CENTRAL CONCRETE SUPPLY COMPANY | A U.S. Concrete Company

The Future is Now

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Environmentally Sustainable Concrete

Higher Performing Low Carbon Mixes

Supplementary Cementitious Materials (SCM's)
Fly Ash, Slag, Natural Pozzolans

High Volume Fly Ash (HVFA)

Ternary Blends: 50% replacement, 28 day strength;
70% replacement, later age strengths

Higher Performing Low Carbon Mixes

Example Case Study:
Approximately 80,000 cubic yards of lower carbon concrete were supplied for the auger piles and the overall Stadium structure. The mixes selected reduced the overall footprint by 23 million pounds of CO_2.

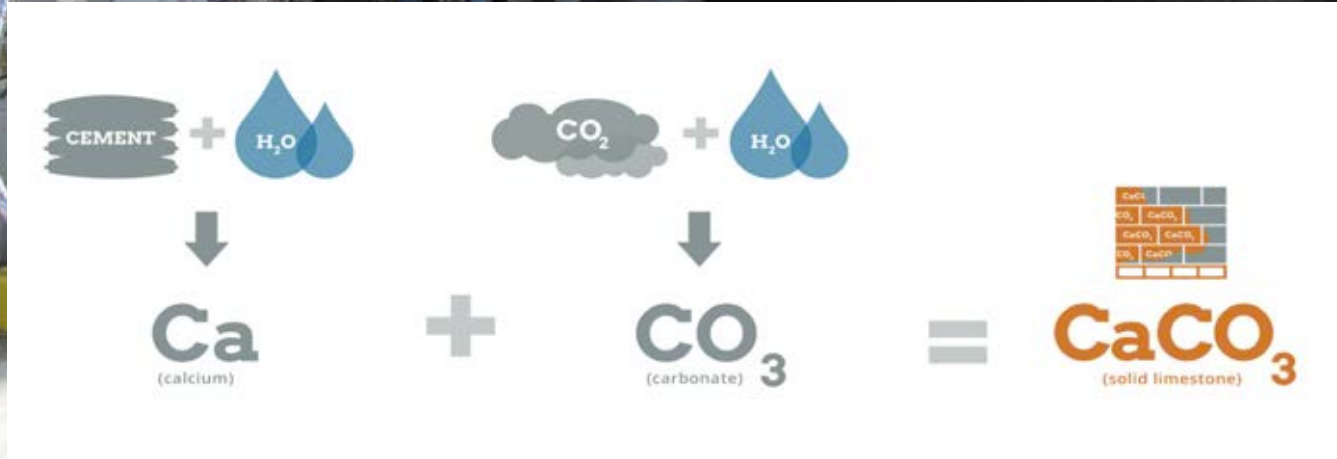
Higher Performing Low Carbon Mixes

Higher Performing Concrete

Lower Carbon Footprint

- Used for nearly all applications on a daily basis
- Increase strength
- Reduce Global Warming Potential (GWP)

Carbon Sequestration Example: CarbonCure



Recycled waste carbon dioxide makes a greener, stronger concrete.

Carbon Sequestration Example: Blue Planet

Blue Planet has developed a process to coat aggregate with calcium carbonate from CO_2

Field trial at SFO:
Batched and delivered concrete containing lightweight aggregate coated by Blue Planet.

Provides carbon footprint reduction of the concrete mix.

Recycled Concrete Aggregate

DID YOU KNOW?

San Francisco has an ordinance that requires maximum reuse and recycling of material and debris generated during construction and demolition projects.

Solution: Crushed concrete used as aggregate in concrete >> No landfill, less draw on raw materials, less energy

Returned Fresh Concrete

Reduced Waste. Improved Productivity. Proven Performance.

Reusing Fresh Concrete:
A Win-Win For Everyone

Reduced Waste

C1798 Meets ASTM Standard

AB 2355 Compliant

Saves Natural Elements

Decreased or Zero Trips to Landfills

- Reduced trucks on road
- Reduced air pollution
- Saves landfill space

ASTM C1798 recognizes unused concrete in a fresh state as an ingredient for a new concrete batch – in other words, it can be treated as a raw material, just like water, aggregates & cement.

Returned Fresh Concrete

Improved Job Site Productivity

- 100% of fleet dedicated to concrete delivery
- Trucks are not sidelined for concrete disposal

Proven Performance

… consistent, highly constructible concrete

Equal or Better Performance

- Strength
- Finishability

DID YOU KNOW?

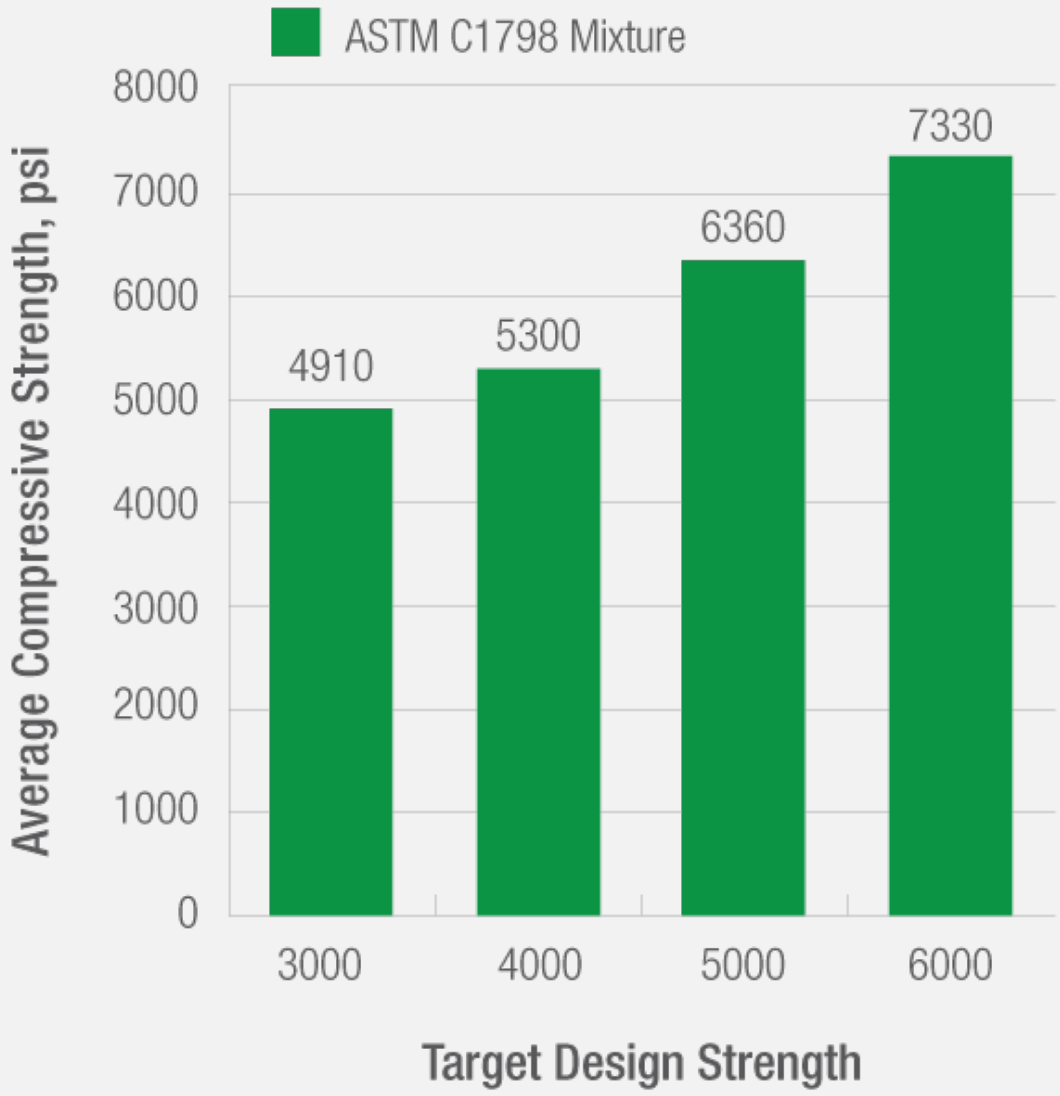
- **2 – 8% of concrete produced in California is returned**
- **CalEPA has estimated that unused concrete results in 2.2 million lbs. of excess carbon emissions/yr.**

Returned Fresh Concrete

DID YOU KNOW?

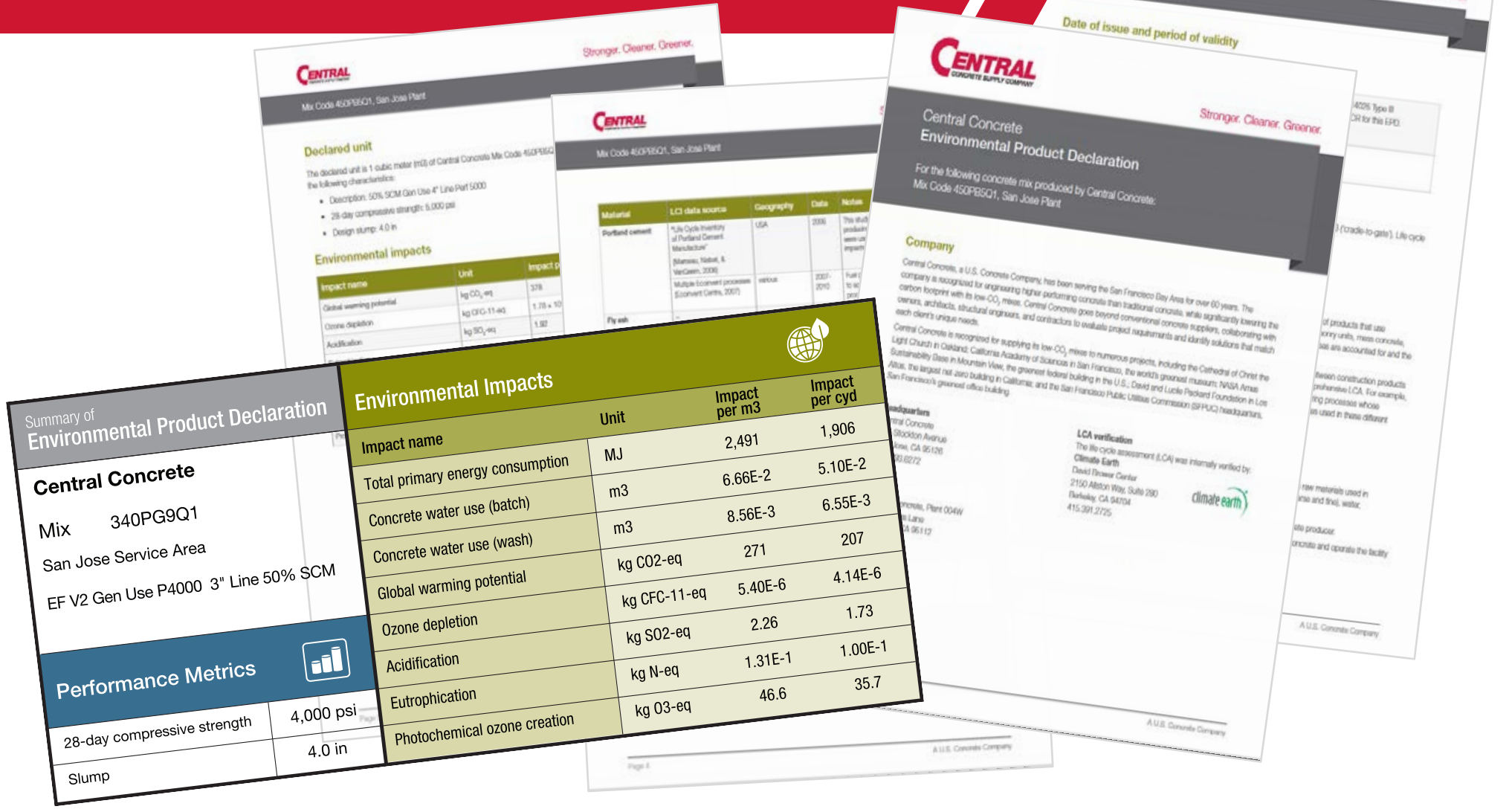
Caltrans *green lighted* the use of returned, fresh concrete at 15%

PROVEN PERFORMANCE



Average 28-Day Compressive Strength of ASTM C1798 Proportioned Concrete Mixtures versus Target Design Strength

Environmental Product Declarations (EPDs)



Summary of
Environmental Product Declaration

Central Concrete

Mix 340PG9Q1

San Jose Service Area

EF V2 Gen Use P4000 3" Line 50% SCM

Performance Metrics

28-day compressive strength	4,000 psi
Slump	4.0 in

Environmental Impacts

Impact name	Unit	Impact per m3	Impact per cyd
Total primary energy consumption	MJ	2,491	1,906
Concrete water use (batch)	m3	6.66E-2	5.10E-2
Concrete water use (wash)	m3	8.56E-3	6.55E-3
Global warming potential	kg CO2-eq	271	207
Ozone depletion	kg CFC-11-eq	5.40E-6	4.14E-6
Acidification	kg SO2-eq	2.26	1.73
Eutrophication	kg N-eq	1.31E-1	1.00E-1
Photochemical ozone creation	kg O3-eq	46.6	35.7

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Stronger. Cleaner. Greener.

Central Concrete
Environmental Product Declaration

For the following concrete mix produced by Central Concrete:
Mix Code 450PB5Q1, San Jose Plant

Company

Date of issue and period of validity

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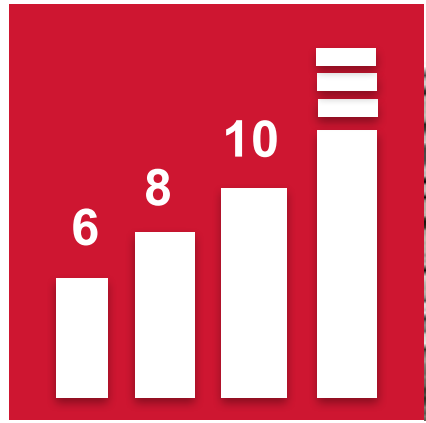
High Performance Concrete

1640 Broadway
Oakland

High Strength Mixes



Increased construction of high-rise buildings is driving the need for high strength mixes.

High Rise =
High Performance

Tall Buildings =
Pumping Challenges

TransBay Tower 6

High Strength Mixes

Benefits of high strength concrete

- Superior compressive strength
- Low shrinkage
- Low permeability
- High modulus of elasticity (MOE)

San Francisco Skyline

High MOE Performance Mixes: Reducing building sway

“…to make high-performance concrete, the materials matter. Use lower-quality sand and gravel and you’ll need to add a larger amount of cement”, said Todd Lamberty, a project manager for construction firm Webcor Builders.

Excerpt: Los Angeles Times. Project; Oceanwide Plaza, mixed-use development across from the Staples Center. Orca aggregate from Polaris.

High Early Strength Concrete

… Rapid Strength Concrete

Evolution of High Early Strength Concrete

LAX Airport
>> One of first locations to use High Early Strength Concrete for overnight runway repairs

Highways
>> High Early Strength Concrete quickly moved to highway repairs across the country

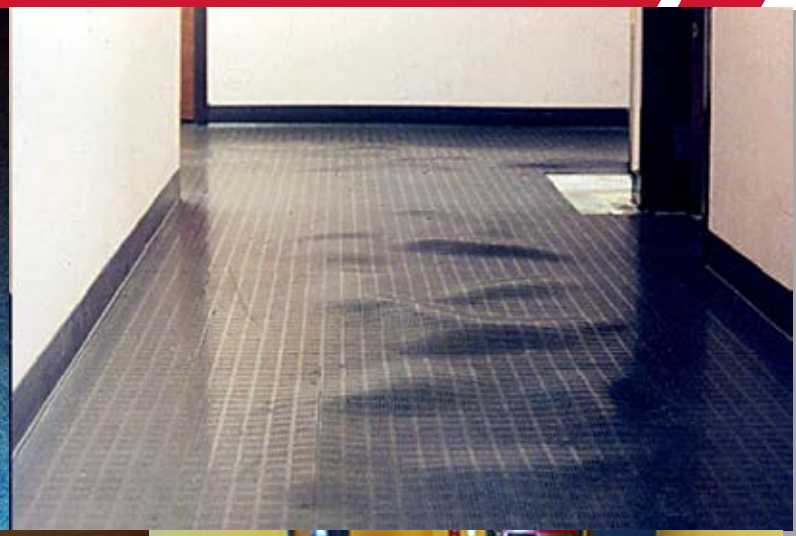
High Early Strength Concrete

PT Decks
>> Now: High Early Strength Concrete
= faster construction = reduced costs
Site: 1400 Mission, SF

>> High Early Strength Concrete moved to bridge decks, including the closure strips for the SF-Oakland Bay Bridge

Rapid Drying Concrete

Eliminates moisture issues: takes moisture totally out of play before the floor is installed.



ARIDUS® Rapid Drying Concrete

Prevents Floor Covering Failures

Consumes excess water >> preventing moisture problems from the very beginning by accelerating the concrete drying time

Rapid Drying Concrete

Community Aquatics Center, Dublin, CA

Impact of Excess Moisture in Concrete Slabs

Construction Delays – Environmental Hazards – Cost Overruns
Liability Issues – Moisture Mitigation – Damaged Reputation

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Improving Productivity

Flowable Mixes

- In-place costs – less labor and equipment
- Productivity
- Worker safety – workers can place w/o entering excavation site.
- Easy to place because it is “self-leveling”
- Ideal for congested, reinforcement & difficult to reach sites
- Specified for projects needing highest levels of aesthetic results

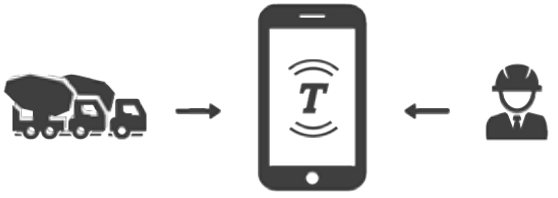
Properties of Flowable Mixes :

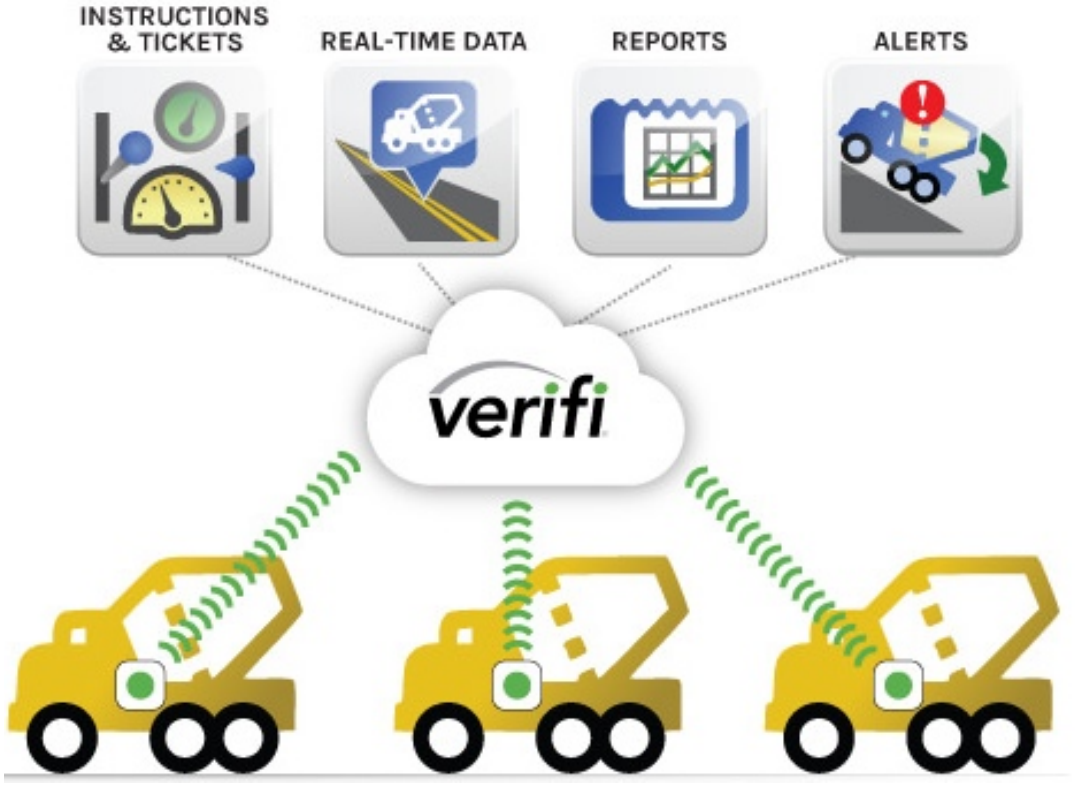
- 8” – 10” slump: High Slump
- 22” – 28” spread: Self-Consolidating Concrete (SCC)

Flowable Mixes

SFO
Airport

Real-time Communications





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High Performance Testing

Maturity Testing

Problem: Inaccurate results from “field-cured” cylinders can create schedule delays and cost overruns

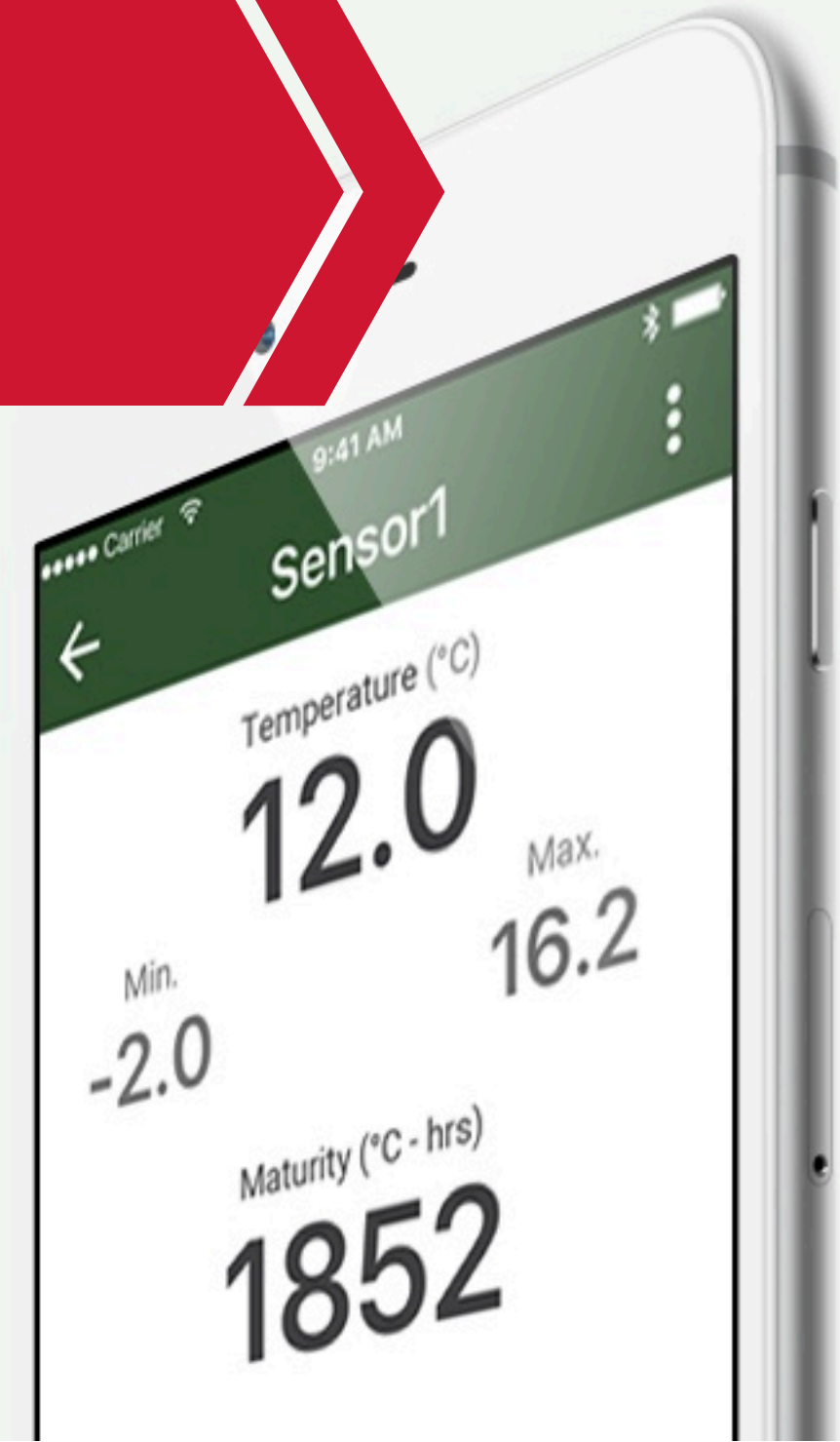
Test probes enable contractors to monitor strength of early-age, in-place concrete in real-time = confidence + time-savings + reduces overdesign

Maturity Testing

Monitor concrete temperature and strength in real time.

More efficient by offering:

- **Wireless connectivity**
- **Mobile-based data collection**
- **Labor cost reduction**
- **Quick decision making**



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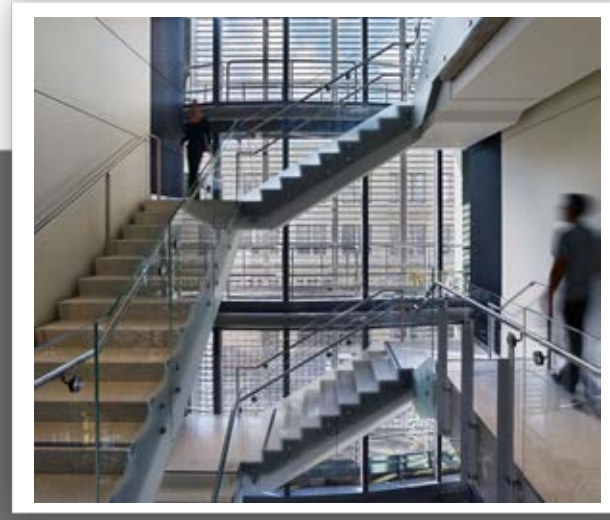
Collaboration Case Study



San Francisco Public Utilities Commission

Case Study: SFPUC

2014: Greenest office building in US

LEED Platinum

Immediate Occupancy after the *Big One*

Structural VE Redesign from Steel to Concrete

$7.4M savings in structure

High-replacement concrete on large scale

Redesign from Steel to Concrete

Case Study: SFPUC

By bringing the supplier in early:

- **Allowed design team to have a better understanding of current concrete advances**
- **Clearly defined structural and environmental goals**
- **Time to develop and test mixes**
- **Allowed discussion on potential environmental impact of local material requirements of LEED**

Case Study: SFPUC

Collaboration included:

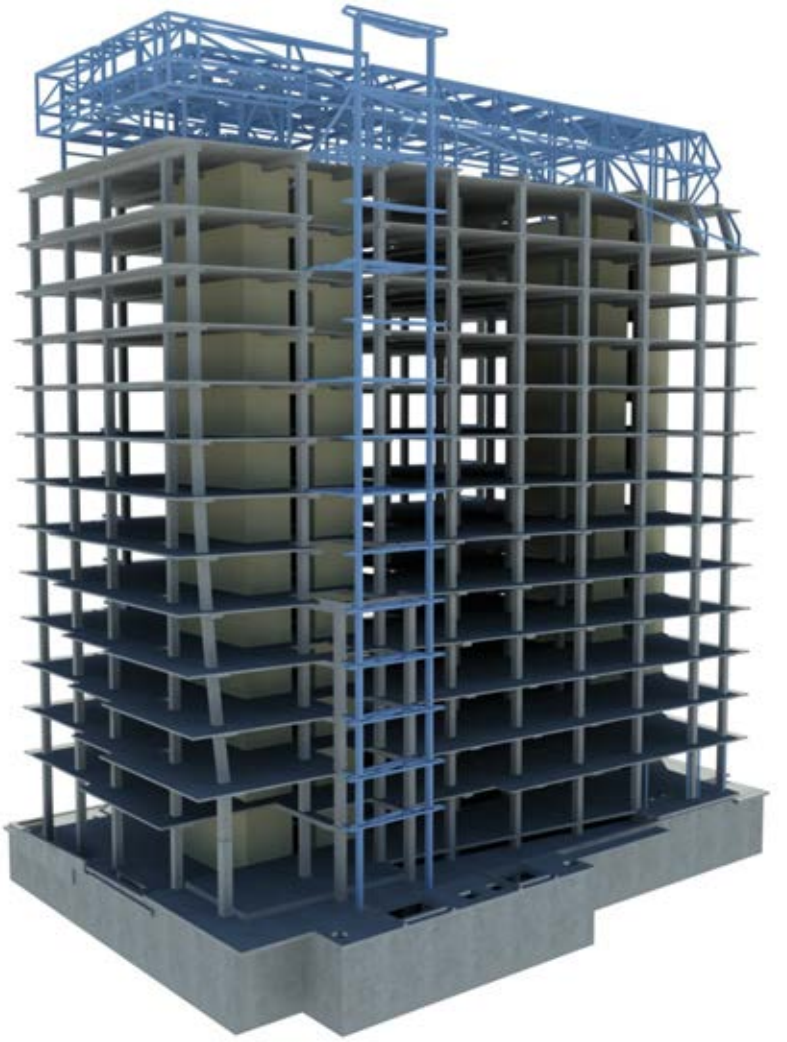
Address constructability issues - scale and speed

Provide simple and reliable design info and construction specifications

Redefine concrete specification - limit cement content, specify target replacement with SCM

Proportion slag and fly ash to optimize cost, workability, performance

Mix design basis, batch testing vs. ACI methods



Case Study: SFPUC

Collaboration at the front end, based on a PERFORMANCE approach vs. a PRESCRIPTIVE approach, along with mutually agreed upon sustainability and testing requirements yielded multiple advantages.

Trimmed

Construction Schedule

Resulted in

$12M

in Savings

Reduced

12 Inches

Floor thickness

Added

13th Floor

Due to concrete's reduced floor-to-floor height

Achieved

3 Day

High, early-strength requirement of 4500 PSI

Concrete Structure

Increased natural lighting

Concrete Reflectivity

Allowed for reduced lighting requirements

Improved

Thermal mass

Matt Slab

70%

Cement replacement

Cores & Columns

70%

Cement replacement

Elevated P.T. Slabs

56%

Cement replacement

Saved

7.4M lbs.

In CO_2 emissions

Summary

Every technology you have learned about today is HERE, NOW.