CITY OF CUPERTINO

CITY MANAGER'S OFFICE

CITY HALL
10300 TORRE AVENUE • CUPERTINO, CA 95014-3255
TELEPHONE: (408) 777-3223 • FAX: (408) 777-3366
CUPERTINO.ORG

SUSTAINABILITY COMMISSION STAFF REPORT

Meeting: December 19, 2019

Subject

Staff update on Buy Clean California Act policy development and Bay Area low carbon concrete codes initiatives.

Recommended Action

Receive update and provide any feedback.

Background

The Buy Clean California Act (AB 262) requires the California Department of General Services (DGS) to establish maximum acceptable Global Warming Potential (GWP) limits for "covered materials" used in state public works projects. AB 262 targets embedded carbon emissions of structural steel, carbon steel rebar, flat glass, and mineral wool board insulation. Monitoring the state's Buy Clean policy is part of the Sustainability Commission's FY 2020 Work Program and supports CC Resolution No. 19-040 Supporting State Implementation of the Buy Clean California Act of 2017. The cities of Berkeley and Richmond have adopted similar resolutions.

Discussion

Buy Clean California update:

AB 1817 modified Buy Clean CA to push implementation to July 2021, giving the DGS a two-year phase-in period to collect EPDs. AB 1817 allowed the DGS to exclude the fabrication stage from the GWP calculation. State agencies can also develop a list of exemptions to Buy Clean, such as health and safety, emergency-related projects.

In October, the DGS hosted an External Stakeholder Event on the status of Buy Clean CA as modified by AB 1817. The webinar provided technical information on the methodology being considered by the DGS to establish the GWP limit and clarification on acceptable Environmental Product Declarations (EPDs) (presentation attached).

Current timeline of Buy Clean policy implementation (from DGS's Buy Clean website[1]):
January 1, 2019 – Awarding authorities will request submission of Environmental Product Declarations (EPDs). Awarding authority means:

- A state agency for a contract for a public works project that is subject to the State Contract Act (Chapter 1 (commencing with Section 10100) of Part 2).
- The Regents of the University of California for a contract for a public works project that is subject to Chapter 2.1 (commencing with Section 10500) of Part 2.
- The Trustees of the California State University for a contract for a public works project that is subject to the California State University Contract Law (Chapter 2.5 (commencing with Section 10700) of Part 2).

January 1, 2020 – Awarding authorities will require submission of EPDs.
January 1, 2021 – DGS will publish the maximum acceptable GWP for eligible materials.
July 1, 2021 – Awarding authorities will gauge GWP compliance of eligible materials with EPDs.

Bay Area low carbon concrete codes update:
Last year, the County of Marin received a grant from the Bay Area Air Quality Management District (BAAQMD)'s Climate Protection Grant Program to explore local model policy to address embodied carbon in concrete. Partners of this effort include StopWaste (Alameda County), Bruce King, Arup, and the Carbon Leadership Forum and is supported by the City and County of San Francisco, County of Alameda, City of Berkeley, and Bay Area building industry companies and organizations. The County of Marin maintains a website[2] to track the Bay Area Low-Carbon Concrete Codes Project and provide model resources that are updated as the project develops.

On November 19, the County of Marin Board of Supervisors unanimously adopted a local modification of the County's Building Code to establish embodied emissions limits in concrete for projects with new poured concrete. The codes are effective January 1, 2020. The County of Marin Community Development Agency, Planning Division's staff report (attached) notes novel elements of the new code:

- Establishes a sliding scale for the maximum amount of cement for different strength of concrete mixes.
- Includes "an alternate pathway for compliance using limits on embodied emissions within concrete mixes, which provides flexibility for SCMs and innovations in cement alternatives." SCMs are "supplementary cementitious materials" and include fly ash, slag, glass pozzolans, and other materials.
- Sets emissions limits for "conventional, Portland cement based concrete mixes, something that has not previously been done in a local building code."

[1] https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act
[2] https://www.marincounty.org/depts/cd/divisions/sustainability/low-carbon-concrete-project

The standards were developed with support from a technical consultant and a review process with a regional stakeholder group established through the BAAQMD grant. Technical recommendations and feedback were also received via multiple meetings with expert stakeholders. The project was featured in the Marin Independent Journal and Engineering News-Record, the latter of which dubbed it the "first low-carbon concrete code in the US."

Cupertino Green Building Ordinance:
Cupertino City Council will be holding a public hearing on December 17 on the subject of electrification and green building local ordinances. Staff is recommending that Council re-adopt the existing Green Building Ordinance with no changes (Cupertino Municipal Code chapter 16.58). The Green Building Ordinance has been in effect in Cupertino since June 2013. Cupertino's local Green Building Ordinance requires all large developments to build and certify their projects to the LEED (Leadership in Energy & Environmental Design) rating system, or otherwise demonstrate their designs meet the LEED certified standard or better. One advantage of the existing Cupertino Green Building Ordinance is that the LEED rating system is continually updated to drive progress in the construction and design industry.

The current LEED rating system (version 4.1) encourages but does not require any GWP limits in product selection. The Building Product Disclosure and Optimization– Environmental Product Declarations Credit[3] rewards the selection of building products with reductions in global warming potential and embodied carbon, as demonstrated in a product EPD or verified life cycle assessment.

Next Steps
Staff will continue to monitor the development of the County of Marin's model code and the implementation of Buy Clean CA.

Prepared by: Gilee Corral, Sustainability Program Coordinator and Staff Liaison
Reviewed by: André Duurvoort, Sustainability Manager

Attachments:
A – Buy Clean California Act External Stakeholder Presentation-10.31.2019
B – Marin County Board of Supervisors Merit Hearing Staff Report and Ordinance-11.19.2019

[3] https://www.usgbc.org/articles/how-leed-v41-addresses-embodied-carbon

Attachment A

CALIFORNIA DEPARTMENT OF GENERAL SERVICES

Buy Clean California Act External Outreach Event October 31, 2019

Procurement Division, Engineering Branch

AB 262 Implementation Team

Agenda

- Buy Clean California Act - Update
- Maximum Acceptable Global Warming Potential (GWP) Limit Methodology
- Environmental Product Declarations (EPDs) Allowed for Compliance
- Agency Compliance Model
- DGS Request to Industry
- Questions & Answers

Buy Clean California Act – Update (1 of 2)

- Assembly Bill 1817 modified Buy Clean California Act (AB 262):
  - Extended implementation date by two years, 7/1/2021.
  - Introduced a two year “phase-in” period to collect facility-specific EPDs.
    - Management Memo
  - Allowed DGS to exclude fabrication stage for GWP calculation.
  - Allowed Awarding Agencies to develop list of AB 262 exemptions.

Buy Clean California Act – Update (2 of 2)

- AB 262 Team responded to stakeholder comments and posted responses on the Buy Clean California Act webpage.
- Met with awarding agencies to discuss progress.
- DGS reached out to stakeholders to continue discussion on implementation.
- Flat Glass Update.

Maximum Acceptable GWP Limit Methodology (1 of 3)

- DGS has revised its approach to determine the maximum acceptable GWP limit after further discussions with stakeholders and subject matter experts.
- AB 1817 allows the exclusion of emissions that occur during the fabrication stages.
- Producer GWP impacts are typically much larger than a fabricator for the current materials.
- Flat glass and steel Product Category Rules (PCRs) expire on 3/31/20 and 5/5/20, respectively.
- DGS expects that the revised PCRs will align with ISO 21930:2017 which may affect GWP impact results.

Maximum Acceptable GWP Limit Methodology (2 of 3)

- Current legislation requires a maximum acceptable GWP to be set at the industry average of facility specific GWP for each material.
- A producer facility-specific EPD identifies the GWP impact to manufacture a product at a particular facility.
- The reported GWP impact from industry-wide production weighted* EPDs can be influenced by market share rather than technology improvements.
- DGS believes that a GWP limit should be determined by calculating an average using producer facility-specific EPDs.
- However, an industry-wide EPD may be a solution to set the limit due to the timing of the PCR revisions.

* Market share production weighting among different suppliers

Maximum Acceptable GWP Limit Methodology (3 of 3)

- Therefore, at this time DGS is considering two options to establish the GWP limit:
  - Use an industry-wide EPD* for an eligible material.
  - Calculate an average using producer facility-specific EPDs*.

  * EPDs should be developed according latest mineral wool PCR and 2020 flat glass and steel PCRs.
- A tolerance is still expected to be added accounting for uncertainty in the life cycle assessment process.
- EPDs will be obtained from awarding agencies as well as those found on publically available databases.

Facility-specific EPDs

- **PCC §3503.(a)** "An awarding authority shall require the successful bidder… to submit a current ***facility-specific*** Environmental Product Declaration…"
- **Facility-specific Environmental Product Declaration** – Product-specific EPD: the environmental impacts are attributed to a single manufacturing facility.
- Evaluate the environmental performance of a product manufactured from a single facility.
- Averaging masks the environmental impacts between different facilities.

Differentiating Producers vs. Fabricators

Producer

- Facility that produces the base material before it is sent for fabrication
- Steel mill
- Rebar mill
- Mineral wool board insulation plant
- Flat glass plant

Fabricator

- Facility that conducts additional processing to base materials
- Bending, tempering, cutting, etc.
- May obtain base material from multiple manufacturers

EPDs Allowed for Compliance

Acceptable

- Facility-specific producer/manufacturer EPDs

Not-Acceptable

- Fabricator EPDs
- Industry-wide/industry-average EPDs
- Multiple facility, production-weighted EPDs from a single producer or fabricator

EPD System Boundaries for Materials

Structural Steel and Carbon Steel Rebar

- Evaluate A1-A3 (product stage)
- A1 will be evaluated for producer EPDs if A2 and A3 represent average fabrication data

Mineral Wool Board Insulation (light and heavy Density)

- Evaluate A1-A3 (product stage)

Flat glass

- Evaluate material acquisition & pre-processing, production, and packaging / storage (cradle-to-gate)

Agency Compliance Model

- DGS has been holding workshop meetings with agencies to develop a compliance framework.
- This framework consists of:
  - Determination which projects are subject to AB 262.
  - Communicate new policies to support AB 262.
  - Develop specific guidelines for staff to determine compliance.

Where can I find more information?

- Information can be found on both DGS' and awarding agencies' websites.
  - DGS will host answers to general Frequently Asked Questions (FAQs).
    - https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act
  - Awarding agencies will host FAQs specific to their department.

DGS Request to Industry

- Develop facility-specific producer EPDs during the 2019-2020 phase-in period to allow establishment of a maximum acceptable GWP limit for each eligible material, and prepare stakeholders for compliance.
- The required Product Category Rules can be found on the Buy Clean California Act webpage. However, it is recommended that the 2020 PCRs are used to develop EPDs for flat glass and steel.
- For those facility-specific EPDs not slated for California public works projects during the 2019-2020 phase-in period, publish them in recognized databases for EPDs or Program Operator's websites.

Questions?

Attachment B

COUNTY OF MARIN

COMMUNITY DEVELOPMENT AGENCY
PLANNING DIVISION

Brian C. Crawford
DIRECTOR

Thomas Lai
ASSISTANT DIRECTOR

Marin County Civic Center
3501 Civic Center Drive
Suite 308
San Rafael, CA 94903
415 473 6269 T
415 473 7880 F
415 473 2255 TTY
www.marincounty.org/plan

November 19, 2019

Marin County Board of Supervisors
3501 Civic Center Drive
San Rafael, CA 94903

SUBJECT: Proposed ordinance to add a new subchapter to Marin County Code Title 19 (Building Code) and adopt standards for low embodied emissions in concrete.

Dear Supervisors,

RECOMMENDATION:
Initiate an amendment to the Building Code by taking the following actions:

1. Conduct public hearing
2. Consider adopting proposed ordinance with an effective date of January 1, 2020

SUMMARY: On November 5, 2019, your Board conducted a first reading of the attached ordinance and scheduled a public hearing for November 19, 2019 at 10:30AM.

The County of Marin has long been a leader in local green building policies, most recently demonstrated in the October 2019 adoption of the updated green building ordinance. To date, these programs have focused on reducing operational energy use through increased energy efficiency requirements and emphasis on low-emission fuel sources. These policies are critical to achieving local greenhouse gas reduction targets. However, standards to date have focused little on reducing the *embodied carbon* emissions generated by the processes associated with the production of a building, including material extraction, transportation and manufacturing.

For older, less energy efficient buildings, the lifetime carbon emissions from electricity, gas, and other operational energy use exceeds the embodied carbon emissions generated during construction. This paradigm is shifting, as new construction and upgraded buildings grow closer to zero net operating energy emissions through increased energy efficiency and renewable power. With low annual energy use, embodied carbon emissions from construction represent most of the lifetime emissions of a building. Because the emissions from material extraction, transportation, manufacturing, and building construction are already emitted by the time the building is occupied, there is little potential to mitigate those impacts later in the building's life, as is possible with energy efficiency retrofits for operational emissions. The importance of addressing embodied carbon emissions is heightened by the pressing need to reduce emissions in the near term to avoid the most catastrophic impacts of climate change.

Concrete is the most widely used construction material in the world and is responsible for an estimated six to ten percent of global carbon dioxide emissions from human activity. Most of these emissions come from Portland cement, the "glue" that binds aggregate like sand and gravel into concrete, creating artificial rock. The emissions

associated with concrete can be reduced by minimizing cement use to the extent possible while still achieving necessary strength, or by using cement alternatives, called “supplementary cementitious materials,” or *SCMs*. SCMs can include but are not limited to fly ash, slag, and glass pozzolans. The proposed ordinance introduces innovative yet practical measures to begin addressing embodied emissions in concrete through modifications to the Building Code.

Based on conversations with local ready-mix suppliers, staff understands these cement alternatives to be locally available and have cost parity with cement. In cases where the amount of cement can be minimized without the need for supplements, there may be cost savings. For projects that need strength quickly, accelerators can be used to speed curing time without substantial increases in emissions, but these additions may add cost. As with all the County’s green building policies, hardship and infeasibility exemptions are written into the code for circumstances where applicants cannot comply or where it is cost-prohibitive to do so, and specific allowances are made in the ordinance for projects that need high early strength.

The Countywide Plan includes multiple recommendations for implementing programs around low-carbon materials in construction, including Program EN-3.d *Encourage Fly Ash in Concrete* which directs the County to “consider regulations requiring new building projects that use a substantial amount of concrete to incorporate at least 25% fly ash to offset some of the energy use and greenhouse gas emissions associated with the manufacturing of cement”. To advance this program, staff sought to develop policies that were current, locally responsive, and regionally replicable. In 2018, the County partnered with StopWaste, the Embodied Carbon Network, Arup, and Bruce King of the Ecological Builders Network and was awarded funding the Bay Area Air Quality Management District’s Climate Protection Grant Program. These funds supported the development of this proposed ordinance through technical consultants and coordination and convening of stakeholders. The funds have also supported County staff time for the policy adoption process, technical assistance for pilot projects, and outreach and dissemination to promote replication.

The standards were developed with substantial review and feedback by the regional stakeholder group convened through the grant. Seven meetings with a group of expert stakeholders, who represented diverse perspectives across academia, the building trades, the concrete industry, and local government staff provided framing for the standards and review of technical recommendations. The proposed standards were developed by the project’s technical consultant but were largely influenced and shaped through rigorous analysis and debate over the course of a year of project development. Local stakeholders including ready-mix concrete suppliers, local structural engineers, and building officials from multiple Marin County jurisdictions were engaged throughout the process participated in a meeting about the proposed standards and local barriers in mid-2019.This feedback was used to inform development of the ordinance.

The proposed standards modify the Building Code to establish a sliding scale of requirements for the maximum amount of cement used for different strength concrete mixes. The standards also include an alternate pathway for compliance using limits on embodied emissions within concrete mixes, which provides flexibility for SCMs and innovations in cement alternatives. These standards are innovative by setting limits on the high emissions potential in conventional, Portland cement based concrete mixes, something that has not previously been done in a local building code. As demonstrated in national and regional surveys (detailed in Attachment 4), the recommended limits

do not change the allowable mix designs but sets a ceiling on potential emissions and provides opportunities for increased education around the impacts of and alternatives to cement use.

The proposed standards apply to projects that include new poured concrete. Enforcement of the standards via the building code may not capture projects that pour concrete but do not require a building permit, which can include patios, walkways, and driveways. Ongoing education of the public, building industry, and ready-mix suppliers will be important to promote the use of low-carbon concretes regardless of local permit requirements. The proposed standards would also apply to public projects developed by the County of Marin. Sustainability team staff will work closely with capital projects staff to apply the appropriate requirements and to gather data about opportunities and barriers that arise during the implementation of the proposed standards. Lessons learned during implementation will be used to improve program administration and be shared with other jurisdictions that are interested in adopting similar policies.

The proposed ordinance is an important step towards more holistically addressing emissions from building activity in Marin County. The importance of considering the climate impacts of the entire building process highlights the need to educate the building community and the general public about the life cycle of climate impacts of construction. In addition to the these proposed standards, the stakeholder group developed a draft pathway to zero emission concrete by 2050. Achieving this would require ratcheting down concrete emissions on an aggressive schedule that both anticipates and prompts advancements in cements and carbon-storing technologies, and depends upon zero carbon technologies that do not presently exist. Staff recommends monitoring the implementation of the proposed standards, if adopted, in Marin County as well as regionally, as is the goal of the Air District grant. Implementation of these novel proposed policies will aid staff in developing recommendations for the 2022 code cycle that continue to lead on innovative climate solutions while supporting fair and achievable growth within the building community.

FISCAL/STAFFING IMPACT: This action does not impact the General Fund.

REVIEWED BY:

[ ] Department of Finance	[X] N/A
[X] County Counsel	[ ] N/A
[ ] Human Resources	[X] N/A

SIGNATURE: **Approved by:**

Alice Zanmiller	Brian C. Crawford	William Kelley
Planner	Director	Deputy Director

Attachments:

1. Ordinance Adopting Amendments to Marin County Code Title 19 (Building Code)
2. Sample Residential Specification
3. Sample Nonresidential Specification
4. Study of Limits for Cement and Embodied Carbon of Concrete
5. Low Carbon Concrete Compliance Form (Cement)
6. Low Carbon Concrete Compliance Form (Embodied Carbon)

Attachment B

MARIN COUNTY BOARD OF SUPERVISORS

ORDINANCE NO. ____

AN ORDINANCE ADOPTING AMENDMENTS TO MARIN COUNTY CODE TITLE 19 (BUILDING CODE), ESTABLISHING A NEW SUBCHAPTER ADDRESSING REQUIREMENTS FOR LOW CARBON CONCRETE.

* *

SECTION I. FINDINGS

The BOARD OF SUPERVISORS OF THE COUNTY OF MARIN hereby ordains as follows:

WHEREAS, the Marin County Community Development Agency initiated proposed amendments to Marin County Code Title 19 (Building Code). The Building Code includes building regulations that apply to the unincorporated areas of Marin County. The project includes proposed amendments that establish practical standards and requirements for the composition of concrete, as defined herein, that maintains adequate strength and durability for the intended application and at the same time reduces greenhouse gas emissions associated with concrete composition.

WHEREAS, the ordinance was introduced at a regular meeting of the Board of Supervisors on the 5th day of November 2019, and adopted by the Board of Supervisors of the County of Marin, State of California, on the 19th day of November 2019; and

WHEREAS, the United Nations Intergovernmental Panel on Climate Change (IPCC) has warned that failure to address the causes of global climate change within the next few years will result in significant sea level increases and frequency of wildland fires and reduced freshwater resources, which will significantly increase the cost of providing local governmental services and protecting public infrastructure; and

WHEREAS, the Marin County's Shoreline Sea Level Rise Vulnerability Assessment concluded that with end of the century projections of five feet of sea level rise and a 100-year storm event, 18,000 acres and over 12,000 buildings could be flooded, potentially impacting over 200,000 people and $15 billion in assessed property value; and

WHEREAS, the County of Marin is authorized by statute to adopt local amendments or additions to the California Building Standards Code when determined to be reasonably necessary by the Marin County Board of Supervisors because of local climatic, geological, topographical or environmental conditions, provided the procedures and effective date of local amendments coincide with the procedures and effective date of the California Building Standards Code; and

WHEREAS, the proposed Marin County Code Title 19 changes implement the Marin Countywide Plan (CWP) program EN-3.d (encourage Fly Ash in Concrete); EN-3.f. (facilitate green building practices); EN-3.i (explore regional collaborations); and EN-3.k (evaluate carbon neutral building incentives); and

WHEREAS, concrete is the most widely used construction material in the world and is responsible for an estimated six to ten percent of global anthropogenic carbon dioxide (CO_2) emissions; and

WHEREAS, Portland cement is the primary ingredient in concrete and is responsible for the majority of concrete's CO_2 emissions, released through both the burning of fossil fuels in the manufacturing process and from naturally occurring chemical reactions during processing; and

WHEREAS, the proportion of ingredients in a concrete mixture can greatly influence the associated CO_2 emissions, and supplementary cementitious materials (SCMs) including but not limited to fly ash, slag, and pozzolans, are readily available and provide a less CO_2-intensive alternative to cement in concrete; and

WHEREAS, in 2018, the Bay Area Air Quality Management District awarded a grant to the County of Marin to develop a policy to develop building codes and technical specifications for low-carbon concrete; and

WHEREAS, the policies developed through this grant and proposed in this ordinance were developed through collaboration with experts and stakeholders from across the region and will lead to concrete poured in Marin County having lower CO_2 emissions compared to national baselines; and

WHEREAS, the Marin County Community Development Agency is the designated enforcement authority for this Title, and with the Ordinance proposed herein is expressly initiating local amendments or additions to the California Building Standards Code

SECTION II: MARIN COUNTY CODE CHAPTER 19.07 ADDED TO MARIN COUNTY CODE TITLE 19

NOW, THEREFORE, THE BOARD OF SUPERVISORS OF THE COUNTY OF MARIN ORDAINS AS FOLLOWS: Marin County Code Chapter 19.07 (Low Carbon Concrete Requirements) is added to read as follows:

19.07 - Low Carbon Concrete Requirements

Express finding: Pursuant to Section 17958.2(a) of the California Health and Safety Code, the Marin County Board of Supervisors hereby finds the following modifications to the 2019 California Building Standards Code, as shown in Section 19.07.040 regulating allowable mix design and materials for plain and reinforced concrete, are reasonably necessary. This is because Marin County experiences climatic seasonal reduction in vegetative moisture content, combined with our heavily populated steep terrain, which presents increased wildfire risk to our residents from carbon-induced global warming; and is also bordered by sea water on three sides and subject to direct adverse local impact from sea-level rise as the result of construction-related contributions to climate change, including significant carbon emissions from cement production.

19.07.010 – Purpose

The purpose of this chapter is to provide practical standards and requirements for the composition of concrete, as defined herein, that maintains adequate strength and durability for

the intended application and at the same time reduces greenhouse gas emissions associated with concrete composition. This code includes pathways for compliance with either reduced cement levels or lower-emission supplementary cementitious materials.

19.07.020 – Definitions

For the application of this chapter the following definitions shall apply:

Concrete: Concrete is any approved combination of mineral aggregates bound together into a hardened conglomerate in accordance with the requirements of this code.

Upfront Embodied Carbon (*Embodied Carbon*): The greenhouse gasses emitted in material extraction, transportation and manufacturing of a material corresponding to life cycle stages A1 (extraction and upstream production), A2 (transportation), and A3 (manufacturing). Definition is as noted in ISO 21930 and as defined in the Product Category Rule for Concrete by NSF dated February 22nd, 2019. https://www.nsf.org/newsroom_pdf/concrete_pcr_2019.pdf

Environmental Product Declaration (EPD): EPDs present quantified environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function. EPDs must conform to ISO 14025, and EN 15804 or ISO 21930, and have at least a "cradle to gate" scope (which covers product life cycle from resource extraction to the factory).

19.07.030 – Scope

The requirements of this chapter shall apply to all plain and reinforced concrete installed within the unincorporated areas of Marin County.

19.07.040 – California Building Standards Code amendments

Section 1901.2 of the 2019 California Building Code is hereby amended as underlined:

> **1901.2 Plain and reinforced concrete.** Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as amended in Section 1905 of this code and Chapter 19.07 of Marin County Code.

Section R402.2.1 of the 2019 California Residential Code is hereby amended as underlined:

> **R402.2.1 Materials for concrete.** Materials for concrete shall comply with the requirements of Section R608.5.1, as amended by Chapter 19.07 of Marin County Code.

Section R404.1.3 of the 2019 California Residential Code is hereby amended as underlined:

> **R404.1.3 Concrete foundation walls.** Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332, or PCA 100, as amended by Chapter 19.07 of Marin County Code. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section R608.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332, or PCA 100, as amended by Chapter 19.07 of Marin County Code. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section R608.2 shall be designed and constructed in accordance with the provisions of ACI 318,

ACI 332, or PCA 100, as amended by Chapter 19.07 of Marin County Code. When ACI 318, ACI 332, PCA 100 or the provisions of this section, as amended by Chapter 19.07 of Marin County Code, are used to design concrete foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority."

Section R506.1 of the 2019 California Residential Code is hereby amended as underlined:

R506.1 General. Concrete slab-on-ground floors shall be designed and constructed in accordance with the provisions of this section of ACI 332, as amended by Chapter 19.07 of Marin County Code. Floors shall be a minimum 3 1/2 inches (89mm) thick (for expansive soils, see Section R403.1.8). The specified compressive strength of concrete shall be as set forth in Section R402.2.

Section R608.5 of the 2019 California Residential Code is hereby amended as underlined

R608.5 Materials. Materials used in the construction of concrete walls shall comply with this section, as amended by Chapter 19.07 of Marin County Code.

Section 301 of the 2019 California Green Building Standards Code is hereby amended as underlined:

301.6 Low-carbon concrete requirements for all projects. Plain and reinforced concrete installed as part of any project subject to the application of this code shall demonstrate compliance with the requirements of Chapter 19.07 of Marin County Code, the full text of which is herein added to this code by reference.

Section A4.403.2 of the 2019 California Green Building Standards Code is hereby amended as struck through and underlined:

A4.403.2 Reduction in cement use. As allowed by the enforcing agency, cement use in foundation mix design is reduced ~~by not less than 20 percent~~ as outlined in the requirements of Chapter 19.07 of Marin County Code.

Section A5.405.5 of the 2019 California Green Building Standards Code is hereby amended as underlined:

A5.405.5 Cement and concrete. Use cement and concrete made with recycled products and complying with the following sections and the requirements of Chapter 19.07 of Marin County.

19.07.050 – Compliance

Compliance with the requirements of this chapter shall be demonstrated through any of the compliance options in Sections 19.07.050.2 through 19.07.050.5.

Table 19.07.050 Cement and Embodied Carbon Limit Pathways

	Cement limits for use with any compliance method 19.07.050.2 through 19.07.050.5	**Embodied Carbon limits** for use with any compliance method 19.07.050.2 through 19.07.050.5

Minimum specified compressive strength f'_c, psi (1)	Maximum ordinary Portland cement content, lbs/yd^3 (2)	Maximum embodied carbon kg CO_2e/m^3, per EPD
up to 2500	362	260
3000	410	289
4000	456	313
5000	503	338
6000	531	356
7000	594	394
7001 and higher	657	433
up to 3000 light weight	512	578
4000 light weight	571	626
5000 light weight	629	675

Notes
(1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits.
(2) Portland cement of any type per ASTM C150.

19.07.050.1 Allowable Increases

(1) *Cement and Embodied Carbon Limit Allowances.* Cement or Embodied Carbon limits shown in Table 19.07.050 can be increased by 30% for concretes demonstrated to the Building Official as requiring high early strength. Such concretes could include, but are not limited to, precast, prestressed concrete; beams and slabs above grade; and shotcrete
(2) *Approved Cements* The maximum cement content may be increased proportionately above the tabulated value when using an approved cement, or blended cement, demonstrated by approved EPD to have a *plant-specific EPD* lower than 1040 kg CO2e/metric ton. The increase in allowable cement content would be (1040 / plant=specific EPD) %.

19.07.050.2 Cement Limit Method - Mix

Cement content of a concrete mix using this method shall not exceed the value shown in the Table 19.07.050. Use of this method is limited to concrete with specified compressive strength not exceeding 5,000 psi.

19.07.050.3 Cement Limit Method - Project

Total cement content shall be based on total cement usage of all concrete mix designs within the same project. Total cement content for a project shall not exceed the value calculated according to Equation 19.07.050.3.

Equation 19.07.050.3:

$Cem_{proj} < Cem_{allowed}$

where

$Cem_{proj} = \Sigma Cem_n \, v_n$ *and* $Cem_{allowed} = \Sigma Cem_{lim} \, v_n$

and

n = the total number of concrete mixtures for the project

Cem_n = the cement content for mixture $_n$, kg/m^3 or lb/yd^3

Cem_{lim} = the maximum cement content for mixture $_n$ per Table 19.07.050, kg/m^3 or lb/yd^3

v_n = the volume of mixture $_n$ concrete to be placed, yd^3 or m^3

Applicant can use yd^3 or m^3 for calculation, but must keep same units throughout

19.07.050.4 Embodied Carbon Method - Mix

Embodied carbon of a concrete mix, based on an approved environmental product declaration (EPD), shall not exceed the value given in Table 19.07.050

19.07.050.5 Embodied Carbon Method - Project

Total embodied carbon (EC_{proj}) of all concrete mix designs within the same project shall not exceed the project limit ($EC_{allowed}$) determined using Table 19.07.050 and Equation 19.07.050.5.

Equation 19.07.050.5:

$EC_{proj} < EC_{allowed}$

where

$EC_{proj} = \Sigma EC_n\ v_n$ *and* $EC_{allowed} = \Sigma EC_{lim}\ v_n$

and

n = the total number of concrete mixtures for the project

EC_n = the embodied carbon potential for mixture n per mixture EPD, kg/m^3

EC_{lim} = the embodied carbon potential limit for mixture n per table 19.07.050, kg/m^3

v_n = the volume of mixture $_n$ concrete to be placed, yd^3 or m^3

Applicant can use yd^3 or m^3 for calculation, but must keep same units throughout

19.07.060 – Verification and Enforcement

As a condition prior to the issuance of every building permit involving placement of concrete, the permit applicant shall be required to submit a completed Low-Carbon Concrete Compliance Form that shall be provided by and reviewed for compliance by the building department prior to issuing the permit.

As a condition of such building permits, and prior to approving construction inspections following placement of concrete, the permit applicant shall be required to submit batch certificates and/or EPDs provided by the concrete provider that demonstrate compliance with the Low-Carbon Concrete Compliance Form on file with the building permit. The batch certificates and/or EPDs shall be reviewed for compliance by the building department prior to approving any further inspections.

When deviations from compliance with this section occur the chief building official is authorized to require evidence of equivalent carbon reductions from the portions of remaining construction of the project to demonstrate alternative compliance with the intent of this chapter.

For projects involving placement of concrete by, or on behalf of, a public works, parks, or similar department the director of such department, or his/her assignee, shall maintain accurate records of the total volume (in cubic yards) of all concrete placed, as well as the total compliant volume (in cubic yards) of all concrete placed, and shall report this data annually to the governing body in a form expressing an annual compliance percentage derived from the quotient of total compliant concrete volume placed divided by total concrete volume placed.

19.07.70 – Exemptions

(1) *Hardship or infeasibility exemption.* If an applicant for a project subject to this chapter believes that circumstances exist that make it a hardship or infeasible to meet the requirements of this chapter, the applicant may request an exemption as set forth below. In applying for an exemption, the burden is on the applicant to show hardship or infeasibility. The applicant shall identify in writing the specific requirements of the standards for compliance that the project is unable to achieve and the circumstances that make it a hardship or infeasible for the project to comply with this chapter. Circumstances that constitute hardship or infeasibility may include, but are not limited to the following:

a. There is a lack of commercially available material necessary to comply with this chapter;
b. The cost of achieving compliance is disproportionate to the overall cost of the project;
c. Compliance with certain requirements would impair the historic integrity of buildings listed on a local, state or federal list or register of historic structures as regulated by the California Historic Building Code (Title 24, Part 8).

(2) *Granting of exemption.* If the chief building official determines that it is a hardship or infeasible for the applicant to fully meet the requirements of this chapter and that granting the requested exemption will not cause the building to fail to comply with the California Building Standards Code, the chief building official shall determine the maximum feasible threshold of compliance reasonably achievable for the project. In making this determination, the chief building official shall consider whether alternate, practical means of achieving the objectives of this chapter can be satisfied. If an exemption is granted, the applicant shall be required to comply with this chapter in all other respects and shall be required to achieve the threshold of compliance determined to be achievable by the chief building official.

(3) *Denial of exception.* If the chief building official determines that it is reasonably possible for the applicant to fully meet the requirements of this chapter, the request shall be denied and the applicant shall be notified of the decision in writing. The project and compliance documentation shall be modified to comply with the standards for compliance.

(4) *Appeal.* Any aggrieved applicant or person may appeal the determination of the chief building official regarding the granting or denial of an exemption or compliance with any other provision of this chapter. An appeal of a determination of the chief building official shall be filed in writing and processed in accordance with the provisions of Section 19.04.028 of this code.

SECTION III: EFFECTIVE DATE

This ordinance is enacted pursuant to and in compliance with Health and Safety Code §17958 §17958.5, §17958.7 and §18941.5 and as expressly permitted in Government Code §50022.2 and is hereby declared to be in full force and effect as of January 1, 2020.

In accordance with Government Code §25124(b)(1)., within fifteen (15) days after adoption the Marin County Board of Supervisors Clerk shall publish a summary of this ordinance, with the names of the Supervisors voting for and against the same in the Marin Independent Journal, a newspaper of general circulation published in the County of Marin. A certified copy of the full text

of this Ordinance along with the names of those Board of Supervisors members voting for and against the ordinance shall also be posted in the office of the Marin County Board of Supervisors.

Prior to the effective date, a copy of this Ordinance shall be filed with the California Building Standards Commission complete with local findings for each local amendment to the California Building Standards Code.

SECTION IV: VALIDITY

If any section, subsection, sentence, clause or phrase of the provisions depicted in this Ordinance is for any reason held to be invalid, such decision shall not affect the validity of the remaining provisions adopted under this Ordinance. The Board of Supervisors of Marin County hereby declares that it would have adopted the Ordinance and each section, subsection, sentence, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases thereof shall be declared invalid.

SECTION V: CALIFORNIA ENVIRONMENTAL QUALITY ACT

The Board of Supervisors of Marin County finds that adoption of this ordinance is exempt from the California Environmental Quality Act ("CEQA") under California Code of Regulations, Title 14, §15061(b)(3).

SECTION VI: VOTE

Notice of this Ordinance was published pursuant to Government Code §50022.3, §6066 and §25124(b)(1), and a certified copy of the full text of this Ordinance was posted in the office of the Clerk of the Marin County Board of Supervisors at least five (5) days prior to the Board of Supervisors meeting at which it was adopted.

PASSED AND ADOPTED at a regular meeting of the Board of Supervisors of the County of Marin held on this 19th day of November by the following vote:

AYES:

NOES:

ABSENT:

_____

PRESIDENT, BOARD OF SUPERVISORS

ATTEST:

_____

CLERK