- WHITE PAPER -

An Analysis of CMGC Efficiencies in California Department of Transportation (Caltrans) Projects

Abbigail Brown, CPM Logistics, LLC
Colin Crawford, Granite Construction Company
George Delano, Granite Construction Company

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EXECUTIVE SUMMARY

There are ongoing perception issues about the value of using the Construction Manager/General Contractor (CMGC) project delivery method on Caltrans projects. Some of these perceptions include:

- CMGC projects are more expensive than DBB
- CMGC projects do not meet the DBE goals established by Caltrans
- Caltrans awards contracts to a small number of companies with prior CMGC experience

The criteria for the CMGC project selection process considers technical complexity, risk, complex phasing, schedule acceleration, design control, phased funding, non-standard design, and the need for cost certainty. By comparing two CMGC projects to the following 6 criteria, we were able to substantiate that through innovation, collaboration and communication, the included CMGC projects are more efficient than traditional DBB projects by a significant margin. These criteria include the following:

- Cost
- Schedule
- Quality
- Risk
- Innovation
- Partnering

Not only did the SR-99 Realignment and Cosumnes Projects realize efficiencies in the amount of $75.4m, they also allowed for significant improvements on project time and quality.

This white paper also includes detailed information on two design-bid-build projects similar in size. The I-5 Pavement Rehabilitation Project was included for comparison to allow that some projects are more efficient by using the design-bid-build model. The I-80 Over the Top Project was included to provide data and results on a similarly sized project with complex scope and construction that may have benefitted from the CMGC process.

Engaging DBE companies to confidently bid on Caltrans projects is a challenge that requires a deft touch and resources made available to them. The preconstruction phase of Caltrans CMGC projects provides DBE contractors with the opportunity to work on remediating barriers prior to submitting a bid. Because of the limited quantity of DBE contractors that have experience on Caltrans projects, as well as competing with other agencies for those scarce DBE resources, each DBE company that successfully submits a bid on a CMGC project is a win for Caltrans.

The lifespan of every CMGC project includes both a negotiated Construction Management (preconstruction) contract and a General Contractor (construction) contract. Once the project is approved by Caltrans, and has the proper funding in place, it is advertised through a Request for Proposal (RFP) process. The selected Construction Manager then proceeds to engage with the project

team to address cost, schedule, quality, risk and innovations through an informal partnering process. This is the CM phase of the project.

Similar to DBB funding, CMGC projects do not have extensive funding to award contracts to all interested DBE contractors. This is why early engagement during the CM phase is critically important - it allows the project team to identify obstacles and provide these companies the support they need to *eventually* win contracts. By bringing project team members together to review the contractor analysis of DBE bids received, the process allows for open collaboration about how to best engage the companies prior to bid time.

Through this analysis, we are able to show that not only did Granite Construction meet the project goals determined by the Caltrans Office of Civil Rights for the SR-99 and Cosumnes Projects, they exceeded them. It is interesting to note that the I-5 project, awarded in 2011 with a contract size of $58.6M, had a 5.0% UDBE goal which is significantly less than goals currently being set by the same department.

As for the last assertion, Caltrans publishes information on all CMGC pursuits on their website. Analyzing data that is readily available produced information that refuted this claim. Caltrans has introduced 17 new companies to the CMGC process through 29 contracts awarded since 2012.

Our recommendation is to continue to analyze and share the benefits of CMGC as more projects are nominated and come to fruition. Based on these findings, providing this data in conjunction with regular updates and training to Caltrans staff, contractors and the California Transportation Commission would greatly improve perceptions about the CMGC process.

PROBLEM STATEMENT

Over the past decade, Caltrans has worked towards greater value efficiencies in their project delivery approach with a focus on how to realize improvements that create real change at the project level. As each project evolves, Caltrans' increased knowledge about best practices for working collaboratively while minimizing risk is realized to a greater extent.

The Construction Management/General Contractor (CMGC) delivery approach is a model that promotes these best practices. It is gaining prominence as it is embraced by an increasing number of local Caltrans districts. With more attention focused on this delivery method, the projects are facing greater scrutiny by internal and external stakeholders. This has resulted in many opinions about how the process works - whether it provides cost and schedule savings through innovations, or if this newer delivery model produces less desirable results.

The CMGC process includes the 'soft science' approach to building projects - increased collaboration, establishing and maintaining trusted stakeholder relationships, and active communication and collective brainstorming on how to improve design resulting in an efficient construction phase. Conversely, the Design-Bid-Build (DBB) approach, otherwise known as the 'hard bid' process, does not utilize these methods. In fact, the California Public Contract Code prohibits these types of conversations to occur prior to the bid submission.

As Caltrans approves more CMGC projects, more education and focus is necessary for all stakeholders to better understand the unique value associated with the softer approach to building a project. It is through understanding this process that stakeholders will be able to realize the delivery model's benefits to the fullest extent. The CMGC approach allows not only for project-specific gains as short term incremental goals, but also systematically changes how the industry collaborates as a whole for forward-thinking long-term impacts.

Because of the relative newness of the process, in addition to the lack of knowledge about how it creates value, there are varying degrees of perceived success by the program's stakeholders. As project teams begin a new CMGC contract, some are more inclined to approach the process as they would a DBB project. Their opinion about CMGC projects is often reinforced by whether the project is managed as a CMGC project or as a DBB project. The team's experience with a "best value", or lack thereof, directly correlates to misconception and perception issues about the value of using the CMGC process. "Best value" is considered to be a process that provides the greatest overall benefit in response to the requirement. Lack of guidance impacts the success of any CMGC project.

There are many impressions surrounding the CMGC process. Because the program is new to California, they are perpetuated by data that is not readily available to show the long-term efficiency impacts of the program. Some of these perceptions are consistently reinforced because of the lack of knowledge about how the process works.

Negative perceptions voiced about CMGC projects include the following:

- CMGC projects are more expensive than DBB projects;
- CMGC projects do not meet the DBE goals established by Caltrans; and
- Caltrans awards contracts to a small number of companies with prior experience.

Because many Caltrans CMGC projects are not complete, we do not have substantial data to analyze with respect to these claims. Therefore, we will be providing information on two CMGC projects and two DBB projects that are complete. Of the two DBB projects, we will be comparing one project (I-5 Pavement Rehabilitation Project) as an example of an appropriately selected DBB project and one project (I-80 Across The Top) that may have greatly benefited from the CMGC process.

As more projects are awarded and begin construction, additional data will be available for review if needed. It is important to note that nearly all the DOT's that have adopted qualification-based contracting, particularly the CMGC process, have gone through a similar verification process and all have validated value and have continued to use qualification based contracting.

This paper will analyze CMGC and DBB projects based on the following 6 criteria.

1. Cost
2. Schedule
3. Quality
4. Risk
5. Innovation
6. Partnering

It will also provide a comparative analysis on how DBE goals are established on CMGC projects, time allocated to developing DBE companies during the CM phase, and how the 6 criteria tie into participation results.

Lastly, the Caltrans Office of Innovative Design and Delivery provides data including the contractors that are awarded Caltrans CMGC projects. This paper will summarize this data and will review the typical characteristics of how these contractors approach the CMGC pursuit process.

CALTRANS CMGC PROGRAM BACKGROUND

The Caltrans CMGC program was legislatively approved in 2012 and allowed for 6 pilot projects to be built in California. Five of the 6 projects would be required to have a project value greater than $10m. The Fresno SR-99 Realignment Project, North Coast Corridor, Ferguson Slide and the Bay Bridge Demo Project were all selected for pilot projects. These projects afforded Caltrans the ability to try a new process that could potentially create the best value for the industry.

The CMGC process includes two contracts - one for the Construction Management (preconstruction) efforts and one for General Contracting (construction) after scope and price are reviewed and approved. Typically, the same contractor is selected for both of these contracts.

The pre construction phase is based on collaboration between the contractor and Caltrans. The 6 criteria below are addressed through this phase. Ideally, by the time the Agreed to Price is realized, the contractor will move forward with the construction contract.

Caltrans CMGC projects approach this collaboration through the 6 criteria below. Some of this criteria also aligns with the Caltrans selection process prior to the CM contract being awarded.

- **Cost:** Establishing construction costs with the contractor prior to the construction contract guarantees a greater cost certainty. Contractor estimates have to be fair and reasonable. This can be within 10% of the production based estimate prepared by the Independent Cost Estimator (ICE) or 10% of the history based Engineer's Estimate (EE) to move to construction. The ICE is hired by Caltrans to independently review the CM estimate.

- **Schedule:** Reviewing design alternatives with the contractor prior to the Agreed To Price (ATP) can provide additional schedule flexibility and savings. One of the biggest benefits realized comes from the contractor's input on the staging and phasing of the work. CMGC allows for the use of Early Work Packages (EWP's).

- **Quality:** Receiving input on construction means and methods prior to construction provides greater accuracy on the quality of construction.

- **Risk:** Working through constructability details early on, and identifying project risks throughout the design phase, provides time to mitigate or address these risks with the project team.

- **Innovation:** Because the CM phase allows for an alternative approach to building the project, in addition to design flexibility, innovations can be realized prior to any dollars being spent on construction work. Unlike the Value Engineering Cost Proposal (VECP) process for a DBB contract that shares the savings with the contractor, all of the innovation savings are retained by Caltrans.

- **Partnering:** Engaging all parties through project partnering can realize efficiencies and iron out any potential variances in scope and constructability prior to the construction contract being executed.

According to the Caltrans CMGC Procedures Manual (CCPM), "[t]he optimal CMGC project has one or more of the following attributes: a high level of technical complexity, the need for a high level of risk management, complex phasing, the need for overall schedule acceleration, the need for Caltrans to retain control over some or all of the design, phased funding, a new non-standard type of design, and/or budget constraints requiring construction cost certainty." Qualifications-based awarded contracts are not

meant to replace the traditional DBB contracting; it is however a powerful contracting method for challenging, complex projects because it allows for the team that is the best fit for the project.

Each Caltrans district nominates CMGC projects for approval at the local level. Once the nominations are received, the Caltrans Alternative Contracting Steering Committee approvals are needed to move the project forward. Approved CMGC projects are listed on the Caltrans website with project numbers, names, values and approximate dates for issuance.

DBE participation goals are established at the end of the CM contract phase. Once design is nearly complete and final costs are approved, the Caltrans Office of Civil Rights (OCR) prepares the project's DBE participation goal based on methodology using the approved bid item list and available scopes of work. The CCPM notes that the OCR and project team work collaboratively to determine the DBE goal for the Independent Cost Estimator (ICE). To date, OCR has worked independently to establish these goals outside of input from the project team.

CMGC projects are approved based on a Qualification Based Selection (QBS) approach which aligns both cost and schedule but also intangibles such as project team's experience, DBE participation and other project enhancements that add value. Projects are awarded based on fair and reasonable pricing that incorporates the mitigation of project risk, provides innovation, cost and schedule certainty.

Team collaboration during the CM phase is essential to the success of aligning costs and schedule by both Caltrans and the contractor. Collaboration allows for an open and transparent process that saves time and money while identifying potential risks.

CALTRANS PROGRAMMED BUDGET VS. ACTUAL CONTRACTED BUDGET

We recognize the concern between the original Caltrans programmed budget versus the actual contracted amount. This is not specific to a single contractor or project, but a program-wide condition. The Caltrans cost history database is robust and has been developed over time but its use may not accurately depict the costs for complex projects with high risk, unless the engineer is diligent to find cost history from projects of similar complexity and risk - which might not be in the database. It should be noted that CMGC cost history is not included in the Caltrans bid unit price database.

As is also the case for DBB projects, the programmed budget is developed significantly before the Ready to List (RTL) documents are completed. The Caltrans cost estimating team works at a significant disadvantage compared to both the CMGC and the Caltrans selected ICE. The Caltrans budget and Engineers Estimate should follow a similar updating path during specific windows of time along with the CMGC and ICE. The contract required budget checks at 30%, 60% and 95% are all opportunities to evaluate cost trends on all levels, including the Caltrans team. An opportunity for the Caltrans budgeting team to utilize their ICE exists to mitigate these concerns and provide Caltrans the ability to continue to keep the CTC aware of the expected funding level prior to submitting any supplemental funding request.

For any Caltrans project to materialize, funding must be programmed at the start of the planning process. During the programming phase of a project, an engineer's estimate is created based on scope and parameters determined long before design has been completed. The programmed cost includes contingencies to account for unknown scope at the project's early stages. For CMGC Projects, this is prior to a contractor being awarded the preconstruction contract.

For example, Caltrans may determine an allocation of $40m to replace three bridges over the Sacramento River. At 60% design completion, the environmental report for the conditions around the three bridges has been finalized and submitted to Caltrans and the contractor. The report includes information that two of the bridges are located in a liquefaction zone and that the soil cannot support the existing foundational components of the new bridges. The cost for the updated foundation work brings the project's construction cost to $68m. This requires Caltrans to ask the CTC for $28m in supplemental funding during the design phase and prior to any construction work starting.

PROJECT FUNDING ALLOCATIONS

With regard to this paper, the following four projects were selected for comparison due to their similar size, complexity, general location, and access to project details by this white paper team. two are CMGC and two are DBB. The two DBB projects were also selected for their similar timeframe and the known factor that one was viewed as unsuccessful.

Reviewing the original allocations with final costs for the four projects, the I-80 Across the Top Project's final cost was the only project of the four to significantly exceed the funding allocation.

It is important to note the following:

- For the SR-99 project, $1.3m of the $2m EWP change orders was for the Parent Project work that was pulled into the early work package project to improve the project's schedule.
- For the Cosumnes project, $4.1m of the $8.3m total change order cost was for Parent Project scope that was added to the child projects to improve the project's schedule.

Table 1: Summary of Original Allocations vs. Final Project Costs

		Original Allocation	AUP/Original Contract Value	Change Orders	Claims	Final Costs
Construction Management General Contractor (CMGC) Projects	**SR-99 Realignment Project (Construction Only)**	**$158,780,000**	**$154,238,833**	**$7,404,663**	**$0**	**$161,909,250**
	Early Work Package (06-2HT114)	$29,000,000	$26,587,424	$2,016,033	-	$28,372,278
	Parent Package (06-2HT104)	$129,780,000	$127,651,409	$5,388,630	-	$133,536,972
	Cosumnes Bridge Replacement Project (Construction Only)	**$164,838,300**	**$149,515,287**	**$8,325,061**	**$0**	**$158,410,740**
	Early Work Package CP6 (03-0F2864)	$67,657,900	$62,554,557	$3,780,689	-	$65,716,371
	Early Work Package CP5 (03-0F2854)	$10,578,000	$9,279,791	$261,949	-	$9,178,975
	Early Work Package CP4 (03-0F2844)	$19,030,300	$16,311,046	$1,206,732	-	$17,503,717
	Early Work Package CP3 (03-0F2834)	$1,655,000	$1,541,834	$20,570	-	$1,565,085
	Early Work Package CP2 (03-0F2823)	$3,457,000	$2,919,312	$286,826	-	$3,164,608
	Early Work Package CP1 03-0F2814)	$11,087,000	$9,389,234	$1,230,980	-	$10,373,880
	Parent Package (03-0F2804)	$51,373,100	$47,519,513	$1,537,315	-	$50,908,104
DBB Projects	**I-5 Pavement Rehabilitation (03-0F5904)**	**$72,399,000**	**$58,639,586**	**$4,995,531**	**$0**	**$61,397,568**
	I-80 Across the Top (03-3797U4)	**$104,588,000**	**$88,422,860**	**$25,807,571**	**$9,400,000**	**$122,278,667**

**Original bid amount plus change orders may not equal final costs due to bid item pay quantity variations that do not require change orders.*

DESIGN-BID-BUILD (DBB) PROJECTS

The typical amenities of a DBB project are that it is a single contract between the owner and lowest responsible contractor, the contract is based on cost alone, and the owner retains design and scope risks and can produce the lowest project cost if the design has been fully vetted.

Depending on available funding, over 400 DBB projects are approved for bid each year. DBB projects do not involve contractor review, or an industry constructability phase, prior to the bid documents being advertised. All design reviews are internal prior to that. After the plans and specifications are publicly advertised, contractors have the ability to ask questions about the project and design through a formal bidder inquiry phase. These questions are published periodically to level the bidding playing field and to avoid giving an unfair advantage to certain contractors.

The DBB process is effective because it gains the most attention from the bidding community - contractors focused on the low bid process - and can provide the lowest possible price on bid day. Caltrans retains design and performance standard control. The DBB process is an economy of scale approach to building projects - it is well suited for projects that are not complex and do not have high risk elements.

CMGC PROJECTS

Conversely, CMGC projects allow for the owner to retain control of the design development as well as realizing more flexible performance standards as well as gaining options for project improvements through the constructability review process. It is a QBS process that takes into account not only cost but added value by using non-cost factors such as innovation savings based on constructability reviews by the selected contractor prior to bid time.

CMGC delivery method is well suited for owners that want to collaboratively receive feedback from industry on complex factors that could significantly affect the project while retaining control of design prior to going to construction. This is especially true for projects with highly complex elements affecting the progress of the project.

> *"An advantage of CMGC project delivery is that it allows the flexibility to perform construction in phases with multiple work packages as project phases are identified and approved for construction. Reasons for using multiple work packages may include project phasing to match funding schedules, being able to construct a phase of the project while right of way is secured for additional phases, or releasing a utility package in advance of roadway construction to advance the project schedule."*
>
> Caltrans Procedures For Construction Manager/General Contractor (CMGC) Projects, Pg. 11

PROJECT CASE STUDIES

SR-99 Realignment Project (CMGC)
District 6, Contract No.: 06-2HT104

The $162m SR-99 Realignment Project was one of 6 Caltrans CMGC pilot projects awarded in 2014. As part of the California High Speed Rail Authority (CAHSRA) corridor of projects, the SR-99 Realignment project included the shifting of two miles of the highway approximately 80 feet to the west to make room for the new high speed rail corridor between Merced and Fresno. Along with this work, three overcrossings were demolished and reconstructed to accommodate the high speed rail alignment.

Table 2: SR-99 Realignment Project Summary of Original Allocations vs. Final Project Costs

	Original Allocation	AUP/Original Contract Value	Change Orders	Claims	Final Costs
SR-99 Realignment Project (Construction Only)	**$158,780,000**	**$154,238,833**	**$7,404,663**	**$0**	**$161,909,250**
Early Work Package (06-2HT114)	$29,000,000	$26,587,424	$2,016,033	-	$28,372,278
Parent Package (06-2HT104)	$129,780,000	$127,651,409	$5,388,630	-	$133,536,972

**Original bid amount plus change orders may not equal final costs due to bid item pay quantity variations that do not require change orders.*

Challenges

- First CMGC contract for District 06 and local Granite personnel
- Working over/under and around UPRR Fresno yard
    - Constant flagging with unknown delay impacts
    - Remove and replace two bridges in 3 phases
    - Tough coordination with UPRR due to CAHSR
        - Separate ECM agreement added complications (not typical Caltrans)
        - Slow submittal review due to CAHSR relationship
            - ☐ Turned this around with better coordination than CAHSR contract
- Utility relocations threatened schedule
    - AT&T relocation mitigated with self-installing conduits and vaults in EWS
    - PG&E electrical was a problem and delayed the project due to poor coordination with UPRR for new track crossings
        - CT/GCC minimized impact with aggressive “workaround” strategy
- Right of way acquisition threatened schedule
    - Worked with Caltrans to phase the project around R/W as available

- Many special requirements for CAHSR
    - 30% SBE/DBE/DVBE combined goal
    - Disadvantaged worker program
    - Community Benefits Agreement
    - Increased reporting
    - Weekly coordination
- Subcontractor claims (not part of the CMGC Team)
    - CT/GCC worked through 13 PCR's and resolved them all
- Aggressive schedule
    - Stay in front of CAHSR contract CP1 resource demand
    - 6 month Clinton closure - The original 18 month construction schedule had multiple closures. Through CMGC innovations, this was reduced to a single 6 month closure.

Cost

The original total project contract amount was $154,238,833. With innovations and efficiencies, the actual project cost at project completion was $161,909,250, within project budget including contingencies. There were no supplemental funds requested from the CAHSRA.

- There were no claims on this project.
- No supplemental funding requests were submitted.
- $42.3M in innovation savings including $7.1M in R/W savings
- Deductive bid item for $12.2M in scope reductions to allow for the project to move forward within CAHSR budget
- The project was completed within budget with 33% of owner contingency remaining.
- CM fees totaled $2.4m with a total project innovation savings of $42.3M

Schedule

Because of ongoing collaboration with Caltrans and Granite, the project team realized significant time savings to avoid unduly burdening the traveling public.

- Clinton Avenue Interchange work was reduced from 18 months to 6 months by closing the interchange for 24/7 access to complete the work. This resulted in a time savings of 193 working days to the overall project schedule.

- 20 calendar day savings by reducing the Clinton Avenue overpass by one span
- Adjusting CRCP paving limits for the tie ins saving 80 calendar days
- The project was completed on time

Quality

No changes were made on the project due to constructability concerns during the construction phase.

Risk

Significant risks to the project included:

- Production and delay impacts due to UPRR flagging delays
    - Largely mitigated by close coordination with local UPRR operations
- Potential delays due to
    - Late R/W acquisition
    - Late UPRR agreements
    - Late Utility relocation
    - Environmental permits and construction impacts
- Third party requirements outside the control of the CT/GCC project team
- Inadequate resources due to high local demand from the CAHSR project

These risks were mostly minimized or mitigated through the CMGC partnership and working relationship between Caltrans and Granite.

Innovation

The SR-99 project was one of the early efforts by Caltrans to implement a process using innovation as a criteria for keeping construction costs manageable before executing a construction contract. The SR-99 project team put forth 50 innovation savings recommendations during the constructability review phase. Of these, 33 recommendations totaling $35m, or 66%, were incorporated. Some of these efforts included:

- Alternative base section under the JPCP
- Traffic shifts at areas adjacent to new pavement
- Use of City of Fresno specs on City work to avoid contract conflicts
- Placing pavement at Shields early to move traffic off of the off ramp eliminating a second “plug”
- ROW acquisition impacts reduced at the Hacienda property totaling $2.5m

- Time and cost savings at Clinton Avenue overpass by reducing one span
- Adjusting CRCP paving limits for the tie ins saving time and $2.3m
- Updated slip form for impact wall at RW 17 saving $2.66m
- Updated gravity wall in lieu of standard retaining wall saving $1.3m
- Clinton Avenue overpass schedule acceleration resulting in a savings of $4.69m
- UPRR coordination with existing AT&T vault avoiding one year of cost escalation totaling $6.11m

Incorporating these innovations reduced the ultimate cost of the project, but the total savings to the project were offset by significant scope increases driven by third parties such as CAHSR and the City of Fresno.

Partnering

Working closely with Caltrans and the California High Speed Rail (CAHSR) staff, partnering was an integral part of the project during both contract phases. Because of the active partnering approach during the CM phase, dispute resolution was minimal during the construction phase. The CMGC delivery method afforded the project team time to develop relationships with key stakeholders early in the CM phase.

Some examples include:

- 18 hour UPRR track outage windows for existing structure demo at both Fresno Yard OH and Ashlan OH bridges
- PlanGrid utilization on iPads for real time plan updates and project information to improve the project's decision making process
- Co-locating Caltrans and Granite staff for increased access and responsiveness efficiently
    - Co-locating allowed for communication on a regular basis for potential punch list items throughout the project instead of at completion on this 5 year project
- Mid State Shopping Center opening on time by shifting work to the EWS
- Dedicated bus service 7 days/week to transport people across the Clinton Avenue overpass during the 6 month closure
- Third party partnering commitments included PG&E, AT&T, City of Fresno, Fresno Irrigation District, Fresno Metro Flood Control, UPRR and RailPros

DBE Participation

This was a unique CMGC project as it subscribed to the CAHSR CBA's 10% DBE participation goal, included in an overall 30% SBE goal plus a 3% DVBE goal. $2m in higher bid costs were absorbed by the project to achieve these goals.

Table 3: SR-99 Realignment Project DBE Participation

	SR-99 Realignment Project	
	Early Work 06-2HT114	Parent Package 06-2HT104
Contract	**$26,587,424.00**	**$139,851,409.00**
DBE Goal	10.00%	10.00%
DBE Commitment	19.40%	11.30%
DBE $	$5,158,058.00	$15,733,476.00
Actual	$5,915,348.92	$18,450,771.32
	Cumulative Total (Contract Total: $166,438,833.00)	
	Avg. DBE Commitment	12.55%
	Total DBE Commitment $	$20,891,534.00
	DBE Actual	14.64%
	DBE Actual ($)	$24,366,120.24

Intangibles

By using early work scope packages, intangibles resulting in a savings of $1.8m included:

- Project momentum
- Lessons learned implemented into the main contract
- Facilitating ROW negotiations early

Conclusion

The Hwy 99 Realignment was a properly selected project for CMGC contracting. Third party funding source, significant public and private stakeholders needing coordination, multiple utilities and public impacts, and aggressive improvement schedule to meet the CAHSRA improvements schedule were all important factors.

Cosumnes Bridge Replacement Project (CMGC)
District 3, Contract No.: 03-0F2804

The Cosumnes Bridge Replacement Project was nominated as a CMGC project due to its complexity, cost and time-sensitive scopes of work. The project focused on bridge remediation/scour work on State Route 99 in and around the Cosumnes River. The project included the following scopes of work:

- Replacing four bridges over the Cosumnes River
- Relinquishing an underpass structure, requiring partial realignment of SR 99 southbound with a new overhead structure
- Rehabilitating and replacing the bridge deck/barrier railings on an overcrossing structure

The project was advertised and awarded to Granite Construction in 2018. With 6 child projects (early work packages) approved and under construction starting in 2019, the CM preconstruction services work continued through 2020. The Consumnes parent project began construction in 2021.

Table 4: Cosumnes Bridge Replacement Project
Summary of Original Allocations vs. Final Project Costs

	Original Allocation	AUP/Original Contract Value	Change Orders	Claims	Final Costs
Cosumnes Bridge Replacement Project (Construction Only)	**$164,838,300**	**$149,515,287**	**$8,325,061**	**$0**	**$158,410,740**
Early Work Package CP6 (03-0F2864)	$67,657,900	$62,554,557	$3,780,689	-	$65,716,371
Early Work Package CP5 (03-0F2854)	$10,578,000	$9,279,791	$261,949	-	$9,178,975
Early Work Package CP4 (03-0F2844)	$19,030,300	$16,311,046	$1,206,732	-	$17,503,717
Early Work Package CP3 (03-0F2834)	$1,655,000	$1,541,834	$20,570	-	$1,565,085
Early Work Package CP2 (03-0F2823)	$3,457,000	$2,919,312	$286,826	-	$3,164,608
Early Work Package CP1 03-0F2814)	$11,087,000	$9,389,234	$1,230,980	-	$10,373,880
Parent Package (03-0F2804)	$51,373,100	$47,519,513	$1,537,315	-	$50,908,104

**Original bid amount plus change orders may not equal final costs due to bid item pay quantity variations that do not require change orders.*

Cost

The original budget for construction was $165m. By using the CMGC process, the project team was able to realize savings over $6m under the original budget and over $33M in innovations. Some of these included:

- Eliminating the approach spans from the McConnell Overhead Bridge
- Using a temporary alignment with temporary bridges over the Cosumnes floodplain
- Reducing the Cosumnes Bridge construction phasing from 3 stages in 3 seasons to two stages in two seasons
- Eliminating pile foundations by using buried tieback anchors
- More efficient drilling approach with shorter pile lengths at one bridge and eliminating permanent casings
- Substituting geosynthetic reinforced embankment instead of a Type 1 retaining wall
- Creating an early work scope process to start work on the temporary alignment and McConnell approach fills
- Raising the abutment two footing at McConnell Overhead Bridge to minimize excavation and backfill
- Leverage contractor's local permitting expertise for reduced mitigation and permitting timelines

Schedule

By using contractor input during the CM phase, the team was able to re-phase the project to realize schedule savings of over two years. Some of these innovations include:

- Collaborating with Caltrans, Union Pacific Railroad (UPRR), California Department of Fish and Wildlife (CDFW) and local utility companies to develop plans that would 'pull the project forward' using a phase approach that included one parent project and 6 child projects (early work packages)
- Using ABC (accelerated bridge construction) techniques that allowed an expedited schedule
- Rephasing to avoid environmentally sensitive areas and cultural concerns and avoid extensive powerline relocation

Quality

The project team approached the Cosumnes project with an eye for extensive planning during the CM phase to allow for innovations without sacrificing safety or quality during construction. Constructability reviews during the design milestones included the following review suggestions:

- Coordination with Caltrans Transportation Management Center (TMC) to shift traffic to the shoulders and medians to allow for daytime paving work with increased quality
- Full time contractor compaction QC to allow immediate response to varying conditions
- Selecting a temporary casing method for CIDH pile installation that minimized the chances of caving soils during concrete placement with loose soil and high groundwater.
- Revised rebar connection details between precast girders and the bridge deck that improved overall rebar placement and consistent concrete cover on the deck rebar with improved safety.

Risk

The major risk to the project was schedule driven, defined by the environmental permit seasonal “river window” to work in the Cosumnes River only between June and October. Any work in the river and surrounding floodplain that missed the seasonal window would carry over to the next year and delay the project. All river windows were completed without delay to the project through aggressive resource allocation and thorough planning for contingencies.

Other significant risks included:

- Coordination with UPRR for design and construction could delay the project - managed through early partnering and regular collaboration
- Obtaining all required permits on an accelerated timeline - accomplished with an aggressive strategy combining Caltrans and the contractor team to leverage local permitting expertise and relationships with the permitting agencies
- The presence of endangered Swainsons hawk threatened work stoppages - managed with an Incidental Take Permit and full time biological monitoring
- Critical Temporary Construction Easements (TCE’s) that could have delayed the work start - managed with collaboration and excellent working relationships with adjacent landowners
- Expensive and time consuming relocation of high voltage electrical lines - mitigated with revised staging and reduced work footprint
- Potential construction traffic impacts on a critical corridor with no local detour route - minimized with alternate staging and a temporary alignment that greatly reduced lane closures

Innovation

Innovation was a major focus of the CMGC effort, starting with the CM participating in the Value Analysis workshop that produced outstanding results. Most of the recommendations were implemented and others added during pre construction for project savings of over $33 million. The project was completed slightly below the original funding allocation. The $33m in savings were redeployed to fund unanticipated added work scope for the McConnell ramps which were originally planned to be permanently eliminated.

- Eliminating the approach spans from the McConnell Overhead Bridge
- Using a temporary alignment with temporary bridges over the Cosumnes floodplain
- Reducing the Cosumnes Bridge construction phasing from 3 stages in 3 seasons to two stages in two seasons
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- Leverage local permitting expertise for reduced mitigation and permitting timelines

Partnering

Partnering efforts included:

- Communication with first responders to ensure they had the most up to date information about travel through the project
- Initial and quarterly partnering meetings with Caltrans, UPRR, CDFW, CVRWQCB, Sacramento Municipal Utility District, Kinder Morgan, Qwest/Lumen, Frontier Communications to discuss permit and utility coordination
- Communication with UPRR to negotiate a single 16 hour track closure to remove the two old bridges. Granite assisted UPRR with removing and improving the affected tracks after the closure.

- Subcontractors were included in the quarterly partnering meetings
- Team members completed monthly surveys for feedback
- This project has won multiple partnering awards from Caltrans, AGC of California, AGC of America, and the International Partnering Institute (IPI).
- All issues resolved and no claims or PCR's on the project

DBE Participation

There were several goals established for this project due to the early work packages and parent project.

Table 5: Cosumnes Bridge Rehabilitation Project DBE Participation

	Cosumnes Bridge Replacement Project						
	CP1 03-0F2814	CP2 03-0F2824	CP3 03-0F2834	CP4 03-0F2844	CP5 03-0F2854	CP6 03-0F2864	Parent Project 03-0F2804
Contract	**$9,389,233.93**	**$2,919,312.09**	**$1,541,834.44**	**$16,311,045.54**	**$9,279,790.54**	**$62,554,557.06**	**$47,519,513.00**
DBE Goal	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	16.00%
DBE Commitment	15.90%	22.60%	0.00%	5.40%	5.10%	$4.33	16.46%
DBE $	$1,495,448.00	$661,500.00	-	$872,643.50	$473,771.00	$2,714,447.14	$7,819,572.02
Actual	$3,170,734.35	$887,051.98	-	$888,665.45	$396,984.68	$3,788,175.09	$9,372,857.15

Cumulative Total (Contract Total: $149,515,286.6)			
Avg. DBE Commitment	9.39%	DBE Actual	12.38%
Total DBE Commitment $	$14,037,381.66	DBE Actual ($)	$18,504,468

Intangibles

Because of schedule reduction of two years, construction was not in the path of 100 year flooding in 2022.

- This allowed for less Time Related Overhead (TRO) costs
- Resources, including labor, were not required on the project for both the original contract time in addition to the avoided flooding impacts

Conclusion

The Cosumnes Hwy 99 bridge replacement was a properly selected project for CMGC contracting. Aggressive improvement schedule, significant public and private stakeholders coordination, structure risk level was near the end of life, sensitive environmental footprint, and complex permit approvals were major factors.

I-5 Pavement Rehabilitation Project (DBB)

District 3, Contract No.: 03-0F5904

The I-5 Pavement Rehabilitation Project allowed for the completion of a 17.2 mile rehabilitation of I-5 south of Sacramento. This included replacing existing concrete pavement with PCC pavement, installing dowel bar retrofit, crack and seat existing concrete pavement and overlay with HMA. The project's scope of work also includes reconstructing the shoulders, widening the median, installing concrete barriers and an HMA overlay of ramps.

Table 5: I-5 Pavement Rehabilitation Project
Summary of Original Allocations vs. Final Project Costs

	Original Allocation	AUP/Original Contract Value	Change Orders	Claims	Final Costs
I-5 Pavement Rehabilitation (03-0F5904)	$72,399,000	$58,639,586	$4,995,531	$0	$61,397,568

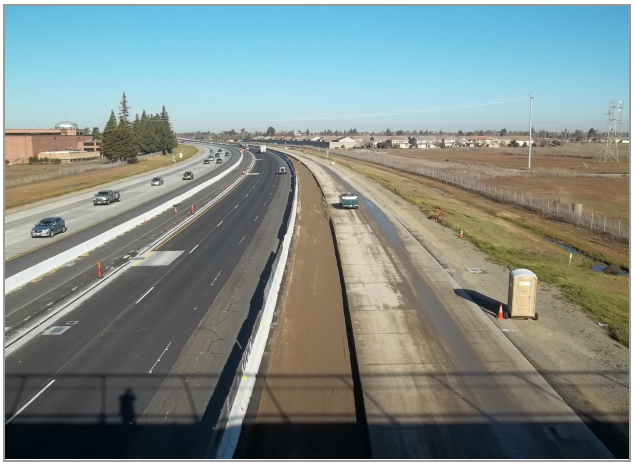
**Original bid amount plus change orders may not equal final costs due to bid item pay quantity variations that do not require change orders.*

Challenges

- Paving limits and details post award
- Public affected by this work
- Conflicting test results of NB #2 Lane JPCP
- 17 mile long project created management challenges
- Restrictions to lane closures limited areas to work
- Multiple R.E.'s rotating through project

Images: I-5 Pavement Rehabilitation Project

I-5 Median Slotted Drain - Elk Grove area



I-5 Shoulder Widening South Pocket Area

Cost

- The original contract bid amount was $58,639,586 with an actual project cost of $61,397,567.
- Revised structural selection to the new median saving the project $947k split between Caltrans and the contractor
- Change order due to NB#2 Lane JPCP test results
- NOPC#1/CCO#46: Approach/sleeper slabs $135,951
- NOPC#3/CCO#61: RSC additional saw cutting $210,000
- NOPC#4/CCO#39 Supp. 1: Additional TRO $122,500
- NOPC#4/CCO#88: Additional cost due to GLD $49,072
- NOPC#5/CCO#76: Paving under South Land Park OC $7,000
- NOPC#6/CCO#87: Eliminate CB60 in Seg3 $7,337
- NOPC#7/CCO#75: JPCP Acceptance $13,721

Schedule

The original contract working days were 280 with actual working days finishing at 350. The additional 70 working days are attributed, mostly, to CCO 39 Supplement 1 for the Grated Line Drain (35 days) and a contract extension to resolve NOPC #7 the resolution to conflicting JPCP strength test results (25 days).

Quality

Quality Control/Quality Assurance implementation and success resulted in substantial performance compensation prior to additional change orders prior to the work being performed.

Risk

Traveling public directly adjacent to work zones. Workers directly adjacent to high speed vehicles.

Innovation

- Revised structural selection to new median reduced the number of trucking hours associated with this work
- Nightly lane closures to minimize impact to public
- Coordinated field site visit with owner's material's representatives and effectively eliminated a substantial amount of unnecessary shoulder reconstruction.
- Caltrans and Granite co-locating within 1 block of each other for ease in communication and problem solving.

Partnering

- Remediation of conflicting test results of the NB#2 lane JPCP through established relationships with the project team. Agreed to alternative QC testing to resolve conflicting strength results.
- Modified the restrictive lane closure limits to make more work available every shift.

(U)DBE Participation

This project had an Underutilized Disadvantaged Business Enterprise (UDBE) goal of 5%. Underutilized groups included firms that were recognized as being in one or more of the following categories: Black America, Asian-Pacific American, Native American or Women and held the certification from 2009 - 2012.

Table 6: I-5 Pavement Rehabilitation Project DBE Participation

	Original Goal Value	Final Participation
I-5 Pavement Rehabilitation Contract No.: 03-0F5904	5% ($3,829,086)	6.98% ($4,272,498)

A large portion of the original UDBE commitment was a designated trucker who severely underperformed. Only through opportunities made available in change orders, we recaptured DBE participation – primarily with a MBGR subcontractor.

Conclusion

The I-5 Pavement Rehabilitation Project was appropriately selected as a traditional Design-Bid-Build. The work scope was well within the Caltrans design and construction staff experience and the project was efficiently staged during the project development process.

I-80 Across the Top (DBB)

District 3 Contract No.: 03-3797U4

The I-80 "Across the Top" project constructed approximately 10 miles of JPCP bus/carpool lanes in both directions, repaved the highway from east of Sacramento River Bridge to Watt Avenue and added approximately one mile of new auxiliary lanes from West El Camino Avenue to the Interstate 80/Interstate 5 interchange.

Table 7: I-80 Across the Top Summary of Original Allocations vs. Final Project Costs

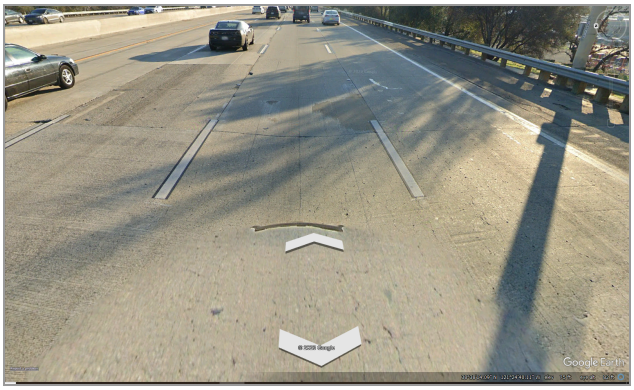
	Original Allocation	AUP/Original Contract Value	Change Orders	Claims	Final Costs
1-80 Across the Top (03-3797U4)	$104,588,000	$88,422,860	$25,807,571	$9,400,000	$122,278,667

**Original bid amount plus change orders may not equal final costs due to bid item pay quantity variations that do not require change orders.*

Challenges

The project required significant staging and phasing to allow for the required cure time of the new JPCP before traffic could be switched. The CC Myers / Bay Cities Joint Venture struggled with the complex schedule requirements which ultimately resulted in CC Myers filing bankruptcy leaving Bay Cities Paving to complete the project. The Myers team brought the PCC Pavement experience which was not a core competency held by the Bay Cities partner. Caltrans was heavily involved to work with both the Bay Cities Team and the bonding company representing the CC Myers firm to complete the work.

Images: I-80 JPCP Accelerated Pavement Deterioration



Costs

The original construction costs for this project was $88,422,860 awarded to CC Myers / Bay Cities Joint Venture. The costs escalated to $112,878,667 with nearly $16m in adjustments of compensation and over $13M in paid extra work, and some smaller quantity underruns. Overall, the project experienced in excess of 25% overrun from bid day results. The final contract cost was $122.3m including a claim paid for $9.4m in addition to the approved change orders.

Schedule

In parallel to the costs, time also experienced a 25%+ added time and TRO cost to complete. The original schedule reflected a 720 Working day to complete the project. The project experienced an additional 250 days to achieve completion, of which 212 were granted by change order.

Quality

Quality has not been highlighted anywhere in the trackable project history, so it is assumed that the project met minimum performance standards. It has been noted that over two lane miles of newly placed JPCP required removal and replacement for not meeting performance quality standards.

Risk

Caltrans ultimately accepted significant risk by using the DBB delivery. Constructability, design gaps, quantity overruns and cost of extended time were incurred by the department. The traveling public was further impacted for at least one additional year due to the schedule overrun.

Innovation

As a DBB project, any innovations that were presented are difficult to track and not documented by the pay estimate schedule. It does appear that portions of the construction improvements originally intended to be constructed with JPCP were revised to asphalt concrete, however this may have been a compromise to complete the project.

Partnering

Partnering is assumed to have occurred, however no awards were received and successes are not evident from the project information.

DBE Participation

No information is available.

Conclusion

The I-80 Across the Top would have greatly benefited from the CMGC process. Plans were not fully vetted to address staging and traffic impacts that could have been mitigated in the constructability reviews. Further, the CM preconstruction process could have presented an opportunity to mitigate some of the change orders and time slippage realized on this project.

Meeting the DBE Goal on CMGC Projects

On CMGC projects, Caltrans establishes the DBE goal at the 90% design completion phase and prior to receiving subcontracting bids. Goals are established for each Early Work Package using the same process. This allows for greater constructability certainty with the contractor's feedback for means and methods while keeping an eye out for opportunities to engage available DBE companies on the project. With typical DBB projects, there is no contractor feedback available prior to bid time.

Caltrans CMGC projects require a DBE Participation Plan that outlines expected steps to engage and assist DBE companies on the project. The plan is prepared by the contractor and reviewed by Caltrans project staff during the CM phase. Each plan is unique to the parameters of each project and contains best practices for engaging DBE companies by using a sincere effort. For Granite and CPM Logistics projects, the plan is also followed by a DBE Availability Analysis (Analysis) to help statistically determine a reasonable participation goal. The Analysis also provides information on where to best focus the team's efforts for participation.

During the CM phase, DBE companies are engaged at an earlier stage in an effort to address any barriers keeping them from working on the project during construction. At 90% design completion, the project's scopes of work and bid list are mostly complete and contribute to the targeted efforts of the contractor for engaging DBE companies. Because of the additional time allowed during the CM phase, the contractor is able to perform the Analysis to determine the feasibility of connecting small contractors with available scopes of work.

This Analysis lends itself to the spirit of the CMGC process as it takes into account the 6 determining criteria for selecting a CMGC project by selection not solely on price but also firm experience and ability to meet the project schedule. Using the project's bid item list and other data from each Opinion of Probable Construction Cost (OPCC) document, the analysis provides data on which DBE companies are ready, available, and have successfully won previous contracts on Caltrans projects. Additional information on the criteria is listed below.

Challenges

Of the 5,628 certified companies in California, 1,034 companies (or 18%) hold contractor's licenses relevant to the Caltrans standard bid item list and the California State Licensing Board requirements. From October 1, 2022 through January 31, 2023, 146 (0.025%) of these companies were awarded subcontracts on Caltrans projects.

There are many challenges associated with assisting DBE companies with removing barriers keeping them from successfully winning contracts. Some of these challenges include:

- Capacity building - Many DBE contractors do not have the resources to rapidly increase their capacity when opportunities arise. One DBE traffic control company was engaged by a local district for emergency work during the 2023 atmospheric river impacts. Because of the nature of the work, accelerated schedule, an increase in manpower and cash flow, the company struggled to provide additional resources to the district and keep up with demand. That coupled with the significant increase in payroll costs caused the company to decline additional work until they were able to plan for more resources at a future time.

- Bidding Confidence - Many times, DBE contractors lack the confidence to successfully pursue subcontracts on public works contracts. One bad contract can put the company out of business. Engaging DBE contractors in a meaningful way to get them over the finish line often takes the lifespan of 2-3 CMGC projects until the support bears fruit and the company can confidently move forward with winning work.

Cost

The Analysis uses construction costs provided by the contractor for each bid item for each phase of the project. A multiplier is added to each line item which takes into account the capacity and experience level of every DBE firm working within the project's district as well as within other districts. For example,

on the Cosumnes parent project, traffic control was included as a bid item valuing $1.7m. By analyzing the available DBE traffic control companies (13) and comparing each to the Caltrans DBE Construction Contracts Quarterly Report (CCQR), only 26.92% of these companies had either worked on a local District 3 contract or a project within another district.

It is important to note that the contractor will receive all subcontractor/vendor pricing for review. This evaluation, with the contractor recommendation based on price, ability to meet schedule, and firm capability, is presented with concurrence with the Caltrans project team. DBE participation goals are also considered and costs are transparently reviewed by the contractor and Caltrans. Because of potential budget constraints, the agency's managers are not always able to accommodate above market value pricing from DBE companies. During the 100% design phases of each CMGC project, Granite Construction provides an 'if/then' analysis to review with CPM Logistics, the Caltrans project manager, Caltrans HQ construction staff, Caltrans Office of Innovative Design and Delivery and the Caltrans Office of Civil Rights (OCR). All attendees review costs submitted by potential DBE subcontractors in conjunction with bids submitted by non-DBE subcontractors. These meetings have been incorporated into the process as a collaborative tool, in the spirit of the CMGC approach, to provide the most current information on engaging DBE companies to all project stakeholders.

One outlier to this process is the SR-99 Realignment Project. This project was funded by the CAHSRA, which included their Community Benefits Agreement (CBA) goals of 10% DBE participation, resulting in a premium of $2m to offset the higher costs submitted by DBE companies.

Schedule

Schedule is always a concern for engaging DBE companies as it relates to the company's ability to perform within the contract's scheduled time for their specific work. Because the CM phase allows for more collaboration and communication with subcontractors at an earlier time, prior to hard bids being submitted, the contractor is able to provide better, more accurate schedule information to them.

This is especially true for the child projects (early work packages) as they allow for the contractor to carve out critical, smaller work packages and provide these opportunities to DBE companies. One example of how the CMGC process successfully engaged a DBE company was on the American River Bridge Project (Project No. 03-3F0714/CP-1). Knowing that steel pipe was a long lead item, and that the schedule was critical to maintain due to public and environmental impacts, Granite Construction was able to secure the pipe through a DBE piling company at an earlier time and while maintaining the schedule. It is important to note that this was a critical item successfully completed by a local DBE company because of the early engagement by the contractor, and active communication with the DBE piling company, while providing assistance for the potential cost barrier of purchasing such a large amount of steel pipe.

Quality

Because of the early engagement though the CM phase, contractors are able to provide constructability feedback on both construction items as well as engaging available DBE companies. It is important to note that there are many local DBE companies that are not available, do not have the capacity and/or do not provide appropriate scopes of work that align with the project's needs. It is through the Analysis that the contractor is able to target local DBE companies and provide project opportunities to them while casting a wider net for all other interested DBE firms.

By being allowed the time to get to know these companies and their qualifications through preconstruction, the contractor has the ability to determine the DBE subcontractor's quality of work and ability to successfully complete the subcontract.

One example of this is L&B Metals. They were engaged early on for the Cosumnes Project to supply miscellaneous metals. They provided a proposal which was not accepted by the project team. Granite and CPM continued to provide support and address the barriers keeping L&B Metals from working on the project. By remediating obstacles such as a higher line of credit, providing labor to install the metal and building a relationship with Granite, L&B was able to confidently submit and win a $2m contract on the American River Bridge project.

Risk

Because the relationship between risk and innovation are inverted, the more innovation a project realizes, the less risk is assumed by the owner and contractor. It is because of this, through active communication, that risk is diminished through contractor's constructability feedback during the design phase. This is especially true for DBE subcontractors and feedback received from each about their capacity and ability to successfully contract on public works projects.

The CM phase of alternative delivery projects allow for the reduction and possible remediation of excess risk, outside of the normal cost of doing business, that is usually assumed through the original construction contract. The reduction in risk is also applied to DBE contractors through active communication with the contractor, providing additional resources to each company based on their unique obstacles and open review by Caltrans of every DBE bid submitted.

Some examples of remediated risk include expedited payments through a prompt payment process, reduction in insurance requirements based on the subcontractors scope of work and early engagement to allow for additional time for resource planning prior to being expected to perform the work.

Innovation

Because the DBE requirements are developed during the ATP process, the contractor is afforded the time to develop better outreach strategies. As was the case with the American River Bridge project, Granite Construction put forth coordinated efforts to provide technical assistance to DBE companies wanting to learn more about the CMGC Process prior to being awarded the project's contract. By engaging even before the RFQ submittal were due, DBE companies were provided relevant information about the CMGC process at the earliest opportunity. By making the information easily available and by using a simple, online environment, relevant DBE companies were able to connect with Granite Construction with less effort on their part. They were also able to begin their own forecasting for backlog work years before their bids were due.

> *"Necessity is the mother of invention."*
>
> - Henry Ford

It is through the CM phase that innovations are realized. This allows for greater flexibility in meeting DBE companies at their level and being able to provide effective assistance to them. Approaching design and constructability at this early stage, when it's much easier to incorporate wholesale changes by the project team, allows for greater flexibility in carving out manageable bid packages and/or having open communication with DBE companies about their capacity and how much work they can take on at that time. These innovations are not realized in DBB projects prior to bids being submitted, if ever. DBB bid costs are assumed up front by DBE companies and, if they have the established prime relationships, only after contracts are awarded will they receive feedback on their bid's details.

Partnering

During the Cosumnes project, informal partnering was essential in assisting Double M Trucking after the company's original owner, who held the DBE certification, passed away. Prior to this, Granite had engaged the company for upcoming work but had not yet executed a contract.

The owner's children inherited the company and were required to submit a new DBE application for certification to maintain their status going forward. To hold the project's critical path schedule, Granite and CPM began discussions with the new owners to expedite their application while also searching for contingencies, such as contracting with a DBE second tier trucking company, to keep the project moving forward. CPM also worked closely with the Office of Civil Rights (OCR) staff to accelerate the process and avoid any undue loss of opportunity for Double M. It was because of this approach to partnering, as well as the ability to use innovations, that Double M was able to move forward on the project despite their recent challenges. Had this been a DBB project, there would not have been time to assist Double M prior to hard bids being received.

Intangibles

Greater intangibles are realized through the CMGC process because of the preconstruction CM phase. This phase allows contractors to work closely with DBE contractors during the design process and prior to the bid submittal phase. Examples of this include:

- An approach that allows the CMGC program as a whole to best align DBE companies with opportunities; if the DBE company is not ready or remediating a barrier keeping them from working on the current project, the contractor continues the support and communication until the next project. K&G Concrete submitted a bid for the Cosumnes project that was 44.9% higher than the lowest bidder's price. With communication from Granite Construction after that bid was awarded, the company submitted a bid for the American River Bridge CMGC project that was 21.8% higher than the lowest bid, closing the gap over half way. A recent bid for the Binney Junction CMGC project was only 2% higher than the low bidder, allowing the selection of K&G to do the work.

- Ongoing office sessions allowing the DBE company's questions to be answered and greater knowledge of the construction process. Direct support for bid opportunities are realized through these conversations.

Caltrans Awards CMGC Projects to a Small Number of Contractors with Prior CMGC Experience

There are efforts associated with winning CMGC pursuits that involve a program-wide approach on the contractor's side to successfully win this type of work. The selected firm must be adequately staffed and trained to serve in the pre-construction CM role. These indirect cost impacts are borne by the contractor - lost opportunity costs with senior management roles, risk of not achieving the Agreed To Price, and sustainable overhead costs needed to pursue these projects. The contractor's focus during the CM phase is to remediate any constructability barriers, prior to the ATP, that will keep them from successfully building the work during the GC phase.

Since the inception of the program in 2012, and with the exception of the California Department of Technology's Broadband Middle Mile Initiative (BBMM) CMGC projects, Caltrans has awarded 29 projects to teams that included 18 unique contractors.

Table 8: Contractors Awarded CMGC Projects Since 2012 (BBMM Projects Excluded)

Year	Contract No.	Contract Name	Awarded Company Name
2022	114312CM	11-SD-5 (114312CM) I-5 SHOPP Asset Management Project	Kiewit Infrastructure West Company
2022	100X46CM	SJ-5 Stockton Channel Viaduct Replacement/Rehabilitation	Kiewit Infrastructure West Company
2022	014011CM	Men-1 Albion River Bridge Replacement/Rehabilitation	Granite Construction Company
2022	1121000129	SD-5 Pavement Preventative Maintenance & Rehabilitation	Kiewit Infrastructure West
2022	033H58CM	Nev-80 Acid Flats Bridge Replacement	Golden State Bridge - Obayashi JV
2021	030H16CM	Yub-70 Binney Junction Roadway Rehabilitation	Granite Construction Company
2021	033F070CM	American River Bridge Rehabilitation	Granite Construction Company
2021	053307CM	SLO-46 Improvements	Guy F. Atkinson Company
2021	040A53TCM	Sol-80 Westbound Cordelia Commercial Vehicle Enforcement Facility	Kiewit Infrastructure West
2021	043G63CM	SCl-9 Saratoga Creek Bridge Rehabilitate	Myers & Sons
2021	0732100CM	LA-405 San Gabriel River Bridge Scour Mitigation	Myers Shimmick, JV
2021	073507CM	LA-405 Active Traffic Management/Integrated Corridor Management	Parsons Transportation Group
	062HT1CM	Fresno 99	Granite Construction Company
	10-0P92CM	Mariposa 140	Myers and Sons/RL Wadsworth Joint Venture
	040135CM	SFOBB East Span Foundation Demolition	Kiewit/Manson A Joint Venture
	112T21CM	I-5 North Coast	Flatiron-Skanska-Stacy and Witbeck a Joint Venture (FSSW)
	080J07CM	Barton Road Interchange	Myers-Rados, A Joint Venture
	083477CM	SR-58 Kramer Junction	Kiewit Infrastructure West Co.
	041J56CM	State Route 101 Managed Lanes	Kiewit Infrastructure West Co.
	044K81CM	University Avenue/MacArthur Maze	Kiewit Infrastructure West Co.
	030F28CM	Cosumnes River Bridges	Granite Construction Company
	050N70CM	SB101-Carpinteria to Santa Barbara	Granite Construction Company
	112E15CM	San Dieguito Lagoon Restoration	Marathon Construction Company
	044G89CM	Scofield Avenue Undercrossing Seismic Retrofit	Golden State Bridge
	021H52CM	Yreka Rehabilitation	Myers-Shea, a Joint Venture
	073182CM	VEN-001 Slope Restoration Project	Flatiron-Drill Tech Joint Venture
	023H32CM	Sacramento River BOH Deck Replacement and Dunsmuir Gap Project	Walsh-Myers, a Joint Venture
	060W80CM	Fre 99 Rehabilitation Project	Granite Construction Company
	073252CM	LA-210 San Gabriel River Bridge Hinge Replacement	Flatiron West, Inc.

Including the BBMM CMGC projects, this number is increased to 40 CMGC projects with 26 unique contractors under contract.

Table 9: Contractors Awarded CMGC Projects Since 2012 (BBMM Projects Included)

Year	Contract No.	Contract Name	Awarded Company Name
2023	01MMBN1CM	01-DN,Hum,Lak,Men-Var-Var (01MMBN1CM) Middle Mile Broadband Network	SA Connects
2023	02MMBN1CM	02-Las,Plu,Sha,Sis,The-Var-Var (02MMBN1CM) Middle Mile Broadband Network	Flatiron-LTS,JV
2023	114B02CM	11-SD-5,8,15,52,67,75,79,94,125-Var (114B02CM) Middle Mile Broadband Network	MiddleMileConstructors,JV
2023	114B01CM	11-IMP-8,78,86,111-Var (114B01CM) Middle Mile Broadband Network	Myers&SonsConstruction,LLC
2023	05CMGC2CM	05-Mon,SBt,SCr-Var-Var (05CMGC2CM) Middle Mile Broadband Network	Granite-Michels,JV
2023	061F28CM	06-MAD,MPA,FRE,KER,TUL-Var-Var (061F28CM) Middle Mile Broadband Network	Granite-Michels,JV
2023	05CMGC1CM	05-SLO,SB-Var-Var (05CMGC1CM) Middle Mile Broadband Network	Flatiron-LTS,AJointVenture
2022	114312CM	11-SD-5 (114312CM) I-5 SHOPP Asset Management Project	Kiewit Infrastructure West Company
2022	101Q23CM	10-Cal,Mer,Mad-4,152-Var (101Q23CM) Middle Mile Broadband Network	Granite Construction Company
2022	081M81CM	08-SBd-Var (081M81CM) Middle Mile Broadband Network	Griffith Company and Henkels & McCoy (H&M)
2022	081M87CM	08-Riv,SBd-Var (081M87CM) Middle Mile Broadband Network	California Connect
2022	100X46CM	SJ-5 Stockton Channel Viaduct Replacement/Rehabilitation	Kiewit Infrastructure West Company
2022	114B00CM	SD,Riv-15,76,78,79, and 371 (114B00CM) – Middle-Mile Broadband Network	Kiewit Infrastructure West Company
2022	014011CM	Men-1 Albion River Bridge Replacement/Rehabilitation	Granite Construction Company
2022	1121000129	SD-5 Pavement Preventative Maintenance & Rehabilitation	Kiewit Infrastructure West
2022	033H58CM	Nev-80 Acid Flats Bridge Replacement	Golden State Bridge - Obayashi JV
2021	030H16CM	Yub-70 Binney Junction Roadway Rehabilitation	Granite Construction Company
2021	033F070CM	American River Bridge Rehabilitation	American River Constructors
2021	053307CM	SLO-46 Improvements	Guy F. Atkinson Company
2021	040A53TCM	Sol-80 Westbound Cordelia Commercial Vehicle Enforcement Facility	Kiewit Infrastructure West
2021	043G63CM	SCl-9 Saratoga Creek Bridge Rehabilitate	Myers & Sons
2021	0732100CM	LA-405 San Gabriel River Bridge Scour Mitigation	Myers Shimmick, JV
2021	073507CM	LA-405 Active Traffic Management/Integrated Corridor Management	Persons Transportation Group

Year	Contract No.	Contract Name	Awarded Company Name
	062HT1CM	Fresno 99	Granite Construction Company
	10-0P92CM	Mariposa 140	Myers and Sons/RL Wadsworth Joint Venture
	040135CM	SFOBB East Span Foundation Demolition	Kiewit/Manson A Joint Venture
	112T21CM	I-5 North Coast	Flatiron-Skanska-Stacy and Witbeck a Joint Venture (FSSW)
	080J07CM	Barton Road Interchange	Myers-Rados, A Joint Venture
	083477CM	SR-58 Kramer Junction	Kiewit Infrastructure West Co.
	041J56CM	State Route 101 Managed Lanes	Kiewit Infrastructure West Co.
	044K81CM	University Avenue/MacArthur Maze	Kiewit Infrastructure West Co.
	030F28CM	Cosumnes River Bridges	Granite Construction Company
	050N70CM	SB101-Carpinteria to Santa Barbara	Granite Construction Company
	112E15CM	San Dieguito Lagoon Restoration	Marathon Construction Company
	044G89CM	Scofield Avenue Undercrossing Seismic Retrofit	Golden State Bridge
	021H52CM	Yreka Rehabilitation	Myers-Shea, a Joint Venture
	073182CM	VEN-001 Slope Restoration Project	Flatiron-Drill Tech Joint Venture
	023H32CM	Sacramento River BOH Deck Replacement and Dunsmuir Gap Project	Walsh-Meyers, a Joint Venture
	060W80CM	Fre 99 Rehabilitation Project	Granite Construction Company
	073252CM	LA-210 San Gabriel River Bridge Hinge Replacement	Flatiron West, Inc.

CONCLUSION/NEXT STEPS

In response to the 3 perceptions about CMGC projects outlined here, mainly that CMGC projects are too expensive, that DBE participation goals are not being met on CMGC projects and that the same contractors are winning CMGC contracts, we offer the following.

Any new process will inherently experience a learning curve by anyone who has never worked on that process before. With the learning curve, much like hiring a new employee, comes added inefficiencies that will cost more money. This is not because of the process itself but because the process is new for managers who oversee that process. As those managers become experienced with CMGC processes, from the pursuit phase through construction, efficiency gains will continue to increase and multiply.

As noted in an earlier section, since the program's inception in 2012, on average Caltrans has awarded less than 10 CMGC projects per year. This is significantly less (97.58 less) than one year of 400+ DBB contracts. Additionally, with 20,000 employees throughout the state, this means that only a handful each year are experienced with the CMGC process. Caltrans was established in 1973 and has over 50 years of experience overseeing design-bid-build projects.

For this, we offer the following.

CMGC Projects are More Expensive Than Traditional DBB Projects

- Based on the SR-99 and Cosumnes projects included in this paper, Caltrans realized a savings of $75.3m due to innovations during the preconstruction phase and prior to construction.
- Combined, the two CMGC projects accelerated the project schedules by almost 3 years at no additional cost to Caltrans.
- The I-80 project experienced construction cost overruns of $24.5m plus $9.4m in claims.
- 212 construction days were added to the original project schedule for the I-80 project.
- Potential construction change orders and claims are minimized during the CM phase resulting in more price certainty during the construction phase.
- Of all completed CMGC contracts to date, none required additional supplemental funding from the CTC in construction.
- Reliance on the Caltrans cost history data may not adequately reflect the CMGC project's complexity.

CMGC Projects Do Not Meet the DBE Goals Established By Caltrans

- Both SR-99 and the I-5 DBB project met and exceeded the projects' established DBE goals.
- DBE contractors that engaged on the Cosumnes project, who were not ready to submit a bid, successfully won contracts on the American River Bridge project.
- Reviewing project data, CMGC projects do not have the funding to accommodate significantly higher bids submitted by DBE contractors
- Working with tight project budgets, Granite Construction has managed to leave the DBE community better off by approaching DBE engagement as a long term effort rather than a project by project basis. Eventually, DBE companies that follow the correct business planning process will win work on a CMGC project
- It is through the preconstruction phase that the project team is afforded the time to assist with barrier remediation prior to subcontractor bids being submitted
- DBE companies that receive assistance through the CM phase tend to be more confident in submitting bids for the next CMGC Project in their district.

- DBE participation, when measured on the final projects costs versus on bid day, is a more accurate reflection on participation.

Caltrans Awards Contracts to a Small Number of Companies with Prior Experience

- Caltrans provides public information on all CMGC project awards. Information on this is included in this white paper and directly refutes this claim.

- Winning a successful CMGC pursuit is not for all contractors. Indirect opportunity costs can be too great for smaller firms to afford when participating in this delivery method.

Based on our research, as well as the ample information based on data that is included in this white paper, perception claims about the CMGC process appear to be unfounded and based on lack of accurate information. However, information about Caltrans CMGC projects is not always easy to find as the program is fairly new in comparison to traditional design-bid-build projects.

One underlying attribute consistent throughout all of these claims is the lack of knowledge about how the CMGC process is different from the DBB process. Because of the CM phase, its ability to allow for increased communication, collaboration and innovations realized prior to bids being received, significant savings have been realized throughout the projects included in this paper.

Our recommendation would be to prepare teams earlier, provide data more often and communicate regularly on gains realized through CMGC projects. This applies to all levels - including but not limited to Caltrans staff, the contracting community and the California Transportation Commission.

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