

Construction Risk Management

HOSAM SALMAN, PHD., P.E., F.ASCE
SENIOR TECHNICAL PRINCIPAL
PROJECT MANAGER, SENIOR SUPERVISING ENGINEER
ADJUNCT PROFESSOR - SOUTHERN METHODIST UNIVERSITY (SMU)

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What is Risk

Risk is the **uncertainty** that surrounds future events and outcomes.

Risk is the expression of the **likelihood and impact** of any event with the potential to influence the achievement of an organization's objectives.

▶ Typically related to one of four areas:

1. Strategy
2. Change management
3. Operations
4. Finance

▶ Risks can be positive, negative, or neutral

What is Risk Management

- ▶ Principles and processes that help minimize the negative impacts of risks and maximize the positive impacts.

Risk Management Perspective

- ▶ Regulatory or legal environment
- ▶ Communications methods
- ▶ Size of the organization
- ▶ Labor relations
- ▶ Structure of the organization
- ▶ Culture of the organization with respect to risk tolerance
- ▶ Financial

*The only alternative to risk management is crisis management
--- and crisis management is much more expensive, time
consuming and embarrassing.*

JAMES LAM, Enterprise Risk Management, Wiley Finance © 2003

*Risk management means more than preparing for the worst;
it also means taking advantage of opportunities to improve
services or lower costs.*

Sheila Fraser, Auditor General of Canada



Risk management Activities



Each design and construction project has a list of risk

- ▶ Risk can be in any form and at any stage of either design or construction process. Lack of risk mitigation can result in threats of budget, profitability, efficiency, and project schedules.
- ▶ One of the complicated parts of the construction industry is identifying and managing construction risks.
- ▶ Risk management is critical for every company/organization. Having unknown risks can make a company vulnerable and unprepared for what's to come.
- ▶ A risk management process/matrix helps project managers predict where risk can come from and identify projects that are susceptible to cost overruns.
- ▶ Design Build and Design Bid Build Projects must have Risk Management Plan

Construction Risks Fall Under Three Categories

▶ Safety

The construction industry is one of the most dangerous professions in the country. Many fatalities and claims are occurring on job sites or during construction. Job location safety is a significant priority. Project managers implement daily safety checklist inspections. Not only do job site inspection checklists help prevent injuries and fatalities, but they are also mandatory standards, and they list processes and procedures to follow.

▶ Financial

Construction managers assume financial risks because of unplanned costs and material waste. To produce more accurate estimates, try tracking actual labor hours and production units closely. Accuracy also can reduce going over labor hour estimates and overordering materials. Also, there are other risks outside of your control, such as the owner not having enough money to complete the project or late payments.

▶ Schedule

Poor scheduling can drastically impact the construction project's budget. Any small hiccup in design, constructing, or outside factors can set your schedule back, stretching the duration of the project. Furthermore, an impact on schedule can result in miscommunications with shareholders, clients, and workers.

Risks in Construction Industry

1. Shifting Workforce and Personnel

- ▶ The construction industry faces a skilled labor shortage, an aging workforce, and an inflow of more and more inexperienced workers that are increasing injuries and accidents on job sites.
- ▶ The risk of a shifting workforce can be reduced by using the following:
 - Cuts down labor expenses
 - Takes less time to accomplish a task by working longer shifts and into the night
 - Performs tasks faster
 - Provide continuous Training

2. Construction Defect

- ▶ Construction defect is happening either in the design, workmanship, or materials used on a project that causes damage to a structure, person, or property. The two common types of defects are **design and workmanship**. Design defects are typically from the engineer's or architect's lack of accuracy on drawings or documents.
- ▶ Examples of workmanship defects are improperly installed weatherproofing systems, soils that were not properly compacted, or improper lighting.
- ▶ Engineering Examples (Ocean Tower, The Leaning Tower of Pisa, New Orleans Levee (Katrina), Space Shuttle Challenger (etc..))
- ▶ This risk relates to the quality of labor work. General contractors try to avoid hiring the wrong subcontractors, but it happens. Finally, hire the right crew, staff, sub who can do the job right.

3. Contractual Risk

- ▶ **Contractual risks are risks placed on subcontractors because of the agreement between owners and general contractors.**
- ▶ **A contract could possibly add a penalty to subcontractors or even reduce payments if a job isn't completed on time.**
- ▶ **Final project check list and warrantee need to be evaluated.**

4. Site Protection

- ▶ **Unprotected job sites can result in damage to frozen or leaking pipes and theft or vandalism of equipment and materials. Not all sites have extensive security and camera monitoring systems, these sites are susceptible to damage and vandalism. Finally, a fenced site has a less likely chance of vandalism compared to a site with nothing guarding it.**
- ▶ **Tips to secure the job/construction site:**
 1. **Let employees know that the management is paying attention**
 2. **Schedule supplies only as needed**
 3. **Keep good records with documentation**
 4. **Practice effective inventory management**
 5. **Secure perimeter with fencing**
 6. **Review security plan and process**
 7. **Use theft deterrents or cameras and employee off-duty officers as security guards**
 8. **Increase lighting in off-hours**

5. Environmental

- ▶ Consider the conditions of the site because natural disasters do happen. If your job site is near a fault line, then, consider the risk of earthquakes. It is hard to predict a natural disaster, but it can never hurt to be prepared.
- ▶ Natural disasters include but, not limited to:
 - ▶ – Hurricanes
 - ▶ – Tornadoes
 - ▶ – Floods
 - ▶ – Fires
 - ▶ – Lightning storms

6. Managing Change Orders

- ▶ Change orders from owner/client could happen anytime.
- ▶ Change orders consist of the additional work completed that is not specified in the contract.
- ▶ Common causes for change order requests are:
 - ▶ – Incorrect estimate of a project,
 - ▶ – Team or client reached an obstacle that steered away from the original plan
 - ▶ – Team or client is incapable of completing their deliverables within budget
 - ▶ – Extreme weather or job site conditions cause delays in work
- ▶ Key management change

7. Coordination Complications

- ▶ **Miscommunication occurs. But in the construction industry specifically, a delay in communication can push back a project schedule and risk the overall success.**
- ▶ **In terms of risk management, coordination complications are very crucial to think about because it can lead to the waste of unnecessary materials and pricey reworks.**

8. Documentation Organization

- ▶ Document control is one of the construction industry's biggest risks.
- ▶ Proper document management is one of the PM's most tedious and time-consuming tasks.
- ▶ Projects require a qualified personal who able to keep record of all design and construction phases and steps.

STEPS TO MANAGE CONSTRUCTION RISKS

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1

INSPECTION

- Determine what risks are most likely to affect your project
- Document which risks are most important

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2

QUANTIFICATION & PLANNING

- Assess the risks carefully
- Identify the possible outcome of these risks

0
3

RESPONSE MONITORING & CONTROL

- Monitor risk responses & determine if the risk exposure has changed
- Monitor risk metrics, milestones, and effectiveness of your risk management solution

Typical Risk management Plan- Design Project

Top Risks: Fort Benning										
Rank	Type	Risk Category	Risk	Impact	Probability	Impact	Exposure	Mitigation	Residual Probability	Residual Impact
1	Threat	Working Relationships	CAUSE:Working for XXXX in takeover EOR role RISK:Not performing up to standards	EFFECT: Poor relationship with parent company	Medium	Medium	Medium	Will keep in frequent contact with client pricipals and check on project status as it relates to expectations.	Very High	Very High
2	Threat	Scope	CAUSE:Undefined relationship with EOR RISK:Taking on out of scope items	EFFECT:Margin Erosion	Medium	High	High	Work through XXXX management to identify scope creep items during work.	Very High	Very High
3	Threat	Schedule	CAUSE:Delayed NTP RISK::Cannot meet clients expected deliver date of plan submittal to the COE	EFFECT: unfavorable perception in eyes of parent company	High	High	High	Weekly communication with XXXX to communicate schedule of remaining items and the casues of delay	Very High	Very High
4	Threat	Program	The scope does not clearly define the extent of coordination with and review of work by third parties.	EFFECT:affect additional work and staffing. This may extend the length of the project duration.	Medium	Medium	Medium	to have a better communication with all parties.	Very High	Very High
Risk Register Exported :Tuesday, October 29, 2013										
View Risk Register in RMIS										

Risk Identification

- ✓ Financial Risk - unplanned losses or expenses
- ✓ Service Delivery/Operational Risk - lapses in continuity of operations
- ✓ HR Risk – Employment practices; retention
- ✓ Strategic Risk – untapped opportunities
- ✓ Reputational Risk – damage to relationship with community at large (loss of revenue)
- ✓ Legal/Compliance Risk – noncompliance with statutory or regulatory obligations
- ✓ Technology/Privacy Risk – threats to and breaches in IT security
- ✓ Governance Risk – wide-spread non-compliance with policies and standards
- ✓ Physical Security/or Hazard Risk – harm or damage to people, property or environment

Risk Assessment – Consider Impact and Likelihood to Prioritize Risks

Impact - level of damage sustained when a risk event occurs

- **5 Critical:** Threatens the success of the project
- **4 Serious:** Substantial impact on time, cost or quality
- **3 Moderate:** Notable impact on time, cost or quality
- **2 Minor:** Minor impact on time, cost or quality
- **1 Insignificant:** Negligible impact

Likelihood of a risk event occurring

- **5 Expected:** Is almost certain to occur
- **4 Highly Likely:** Is likely to occur
- **3 Likely:** Is as likely as not to occur
- **2 Not Likely:** May occur occasionally
- **1 None/Slight:** Unlikely to occur

Risk Inventory

Identification

Assessment

Mitigation or Treatment

Risk Number	Risk Short Name	Risk Description	Existing Risk Controls/Measures In Place	Outcome	Impact	Likelihood	Impact Score	Likelihood Score	Net Score	Risk Mitigation Actions	Responsibility	Cost Estimate	Resources Needed	Target Date for Completion Mitigation Complete
EXAMPLE	Access To High Hazard Areas	The risk of unauthorized access to hazardous areas outside of normal business hours	*Perimeter doors have mechanical locks that are randomly spot checked by police after normal business hours.	*Some buildings with high hazard areas are open to the public, increasing the chances of unauthorized or accidental access to high hazard areas. *Random spot checks not adequate considering the life/safety risks in some areas.	Serious	Likely	4	3	12	*Installation of electronic door locks (prox cards) will allow 24/7 security control as only authorized users will have access to the area.	John Doe	\$3,000		1/14/2015
1							RP/A	RP/A	RP/A					
2							RP/A	RP/A	RP/A					
3							RP/A	RP/A	RP/A					
4							RP/A	RP/A	RP/A					
5							RP/A	RP/A	RP/A					
6							RP/A	RP/A	RP/A					
7							RP/A	RP/A	RP/A					
8							RP/A	RP/A	RP/A					
9							RP/A	RP/A	RP/A					

Identifications of Risk

A	B	C	D	E
Risk Number	Risk Short Name	Risk Description	Existing Risk Controls/Measures in Place	Outcome
1	Access To High Hazard Areas	The risk of unauthorized access to hazardous areas outside of normal business hours	Perimeter doors have mechanical locks that are randomly spot checked by police after normal business hours.	*Some buildings with high hazard areas are open to the public, increasing the chances of unauthorized or accidental access to high hazard areas *Random spot checks not adequate considering the life/safety risks in some areas.
2	Risk #2			
3	Risk #3			
4	Risk #4			

Mitigating or Treating Risks – Accept? Alter? Transfer? Decline?

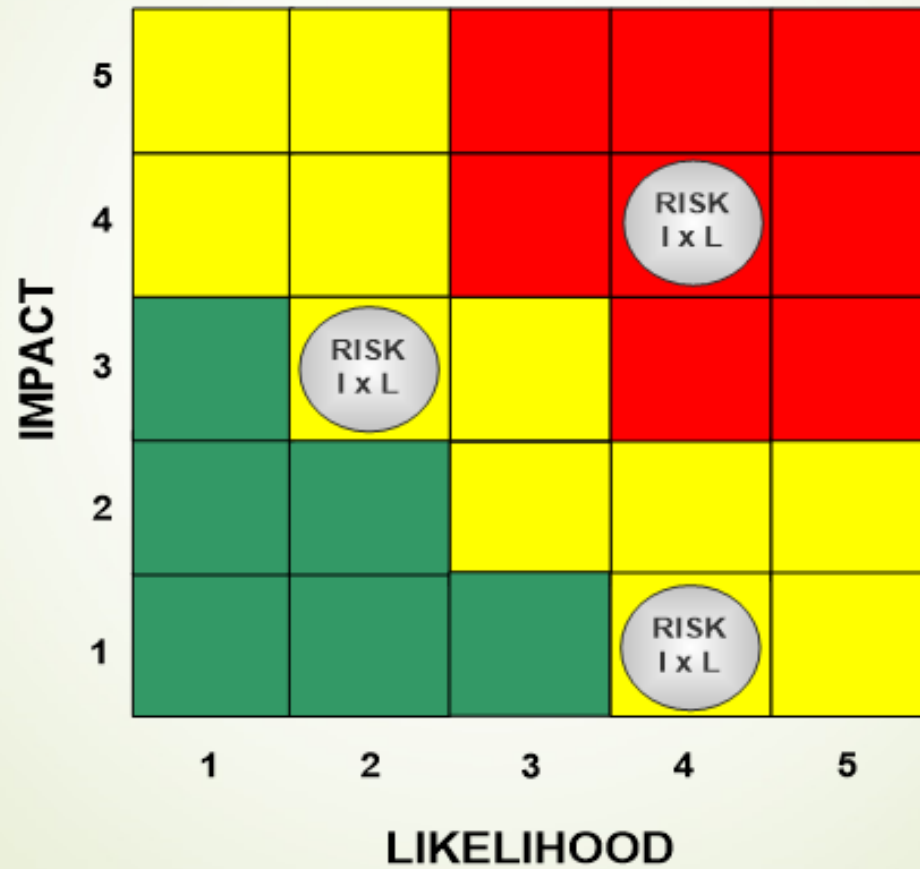
K	L	M	N	O
Risk Mitigation Actions	Responsibility	Cost Estimate	Resources Needed	Target Date for Completion Mitigation Complete
*Installation of electronic door locks (proxy cards) will allow 24/7 security control as only authorized users will have access to the area.	John Doe	\$3,000		3/14/2015

Risk reporting and communications

Risk Level	Action and Level of Involvement Required
Critical Risk	<ul style="list-style-type: none">• Inform Cabinet• Immediate action required
High Risk	<ul style="list-style-type: none">• Inform division Vice President• Attention is essential to manage risks – provide report to VP as directed
Moderate Risk	<ul style="list-style-type: none">• Inform relevant administrators• Mitigation and ongoing monitoring by managers is required
Low Risk	<ul style="list-style-type: none">• Accept, but monitor risks• Manage by routine procedures within the program or department

Risk Heat Map

RISK PRIORITIZATION MATRIX



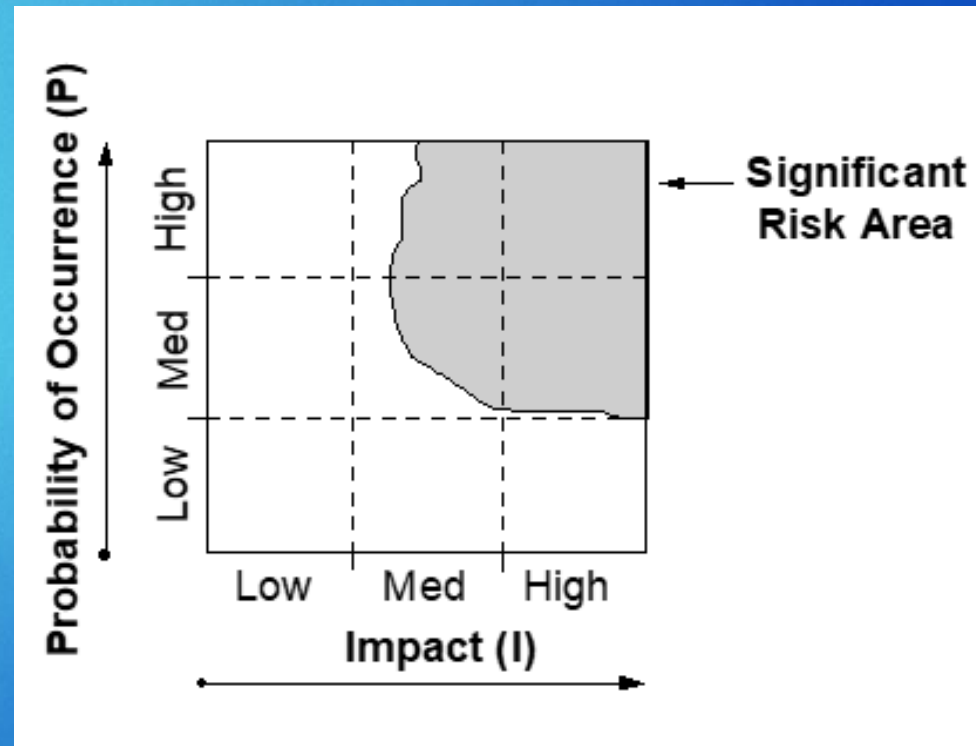
The Probability / Impact Matrix

<i>impact</i>	high	<i>insure / mitigate</i>	<i>mitigate / cancel</i>
	low	<i>accept</i>	<i>externalise</i>
		low	high

rare catastrophe probable disaster

bad luck management challenge

probability



Risk Assessment

Likelihood	Severity		
	Low	Medium	High
Likely			Focus efforts here first
Neutral			
Not Likely	Focus efforts here last		

Responding to Risks

- ▶ Ensure normal business practices are not interrupted.
- ▶ Managing the media should be part of your plan.
- ▶ Direct communication with stakeholders is critical.
- ▶ If there is any chance that people may be injured or worse, you should

Include medical support in your planning.

- ▶ You may be required by law to obtain insurance.

Risk control Checklist

- ▶ Does the control meet laws and regulations?
- ▶ How well does each control mitigate the risk?
- ▶ What is the cost of the control vs. the implementation benefit?
- ▶ What is the sustainability of the control?
- ▶ What changes might have to be made to this control?
- ▶ What other effects will this control have?

Reviewing and Evaluating

- ✓ Analysis of risk response measures, whether they achieved the desired result, and did so efficiently
- ✓ Review of reporting and monitoring procedures
- ✓ Knowledge gap analysis for risk assessments
- ✓ Compliance check with appropriate regulations and organizations
- ✓ Opinions of key external and internal stakeholders
- ✓ Self-certification
- ✓ Risk disclosure exercise, to identify future risks
- ✓ Repeat of risk assessment
- ✓ Lessons learned
- ✓ Recommendations and implementation plan

September 2021 Construction Inflation report



AGC
THE CONSTRUCTION
ASSOCIATION

Rising costs, flat project pricing

Figure 1 illustrates the threat. The red line (“Input costs”) shows the change from April 2020—the low point—to August 2021 in the price of all materials and services used in construction, while the blue line (“Bid prices”) measures the far smaller change in what contractors say they would charge to erect a set of nonresidential buildings. This latter line, essentially a measure of bid prices, rose 5.2% over 16 months. In contrast, the line measuring the cost of contractors’ purchases soared 27.8% over the same interval.

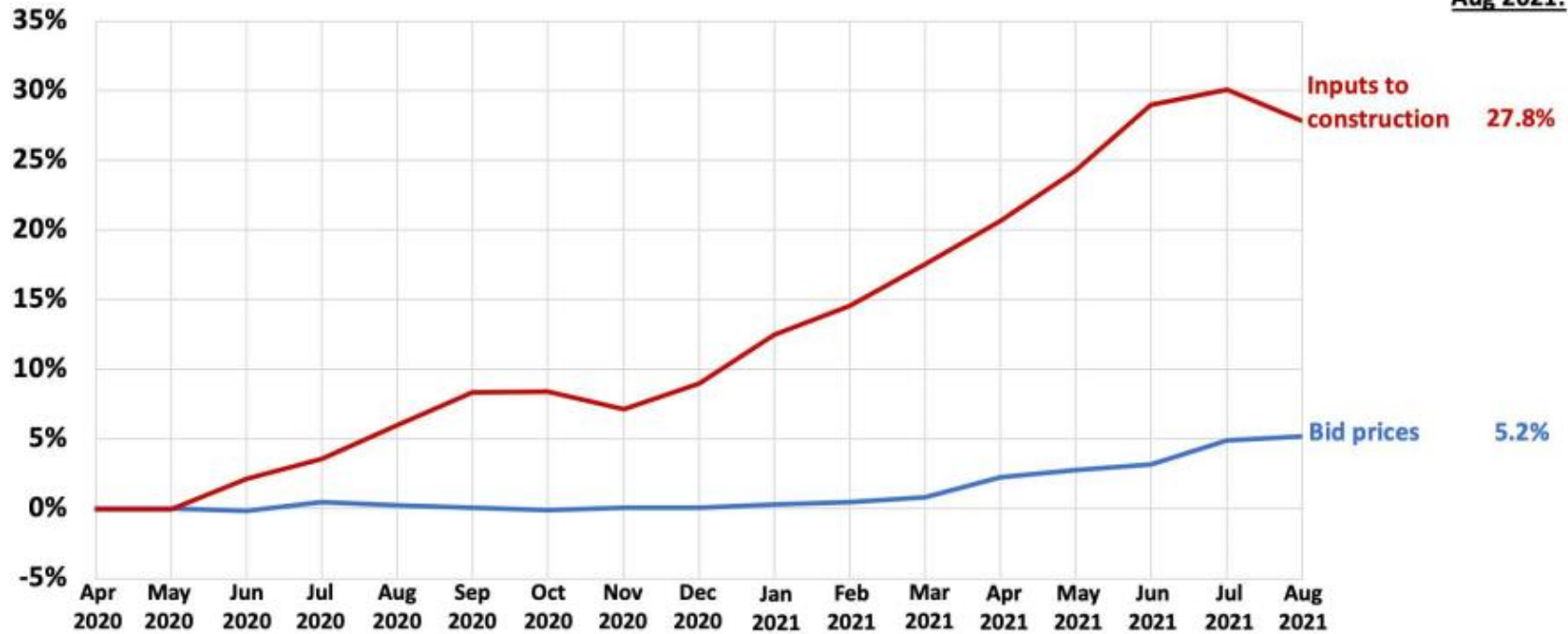
27.8%

Input costs for construction
soared 27.8% from April
2020 to August 2021

In other words, if a contractor or subcontractor submitted a fixed-price bid in April 2020 based on materials costs at that time but did not buy the materials until this summer, its cost for the materials would have risen an average of nearly 28%. Given that materials may account for half or more of the cost of a contract, such an increase could easily wipe out the profit from a project and potentially put the contractor out of business.

FIGURE 1

Change to construction inputs and bid prices
April 2020- August 2021



Source: Bureau of Labor Statistics, producer price indexes (PPIs) for new nonresidential building construction (bid prices) and inputs to construction, not seasonally adjusted

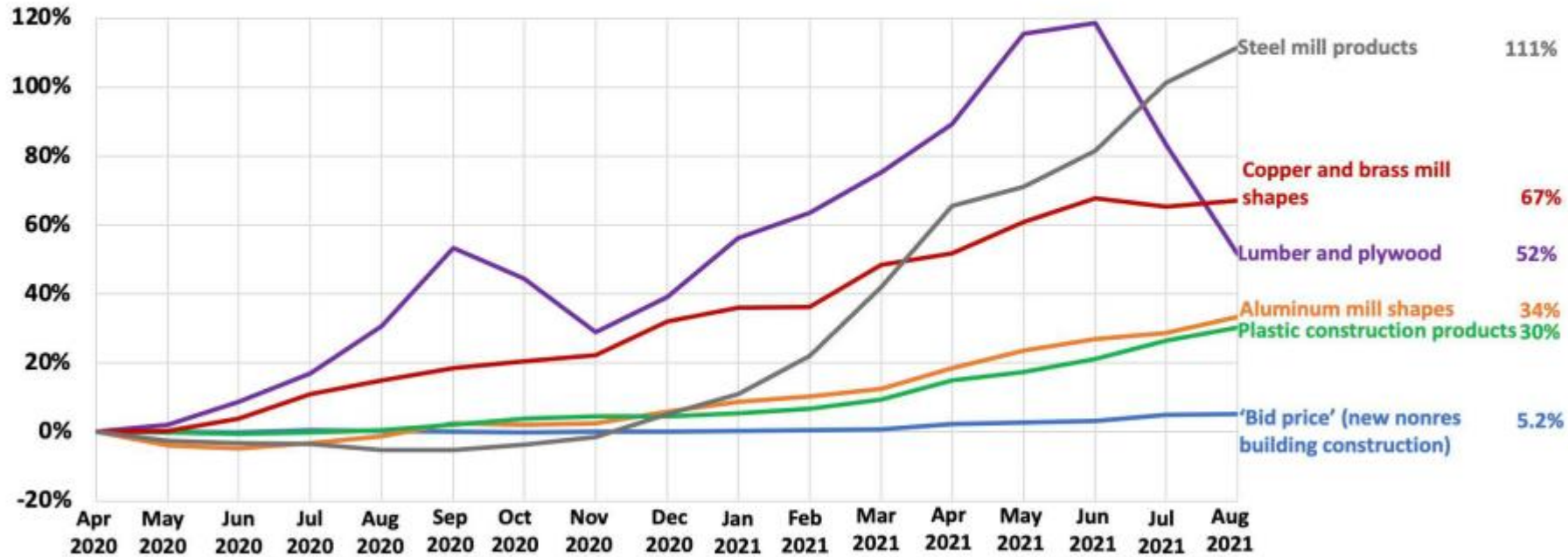
In fact, Figure 1 understates the severity of the current situation for many contractors, in two respects. First, the two lines are calculated from producer price indexes (PPIs) posted monthly by the Bureau of Labor Statistics (BLS). The most recent PPIs are based on prices BLS collected around August 11.

No single or simple solution will resolve the situation, but there are steps that government officials, owners, and contractors can take to lessen the pain

FIGURE 2

Price changes for construction and selected materials April 2020- August 2021

**% change
Apr 2020-
Aug 2021:**



Source: Bureau of Labor Statistics, producer price indexes (PPIs) for new nonresidential building construction (bid prices), gypsum products, wood, metal products, and plastic products, not seasonally adjusted

111%

The price index for steel mill products jumped 111% from April 2020 to August 2021

- ▶ Federal trade policy officials can act immediately to end tariffs and quotas on imported products and materials. With many U.S. mills and factories already at capacity, bringing in more imports at competitive prices will cool the overheated price spiral and enable many users of products that are in short supply to avoid layoffs and shutdowns.
- ▶ Officials at all levels of government should review all regulations, policies, and enforcement actions that may be unnecessarily driving up costs and slowing importation, domestic production, transport, and delivery of raw materials, components, and finished goods.
- ▶ Owners need to recognize that significant adjustments are probably appropriate regarding the price or delivery date of projects that were awarded or commenced early in the pandemic or before, when conditions at suppliers were far different. For new and planned projects, owners should expect quite different pricing and may want to consider building in more flexibility regarding design, timing, or cost-sharing.
- ▶ Contractors need, more than ever, to closely monitor costs and delivery schedules for materials and to communicate information with owners, both before submitting bids and throughout the construction process.
- ▶ Materials prices do eventually reverse course. Owners and contractors alike will benefit when that happens. Until then, cooperation and communication can help reduce the damage.

