

**NORTHROP GRUMMAN**

DEFINING THE FUTURE

# DoD Military Construction Inflation Index vs. Construction Industry Inflation Indices

June 12-15, 2007

Brian Welsh and Vince Russo  
Northrop Grumman Corporation



The Society of Cost Estimating and Analysis

# Contents

---

- **Introduction**
- **Background**
- **Past Findings**
- **Current Study**
  - Data
  - Construction Industry Inflation vs. DoD Military Construction Inflation Analysis
  - Results and Analysis
- **Conclusions**
- **Future Research**

# Introduction

## ■ Purpose

- Compare and Contrast the DoD Military Construction inflation indices and industry trends in construction inflation
- Quantify discrepancies between the DoD Military Construction inflation index and industry trends in construction inflation

## ■ Summary

- Department of Defense construction projects are required to use the Total Obligation Authority Military Construction inflation rates provided by the Office of the Under Secretary of Defense
- Two major construction industry companies publish construction inflation indices which have recently been averaging 2% higher than the DoD Military Construction inflation index
- Construction cost drivers such as steel, cement, lumber, and labor also have inflation indices higher than the DoD Military Construction inflation index
- Users of the DoD Military Construction inflation index should be aware of the potential for inflation greater than that accounted for in DoD rates

# Background

- **What is Construction Inflation?**
  - A general and progressive increase in prices of construction materials and labor over time
  - The level of construction inflation varies with the prices of construction commodities like steel, cement, lumber and labor
- **Why is Construction Inflation important to cost and risk estimating?**
  - DoD construction projects are multi-year projects, and construction inflation can significantly increase the total cost of a construction project
  - DoD construction projects are multi-million dollar, if not billion dollar projects, and unforeseen construction inflation could potentially be a large cost and risk
- **The Office of the Under Secretary of Defense publishes the National Defense Budget Estimate (Green Book) every year**
  - The National Defense Budget Estimate provides a National Defense Budget Summary, and the National Defense Budget Authority in Current Dollars and Constant Dollars
  - It also provides guidance for appropriation's inflation indices in reference to Total Obligation Authority, Budget Authority, and Outlay Trends / Program Changes

## Past Findings

- **“X Factor” presented by Annette Harris and Sasha Lanes at the 2004 SCEA Conference in Los Angeles, CA**
  - Compared OSD inflation rates with actual submarine material growth costs
  - Inflation becomes a significant cost factor for long term projects like submarines and large ships
  - Ship building material inflation is greater than OSD inflation rates
  
- **Currently there are no studies comparing DoD Military Construction Inflation Indices and Construction Industry Inflation Indices**

# Current Study

---

- **Data**

- Data Collection for a 37 year time period (1970-2006)
  - DoD recommended construction index
  - Construction company indices based on actual construction material prices which represents actual trends in construction inflation
  - Actual material and labor prices used for construction indices
- Sources
  - National Defense Budget Estimate for Fiscal Year 2007
  - Turner Construction Company
  - Engineering News Record (ENR)
  - Bureau of Labor and Statistics
- Compiled raw data from each of the sources in the form of indices and labor rates
- Normalized Data to the form of percent change between each year



## Current Study – Data

- **National Defense Budget Estimate for FY 2007 (Green Book)**
  - The Military Construction Index represents predicted costs
  - Office of the Under Secretary of Defense (Comptroller)
  - Department of Defense Deflators, Total Obligation Authority, Military Construction

DoD Total Obligation Authority Military Construction		
Year	Index	Percent Change
1996	81.97	2.19%
1997	82.77	0.98%
1998	83.52	0.91%
1999	84.71	1.42%
2000	85.96	1.48%
2001	87.28	1.54%
2002	88.88	1.83%
2003	90.94	2.32%
2004	93.35	2.65%
2005	95.70	2.52%
2006	97.89	2.29%

## Current Study – Data

- **Turner Building Cost Index – The index is based on actual costs from the following factors considered on a nationwide basis**
  - Labor Rates
  - Productivity
  - Material Prices
  - Competitive conditions of the marketplace

Turner Building Cost Index		
Year	Index	Percent Change
1996	505	2.64%
1997	525	3.96%
1998	549	4.57%
1999	570	3.83%
2000	595	4.39%
2001	613	3.03%
2002	619	0.98%
2003	621	0.32%
2004	655	5.48%
2005	717	9.47%
2006	793	10.60%



## Current Study – Data

- **Engineering News Record (ENR) Construction Cost Index – The Construction Cost Index is based on the actual cost of labor, steel, cement, and lumber across 20 major US cities**

Engineering News Record Construction Cost Index		
Year	Index	Percent Change
1996	5620	2.72%
1997	5826	3.67%
1998	5920	1.61%
1999	6059	2.35%
2000	6221	2.67%
2001	6343	1.96%
2002	6538	3.07%
2003	6694	2.39%
2004	7115	6.29%
2005	7446	4.65%
2006	7751	4.10%

## Current Study – Data

- **Bureau of Labor and Statistics Producer Price Index – The indices are based on actual costs across the nation for the following commodities**
  - Iron and Steel
  - Cement
  - Lumber

Bureau of Labor and Statistics Producer Price Index for Iron and Steel		
Year	Index	Percent Change
1996	125.82	-2.32%
1997	126.46	0.51%
1998	122.51	-3.12%
1999	114.04	-6.91%
2000	116.60	2.24%
2001	109.68	-5.94%
2002	114.06	4.00%
2003	121.49	6.52%
2004	162.41	33.68%
2005	171.14	5.38%
2006	185.97	8.66%

Bureau of Labor and Statistics Producer Price Index for Cement		
Year	Index	Percent Change
1996	133.99	4.62%
1997	139.39	4.03%
1998	145.66	4.50%
1999	150.56	3.36%
2000	150.13	-0.29%
2001	150.19	0.04%
2002	152.64	1.63%
2003	152.03	-0.40%
2004	156.78	3.12%
2005	176.36	12.49%
2006	198.75	12.70%

Bureau of Labor and Statistics Producer Price Index for Lumber		
Year	Index	Percent Change
1996	179.81	3.68%
1997	194.53	8.18%
1998	179.51	-7.72%
1999	188.23	4.86%
2000	178.78	-5.02%
2001	171.59	-4.02%
2002	170.57	-0.60%
2003	174.36	2.22%
2004	203.63	16.79%
2005	198.64	-2.45%
2006	191.87	-3.41%

## Current Study – Data

- Labor is a major component of construction in addition to steel, cement, and lumber
- Bureau of Labor and Statistics National Compensation Survey of All Blue Collar Occupations in the US

Bureau of Labor and Statistics National Compensation Survey All Blue Collar Occupations		
Year	Hourly Rate	Percent Change
1997	\$ 12.36	
1998	\$ 12.90	4.37%
1999	\$ 13.03	1.01%
2000	\$ 13.41	2.92%
2001	\$ 13.73	2.39%
2002	\$ 14.51	5.68%
2003	\$ 15.03	3.58%
2004	\$ 15.46	2.86%
2005	\$ 15.87	2.65%

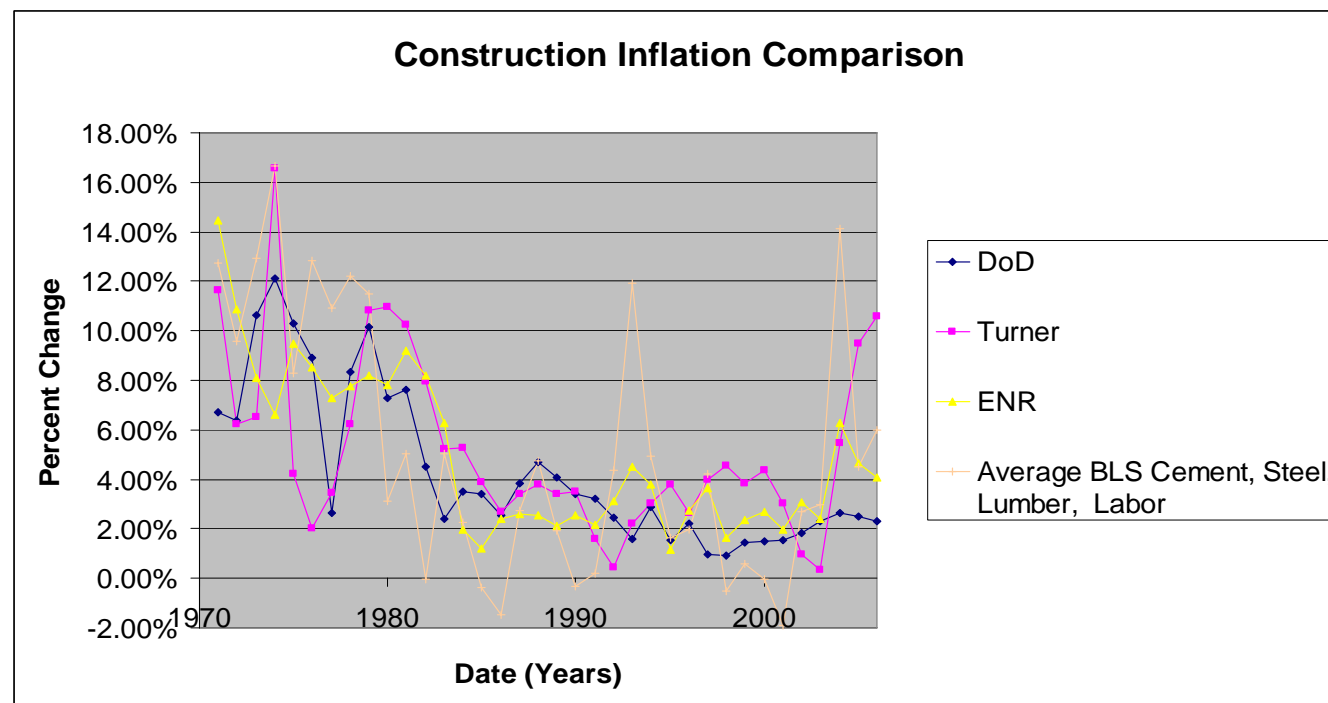
## Current Study – Data

- Averaging the previous four construction commodity indices weighted evenly develops an average Bureau of Labor and Statistics Index for steel, cement, lumber, and labor
- This creates a cumulative index representing the major cost driving factors of construction projects

Average Bureau of Labor and Statistics Steel, Cement, Lumber, Labor	
Year	Percent Change
1996	1.99%
1997	4.24%
1998	-0.49%
1999	0.58%
2000	-0.04%
2001	-1.88%
2002	2.68%
2003	2.98%
2004	14.11%
2005	4.52%
2006	5.98%

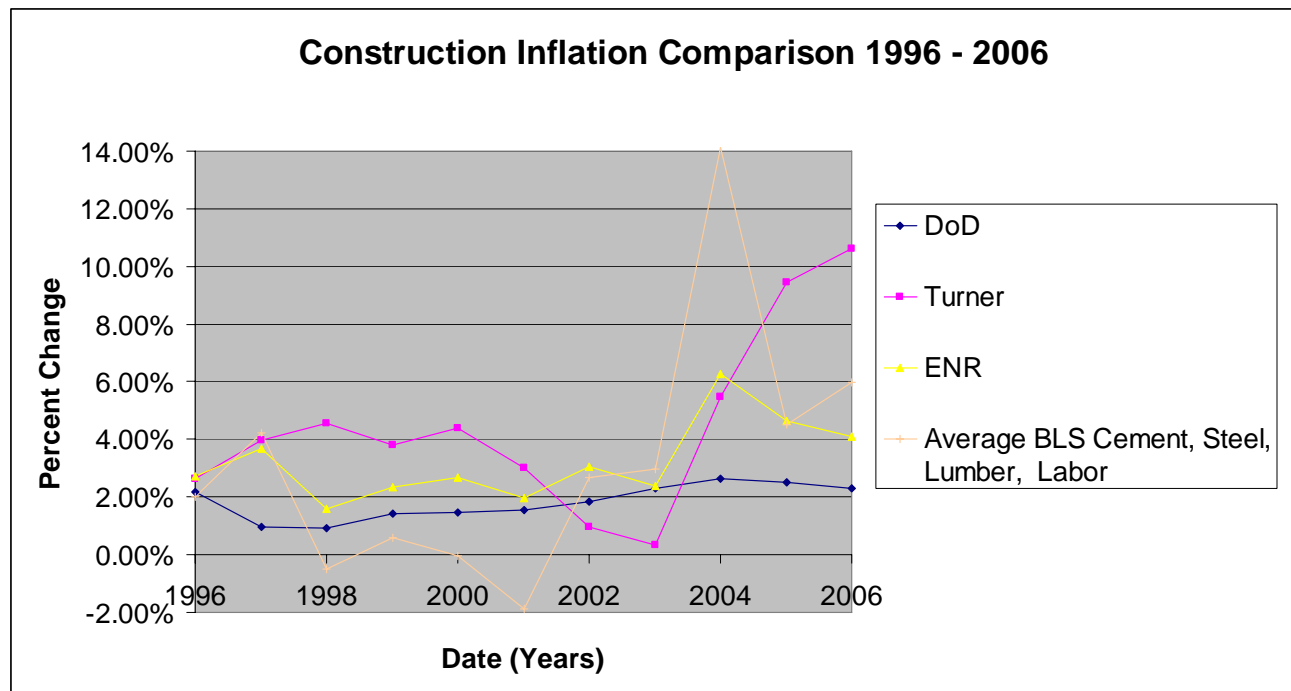
# Current Study – Construction Inflation Comparison / Analysis

- An important point to note is that the Turner and ENR inflation rates are not always greater than and are sometimes less than the DoD inflation rates but in recent years the Turner and ENR inflation rates are substantially greater
- The graph shows that over the past 10 years the Turner and ENR inflation rates are on average higher than the DoD Military Construction inflation rate
- Also, the graph shows that construction commodities are very volatile as demonstrated by the average of the BLS construction commodities



# Current Study – Construction Inflation Comparison / Analysis, 1996 – 2006

- This graph focuses on more recent years which are most relevant to current and future construction projects
- The DoD Inflation rate is below Turner and ENR Inflation rates in all years except for 2002 and 2003 but the trend for 2004, 2005, and 2006 shows that the DoD Inflation is much lower than Turner and ENR
- Construction commodities are more volatile than the indices since they are comprised of a single material opposed to a group of materials like the indices





# Current Study – Delta Between Inflation Rates

- The table shows that from 1996 to 2006 the industry average for construction inflation is 2.02% higher than the DoD Military Construction inflation rate
- Also the table shows that construction commodities are 1.32% higher than the DoD Military Construction inflation rate
- Many of the individual years have very similar inflation rates between DoD, Turner, and ENR but the overall trend is that the gap is widening between the industry inflation rates and the DoD inflation rate

	DoD	Turner	ENR	Avg(Turner and ENR)	Avg(Turner and ENR) - DoD	Avg(BLS, Cement, Steel, Lumber, Labor)	Avg(BLS) - DoD
1996	2.19%	2.64%	2.72%	2.68%	0.49%	1.99%	-0.20%
1997	0.98%	3.96%	3.67%	3.81%	2.84%	4.24%	3.27%
1998	0.91%	4.57%	1.61%	3.09%	2.19%	-0.49%	-1.40%
1999	1.42%	3.83%	2.35%	3.09%	1.66%	0.58%	-0.85%
2000	1.48%	4.39%	2.67%	3.53%	2.05%	-0.04%	-1.51%
2001	1.54%	3.03%	1.96%	2.49%	0.96%	-1.88%	-3.42%
2002	1.83%	0.98%	3.07%	2.03%	0.19%	2.68%	0.84%
2003	2.32%	0.32%	2.39%	1.35%	-0.96%	2.98%	0.66%
2004	2.65%	5.48%	6.29%	5.88%	3.23%	14.11%	11.46%
2005	2.52%	9.47%	4.65%	7.06%	4.54%	4.52%	2.00%
2006	2.29%	10.60%	4.10%	7.35%	5.06%	5.98%	3.70%
<b>Average</b>	<b>1.83%</b>	<b>4.48%</b>	<b>3.23%</b>	<b>3.85%</b>	<b>2.02%</b>	<b>3.15%</b>	<b>1.32%</b>

**NORTHROP GRUMMAN**

## Current Study – Results and Analysis

- This data shows there is a discrepancy between the DoD's predicted Military Construction inflation index and the actual construction industry inflation indices
- Comparing the average of the Turner Building Cost Index and the ENR Construction Cost Index to the DoD Military Construction Index shows on average that the Turner and ENR index is greater by 2.02% between 1996 and 2006
- Comparing the average of the construction commodities and the DoD Military Construction Index shows that the construction materials are about 1.32% greater between 1996 and 2006
- Therefore, it appears that the DoD Military Construction inflation index has been underestimated over the past decade compared to construction industry inflation indices

**NORTHROP GRUMMAN**

## Conclusions

---

- **In recent years the DoD Military Construction inflation index has been on average at least 2.02% lower than the industry average**
- **Cost and risk analysts should be aware of the discrepancy between the DoD Military Construction inflation index and the industry average so that it can be adequately factored into cost and risk estimates**
- **Construction commodities are extremely volatile so those factors should be considered when evaluating the risk of cost estimates**
- **Construction projects last several years which leaves more room for unknown construction inflation risk**

# Future Research

---

- **Basis for DoD Military Construction Inflation Index**
  - What factors are used to determine the index
  - Does the Military Construction Inflation Index follow national economic trends
- **Construction Commodities**
  - Why construction material prices fluctuate
  - Regional Supply and Demand (lumber and labor)
  - World Supply and Demand (steel and cement)
  - Competitive markets
  - Productivity
- **Construction Inflation vs. Other National Economic Rates**
  - Consumer Price Index
  - Economic Growth Rate (Gross Domestic Product)
  - Interest Rates

## Sources

- Bureau of Labor and Statistics. "National Compensation Survey All Blue Collar Occupations (Labor)." 2007  
<http://data.bls.gov/PDQ/outside.jsp?survey=wp>
- Bureau of Labor and Statistics. "Producer Price Index for Cement." 2007  
<http://data.bls.gov/PDQ/outside.jsp?survey=wp>
- Bureau of Labor and Statistics. "Producer Price Index for Lumber." 2007  
<http://data.bls.gov/PDQ/outside.jsp?survey=wp>
- Bureau of Labor and Statistics. "Producer Price Index for Iron and Steel." 2007  
<http://data.bls.gov/PDQ/outside.jsp?survey=wp>
- Engineering News Record. "ENR Construction Cost Index." 2007. McGraw-Hill. <http://enr.construction.com/features/conEco/indexFAQ.asp>
- Office of the Undersecretary of Defense. National Defense Budget Estimate for FY 2007 (Green Book) pg. 46 2007.  
[http://www.dod.mil/comptroller/defbudget/fy2007/fy2007\\_greenbook.pdf](http://www.dod.mil/comptroller/defbudget/fy2007/fy2007_greenbook.pdf)
- Turner Construction Corporation. "Turner Building Cost Index." 2007.  
[www.turnerconstruction.com](http://www.turnerconstruction.com)