



Innovative Contracting and Accelerated Bridge Construction

James McMinimee, P.S.E., Senior Project Manager



James McMinimee P.E.

25 years UDOT – Director of Project Development / Chief Engineer

150+ Innovative contracting projects; DB, CMGC, ABC, A+B

ENR Top 25 Engineers in the News 2009- For SPMTs

AISC Designer Special Achievement Award 2012 – For Modular Steel



MODEL TO IMPLEMENT INNOVATION

4500 SOUTH

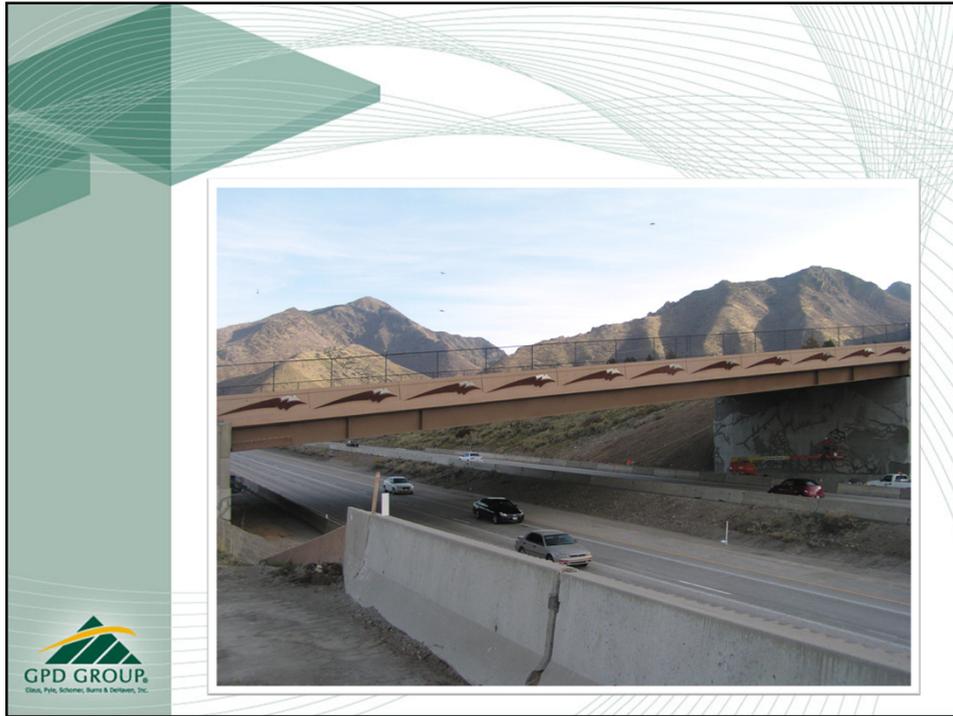


Generic Innovative Contracting





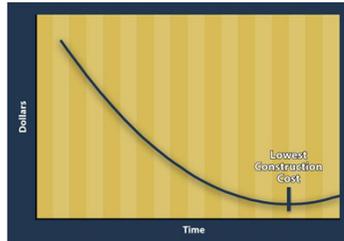




WHY?

- ◆ Economic Competitiveness for the State
- ◆ Public wants/expects less interruptions
- ◆ Buys political capital

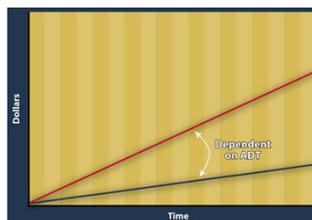
TRADITIONAL BUSINESS MODEL DBB



- ◆ Successful business model
- ◆ Existing interstate was constructed
- ◆ Great model for “Green field” projects
- ◆ Competition determines the lowest construction cost
- ◆ Contractors select time and method

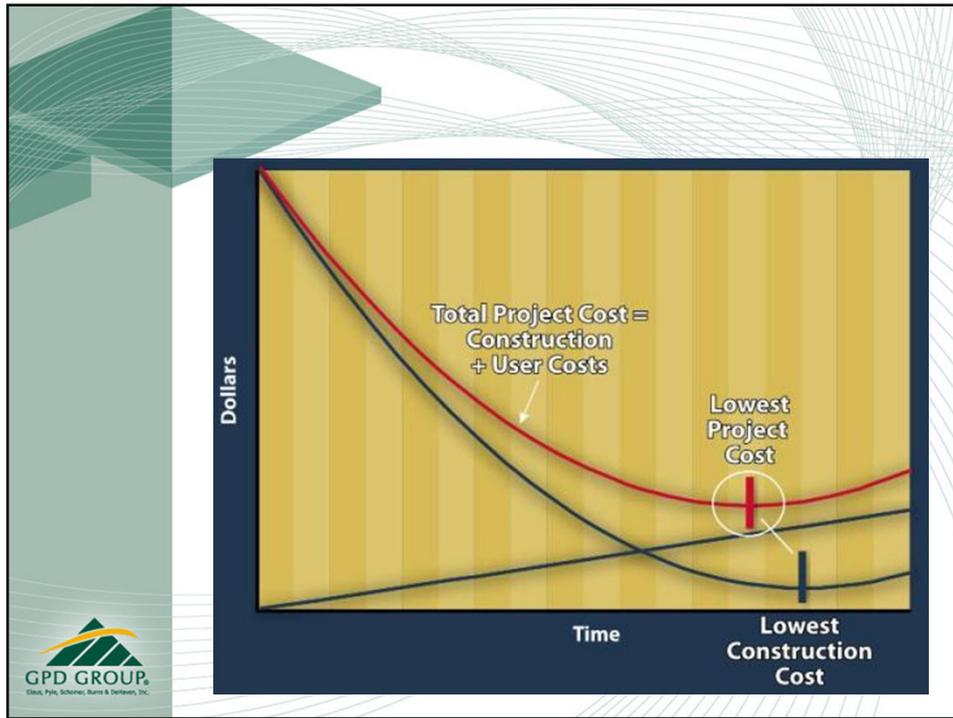


USER/SOCIETAL COSTS



- ◆ Linear relationship
- ◆ Cost depends on volume of traffic
- ◆ Longer construction duration → increase impacts to users
- ◆ Slope of line depends on traffic number





NEW BUSINESS MODEL FOR MANY STATES

Dollars

Time

Total Project Cost = Construction + User Costs

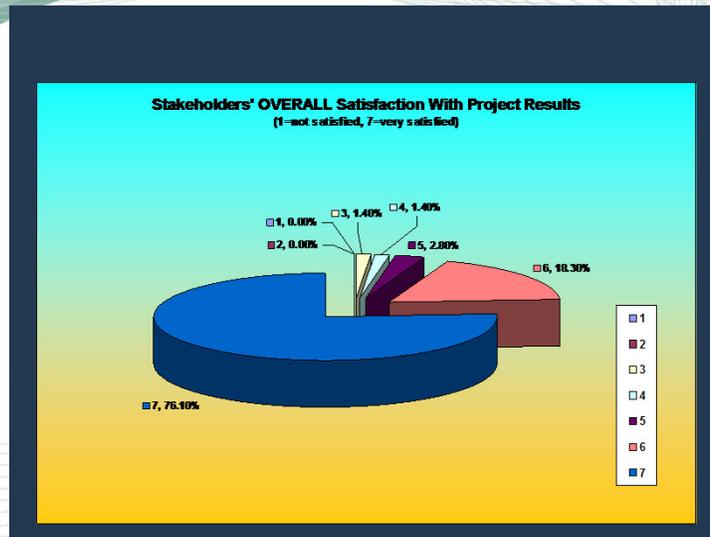
Lowest Project Cost

Lowest Construction Cost

- ◆ New paradigm
- ◆ Lowest construction cost → lowest Project cost
- ◆ Societal costs minimized
- ◆ Political capital
- ◆ Public praise

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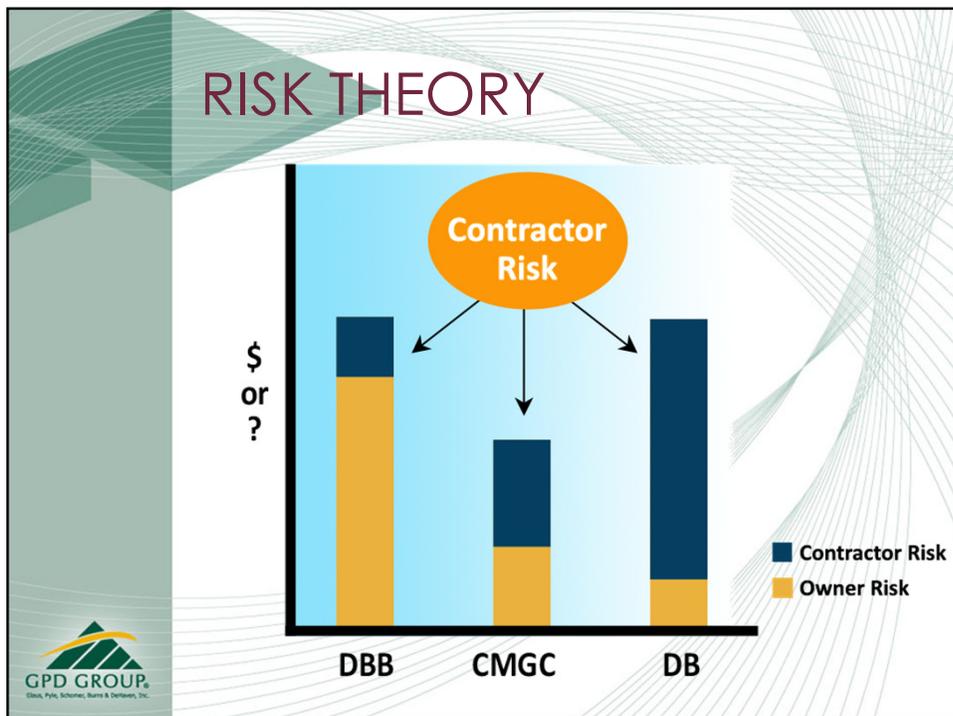
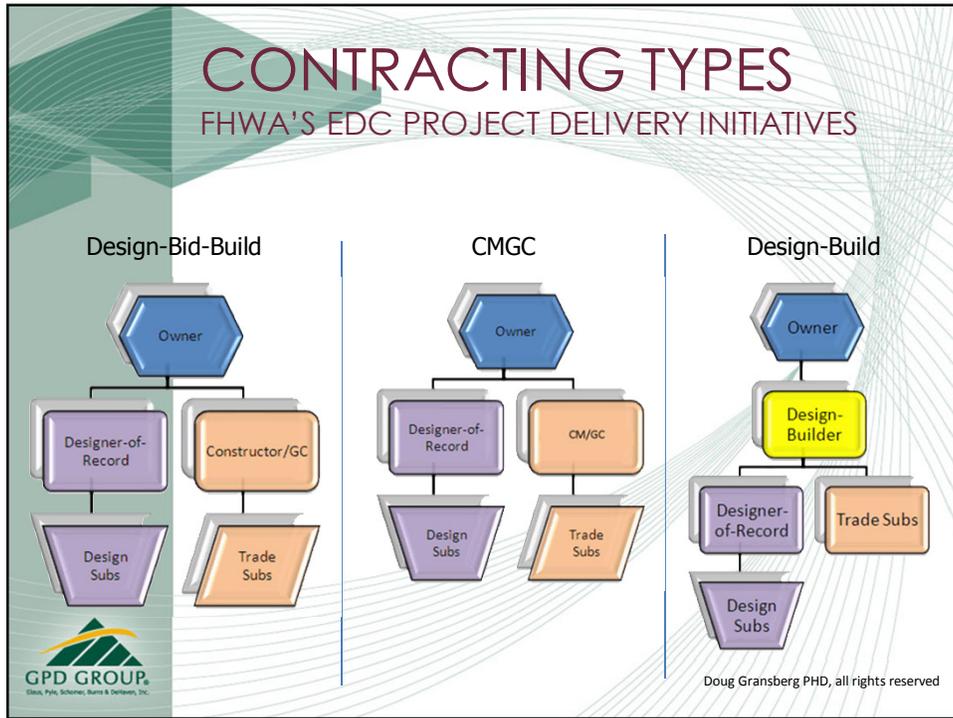
PUBLIC PERCEPTIONS

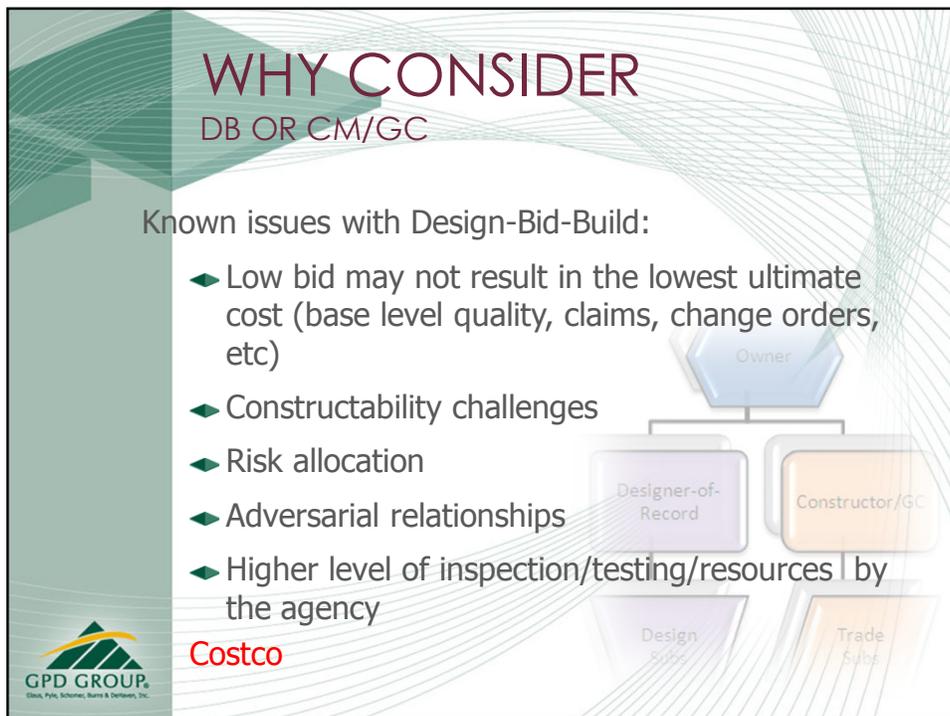
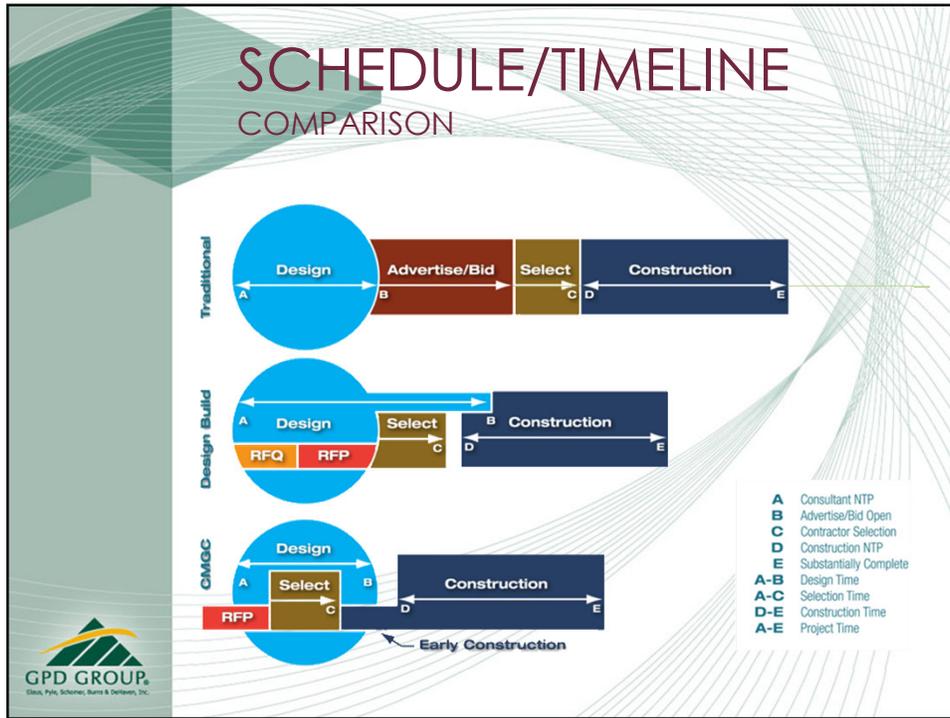


TODAYS AGENDA

- ◆ Discuss Tools for the Toolbox – Speed Delivery
- ◆ Design Build, CMGC and A+B contracting
- ◆ Accelerated Bridge Construction or ABC







CONTRACT COMPONENTS

Project Delivery Method

- ◆ DBB; CMGC; DB

Procurement Procedure

- ◆ Low Bid; Best Value; Qualifications-based; Sole Source, Fixed Cost Variable Scope

Contract Payment Provision

- ◆ Lump Sum; Guaranteed Maximum Price; Cost Plus Fee; Cost Reimbursable, Unit Prices

Trend in Transit and Airports is

- ◆ DB-QBS-GMP



DESIGN-BUILD



OVERVIEW

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WHAT IS DESIGN-BUILD

- "One Step" or "Two Step" competitive negotiation
- Proposals based on definitive performance criteria
- Uses Request for Proposals instead of Invitation for Bids procedures
- Awards on Best Value basis



Fire and Forget

WHAT'S DIFFERENT?

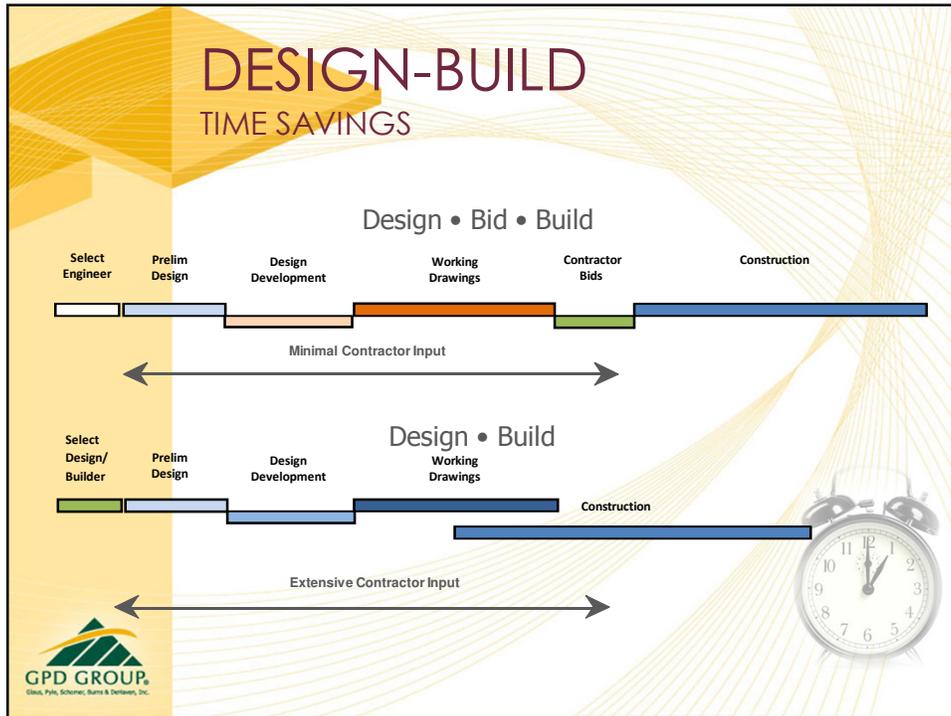
Owner

- ◆ Design compliance review
- ◆ Need dedicated design assets available to the field
- ◆ Performance-based
- ◆ Higher level of trust required

Design-Builder

- ◆ Owns details of design
- ◆ Designer-of-Record (DoR) **Must** design to budget & schedule
- ◆ Responsive to owner needs-preferences
- ◆ Internal contracts different
- ◆ DoR's client is the design-builder NOT the Owner





DESIGN-BUILD PROJECT CANDIDATES

Schedule Issues

- ◆ Can significant time savings be realized through concurrent activities?
- ◆ Will staff resource constraints impact project schedule?
- ◆ Must the work begin or end by a specific time?
- ◆ Are traffic detours and/or closure periods limited?

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DESIGN-BUILD

PROJECT CANDIDATES

Project Complexity

- ◆ Does the project include a number of primary features (road, bridge, traffic control system)?
- ◆ Are the features tightly interrelated and/or closely located?
- ◆ Will construction staging be a major issue?
- ◆ Does the site present unique or unusual conditions?
- ◆ Are specialty skills needed for design or construction?

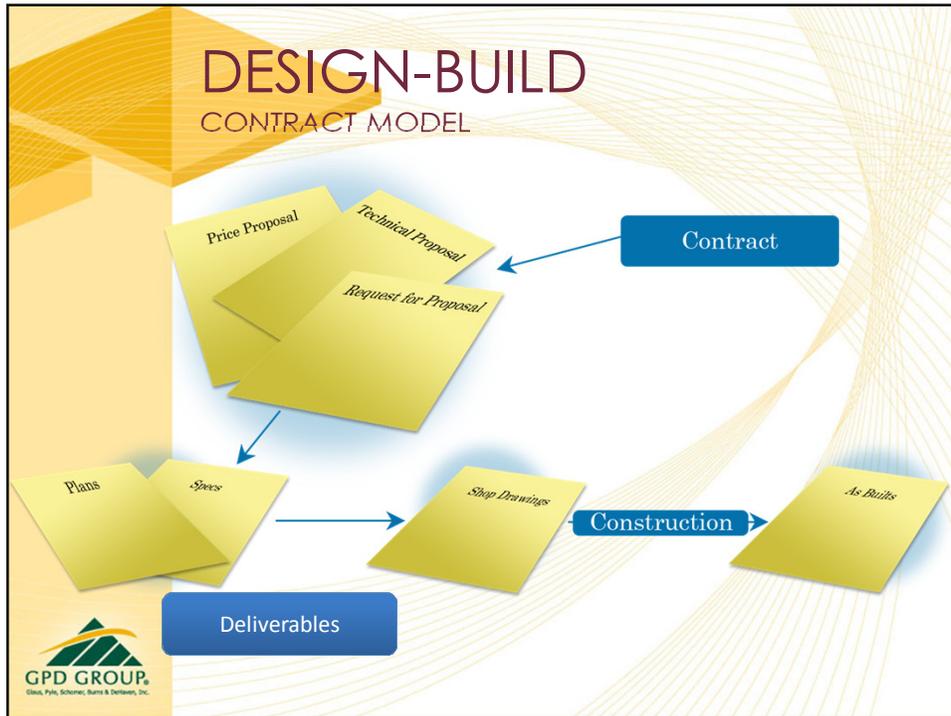


DESIGN-BUILD

NOT A CANDIDATE

- ◆ Final design must be completed before:
 - » Accurate Estimate of Costs
 - » Obtain NEPA Clearance
 - » Approval to Proceed
- ◆ Owner wants "Heavy" input to design
- ◆ Project too small to attract competent competitors
- ◆ Owner can't Let Go

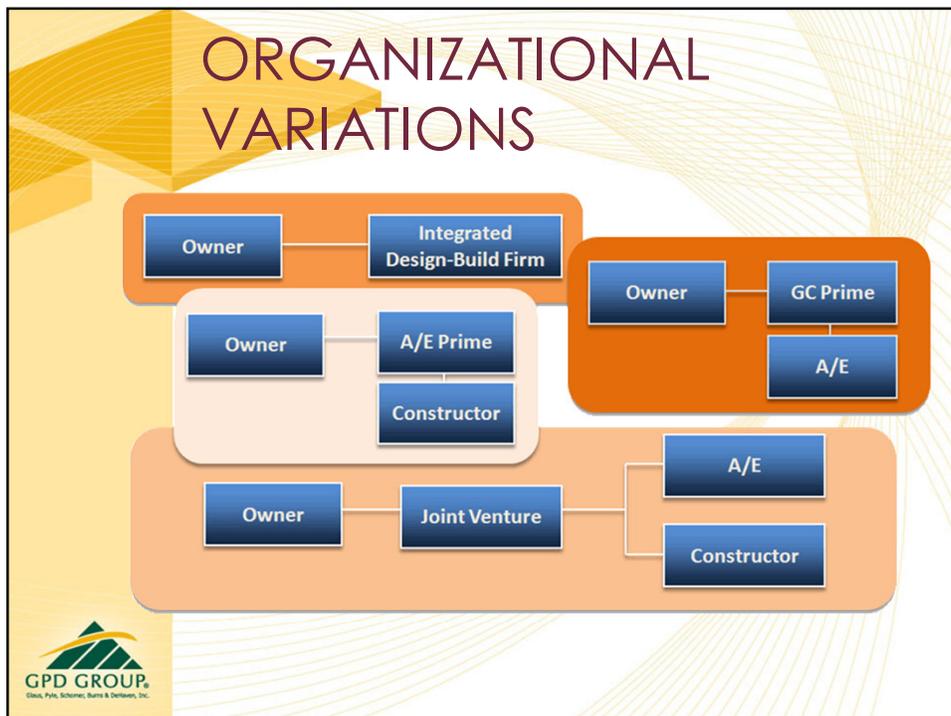
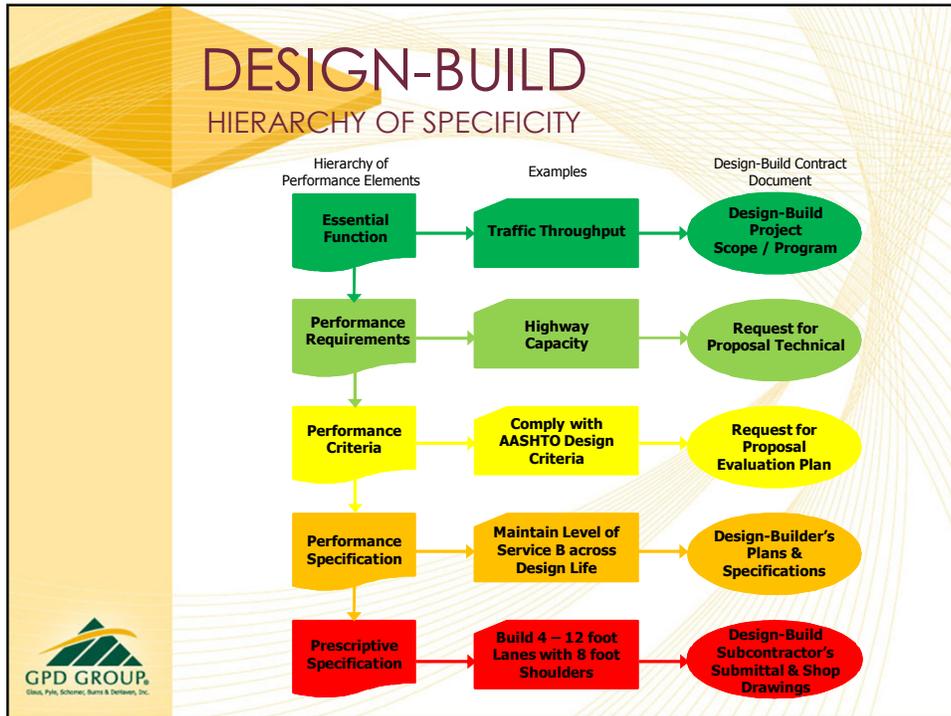




DESIGN-BUILD SEMANTICS

- ◆ Must be careful about misusing the term: *"Performance Specification"*
- ◆ Specification indicates that a design decision has been made
- ◆ The DB RFP contains *"Performance Criteria"*
- ◆ The DB's Designer-of-Record prepares "specifications"

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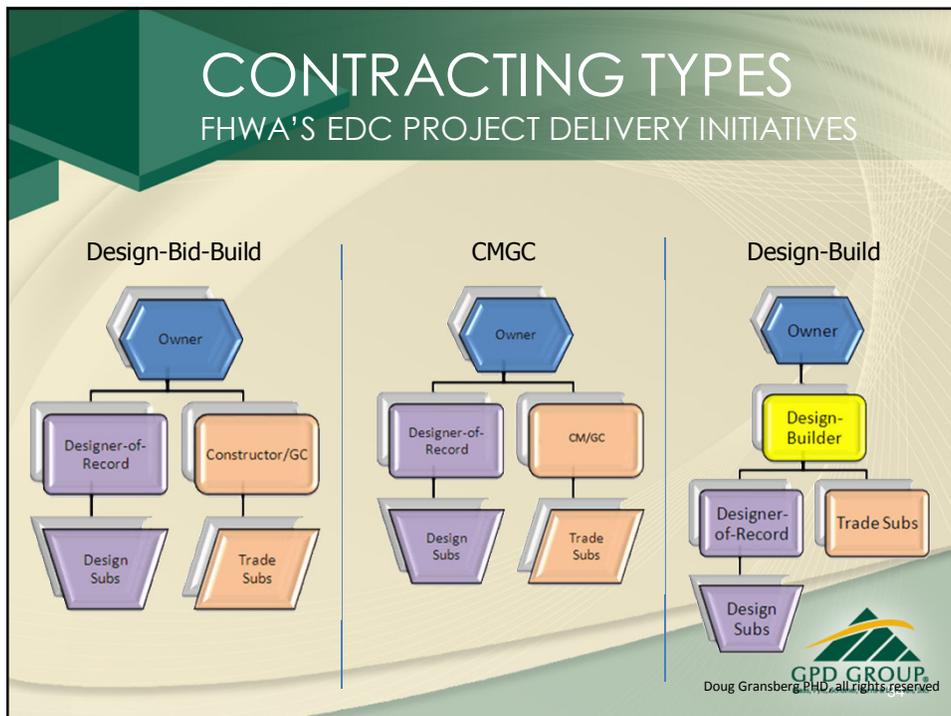
DESIGN-BUILD

SUMMARY

- ◆ DB is a CONSTRUCTION project
- ◆ DOT gives up control of the details of design
- ◆ DOT must be able to identify TANGIBLE benefits to compensate for shifting control of design details to the design-builder
- ◆ Don't build a selection system that puts HEAVY weight on price – that makes it a low bid competition & waters down possible advantages
- ◆ Do not attempt DB with a DBB mentality

Good weapon to have- FLA







CONSTRUCTION MANAGER GENERAL CONTRACTOR

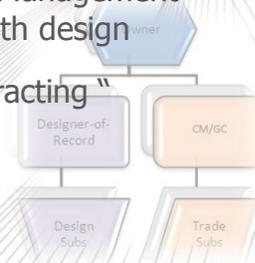
OVERVIEW

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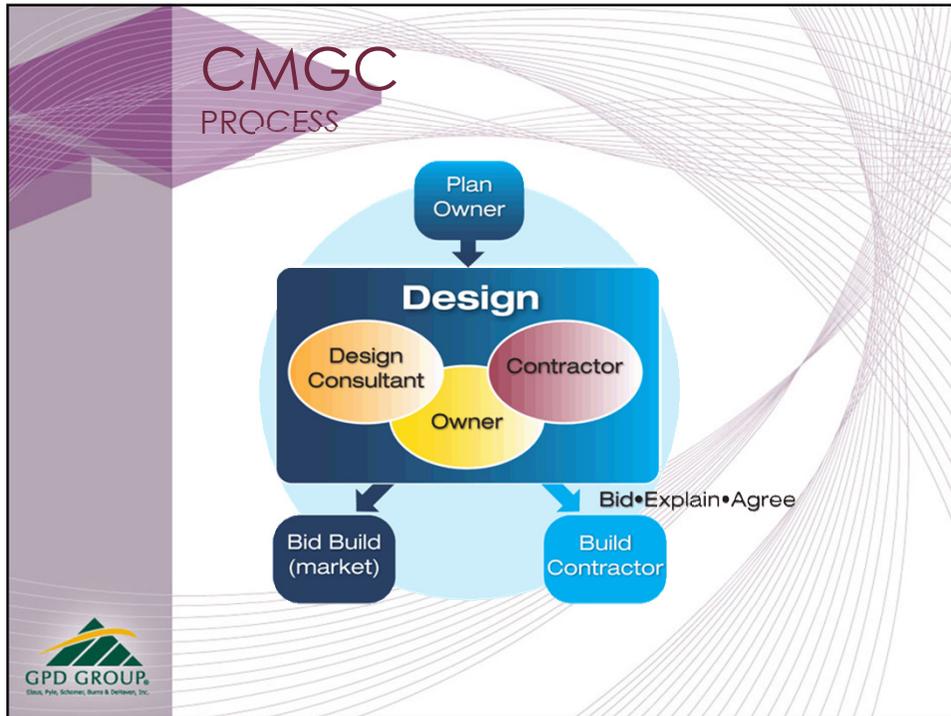
WHAT IS CMGC?

A Project Team consisting of three components:

- ◆ An Owner
- ◆ A Contract with a Designer
- ◆ A Two Phase Contract with a General contractor
 - Phase one – A “Construction Management” consulting contract to help with design
 - Phase two – A “General Contracting” contract to build the project



FHWA name for EDC



CMGC IS NOT CM@RISK

- ◆ The process is not the vertical world of CM@Risk – *similar but different*
- ◆ Transportation industry projects are different and require a process of their own
 - Self-performance requirements are typical
 - Subcontractor procurement process is different
 - CMGC relies on best-value selection

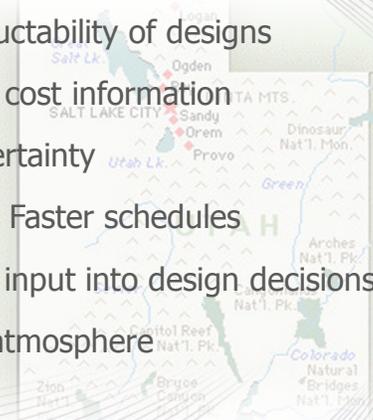
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    graph TD
      Owner((Owner)) --- Designer((Designer))
      Owner --- Contractor((Contractor))
      Contractor --- Subcontractors((Subcontractors))
  
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CMGC

- ◆ Constructability of designs
- ◆ Timely cost information
- ◆ Cost certainty
- ◆ Better/ Faster schedules
- ◆ Owner input into design decisions
- ◆ Team atmosphere



WHAT DOES AN OWNER EXPECT

IN THEORY

- ◆ Better Designs
- ◆ Better, Faster schedules
- ◆ Lower costs
 - Savings in design
 - Savings in constructability
 - Savings in innovation



CMGC PROJECT DELIVERY

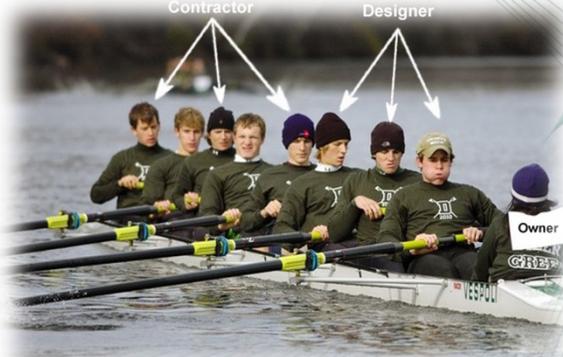


Big Picture

THE BIG PICTURE

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CMGC CONTRACTING



Contractor

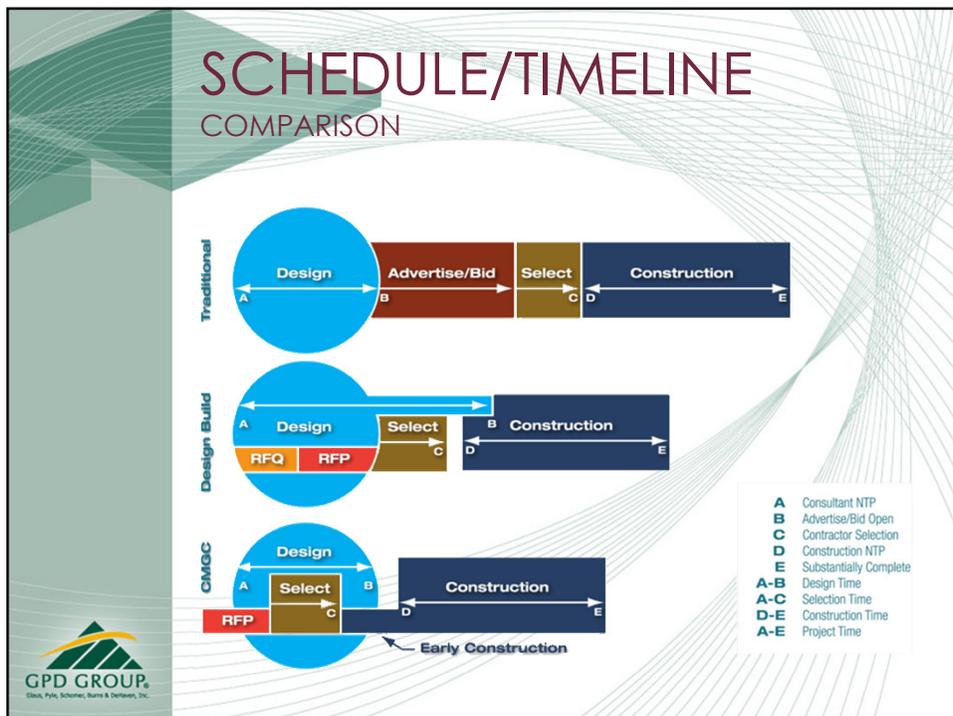
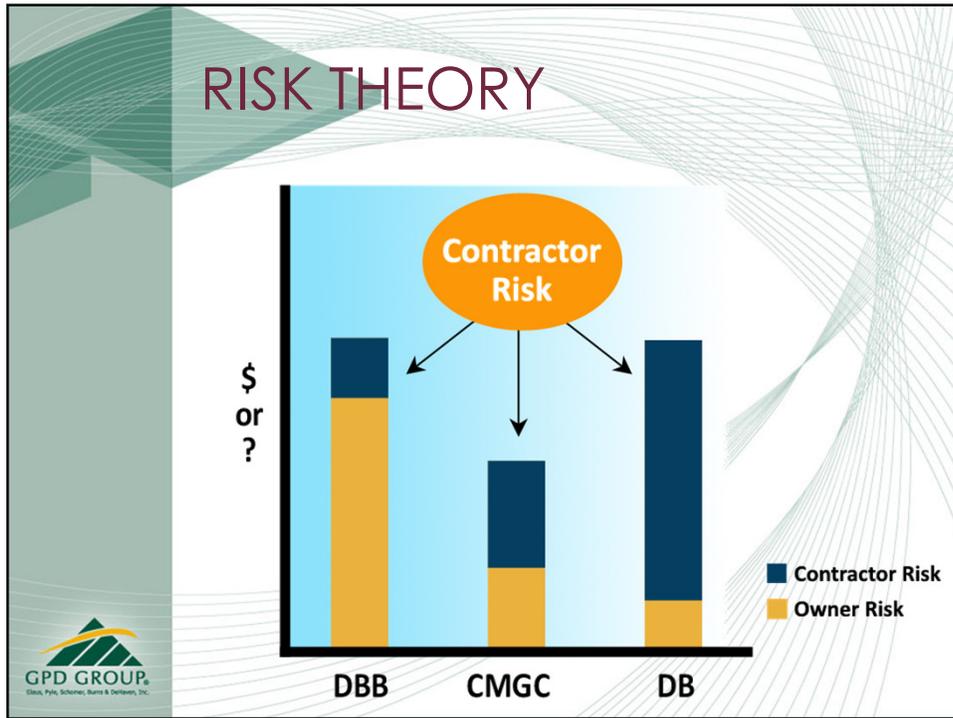
Designer

Owner

CMGC is an integrated team approach to the planning, design and construction of highway projects.



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OPERATION STAGING AREAS

BRIDGE FARM @ 1300 EAST

7 Superstructures Constructed in a Single Location



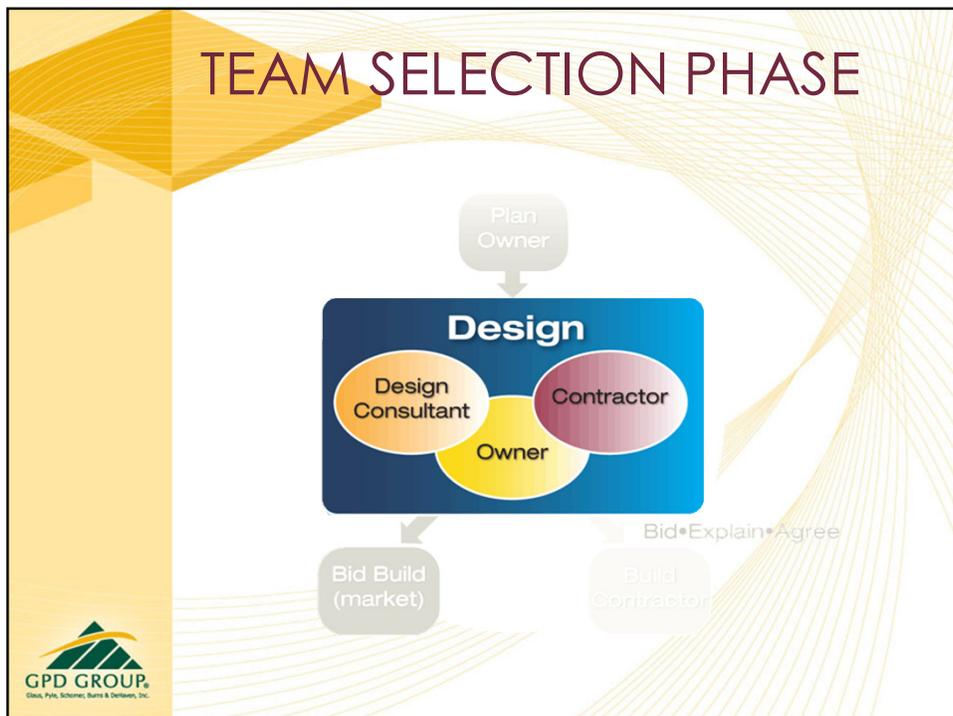
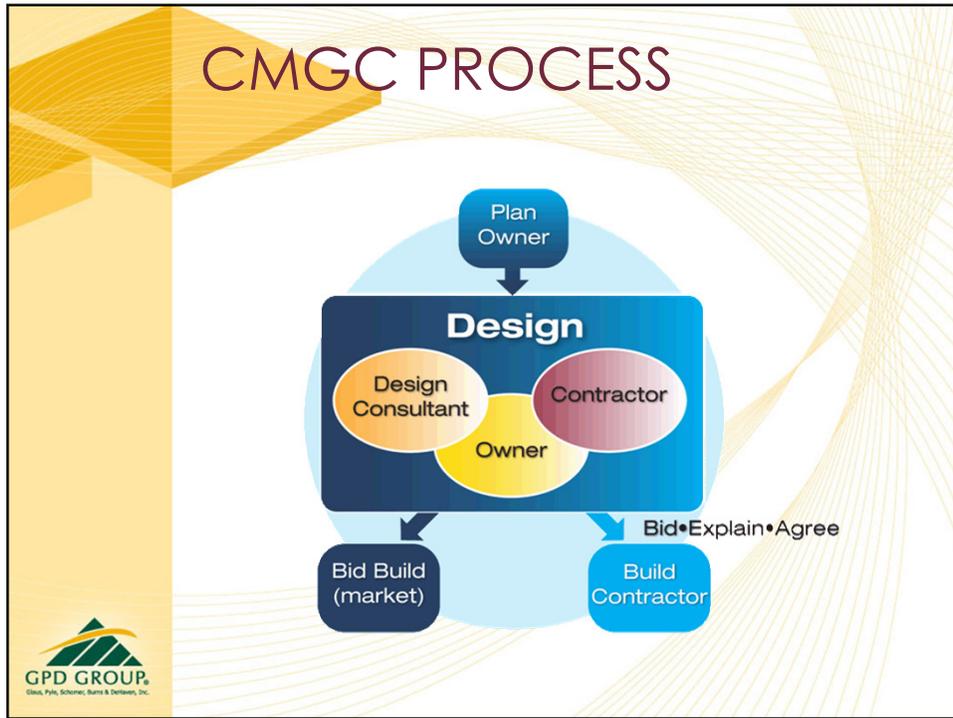
CMGC PROJECT DELIVERY

THE PROCESS



THE PROCESS

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HOW IS THE TEAM SELECTED?*

- ◆ Designer – regular consultant selection process
- ◆ General Contractor – “Best Value Selection”
 - Includes Technical score
 - Includes “Price”*

**UDOT model – other models exist including qualifications based selection and competing profit. FHWA will allow any fair and transparent selection method to be evaluated under SEP-14.*



GENERAL CONTRACTOR RFP

RFP evaluation criteria includes the following:

- ◆ Team
- ◆ Approach
- ◆ Approach to price
- ◆ Unit prices on a few select items
- ◆ Innovations
- ◆ CMGC Design Process

Request for
Proposal

*A Guide to Effective RFP
Development*



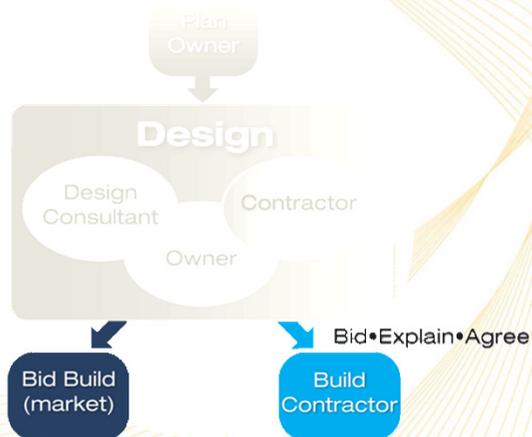
DESIGN PHASE

Once we have selected contractor and designer:

- ◆ Two part contracting method:
 - Part one – Construction Management
 - Part two – General Contractor
- ◆ Part one:
 - Work with Owner, and Designer to design Project
 - Provide advice on Constructability, Schedule, Materials, Budget
 - When ready "Bid" on project
- ◆ Part two:
 - Build project



CMGC "BID" PROCESS



CMGC "BID" PROCESS

Team works on design:

- ◆ Periodically owner asks CMGC to price job
- ◆ Owner evaluates "bid"
- ◆ Most models have two estimates – Designer furnished Engineer's Estimate, and an Independent Cost Estimate (ICE)
- ◆ If bid is within 10% owner can award
- ◆ If bid >10% estimating team meets to discuss differences in bid assumptions
- ◆ Iterations address risk



CMGC "BID" PROCESS

Two possible outcomes of "bid"

- ◆ Owner gets acceptable price
 - Proceed with build
- ◆ Owner doesn't get acceptable price
 - Proceed with more design – ultimately convert to Design-Bid-Build

Build contract can be Guaranteed Max price or Unit price (Should be both)

- ◆ Allows comparison of pricing
- ◆ Provides transparency



WHAT DOES A DOT GET FROM CMGC?

- ◆ Better Designs – *Hard to Quantify – Contractor satisfaction with plans, CO's, Designers like*
- ◆ Better schedules – *Exceeded expectations*
- ◆ Lower costs
 - *Savings in design*
 - *Savings in constructability and innovation*

Another Good Weapon



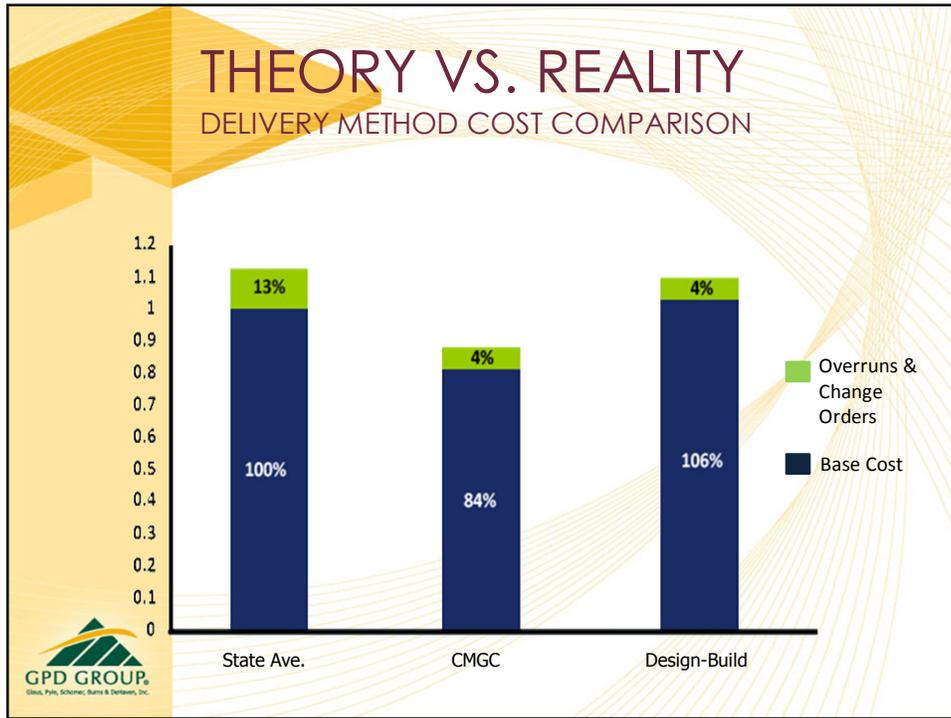
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WHICH TOOL FROM THE TOOLBOX?

- ◆ You want speed and have no staff – go DB
- ◆ You have design and not complex – paving or rehab jobs – go DBB
- ◆ You have complex or urban job with third-party inputs, staffing issues, DB designer issues – CMGC



The slide features a yellow and white background with a decorative pattern of thin, curved lines. The text is in a dark purple font. The logo for GPD GROUP is located in the bottom left corner, and an illustration of a toolbox is in the bottom right corner.



A+B

COST PLUS TIME CONTRACTING

Agenda

- ◆ What is it?
- ◆ How does it work?
- ◆ What kind of results do you get?
- ◆ Lessons Learned

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WHAT IS A+B CONTRACTING?

- ◆ Cost Plus Time is a bidding mechanism
- ◆ A+B is a bolt on to DBB, CMGC and DB
- ◆ Is a way to get projects delivered faster
- ◆ Allows Contractors to set schedule
- ◆ Typically incents aggressive schedules
- ◆ Typically has Incentive/Disincentive based on owner determined RUC



HOW DOES A+B WORK?

- ◆ Contractor bid includes "Construction Cost" and a "Time" component
- ◆ Low bid is determined on sum of Cost and Time
- ◆ Contract is awarded for construction cost
- ◆ Time incentive/ disincentive is Change order



WHAT KIND OF RESULTS DO YOU GET?

- ◆ NCHRP 451 "Guidelines for Warranty, Multi-Parameter, and Best Value Contracting"
- ◆ Does not increase project costs significantly
- ◆ Decreased completion times
- ◆ Increases schedule reliability, public trust



LESSONS LEARNED FROM A+B

- ◆ Requires owner produce realistic RUC
- ◆ Requires intense resources, owner and contractor
- ◆ Understand Schedule and scheduling
- ◆ Deal with Unknowns- ROW, Utilities, Weather, design issues
- ◆ Real Partnering
- ◆ Program Cost plus incentive



Another good weapon

ACCELERATED BRIDGE CONSTRUCTION



DBB, DB or CMGC?

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ACCELERATED BRIDGE CONSTRUCTION COMPONENTS

Foundation & Wall Elements

Continuous Flight Auger Piles

Geosynthetic Reinforced Soil (GRS) Integrated Bridge System

Rapid Embankment Construction

EPS Geofoam

Prefabricated Bridge Elements & Systems

Prefabricated Elements
- Superstructure
- Substructure

Prefabricated Systems
- Superstructure
- Substructure
- Total Bridge

Structural Placement Methods

Self-Propelled Modular Transporters (SPMTs)

Longitudinal launching

Horizontal sliding or skidding

Other heavy lifting equipment & methods

Conventional lifting equipment & methods

Fast Track Contracting

Innovative Contracting

- Best value
- CMGC method
- Design Build
- A+B
- A+B+C
- Warranties

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PBES = LEGO BRIDGES



ELEMENT VS. SYSTEM?

Elements



Systems



WHAT ARE PBES SYSTEMS?

Systems: rolled, launched, slid, etc.

- ◆ Superstructure
- ◆ Superstructure / pier
- ◆ Total bridge



STRUCTURAL PLACEMENT METHODS



SPMT MOVE #23



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SAM WHITE BRIDGE

NORTH AMERICAN RECORD,
354 FEET, TWO SPAN STRUCTURE



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I-80 STATE TO 1300 EAST SEQUENCE



I-80 STATE TO 1300 EAST SEQUENCE



SUPERSTRUCTURE SPAN ON SPMT



FHWA SPMT MANUAL

U.S. Department of Transportation
Federal Highway Administration

Manual on Use of Self-Propelled Modular Transporters to Remove and Replace Bridges

June 2007

Sponsored By:
Federal Highway Administration
American Association of State Highway and Transportation Officials
National Cooperative Highway Research Program
Florida Department of Transportation

<http://www.fhwa.dot.gov/bridge/pubs/07022/>



SPMT RESOURCE PROVIDERS

- ◆ Barnhart Crane & Rigging
- ◆ Bigge Crane and Rigging Co.
- ◆ Fagioli, Inc.
- ◆ Mammoet USA
- ◆ NDF (New Dafang Group)
- ◆ Sarens Group



CONTINUOUS LAUNCHING



FORT LANE/I-15 SOUTH LAYTON INTERCHANGE LONGITUDINAL LAUNCHING

Utah



MEDIA INTEREST



LESSONS LEARNED AND BEST PRACTICES-STATE PERSPECTIVE

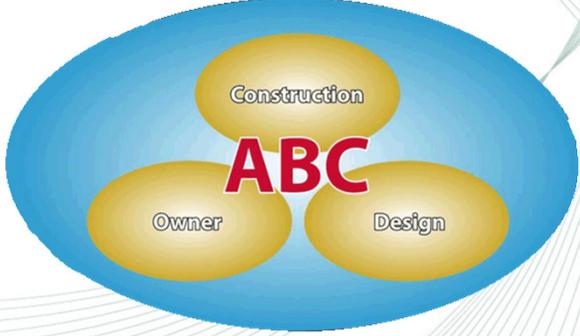
- ◆ Get Department Leadership Committed and Involved
- ◆ Provide Adequate Contractor discussion
- ◆ Obtain Funding for Demonstration Projects
- ◆ Plan a program of projects – not just 1
- ◆ Use Innovative Contracting
- ◆ Scanning Tours
- ◆ Communicate with Industry, Utilities, Local Governments and Your Agency



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LESSONS LEARNED AND BEST PRACTICES

- ◆ Engage the entire industry!!!!



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BENEFITS OF USING ABC

This process offers significant advantages over on-site construction, resulting in:

- ◆ Reduced onsite construction time
- ◆ Minimized traffic disruption – *months to days*
- ◆ Reduced Environmental impact
- ◆ Improved work zone & worker safety
- ◆ Positive Cost-Benefit ratios when user costs are considered
- ◆ Improved product quality – *controlled environment, cure times, easier access, etc.*

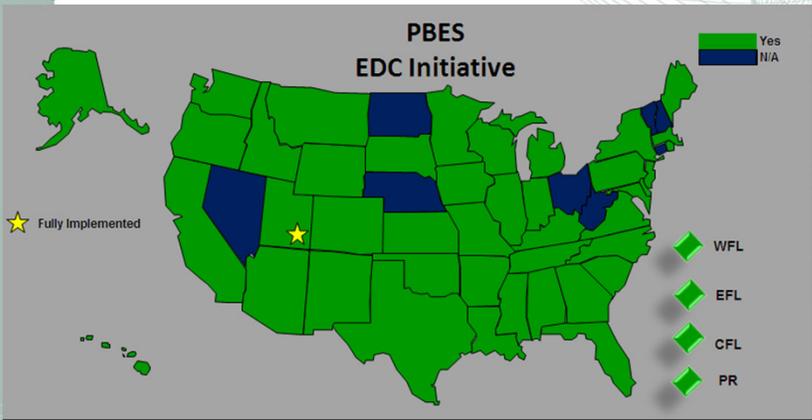


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DEPLOYMENT

OCTOBER 2011

**PBES
EDC Initiative**

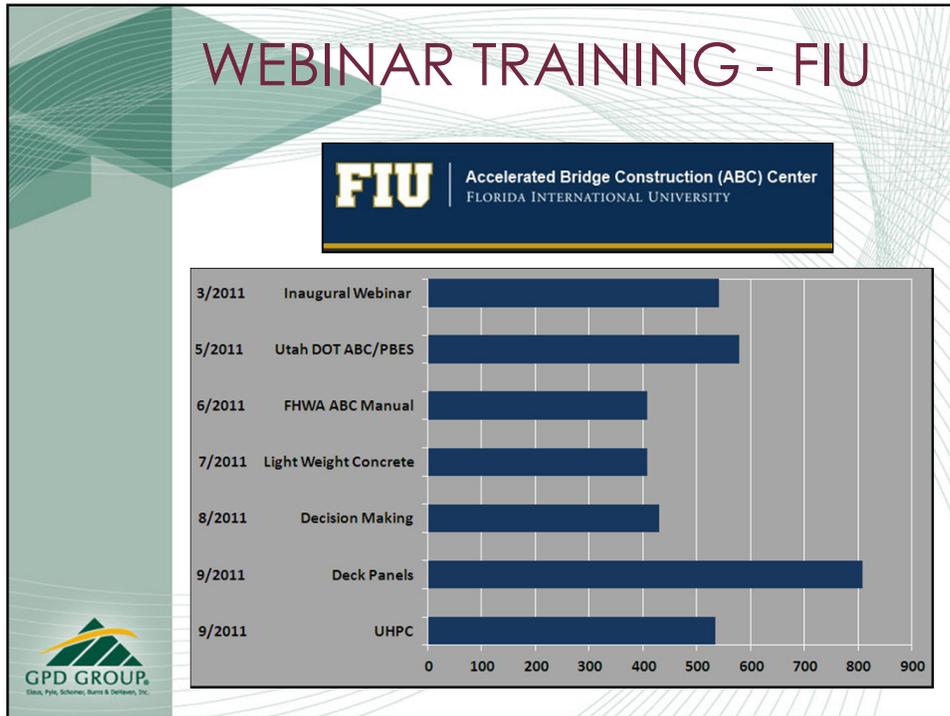


★ Fully Implemented

◆ WFL
◆ EFL
◆ CFL
◆ PR



CA,WA,UT,CO,TX,LA,FL,NY,RI, MA
Have used SPMTs



DOTS NEED FOR SPEED

- ◆ Customer driven culture
- ◆ Innovative contracting is an option
- ◆ Implement new technologies:
 - Accelerated Bridge Construction
 - Accelerate Pavement Construction
 - Diverging Diamond Interchanges
- ◆ Increased partnerships
- ◆ Match Legislative tempo

