary).

Roadway Excavation

1. Excavation contributes 14% to the CCI and dipped to 9% in SFY 2017.
2. Following the extreme inflation aberration [+43%] in SFY 2016, roadway excavation costs “returned to earth” by sinking 16% in SFY 2017. The pattern of quickly reversing course towards a baseline level after a 25%+ jump, as witnessed on four other occasions since 2000 (in SFYs 2002, 2005, 2011, and 2014), is again playing out. The excavation volume in SFY 2017 was more than double the 2016 haulage (4.7 million C.Y. vs. 2.1 million C.Y. previously), minimizing the potential for any one project with outlying (high) unit costs to sway the annual average.
3. Consequently, a similar resumption of the long-run mean is currently forecast for the STIP+6, following an immediate, one-year correction drawn from the average of the four earlier post-25%+ episodes.
4. A general correlation has emerged between unit excavation costs and diesel prices, and this connection will be the basis for ongoing forecasting while it holds. Diesel’s restrained pricing during the past four years—even after a modest bounce of +4% in SFY 2017—suggests current excavation costs have not yet fully corrected to their expected value based on the long-run trend over the past 15 years.
5. Following the closure of that remaining diesel-driven gap, residual variation in the excavation inflation rate from year to year is explained by differences in the material being excavated, removal location, replacement/embankment specifications, staging, movement efficiency (i.e. how many times the excavated material is “touched”), and other project specifics that are likely not finalized for construction scheduled many years from now.

Reinforcing & Structural Steel

1. Steel’s CCI share of 11% nearly mirrors last year’s project makeup, with SFY 2017’s structural steel magnitude just one percentage point below the fixed-basket weighting. More importantly, this snaps the two-year stretch of having no eligible, representative jobs employing structural steel—though the structural steel item still must be ignored when figuring relative significance in year-over-year subindex comparisons.
2. Volatility in steel prices is demonstrated by the double-digit inflation rates—positive or negative, for at least one of the steel subindexes—recorded in 13 of the 18 fiscal years going back to 2000, but not for SFY 2017.
3. Chinese government data shows that steelmakers succeeded in hitting their 2016 target of cutting 45 million tons of crude steel production capacity from a base of around 800 million tons. (To put this in perspective, U.S. steel output in 2015 was 87 tons.) This restraint has been felt on world markets this

year, with net Chinese steel exports down almost ⅓ through July versus 2016.¹⁴ The remaining extent of the annual oversupply within China is believed to amount to 100 million tons.¹⁵

4. The twin Atlantic storms that struck Texas and Florida this past August and September are expected to prove advantageous for domestic steel manufacturers in two ways:

Observers believe there were 500,000 to 1 million vehicles effectively junked by Hurricanes Harvey and Irma. This unfortunate scenario could be a beneficial double whammy for American [steel] mills. More automotive steel will be needed to replace those cars and trucks, and a surge in scrap steel from auto shredders will increase supply and presumably lower scrap prices for those same mills.¹⁶

5. Steel costs continue to be modeled over the STIP+6 time frame as tracking with the IHS Markit inflation factor for metals and metal products, anchored to the long-term average inflation rates historically experienced by MnDOT for reinforcing and structural steel. Structural also incorporates a GDP term, as recommended by the PB study cited above in the bituminous surfacing section.

Uncertainty

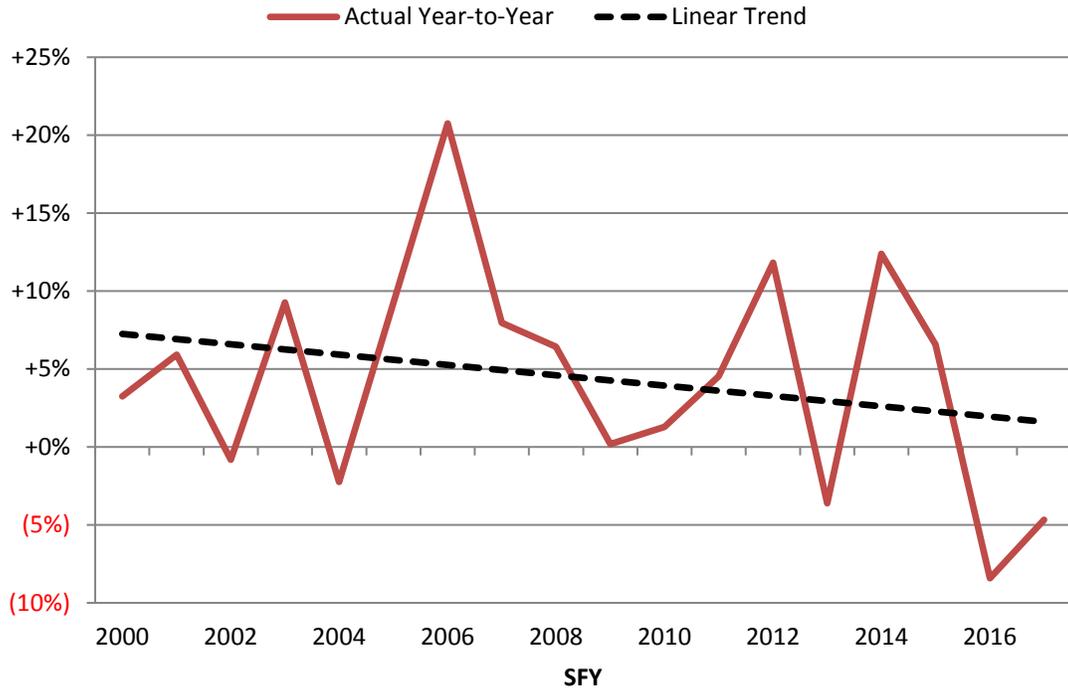
- Price jumps, and eventual drops during reversion to the long-term trend, are inherently difficult to anticipate years in advance. Continual, year-round monitoring of underlying market forces and recorded prices will be performed to detect sizable departures from forecast.

¹⁴ S&P Global Platts article, Aug. 16, <http://blogs.platts.com/2017/08/16/china-supply-side-reform-steel-metals-market/>

¹⁵ *The Economist* article, Apr. 24, <http://tinyurl.com/mn3nnp8>

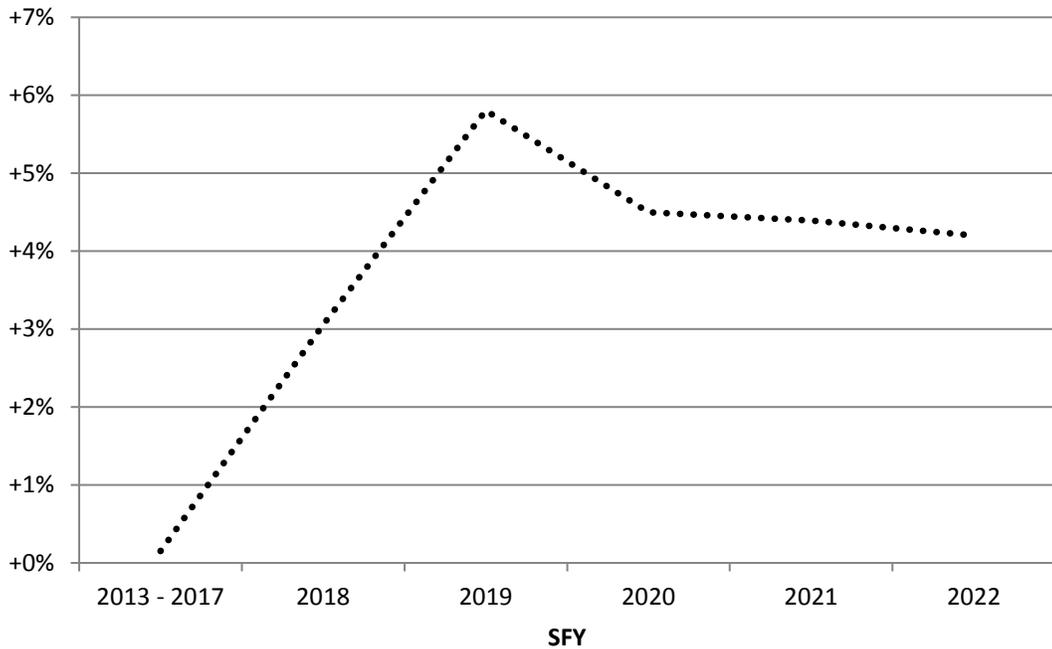
¹⁶ S&P Global Platts article, Sept. 13, <http://blogs.platts.com/2017/09/13/us-steel-market-new-direction-harvey-irma/>

CCI Inflation History & Regression Trend

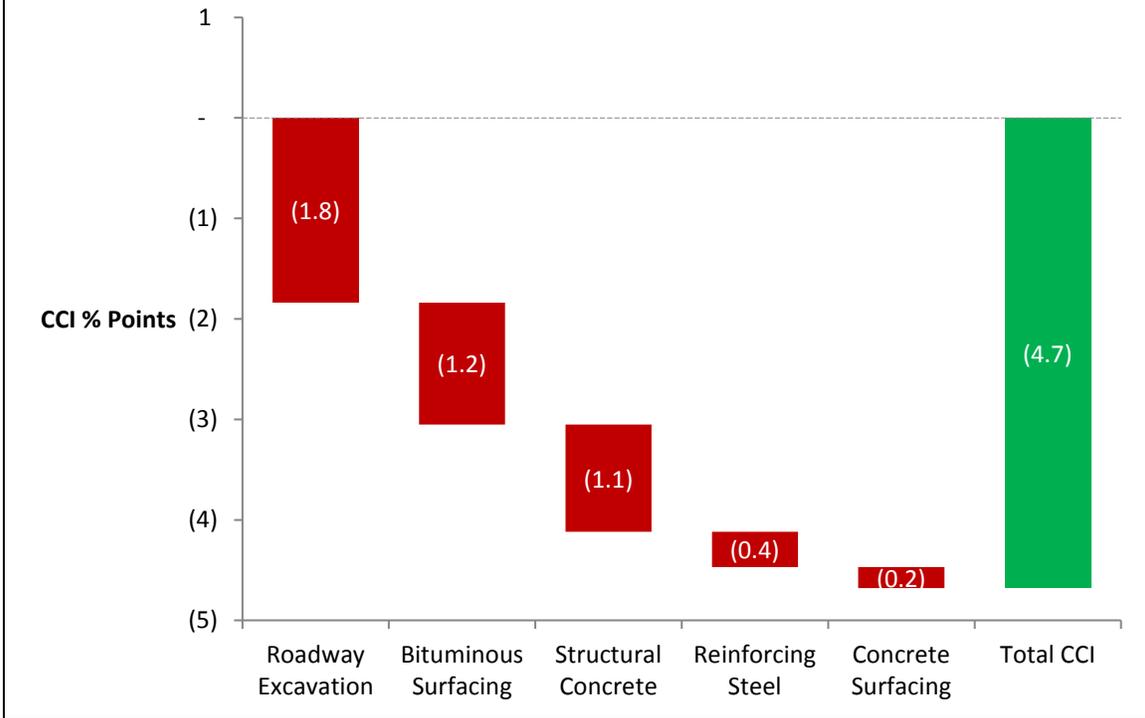


CCI Inflation STIP Projection

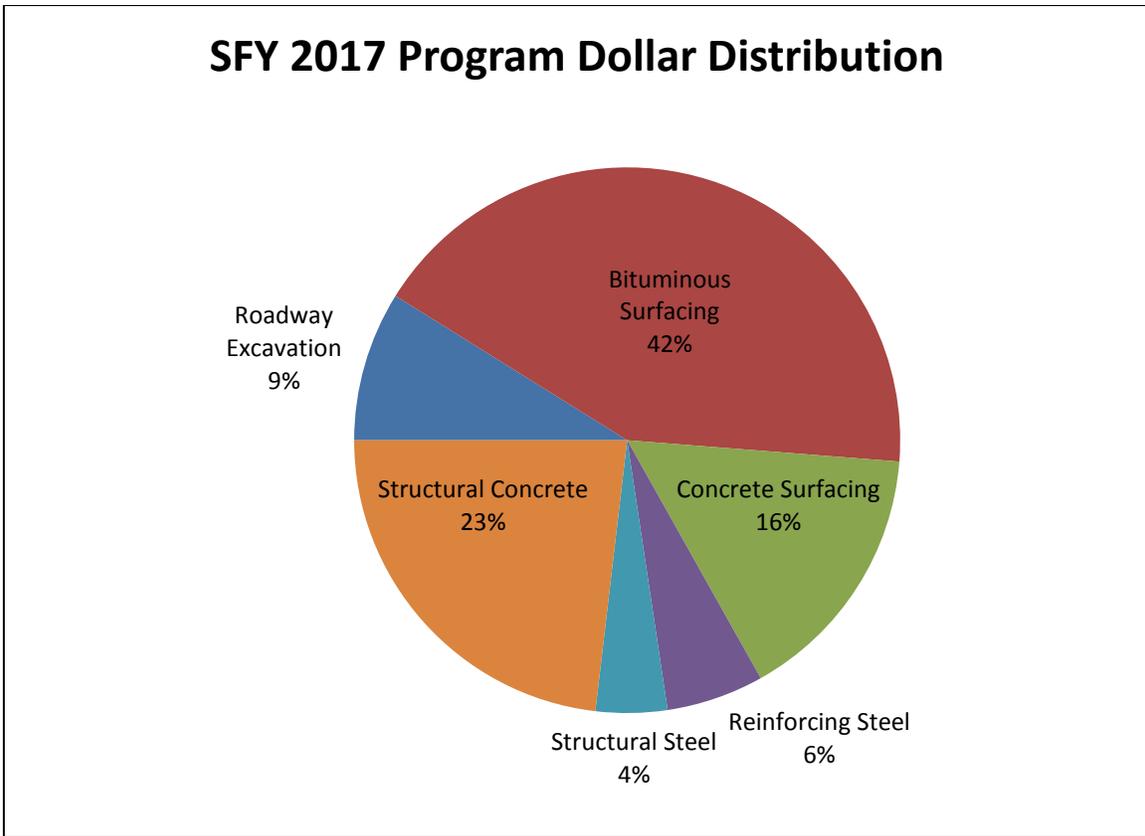
October 2017 outlook



Waterfall Breakdown of 2017 5% Deflation

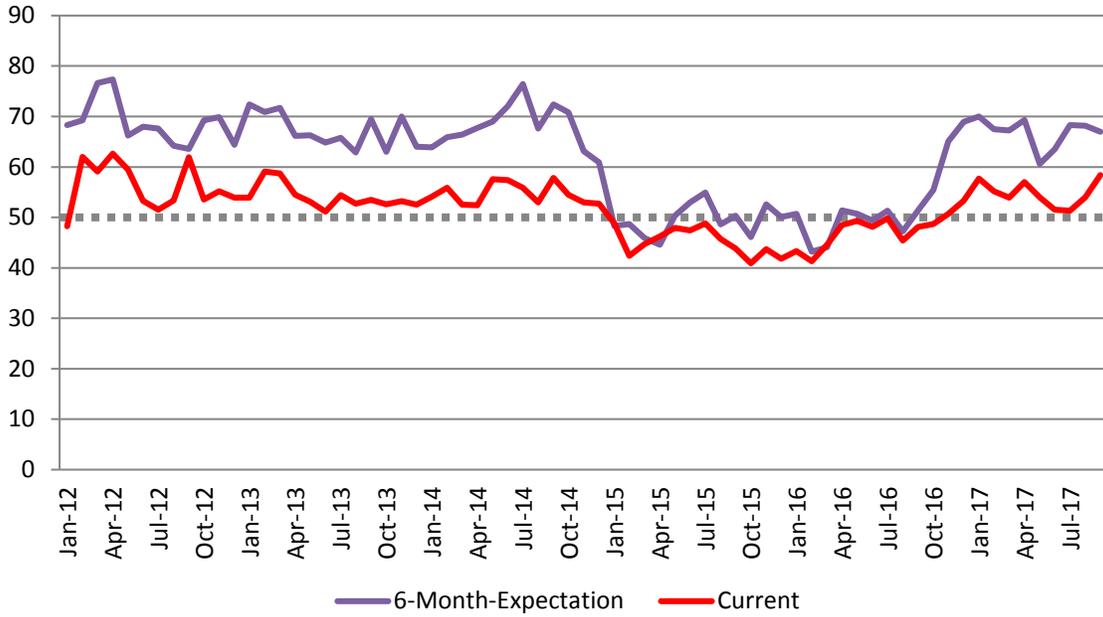


SFY 2017 Program Dollar Distribution



IHS-Procurement Executives Group Engineering and Construction Cost Index

50 = neutral sentiment



JPMorgan Global Manufacturing & Services Purchasing Managers' Index (PMI)[™]

50 = neutral sentiment

