Embodied Carbon Action Plan

2026

Marisol Zero One
Malibu, CA

tsstructural.com

T&S STRUCTURAL

TABLE OF CONTENTS

Thacher School C+T Building
Ojai, CA

INTRODUCTION

T&S Structural, a 50-person structural engineering firm with offices located in San Luis Obispo, Santa Barbara, Pasadena, Santa Clara, and Northern Nevada, is hereby signing on to the SE2050 Commitment Program. We support the vision that all structural engineers will strive to understand, reduce, and ultimately eliminate embodied carbon in their projects by 2050.

We realize we all have the responsibility to take care of our planet. Our vision is to support the growth of healthy communities through safe and efficient structural design and expertise. Healthy communities can only thrive if they are supported and surrounded by a healthy environment.

Structural engineers are uniquely positioned to have a significant influence on the materials that form the built environment. It is up to us, as structural engineers, to move our industry in the direction of net zero embodied carbon.

We therefore commit T&S Structural to take the following steps of the SE2050 Commitment Program:

- We commit to annually reporting an Embodied Carbon Action Plan (ECAP) and permit the ECAP document to be made public on the SE2050 website.
- We commit to annually submitting data to the SE2050 project database in a collaborative effort to understand embodied carbon in structural engineering projects and to set attainable targets for future projects.

We look forward to joining this coalition and industry effort to achieve the goals of the SE2050 Program.

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TEAM

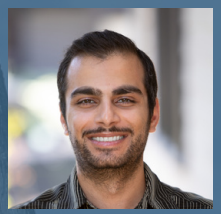
The engineering staff across all T&S offices meet monthly for internal presentations on various engineering topics. In our office-wide meeting on August 14, 2025, we kicked off our commitment to SE2050 with an overview of the program. From this meeting, we put out a call for individual engineers that were interested in being part of the team.

Our 2025-2026 SE2050 team consists of:

Aaron Cook, P.E.
Lead
Colorado Springs, CO

Hosein Kerdar, PhD, P.E.
Principal
Santa Clara, CA

Angel Trejo, P.E.
Ithaca, NY



Soheil Kashani
Pasadena, CA

Dylan Thompson, P.E.
Santa Barbara, CA

Elizabeth Shaw
San Luis Obispo, CA

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Shoreline Residence
Santa Barbara, CA

EDUCATION

T&S is committed to making sure our engineers have the tools and knowledge available to make embodied carbon reduction a key driver of project design decisions. A few of our strategies are outlined below:

ACTIONS

- Internal Presentations
  - SE2050 Overview and Commitment
  - Embodied Carbon 101
- Shared educational opportunities
- Attended Towards Zero Carbon Bootcamp
- Attended SEAOSC Sustainability Summit
- All employees to receive a copy of this report
- Life-cycle assessment (LCA) training

GOALS

- Regular office-wide email updates to share carbon reducing strategies
- Include embodied carbon info within onboarding procedure
- Produce embodied carbon quick reference guide
- Produce general embodied carbon slide deck template for internal and external use

Thacher Dining Hall
Ojai, ,CA

ADVOCACY

ACTIONS

- Include Life-Cycle Assessment (LCA) within proposals for select projects under “Scope of Services.” Sample language:
  - “*Provide a Life-Cycle Assessment (LCA) of embodied carbon within the proposed structural system. This assessment is a way to measure the environmental impact of structural materials. The assessment can be helpful to guide decision making for both environmental impact reduction and construction cost savings. This assessment is provided at no cost to the Client.*”

GOALS

- Create informational PowerPoint presentation (goal for 2026)
  - Internal and External use
- Share the information in this ECAP with our clients
- Create SE2050 page on T&S website
- Update email signatures to link to ECAP and website page

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REDUCTION

STRATEGIES

- Internal education = highest priority
- Produce quicker method for LCA
- Specify lower carbon materials
- Action in 2025 – Created specifications template for lower carbon concrete
- Target for 2026 – Produce similar template allowing for lower carbon steel strategies

GOALS

- By March 2027, establish a baseline carbon intensity using values from 2026 and 2027 ECAPs.
- By 2031, all T&S projects over 3000 SF will have a written goal of 25% reduction of carbon impact intensity compared to the 2027 baseline.

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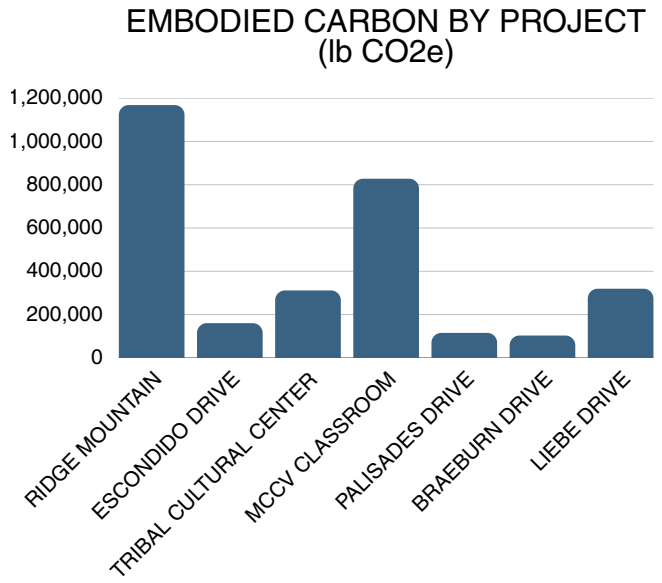
REPORTING

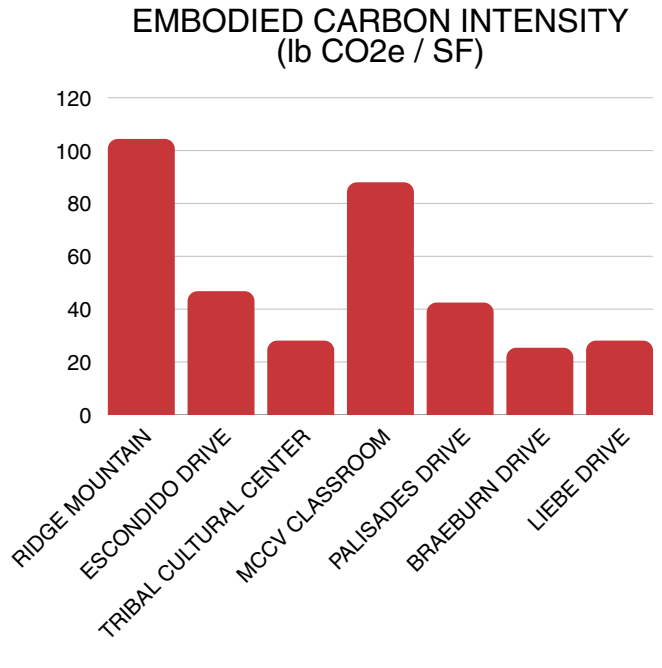
METHOD

- As a first-year contributor, our priority was to gather data from a representative sample of typical T&S projects.
  - 1 Educational Project
  - 1 Civic/Municipal Project
  - 5 Custom Residential Projects
- For each project, we ran a Tier 1 Life-Cycle Analysis, following the ASCE Prestandard.
- Used the carbon impact values listed on the SE2050 ECOM tool.
- Used in-house quantity take-off spreadsheets to arrive at material quantities.
- Completed analyses on 7 current or recently completed projects.

CONCLUSIONS

- By both total impact and intensity, concrete and rebar make up about 60% of our total impact.
- Steel makes up around 30%.
- Wood is very low impact. This reinforces what we already know: From an environmental standpoint, larger wood members typically have a lower carbon footprint than smaller steel framing.

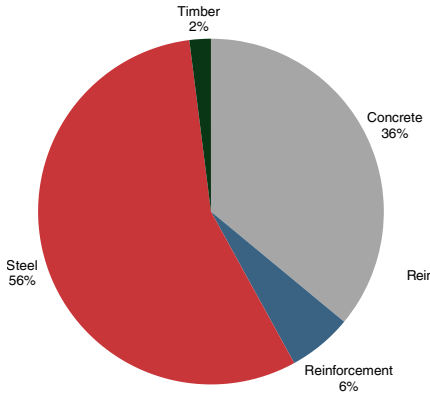




REPORTING

% Carbon Impact By Material, By Project

RIDGE MOUNTAIN RESIDENCE



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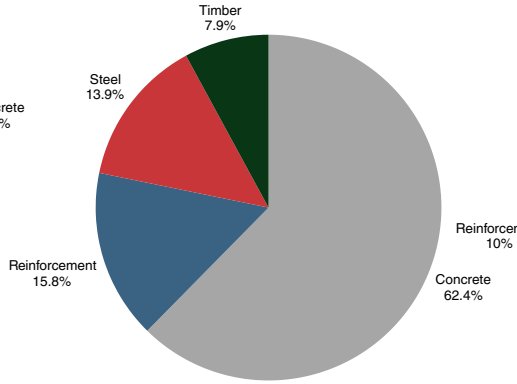
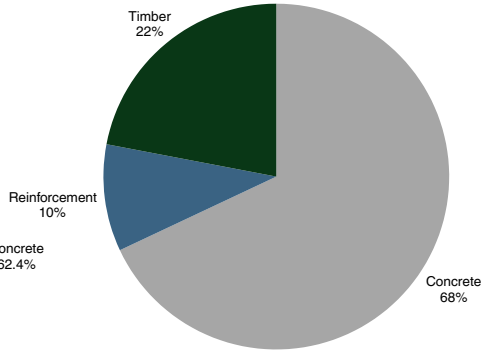
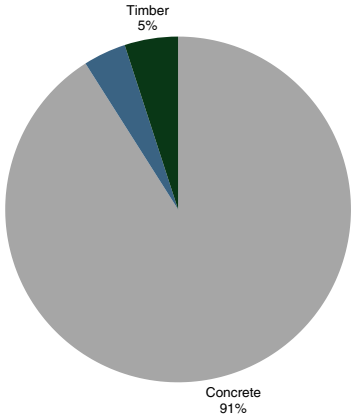


TRIBAL CULTURAL CENTER



MCCV CLASSROOM



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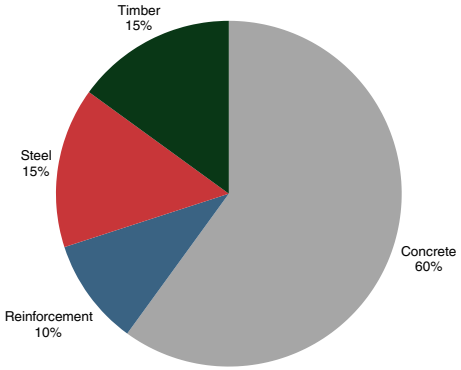

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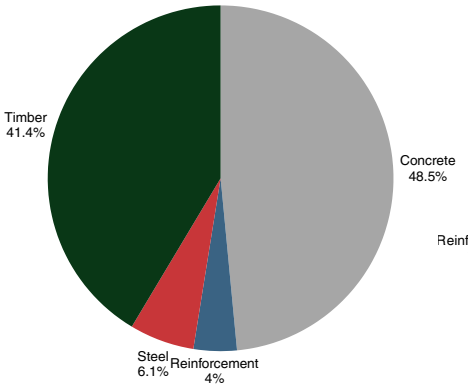

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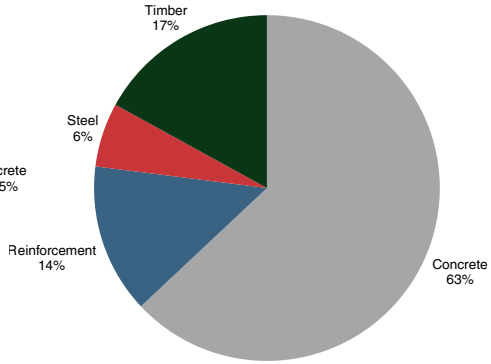


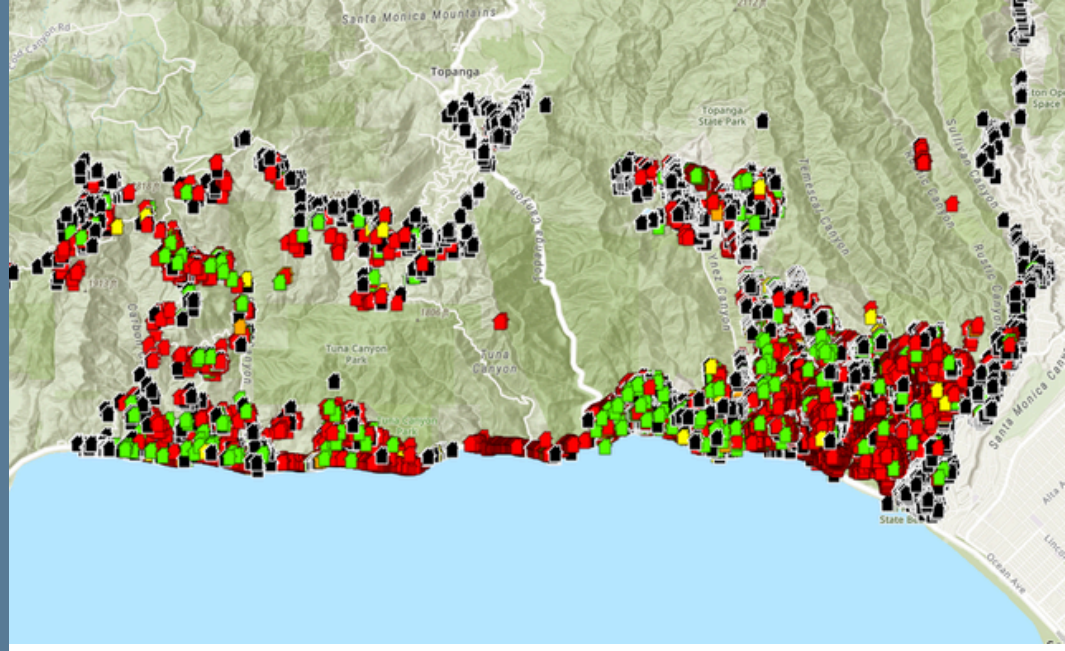
APPENDIX A

REUSE OF FIRE DAMAGED FOUNDATIONS

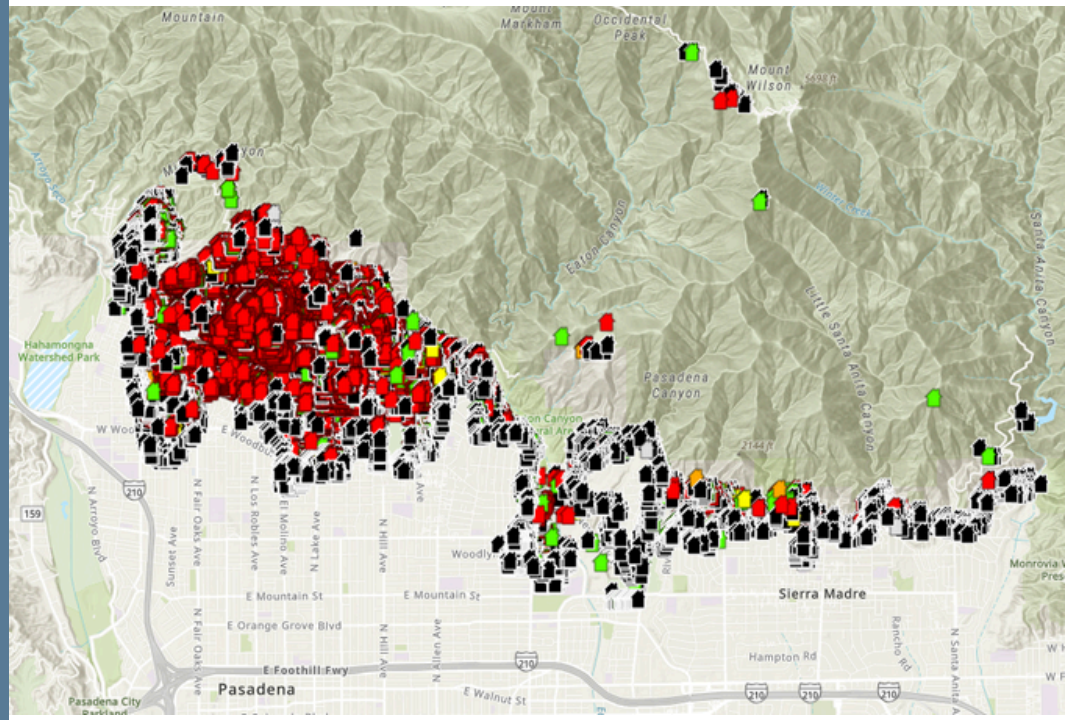
In January of 2025, the Eaton and Palisades Fires destroyed over 16,000 structures in Southern California. Over this past year, T&S has provided engineering for over 60 rebuilds. A question that comes up repeatedly is, “can we reuse the existing foundation?” Understandably, homeowners want to avoid paying unnecessary costs for something that will be underground, if at all possible.

Garrett Mills, S.E., of our Pasadena office, summarized the knowledge we have gained over the past year in a presentation at the 2025 SEAOC Convention in San Diego, titled “Practical Application of SEAOC Fire-Exposed Foundation Guidelines”. While we are not able to summarize this whole presentation within this document, here are some key takeaways:

- Most often, concrete has the biggest environmental impact in the project.
- For fire rebuilds, homeowners often prefer to limit costs as much as feasible.
- With the right knowledge and testing procedures, we can often utilize existing concrete foundations, even though they may have been damaged in a fire.
- It is possible to greatly reduce or eliminate the need for any new concrete work on a fire rebuild project.
- This saves the homeowner serious costs, while also minimizing the carbon impact of rebuilding the home.



Los Angeles County
Palisades Fire Damage Map



Los Angeles County
Eaton Fire Damage Map

APPENDIX B

MCCV CLASSROOM CASE STUDY
STEEL vs. WOOD ANALYSIS

ANALYSIS

T&S performed Tier 1 Life-Cycle Analyses (A1–A3, ASCE Prestandard / SE 2050 ECOM tool) for two framing options on a 9,440 SF classroom building on a sloped site.
Selecting a wood framing system over steel cuts the building's controllable embodied carbon nearly in half—from 76 to 39 lb CO2e/SF—a savings of 352,000 lb CO2e. In both options, concrete dominates: 10,000 psi retaining wall concrete alone accounts for 462,100 lb CO2e, identical in both options and driven entirely by site topography.

BEYOND THE REPORTING BOUNDARY

The sloped site also requires 508,500 lb CO2e of site retaining walls and concrete stairs (A1-A3) plus 351,000 lb CO2e of temporary shoring (A5)—totaling approximately 860,000 lb CO2e that is identical in both framing options and invisible in SE 2050 benchmarks. Including this site work raises the reported intensity from 76 to 167 lb CO2e/SF (steel) and from 39 to 130 (wood). The ECOM tool has no category for site structural work or temporary shoring, creating a boundary gap that distorts project-to-project comparisons on sites with significant earthwork.

TAKEAWAY

Wood framing is the clear winner and cuts the controllable portion of the building carbon nearly in half. However, on this project, the majority of the total carbon impact from site-driven structural work falls outside the scope of SE 2050 reporting. How the industry accounts for site work in the future will shape whether benchmarks reflect the full carbon picture.