Quantifications of Transitions to Progressive Design Build: FHWA Findings

Independent Cost Estimator

Qualifications Based Selection

Work Packaging

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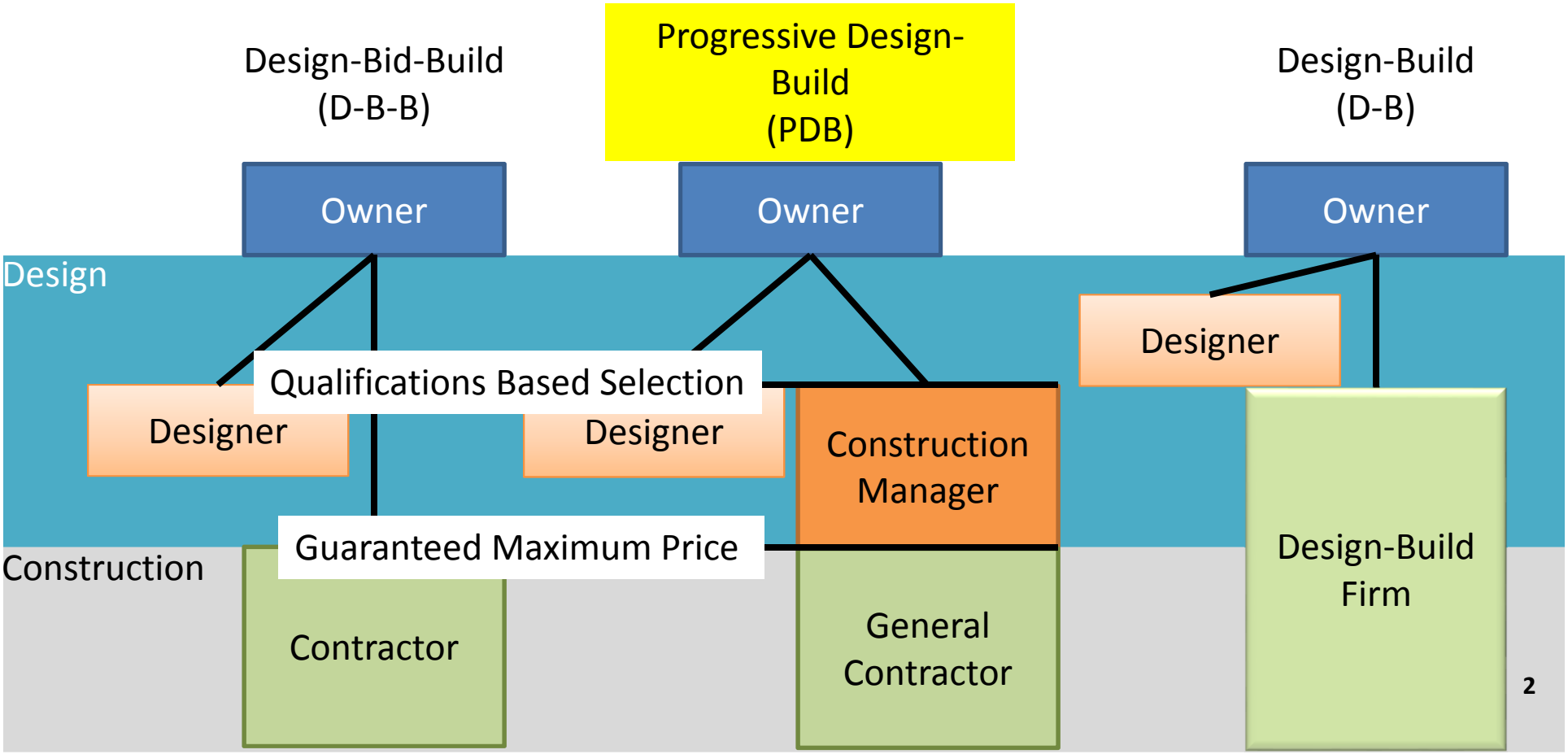
Project Delivery Methods



Objectives

- Describe Progressive Design-Build Processes
  - Independent Cost Estimator (ICE)
  - Qualifications Based Selection
  - Work Packaging
- Promote Discussion

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Agenda

- FHWA ACM Research Project
- Progressive Design-Build
- Independent Cost Estimator
- Qualifications Based Selection
- Work Packaging
- Discussion

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A Study of Cost, Benefits and Risks Associated with ACMs

- Federal Highway Research Study

- Two-Year Investigation into ACM Performance

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A Study of Cost, Benefits and Risks Associated with ACMs

- Quantify for ACMs
  - Cost
  - Schedule
  - Quality
  - Risks
  - Lessons Learned

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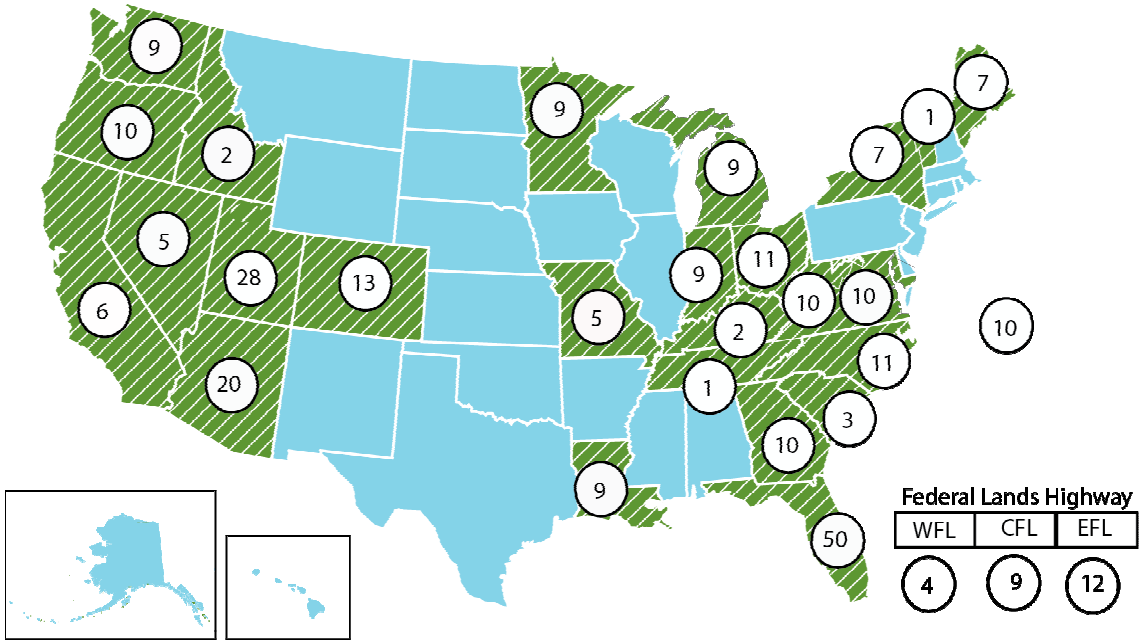
Data Collection Overview



States That Contributed: D-B-B, CM/GC & D-B Projects

Research Data Collection

- 291 projects
  - 134 D-B-B projects
  - 34 CM/GC projects
  - 39 D-B/LB projects
  - 84 D-B/BV projects
- 28 agencies
- Completed 2004-2015

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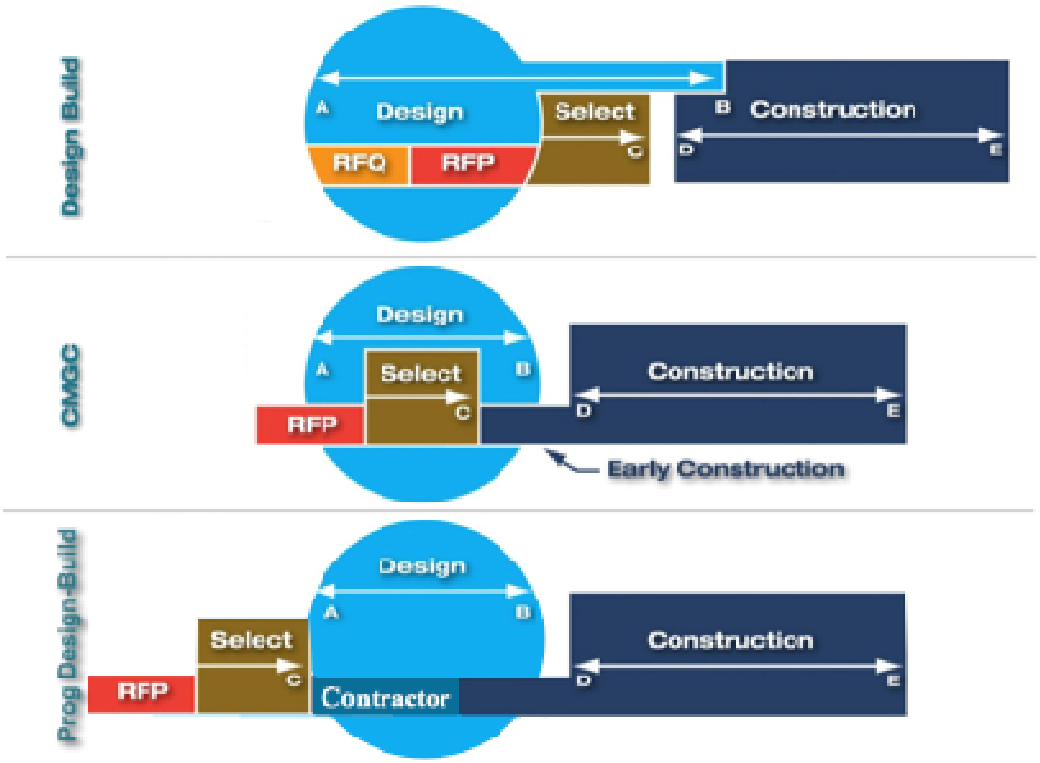
TRR Publications

- Paper: 17-04745 - Roles and Responsibilities of the Independent Cost Estimator in Construction Manager/General Contractor in Highway Construction

- Paper: 17-05805 - Comparison of Qualifications-Based Selection and Best Value Procurement for Construction Manager/General Contractor Highway Construction

- Paper: 17-06114 - Exploration of Early Work Packaging in Construction Manager/General Contractor Highway Projects

Progressive Design-Build



A	Consultant NTP
B	Advertise/Bid Open
C	Contractor Selection
D	Construction NTP
E	Substantially Complete
A-B	Design Time
A-C	Selection Time
D-E	Construction Time
A-E	Project Time

Modified from FHWA EDC 2013

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CM/GC versus PDB

- For Transportation (FHWA), Both Require
  - An Independent Cost Estimator
  - Qualifications Based Procurement
  - Potential Benefit: Work Packaging

Roles and Responsibilities of the Independent Cost Estimator in CM/GC

TRR Paper Number 17-04745

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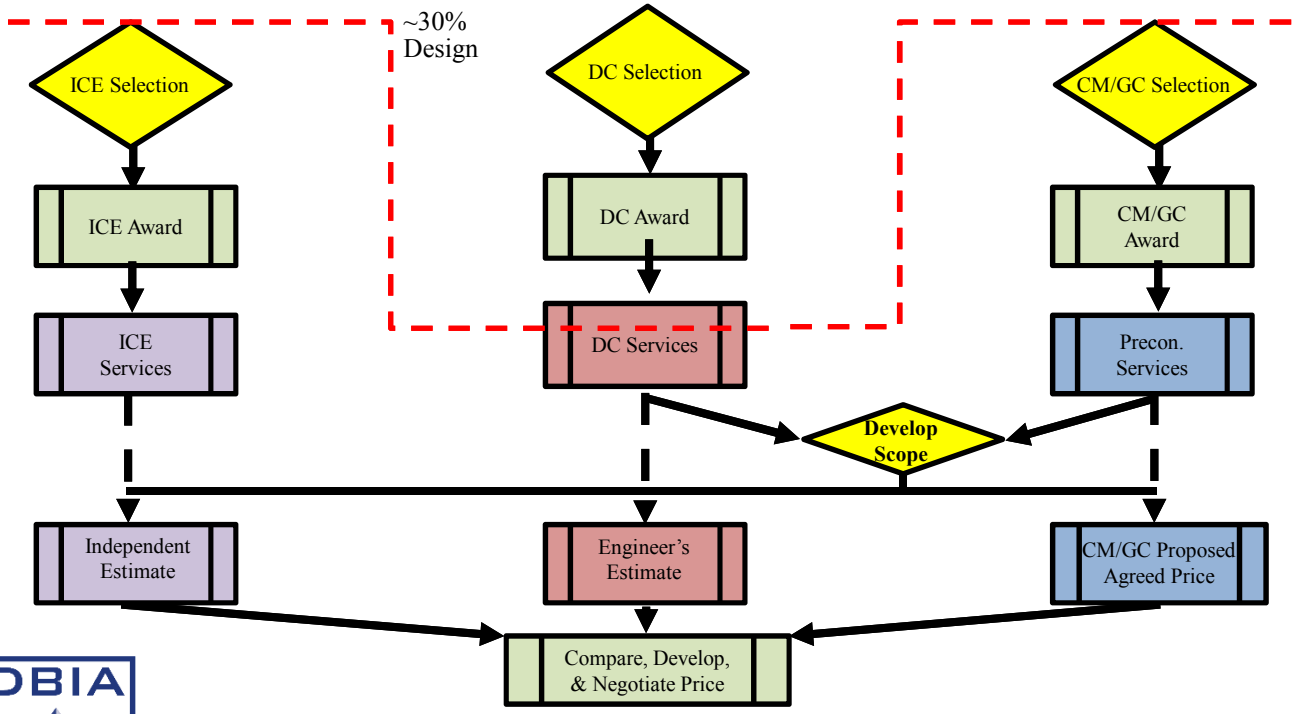
FHWA > Prog. D-B > ICE > QBS > Work Packaging

Independent Cost Estimator (ICE)



- ICE and CM/GC hired 30% design
- All (3) entities develop estimate
- During negotiation (3) estimates are compared for accuracy
- After agreed upon price, construction contract is executed

Gransberg et al 2015

	ADOT	CDOT	Mass.	MnDOT	MDOT	UDOT
Cost-based estimate	✓	✓	✓	✓	✓	✓
Bid reconciliation process	✓	✓	✓	✓		✓
CM/GC proposed agreed price must be within 10%		✓	✓	✓	✓	✓
Requirements to attend specific project meetings	✓	✓	✓	✓		✓
ICE to provide interim estimates at milestones		✓	✓	✓	✓	
Blind Bid process			✓	✓		✓
Formal design and risk workshop (Risk analysis)		✓		✓		
Review CM/GC schedule and cost model	✓	✓				
Involved in major change order negotiations		✓				
CM/GC technical consultant	✓					

ICE State-of-Practice

- Arizona, Colorado, Massachusetts, Minnesota, Michigan, and Utah
- Agency manuals with significant discussion of ICE
- Majority require
  - Cost Based Estimate
  - Bid Reconciliation Involvement
  - Attend Project Meetings

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ICE Survey Findings

Percent of Award Cost	Number of Projects
0.25% to 0.50%	7
0.51% to 1.00%	8
1.00% to 2.00%	1
2.00% to 3.00%	2
Average Percent of Award Cost	0.88%

- Average Cost 0.9%
- Majority hired 0-30% design completion
- Majority perform 3 estimates, with up to 5 estimates performed
- Most common complication is means and methods

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Overall Findings and Lessons Learned

- ICE should be an involved project team member
  - Involve ICE in preliminary engineering
  - Involve ICE in pre-construction meetings
  - Develop culture of collaboration
- ICE needs construction and/or construction estimating exp.
- ICE can provide design/construction support
- ICE is a value added CM/GC process

ICE Adding Value

- Average ICE Cost 0.9%

"The ICE absolutely adds value to the process... The ICE gives you a comfort level that you are not being taken to the cleaners."

"I felt much more comfortable knowing that we were getting a production based estimate rather than an engineer's estimate. I don't think I could have ever been comfortable that we were getting a fair market price without an ICE. It is piece of mind."

"The ICE… also can provide input and insight into the schedule of the project, risks that are misplaced that could be shared or kept under the ownership of the department to minimize cost, they give a good check on quantities and planned quality."

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CDOT CMGC ICE Lessons Learned

- ICE needs to be flexible, have negotiation skills, may need project specific specialty estimating.
- Strong project manager/project director with negotiation skills.
- Competitive pricing can be a challenge.
- Negotiation can be challenging– Start high negotiate to the middle.
- Open Cost Model expectations must be specific and detailed.
- Perception of not getting lowest price in a culture of low bid.
- Resistance to culture change and industry acceptance.
- Recommend official ICE strategic plan for any entity.
- Hire ICE AS EARLY AS POSSIBLE

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Comparison of Qualification Based Selection and Best Value Procurement

TRR Paper Number 17-05805

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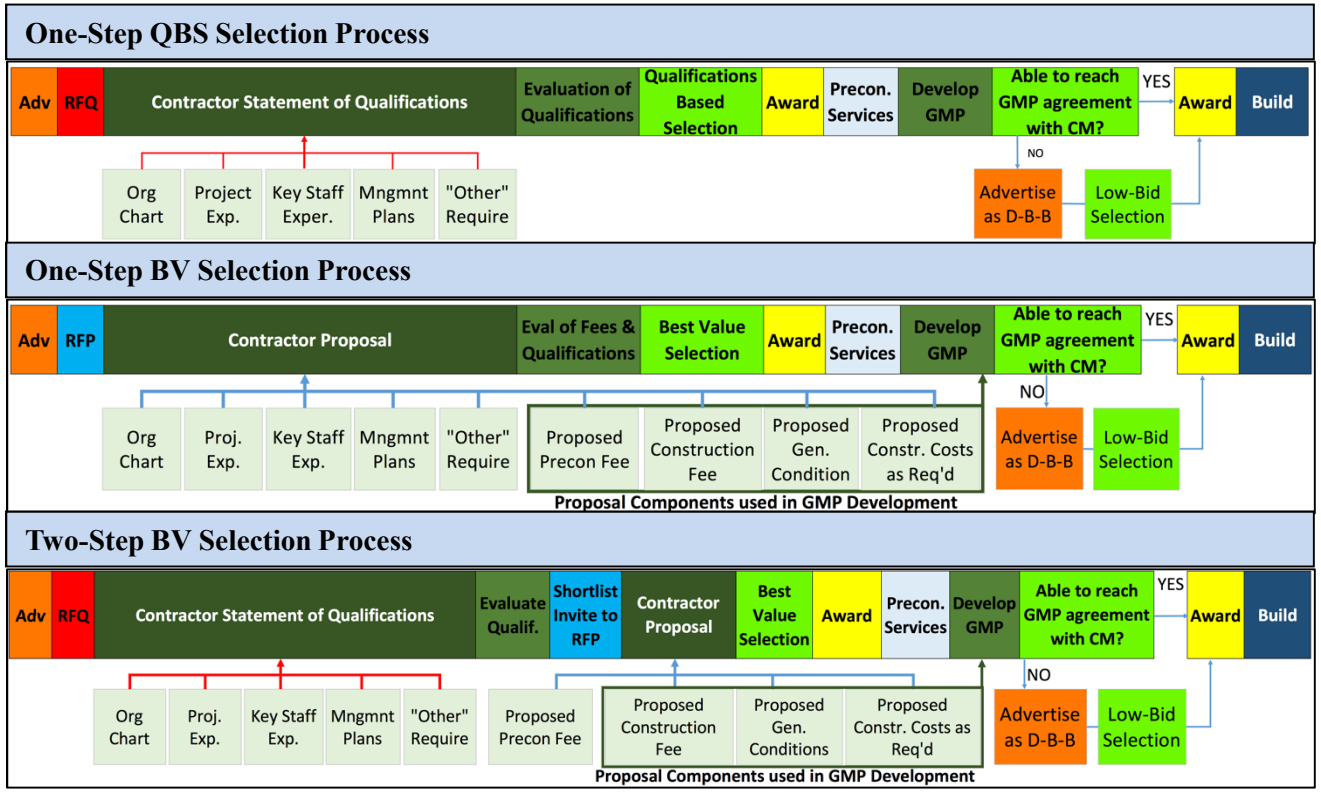
QBS versus BV Procurement



Gransberg et al 2010

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Cost in CM/GC Procurement Legislation

- Cost Not Allowed
  - Arizona
  - Michigan
- Either/No Rule
  - California
  - Minnesota
  - Nevada
  - Utah
  - Florida
  - Tennesee
- Cost Required
  - Alaska
  - Connecticut
  - Colorado
  - Idaho
  - Maryland
  - Oregon
  - Rhode Island
  - Washington

Submittal Requirements for Success

- Review Contractor References
- Perform Contractor Interviews
- Educate Selection Party
- Include a Diverse Selection Panel

Qualification Based

- Opportunities
  - Ability to Select Solely on Qualifications
  - Difficult to Develop Pricing
  - Pricing Increases Negotiation
  - Price Detracts from Quality/Innovation
- Obstacles
  - Receiving a Fair Market Price; Mitigated by
    - Independent Cost Estimator
    - GMP Protocols in GMP
    - Having 2nd Contractor as an Option

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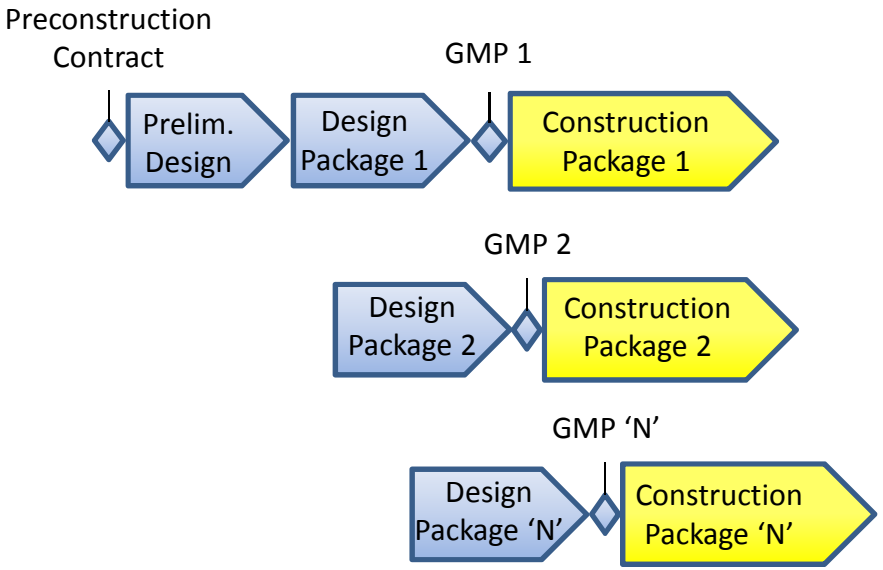
CDOT CMGC Qualification Based/BV

- Opportunities
  - Ability to Select Solely on Qualifications
  - Should remove profit, back office overhead and administrative from prices
  - Can be difficult to develop pricing
  - Pricing Increases Negotiation
  - Early Contractor involvement can provide value
- Obstacles
  - Receiving a Fair Market Price; Mitigated by
    - Independent Cost Estimator
    - Competitive bid packaging
    - Low bid process as alternative
  - Package severability KEY
  - Work packaging must be strategic and specifically tailored to each project

Exploration of Early Work Packaging

TRR Paper Number 17-06114

Early Work Packaging



Early Work Packaging Used For

- Procuring Long Lead Items and/or Volatile Priced Items
- Schedule Acceleration
  - Overlap Design and Construction
  - Perform Early Work Including
    - Right of Way
    - Utility
    - Subsurface
    - Prep Work
  - Avoid Environmental Restrictions or Disadvantageous Seasons

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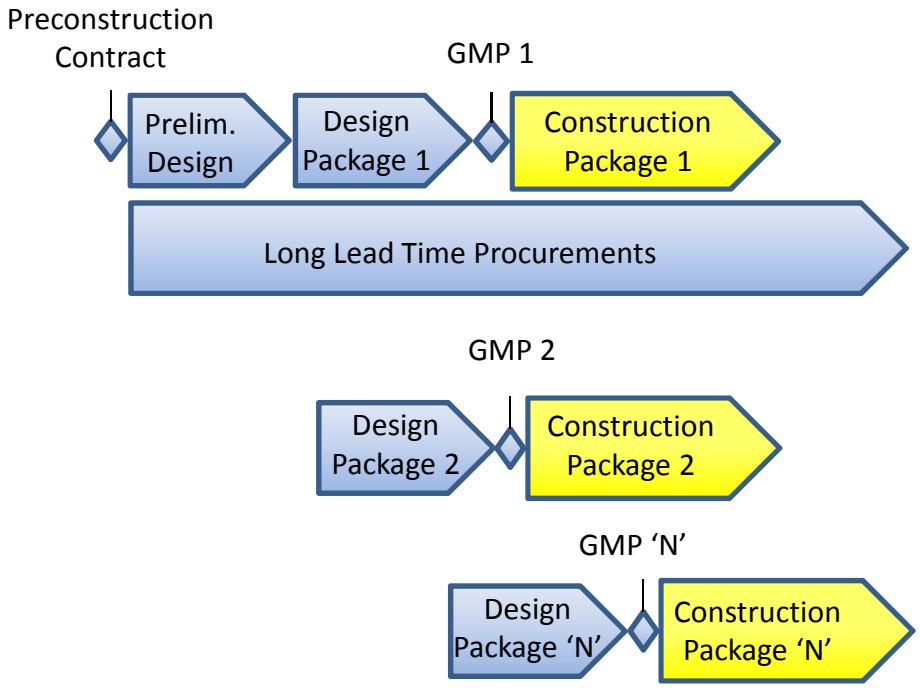
Early Work Packaging Benefits

- Expedite Project Completion
- Mitigate Project Risks
- Reduce Project Costs
- Minimize Impact to the Public

Early Work Packaging Implementation Factors

- Maintain Severability
- Proactive Planning
- Involve Contractors and Stakeholders
- Only Use After Progressive Design-Build Experience is Gained

CDOT CMGC Early Work Packaging



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CDOT CMGC Packaging Lessons Learned

- Every project is unique and the packaging must fit the project schedule and phasing.
- Each package has to be as severable as possible.
- Each package needs to be strategically planned.
- Challenges with overlapping items, traffic control, mobilization, overhead, offices, yards, and other items.
- Challenges in pricing but can reduce risk, schedule, and impact.

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CDOT CMGC LLTP and Early Work Packaging Benefits

- Expedite Project Completion
- Expedite equipment and material purchases
- Mitigate Project Risks
- Mitigate construction phasing challenges
- Reduce Project Costs
- Minimize Impact to the Public
- Better understanding of construction cost estimating for CDOT

Conclusions

- Independent Cost Estimator
- Qualification Based Selection
- Early Work Packaging

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Questions/Comments

- General Feedback or any Negative Experiences with
  - ICE
  - QBS
  - Work Packaging
- Any Research Ideas on the Above Processes?
- CM/GC Practices Applicability to Progressive DB
- General Comments

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