

Construction Outlook 2024

Feb 2024

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Construction Analytics

<https://edzarenski.com/>

Construction Outlook 2024, based on data from:

Actual Jobs data includes BLS Jobs to Jan 15th, issued 2-2-24

Forecast includes US Census 2023 year-end spending issued 2-1-24

Forecast includes Dodge Outlook 2024 and Dec construction starts issued 1-20-24

Purpose and Method of Analysis

This report presents the Construction Outlook results of analysis using currently available actual and predicted national construction data to determine the impact of recent construction market activity and cost inflation and to forecast future construction activity, jobs and inflation.

This analysis is national level data.

All Adjusted Starts, Backlog, Cash Flow and Spending reported in the tables in this report is forecast from the construction starts data provided by Dodge Construction Network. The input data is new and forecast construction starts. Survey market share factors and cash flow curves applied are developed by Construction Analytics from historical actual starts and spending data. Actual Spending data is reported by U.S. Census. All jobs' data is from U.S. Census Bureau of Labor Statistics. Inflation indices are developed by Construction Analytics and inputs are from various named sources.

This analysis does not assume a recession on the horizon.

Summary of Analysis – Conclusions

STARTS – BACKLOG - SPENDING

For the same reason we saw a huge reduction in nonresidential and non-building construction starts in 2020 result in a drop in business volume in 2021 and again in 2022, we see an increase in starts in 2021, 2022 and 2023 result in spending increases in 2023 and 2024. The peak spending from starts, either lost or gained, generally occurs 1 to 2 years after the starts.

Total construction starts for 2021 were UP 16%. Nonresidential Buildings starts were UP 17%, Non-building Infrastructure starts were UP 7% and Residential starts were UP 20%.

Total construction starts for 2022 ended UP 20%. Nonresidential Buildings starts were UP 50%, Non-building Infrastructure starts were UP 24%, but Residential starts decreased -2%.

Total construction starts for 2023 ended down -4%, but Nonresidential Buildings starts finished down -7% and Non-building Infrastructure starts were UP 16%. Residential starts decreased -12% in 2023.

Total construction starts for 2024 are forecast up 7%. Nonresidential Buildings starts are forecast up 5% and Non-building Infrastructure starts up 8%. Residential starts are forecast up 10% in 2024.

Starting backlog is the estimate to complete (in this analysis taken at Jan 1) for all projects currently under contract. The last time starting backlog decreased was 2011. It's when new starts don't replenish the amount of spending in the year that backlog declines.

Construction Backlog leading into 2024, in every sector, is at all-time high, in total up 46% from Jan 2020. For years 2022 and 2023, backlog is up 11% and 12%.

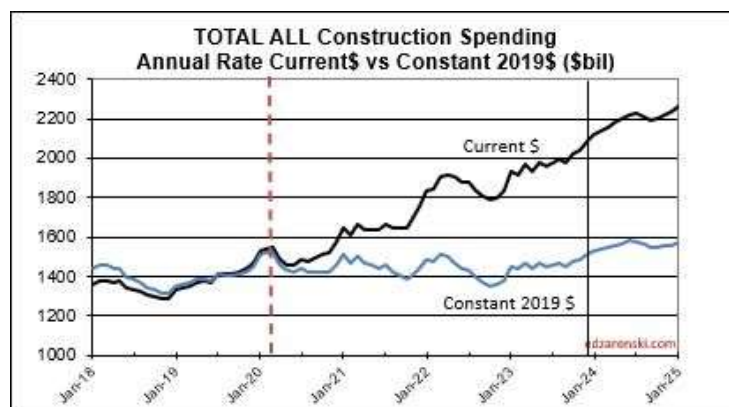
Residential backlog in 2024 is down 0.5%, but from such a previous high, essentially, starts are riding flat along the top. Starts are up 55% since Jan 2020.

Nonresidential Bldgs starting backlog for 2024 received a boost from all the starts in 2022 and 2023. Backlog is up 12% from 2023 and up 50% from Jan 2020.

Nonbuilding Infrastructure starting backlog is up 12% each of the last two years boosted by strong starts in 2022 and 2023. For 2024, backlog is up 40% from Jan 2020.

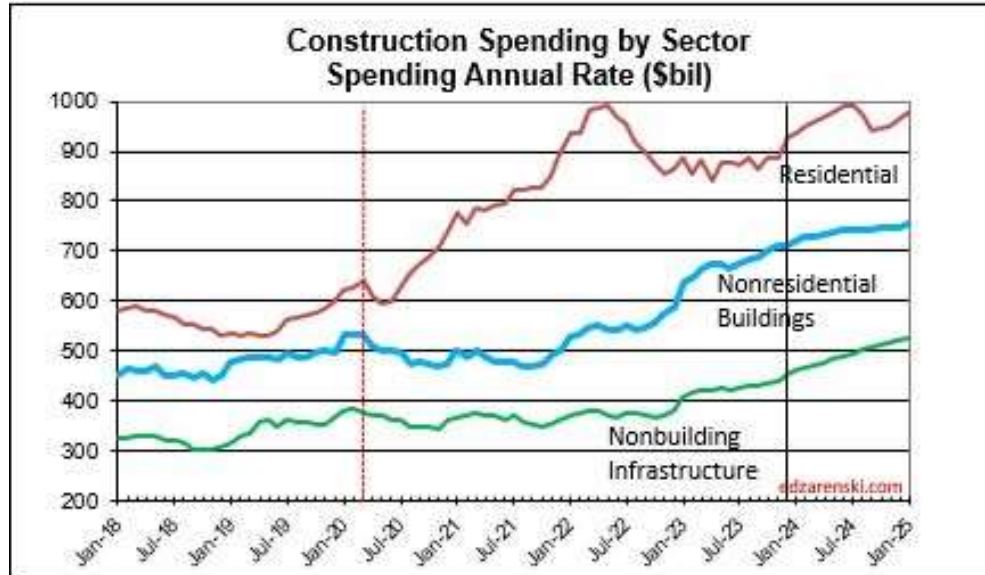
Manufacturing backlog increased nearly 300% from 2020-2024, from \$117bil going into 2020 to \$300bil beginning 2024. No other market has ever been close. Manufacturing was responsible for 60% of all the Nonres Bldgs spending growth in 2023.

Construction spending preliminary total for 2023 is up 7.0%. But inflation is near 5% of that. Except for Nonresidential Bldgs, spending increased 23%, even deducting inflation still leaves 75% of it as volume growth. Most of that growth is in Manufacturing buildings. Spending is up a total of 42% since 2019; up 8% in 2020, 10% in 2021, 12% in 2022 and now 7% in 2023. But volume after adjusting for inflation is up only 5% total. You can see the Constant\$ line, with one lower dip in 2022, has ranged between Constant\$1400bil. to \$1500bil. since mid-2019.



Construction spending total forecast for 2024 is up 10.7%. Nonresidential Buildings is forecast up 8.8%, Non-building Infrastructure up 15.8% and Residential up 9.7%. Lower inflation in 2024 means more of that spending is counting towards real volume growth. I'm expecting only 4% to 5% inflation for 2024, so, with a

forecast spending of 11%, **in 2024, real volume growth could reach 6%** for the first time since 2015. From 2012-2016, volume growth averaged 6%/yr. For the last four years, 2020-2023, 42% spending growth vs 37% inflation growth netted only 5% total real volume growth. Since 2017, volume growth averaged less than 1%/yr. Non-building Infrastructure volume could increase 10%+ in 2024.



PROJECT COST ESCALATION – INFLATION

General construction cost indices and Input price indices that don't track whole building final cost do not capture the full cost of inflation on construction projects. **To properly adjust the total cost of construction over time you must use actual final cost indices, otherwise known as selling price indices. (PPI) Final Demand Indices are an example of construction cost indices that represent whole building costs.**

Residential inflation indices are primarily single-family homes but would also be relevant for low-rise two to three story building types. Hi-rise residential work is more closely related to nonresidential building cost indices.

A nonresidential buildings index would be representative of commercial construction or hi-rise residential construction, since hi-rise residential is quite similar too commercial construction and in fact large portions of the building are constructed by firms classified as commercial constructors.

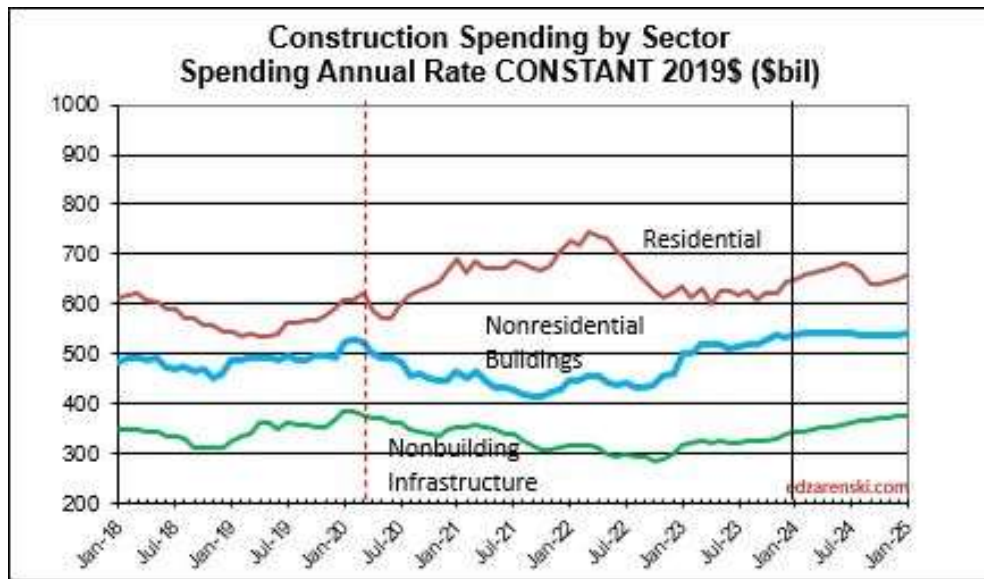
Current and predicted Inflation updated to Q4'23 1-13-24

- 2023 Rsdn Inflation 2.5%, Nonres Bldgs 5.4%, Nonbldg Infra 4.9%
- 2024 Rsdn Inflation 3.4%, Nonres Bldgs 4.5%, Nonbldg Infra 3.8%

VOLUME - JOBS

Volume = spending minus inflation. Spending includes inflation. Inflation adds nothing to business volume. Construction Spending drives the headlines. Construction Volume measures business growth

and drives jobs demand. Total Volume is forecast to increase 6% from 2023 to 2024. In 2020 and 2021, residential volume increased 10%/year. In 2023 Nonresidential Bldgs volume increased 16%. For 2024, the forecast predicts Nonbuilding volume up 11%.



When spending increases less than the rate of inflation, the real work volume is declining. The extent of volume declines impacts the jobs situation. Jobs are supported by growth in construction volume, spending minus inflation. From 2012-2016, volume growth averaged 6%/yr. For the last four years, 2020-2023, 42% spending growth vs 37% inflation growth netted only 5% total real volume growth. Since 2017, volume growth averaged less than 1%/yr. Non-building Infrastructure volume could increase 10%+ in 2024.

Construction Jobs increased 2.75% in 2023. We added 214,000 jobs. There are currently 8,056,000 construction jobs. The largest annual increase post 2010 is 321,000 jobs (+4.6%) in 2018. The average jobs growth since 2010 is 200,000 jobs per year, or average jobs growth of 3%/yr.

Since 2016, spending has increased 63%, volume after inflation increased 6% and jobs increased 19%. In the last 7 years, 2017-2023, jobs increased 2.5%/yr. Volume of work increased only 0.8%/yr. Volume and jobs should be moving together.

If jobs increase faster than volume, that adds to productivity losses and adds to inflation.

Terms - Construction Starts > Cashflow > Backlog > Spending > Volume

New Construction Starts (construction starts referred to in this report is Dodge Data Starts) is excellent data for forecasting. The process to produce the market activity information needed is outlined here.

The starts data is a survey. As in any survey, **STARTS data captures only a share of the total market or a portion of all construction spending, on average about 60% of all construction.** The easiest way to understand this is to compare total annual construction starts to total annual spending. National starts in recent years about \$800 billion/year, while spending in this period ranges from \$1,300 billion/year to \$1,500 billion/year. From this simple comparison we can see starts captures a share of about 60% of the total market. The actual share for each market varies from as low as 35% to as high as 70%.

In this analysis every market is adjusted by its own individual market share factor. The factors have been shown to produce a reliable prediction of total future market activity. See plot next page.

Construction starts data is needed to predict spending or the level of market activity. This provides insight into market costs and inflation. **To predict spending activity from new construction starts, the starts data must be spread over time using appropriate CASH FLOW curves.** On average about 20% of new nonresidential building construction starts get spent within the year started, 50% is spent the next year and 30% is spent in years three and four. The cash flow curves used in this model are market specific and can vary from the average. Applying a predicted duration for all starts depending on market type to produce a cash flow from starts data, the forecast pattern of spending is developed.

BACKLOG at the beginning of the year is how much remains to be completed for all the work in contract. Backlog or new starts within the year does not give an indication of spending within the year or next year. New starts within any given year could contribute spending spread out over several years. Total cash flow in the year, or spending, could include cash flow from projects that started or entered backlog years ago.

Backlog increases if new starts during the year is greater than spending during the year. However, an increase in backlog does not necessarily indicate there will be an increase in market activity. An increase in backlog could represent a level rate of market activity, but for a longer duration.

Cash flow provides the best indicator of how much and when SPENDING will occur. Cash flow from all previous starts gives a prediction of how spending will change monthly from all projects in backlog. Cash flow totals of all jobs can vary considerably from month to month, are not only driven by new jobs starting but also old jobs ending, and are heavily dependent on the type, size and duration of jobs.

One of the best predictors of construction inflation is the level of activity in an area. When the activity level is low, contractors are all competing for a smaller amount of work and therefore they may reduce bids. When activity is high, there is a greater opportunity to bid on more work and bids can be higher. The level of activity has a direct impact on inflation. **Inflation helps differentiate between spending, or revenue, and volume of work. VOLUME is spending minus inflation.**

New Construction Starts

Dodge Construction Network (DNC) monthly newsletter of construction starts by sector provides the data from which the following is summarized.

In recent years, Nonres Bldgs new starts averaged \$300 billion/year. In the 2nd half of 2022, starts averaged near \$500 billion/year. For the 1st half 2023 starts dropped to a rate of \$390bil./yr., which is still well above the recent average. Then, for 2nd half 2023, starts came back up to average \$430 billion/year, the 2nd highest half year average. A 50% increase in new nonresidential building starts in 2022 has a positive impact on the rate of construction spending in 2023 and 2024. It will continue to add lesser impact into 2025. Projects starting in 2nd half of 2023 could have midpoint of construction, point of peak spending, in 2024 or into 2nd half of 2025, some real long duration starts even later. **So, the major spending impact from starts is sometimes one or two years later.**

Residential construction (Dodge) starts posted the five highest months ever, all in the 1st 6 months of 2022. Starts achieved an all-time high in 2021 before the 1st half 2022 added another 6%. Then, in the second half of 2022, residential starts fell 15%. In Q1 2023, residential starts dropped another 12% below 2nd half 2022, the lowest average since Q1-Q2 2020, after two years of all-time highs. Finally in July and August, starts regained some strength coming in 33% higher than the lows in Q1. Residential starts finish 2023 down 12%. Forecast is up about 10% in 2024.

Nonresidential Buildings, in 2022 posted the largest ever one-year increase in construction starts, up 50%. Some of these starts will be adding to peak spending well into 2025. Nonres Bldgs starts in the 2nd half 2022 averaged 67% higher than any other 6-mo period in history. Starts fell 20% in the 1st half 2023 but still posted the 2nd highest 6-mo average ever. After two years of outstanding growth, Nonres Bldgs starts close 2023 down 8%. The forecast for 2024 is +5%.

Manufacturing starts, the market with the largest movement, gained 120% from 2020 to 2023. Manufacturing projects can have a moderately long average duration because some of these are multi-billion\$ projects and can have schedules that are 4 to 5 years.

Educational, Healthcare, Lodging and Public Buildings all had starts of 20% or more the last two years.

Non-building starts for the 6-mo period Mar-Aug 2023 posted the best 6 months on record, up 30% from the average of 2022. The 2nd half 2022 was up 50% over 1st half 2022. For 2023, Highway/Bridge and Power have the strongest gains. Total Non-building Starts for 2023 are up 16%. Non-building starts for 2024 are forecast up 8%.

Power starts are up 25% the last two years. Highway starts and Environmental Public Works are both up 33% the last two years and up 50% the last three years.

Total construction starts for 2023 ended down 4%, but Nonresidential Buildings starts finished down 7% and Non-building Infrastructure starts were UP 16%. Residential starts decreased 12% in 2023.

Total construction starts for 2024 are forecast up 7%. Nonresidential Buildings starts are forecast up 5% and Non-building Infrastructure starts up 8%. Residential starts are forecast up 10% in 2024.

The table below, Forecast Starts Adjusted, is model-generated by Construction Analytics. Starts are adjusted for calculated share of market captured to generate a value for starts needed to provide past and current spending, and to forecast future spending.

FORECAST STARTS ADJUSTED												
Construction Analytics		Change		Change		Change		Change		Change		
NEW STARTS ONLY		Yr/Yr		Yr/Yr		Yr/Yr		Yr/Yr		Yr/Yr		
\$ in millions 000,000	2020		2021		2022		2023		2024		2025	
TOTAL ALL MARKETS	1,597,512	10.3%	1,849,275	15.8%	2,058,203	11.3%	2,166,790	5.3%	2,325,516	7.3%	2,420,002	4.1%
RESIDENTIAL	700,158	19.4%	846,428	20.9%	912,191	7.8%	904,473	-0.8%	985,826	9.0%	1,059,051	7.4%
MANUFACTURING	107,829	24.0%	149,931	39.0%	200,763	33.9%	236,666	17.9%	257,148	8.7%	258,608	0.6%
OFFICE	91,534	0.4%	94,103	2.8%	99,597	5.8%	104,218	4.6%	105,954	-1.7%	106,906	0.9%
COMMERCIAL/RETAIL	100,619	11.7%	118,093	17.4%	128,320	8.7%	126,620	-1.3%	122,232	-3.5%	122,362	0.1%
EDUCATIONAL	103,453	-3.8%	106,049	2.5%	117,221	10.5%	129,508	10.5%	138,980	7.3%	145,863	5.0%
LODGING	21,820	-23.9%	20,058	-8.1%	22,544	12.4%	24,294	7.8%	27,562	13.5%	33,240	20.6%
HEALTHCARE	51,285	5.4%	56,117	9.4%	62,061	10.6%	65,973	6.3%	69,126	4.8%	72,574	5.0%
AMUSEMENT/RECREATION	28,330	-0.4%	30,332	7.1%	32,946	8.6%	35,514	7.8%	38,257	7.7%	41,759	9.2%
OTHER NONRES BLDGS	16,805	-10.9%	15,280	-9.1%	16,878	10.5%	19,584	16.0%	21,542	10.0%	23,261	8.0%
TOAL NONRES BLD MRKTS	521,675	4.2%	589,963	13.1%	680,328	15.3%	742,377	9.1%	780,800	5.2%	804,573	3.0%
POWER	117,078	0.7%	125,124	6.9%	139,814	11.7%	156,762	12.1%	169,532	8.1%	167,228	-1.4%
HIGHWAY/BRIDGE	116,062	8.5%	132,910	14.5%	154,560	16.3%	177,071	14.6%	194,417	9.8%	191,019	-1.7%
TRANSPORTATION	59,088	-1.4%	61,938	4.8%	65,308	5.4%	68,537	4.9%	68,959	0.6%	67,776	-1.7%
ENVIRON PUB WORKS	59,868	8.0%	68,803	14.9%	81,110	17.9%	91,970	13.4%	99,610	8.3%	103,192	3.6%
COMMUNICATIONS	23,583	1.5%	24,108	2.2%	24,890	3.2%	25,600	2.9%	26,373	3.0%	27,164	3.0%
TOTAL NONBLDG MRKTS	375,679	3.8%	412,883	9.9%	465,683	12.8%	519,940	11.7%	558,891	7.5%	556,378	-0.4%

Source: includes Dodge Data & Analytics Starts thru DEC 2023 edzarenski.com

Starts data captures a share of the total market or only a portion of all construction spending, on average about 60% of all construction. The easiest way to understand this is to compare total annual construction starts to total annual spending. National starts in recent years about \$800 billion/year, while spending in this period ranges from \$1,300 billion/year to \$1,500 billion/year. From this simple comparison we can see starts captures a share of about 60% of the total market. The actual share for each market varies from as low as 35% to as high as 70%. Before using starts data to forecast spending, starts here were adjusted for market share.

Construction Analytics	2016	2017	2018	2019	2020	2021	2022	2023	2024
Starts vs Spending									
\$ billions									
ALL CONSTRUCTION STARTS	722	782	810	850	796	932	1,112	1,110	1,192
% YR/YR GROWTH	8.7%	8.3%	3.6%	5.0%	-6.5%	17.2%	19.3%	-0.2%	7.4%
ALL CONSTRUCTION SPENDING	1,213	1,280	1,333	1,391	1,500	1,653	1,849	1,979	2,183
% YR/YR GROWTH	7.2%	5.5%	4.2%	4.3%	7.8%	10.3%	11.8%	7.0%	10.3%
RESIDENTIAL STARTS	297	307	330	331	352	426	418	365	406
% YR/YR GROWTH	9.8%	3.2%	7.7%	0.2%	6.3%	21.2%	-1.8%	-12.8%	11.2%
RESIDENTIAL SPENDING	486	546	564	553	644	809	927	875	961
% YR/YR GROWTH	10.8%	12.3%	3.3%	-1.9%	16.4%	25.6%	14.6%	-5.6%	9.8%

Starting Backlog

Starting backlog is the estimate to complete (in this analysis taken at Jan 1) for all projects currently under contract. The last time starting backlog decreased was 2011. If new construction starts in the year are greater than construction spending in the year, then for the following year starting backlog increases. It's when new starts don't replenish the amount of spending in the year that backlog declines.

Construction Analytics measures Backlog at the start of the year and growth vs backlog at the start of the previous year. This is different than the ABC Backlog indicator, which measures current month's backlog compared to previous year's total revenue.

80% of all nonresidential spending in any given year is from backlog and could be supported by projects that started last year or 3 to 4 years ago. Residential spending is far more dependent on new starts than backlog. **Only about 30% of residential spending comes from backlog and 70% from new starts.**

The table below, Forecast Starting Backlog, is model generated by Construction Analytics. Adjusted starts are spread over time to generate cash flow. A sum of spending each month/year, subtracted from start of year plus new starts provides Backlog.

FORECAST STARTING BACKLOG												
Construction Analytics	Change		Change		Change		Change		Change		Change	
STARTING BACKLOG ONLY	Yr/Yr		Yr/Yr		Yr/Yr		Yr/Yr		Yr/Yr		Yr/Yr	
\$ in millions 000,000	2020	2021	2022	2023	2024	2025						
TOTAL ALL MARKETS	1,238,251	4.0%	1,316,949	6.4%	1,467,393	11.4%	1,650,484	12.5%	1,809,402	9.6%	1,959,968	8.3%
RESIDENTIAL	187,012	4.2%	222,176	18.8%	268,473	20.8%	290,593	8.2%	289,136	-0.5%	313,910	8.6%
MANUFACTURING	117,023	7.1%	137,851	17.8%	182,417	32.3%	244,703	34.1%	301,199	23.1%	340,624	13.1%
OFFICE	102,225	5.8%	103,938	1.7%	106,275	2.2%	111,441	4.9%	116,856	4.9%	119,848	2.6%
COMMERCIAL/RETAIL	84,391	3.9%	93,152	10.4%	108,376	16.3%	119,354	10.1%	119,942	0.5%	116,309	-3.0%
EDUCATIONAL	114,241	1.1%	110,976	-2.9%	111,955	0.9%	121,461	8.5%	134,151	10.4%	144,963	8.1%
LODGING	23,148	-8.9%	18,105	-21.8%	16,127	-10.9%	17,606	9.2%	19,075	8.3%	21,494	12.7%
HEALTHCARE	50,594	4.9%	53,279	5.3%	57,798	8.5%	63,756	10.3%	68,388	7.3%	71,911	5.2%
AMUSEMENT/RECREATION	31,210	-1.2%	30,916	-0.9%	32,450	5.0%	35,052	8.0%	37,840	8.0%	40,775	7.8%
OTHER NONRES BLDGS	17,326	17.3%	16,250	-6.2%	14,722	-9.4%	15,659	6.4%	18,008	15.0%	19,993	11.0%
TOAL NONRES BLD MRKTS	540,159	3.8%	564,467	4.5%	630,120	11.6%	729,033	15.7%	815,459	11.9%	875,917	7.4%
POWER	205,465	3.1%	208,679	1.6%	216,937	4.0%	235,058	8.4%	260,935	11.0%	286,526	9.8%
HIGHWAY/BRIDGE	151,726	5.0%	162,717	7.2%	182,085	11.9%	209,643	15.1%	241,204	15.1%	269,460	11.7%
TRANSPORTATION	74,181	4.6%	74,535	0.5%	76,772	3.0%	80,493	4.8%	84,513	5.0%	86,293	2.1%
ENVIRON PUB WORKS	57,479	6.7%	61,885	7.7%	70,052	13.2%	82,019	17.1%	93,815	14.4%	102,799	9.6%
COMMUNICATIONS	22,229	-0.4%	22,491	1.2%	22,953	2.1%	23,644	3.0%	24,339	2.9%	25,065	3.0%
TOTAL NONBLDG MRKTS	511,081	4.1%	530,306	3.8%	568,800	7.3%	630,858	10.9%	704,807	11.7%	770,142	9.3%

Source: includes Dodge Data & Analytics Starts thru DEC 2023

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Construction Backlog leading into 2024, in every sector, is at all-time high, in total up 46% from Jan 2020. For years 2022 and 2023, backlog is up 11% and 12%. Reaching new highs in Backlog could mean

either not enough labor to support advancing growth so quickly or future workload from new starts is piling up faster than current companies can complete.

Residential backlog in 2024 is down 0.5%, but from such a previous high, essentially, starts are riding flat along the top. Starts are up 55% since Jan 2020.

Nonresidential Bldgs starting backlog for 2024 received a boost from all the starts in 2022 and 2023. Backlog is up 12% from 2023 and up 50% from Jan 2020.

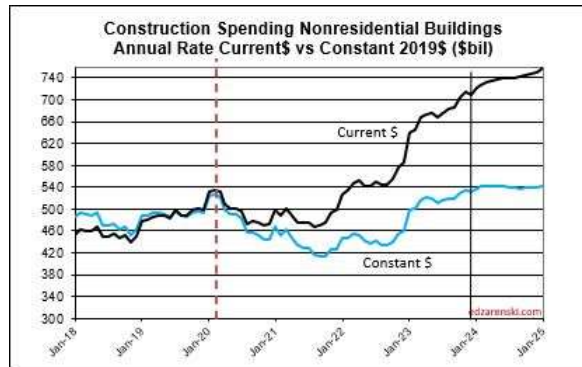
Nonbuilding Infrastructure starting backlog is up 12% each of the last two years boosted by strong starts in 2022 and 2023. For 2024, backlog is up 40% from Jan 2020.

Manufacturing backlog increased nearly 300% from 2020-2024, from \$117bil going into 2020 to \$300bil beginning 2024. No other market has ever been close. Manufacturing was responsible for 60% of all the Nonres Bldgs spending growth in 2023. It was also responsible for 60% of the Backlog growth leading into 2024. Nonres Bldgs has a total 3.6 million jobs and has never increased by more than 150,000 jobs in one year. Manufacturing is 30% of all Nonres Bldgs spending, so assume 30% of Nonres Bldgs jobs. That's 1.2million jobs supporting just Manufacturing projects. So Backlog of \$300bil, at 5000 jobs per billion per year, would need 1,500,000 jobs for a year. With a 1,200,000 jobs share of the workforce, that backlog would provide support for 15 months. Of course, new starts add to support throughout the year, but the calculation of how long backlog would support that market segment is valuable.

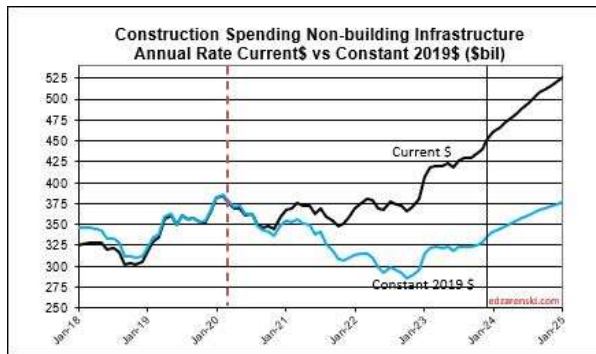
Backlog at the beginning of the year or new starts within the year does not give an indication of what direction spending will take within the year. Backlog is increasing if new starts during the year is greater than spending during the year. An increase in backlog could immediately increase the level of monthly spending activity, or it could maintain a level rate of market activity, but spread over a longer duration. In this case, there is some of both in the forecast. It takes several years for all the starts in a year to be completed. Cash flow shows the spending over time.

Current Rate of Spending

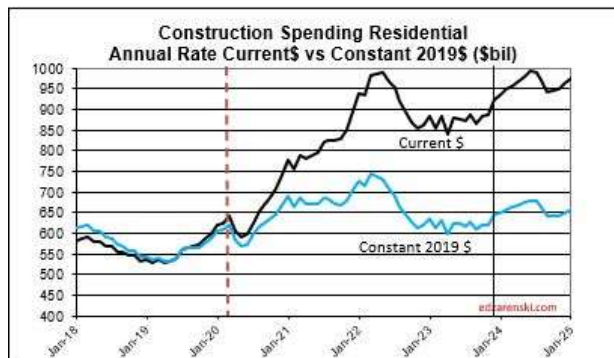
The current seasonally adjusted annual rate (SAAR) of spending gives an indication of how spending will perform in the following year. As we begin 2024, the current rate of spending (SAAR) for **Nonresidential Buildings** in Q4'23 is \$709bil., already 4.5% higher than the average for 2023 (\$677bil). If spending stays at the current level and no additional growth occurs, Nonresidential Bldgs spending will finish 2024 up 4.5%. Spending would need to have more monthly declines than increases to finish the year up less than 4.5%. The current forecast shows a monthly SAAR rate of growth for Nonresidential Bldgs. averaging about 0.5%/mo in 2024, so we have a minimum, but we can expect 2024 total spending to rise considerably higher than the current rate.



Non-building Infrastructure current rate of spending is now 3.7% higher than the average for 2023, however the forecast is indicating steady growth of 1%/mo for all of 2024.



Residential current rate of spending is 2.4% above the 2023 average and is forecast to average an increase of just under 1%/mo for 2024.



2024 Construction Spending Forecast

Starts lead to spending, but that spending is spread out over time. Starts represent a contract award. Spending takes the amount of that contract award and spreads it out by a cash flow curve over the duration of the job. An average spending curve for the sum of nonresidential buildings is 20:50:30 over three years. Only about 20% of new starts gets spent in the year started. 50% gets spent in the next year and 30% in YR3/4. An average spending curve for Non-building Infrastructure is more like 15:30:30:20:5. The effect of new starts does not show up in spending immediately.

For example: If 2024 posts an additional \$100 billion in **new starts for Infrastructure**, only about \$15 billion of that would get put-in-place in 2024. The cash flow schedule for that \$100 bil of new starts would extend out over 3 to 5 years. Most of that \$100 bil would get spent in 2025 and 2026.

Total Construction Spending \$2,190 billion +10.7% over 2023.

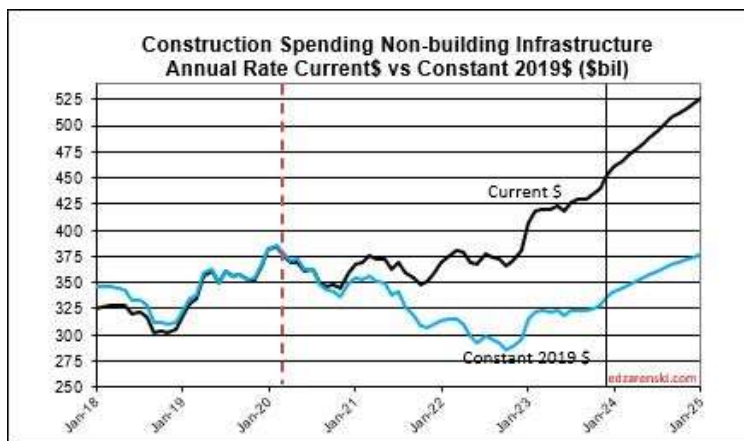
Nonresidential Buildings \$737 billion +8.8% over 2023.

Non-building Infrastructure \$493 billion +15.8% over 2023.

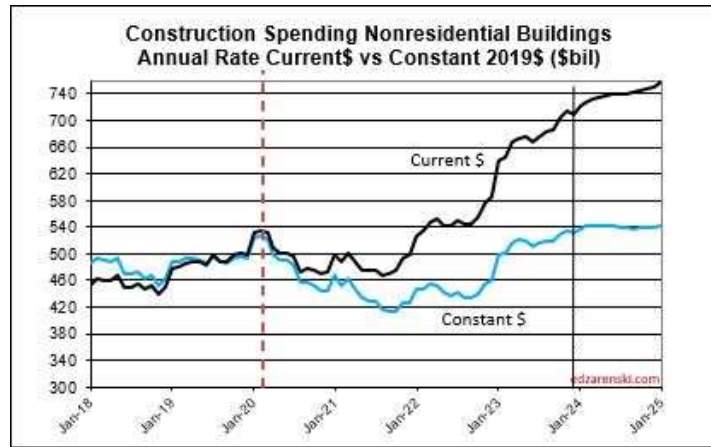
Residential Buildings \$960 billion +9.7% over 2023.

This forecast does not include a recession.

The **Non-Building Infrastructure** spending forecast for 2024 is most affected by the fact that Highway new starts and Public Works new starts, for the last three years have increased by an average 15%/yr. Also starts have been greater than spending each of the last three years, so backlog is also increasing, by 15%/yr.



The **Nonresidential Buildings** spending forecast for 2024 is most affected by Manufacturing. For the last three years starts have increased by an average 30%/yr. Also starts have been greater than spending each of the last three years, so backlog is also increasing, by 30%/yr.



The largest increases to construction spending in 2023 are Manufacturing +\$80bil, riding on a 150% increase in starts over the last three years; Highway +\$20bil, supported by 70% growth in starts since 2020; Public Utilities (Sewage and Waste, Water Supply and Conservation-Rivers-Dams) +15\$bil, with 66% growth in starts and Educational +\$14bil.

Residential regains the top growth spot in 2024 with a forecast spending increase of +\$68bil. Manufacturing is forecast to add +\$32bil. Highway gains +\$26bil, Power +\$24bil and Educational gains +\$15bil.

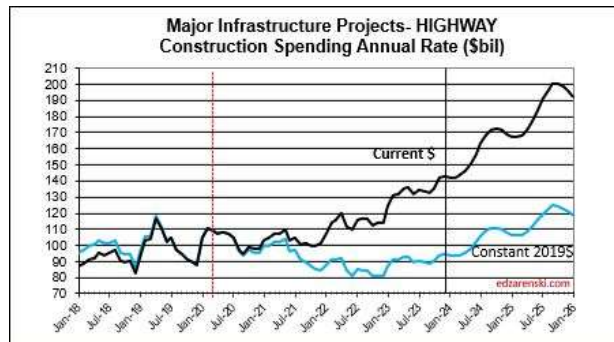
U.S. Total Construction Spending Summary										
\$ in billions % growth vs prior yr	Actual 2021		Actual 2022		Preliminary 2023 as of Dec'23		Forecast 2024 as of Dec'23		Forecast 2025 as of Dec'23	
	Total Construction	1653	10.3%	1849	11.8%	1979	7.0%	2190	10.7%	2358
Residential	809	25.6%	927	14.6%	875	-5.6%	960	9.7%	1030	7.3%
Nonresidential Buildings	483	-2.5%	549	13.7%	677	23.4%	737	8.8%	776	5.3%
Nonbuilding Infrastructure	362	0.4%	372	3.0%	426	14.4%	493	15.8%	553	12.0%
Educational	101.0	-8.8%	102.1	1.1%	115.8	13.4%	131.4	13.5%	141.6	7.8%
Healthcare	50.3	3.6%	54.8	8.8%	62.9	14.9%	66.1	5.1%	68.7	3.9%
Amusement / Recreation	27.1	-4.2%	30.0	10.7%	32.5	8.2%	35.9	10.5%	37.9	5.7%
Commercial / Retail	97.4	8.6%	121.4	24.6%	131.6	8.5%	128.8	-2.1%	122.1	-5.2%
Lodging	19.1	-33.0%	19.7	3.5%	23.6	19.3%	23.4	-0.6%	27.3	16.7%
Office	89.9	-3.2%	91.6	1.9%	98.8	7.8%	103.9	5.2%	106.1	2.1%
Manufacturing	82.0	8.8%	114.7	39.8%	195.6	70.5%	227.6	16.4%	250.6	10.1%
Religious + Public Safety	15.9	-24.7%	14.5	-8.8%	16.7	14.8%	19.9	19.3%	21.7	9.0%
Power	119.1	0.8%	109.8	-7.8%	122.4	11.4%	146.7	19.9%	168.2	14.7%
Highway / Bridge / Street	103.4	1.0%	114.1	10.4%	134.5	17.9%	160.6	19.4%	187.6	16.8%
Transportation / Air / Rail	59.1	-2.7%	58.7	-0.6%	63.8	8.7%	68.6	7.4%	69.2	0.9%
Sewer / Water / Conservation	57.0	3.6%	65.5	14.9%	80.5	22.9%	91.0	13.1%	99.8	9.6%
Communication	23.1	-3.3%	24.3	5.3%	24.9	2.3%	26.4	6.2%	27.8	5.4%
Forecast includes U.S.Census DEC 2023 year-to-date spending issued 2-1-24										
Actual Spending data includes revisions 2021-2022 issued 7-3-23										
Forecast includes Dodge Starts through DEC 2023										

One big question is how did the forecast for **Manufacturing** increase so much since the beginning of 2023. Since January 2023, the starts forecast for 2023 increased by 35%. How much of that 35% is real growth in starts vs an increase in the capture rate of data gathering is yet to be determined, but has an impact of 2023-2024 spending. Also, starts for future years were increased by 50%. Starts (contract awards) drives up the spending forecast, since spending is a function of the future monthly cash flow (spending) of starts.

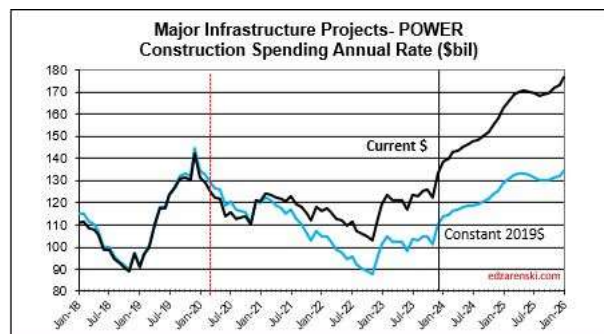
As we begin the year, **Manufacturing** SAAR current rate of spending is already 8% higher than the average for 2023. The current rate of spending is increasing at an average of near 2%/month for the next 6 months, then slows or dips slightly for the remainder of the year, indicating total spending for 2024 will finish well above the current rate of 8%. I'm forecasting 16% growth for the year.



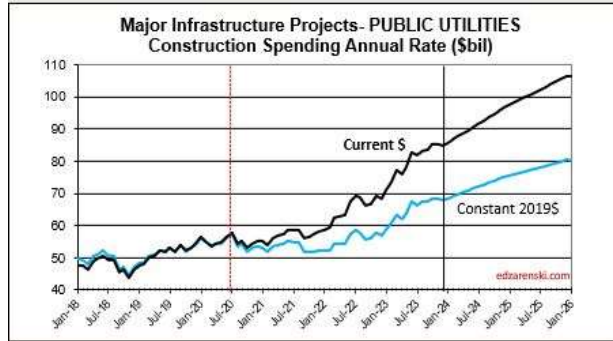
Highway SAAR rate of spending begins the year 6.5% higher than the average for 2023, with the current rate increasing at an average of 1%/month for all of 2024, indicating total spending for 2024 will finish well above the current rate of 6.5%. My forecast is for 19% growth in 2024.



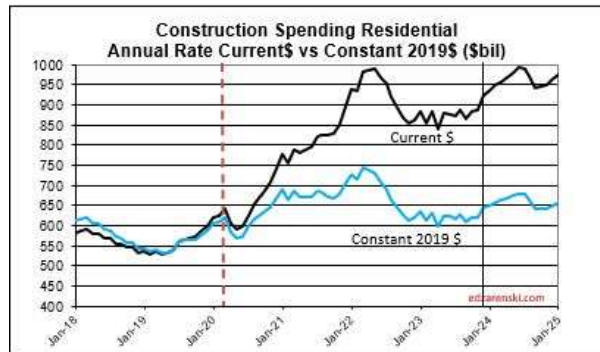
Power SAAR rate of spending begins the year 4% higher than the average for 2023, with the current rate increasing at an average over 1%/month for 2024, indicating total spending for 2024 will finish much higher. My forecast is for 20% growth in 2024.



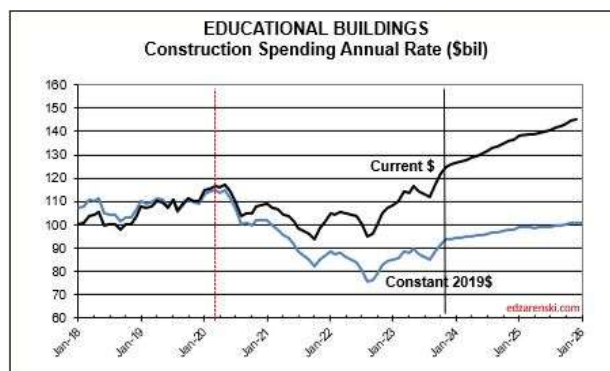
Public Utilities SAAR rate of spending begins the year 6% higher than the average for 2023, with the current rate increasing at an average over 1%/month for 2024. My forecast is for 13% growth.



Residential regains the top spot in 2024 with a forecast spending increase of \$68bil. Residential SAAR rate of spending in Q4'23 was up 2.5% over 2023, but December was up 5%. So we begin the year 2.5% to 5% higher than the average for 2023. The rate of spending is forecast to increase 1%/month for 6 months, then fall 0.5%/mo for H2 2024. My forecast is for 10% growth in 2024.

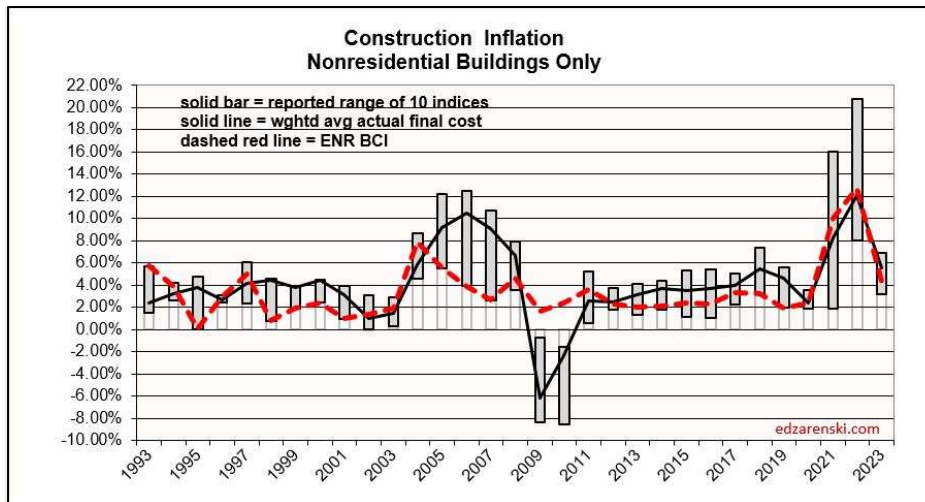


Educational SAAR rate of spending begins 2024 7% higher than the average for 2023, and the current rate is increasing at an average of 0.7%/month for 2024. My forecast is for 13% growth.



Inflation

The following **Construction Inflation plot (for Nonresidential Buildings only)** shows three elements: 1) a solid grey bar reflecting the max and min of the 10 indices I track in my weighted average inflation index, 2) a solid black line indicating the weighted average of those 10 indices, and 3) a dotted red line showing the Engineering News Record Building Cost Index (ENR BCI). Notice the ENR BCI is almost always the lowest, or one of the lowest, indices. ENR BCI, along with R S Means Index, unlike final cost indices, do not include margins or productivity changes and in the case of ENR BCI has very limited materials and labor inputs.



Final cost indices represent total actual cost to the owner and are generally higher than general indices. Producer Price Index (PPI) INPUTS to construction reflect costs at various stages of material production, generally do not represent final cost of materials to the jobsite and do not include labor, productivity or margins. Even with that, a PPI Inputs index +20% for a material could be only a +5% final cost. PPI Final Demand indices include all costs and do represent actual final cost. The solid black line (above) represents the Construction Analytics Building Cost Index for Nonresidential Bldgs and is a final cost index.

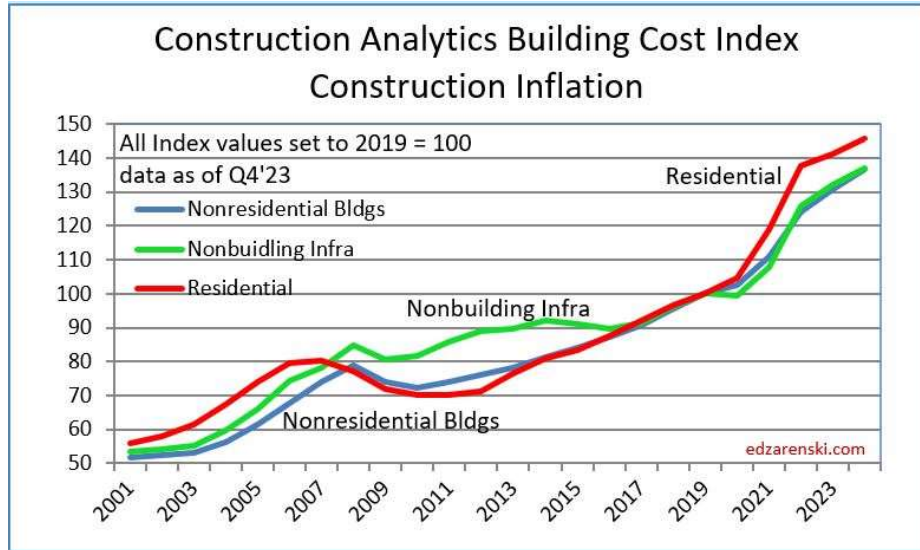
CONSTRUCTION ANALYTICS INDEX ESCALATION from Prev Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
nonresidential bldgs	3.5%	3.7%	4.0%	5.4%	4.7%	2.4%	8.2%	12.1%	5.4%	4.3%	3.8%
nonbuilding	-1.2%	-1.6%	2.1%	5.2%	4.0%	-0.5%	8.2%	17.0%	4.9%	3.8%	3.5%
residential	3.1%	4.7%	5.5%	4.7%	3.5%	4.5%	13.9%	15.7%	2.5%	3.4%	3.6%

All data updated to Q4'2023 where available

This short table shows the inflation rate for each year. Useful to compare to last year, but you would need to mathematically do the compounding to move over several years. The plot below shows the cumulative inflation index, or the cumulative compounded effect of inflation for any two points in time.

30-year average inflation rate for residential and nonresidential buildings is 3.7%. Excluding deflation in recession years 2008-2010, for nonresidential buildings is 4.2% and for residential is 4.6%.

Reference Inflation Data [Construction Inflation 2024](#)



Deflation is not likely. Only twice in 50 years have we experienced construction cost deflation, the recession years of 2009 and 2010. That was at a time when business volume dropped 33% and jobs fell 30%. During two years of the pandemic recession, volume reached a low down 8% and jobs dropped a total 14%. But we gained back far more jobs than volume. That means it now takes more jobs to put-in-pace volume of work. That increases inflation.

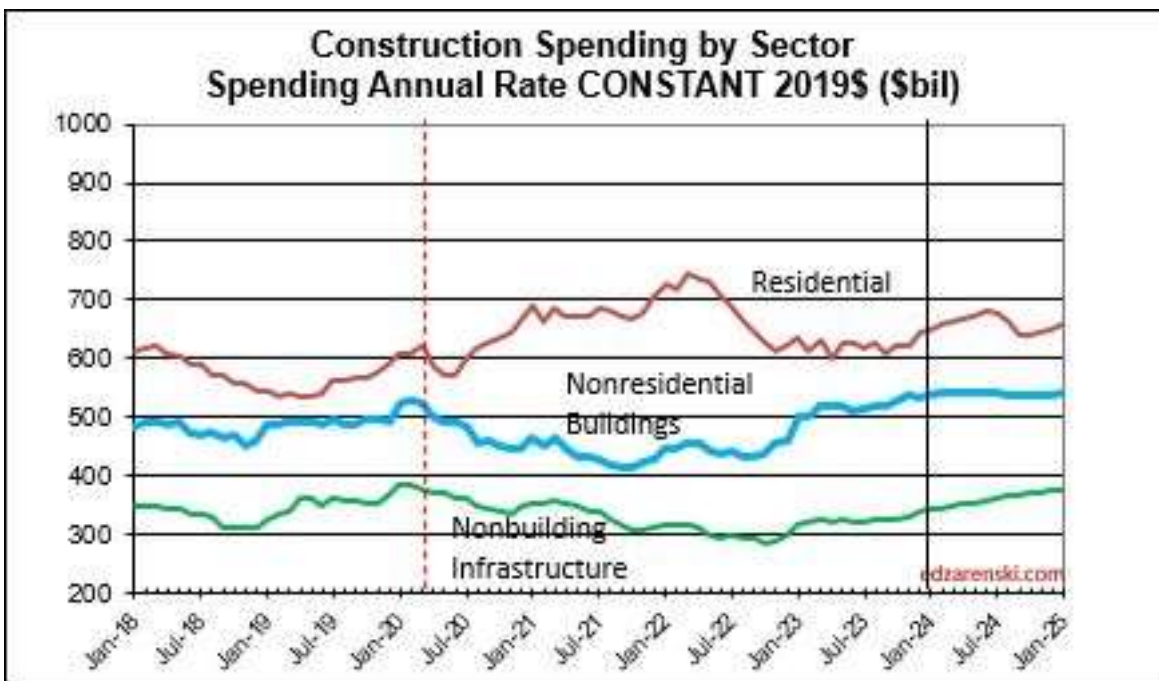
Typically, when work volume decreases, the bidding environment gets more competitive. We can always expect some margin decline when there are fewer nonresidential projects to bid on, which typically results in sharper pencils. However, when labor or materials shortages develop or productivity declines, that causes inflation to increase. We can also expect cost increases due to project time extensions or potential overtime to meet a fixed end-date.

Current \$ Spending, Inflation and Constant \$ Volume

Volume = spending minus inflation. Spending includes inflation. Inflation adds nothing to volume.

Many construction firms judge their backlog growth by the remaining estimate to complete of all jobs under contract. The problem with that, for example, is that Nonresidential Buildings spending (revenues) increased 14% in 2022, but after adjusting for 12% inflation the actual volume of work was up only 2%. By this method, firms are including in their accounting an increase in inflation dollars passing through their hands. Spending includes inflation, which does not add to the volume of work.

Total volume for 2024 is forecast up 6.4%. Residential volume is forecast up 6%. Nonresidential Bldgs volume is forecast up 4% and Non-bldg volume is forecast up 11%.



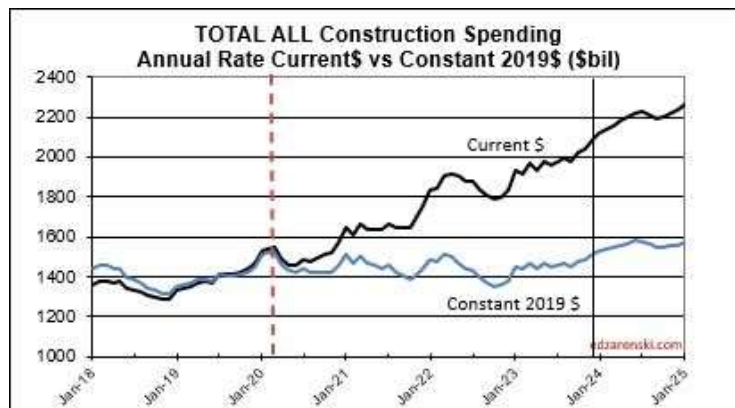
Inflation adjusted volume is spending minus inflation, or to be more accurate, spending divided by (1+inflation). Inflation adds nothing to volume growth. The following table shows spending, inflation and volume (spending without inflation) for each year. Spending is current to the year stated. The values in the constant table are indexed to a constant value year, 2019. This shows business volume year to year, can be a lot different than spending would indicate. When inflation is positive, volume is always less than spending by the amount attributed to inflation.

Lower inflation in 2024 means more of that spending is counting towards real volume growth. Expecting only 4% to 5% inflation for 2024, **real volume growth could reach 6%** for the first time since 2015. From 2012-2016, volume growth averaged 6%/yr. For the last four years, 2020-2023, 42% spending growth vs 37% inflation growth netted only 5% total real volume growth. Since 2017, volume growth averaged less than 1%/yr. Non-building Infrastructure volume could increase 10%+ in 2024.

CONSTRUCTION OUTLOOK 2024

CONSTRUCTION SPENDING Current \$	2019	2020	2021	2022	2023	2024	2025	
Buildings	488.9	495.2	482.8	548.8	677.4	737.0	776.0	
% change year over year	8.0%	1.3%	-2.5%	13.7%	23.4%	8.8%	5.3%	
Non-building heavy engr	348.7	360.2	361.7	372.5	426.1	493.3	552.6	
	10.1%	3.3%	0.4%	3.0%	14.4%	15.8%	12.0%	
Residential	553.4	644.3	809.0	927.4	875.3	960.0	1029.9	
	-1.9%	16.4%	25.6%	14.6%	-5.6%	9.7%	7.3%	
SPENDING Current \$	1391.0	1499.6	1653.4	1848.7	1978.7	2190.3	2358.5	
Spending Growth %	4.3%	7.8%	10.3%	11.8%	7.0%	10.7%	7.7%	
CONSTRUCTION INFLATION INDEX	2019	2020	2021	2022	2023	2024	2025	
INFLATION NONRES BLDGS	4.7%	2.4%	8.2%	12.1%	5.4%	4.5%	3.8%	
INFLATION NONBLDG INFRA	4.0%	-0.5%	8.2%	17.0%	4.9%	3.8%	3.5%	
INFLATION RESIDENTIAL	3.5%	4.5%	13.9%	15.7%	2.5%	3.4%	3.6%	
Index - constant NONRES BLDGS	1.000	1.024	1.109	1.243	1.309	1.368	1.421	
Index - constant NONBLDG INFRA	1.000	0.995	1.077	1.259	1.320	1.370	1.418	
Index - constant RESIDENTIAL	1.000	1.045	1.191	1.377	1.412	1.459	1.512	
CONSTANT TO 2019\$ = Volume over time	2019	2020	2021	2022	2023	2024	2025	
Buildings	490.7	482.7	434.6	445.1	518.2	539.7	546.9	
% change year over year	3.2%	-1.6%	-10.0%	2.4%	16.4%	4.1%	1.3%	
Non-building heavy engr	351.2	360.8	334.2	300.0	323.5	358.9	388.6	
	6.3%	2.73%	-7.4%	-10.2%	7.8%	10.9%	8.3%	
Residential	554.3	612.4	679.0	685.5	622.3	659.4	681.8	
	-5.6%	10.5%	10.9%	1.0%	-9.2%	6.0%	3.4%	
SPENDING Constant \$	1396.3	1455.8	1447.8	1430.6	1464.0	1558.0	1617.4	
Current Year Total Growth \$bil	3.1	59.6	-8.0	-17.2	33.4	94.0	59.4	
Constant \$ growth % = Volume over time	0.2%	4.3%	-0.6%	-1.2%	2.3%	6.4%	3.8%	
data includes Census spending 2-1-24							edzarenski.com	

Spending during the year is the value of business volume plus the inflation on that volume. When inflation is 12%, volume plus 12% = total spending. Revenue is generally measured by spending put-in-place during the year. Therefore, Revenue does not measure volume growth. In 2022, Nonresidential buildings inflation was 12%, so business volume was 12% less than spending, or 12% less than revenue. Residential volume was 15% less than spending.

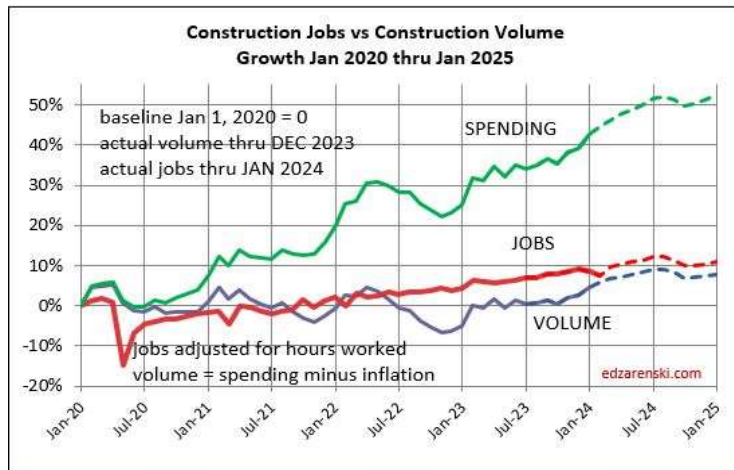


When referencing Constant \$ growth, remember the dollars for all years are reported here as 2019\$. If the baseline year is changed to this year (divide all indices by this year's index), the resulting comparison would be all years reported as 2024\$. In this table, nominal spending is divided by the inflation INDEX for the year.

You can also deduct the percent inflation from any individual year of spending to find inflation adjusted \$ for that year alone, however that method does not show cumulative change and would not allow comparing the adjusted dollars to any other year. A baseline year is necessary to compare dollars from any year to any other year.

Reference Inflation Data [Construction Inflation 2024](#)

Through December 2023, **Total Construction Spending is up 40% for the four years 2020-2023, but, during that same period inflation increased 35%. After adjusting for 35% inflation, constant \$ volume is up only 5%.** So, while the current \$ spending plot shows a four-year total increase of 40% in spending, the actual change in business volume is up only 5% and has just recently returned to the pre-pandemic peak in Feb-Mar 2020.

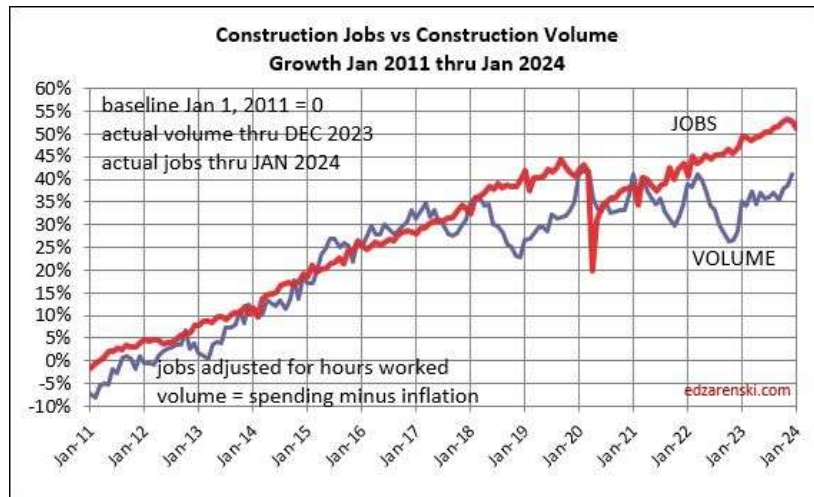


Jobs are supported by growth in construction volume, spending minus inflation. If volume is declining, there is no support to increase jobs. Although total volume for 2023 is up 2.3%, Residential volume is down 9%, Nonresidential Bldgs volume is up 16% and Non-building volume is up 8%. Inflation was so high in 2021 and 2022 that it ate away most of the spending gains in those years.

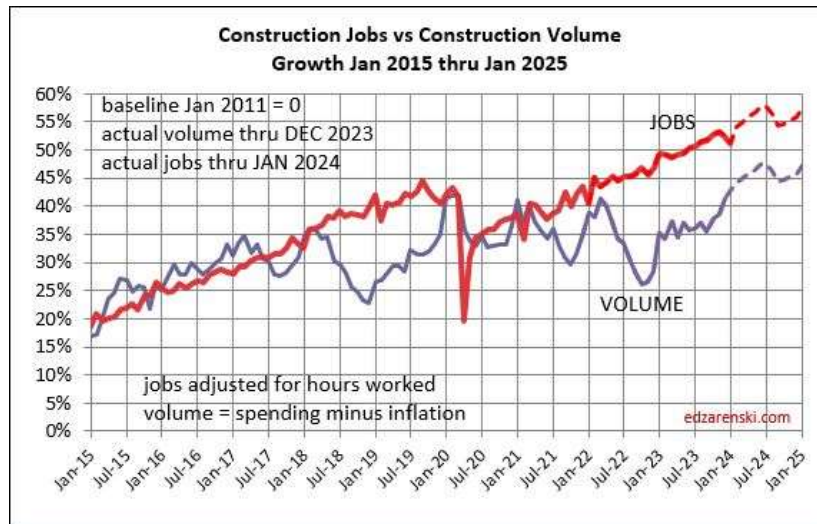
Jobs vs Volume

Construction Jobs increased 2.75% in 2023. We added 214,000 jobs (avg'23-avg'22). There are currently 8,056,000 construction jobs. The largest annual increase post 2010 is 321,000 jobs (+4.6%) in 2018. The average jobs growth post 2010 is 200,000 jobs per year.

Since 2010, average jobs growth is 3%/yr. Average volume of work growth since 2010 is 2.3%/yr. This plot shows Jobs and Volume growth closely match from 2011 to 2018. With few exceptions for recession periods, this pattern can be seen throughout the historical data.



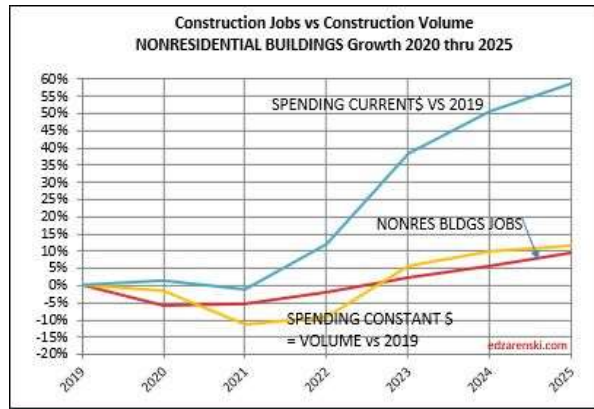
What's remarkable about the growth is this, since 2016, spending has increased 63%, volume after inflation increased 6% and jobs increased 19%. In the last 7 years, 2017-2023, jobs increased 2.5%/yr. Volume of work increased only 0.8%/yr. Volume and jobs should be moving together.



It takes about 5000 jobs to put-in-place \$1 billion of volume in one year. It could easily vary from 4000 to 6000. So, an add of \$100 billion+ in one year would need 500,000 new jobs. Jobs should track volume, not spending growth. Volume = spending minus inflation.

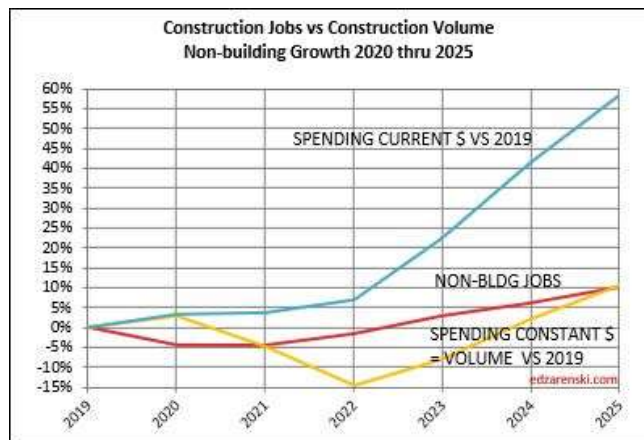
Normal construction jobs growth is about 250,000 jobs per year and maximum prior growth is about 400,000. From the table above, **Nonresidential Bldgs and Non-building Infrastructure added \$100bil of volume in 2023 and will add \$60bil in 2024.** The workload discussed above would theoretically require 500,000 new jobs in 2023 and 300,000 more in 2024. That's an expansion of the industry workforce by 10% in two years, for just half the industry, in an industry that normally grows in total 3%/yr. This industry can't grow that fast. This may have some impact if over-capacity growth results in a potential reduction or extension in future forecast. You can't increase spending that fast if you can't also expand the labor force and the suppliers to the industry that fast.

In the last 12 months, Dec'22 to Dec'23, Nonres Bldgs jobs are up 4%. Nonres Bldgs spending is up 23%, by far driven by Manufacturing, but after ~5.4% inflation, volume of nonres bldgs workload is up 16%. So, we have a 4% increase in jobs versus a 16% increase in volume.

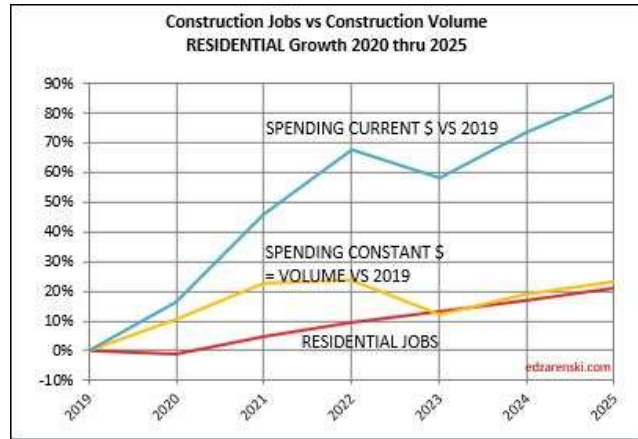


The last year has shown a huge increase in the volume of nonres bldgs work, without an equal increase in jobs. Is this excess nonres bldgs work for the past three years now absorbing added workload, (a 4% increase in jobs but a 16% increase in volume), without collapsing the labor force or canceling the volume?

Non-building, over the next two years, could experience the same kind of growth spurt as Nonres Bldgs., a forecast increase in volume the next two years without an equal increase in jobs. Volume which was lower than jobs since 2021, is now increasing faster than jobs. Non-bldg volume is forecast up 6% to 8%/year the next 3 years. Jobs increase at an avg. 3.5%/year.

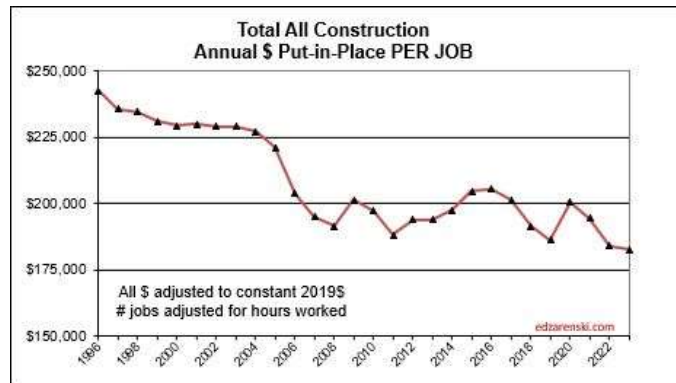


Residential volume has exceeded residential jobs all the way back to 2011. The recent decline in volume brings the two even, if the jobs hold the pace.



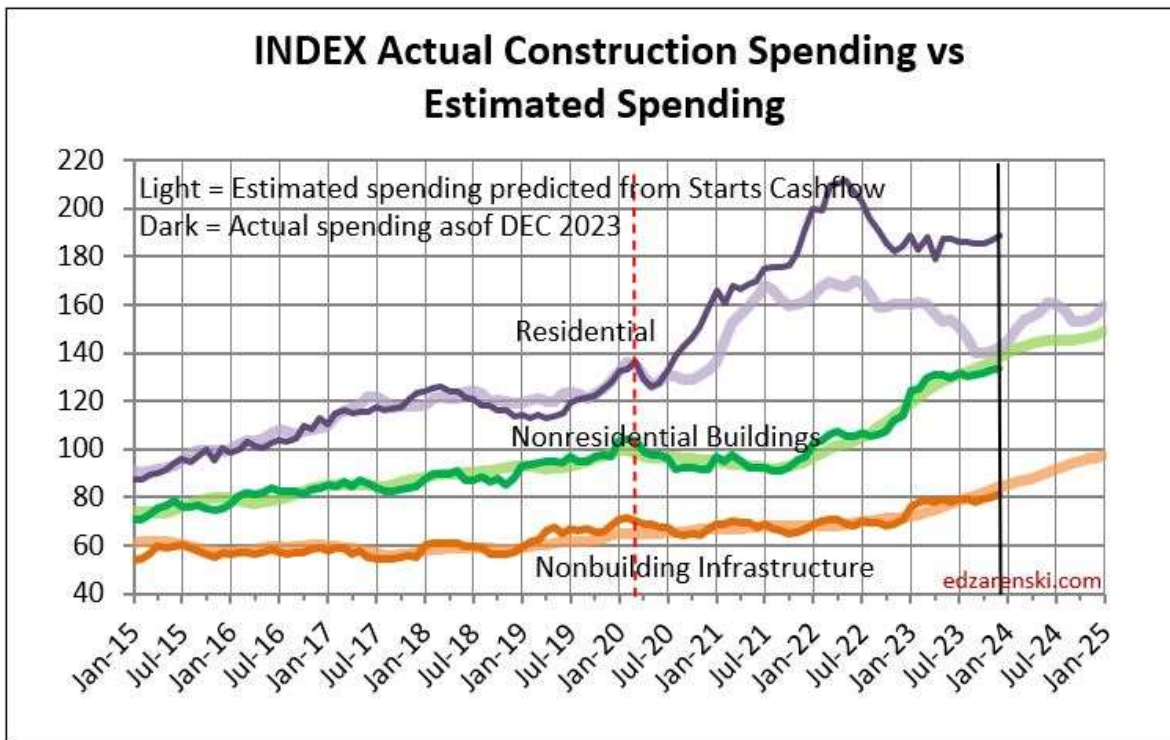
For as long as I can remember, the construction industry has been complaining of jobs shortages. And yet, as shown in the data mentioned above, jobs have increased multiples times greater than volume of work. With an exception for recession years, (2007-2010 and 2020), jobs increase at a rate of 2.5% to 3% per year. The greatest disparity between jobs and volume occurred in late 2022, when jobs growth had already resumed normal pace, but volume of work was still reeling from the effects of new construction starts that were canceled dating back to late 2020-early 2021. Recent volume growth at a much faster rate than jobs growth is now closing the gap.

When jobs increase without an equal increase in the volume of work, productivity declines. This recent increase in volume and the projected increase in volume in 2024, several points stronger than jobs, will offset some of the disparity which has been negative for a long time.



A Check on Measuring Methodology

And finally, here's one of the markers I use to check my forecast modeling, my forecasting performance tracking index. The light plot line is forecast predicted from my modeling. The dark plot line is actual construction spending. Even after any separation in the indices, the plots should move at the same slope. Almost without fail, the forecast model, estimated spending from cashflow, predicts the changes in direction of actual spending. The nonresidential buildings plots (and the residential plot prior to 2020) are remarkably close, providing an indication the method of analysis employed, cash flow of all construction starts to get spending forecast, is reasonably accurate.



Note the divergence of residential in Jul-Dec 2020. Actual residential spending finished much higher than predicted. Even the cash flow from an all-time high in new residential starts does not predict spending to increase so rapidly. But residential project spending was fully back to prior levels by August, within 3 months from the May 2020 bottom. In 3 months, the actual spending pushed 15% higher than starts predicted. A part of the spending was the resumption of delayed projects, but another big part was renovations, which surged, and reno is 40% of all residential spending.

Links to Articles and Data

The U.S. Census Single-Family house Construction Index
https://www.census.gov/construction/nrs/pdf/price_uc.pdf

Reference Link to Web [Dodge Construction News](#)

Reference Article by AGC [Explanation of PPI Indices](#)

SEE ALSO these linked related articles on my blog Construction Analytics

[Measuring Forecasting Methodology & Accuracy](#)

[Construction Inflation 2024](#)

[The Next Forecast Challenge](#)

[Midyear '23 Jobs Outlook](#)

[Reliability of Predicted Forecast](#)