

# Off Topic Reminder!

- **Please complete and submit the FY 2024 Water Management Plan Template!**
  - Due 02/29/2024
  - We will reach out to all state agencies that miss this deadline
- **Submit templates to [bailey.vigil@state.co.us](mailto:bailey.vigil@state.co.us)**
  - I will review and organize all Water Management Plan Templates
  - If we have any questions regarding your submission, we will reach out



# Buy Clean Colorado Act Agency/IHE Training #2

Office of the State Architect  
Energy & Environment Program

State Agency/IHE Delegate Training – Spring 2024

Presented by: Bailey Vigil, Buildings GHG Emissions Analyst



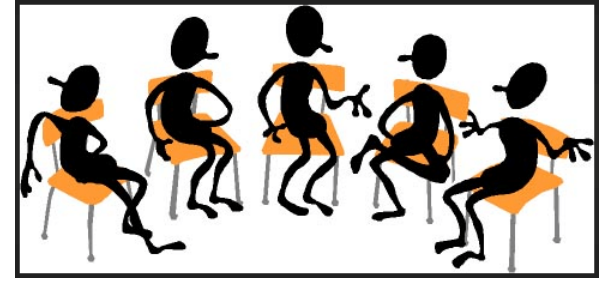
**COLORADO**

**Division of State Property**

Department of Personnel & Administration

# Introductions

Tana Lane – State Architect



Ellie Maji – Administrative Assistant

Rod Vanderwall – Manager of Energy & Environment Program

Bailey Vigil – Buildings GHG Emissions Analyst

Hydie Alcantara – Building Materials Tax Analyst



# Meeting Agenda

**Communication  
+ Program  
Updates**

**Important  
Definitions**

**Global  
Warming  
Potential  
(GWP) Limits**

**Environmental  
Product  
Declaration  
(EPD) Process**

**Waiver Process**

**Questions**



# Communications

Due to the statutory authority of HB21-1303 and the emergence and development of this requirement, OSA will be working with and educating the OSA delegate via communications on the implementation of BCCO through the design and construction of projects.

It is the delegate's responsibility to work with OSA to ensure compliance with this requirement through all phases of a construction project. This is to ensure that all waivers and modifications processed by OSA or the delegate are handled within the same criteria.



# Program Overview

The Buy Clean Colorado (BCCO) Act ([C.R.S. 24-92-117](#)) applies to State [public projects](#) for which the project cost **exceeds five hundred thousand dollars** (\$500,000) and for which an agency of government issues a **design solicitation** on or after **January 1, 2024**

<https://osa.colorado.gov/energy-environment/buy-clean-colorado-act>

Website contains: BCCO Act Policy, OSA's GWP Limits, BCCO Act Forms, Educational & Training Materials, Important Definitions, and Tools & Resources



# Notable Policy Updates

- Principal Representatives have the option to specify the eligible materials that will be used in the project and establish reasonable minimum usage thresholds below which the BCCO Act requirements shall not apply
  - \$25K - \$50K range
  - Considers previous agency purchasing
- Permission to utilize Linear Interpolation for ReadyMix Concrete strengths with unspecified GWP limits (ex. 3300 psi)
- Exhibits (OSA Forms)



# Important Definitions

“**Eligible materials**” means materials used in the construction of a public project, including:

- Asphalt and asphalt mixtures
- Cement and concrete mixtures
- Glass
- Post-tension steel
- Reinforcing steel
- Structural steel
- Wood structural elements





# Important Definitions

“**Eligible project**” means a public project defined as any construction, alteration, repair, demolition or improvement of any land, building, structure, facility, or other public improvement for which appropriation or expenditure of moneys is over \$500,000 and for which an agency of government issues a solicitation on or after January 1, 2024. Public project defined in C.R.S. 24-92-102.

“Embodied Carbon” is reported as global warming potential (GWP) and includes greenhouse gas emissions arising from the production, construction, use, and end-of-life of products or systems used in the construction of buildings, roads, and other infrastructure.



# Important Definitions

“**Consultant**” has the same meaning as defined in C.R.S. 24-32-1402 (6), meaning any professional services provided by architects, industrial hygienists, engineers, landscape architects, and land surveyors.

“Life Cycle Assessment” or “LCA” is an independently verified study of a product or building. Product-level LCAs must be done in accordance with ISO 14040 and ISO 14044 for incorporation in a product’s environmental product declaration.

“Product category rule” or “PCR” means a set of guidelines that determine what data should be gathered and how it will be evaluated when conducting the LCA of a product.



# Important Definitions

“**Global warming potential**” or “**GWP**” is a metric describing the potential climate change impact of a product or process as measured by an LCA, reported in an Environmental Product Declaration (EPD).

“Stages A1-A3” refers to the life cycle stages which define an EPD from cradle-to-gate and considers emissions from the raw materials extraction and processing (A1), transport to the manufacturer (A2), and manufacturing of building materials (A3).

“Stage A4” refers to the life cycle stage involving material transport to the building site.



# Important Definitions

“Industry-Wide Environmental Product Declaration” or “IW-EPD” means an EPD that meets the representativeness criteria and is released by multiple manufacturers to publish the production-weighted average footprint of the entire industry.

“**Environmental Product Declaration**” or “**EPD**” or “**Type III EPD**” means a third-party verified document that summarizes the life cycle assessment (LCA) of a single product and publicly discloses its environmental impacts. EPDs enable comparisons between products serving the same function. For an EPD to be deemed approved:

- A. The EPD must be a current product-specific, Type III EPD.
- B. The EPD must reference all ISO Standards - ISO 14025:2006, ISO 14040:2006, ISO 14044:2006, and ISO 21930:2017.
- C. The EPD must align with the applicable product category rule requirements.



# Global Warming Potential (GWP) Limits



# Global Warming Potential (GWP) Limits

OSA maximum acceptable GWP limits went into effect on 01/01/2024

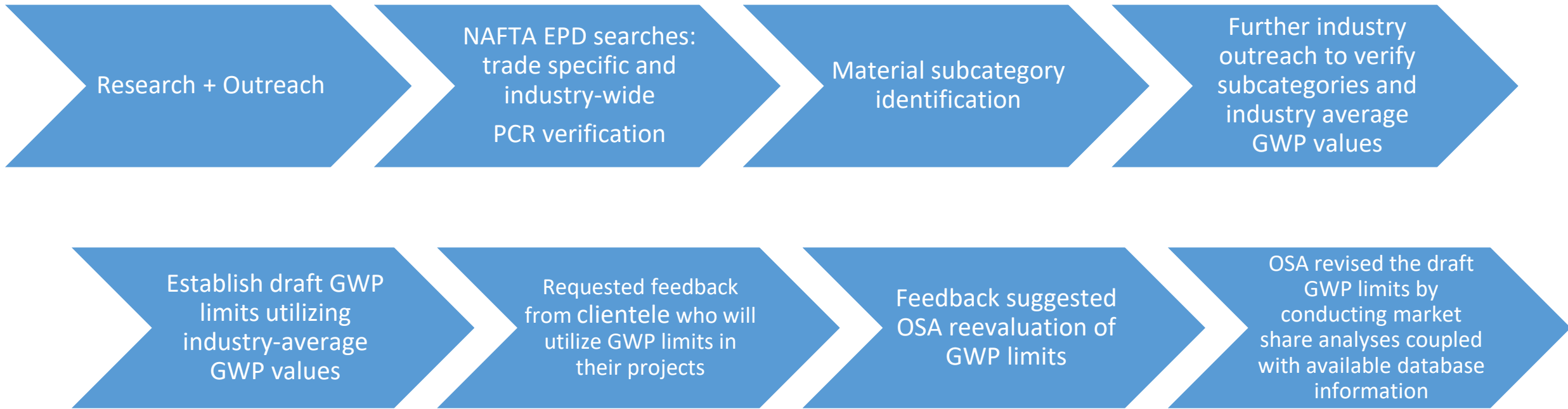
- Utilize the GWP limits available at the point of **design solicitation**
  - See [EE-5.1](#) for OSA's GWP limits

Statute Update Protocol: First review + update due by January 1, 2026

- True Frequency: OSA may choose to review the GWP limits on an annual basis
  - In this case, the review process is to occur during the months of January – February with all changes complete by February 28<sup>th</sup> of the applicable year



# OSA Approach to Setting GWP Limits



Material <sup>1</sup>	2024 OSA Updated Limits <sup>2</sup>
<b>Asphalt and Asphalt Mixtures <sup>3</sup></b>	<b>1. Asphalt Mixtures</b> (1 metric ton): 85 kg CO2 eq.
<b>Cement &amp; Concrete Mixtures <sup>4</sup></b>	<b>1. ReadyMix Concrete</b> (in kgCO2e/m3 or kilograms of carbon dioxide equivalent per cubic meter) at 28 days:
	a. 2500 psi: 232
	b. 3000 psi: 255
	c. 4000 psi: 301
	d. 5000 psi: 358
	e. 6000 psi: 379
	f. 8000 psi: 440
	g. Lightweight (LW) 3000 psi: 484
	h. LW 4000 psi: 532
	j. LW 5000 psi: 580
	<b>2. Cement</b> (in kgCO2e/t or kilograms of carbon dioxide equivalent per metric ton): 1,112
<b>Glass <sup>5</sup></b>	<b>1. Flat Glass</b> (1 metric ton): 1510 kg CO2 eq.
<b>Post-Tension Steel <sup>6</sup></b>	No sufficient data to set a valid threshold at this time
<b>Reinforced Steel <sup>7</sup></b>	<b>1. Fabricated Steel Reinforcing Bar "Rebar"</b> (1 metric ton): 1030 kg CO2 eq.
<b>Structural Steel <sup>8</sup></b>	<b>1. Fabricated Hot-rolled steel</b> (1 metric ton): 1220 kg CO2 eq.
	<b>2. Fabricated Plate steel</b> (1 metric ton): 1730 kg CO2 eq.
	<b>3. Fabricated Hollow Structural Sections</b> (1 metric ton): 1990 kg CO2 eq.
<b>Wood Structural Elements <sup>9</sup></b>	<b>1. Wood Framing/ Softwood Lumber</b> (1 m3): 63.12 kg CO2 eq
	<b>2. Plywood</b> (1 m3): 219.32 kg CO2 eq
	<b>3. OSB Sheathing</b> (1 m3): 242.58 kg CO2 eq
	<b>4a. Laminated Strand Lumber</b> (1 m3): 274.90 kg CO2 eq
	<b>4b. Laminated Veneer Lumber</b> (1 m3): 361.45 kg CO2 eq
	<b>5. Glued Laminated Timber</b> (1 m3): 137.19 kg CO2 eq



# GWP Limits – Material Considerations

## Asphalt and Asphalt Mixtures

- GWP Limit contains level of uncertainty

## Glass

- Limited EPDs available, may qualify for a waiver

## Post-tension steel

- No GWP limit established yet, no EPDs are required for this category at this time

## Cement vs Concrete

- Only consider the cement GWP if you purchase cement (not concrete)
- If purchasing a concrete mixture, refer to the ReadyMix GWP limit per desired strength



# GWP Limits – Concrete + Linear Interpolation

For concrete strengths between the stated values, use linear interpolation to determine embodied carbon limits, rounded to the nearest whole number.

$$y = y_1 + (x - x_1) \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

*y = linear interpolation value = Interpolated GWP value*

*x = independent variable = Desired Strength*

*x<sub>1</sub>, y<sub>1</sub> = values of the function at one point = Values of lower strength and GWP*

*x<sub>2</sub>, y<sub>2</sub> = values of the function at another point = Values of higher strength and GWP*

Example: For a 3300psi ReadyMix Concrete mix:

$$\frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(301 - 255)}{(4000 - 3000)} = 0.046 \rightarrow (0.046 * (3300 - 3000)) + 255 = 268.8$$

→ 269 is the Maximum GWP/m<sup>3</sup> for a 3300psi mix.



# Environmental Product Declaration (EPD) Process



# EPD Submittal Process - Overview

- Agency Delegate
  - Pass along forms, sign off on the consultant and contractors entries, submit form EE-5.2/EPDs to OSA
- Design Consultant
  - Specifies eligible materials with EPDs prior to bid
  - Completes and submits EE-5.2 to Agency Delegate
- Contractor
  - Consider EPDs needed during bid
  - Procure and obtain products with compliant EPDs
  - Report Transportation Emissions for Products Sourced 100+ miles from site
  - Submit EE-5.2 and EPD zip folder to Agency Delegate
- *Demonstration of submittal sheets: [EE-5.2](#)*



# Demo of EPD Submittal Sheets: EE-5.2

Design Submittal #:	
General Contractor:	
Consultant:	
Agency/Institution:	
Project #/Title:	
Date:	

This form shall be used by consultants, contractors, and agency delegates to submit eligible material information and Environmental Product Declaration (EPD) information for compliance with the Buy Clean Colorado (BCCO) Act requirements (C.R.S. 24-92-117). Products must demonstrate compliance with the Office of the State Architect's (OSA's) global warming potential (GWP) limits by demonstrating that the GWP included in each EPD is less than or equal to the OSA's GWP limit for that product category. For all public projects beginning solicitation on or after January 1, 2024, a current product-specific Type III EPD must be submitted for each eligible material purchased and installed on the project. For assemblies containing eligible material components, if the embodied carbon of each eligible material in the assembly is less than the embodied carbon limits established by OSA, then it can be reasonably assumed that the embodied carbon of the assembly is compliant with the BCCO Act.

Consultants should fill out Column G on the 'Instructions' sheet to indicate which materials apply to the project. Consultants shall fill out the 'EPD Design Submittal' sheet and certify that they have met the minimum requirements by signing the 'EPD Design Submittal' and 'Final Sign-Off' tables. Contractors shall review the information provided by the consultant and shall complete the 'EPD Construction Submittal' sheet for each eligible material procured for the project. Contractors shall also complete the 'Transportation (A4)' table for all eligible materials procured over 100 miles from the project site. Contractors shall maintain and organize all project EPDs to be submitted in a zip folder as part of the closeout documentation. Eligible product-specific EPDs must reference the associated Product Category Rule (PCR), indicate third-party verification (Type III), and reference all ISO Standards (ISO 14025:2006, ISO 14040:2006, and ISO 14044:2006).

After completing all necessary sections, contractors shall certify that they have met the minimum requirements by signing the 'EPD Construction Submittal' and 'Final Sign-Off' tables. Agency and Institution of Higher Education (IHE) Delegates shall review the tables for accuracy and completion. After all entries are reviewed and complete, the Agency/IHE delegate shall certify that they have met the minimum requirements by signing the 'EPD Design Submittal', 'EPD Construction Submittal', and 'Final Sign-Off' tables before submitting this spreadsheet and the EPD zip folder to the OSA as part of the Project Close Out Code Compliance Documentation Exhibit L-1 (SBP-L-1).

If additional rows are needed to complete this request, please drag down pre-existing formulas and lists with row additions.

Material	2023 OSA Updated Limits	Indicate whether each material is applicable to the project
Asphalt and Asphalt Mixtures	1. Asphalt Mixtures (1 metric ton): 85 kg CO2 eq.	
Cement & Concrete Mixtures	1. ReadyMix Concrete (in kgCO2e/m3 or kilograms of carbon dioxide equivalent per cubic meter)	
	a. 0-2500 psi: 232	
	b. 2501-3000 psi: 255	
	c. 3001-4000 psi: 301	
	d. 4001-5000 psi: 358	
	e. 5001-6000 psi: 379	
	f. 6001-8000 psi: 440	
	g. Lightweight 0-3000 psi: 484	
	h. LW 3001-4000 psi: 532	
	j. LW 4001-5000 psi: 580	
	2. Cement (in kgCO2e/t or kilograms of carbon dioxide equivalent per metric ton): 1,112	
Glass	1. Flat Glass (1 metric ton): 1510 kg CO2 eq.	
Post-Tension Steel	No sufficient data to set a valid threshold at this time	
Reinforced Steel	1. Fabricated Steel Reinforcing Bar "Rebar" (per 1 metric ton): 1030 kg CO2 eq.	
Structural Steel	1. Fabricated Hot-rolled steel (per 1 metric ton): 1220 kg CO2 eq.	
	2. Fabricated Plate steel (per 1 metric ton): 1730 kg CO2 eq.	
	3. Fabricated Hollow Structural Sections (per 1 metric ton): 1990 kg CO2 eq.	
Wood Structural Elements	1. Wood Framing/ Softwood Lumber (1 m3): 63.12 kg CO2 eq	
	2. Plywood (1 m3): 219.32 kg CO2 eq	
	3. OSB Sheathing (1 m3): 242.58 kg CO2 eq	
	4a. Laminated Strand Lumber (1 m3): 274.90 kg CO2 eq	
	4b. Laminated Veneer Lumber (1 m3): 361.45 kg CO2 eq	
	5. Glued Laminated Timber (1 m3): 137.19 kg CO2 eq	
<a href="#">The OSA's GWP Limits can be found here: OSA Max. GWP Thresholds_2023-06.pdf</a>		





Design Submittal #:	
General Contractor:	
Agency/Institution:	
Project #/Title:	
Date:	
Calculated A4 CO2 Footprint:	0.00 tonnes CO2e

**Transportation Emissions Calculator (A4)**  
 "Stage A4" refers to the life cycle stage involving material transport to the building site.

**a. Ready-Mix Concrete**

	EPD Material	Yardage	Number of Trucks Required	Batch Plant Origin (n0)	Destination (n1)	Distance (n0-n1) (miles)	kg CO2e	Total (tonnes CO2e)
Ex.	e.g. Concrete Mix #0	2500	299	Omaha, NE	Springfield, NE	5	10,739	10.7
1								-
2								-
3								-
4								-
5								-
6								-
7								-
8								-
9								-
10								-
11								-
12								-
13								-
14								-
15								-
16								-
17								-
18								-
19								-
20								-

Transportation (A4) reporting required for eligible materials sourced 100+ miles from the project site

**b. All Other Materials**

	EPD Material	Tonnage	Manufacturer Origin (n0)	Trip 1			kg CO2e	Trip 2			kg CO2e	Total (kg CO2e)	Total (tonnes CO2e)
				Delivery Method	Location (n1)	Distance (n0-n1) (miles)		Delivery Method	Location (n2)	Distance (n1-n2) (miles)			
Ex.	e.g. WB-1	5	Shezhen, China	Shipped	Oakland, CA	6,902	1,552	Railed	Milwaukee, WI	2,168			
1							0						
2							0						
3							0						
4													
							kg CO2e	Delivery Method	Location (n3)	Distance (n2-n3) (miles)	kg CO2e	Total (kg CO2e)	Total (tonnes CO2e)
5							230	Trucked	Columbus, OH	453	388	2,170	2.17
6							0				0	-	-
7							0				0	-	-
8							0				0	-	-
9							0				0	-	-
10							0				0	-	-
11							0				0	-	-
12							0				0	-	-
13							0				0	-	-
14							0				0	-	-
15							0				0	-	-
16							0				0	-	-
17							0				0	-	-
18							0				0	-	-
19							0				0	-	-
20							0				0	-	-
21							0				0	-	-
22							0				0	-	-



# Demonstration of EPD Submittal Sheets

## Final Sign-Off

Design Submittal #:	
Agency/Institution:	
Project #/Title:	
Date:	

Please provide signatures from the Consultant and the General Contractor who filled out this form. After receiving the necessary signatures, the State Agency or Institution of Higher Education (IHE) delegate shall certify that all entries are complete and accurate before signing and submitting this spreadsheet with the EPD zip folder to the Office of the State Architect during the L-1 Code Compliance Phase.

Signatory Party	Signature	Date
Consultant:		
General Contractor:		
DPA Authorized Delegate:		



# EPD Process (Who does what)

- Agency Delegate
  - Pass information to proper channels (consultants, contractors, OSA)
  - Review and sign-off to verify entries (EE-5.2)
- Design Consultant
  - Complete Submittal Form w Specifications (EE-5.2)
  - Sign-off (EE-5.2)
- General Contractor
  - Collect and Organize EPDs for procured eligible materials
  - Submittal Form (EE-5.2)
  - A4 Reporting (EE-5.2)
  - Sign-Off (EE-5.2)



# Waiver Process



# Waiver Forms

## OSA Waiver Forms:

- Design-Phase Waiver and Construction-Phase Waiver (EE-5.30)
- EPD Exemption Justifications (EE-5.31)
- Waiver Management Form (EE-5.32)

Please verify with the design consultant that material alternatives are unavailable prior to requesting a waiver. If an alternative material is utilized, submit the alternative product EPD to the OSA in place of the specified EPD



# Waiver Exemption Justifications (EE-5.31)

1. Technically Infeasible / Code Compliance
2. Significant Increase in Project Cost
3. Significant Time Delay
4. One Source for Material (Sole Source)
5. Reused / Recycled Materials
6. Emergency
7. No Eligible Materials Utilized in Project



# Demonstration of Waiver Forms (EE-5.30)

## REQUEST FOR ELIGIBLE MATERIAL WAIVER FOR COMPLIANCE WITH THE BUY CLEAN COLORADO ACT REQUIREMENTS

*Please verify with the design consultant that material alternatives are unavailable prior to requesting a waiver. If an alternative material is utilized, submit the alternative product Environmental Product Declaration (EPD) to the Office of the State Architect (OSA) in place of the specified EPD. If an EPD is not available for an eligible material, the contractor shall notify the project principal representative and install an alternative eligible material with an EPD. If a waiver is necessary, principal representative approval is required before the waiver can be escalated to the OSA.*

**Agency/Institution Name:**

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**Delegate Name:**

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**Contractor/Designer:**

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**Waiver Request #** (Total number of waivers the project has requested, per EE-5.32):

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**Project #/Title:**

---

**Waived Product/Material Name:**

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**Waiver Type:** (Select one)

- Design-Phase Waiver
- Construction-Phase Waiver



# Demonstration of Waiver Forms (EE-5.30)

**Waiver Reason:** *(Select one) See EE-5.31 for waiver exemptions and examples.*

- Technically Infeasible / Code Compliance
- Significant Increase in Project Cost
- Significant Time Delay
- One Source for Material (Sole Source)
- Reused / Recycled Materials
- Emergency
- No Eligible Materials Utilized in Project

**Justification:**

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**Can an alternative product with an EPD be installed in place of the waived product?**

Yes /  No

**Please attach additional documentation/evidence needed (if any) to support the waiver request.**

*Contractors shall submit waivers to the Principal Representative for review and approval; Principal Representatives shall submit all waivers to the OSA for final approval.*

**Delegate Signature:**

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**Date:**

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**THIS FORM MUST BE SUBMITTED TO THE OSA DELEGATE PRIOR TO OCCUPANCY.**



# Demonstration of Waiver Forms (EE-5.32)

Design Submittal #:	
Consultant:	
General Contractor:	
Agency/Institution:	
Project #/Title:	
Date:	

**Buy Clean Colorado (BCCO) Act: Waiver Management Form for State Agency and Institution of Higher Education (IHE) Delegates**

For each project, utilize this form to manage waivers requested and approved by the Office of the State Architect (OSA) as per the Buy Clean Colorado (BCCO) Act requirements. Only enter the "OSA Approval Date" after receiving approval from the OSA for each waiver request.

Waiver Request #	Date Requested	Eligible Material Category	Product Name	Waiver Justification	OSA Approval Date
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					





# Waiver Process (Summary)

**Waiver Process must involve the main point of contact = OSA Delegate = DPA authorized delegate = SBP delegate**

## **During Design**

- Consultants may request delegate complete and submit a design-phase waiver (EE-5.30)
- Design-phase waivers must receive OSA approval

## **During Construction**

- Contractor shall notify the design consultant and OSA delegate that a waiver is needed
- Install an alternative eligible material with an EPD

## **During Closeout**

- Submit all waivers (EE-5.30) and the waiver management form (EE-5.32) to OSA with EPD submission (EE-5.2) and EPD zip folder





# Questions

