HOW TO USE THE MCAA LABOR FACTORS

Presented by
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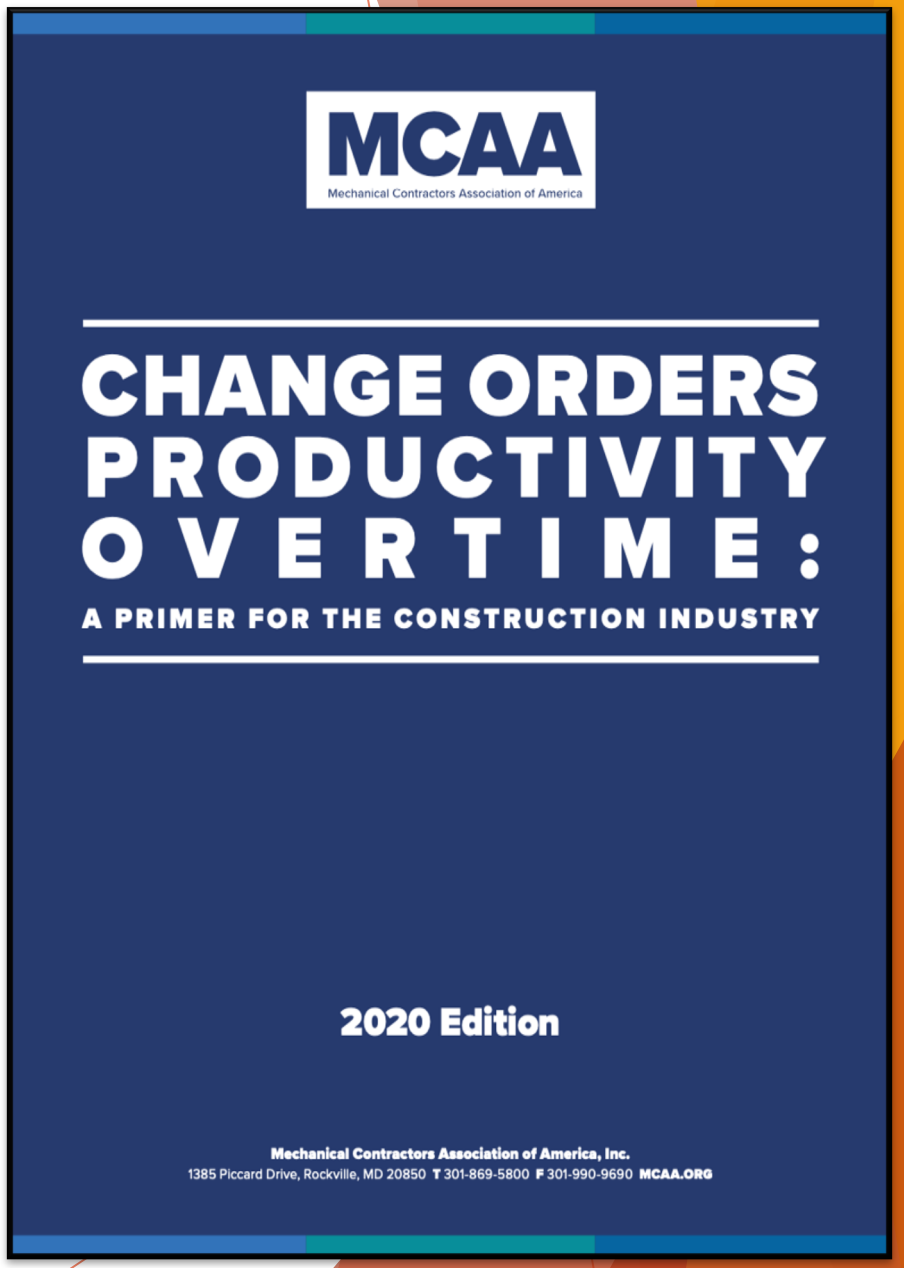
MCA



About the Teacher

John Koontz

MCAA, Director of Project Management Education (Since 1999)

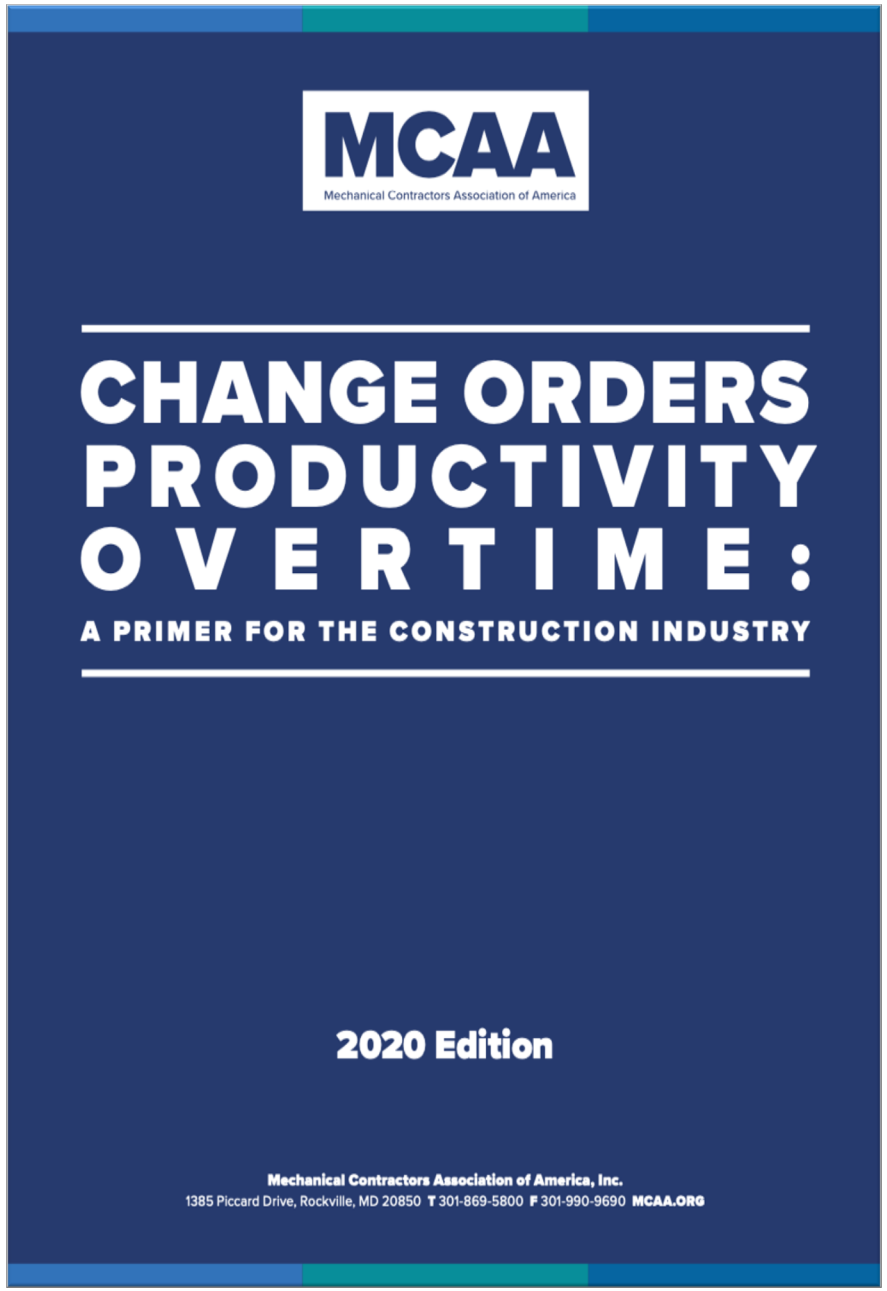
- **MCAA IPM/AIPM Director** – 21 years
- **Associate Professor** (Purdue University) – 8 yrs
- **Mechanical Industry Consultant** – 25 yrs +
- **Mechanical Project Manager** – 15 yrs

Goals for This Session

- My focus today will be a 60-minute general description, explanation, and awareness of how to use the MCAA labor factors
- This a large subject for a 60-minute webinar. Therefore, I hope to inspire and motivate you to learn more about the "when and how" regarding the effective use of the MCAA labor factors

LEGAL DISCLAIMER

- *The information discussed in this webinar is not intended to constitute legal advice. Instead, all information, content, and materials discussed are for general informational purposes only. Please contact your attorney to obtain specific legal advice.*



We are going to be reviewing pages 135 to 161

The MCAA Labor Factors

- Historically they have been referred to as:
  - MCAA Management Methods Bulletin PD2
  - or just “PD2”
  - The MCAA Factors
  - MCAA Factors Effecting Labor Productivity

The MCAA Labor Factors are an Old and Well-Established Method

- Introduced by MCAA in 1971
- Since introduced in 1971, the factor titles, their descriptions and their “percentage of loss per factor” percentages have remained unchanged
- It is important to note that over the last 40-50 years, the MCAA factors have gained wide acceptance in the construction industry and before various courts, boards of contract appeals, and tribunals of the American Arbitration Association

Factor	Percent of Loss per Factor		
	Minor	Average	Severe
1. STACKING OF TRADES: Operations take place within physically limited space with other contractors. Results in congestion of personnel, inability to locate tools conveniently, increased loss of tools, additional safety hazards and increased visitors. Optimum crew size cannot be utilized.	10%	20%	30%
2. MORALE AND ATTITUDE: Excessive hazard, competition for overtime, over-inspection, multiple contract changes and rework, disruption of labor rhythm and scheduling, poor site conditions, etc.	5%	15%	30%
3. REASSIGNMENT OF MANPOWER: Loss occurs with move-on, move-off men because of unexpected changes, excessive changes, or demand made to expedite or reschedule completion of certain work phases. Preparation not possible for orderly change.	5%	10%	15%
4. CREW SIZE INEFFICIENCY: Additional workers to existing crews "breaks up"original team effort, affects labor rhythm. Applies to basic contract hours also.	10%	20%	30%
5. CONCURRENT OPERATIONS: Stacking of this contractor's own force. Effect of adding operation to already planned sequence of operations. Unless gradual and controlled implementation of additional operations made, factor will apply to all remaining and proposed contract hours.	5%	15%	25%
6. DILUTION OF SUPERVISION: Applies to both basic contract and proposed change. Supervision must be diverted to (a) analyze and plan change, (b) stop and replan affected work, (c) take-off, order and expedite material and equipment, (d) incorporate change into schedule, (e) instruct foreman and journeyman, (f) supervise work in progress, and (g) revise punch lists, testing and start-up requirements.	10%	15%	25%

Factor	Percent of Loss per Factor		
	Minor	Average	Severe
7. LEARNING CURVE: Period of orientation in order to become familiar with changed condition. If new men are added to project, effects more severe as they learn tool locations, work procedures, etc. Turnover of crew.	5%	15%	30%
8. ERRORS AND OMISSIONS: Increases in errors and omissions because changes usually performed on crash basis, out of sequence or cause dilution of supervision or any other negative factors.	1%	3%	6%
9. BENEFICIAL OCCUPANCY: Working over, around or in close proximity to owner's personnel or production equipment. Also badging, noise limitations, dust and special safety requirements and access restrictions because of owner. Using premises by owner prior to contract completion.	15%	25%	40%
10. JOINT OCCUPANCY: Change cause work to be performed while facility occupied by other trades and not anticipated under original bid.	5%	12%	20%
11. SITE ACCESS: Interferences with convenient access to work areas, poor man-lift management or large and congested worksites.	5%	12%	30%
12. LOGISTICS: Owner furnished materials and problems of dealing with his storehouse people, no control over material flow to work areas. Also contract changes causing problems of procurement and delivery of materials and rehandling of substituted materials at site.	10%	25%	50%
13. FATIGUE: Unusual physical exertion. If on change order work and men return to base contract work, effects also affect performance on base contract.	8%	10%	12%
14. RIPPLE: Changes in other trades' work affecting our work such as alteration of our schedule. A solution is to request, at first job meeting, that all change notices/bulletins be sent to our Contract Manager.	10%	15%	20%
15. OVERTIME: Lowers work output and efficiency through physical fatigue and poor mental attitude.	10%	15%	20%
16. SEASON AND WEATHER CHANGE: Either very hot or very cold weather.	10%	20%	30%

The Range of Impact

- **Minor**
  - occasionally, sometimes, once in awhile, disruptive
  - maybe a score of 1 to 3 on a scale of 10
- **Average**
  - regularly, often, common, detrimental, damaging
  - maybe a score of 4 to 7 on a scale of 10
- **Severe**
  - most of the time, constantly, consistently, crippling,
  - maybe a score of 8 to 10 on a scale of 10

AVERAGE IMPACT DOES NOT MEAN AVERAGE CONDITIONS!

- **No Impact:**
  - I'm in the library and trying to read:
    - **MINOR CONDITION**: It's mostly quiet and good reading conditions
    - **AVERAGE CONDITION**: I heard someone whisper and I looked up and then continued reading
    - **SEVERE CONDITION**: I heard someone talk and I looked up, frowned, and sighed in disgust, and then I continued reading
- **Impacted:**
  - I'm in the library and trying to read:
    - **MINOR IMPACT**: People are talking loudly a lot, I'm struggling to read and and its hard to concentrate!
    - **AVERAGE IMPACT**: People are yelling and screaming a lot, reading is slow and difficult, concentration is sometimes nearly impossible
    - **SEVERE IMPACT**: People are having a loud party and playing heavy metal music and its almost impossible to read, even with my headphones on! I gotta get outta here! I feel like I'm never going to get this book read!

Connecting the Cause and the Effect

- FACTOR = CAUSE
- PERCENT OF LOSS = Effect

- Excellent contemporaneously written project records from the site management team will be crucial

Connecting the “Cause” and “Effect” in Loss of Productivity Claims

- “ One of the fundamental issues that a trier of fact considers in hearing a contractors inefficiency claim is “cause and effect”. Important in the consideration is the question of whether or not the contractor’s claims as to productivity impacts **comport** with the **quantum** being sought.”
- Comport means “agree with” and quantum means “quantity or amount”.
- What do you think the Judge means by this statement?

Connecting the "Cause" and "Effect" in Loss of Productivity Claim

- "However, where productivity is concerned, there is no general agreement and no "black letter" law as to how this is to be quantified. This is equally true of quantifying the loss of productivity"
- There is NO accepted empirical study/specific methodology or means of record keeping that proves productivity or loss of productivity
- However, "The Measured Mile Analysis" is highly accepted
  - (Last Week's webinar)

Connecting the "Cause" and "Effect" in a Loss of Productivity Claim

- "The inability to prepare a measured mile analysis does not, in and of itself, bar a contractor's loss of productivity claim. **In such cases, the contractor must apply a different methodology to connect the cause and effect.**"
- The MCAA Factors Affecting Labor Productivity is the basis for this "different methodology"
- ***It is the process of matching facts with the claimed loss of productivity***
- "It is well recognized that a contractor does not have to prove its loss of productivity with mathematical exactitude; however this does not relieve the contractor from making a compelling case as to the specific causes of the impacts and to then connect them with a logical effect."

Two Methods Used With the MCAA Labor factors

- **Forward Priced Productivity Loss Estimate**
  - Used for pricing before the change is made
  - Includes known or anticipated impacts
- **Retroactive Productivity Loss Analysis**
  - After the changes are completed or usually used at conclusion of the project
  - All impacts are known because the work is complete
- Both are valid methods and the project may require using either one or both

Direct Impacts AND Cumulative Impacts

- A contractor must consider both the direct impacts of a loss of labor productivity caused by a change to the contract scope of work, as well as the CUMMULATIVE IMPACT of changes in scope to the unchanged work.
- The MCAA Labor Factors can be applied equitably and reasonably when retroactively quantifying the cumulative effects of changes on the productivity of a construction project

Cumulative Impact Claims

- FACT:
  - Most experts in the field of construction productivity loss analysis believe that the only means of recovering a significant portion of productivity loss is to measure such losses in their totality, at the end of a project, particularly when such losses are a result of a large number of scope changes, which add a significant number of craft hours.
  - Why?
  - These claims are called “Cumulative Impact Claims”

What does your contract, contract documents, waivers, and/or change order forms say about cumulative productivity impact claims?

- There's a lot of murky legal water regarding change order forms, waivers, broad waiver language, contract documents, full accord and satisfaction contract language, knowable impacts, unknowable impacts, etc.
- READ THE MANUAL
- GET ADVICE FROM EXPERIENCED CONSTRUCTION COUNSEL

Which of the MCAA Labor Factors are most appropriate?

Which factors are most appropriate?

- You must determine which MCAA Labor Factors are most appropriate for the specific change scenario or window of time and apply the appropriate factor categories and percentages
- *If possible, the factors and their 3 levels of intensity should be applied cautiously and with significant input by those who witnessed the conditions under evaluation*
- You must interview your jobsite labor supervision, ask them good questions, AND carefully review their contemporaneously written records (aka: Foreman Daily Logs, etc.)

Your rationale for choosing the factors and their intensity will be scrutinized.

Rational explanation needs to be supported by project productivity records, written documentation, and other detailed information obtained from your field supervisory personnel

AVOID OVERLAPS AND DUPLICATION

- Care must be taken to eliminate overlapping factors
  - Morale and Attitude is a good example
  - Stacking of trades, overtime fatigue, and reassignment of manpower already include in their losses a factor for decreased morale and attitude
- You must also consider “Ripple Effect” when striving to avoid factor duplication
  - Example: When you are asking for additional costs for additional supervision, it may be duplicative to ask for “Dilution of Supervision”

How many MCAA factors should you choose?

- The indiscriminate choice of multiple factors will lead to unreliable results and the overstating of impacts – be cautious and choose them with care!
- Although there is no exact answer, in most cases, 3-6 factors are both necessary and applicable
  - Maybe fewer than 3 but rarely more than 6

CHOOSE CAREFULLY ; CHOOSE WISELY

Choose the appropriate factors

Choose the appropriate intensity % for each factor

The MCAA Labor Factors are Additive

- Once all the factors have been carefully evaluated for each changed condition, the percentages are added together. When used for forward pricing, the total percentage is then multiplied against the estimated craft labor hours for the change.

Forward Pricing Sample Calculation

- Estimated Change Order hours w/o impacts are 2,000 hours
- MCAA factors:
  - Crew Size Inefficiency = 10%
  - Learning Curve = 10%
  - Reassignment of manpower = 5%
  - **TOTAL = 25%**
- What is the estimated loss of efficiency hours?
  - Answer: 2,000 hours X 0.25 = 500 Hours
- What would be the total required craft hours for this work?
  - Answer: 2,000 hours estimated + 500 hours estimated productivity loss = 2,500 hours total

Modified Forward Pricing

- It is a well understood principle that when significant changes in scope are issued to a contractor, a loss of labor productivity may affect the change order labor hours AND the base contract labor hours
- The previous slide was an estimation of only the productivity impact on the change order hours only….it did not include the impact to the base contract hours

- Modified Forward Pricing looks at BOTH

Modified Forward Pricing – Time Specific Method

C.O. Impact Period	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Orig Planned Hours	400	400	600	600	720	800
Est C.O. Hours	80	160	320	400	400	160
Revised Planned Hrs	480	560	920	1,000	1,120	960
Learning Curve	5%	5%	5%	0%	0%	0%
Dil of Supervision	0%	10%	10%	10%	10%	10%
Crew Size Ineff	0%	0%	10%	10%	10%	0%
Total MCAA factor	5%	15%	25%	20%	20%	10%
Est Loss of Productivity	24	84	230	200	224	96
					Total	858

Retroactively Pricing Losses of Labor Productivity Using the MCAA Labor Factors

- In most instances, the only option for a contractor attempting to recover a loss of labor productivity caused by changed conditions is to wait until the project is over and review the actual loss: planned versus actual.
- These claims are usually called “Cumulative Impact Claims”

Practical Considerations

- Before pursuing a Cumulative Impact Claim at the conclusion of a project, several obvious and practical considerations must be made including the following five:
  1. Was the estimate/plan of craft hours accurate and reasonable?
  2. Were the conditions, which caused the loss of productivity, reasonably foreseeable when the project was bid/negotiated?
  3. Did the contractor cause this loss of productivity?
  4. Were the principal causes for the loss of productivity the responsibility of identifiable parties?
  5. Will the potential cost of recovery exceed the loss?

NO DOUBLE DIPPING ALLOWED

- You must be cautious to remove, from your retroactively developed loss of productivity claim, if any, the forward priced loss of productivity hours which were included in your executed change orders.

MCAA factors must not be applied against actual hours!

- Why?
- Loss of productivity will be overstated
  - Actual hours must be adjusted to remove:
    1. Time and material hours
    2. Hours spent to repair the contractor's defective work
    3. Change orders on which a loss of productivity has already been calculated or forward priced
    4. Hours associated with executed changes where its been determined that the contractor is barred from recovering the impact
    5. Hours expended by crews that were not affected by a loss of productivity
    6. Other types of productivity losses for which the contractor is responsible (i.e., bid errors, etc.)

Be Cautious

- Be cautious applying the total MCAA factor to the total hours for the entire project duration
  Why?
- Inaccurate results can occur because the effects of labor inefficiency can change during the life of the project
- The MCAA factors often change as the actual project conditions change – *Use the Time Specific Method*
- Apply the MCAA factors to the specific impacted time frames within the overall project schedule (see next slide)

Contract Period	Week 40	Week 41	Week 42	Week 43	Week 44	Week 45
Actual Payroll Hours	1,600	1,600	1,800	2,400	2,400	3,200
Deducted Hours		–80	–120	0	–120	–120
Revised Actual Hours	1,600	1,520	1,680	2,400	2,280	3,080
Reassignment of Mpw	5%	5%	5%	10%	10%	10%
Dil of Supervision	0%	10%	10%	10%	10%	10%
Crew Size Ineff	0%	0%	10%	10%	10%	10%
Total MCAA factor	**5%**	**15%**	**25%**	**30%**	**30%**	**30%**
Est Loss of Productivity	**76**	**198**	**336**	**554**	**526**	**711**
					Total	**2,401**

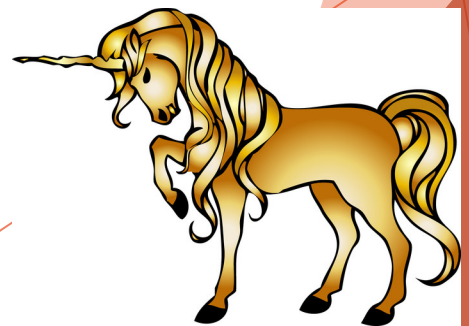
1680 / 1.25 = 1344

1680
1344
336

The 1,344 hours are the "should have spent hours"

The Should Have Spent Labor Hours

- One of the foundations of a loss of labor productivity claim is to determine how many hours the contractor ***should have spent*** to perform the work had the contractor not been affected by events caused by others
- THE UNICORN – The hypothetical condition that almost never exists
  - "In a hypothetical project, one without changes in scope, estimate errors, and contractor-caused inefficiencies, the calculated "should have spent" hours should, theoretically, equal the original estimated hours"



Calculating the “should have spent” hours

- This example is from page 154-156 of the 2020 manual
  - 18,000 = actual hours expended
  - 10,000 = original estimated hours
  - 3,000 = change order/scope change hours
  - 300 = contractor self inflicted rework hours
  - 4,085 hours of productivity loss from impacts (30% impact determined from MCAA labor factors and their applicable intensities)
    - 18,000 - 300 = 17,700 hours adjusted for rework
    - 17,700/1.30 = **13,615 should have spent hours**
    - 17,700 – 13,615 = 4,085 inefficient hours

Calculating the “should have spent” hours

- 18,000 = actual hours
- (10,000) = original estimate hours
- (300) = rework hours
- (3,000) = change order hours
- (4,085) = productivity loss hours
- = 615 Hours remaining ???

- These 615 hours are the contractor’s productivity loss hours that remain undefined and are the not claimed by the contractor - Why?

Calculating the “should have spent” hours

- What about the difference between the original estimate hours (10,000 hours) and the “should have spent hours” (13,615 hours)?
  - 13,615 – 10,000 = 3,615 hours???
- The 3,615 hours is the change order hours of 3,000 hours and the undefined contractor caused inefficiencies of 615 hours)
- The 615-hour difference is caused by the contractor’s MCAA Labor Factor estimate of 30%.
  - An estimate greater than 30% would reduce the 615 hours and an estimate lower than 30% would increase the 615 hours.

Does your brain hurt just a little?

Sorry!

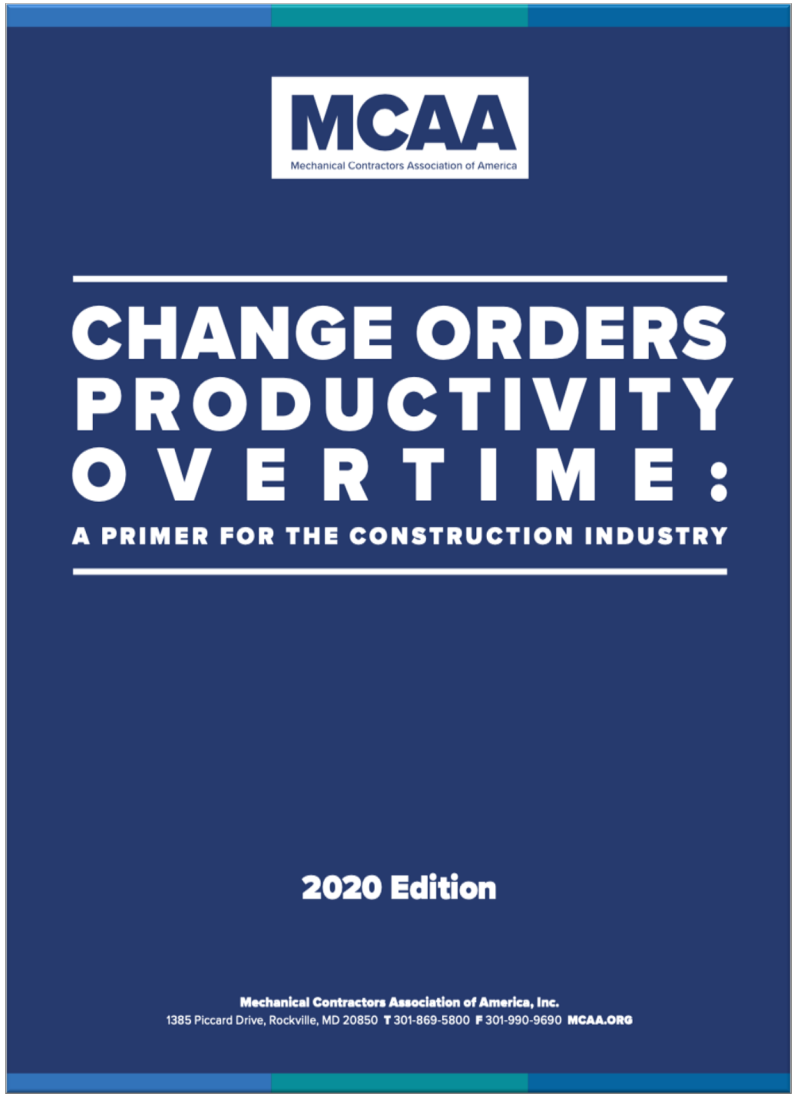

WHAT HAVE YOU LEARNED?

The next webinar in this 4-part series:

Tuesday, June 23, 2020 - 1-2pm

"How to Estimate the Impacts of Overtime on Productivity"

Acquiring the Manual – mcaa.org



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- $150 for a Hard Copy


Thank
You !

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