



**ARCHITECTURE**  
*enriching communities*

## ICF DETAILING – LESSONS LEARNED

[www.dsgw.com](http://www.dsgw.com)

# Agenda

- Why use ICFs?
- ICF Detailing
- Recent ICF projects
- ICF and Net Zero
- Lessons learned

- Principal at DSGW Architects
- President, Owner of First American Design Studio
- Enrolled member of the Turtle Mountain Band of Chippewa in North Dakota
- Reg. Architect-MN,ND,SD,IA,FL,WI,MT,WA
- Past-President of the American Indian Council of Architects & Engineers
- Board Member for American Indian Science & Engineering Society
- LEED Accredited Professional
- Past AIA ND Intern Architect of the Year



## Angie Wilson AIA, NCARB, LEED AP

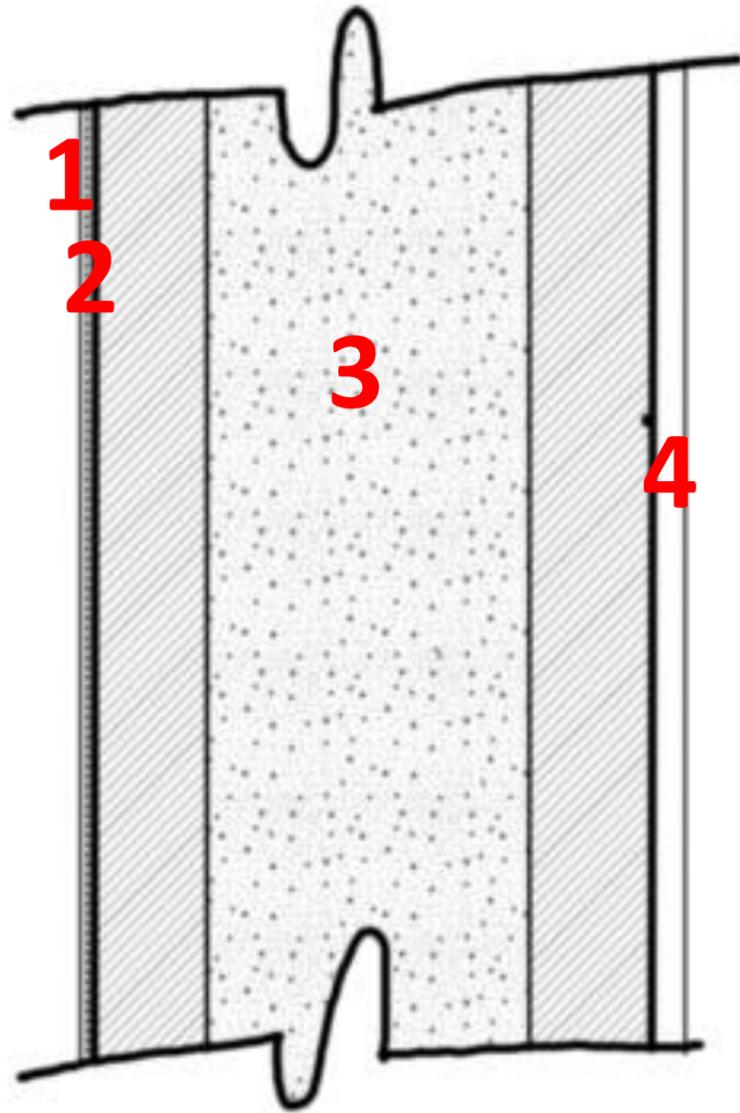
- Senior Architect and Project manager at DSGW Architects
- Reg. Architect-MN
- LEED Accredited Professional



# Why use Insulated Concrete Forms?

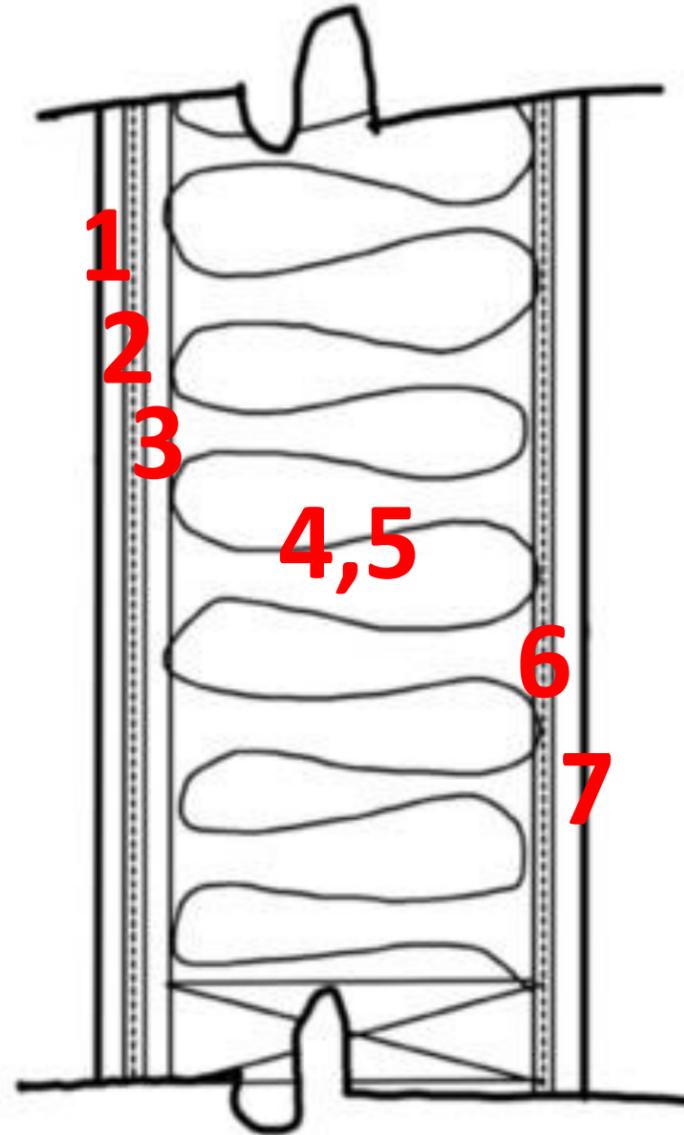
- ICF's are modular, easy to install.
- ICF's lend themselves to becoming community storm shelters
- Local labor can be taught to install and not have to be union or experienced tradesman.
- Reduced trades in building envelope.
- Thermal mass reduces peak energy demand
- Continuous insulation (New MN Energy Code) and excellent air tightness
- LEED, Energy Star & Net Zero friendly product
- Baseline R28 @ 8" form

R=28



Typical ICF Wall

R=6 stl  
R=14 wd



Typical 2x Wall

- Reduced trades in building envelope
- Easier to detail
- Fire and forget high performing exterior envelope
- A good investment for clients relative to current cost escalations compared to traditional 2x stick built framing

# Why use Insulated Concrete Forms?

*“ICF allowed us to start moving out of the ground quickly with basic structural requirements and reviews being met. Once foundation is established, and back filled the system can move 7 to 10 feet every three days so the openings (windows, doors, sleeves) need to be established.” – Bryan Koenig, Shingobee Builders*



# CONSTRUCTION SEMINAR SERIES

## INSULATED CONCRETE FORMS

— FREE SEMINAR —

FRIDAY, FEBRUARY 24

9:00 AM — 4:30 PM

LEECH LAKE TRIBAL COLLEGE



Join us for an exciting new **learning opportunity** geared toward **specific construction methods** – based on known design content of upcoming Leech Lake construction projects.

**FOR INFORMATION/REGISTRATION, CONTACT:**

|                 |                           |              |
|-----------------|---------------------------|--------------|
| Rocky Carpenter | rocky.carpenter@lltc.edu  | 218-335-4287 |
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| Cale LaVoie     | clavoie@shingobee.com     | 320-333-9079 |

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CONCRETE, INC. – ST. CLOUD MN



SHINGOBEE BUILDERS, INC.  
ST. CLOUD – LORETTO MN

## ICF Training

- Training is easy to implement
- Can train entry level laborers
- Lightweight install prior to concrete pour
- Many manufacturers are eager to assist in training
- Communities like this as it is a learned skill and is able to be used on future builds
- Contractor has experienced lower EMR such as less pinch fingers, strained backs, cuts and bruises



Benefits of ICF's

# Safety

*“There are no aspects of the ICF system that pose a safety risk any higher than any other form of construction. If anything the risks are less. Concrete truck traffic and overhead concrete pumping are typical. The sub-contractor had a wall brace/scaffold system for the walls up to 10 feet which included a railing system to meet fall protection requirements. For the main gym walls extending nearly 36 feet they utilized a Safeway scaffold system which included on-site training for all.” – Bryan Koenig, Shingobee Builders*



#### 2603.5.5 Vertical and lateral fire propagation.

The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

#### Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. Wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete and meeting one of the following:
  - 2.1. There is no airspace between the insulation and the concrete or masonry.
  - 2.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete or masonry is not more than 1 inch (25 mm).

- EIFS

NUDURA has proposed the application of any one of eight EIFS coating systems to be applied to their ICF system to meet the requirement specified in Paragraph 3.3.2.1.3. The coating systems are:

- Dryvit Systems, Inc., Outsulation, Evaluation Report No. ESR-1232, Issued July 1, 2004;
- FINESTONE, FINESTONE Pebbletex, Pebbletex-D, Quick Clad-D and Impact-R Wall Systems, Evaluation Report No. ER-4455, Issued February 1, 2004;
- Omega Products International, Inc., Omega Diamond Wall and Diamond Wall PM Insulating Exterior Stucco System, Evaluation Report No. ESR-1194, Revised October 2004;
- Senergy, LLC, Senerflex and Senerthik Exterior Insulation and Finish System, Evaluation Report No. ER-3850, Reissued March 1, 2004;
- Sonowall Stucco Systems, SonoWall Exterior Insulation and Finish System, Evaluation Report No. ER-5678, Reissued April 1, 2004;
- STO Corporation, STO Classic Exterior Insulation and Finish System and STO Classic Exterior Insulation and Finish System with Gold Guard, Evaluation Report No. ER-3906, Reissued October 1, 2004;
- STO Corporation, STO Essence Exterior Insulation and Finish System, Evaluation Report No. 9642B, Reissued April 1, 2004; and
- STO Corporation, STO Essence Exterior Insulation and Finish System with STO Gold Guard, Evaluation Report No. ER-3617, Reissued February 1, 2004.

The above EIFS coating systems are required to be installed with the basecoat, mesh, and finish coat material and application methods, as described in the corresponding referenced evaluation reports.

- Masonry
- Tested Finishes
- Contact the ICF Rep for additional questions



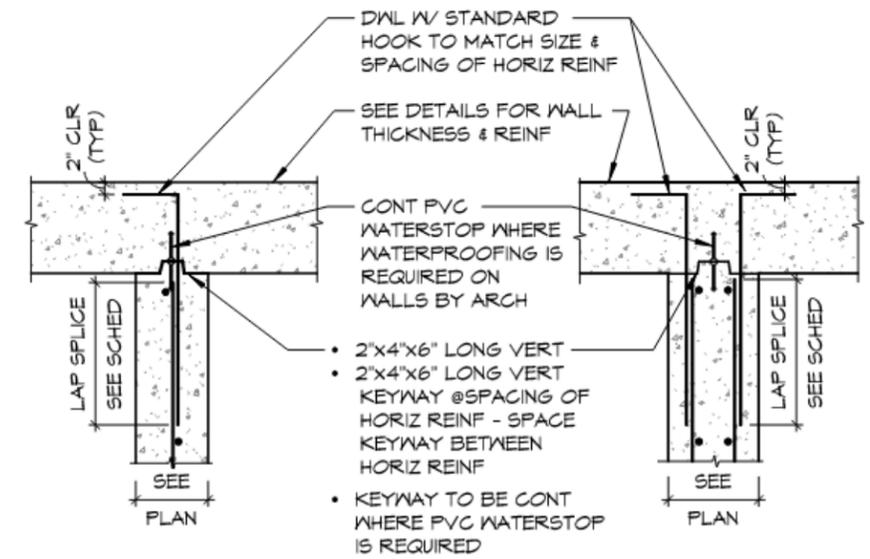
ICF Design - Coursing



ICF Design - Corners



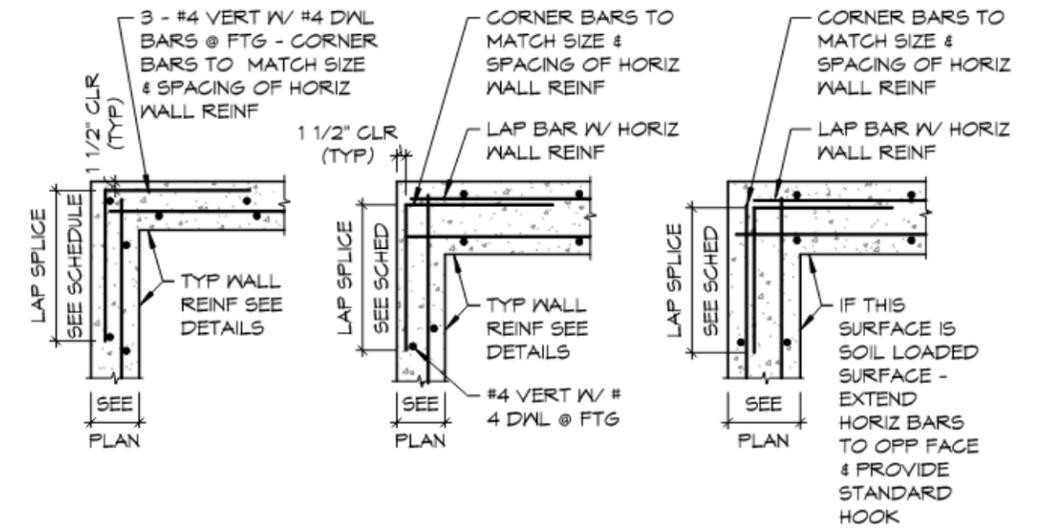
ICF Design – Curved Walls



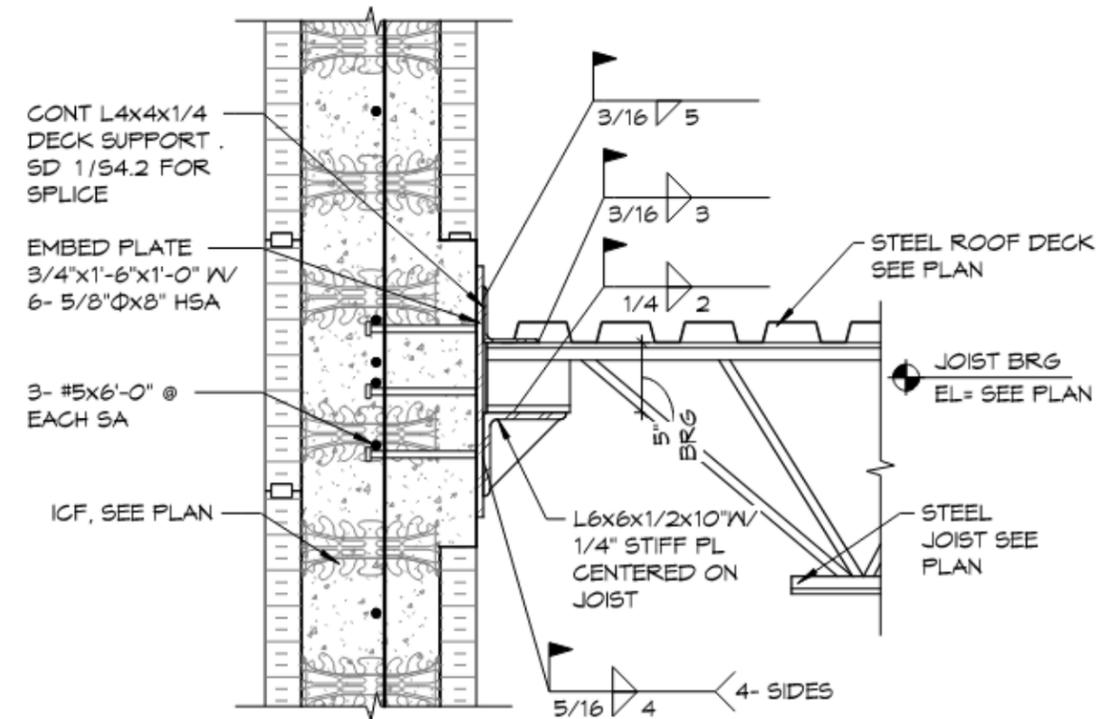
**NOTE:**

- CONSTRUCTION JOINT SHOWN MAY BE OMITTED @CONTRACTOR'S OPTION.

4 TYP WALL INTERSECTION DETAIL  
 S3.1 1/2" = 1'-0"



3 TYP CORNER BAR DETAIL  
 S3.1 1/2" = 1'-0"





**Brick Ties Cast-In Place (Galvanized Steel)**

|           |              |
|-----------|--------------|
| Qty. /Box | 100 PCS      |
| Code #    | NUS-ABRKG-00 |

**Brick Ties Cast-In Place (Stainless Steel)**

|          |              |
|----------|--------------|
| Qty./Box | 100 PCS      |
| Code #   | NUS-ABRKS-00 |

Cast-In Place Brick Tie and Pintle. – Enables solid anchorage of veneer masonry through exterior foam to concrete core; tested to meet ASTM D754 (USA) and CSA-A370 (CAN) std. requirements for masonry anchors.

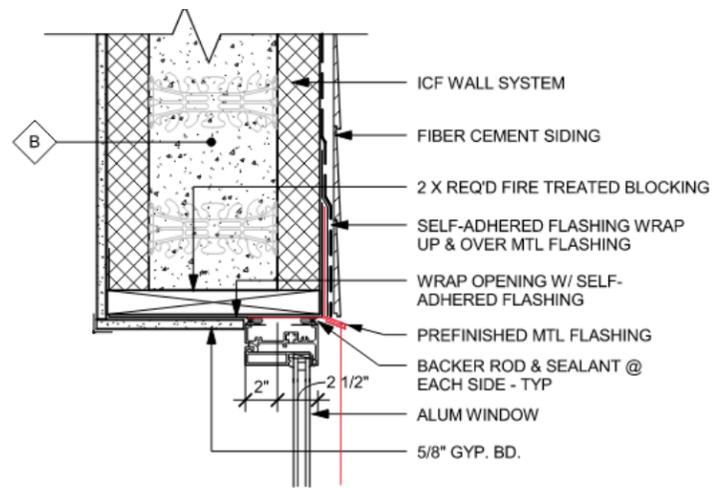


Structural Design – Brick Ledges



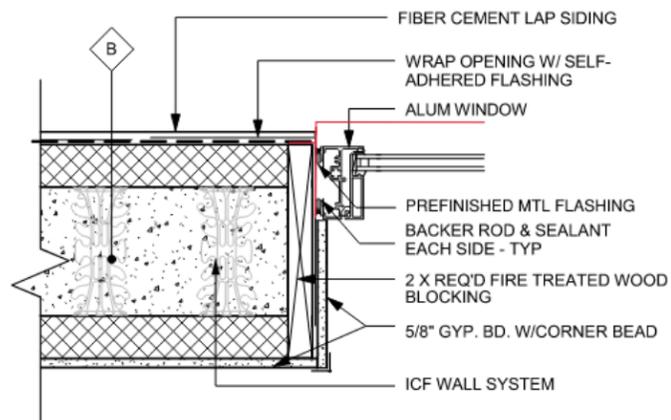


Architectural Details - Damproofing



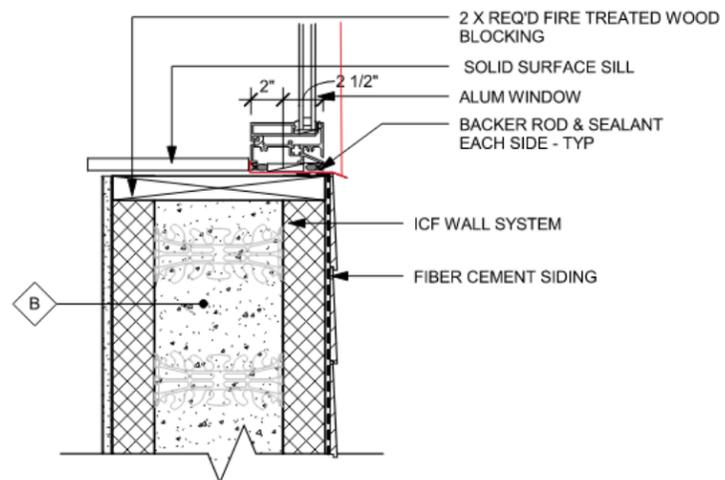
e Alum Window Head @ SIDING

1 1/2" = 1'-0"



d Alum Window Jamb @ SIDING

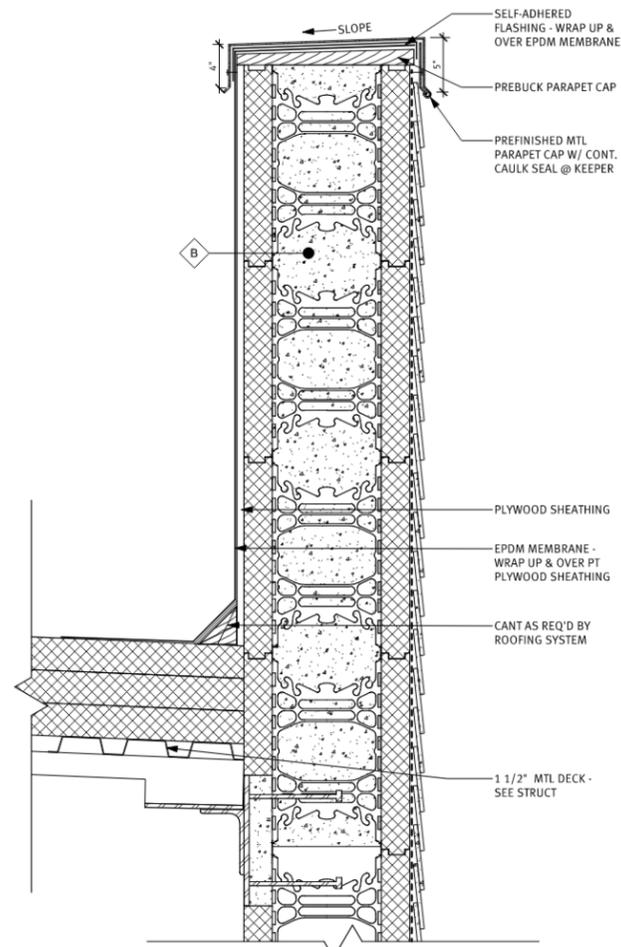
1 1/2" = 1'-0"



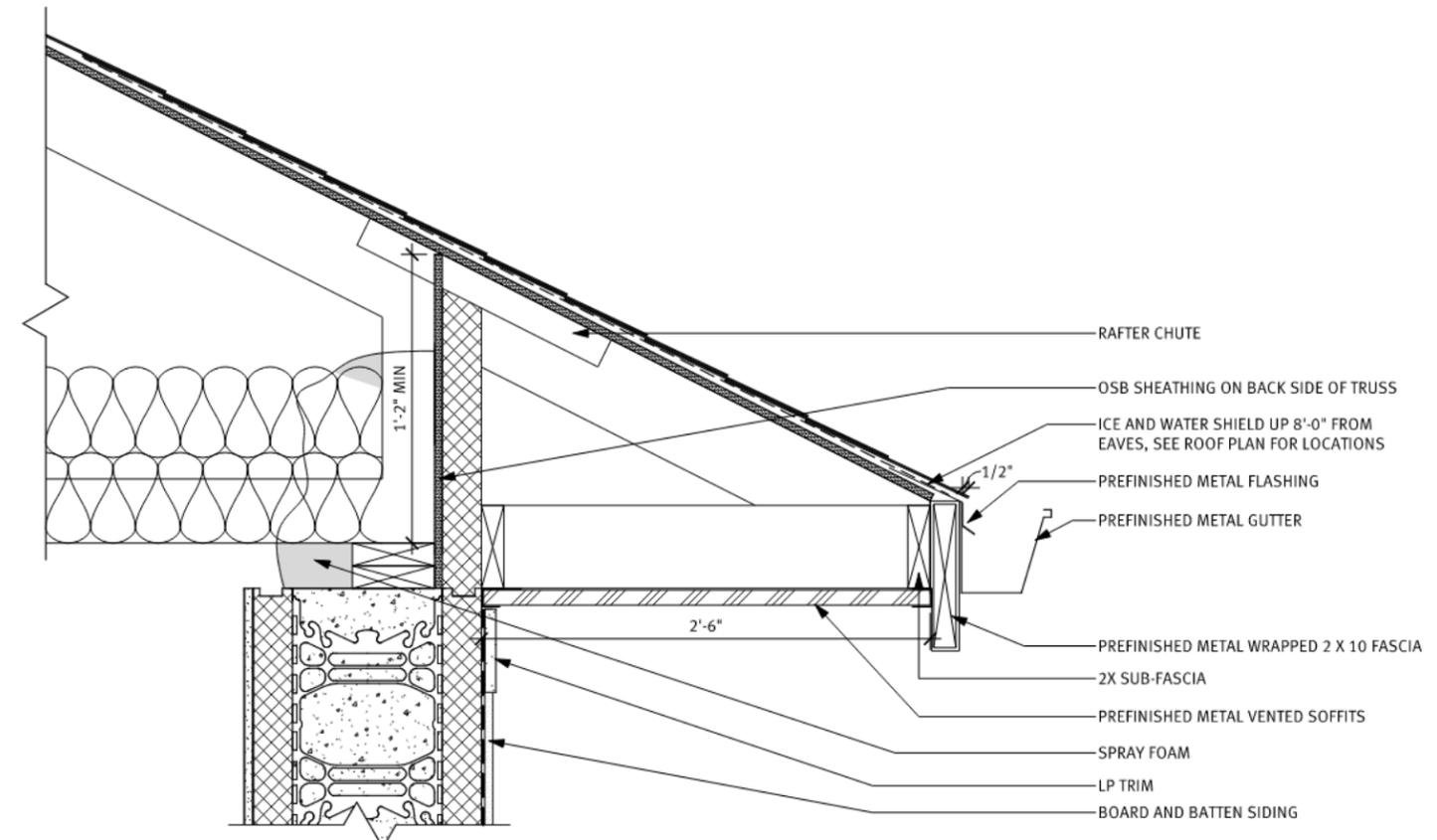
c Alum Window Sill @ SIDING

1 1/2" = 1'-0"

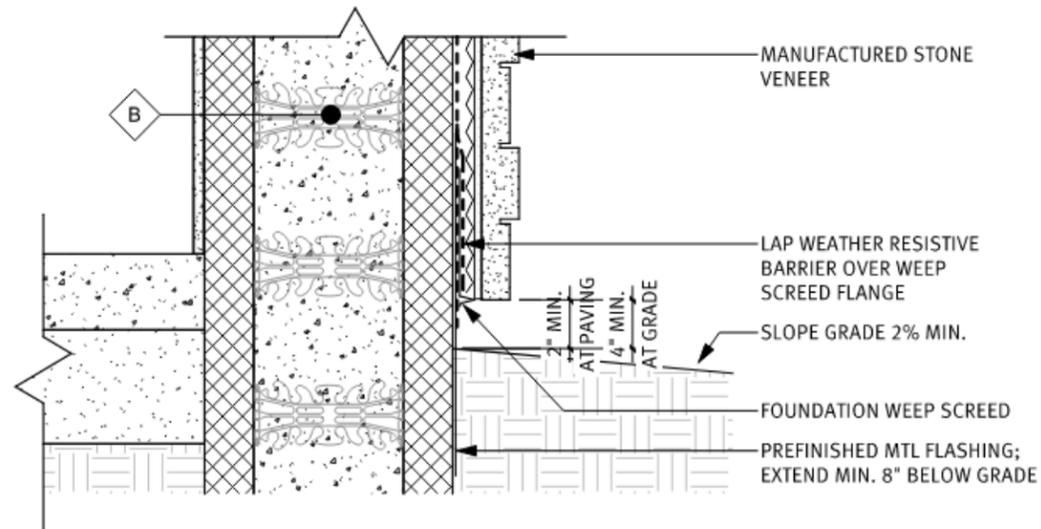




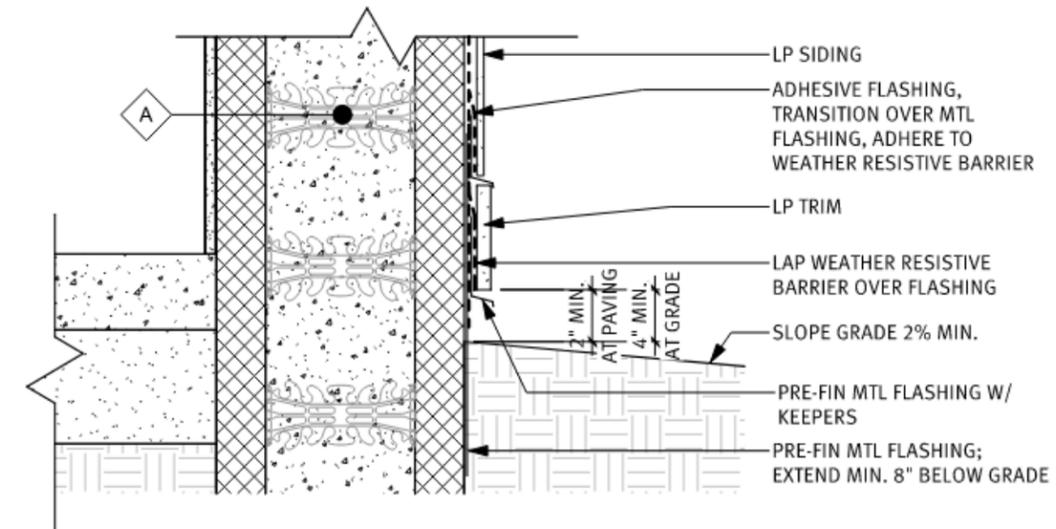
③ TYP PARAPET @ SIDING  
1 1/2" = 1'-0"



④ TYPICAL ROOF EDGE DETAIL  
1 1/2" = 1'-0"

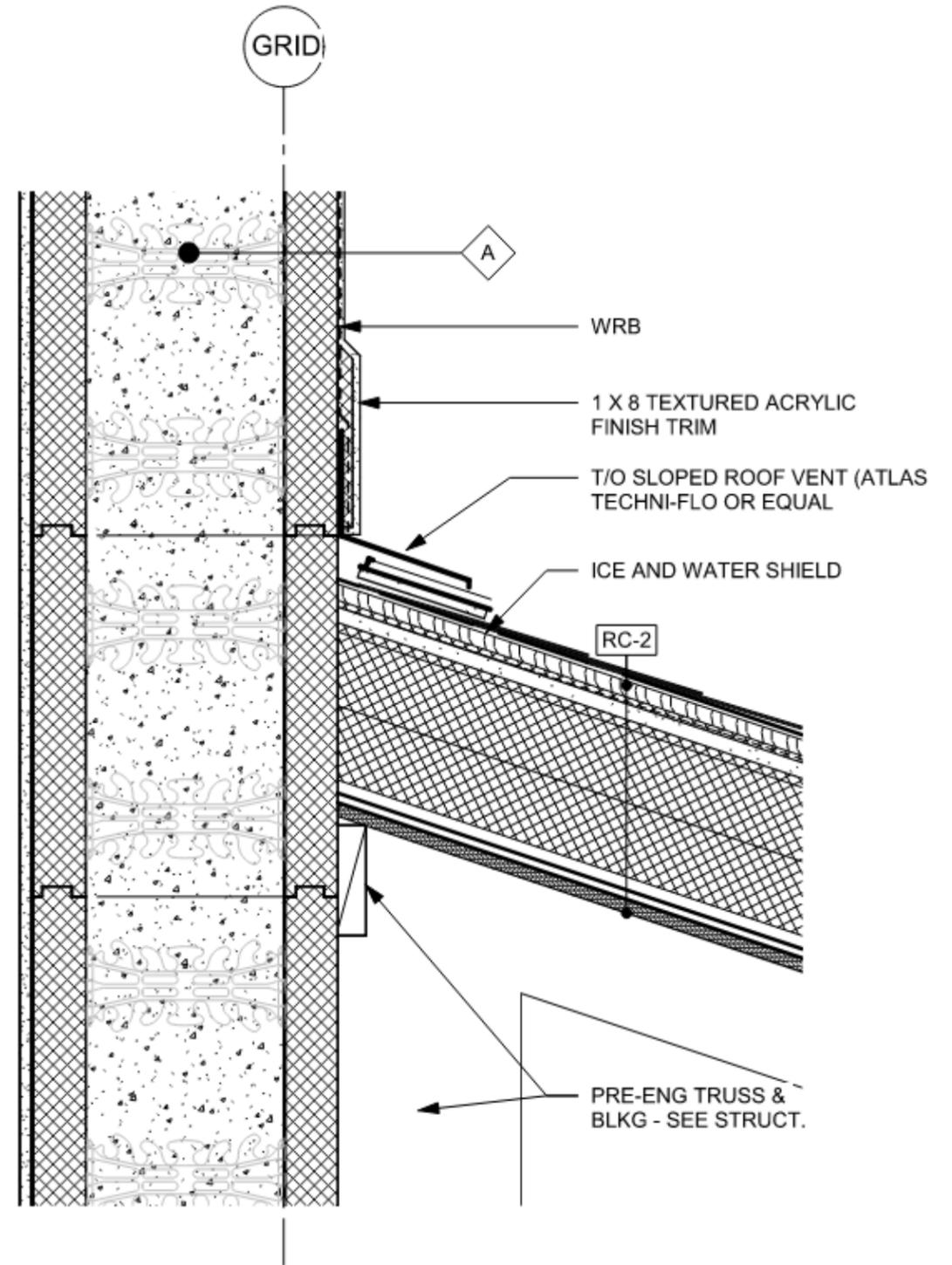


② TYP GRADE DETAIL @ STONE  
1 1/2" = 1'-0"



① TYP GRADE DETAIL @ SIDING  
1 1/2" = 1'-0"

# Architectural Details – Grade, Roof edge, and Parapet Detail



④ Sloped Roof To Wall Detail  
1 1/2" = 1'-0"



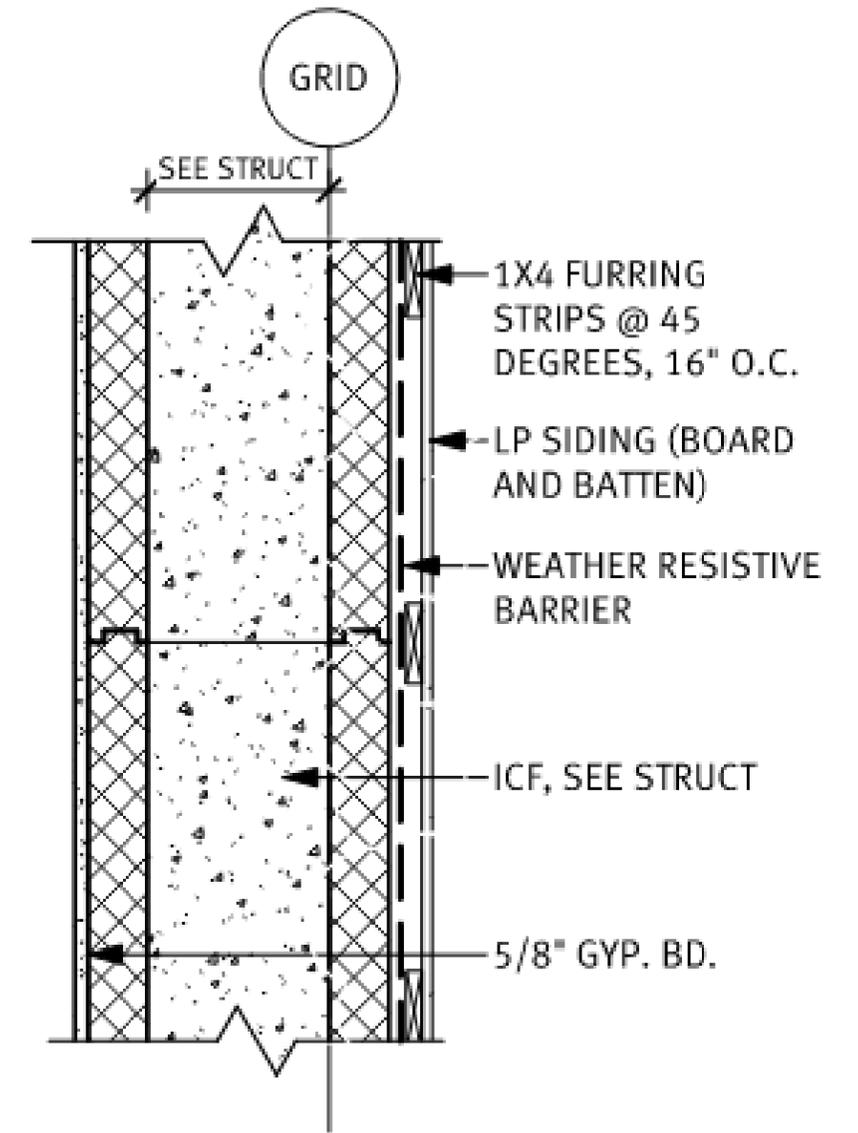
Finishes – Lap Siding & Manufactured Stone



Finishes – Masonry



Corrugated Metal



A ICF W/SIDING



Board and Batten Siding



MHA Interpretive Center | New Town, ND





Meskwaki Travel Plaza | Tama, IA





Leech Lake Onigum Community Center | Onigum, MN





| HOME  |        | PERIOD |        | GUEST |  |
|-------|--------|--------|--------|-------|--|
| BONUS | POSS   | POSS   | BONUS  |       |  |
| FOULS | PLAYER | FOULS  |        |       |  |
| WON   | T.O.T. | GAME   | T.O.T. | WON   |  |



**ONIGUM  
NIGHTHAWKS**

Leech Lake Onigum Community Center | Onigum, MN





Leech Lake Onigum Community Center | Onigum, MN





Leech Lake Onigum Community Center | Onigum, MN





Leech Lake Onigum Community Center | Onigum, MN





Leech Lake Onigum Community Center | Onigum, MN





Red Hawk Estates | New Town, ND





Red Hawk Estates | New Town, ND



## Net Zero

A building which, while still connected to the grid, produces enough energy on site equal to the amount of energy used.



<https://living-future.org/zero-energy/certification/>

- Certifies that the building is truly operating as claimed, harnessing energy from the sun, wind or earth to produce net annual energy demand through a third-party audit of actual performance data
- Provides a case study platform for your project to inform and accelerate other zero energy efforts throughout the world
- Celebrates a significant accomplishment, and differentiates both the building and those responsible for its success in this quickly evolving market



<https://living-future.org/zero-energy/certification/>

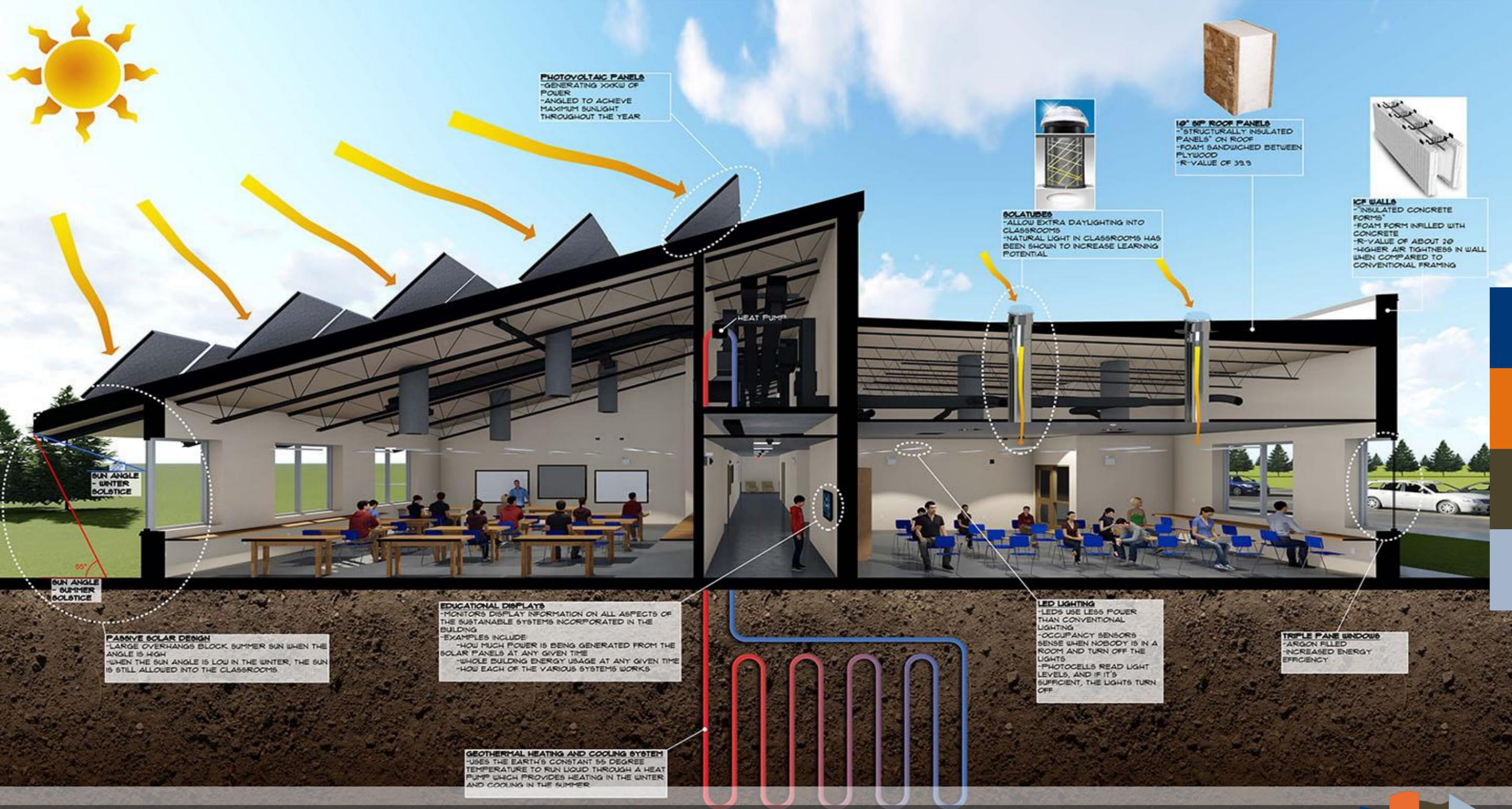
- A lot cheaper than LEED Certification!
- LEED can cost a project additional design fees and construction costs
- Zero Energy Certification costs a couple thousand dollars
- Actual verifiable data in real time for clients / designers / contractors (solar monitoring and utility bills)

## Energy Use Intensity

- EUI is expressed as energy per square foot per year
- It's calculated by dividing the total energy consumed by the building in one year (measured in kBtu or GJ) by the total gross floor area of the building.
- Generally, a low EUI signifies good energy performance

## U.S. National Median Reference Values for All Portfolio Manager Property Types

| Broad Category                | Primary Function   | Further Breakdown (where needed) | Source EUI (kBtu/ft <sup>2</sup> ) | Site EUI (kBtu/ft <sup>2</sup> ) | Reference Data Source - Peer Group Comparison |                    |
|-------------------------------|--------------------|----------------------------------|------------------------------------|----------------------------------|-----------------------------------------------|--------------------|
| Banking/Financial Services    | Bank Branch *      |                                  | 252.8                              | 87.0                             | CBECS - Bank/Financial                        |                    |
|                               | Financial Office*  |                                  | 148.1                              | 67.3                             | CBECS - Office & Bank/Financial               |                    |
| Education                     | Adult Education    |                                  | 141.4                              | 59.6                             | CBECS - Education                             |                    |
|                               | College/University |                                  | 262.6                              | 130.7                            | CBECS - College/University                    |                    |
|                               | K-12 School*       |                                  | 141.4                              | 58.2                             | CBECS - Elementary/Middle & High School       |                    |
|                               | Pre-school/Daycare |                                  | 145.7                              | 70.9                             | CBECS - Preschool                             |                    |
|                               | Vocational School  |                                  | 141.4                              | 59.6                             | CBECS - Education                             |                    |
|                               | Other - Education  |                                  | 141.4                              | 59.6                             | CBECS - Education                             |                    |
| Entertainment/Public Assembly | Convention Center  |                                  | 69.8                               | 45.3                             | CBECS - Social/Meeting                        |                    |
|                               | Movie Theater      |                                  | 85.1                               | 45.3                             | CBECS - Public Assembly                       |                    |
|                               | Museum             |                                  |                                    |                                  |                                               |                    |
|                               | Performing Arts    |                                  |                                    |                                  |                                               |                    |
|                               | Recreation         | Bowling Alley                    |                                    | 96.8                             | 41.2                                          | CBECS - Recreation |
|                               |                    | Fitness Center/Health Club/Gym   |                                    |                                  |                                               |                    |
|                               |                    | Ice/Curling Rink                 |                                    |                                  |                                               |                    |
|                               |                    | Roller Rink                      |                                    |                                  |                                               |                    |
|                               |                    | Swimming Pool                    |                                    |                                  |                                               |                    |
|                               | Other - Recreation |                                  |                                    |                                  |                                               |                    |
| Social/Meeting Hall           |                    | 69.8                             | 45.3                               | CBECS - Social/Meeting           |                                               |                    |



Net Zero Project – Four Winds Alternative CTE School, Fort Totten, ND





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# Fort Totten Alternative School

Animated View

Classic View

Feedback

Bergstrom Electric

Site Overview

Environmental Footprint

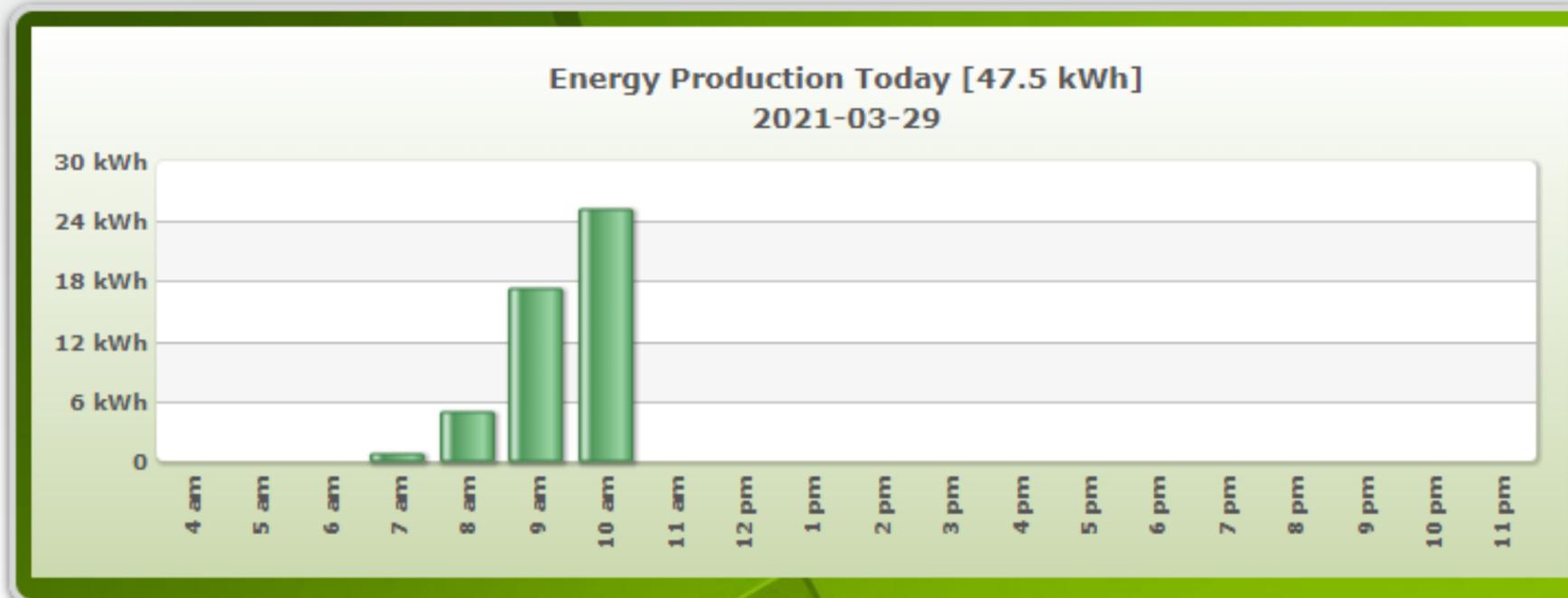
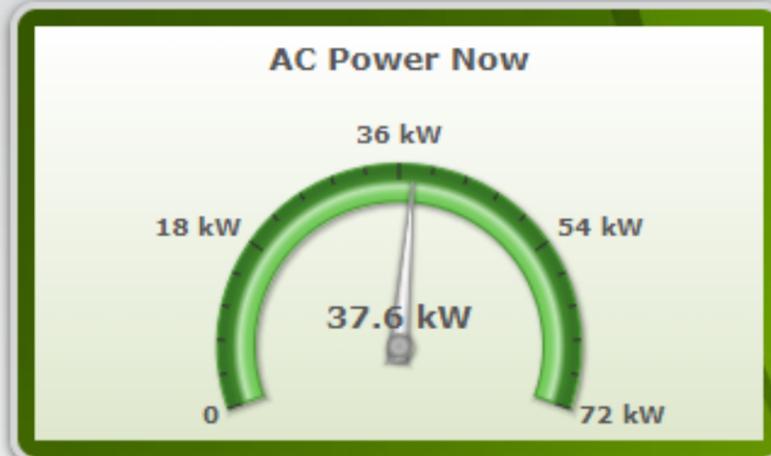
Project Details

Site Analytics

Mon Mar 29th, 2021 10:50 AM

Page refresh in 14:16

ONLINE



SOLRENVIEW

powered by YASKAWA SOLECTRIA SOLAR

Net Zero Project – Four Winds Alternative CTE School, Fort Totten, ND



# Fort Totten Alternative School

Animated View

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Feedback

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Environmental Footprint

Project Details

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Mon Mar 29th, 2021 10:50 AM

ONLINE

Inverter 1 [1013271702017 PVI 36TL]

Inverter 2 [1013271702003 PVI 36TL]

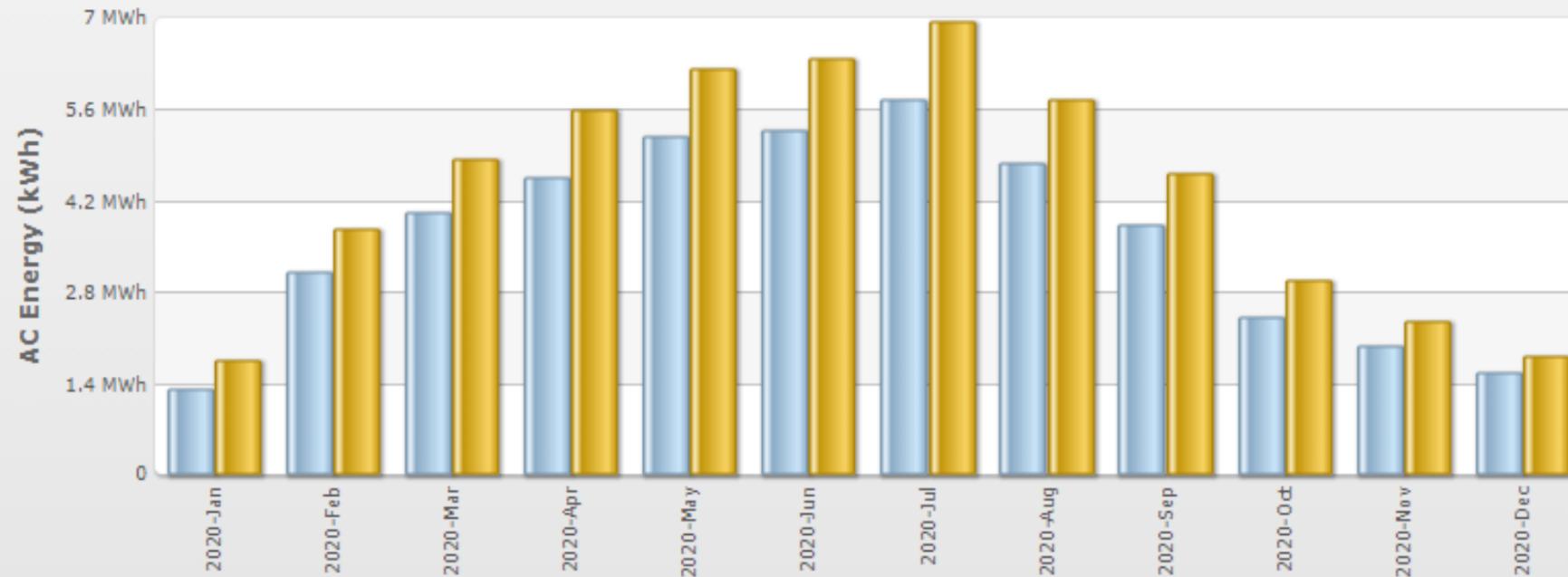


Today

Export Data

Analytics [2020-01-01 - 2020-12-31]

Total Energy generated by Inverter 1 [1013271702017 PVI 36TL] = 43.34 MWh  
Total Energy generated by Inverter 2 [1013271702003 PVI 36TL] = 52.67 MWh



Inverter 1 [1013271702017 PVI 36TL] - AC Energy (kWh) Inverter 2 [1013271702003 PVI 36TL] - AC Energy (kWh)

Day

Week

Month

Year

Range

AC Energy

AC Power

AC Current

AC Voltage

DC Voltage

DC Current

SOLRENVIEW

powered by YASKAWA SOLECTRIA SOLAR

Net Zero Project – Four Winds Alternative CTE School, Fort Totten, ND



# Lessons Learned

- Simplifies the design process
- Reduces risk of failures at exterior envelopes
- Provides a long-life structure
- Pairs well with Energy Efficient design, esp. Net Zero
- Teaches a trade skill to local labor, especially with shortage of good masons
- No lead times, can start construction quickly, especially with fast track/bid pack scenarios

**THANK YOU**

