

HOW KEEPING YOUR COFFEE HOT CAN HELP YOU UNDERSTAND THE BENEFITS OF INSULATED CONCRETE FORMS (ICFs)

BUILD WITH STRENGTH
MINNESOTA

Minnesota Concrete Council
CELEBRATING 30 YEARS - 1989-2019

1




Karl Conrad Schaub

design west | architects

Logan, UT | Salt Lake City, UT

since 1892

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STEPHEN WILLIAMS, AIA NCARB
Principal . Architect

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LEARNING OBJECTIVES

1. ICFs as an Efficient Tool for Net-Zero Building Design
2. Introduction to Insulated Concrete Forms
 - Benefits
 - Economies
 - Attributes
3. ICF Details
 - Rules of Thumb and Lessons Learned
4. Understand Benefits and Properties of a Thermal Mass/Thermal Reservoir (case study).
5. History of ICF use by Design West Architects

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NET-ZERO ENERGY – WHAT IS IT?

When a building consumes as much energy as it produces.

5

NET-ZERO READY – WHAT IS IT?

When a building is master planned where, when fully realized with all components in place, has the ability to produce as much energy as it consumes.

6

WHAT ARE THE COMPONENTS THAT MAKE UP A NET-ZERO ENERGY BUILDING?

A PASSIVE ENERGY SOURCE

- PV (Photovoltaic) Solar Array
- Wind Power
- Hydroelectric Power
- Geothermal Exchange

7

WHAT ARE THE COMPONENTS THAT MAKE UP A NET-ZERO ENERGY BUILDING?

EFFICIENT MECHANICAL AND ELECTRICAL SYSTEMS

- Ground Source Heat Pumps / Exchangers
- Recovery Heat Exchangers
- Evaporative Cooling
- LED Lighting Technology
- Conscious Use of Plug Outlets

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WHAT ARE THE COMPONENTS THAT MAKE UP A NET-ZERO ENERGY BUILDING?

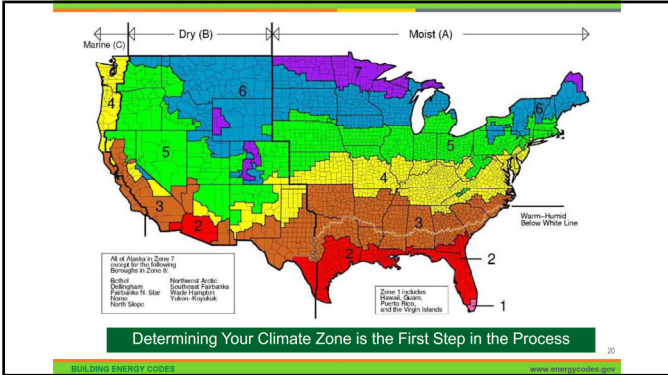
EFFICIENT BUILDING ENVELOPE!

(Roofs, Floors, Doors, Windows, and Walls)

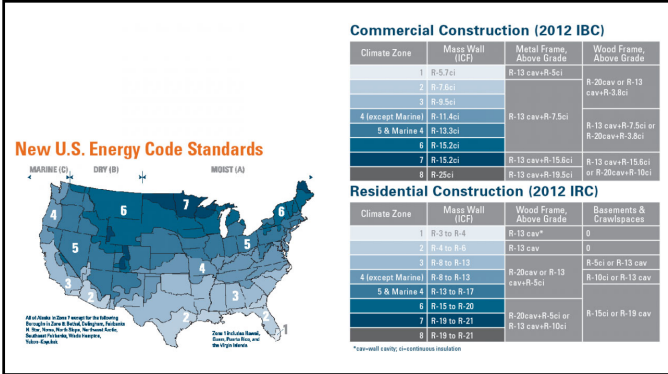
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“Everyone instinctively knows that when you go outside on a cold day, you must zip your coat to stay warm. It doesn’t matter how thick the coat is, if it’s left open, your body heat will leak out. The same is true with building insulation – no matter its R-value (thermal performance), if insulation isn’t continuous throughout the building envelope like a zipped coat, heat will escape – wasting energy and money.”

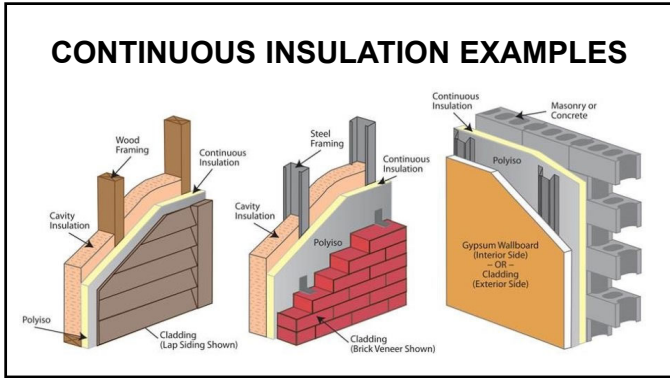
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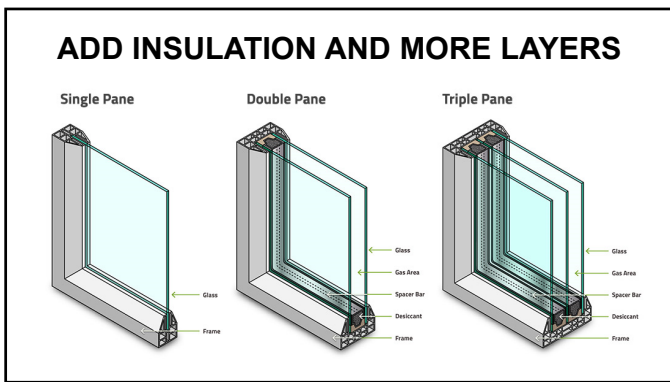
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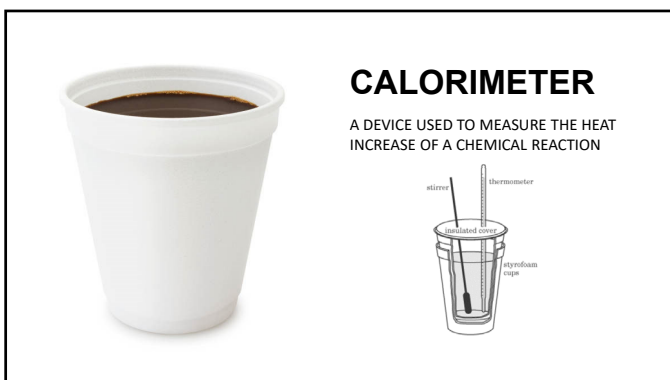
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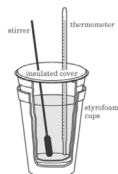


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CALORIMETER

A DEVICE USED TO MEASURE THE HEAT INCREASE OF A CHEMICAL REACTION




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THIS IS AN ICF

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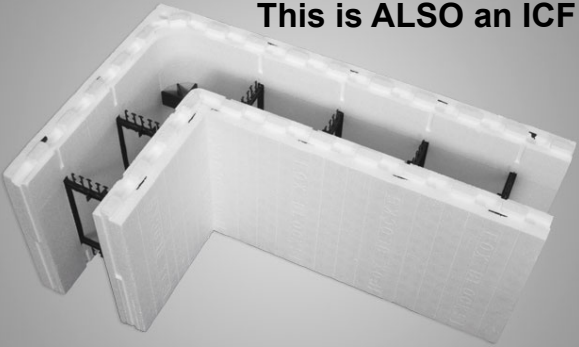


**I – nsulated
C – offee
F – orm**

Or

**I – nsulated Hot
C – hocolate
F – orm**

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This is ALSO an ICF

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ICF Frequently Asked Questions

- What is an ICF?**
ICF stands for insulated concrete form. It is basically a poured in place concrete wall, except you do not strip away the forms. The forms stay in place EPS (expanded polystyrene), both on the outside and inside of the concrete wall.
- What kind of projects can ICFs be used for?**
From homes to multi family housing, condos, apartments, commercial strip malls, to large shopping mall complexes and schools. Almost all commercial and residential applications apply.
- What type of finishes can be attached to ICFs?**
Interior - Sheetrock or Stucco
Exterior - Most any exterior finish (EIFS, brick, cultured stone, metal, etc.)
- How tall of a wall can I build with ICFs?**
We have built walls as tall as 53' with just a floor and roof tie in. Our tallest building to date is 22 stories or about 250 feet tall.
- How fast does ICF install?**
In most applications, ICFs install faster than tilt-up and up to 50% faster than concrete block.

Source: Fox Blocks

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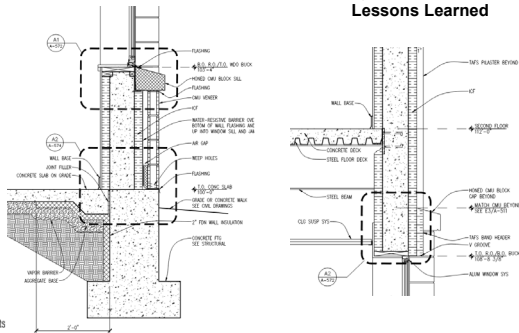
ICF Frequently Asked Questions

6. **What trades have installation crews?**
Typically ICFs are installed by masons, however concrete crews are known to install ICFs.
7. **What is the energy savings I can obtain using ICFs?**
Up to 60% compared to conventional construction.
8. **Can I downsize my HVAC system because of the high R-Values?**
Yes, up to 30% (Please check with your Mechanical Engineer)
9. **Do ICFs qualify for LEED points?**
Yes, you can normally obtain between 6-19 points, depending on the project.
11. **What is the R-Value of ICFs?**
It depends on the brand. The EPS in all ICF's is at 4.55 per inch, giving us an R-23 at two layers of 2 5/8" (5 1/4" total), however it performs as well as an R-36+ wall with thermal mass.

Source: Fox Blocks

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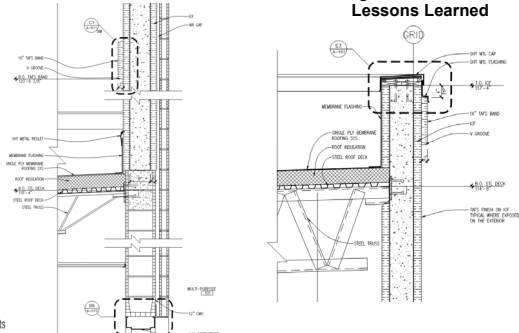
ICF Details – Idaho Falls Elementary Schools Lessons Learned



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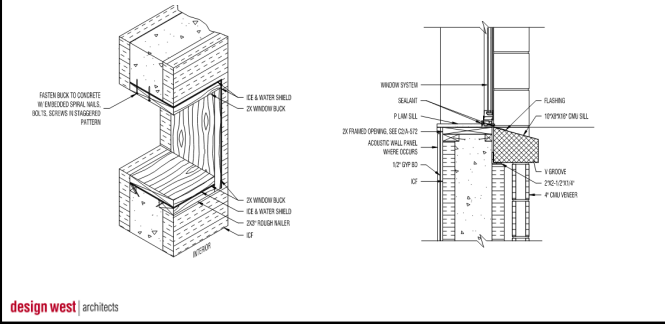
ICF Details – Idaho Falls Elementary Schools Lessons Learned



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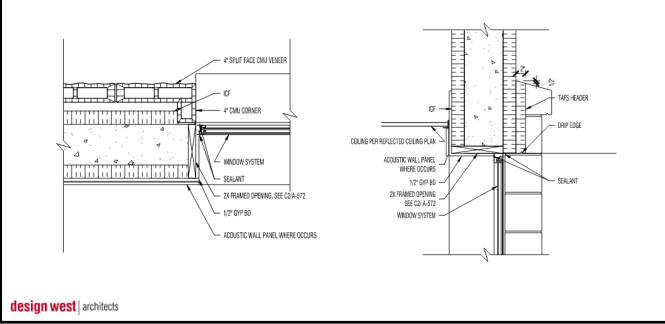
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ICF Details – Idaho Falls Elementary Schools Lessons Learned



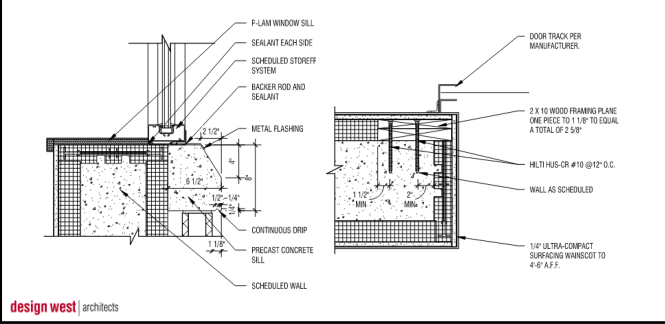
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ICF Details – Idaho Falls Elementary Schools Lessons Learned



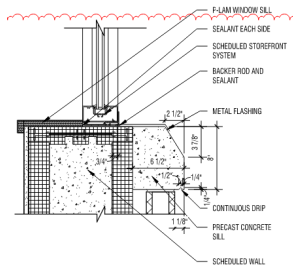
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ICF Details – Roy Junior High School Lessons Learned



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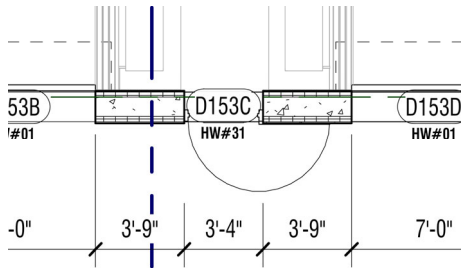
ICF Details – Roy Junior High School Lessons Learned



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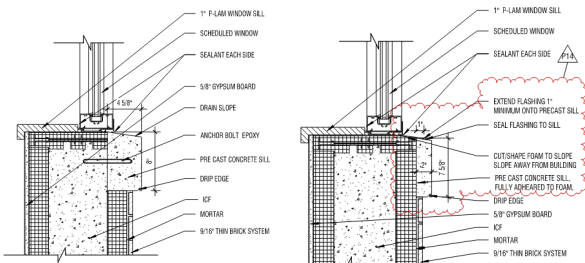
ICF Details – Roy Junior High School Lessons Learned



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ICF Details – Ellis Elementary – Logan, UT Current Details



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ICF Details – Ellis Elementary – Logan, UT

Current Details

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ICF Details – Ellis Elementary – Logan, UT

Current Details

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ICF Details – Ellis Elementary – Logan, UT

Current Details

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Rules of Thumb and Lessons Learned:

1. Situate storefront windows 1/4" from face of concrete ICF core
2. For easy coursing, place exterior face of 4" CMU veneer 8" off the face of the interior concrete core of the ICF (result = 1 3/4" Air Gap).
3. Use ICF bucks for exterior ICF walls and protect sills from traffic, cables, chords, air hoses etc.
4. Use wood bucks for interior ICF openings. Better for nailing/fastening and gyp wrapping corners; thermal break not needed.
5. Be careful of single doors with closers in an ICF wall that they don't exceed the 8" max depth on the door approach to meet accessibility requirements.
6. Allow metal flashings to bridge the gap between windows and precast or EIFS sills.

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ICFMA
INSULATING CONCRETE FORMS
WALL SYSTEMS

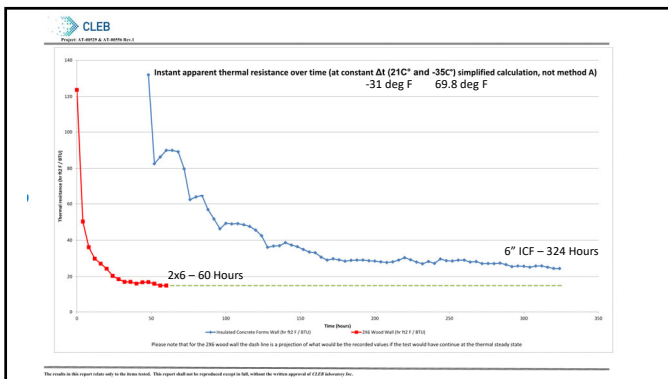
TEST: THERMAL PERFORMANCE OF AN INSULATED CONCRETE FORMS WALL SYSTEM AND A 2" x 6" WOOD FRAME WALL SYSTEM, IN ACCORDANCE WITH TEST PROCEDURE ASTM C 1363-11
TESTED BY: CLEB LABORATORY, INC.
REPORT: AT-00529 & AT-00556
REPORT DATE: 12/08/2016

UP TO 60% MORE ENERGY IS USED WITH A 2" X 6" WOOD FRAME WALL SYSTEM VS. AN ICF WALL SYSTEM

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-31 DEGREES (F) **69.8 DEGREES (F)**

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Helical Steel Fiber Reinforcement Admixture

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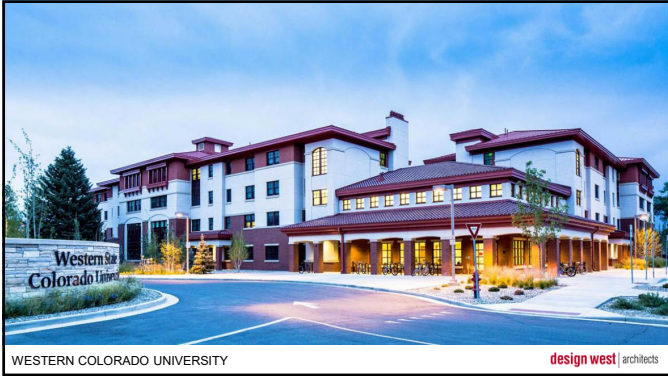
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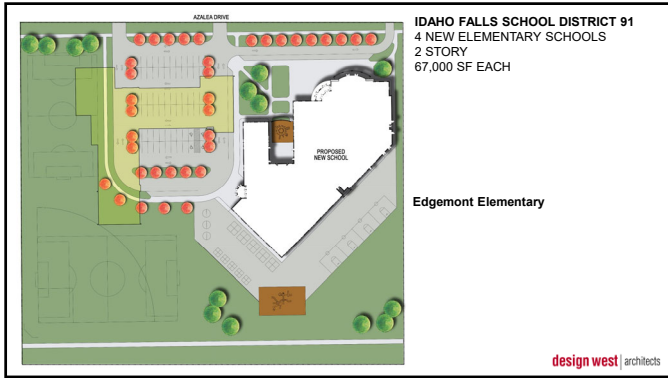
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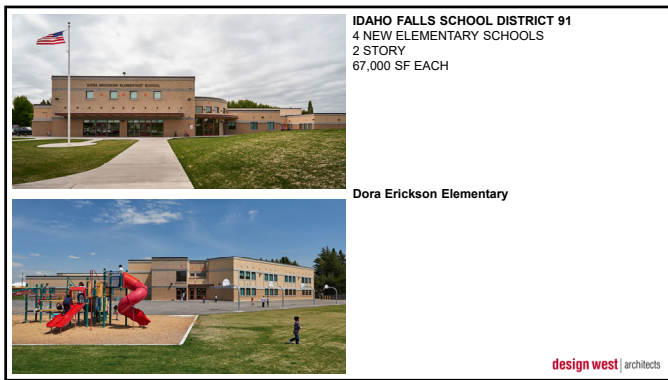
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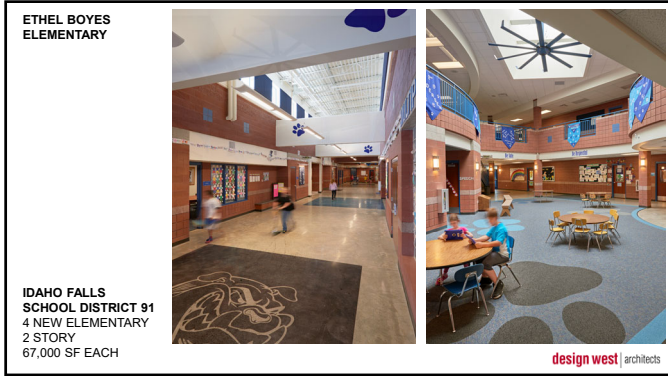
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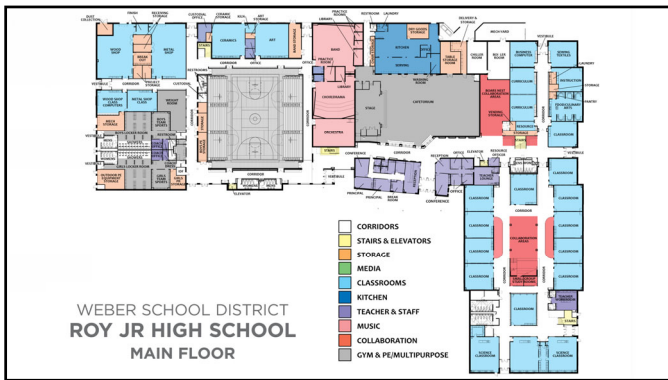
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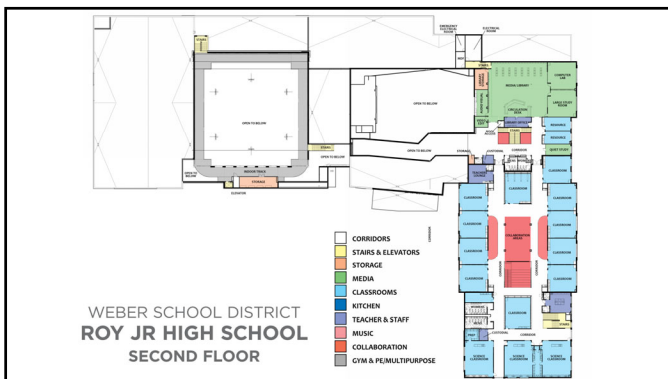
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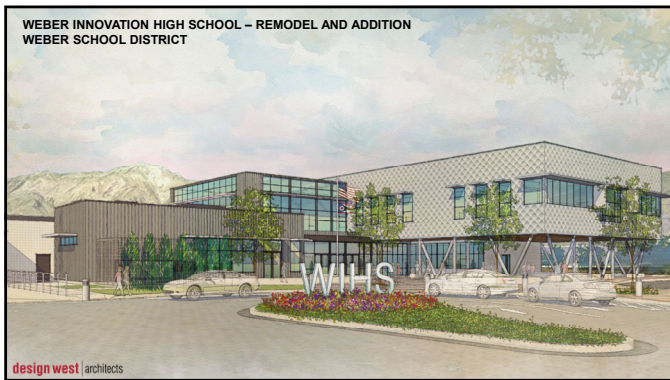
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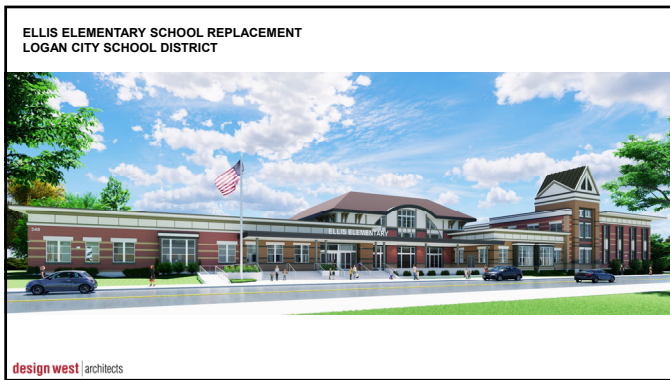
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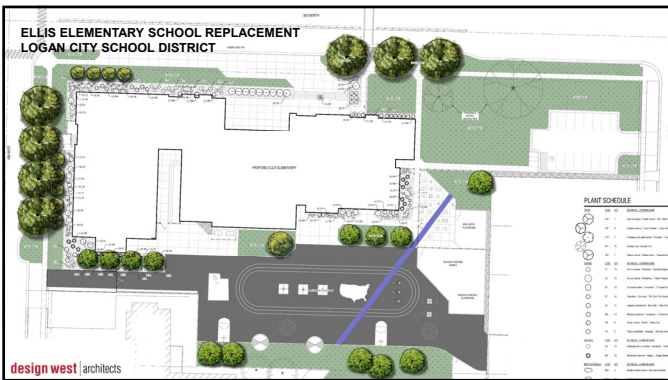
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CONCLUSION:

- Net-Zero Ready Buildings starts with efficiently designed building envelopes
- There's real value in a thermal reservoir as offered by ICF construction compared to other systems
- Insulated Concrete Forms have many noteworthy benefits to all building types

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- <https://www.nudura.com/divisions/builder/r-value-thermal-mass>
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ICF Manufacturer's Association











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- <http://utahcdmag.com/2021/01/most-outstanding-small-k-12-project-wasatch-elementary-school-addition-and-remodel/>

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THANK YOU!





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