Oldcastle Infrastructure
A CRH COMPANY

EPD
ENVIRONMENTAL PRODUCT DECLARATION

PRECAST CONCRETE PRODUCED BY: OLDCASTLE INFRASTRUCTURE

FACILITY:	Ogden
STRENGTH:	6000 psi @ 28 days
PRODUCT:	Concrete Box Culvert

IMPACTS PER 1 METRIC TONNE		A1-A3 TOTAL
Global Warming Potential	kg CO_2e	198.14
Ozone Depletion	kg CFC11e	3.90E-06
Acidification	kg SO_2e	0.64
Eutrophication	kg Ne	0.24
SFP (Smog)	kg O_3e	10.64
Non-renew. energy	MJ, NCV	1635.08

GENERAL INFORMATION		
Declared Product	1 metric tonne of Precast Concrete produced by Olcastle Infrastructure	
Date of Issue	September 11, 2025	
Period of Validity	5 years; April 28, 2030	
EPD Holder	Oldcastle Infrastructure 801 W. 12th Street Ogden, UT 84404	Oldcastle Infrastructure A CRH COMPANY
Program Operator	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428	ASTM INTERNATIONAL Helping our world work better
LCA and EPD Developer	WAP Sustainability Consulting 1701 Market Street Chattanooga, TN 37408 www.wapsustainability.com	WAP SUSTAINABILITY CONSULTING
Core PCR	ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products	
Sub-category PCR	NSF International Product Category Rules for Precast Concrete, V3.0, May 2021 Reviewed by: Dr. Thomas Gloria, Industrial Ecology Consultants; Mr. Bill Stough, Bill Stough, LLC; and Dr. Michael Overcash, Environmental Clarity	
Independent LCA Reviewer and EPD Verifier	Independent verification of the declaration and data, according to ISO 14025 and the reference PCR	
	☐ Internal ☒ External Thomas P. Gloria, PhD	Industrial Ecology Consultants
For Additional Explanatory Material	Manufacture Representative: Trevor Nye (trevor.nye@oldcastle.com) Software Tool: Theta by WAP Sustainability V1.0	

The declared product meets the following product specifications:

- ACI 211: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- ACI 318: Building Code Requirements for Structural Concrete.
- CSA A23.4 Precast Concrete – Materials and Construction
- CSA A23.1/A23.2: Concrete Materials and Methods of Concrete Construction
- CSI Masterformat Division 03-30-00: Cast-in-Place Concrete.

Disclaimer:
Environmental declarations from different programs (ISO 14025) may not be comparable. EPDs are comparable only if they use the same PCR (or sub-category PCR where applicable), include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works. This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. However, variations and deviations are possible.

METHODOLOGICAL FRAMEWORK

DECLARED UNIT

○ The declared unit is 1 metric tonne of precast concrete.

PRODUCT DEFINITION AND APPLICATION

○ Precast concrete (UN CPC 3755) is a construction product produced by casting concrete in a reusable mold or "form" which is then cured in a controlled environment, transported to the construction site, and lifted into place. In contrast, standard concrete is placed into site-specific forms and cured on site. Precast concrete is primarily composed of (in order of greatest mass per mix): natural and crushed aggregates, portland cement, slag cement, reinforcement materials, batch water, and admixtures.
○ Precast concrete products are engineered products satisfying a wide array of building and civil engineering applications.

SYSTEM BOUNDARY

A summary of life cycle stages included in the EPD is identified in the figure below. This EPD covers A1-A3 life cycle stages (Cradle-to-Gate). A summary of activities excluded from the EPD is as follows:

○ Production, manufacture, and construction of manufacturing capital goods and infrastructure.
○ Production and manufacture of production equipment, delivery vehicles, and laboratory equipment.
○ Personnel-related activities (travel, furniture, and office supplies)
○ Energy and water use related to company management and sales activities.

BUILDING LIFE CYCLE INFORMATION MODULES (X: Included in LCA; MND: Module Not Declared)

Production State			Construction Stage		Use Stage							End-Of-Life Stage			
Extraction Production	Transport to Facility	Manufacturing	Transport to Site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/ Demolition	Transport to Disposal	Waste Processing	Disposal of Waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

CUT-OFF RULES

Cut-off rules, as specified in NSF PCR for precast concrete: 2021, Section 7.1.8 were applied. All input/output flow data reported by the participating member facilities were included in the LCI modeling. None of the reported flow data were excluded based on the cut-off criteria. No substances with hazardous and toxic properties that pose a concern for human health and/or the environment were identified in the framework of this EPD.

ALLOCATION

Allocation procedures observed the requirements and guidance of ISO 14044:2006, clause 4.3 and those specified in NSF PCR for precast concrete, section 7.1. Specifically, the allocation criteria were applied as follows:

- Allocation related to transport is based on the mass and distance of transported inputs;
- The NSF sub-category PCR recognizes fly ash, silica fume and granulated bast furnace slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a precast concrete material input. That is, any allocations before reprocessing are allocated to the original product;
- The environmental flows related to the disposal of the manufacturing (pre-consumer) solid and liquid waste are allocated to module A3 Manufacturing.

CALCULATED RESULTS PER 1 METRIC TONNE

CORE MANDATORY IMPACT INDICATOR	UNIT	Module A1	Module A2	Module A3	Total A1-A3
Global warming potential	kg CO2e	156.29	10.38	31.47	198.14
Depletion potential of the stratospheric ozone layer	kg CFC11e	3.05E-06	4.38E-10	8.49E-07	3.90E-06
Acidification potential of soil and water sources	kg SO2e	0.32	0.12	0.20	0.64
Eutrophication potential	kg Ne	0.15	7.25E-03	0.08	0.24
Formation potential of tropospheric ozone	kg 03e	6.29	3.07	1.28	10.64
Abiotic depletion potential for fossil resources	MJ, NCV	123.25	148.94	452.33	724.51
Abiotic depletion potential for non-fossil mineral resources	kg Sbe	5.68E-05	0.00	1.27E-05	6.94E-05
Fossil fuel depletion	MJ Surplus	3.58	22.01	63.27	88.86
USE OF PRIMARY RESOURCES					
Renewable primary energy carrier used as energy	MJ, NCV	44.35	0.00	32.45	76.80
Renewable primary energy carrier used as material	MJ, NCV	0.00	0.00	0.00	0.00
Non-renewable primary energy carrier used as energy	MJ, NCV	955.93	157.87	521.28	1635.08
Non-renewable primary energy carrier used as material	MJ, NCV	0.00	0.00	0.00	0.00
USE OF SECONDARY RESOURCES					
Secondary material	kg	0.00	0.00	0.00	0.00
Renewable secondary fuel	MJ, NCV	0.00	0.00	0.00	0.00
Non-renewable secondary fuel	MJ, NCV	71.25	0.00	0.00	71.25
Recovered energy	MJ, NCV	0.00	0.00	0.00	0.00
MANDATORY INVENTORY PARAMETERS					
Consumption of freshwater resources	m3	0.99	0.00	0.24	1.23
Calcination and carbonation emissions	kg CO2e	65.39	0.00	0.00	65.39
WASTE AND OUTPUT FLOWS					
Hazardous waste disposed	kg	0.05	0.00	0.00	0.05
Non-hazardous waste disposed	kg	42.34	0.00	1.15	43.49
High-level radioactive waste, conditioned	m3	2.60E-04	0.00	1.27E-08	2.60E-04
Intermediate- and low-level radioactive waste	m3	4.76E-04	0.00	1.19E-07	4.77E-04
Components for re-use	kg	0.00	0.00	0.00	0.00
Materials for recycling	kg	0.00	0.00	0.00	0.00
Materials for energy recovery	kg	0.00	0.00	0.00	0.00
Recovered energy exported from the product system	MJ, NCV	0.00	0.00	0.00	0.00

** Some LCA impact categories and inventory items are still under development and can have high levels of uncertainty. To promote uniform guidance on the data collection, calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.*

DATA SOURCES

This EPD is based on foreground LCI data collected from the participating company's production facilities for the calendar year 2023. All upstream material, resource and energy carrier inputs have been sourced from various industry-average datasets and literature. Many of these data sets are defaulted to those specified for use in the NSF PCR 2021. The following Table describes each LCI data source and includes the data quality assessment.

MATERIALS	LCI DATA SOURCE	YEAR	GEOGRAPHY	DATA QUALITY ASSESSMENT
Portland Cement and Limestone Cement, ASTM C595, AASHTO M240, or CSA A3001	Portland Cement Association EPD of Portland Cement and Portland Limestone Cement (2021)	2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Slag Cement, ASTM C989	Slag Cement Association EPD of North America Slag Cement (2021)	2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Fly Ash, ASTM C618	None, no incoming burden, only inbound transport is considered	N/A	N/A	N/A
Rebar, Welded Wire, Steel Stressing Strand*	Concrete Reinforcing Steel Institute EPD for Steel Reinforcement Bar (2020) – *Adjusted by factor 1.10 for Steel Stressing Strand	2022	North America	Technology: very good, Time: very good, Geography: good, Completeness: very good, Reliability: very good
Crushed Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, crushed {RoW}| production | Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor Geography: good, Completeness: very good, Reliability: very good
Natural Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, round {RoW}| gravel and sand quarry operation | Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Manufactured Lightweight Aggregates, ASTM C330	ecoinvent 3.4: Expanded clay {RoW}| production | Cut-off, U (2018), modified with US average electricity	2000	World/US	Technology: good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Admixtures, ASTM C494	EFCA EPDs for Air Entrainers,Plasticisers and superplasticisers,Hardening Accelerators, Set Accelerators,Water Resisting Admixtures, and Retarders (2015)	2015	North America	Technology: very good, Time: very good, Geography: fair, Completeness: very good, Reliability: very good
Batch and Wash Water, ASTM C1602	ecoinvent 3.4: Tap water {RoW}| market for | Cut-off, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: fair, Completeness: very good, Reliability: very good
Road Transport	USLCI 2014: Transport, combination truck, short-haul, diesel powered/tkm/RNA (2014)	2010	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Rail Transport	USLCI 2014: Transport, train, diesel powered /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: good, Reliability: very good
Ocean Transport	USLCI 2014: Transport, ocean freighter, average fuel mix/US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Electricity	ecoinvent 3.4: Electricity, low voltage {XX}| market for | Cut-off, U (2018)	2015	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Diesel	USLCI 2014: Diesel, combusted in industrial boiler / US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Gasoline	USLCI 2014: Gasoline, combusted in equipment/ US "U" (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Liquefied Propane Gas	USLCI 2014: Liquefied petroleum gas, combusted in industrial boiler /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Hazardous Solid Waste	ecoinvent 3.4: Hazardous waste, for incineration {RoW}| treatment of hazardous waste,hazardous waste incineration | Alloc, Rec, U 2018), modified with US electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Non-Hazardous Solid Waste	ecoinvent 3.4: Inert waste {RoW}| treatment of, sanitary landfill | Alloc Rec, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Expanded Polystyrene Foam	Polystyrene, expanded, EPS, virgin resin; batch suspension polymerization; industry average, at plant (USLCI)	2015	North America	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Steel Plate	Institute – Life Cycle Inventories of North American Steel Products (2020) – wire and plate	2017	US	Technology: very good, Time: very good, Geography: good, Completeness: very good, Reliability: very good

**This sub-category PCR recognizes fly ash, silica fume, and granulated blast furnace slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a precast concrete material input*

REFERENCES

American Concrete Institute (2009) ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

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European Federation of Concrete Admixture Associations (2015). EFCA Environmental Declarations for Admixtures.

International Organization for Standardization (2017) ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

National Renewable Energy Laboratory (2019) U.S. Life Cycle Inventory Database http://www.nrel.gov/lci/

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American Concrete Institute (2009) ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete

ASTM International (2018) ASTM C94: Standard Specification for Ready-Mixed Concrete.

Construction Specifications Institute (CSI) MasterFormat Division 03-30-00 Cast-in- Place Concrete

CSA Group (2014) CSA A23.1-09/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.

EN 15804:2012 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

ISO 14044:2006/AMD 1:2017/ AMD 2:2020 Environmental Management – Life cycle assessment – Requirements and guidelines

ISO 14040:2006 Environmental Management - Life cycle assessment - Principles and framework

ISO 21930:2017 Sustainability in Building Construction — Environmental Declaration of Building Products