

Case Study: Dublin BART Parking Garage

The Project

The County of Alameda is developing a modern, state-of-the-art, five story parking structure to serve the Dublin BART station, expanding access to clean commute options for East County (and beyond) residents with 516 parking spaces. Located along Campus Drive in Dublin, the building is of Type IIB, Post Tension (PT) concrete construction and consists of five floors roughly 34,000 sf in area for a building total gross floor area of 179,000sf. Construction is anticipated to begin in October 2021 and complete in December 2022.

Alameda County has a strong commitment to climate action. In 2019, the General Services Agency Office of Sustainability published a sustainable supply chain report, which identified that construction and maintenance contributed 43% of the carbon footprint of all County expenditures made in fiscal year 2015. Within the construction and maintenance category, the material types that contributed the largest source of supply chain emissions were concrete and steel, and the report specifically identified low-carbon concrete as an emissions reduction strategy.

Alameda County General Services Agency Capital Programs department directly manages and implements new and existing building projects for County agencies and departments. The GSA Office of Sustainability was the project lead for managing the low-carbon concrete pilot project on behalf of the County, and worked with the Capital Programs team to appropriately integrate the specification into the project delivery process.

The Process

When approaching the Dublin garage project, the Sustainability staff used Arup's technical assistance to address concerns raised by the County's internal project team regarding 1) performance, 2) cost - in materials and schedule delays, and 3) timing in the project schedule. They needed to ensure that the project managers have the specification information they need at the right time in the project. They began the pilot project by attempting to incorporate the specifications into the bridging narrative, working through their architectural contractor, but found this added a layer of complexity to the bridging narrative development process. As a result of this pilot process, the County instead developed a performance specification template within the General Requirements section of the contracting documents (Division 01) that will allow the low-carbon specifications to be incorporated as part of the standard template used when developing the contract in projects going forward.



PROJECT DETAILS

Developer/owner	County of Alameda
Bridging Architect	AE3 PARTNERS
Design-Build Architect, Structural Engineer & other teams	TBD
Concrete supplier	TBD
Project status	Bridging design completed in Nov 2020

CEMENT DETAILS

Volume	8,600 cubic yards
Path	TBD
Anticipated Cement Savings ¹	1,341,000 lbs or more
Estimated GHG Savings ²	544 MTCO _{2e} or more

1 Savings is in comparison to NRMCA 2016 national averages, the dataset used by the Bay Area low carbon concrete working group to set code thresholds.

2 GHG savings assumes 0.0406 kgCO_{2e} per lb of cement reduction. Source: Athena Impact Estimator v5.4, A1-A3 GWP impacts, taking the very rough assumption that the cement is replaced 1:1 with slag, which was found to have higher impact than fly ash.

CONCRETE MIX DETAILS						
Primary Applications	Volume (cyd)	Strength (psi)	Cement content (lb/cyd)	Total cement content (lbs)	NRMCA average (lb/cyd)	Total cement if NRMCA avg (lbs)
Foundation & slab on grade	3876	4000	456	1,767,000	570	2,209,000
Columns & walls	1245	4000	456	568,000	570	710,000
Beams & elevated slabs	3503	5000	503	1,762,000	719	2,519,000
Total	8624			4,097,000		5,438,000

Note: The concrete for this project has not yet been specified. Volumes and cement content may change. The above estimates assume that the concrete will meet the County’s new standards. The savings could be significantly higher depending on the final mixes.

The County incorporated low-carbon concrete performance specifications into an existing owners specification titled Sustainable Building Design. The original specification provided the contractor clear performance requirements for achieving a LEED Silver rated building on behalf of the County. It now contains added performance requirements to require the contractor to also specify and document the use of low carbon concrete. This had the added benefit of incorporating an accountability structure by requiring a reporting form be submitted by the contractor at two times during the contract:

- First, when the concrete mix designs are being specified by the structural engineer. At this time, the structural engineer and concrete provider work together to design mixes to meet the standard.
- Second, after the concrete has been poured. At this time, the reporting form provides the details on the actual mixes used in the project.

In developing a standard contracting specification template, the County will realize GHG savings beyond this one project by introducing low-carbon concrete to future County projects

Keys to Success

- Incorporate low-carbon concrete specifications into contracting documents and owners specifications so that the requirements are known to the project team up-front.
- Provide decision makers, such as Capital Programs Project Managers, the technical performance and cost details needed to show that the low carbon mix will meet their needs.

Accommodating Other Concrete Products

During the pilot process the project team chose not to specify the type of structural concrete used on the project, to allow the bidders on the project flexibility to design the most cost effective structure using poured in place, tilt up, or CMU. This added a layer of complexity to the specifications, and required Arup to assess the appropriateness of the GWP and cement thresholds for a larger set of concrete products. In the end, the County was able to incorporate this information into the final owners requirement specification.

