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Sheperd Community Campgrounds Cabin

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Logan Nazarene Camp

Group 11

Team Members: Hannah Taggart, Nathan Hart, Michael Hill, and Miles Vander Klok

Faculty Mentor: Quinten Scott Ragan

Project Sponsor: Rob Paugh

4/21/2022



Martin D. Walker School of
SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS

Acknowledgements

Rob Paugh

- Excellent sponsor
- Met over Zoom bi-weekly
- Emailed weekly
- God-centered vision

Professor Ragan

- Excellent mentor
- Met weekly for questions and advice
- Provided textbooks, drawings, and other manuals

Meet the Team

- Hannah Taggart – Structural, Floor & Wall Framing, Foundation
- Nathan Hart – Structural, Truss Design
- Michael Hill – Architectural, Revit
- Miles Vander Klok – MEP, Project Communications

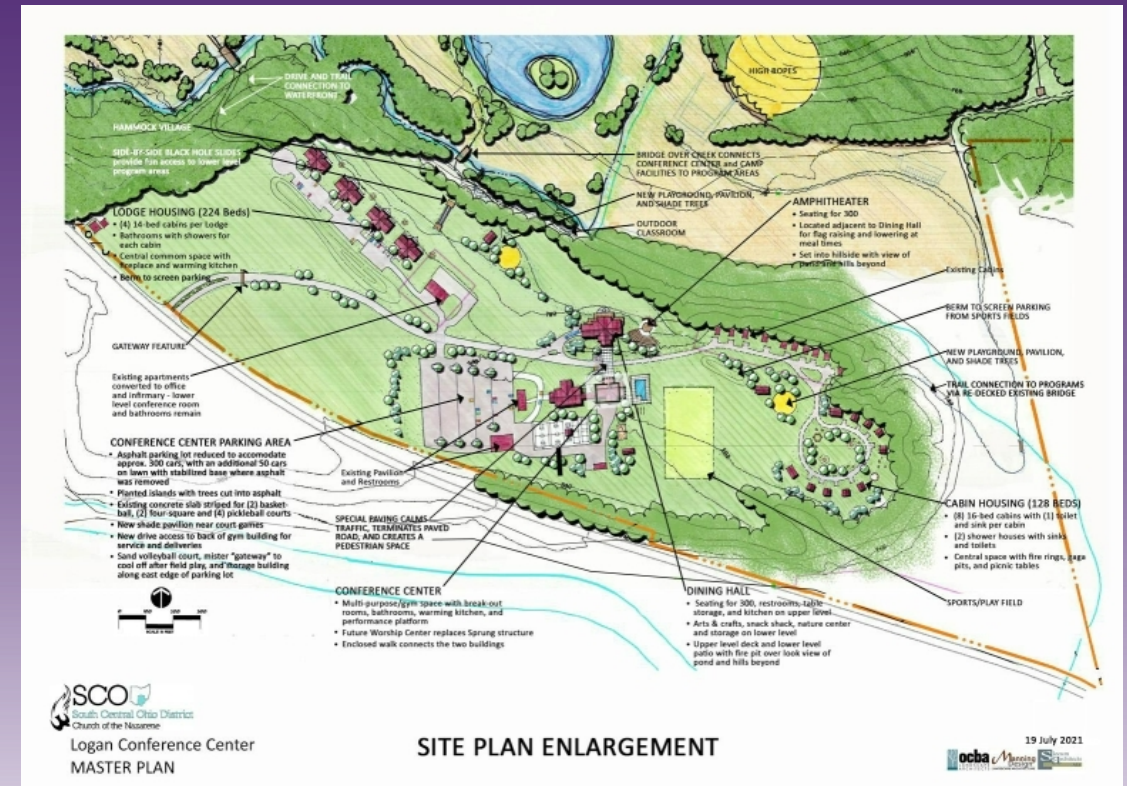
Presentation Outline

- Project Background
 - Sponsor
 - Problem
 - Design Objectives
 - Functional Requirements
 - Design Constraints
 - Codes and Other Constraints
- Design Alternatives
 - Initial Design
 - Design Proposal
 - Decision Matrix
 - Engineering Analysis
- Final Design
 - § Deliverables
 - Revit Model
 - Cost Analysis
- Design Validation
 - ASTM Testing Plan
 - ASTM Testing Results
 - Meeting all Projections
- Conclusion
 - Benefit to Users & Future Recommendations
 - Q & A

Project Background

Project Background

- Sponsor – Rob Paugh
 - Lead Pastor of Shepherd Church of the Nazarene
 - Gahanna, Ohio
 - Church owns land
 - Hocking Hills, Ohio



Problem Statement

- Design a cabin from the ground up

- Host people year-round
 - Ability to be open 365 days
 - Future to expand
- Mission Field
 - Proclaim the Gospel through the outdoors
- Host Everyone
 - All ages
 - All backgrounds



LOGAN CONFERENCE CENTER PHASED DEVELOPMENT PLAN **TOTAL 14 M**

PHASE 1 2.0M

PRIORITY 1 CABIN VILLAGE
4 Cabins
1 Shower Houses
898 K

CAMPER CABINS

SHOWER HOUSES

PRIORITY 2 RUSTIC DINING HALL
Full Working Kitchen
Dining Seating for 150
Meeting Room
545 K

PHASE 2 3.4M

LODGE HOUSING
14 Single Story Lodges
Sleep 48 Campers Per Lodge
4 Dividable Rooms Per Lodge

PRIORITY 3 PROGRAMMING FACILITIES & EQUIPMENT
Outdoor Chapel & Amphitheater
Sports Fields
Bridge
Primitive Camping Areas
Low Ropes & High Ropes
Shooting Ranges
Hammock Hamlet
557 K

HIGH ROPES CONCEPT

AMPHITHEATER

PHASE 3 3.8M

DINING HALL
14,320 Square Feet - Seat 250+
Professional Food Prep Kitchen
Lower Level Snack Shop & Classrooms

PHASE 4 & 5 2.4M

GYMNASIUM PARKING & MAINTENANCE BARN

DELAYED 2.4M

PROJECTS ON HOLD
4 Cabins
Shower House
Pond & Waterfront
Some Programming Facilities and Equipment

30682 CHIEFTAIN DR, LOGAN, OH 43138 **SCONAZ.ORG**

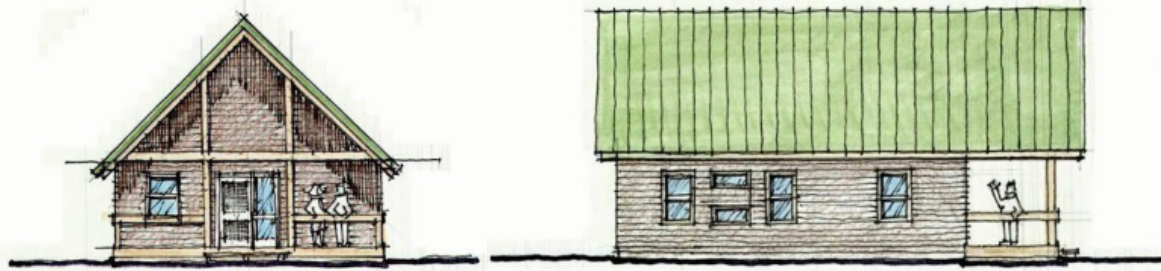
Problem Statement

Design Objectives

- Sustainable
- Low Maintenance
- Cost Efficient
- Rustic Appearance

Functional Requirements

- Temperature Control
- Sleeps 12-16 Campers
- Fits 6-8 Bunk Beds
- Plumbing for Toilet and Sink
- Adequate Lighting

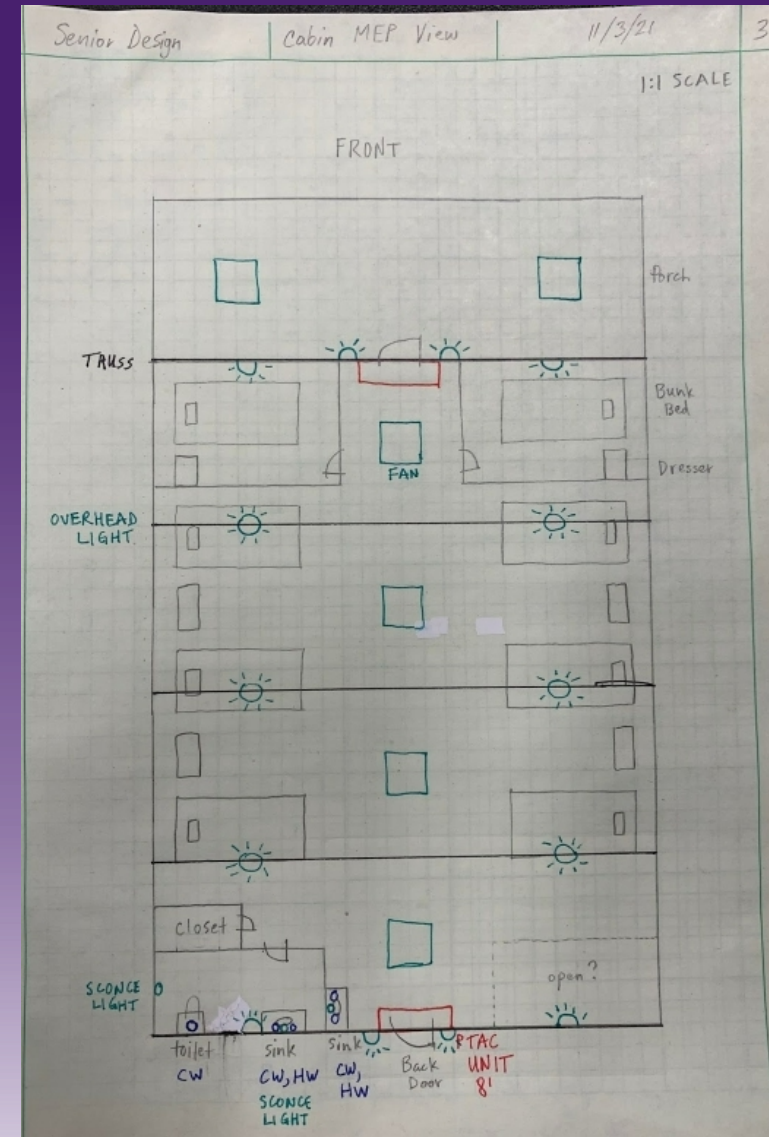


FRONT ELEVATION

SIDE ELEVATION

Design Constraints

- Size: 24 by 32 feet
- 8-foot front porch
- Separated counselor's room
- Toilet and sink
- Heated water
- Sturdy in harsh weather
- Preliminary budget of \$700,000/four cabins
- Materials: No drywall, wood sourced on-site, green metal roof, CMU foundation



Problem Statement- Codes and Other Constraints

Codes

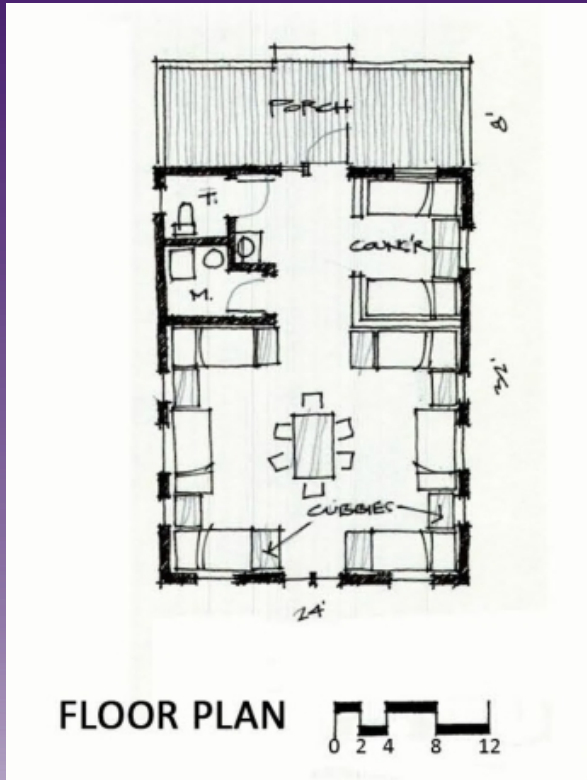
- IBC - International Building Code
- IMC - International Mechanical Code
- IPC - International Plumbing Code
- IRC - International Residential Code
- NEC - National Electrical Code
- OBC - Ohio Building Code

Other

- ACI - American Concrete Institute
- ADA - American Disabilities Act
- ASCE - American Society of Civil Engineers
- ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers
- ASTM - American Society for Testing and Materials
- NDS - National Design Specification for Wood Construction

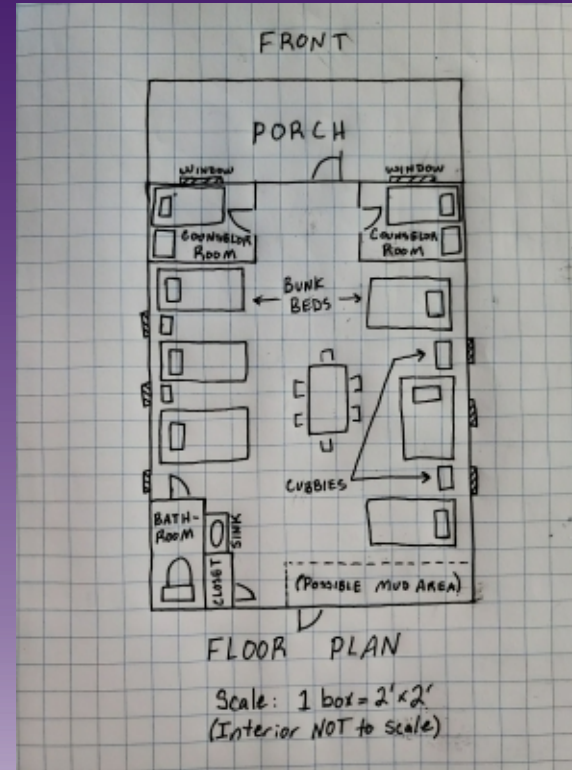
Design Alternatives

Initial Design



Sketch by Jon Rambow

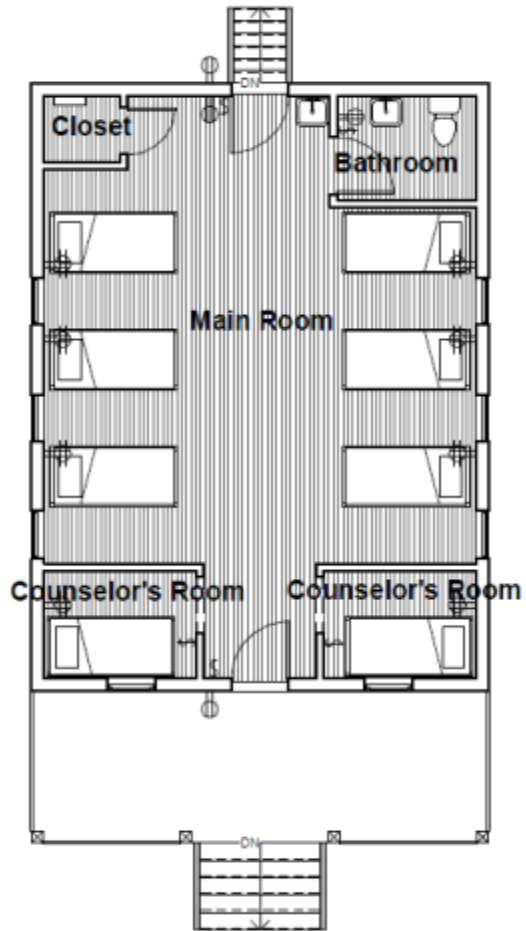
- 8' Wood Porch
- 1 Counselor Room (2 beds)
- Bathroom in Front
- Mechanical Equipment Room (Furnace and Water Heater)
- Center Table with Chairs



Sketch after site visit (10/7/21)

- 8' Concrete Porch
- 2 Counselor Rooms (1 bed each)
- Bathroom in Back
- Small Storage Room
- PTAC Unit(s) for Air Control
- Under-Sink Water Heater
- Center Table with Chairs
- Possible Mud Room

Design Proposal



Decision Matrix

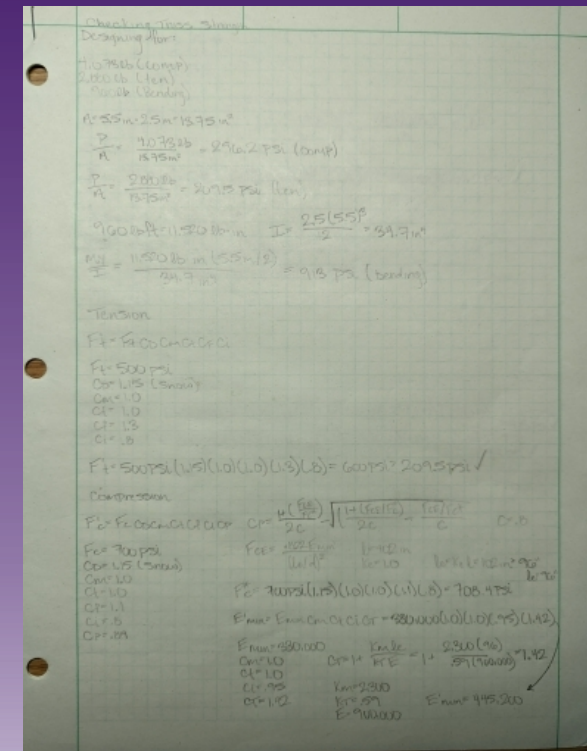
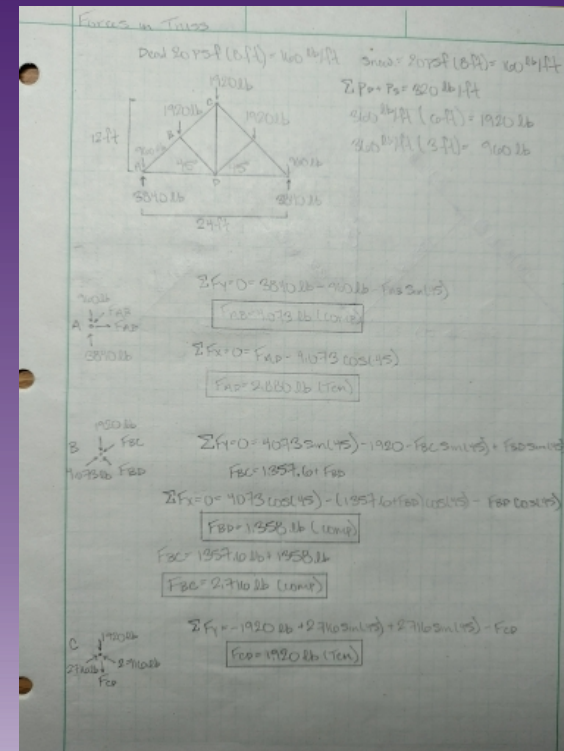
PTAC Unit



Item: HVAC	PTAC UNIT										
		BLUERIDGE BPM07		AMANA PTH073G35AXXX		Friedrich PZE09K3SB		Friedrich Zoneaire		Friedrich PDH07K3S	
Criteria	Weight	Score (1-10)	Weighted Score	Score (1-10)	Weighted	Score (1-10)	Weighted	Score (1-10)	Weighted	Score (1-10)	Weighted
Durable/ Long-lasting	8	8	64	9	72	8	64	8	64	8	64
Renewable/ Economical (Efficiency)	5	9	45	7	35	7	35	8	40	9	45
Cost-efficient (Price)	8	9	72	7	56	6	48	6	48	5	40
Low-maintenance	7	7	49	7	49	7	49	7	49	7	49
Total Score			230		212		196		201		198
% Score (Normalized) [Value/ Largest Value]			82%		75.70%		70.00%		71.80%		70.70%
Grade [A+ ... F]			B-		C		C-		C-		C-
			heating-and-cooling-units/air-coating-and-cooling-units/air-cond		adison.com/cgi-bin/ajmadison/		eaire-select-ptac-pzh07k3sb-7200		packaged-terminal-air-condition		

Engineering Analysis of Truss

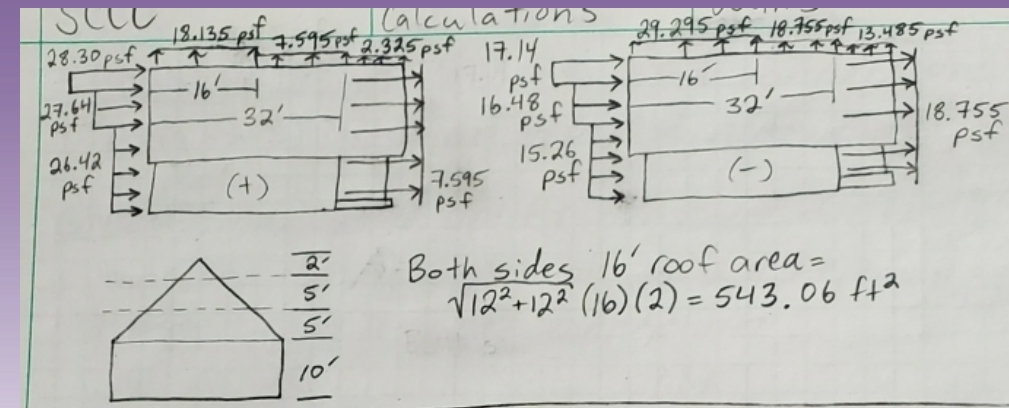
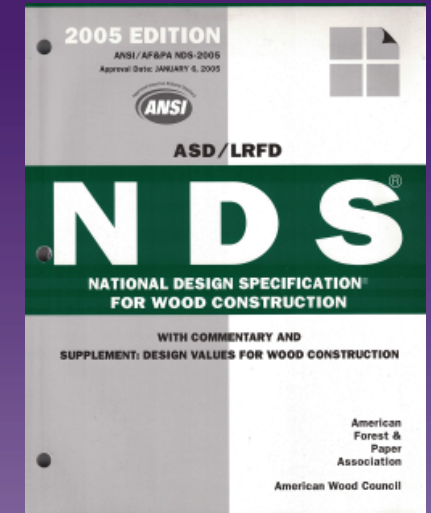
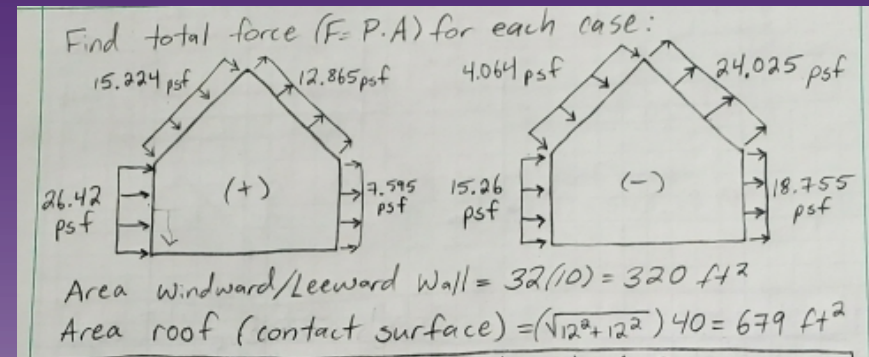
- Used statics and mechanics of materials formulas for analysis of the truss members
- First used method of sections to determine the forces in each truss member
- Then, using the design strength of White Oak at a No. 2 grade from the National Design Specification for Wood Construction, used the mechanics of materials formulas to determine what size lumber would be required to support that load
- Finally determined that using a 3x6 for the truss members would be the best option



Engineering Analysis

Additional Calculations to Support Design of...

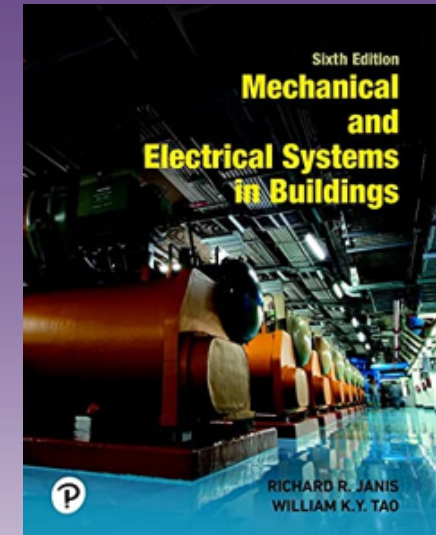
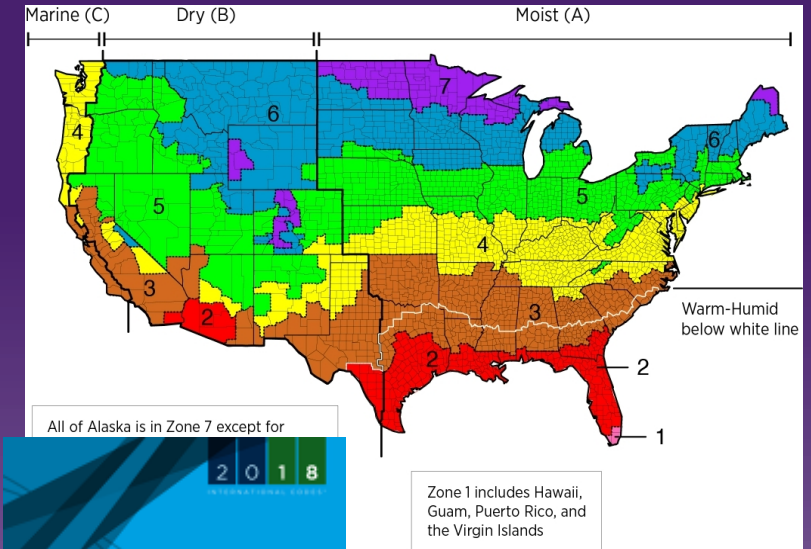
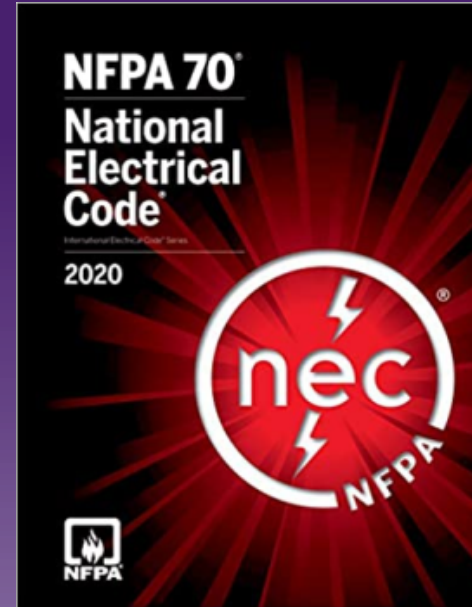
- Structural columns
- Wall studs/framing
- Floor joists/framing & girders
- Shear & uplift resistance mechanisms due to wind loading
- ASTM wood testing



Engineering Analysis

Codes used:

- Mechanical
 - ASHRAE 90.2 - Climate Zone 5
 - Required 46,080 Total BTUs
 - Providing 52,800 Total BTUs
 - U.S. Department of Energy
- Electrical
 - NFPA 70 – NEC 210, 250, 348, 358, and more
- *Mechanical and Electrical Systems in Buildings* by William K.Y. Tao



Final Design

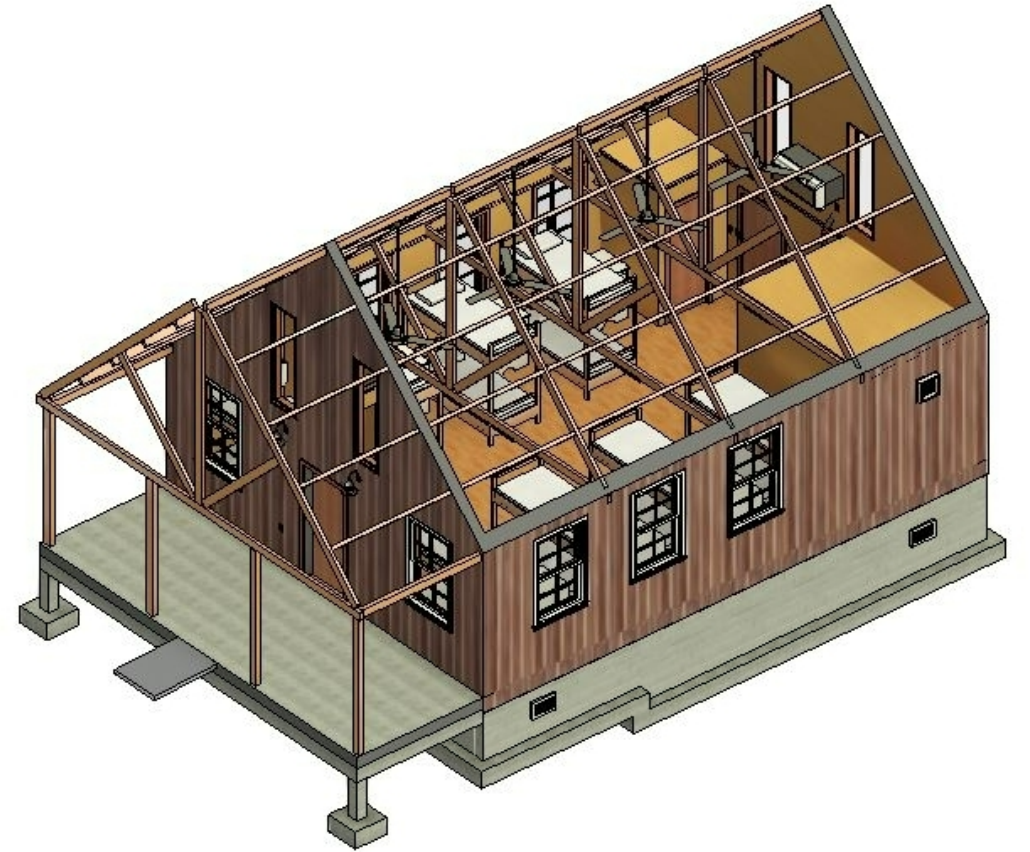
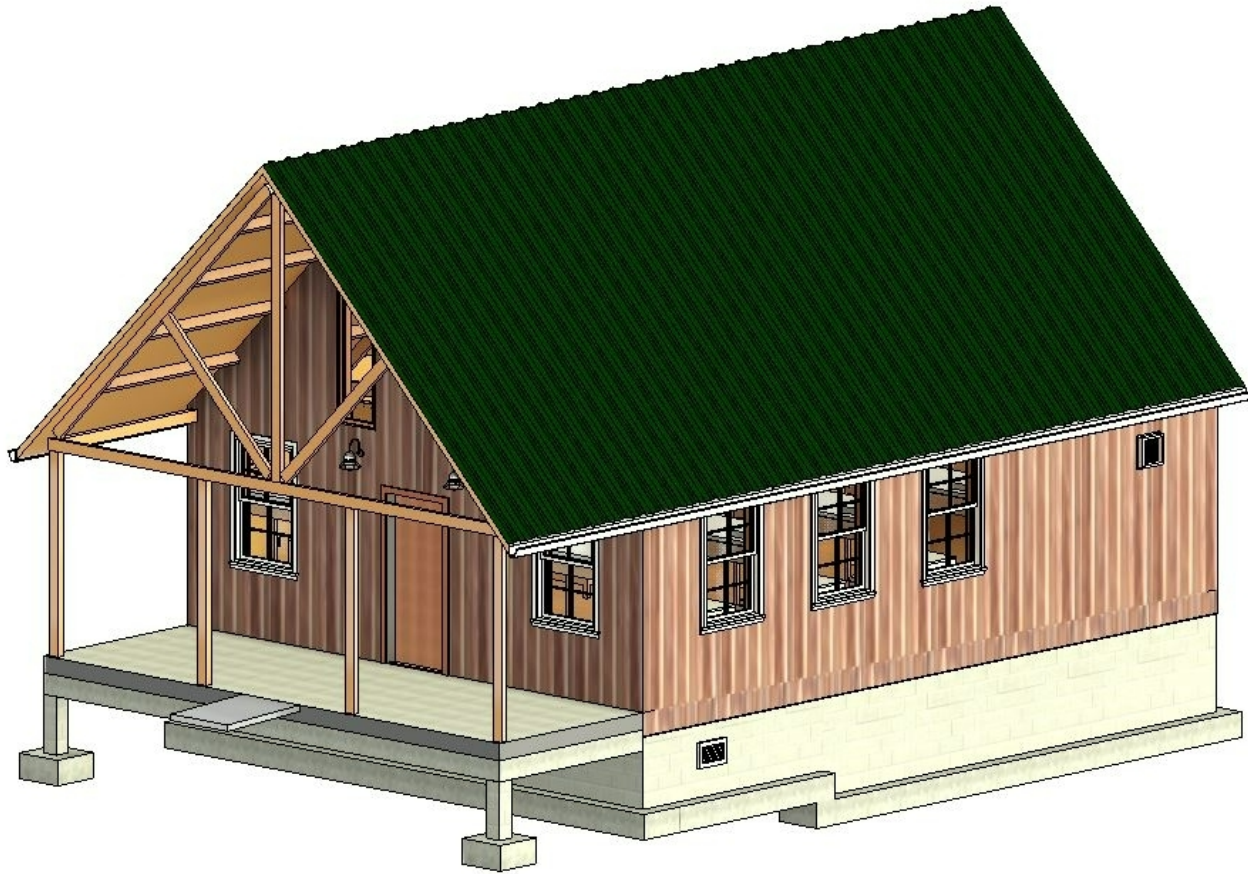


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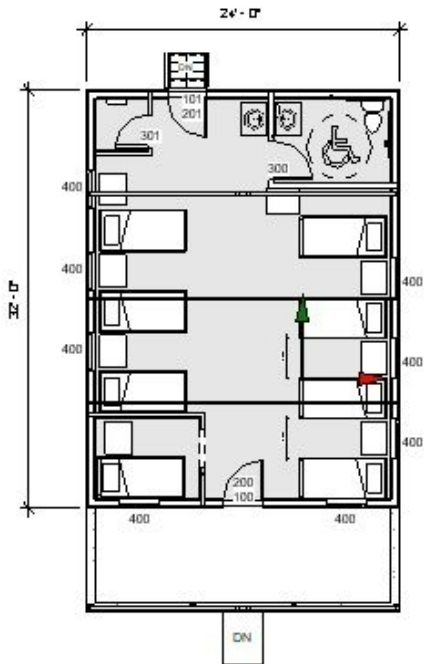
Deliverables

- 1) Revit File – 3D Model and Sheets
- 2) Construction Documents
- 3) Material Cost Spreadsheet
- 4) Engineering Calculations
- 5) Final Presentation
- 6) Final Report

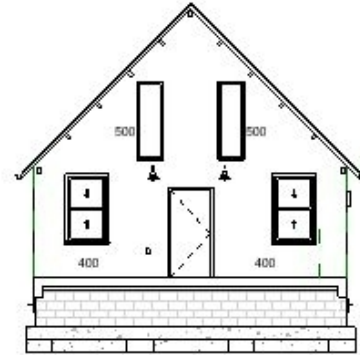
REVIT - 3D



Revit – Architectural Sheet



① Level 1 Architectural
1/8" = 1'-0"



② Gable Window Front View
1/8" = 1'-0"

Door Schedule

Door Number	Description	Width (Inches)	Height (Inches)	Thickness (Inches)	Door Material	Notes
100	Front Door	36	80	1-3/4	Wood	Unfinished
101	Back Door	36	80	1-3/4	Wood	Unfinished
200	Front Screen Door	36	80	1-3/8	Wood	Removable screen
201	Back Screen Door	36	80	1-3/8	Wood	Removable screen
300	Bathroom Door	36	80	1-3/8	Wood	Right hung
301	Closet Door	36	80	1-3/8	Wood	Left Hung

Window Schedule

Window Number	Brand	Description	Width (Inches)	Height (Inches)	Thickness (Inches)	Notes
400	Pella Lifestyle	Double-Hung	37	59	1 1/16	
500	Pella Lifestyle	Picture Window	47	59	1	

*Refer to Material Cost Spreadsheet for product specifications



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Logan Nazarene Campground

No.	Description	Date

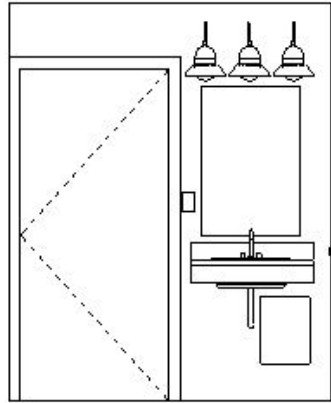
Architectural Plan

Project number	Project Number	A101
Date	Issue Date	
Drawn by	Author	Scale 1/8" = 1'-0"
Checked by	Checker	

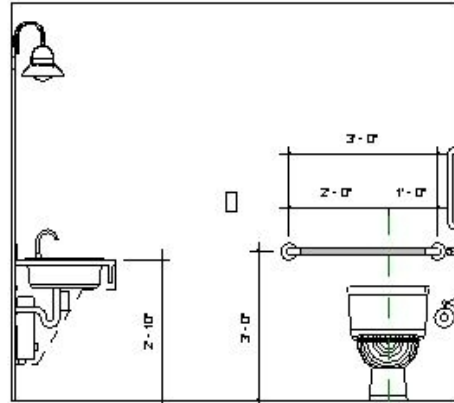
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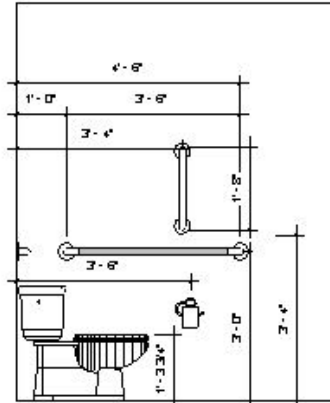
Revit – Bathroom Details



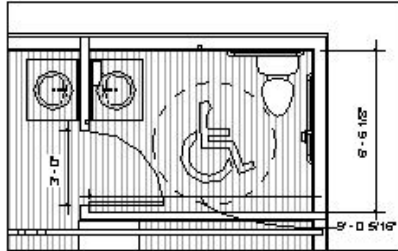
1 Bathroom-East
1/2" = 1'-0"



2 Bathroom-North
1/2" = 1'-0"



3 Bathroom-West
1/2" = 1'-0"



4 Level 1 Architectural Bathroom
1/4" = 1'-0"

Codes:

- 2010 ADA Standards Chapter 6
- 603 Toilet and Bathing Rooms
- 604 Water Closet and Toilet Compartments
- 606 Lavatories and Sinks
- 609 Grab Bars

Notes:

See Plumbing Sheets P101, P102, P103, and P104 for product and piping notes



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No.	Description	Date

Bathroom Details

Project number	Project Number	A106
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	
Scale As indicated		

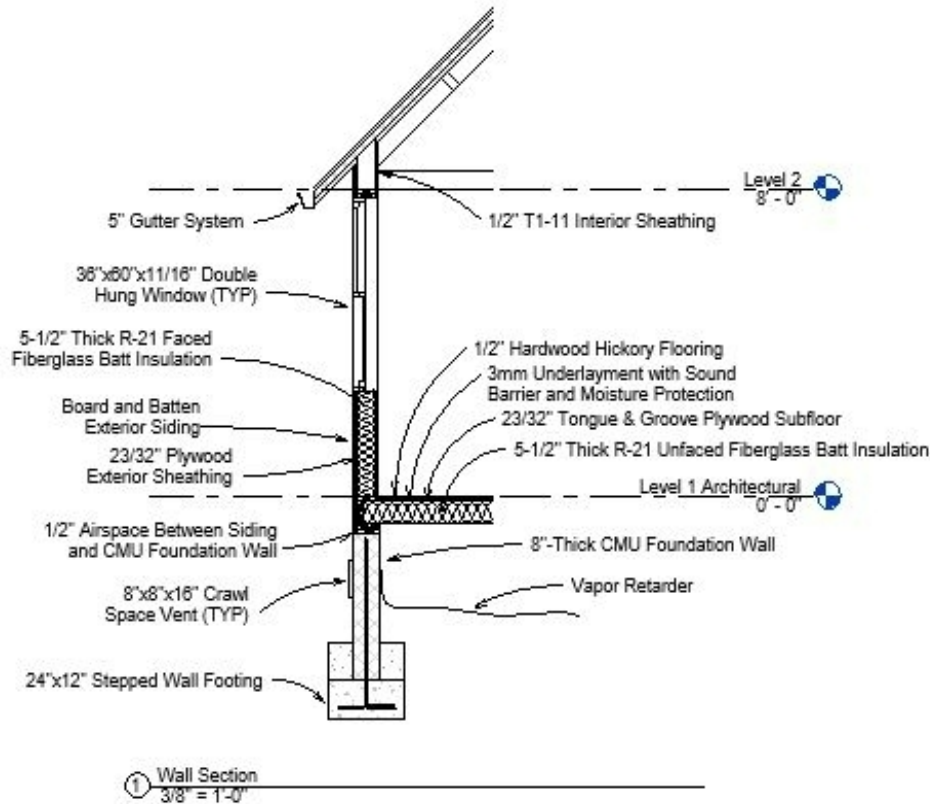
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Revit - Walkthrough



Revit - Wall Section



Notes:

- Board and Batten Exterior Siding shall be treated with Thompson's WaterSeal finish or similar approved product.
 - Vapor Retarder shall have greater than or equal to 0.1 permeance, be lapped a minimum of 6", and sealed along all joints. It shall extend a minimum of 24" up the interior of the foundation wall and sealed.
 - Crawl Space Vents must be offset horizontally a minimum of 36" from corner of Foundation Wall. A minimum of (2) vents shall be spaced 22' apart or greater along side Foundation Walls and (1) vent centered along rear Foundation Wall. Vents must be installed above grade and may structurally replace one 8"x8"x16" CMU in the Foundation Wall.
 - Insulation shall be installed with faced side towards the interior of the building. Insulation in flooring will be braced by Simpson Strong-Tie Insulation Supports. Follow manufacturer instructions.
 - Interior and exterior sheathing shall be fastened in accordance with IBC Table 2304.9.1 at 3" O.C. maximum spacing. Exterior siding shall be fastened likewise at 2" O.C. maximum spacing.
- *See S401 for structural wall details.
 *See S103 for roof material and construction details.
 *See S201-S203 for foundation details.
 *Refer to IBC Table 2304.9.1 for standard Fastening Schedule.
 *Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, OBC, and NDS for Wood Construction for applicable code.
 *Refer to Material Cost Spreadsheet for product specifications.



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No.	Description	Date

Wall Section

Project number	Project Number	A105
Date	Issue Date	
Drawn by	Author	Scale: 3/8" = 1'-0"
Checked by	Checker	

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Revit – Electrical Sheets

3/16" = 1'-0"
Level 1 Electrical Power

Electrical Legend
 1/2" = 1'-0"
 GFI Duplex Receptacle
 USB Duplex Receptacle
 Standard Duplex Receptacle
 Special Receptacle
 Junction Box
 3-Way Switch
 Single Switch

Code (Typ.):
 - NEC ARTICLE 210 Branch Circuits
 - Refer to NEC Table 210.21(B)(2) Maximum Cord-and-Plug-Connected Load to Receptacle
 - Refer to Table 210.24 Summary of Branch-Circuit Requirements
 - NEC ARTICLE 250 Grounding and Bonding
 - Table 250.122 Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment
 - NEC ARTICLE 348 Flexible Metal Conduit: Type FMC
 - Table 348.22 Maximum Number of Insulated Conductors in Metric Designator 12 (Trade Size 3/8) Flexible Metal Conduit
 - NEC ARTICLE 358 Electrical Metallic Tubing: Type EMT

Notes:
 Rotate all USB Receptacles (F) 90 degrees to fit between window and dresser
 Rough-in before final construction

Receptacle Schedule

Mark	Description	Manufacturer	Amps	NEMA	Poles	Wires	Quantity
A	PTAC 30 Amp Receptacle	Hubbell Wiring Device-Kellems	30	6-30R	2	3	1
B	PTAC 20 Amp Receptacle	Bryant	20	6-20R	2	3	1
C	Water Heater Receptacle	Hubbell Wiring Device-Kellems	20	5-20R	2	3	1
D	Standard GFI Receptacle	Bryant	15	5-15R	2	3	1
E	Standard Receptacle	Hubbell Wiring Device-Kellems	15	5-15R	2	3	3
F	USB Receptacle	Hubbell Wiring Device-Kellems	15	5-15R	2	3	6

***Refer to Material Cost Spreadsheet for product specifications**

OLIVET NAZARENE UNIVERSITY
 Rob Paugh
 Logan Nazarene Campground

Electrical Power - Level 1

No.	Description	Date

Project number: _____
 Date: _____
 Drawn by: Author
 Checked by: Checker

E101
 Scale As Indicated

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3/16" = 1'-0"
Level 1 Electrical Lighting

Electrical Legend
 1/2" = 1'-0"
 GFI Duplex Receptacle
 USB Duplex Receptacle
 Standard Duplex Receptacle
 Special Receptacle
 Junction Box
 3-Way Switch
 Single Switch

Light Fixture Schedule

Mark	Description	Manufacturer	Lamp	Volts	Watts	Quantity
A	Bathroom Light	Iron Hill 2 Light Wall - 6349	E26	120	60	1
B	Interior Wall Sconce	Bel Air Lighting - Tacoma 1	E26	120	60	2
C	Exterior Wall Sconce	Bel Air Lighting - Tacoma 1	E26	120	60	4
D	Interior Strip Light	Lithonia Lighting - 250K65	LED	120	20	6
E	Ceiling Fan and Light	Hunter Bronham 12" - 50033	E26	120	18	4

***Refer to Material Cost Spreadsheet for product specifications**

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 Rob Paugh
 Logan Nazarene Campground

Electrical Lighting - Level 1

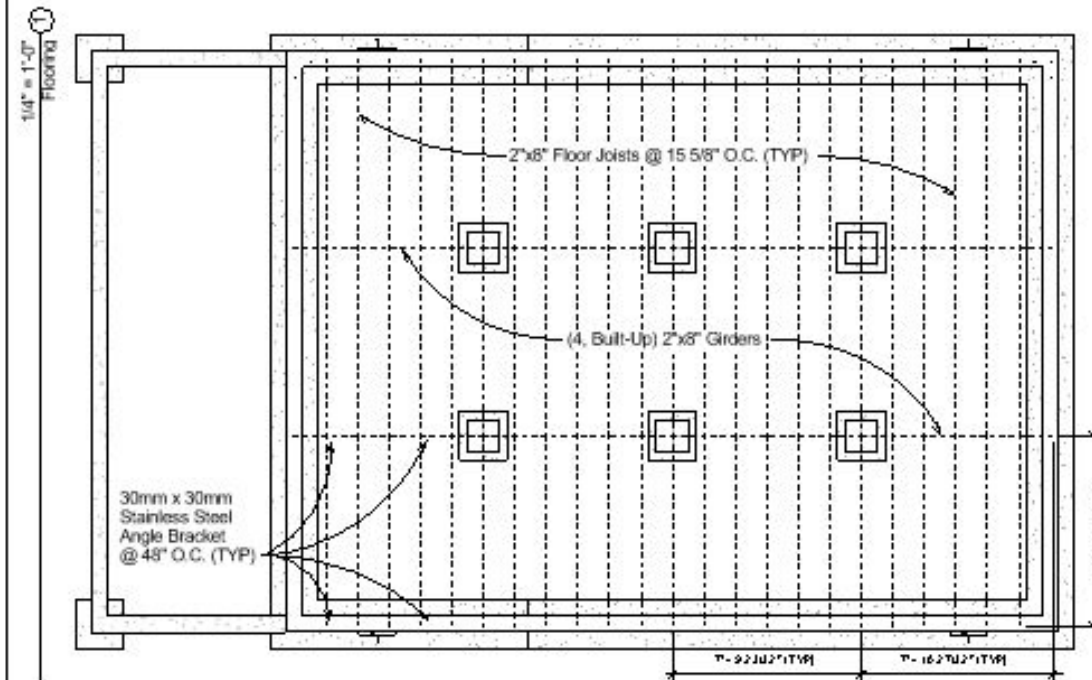
No.	Description	Date

Project number: _____
 Date: _____
 Drawn by: Author
 Checked by: Checker

E102
 Scale As Indicated

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Revit – Structural Flooring



Notes:

1. Floor joists shall be situated on top of girders and oriented such that the vertical load is applied to the narrow face. Each joist shall be laterally blocked at maximum 8' spans and fastened (on both support ends) to sill plate with 30mm x 30mm stainless steel angle brackets at 48" O.C. or every third joist.
2. Girders shall be built-up of (4) 2"x8" lumbers, adhered with construction adhesive and fastened in accordance with IBC Table 2304.9.1, using (3) rows of nails at 2.5" O.C., where nails in a row are spaced at 6" O.C. Girders must be preservative-treated or provided with 1/2" airspace on top, sides, and end of girder entering exterior foundation wall. Where girders enter exterior foundation wall, sill plates must adequately cover opening in exterior wall to prevent girder-to-wall contact. Girders shall span between pier footings and be centered on top of sill plates.
3. All sill plates shall be of preservative-treated wood.

*Preservative-treated wood, as defined by the Ohio Building Code (2017), is wood that is "conditioned with chemicals by a pressure process or other means, exhibiting reduced susceptibility to damage by fungi, insects or marine borers."

*Nominal dimensions are given for dimensional lumber.

*Refer to IBC Table 2304.9.1 for standard Fastening Schedule.

*Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, OBC, and NDS for Wood Construction for applicable code.

*Refer to Material Cost Spreadsheet for product specifications.



Rob Paugh

Logan Nazarene Campground

No.	Description	Units

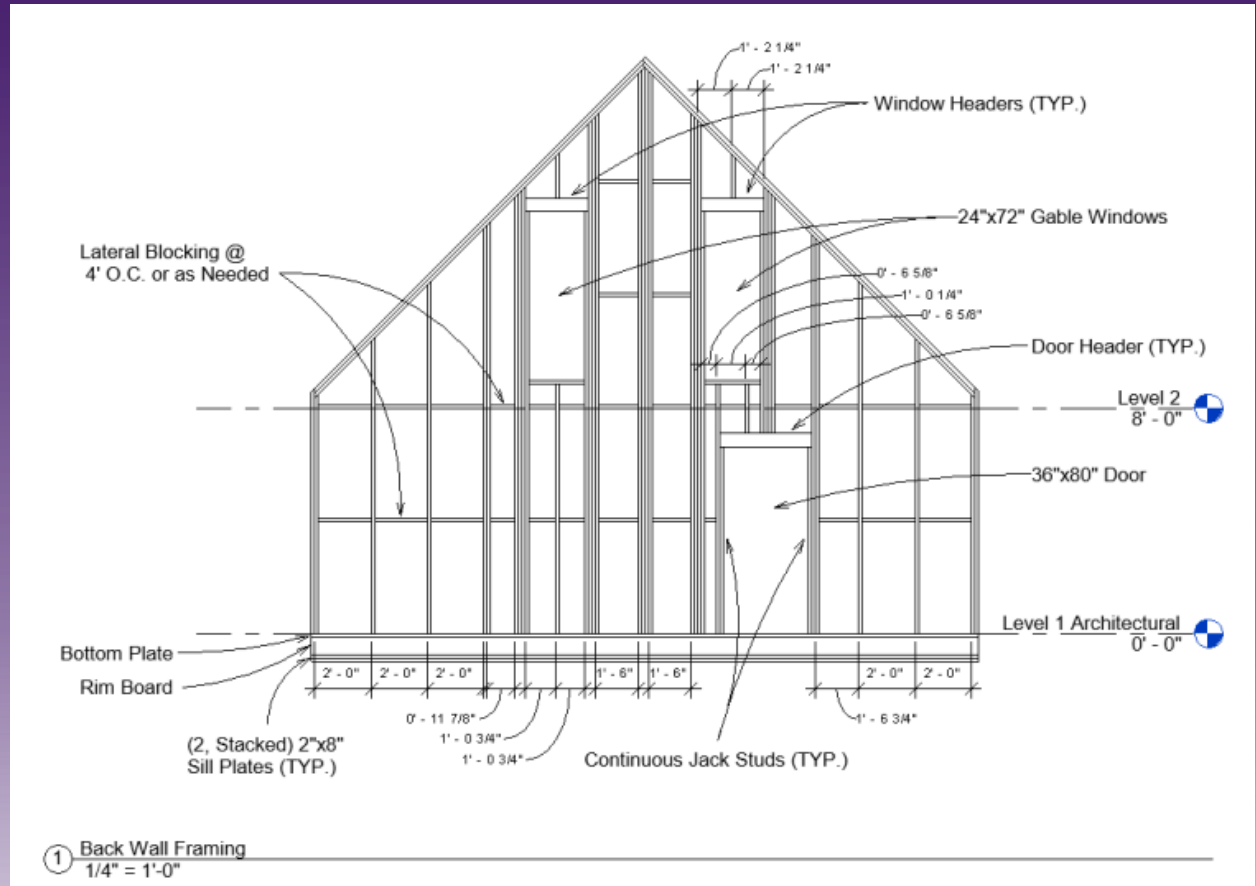
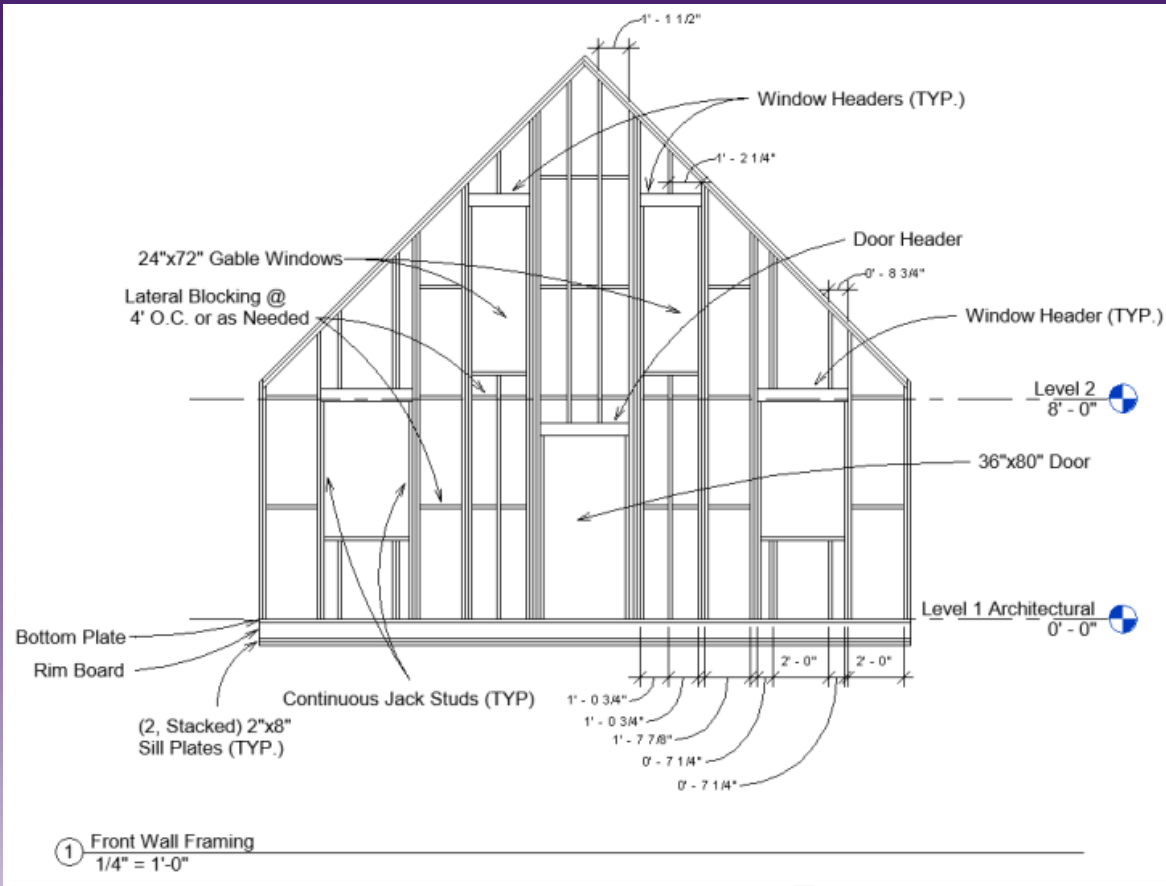
Structural Flooring

Project number	Project Number	S301
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	
Scale		1/4" = 1'-0"

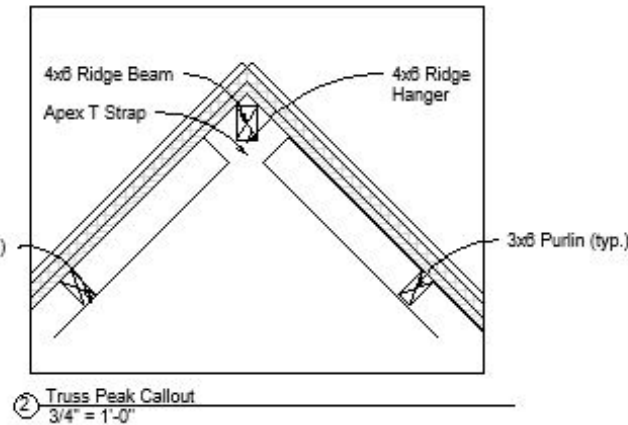
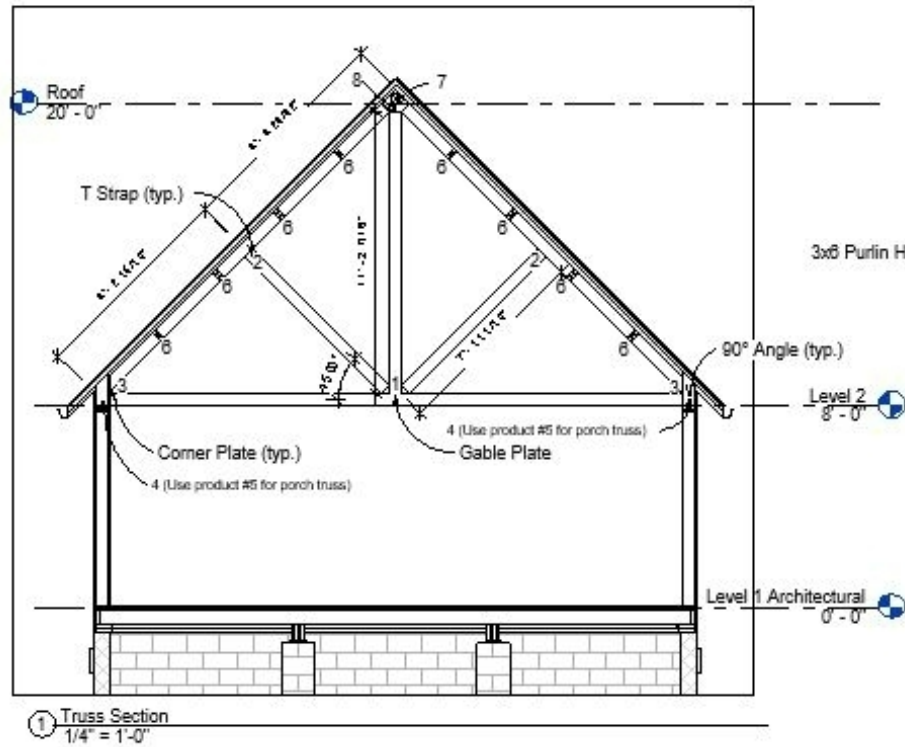
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Revit – Wall Framing



Revit – Truss



Metal Bracket Schedule									
Number	Name	Width (inches)	Height (inches)	Length (inches)	Thickness	Model No.	Quantity	Notes	
1	Gable Plate	5	19-2 1/2	34-1/2	1/2 Gauge	APV1212	8		
2	T-Strap	5	16-1/2	18	1/2 Gauge	APV75	16		
3	Corner Plate	-	-	-	-	-	16	Special Order Part	
4	90° Angle	3	3-1/4	3	1/2 Gauge	APV34	12		
5	Deck Joint Tie	5	8-1/2	-	1/2 Gauge	APV1214	4		
6	Purlin Hanger	2-9/16	5-3/8	18	1/8 Gauge	L78	84		
7	Ridge Beam Hanger	5-9/16	5-1/8	3	1/2 Gauge	APV64	16		
8	Apex T-Strap	3-1/2	12	12	3/8 Gauge	1212HTPC	8		
9	Reinforcing Angle	-	-	4-7/8	1/8 Gauge	L55	24		

Name	Description	Quantity	Notes
1/2 inch Bolt	Truss Plate/T-Strap/Corner Plate Bolt	240	Use 3 inch long bolts
1/2 inch Nut	Truss Plate/T-Strap/Corner Plate Nut	240	
SDWS2210268 Structural Wood Screw	90° Angle/Deck Joint Tie/Ridge Beam Hanger Screw	60	
STN2 Hex-Head Washer	90° Angle/Deck Joint Tie/Ridge Beam Hanger Washer	60	
316 Stainless-steel Nails (3.152" x 3-1/2")	Purlin Hanger Nail (Hanger to truss)	872	
316 Stainless-steel Nails (3.148" x 3-1/2")	Purlin Hanger Nail (Hanger to purlin)	336	
SDS2390 Wood Screw	Ridge Hanger Screw	60	
SS10d Nails (148 x 3")	Reinforcing Angle Nails	272	

*Refer to Material Cost Spreadsheet for product specifications



Rob Paugh

Logan Nazarene Campground

No.	Description	Date

Truss System Front View

Project number	Project Number	S101
Date	Issue Date	
Drawn by	Author	Scale As Indicated
Checked by	Checker	

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Final Design

- Cost Analysis
 - Budget of \$125,000 per Cabin
 - Generous Fundraising of Church and Community
- Completed Material Cost Spreadsheet

	Options	Unit Cost	Quantity	Total Cost	Link		
Switches	Occupancy Sensor	\$59.36	2	\$118.72	https://www.grainger.com/product/HUBBELL-WIRING-DEVICE-KELLEMS-Wall-Switch-Box-Hard-Wired-23NY59		
	3 Way Switch	\$11.81	2	\$23.62	https://www.grainger.com/product/HUBBELL-WIRING-DEVICE-KELLEMS-Wall-Switch-3-Way-49YL53		
	1 Way Switch	\$8.88	4	\$35.52	https://www.grainger.com/product/HUBBELL-WIRING-DEVICE-KELLEMS-Wall-Switch-1-Pole-49YL44		
and	Switch Cover	\$0.92	6	\$5.52	https://www.grainger.com/product/HUBBELL-WIRING-DEVICE-KELLEMS-Toggle-Switch-Wall-Plate-1-59KR04		
				Total Cost:	\$177.86		
Wiring	Options	Unit Cost	Quantity	Length	Total Cost	Link	https://www.hunker.com/13414107/how-to-calculate-conduit-size-for-wiring
	THHN 15 Amp = 14 AWG	\$98.91	1	500 ft	\$98.91	https://www.grainger.com/product/SOUTHWIRE-Building-Wire-14-AWG-Wire-2W407	
	THHN 20 Amp = 12 AWG	\$135.04	1	500 ft	\$135.04	https://www.grainger.com/product/SOUTHWIRE-Building-Wire-12-AWG-Wire-4W014	
	THHN 30 Amp = 10 AWG	\$217.68	1	500 ft	\$217.68	https://www.grainger.com/product/SOUTHWIRE-Building-Wire-10-AWG-Wire-4W010	
				Total Cost:	\$451.63		
Conduit	Options	Unit Cost	Quantity	Length	Total Cost	Link	
	FMC	\$181.42	1	100 ft	\$181.42	https://www.grainger.com/product/GRAINGER-APPROVED-Flexible-Metal-Conduit-Reduced-SYH60	
and	EMT	\$169.55	1	10 ft	\$169.55	https://www.grainger.com/product/CALBRITE-EMT-Conduit-Standard-304-Stainless-36LM37	
				Total Cost:	\$350.97		
Junction Box	Option	Unit Cost	Quantity	Total Cost	Link		
	Square Junction Box	\$10.08	8	\$80.64	https://www.grainger.com/product/RACO-Electrical-Box-Galvanized-2DDE1		
	Square Junction Box Cover	\$5.57	8	\$44.56	https://www.grainger.com/product/RACO-Electrical-Box-Cover-Square-2DDE3?opr=RAPD&analytics=REQACC_2DDE1		
				Total Cost:	\$125.20		
				TOTAL ELECTRICAL COST:	\$4,122.09		

Total breakdown	
Architectural	\$9,636.78
Roof	\$4,950.00
Truss	\$4,996.00
Floor	\$4,086.36
Foundation	\$10,200.85
Walls	\$946.80
Electrical	\$4,122.09
Mechanical	\$2,341.49
Plumbing	\$1,278.43
Sub Total:	\$42,558.80
+Tax (8%)	\$45,963.50
+Other (10%)	=\$50,559.85

Design Validation

Design Validation- ASTM Testing Plan

- Received Poplar, Red Oak, and White Oak samples (1/31/22)
- Replicate point load scenario
- Complete math on structural analysis and wood strength calculations
- Weight room experiment (2/17/22)
 - Thanks to Coach Peterson!

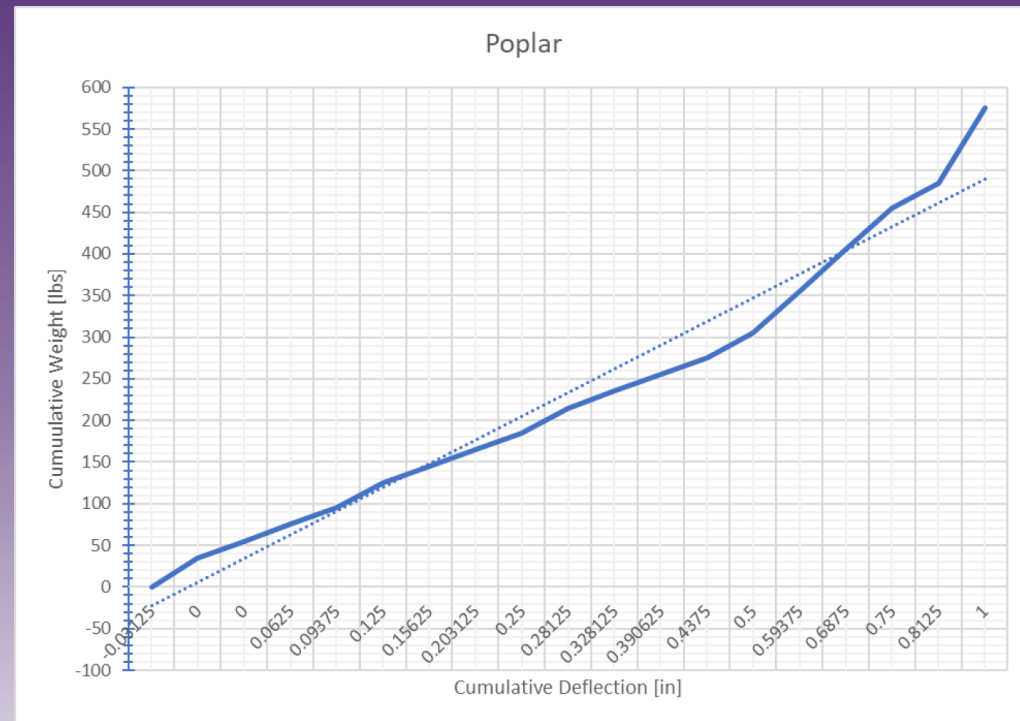


Design Validation- ASTM Testing Results

- Both White Oak and Poplar exceed necessary strength requirements



495 pounds!



575 pounds!

Design Validation

Functional Requirements	Inspection	Experiment	Analysis	Notes
Temperature Control			X	2 PTAC Units
Sleeps # Campers	X			12-16 Campers
Fits # Bunk Beds	X			6-8 Bunk Beds
Plumbing	X			Follow Code
Lighting			X	Lights and Windows

Design Validation

Design Objectives	Inspection	Experiment	Analysis	Notes
Sustainable		X	X	On-Site Wood
Low-Maintenance	X		X	Simple MEP Design
Cost Efficient			X	Under Budget
Rustic Appearance	X			All Wood Design

Conclusion



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Conclusion

Benefit to Users

- Brand new cabin for students
- Further develop the land for more use
- Great space to grow in relationships with peers and God

Future Recommendations

- Continue to develop the shower house, dining hall, gymnasium, and more
- Great internship opportunity to help design and construct buildings

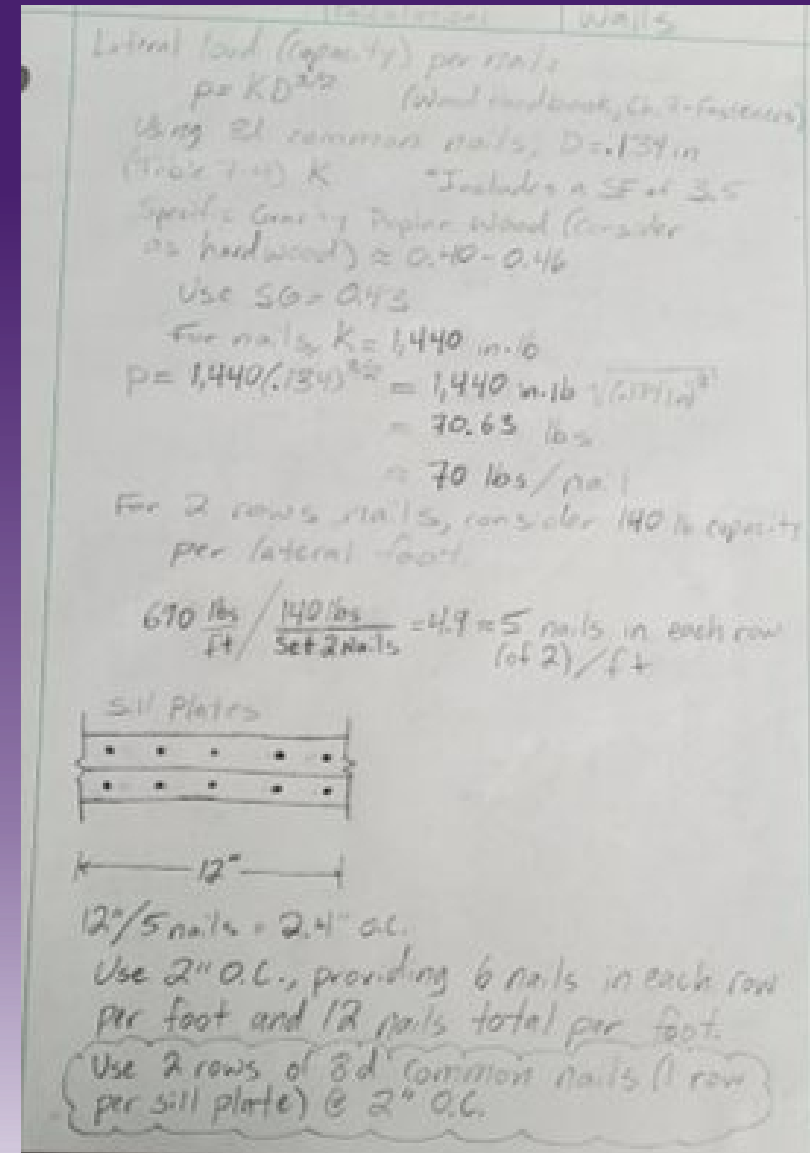
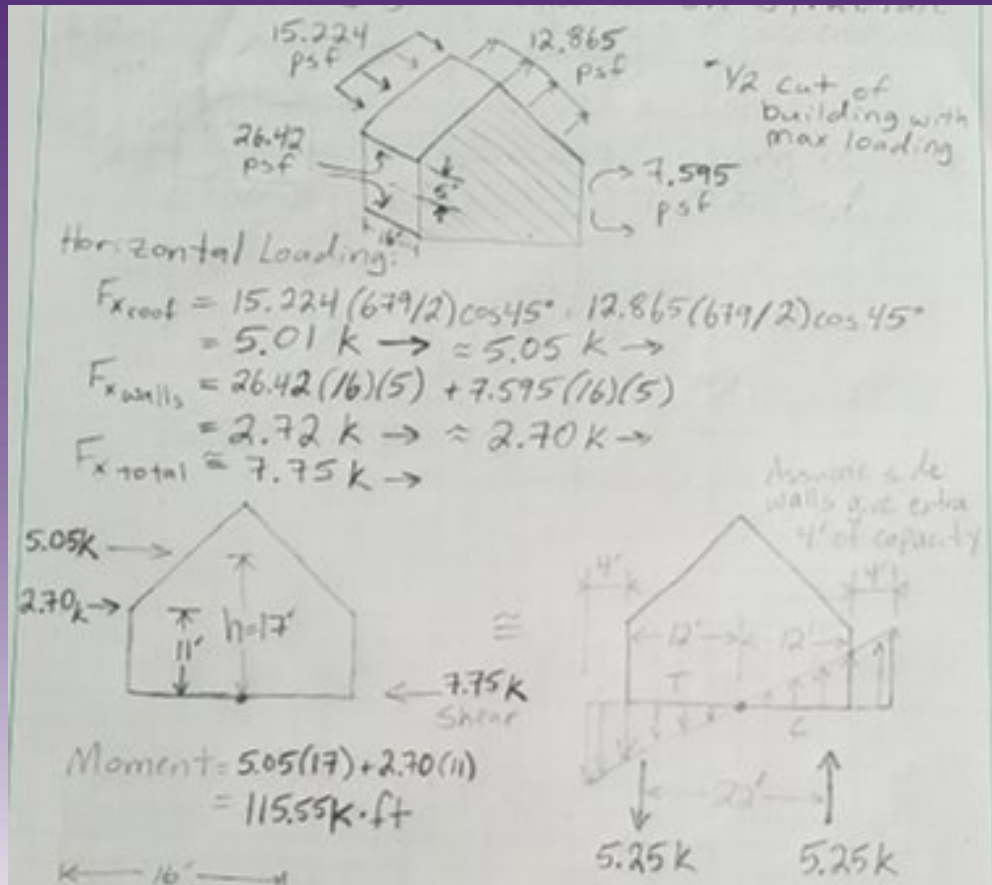
Q&A



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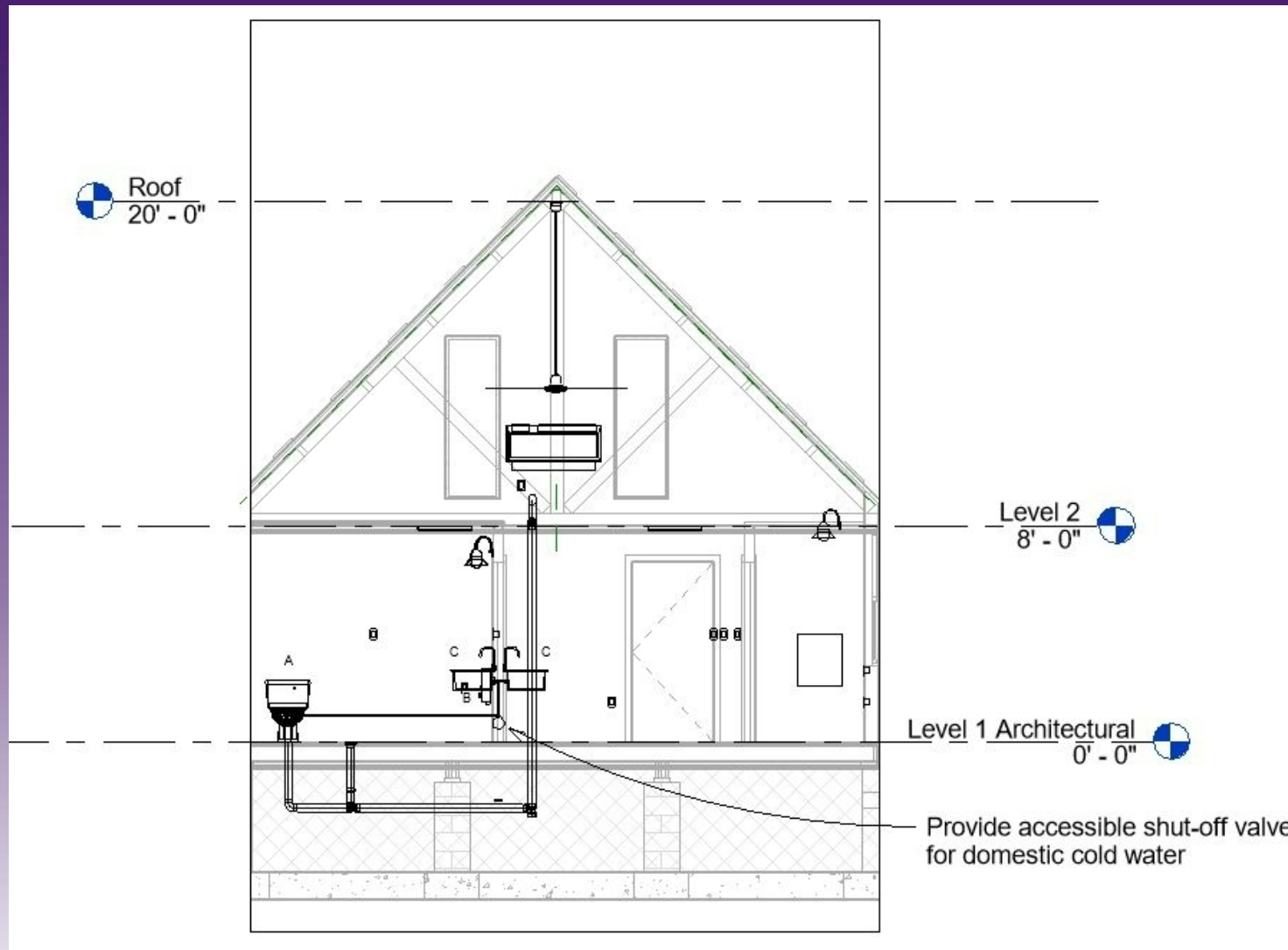
Extra Engineering Analysis Design Calculations

Structural Calculations

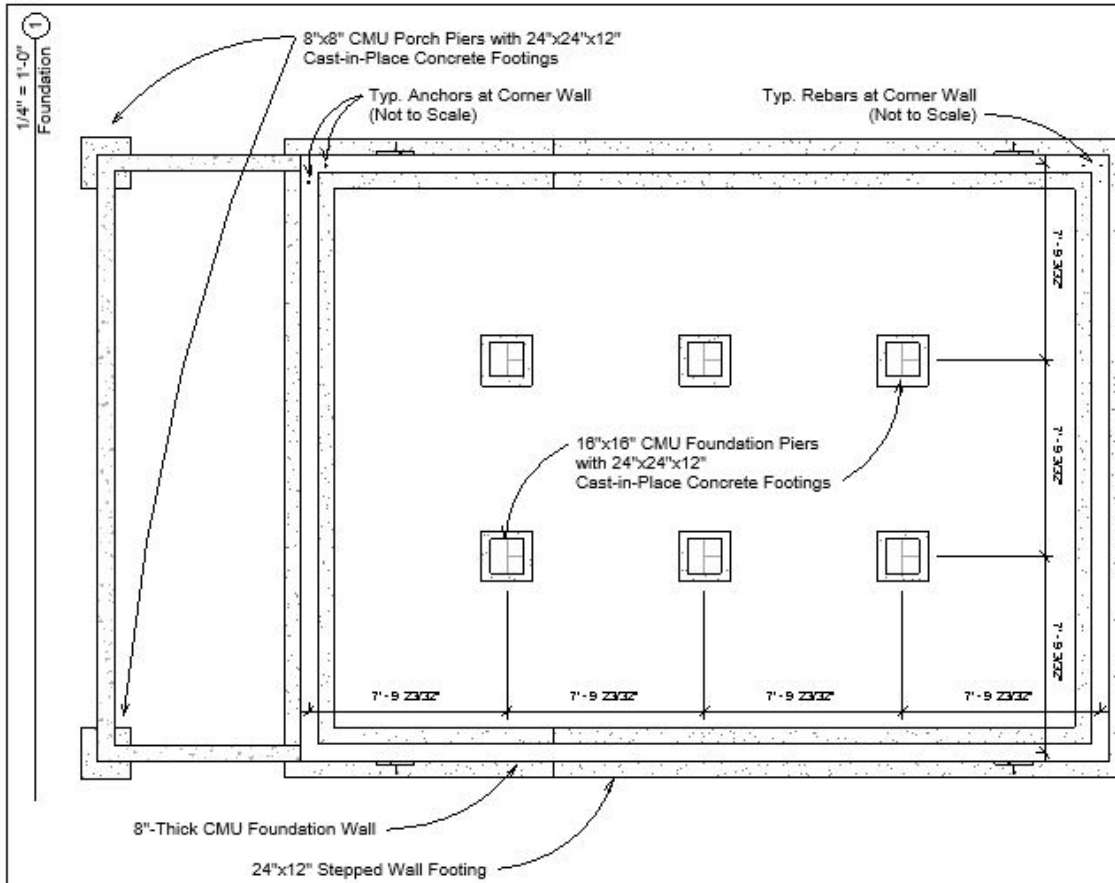


Extra Revit Renderings

Revit – Plumbing



Revit – Structural Foundation



Notes:

1. Pier footings shall be at same depth as adjacent wall footing at same grade. All footings must be below frost depth. See S202 and S203 for further details.
2. All wood floor structural members are to be made of at least No. 2 grade Poplar wood or equivalent and treated as required. See design calculations for detail.
3. Foundation walls are to be centered and stepped with wall footings and centered with wall studs. They shall be grouted and reinforced with (1) #4 bar at a maximum of 4' O.C. with (3) at each corner wall. See S203 for foundation reinforcement specifications and placement.
4. Sill plates shall be sufficiently anchored (and the anchors grouted into the foundation wall) at a maximum of 4' O.C. and (2) at each corner wall, as shown. Horizontal joint reinforcement shall be implemented between layers of CMU block at a maximum of 16" O.C.
5. Reinforcement in foundation walls shall extend into footings to a depth of 3" above the bottom of footing and horizontally 9". Longitudinal reinforcement in wall footings and pier footings shall consist of (3) #4 bars at a depth 3" above bottom of footing @ 9" O.C. Rebars shall be sufficiently tied to prevent displacement while pouring.
6. Footings shall be poured on stable, level, undisturbed ground or as approved by qualified engineer/technician.
7. Cast-in-place concrete shall have a minimum compressive strength of $f'_c = 3,000$ psi. Refer to ACI-318 and supplemental code for additional requirements.

*Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, and NDS for Wood Construction for applicable code.

*Refer to Material Cost Spreadsheet for product specifications.



Rob Paugh

Logan Nazarene Campground

No.	Description	Date

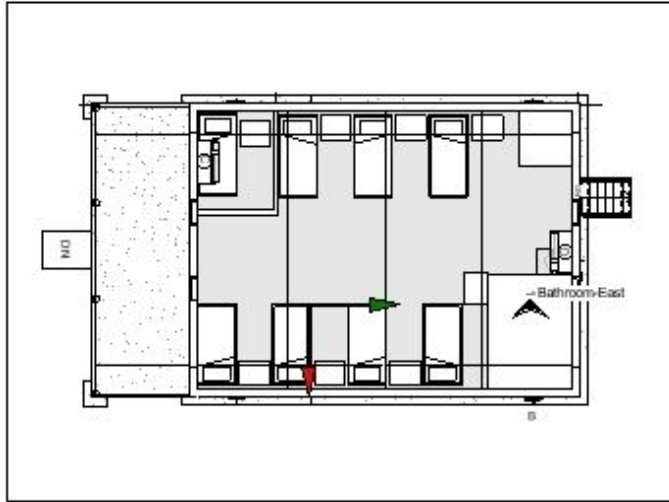
Structural Foundation Plan

Project number	Project Number	S201
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	
		Scale 1/4" = 1'-0"

4/23/2022 8:00:21 PM

Revit – Mechanical

1/8" = 1'-0"
Level 1 Mechanical



Notes:

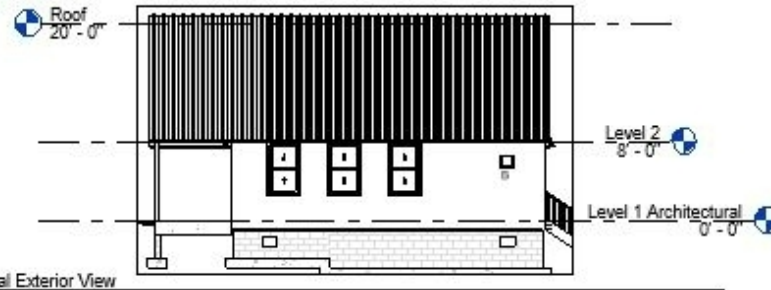
- B - Wall Exhaust Bathroom Fan
-Mount at 6 feet
- C - PTAC Unit with 12,000 BTUH
- See Electrical Sheet for 20 Amp Receptacle Connection
- Mount at 8 feet
- D - PTAC Unit with 15,000 BTUH
- See Electrical Sheet for 30 Amp Receptacle Connection
- Mount at 10 feet

See product installation guide for other details

All Mechanical work shall conform to International Mechanical Code and Ohio Mechanical Code

Mechanical Schedule						
Mark	Brand	Description	Width (Inches)	Depth (Inches)	Height (Inches)	Notes
B	Panasonic WhisperWall	Wall Exhaust Bathroom Fan	8		8	70 CFM
C	Blueridge BPM12	Front PTAC Unit	42	21	16	12,000 Cooling BTUs
D	Blueridge BPM15	Back PTAC Unit	42	21	16	15,000 Cooling BTUs

*Refer to Material Cost Spreadsheet for product specifications



2 Mechanical Exterior View
1" = 10'-0"



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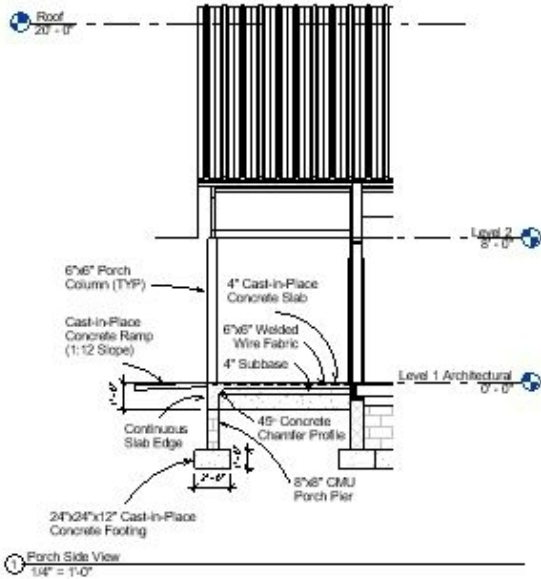
No.	Description	Date

Mechanical

Project number	Project Number	M101
Date	Issue Date	
Drawn by	Author	Scale As Indicated
Checked by	Checker	

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Revit – Porch



Notes:

1. Porch slab shall be made of cast-in-place concrete and have a minimum compressive strength of $f'_c = 3,000$ psi. Refer to ACI-318 and supplemental code for additional requirements. Concrete slab shall be 4" thick on top of a compacted, 4" thick aggregate subbase. Concrete slab shall be reinforced with 6"x6" welded wire fabric (remesh) at 2" above subbase. Finished surface of front of porch slab shall be no more than 6" above grade and accompanied by an ADA compliant, cast-in-place concrete ramp, as needed, with a maximum ramp slope of 1:12. Continuous slab edge shall be a minimum of 18" along all exterior edges.
 2. Porch foundation piers shall be composed of 8"x8" CMU blocks, grouted and reinforced with (1) #4 bar. Horizontal joint reinforcement shall be implemented between layers of CMU block at a maximum of 16" O.C. All footings must be below frost depth. See S202 and S203 for further details and reinforcement specifications and placement.
 3. Porch columns shall be of preservative-treated wood and secured to concrete porch slab with Simpson Strong-Tie Porch Post Bases according to manufacturer instructions.
- *Preservative-treated wood, as defined by the Ohio Building Code (2017), is wood that is "conditioned with chemicals by a pressure process or other means, exhibiting reduced susceptibility to damage by fungi, insects or marine borers."
- *Nominal dimensions are given for dimensional lumber.
- *Refer to IBC Table 2304.9.1 for standard Fastening Schedule.
- *Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, OBC, and NDS for Wood Construction for applicable code.
- *Refer to Material Cost Spreadsheet for product specifications.
- reinforcement into porch slab from pier...



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No.	Description	Date

Porch Side View

Project number	Project Number	S204
Date	Issue Date	
Drawn by	Author	Scale: 1/4" = 1'-0"
Checked by	Checker	

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② Porch Front View Copy 1
3/16" = 1'-0"



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No.	Description	Date

Porch Front View

Project number	Project Number	S205
Date	Issue Date	
Drawn by	Author	Scale: 3/16" = 1'-0"
Checked by	Checker	

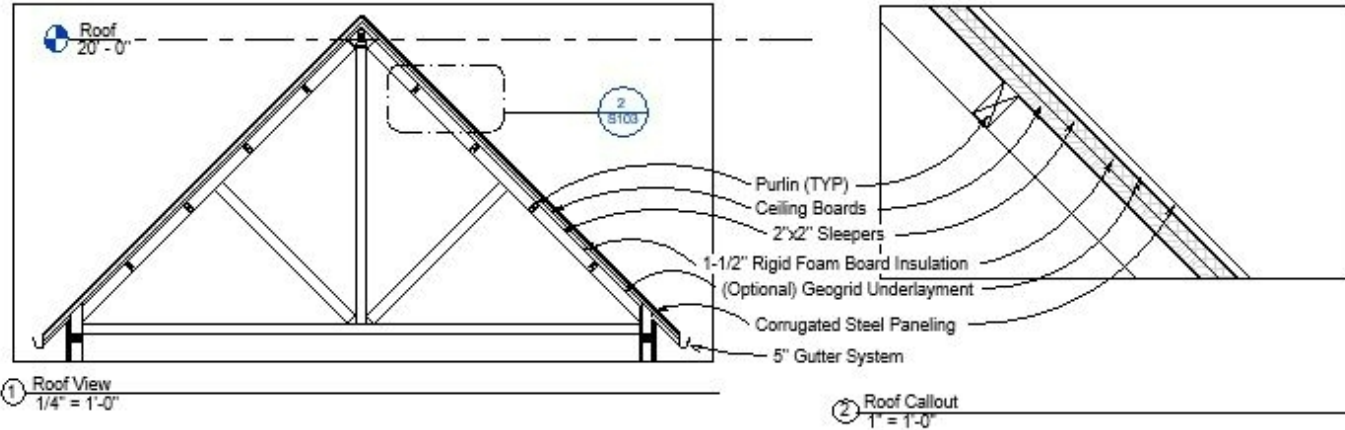


Notes:

1. Porch slab shall be made of cast-in-place concrete and have a minimum compressive strength of $f'_c = 3,000$ psi. Refer to ACI-318 and supplemental code for additional requirements. Concrete slab shall be 4" thick on top of a compacted, 4" thick aggregate subbase. Concrete slab shall be reinforced with 8"x8" welded wire fabric (remesh) at 2" above subbase. Finished surface of front of porch slab shall be no more than 6" above grade and accompanied by an ADA compliant, cast-in-place concrete ramp, as needed, with a maximum ramp slope of 1:12. Continuous slab edge shall be a minimum of 18" along all exterior edges.
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- *Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, OBC, and NDS for Wood Construction for applicable code.
- *Refer to Material Cost Spreadsheet for product specifications.

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Revit – Roof



Notes:

1. Ceiling boards shall be positioned longitudinally from ridge to eave of roof, composed of adjacent 2'x4", 2'x6", or 2'x8" dimensional lumber boards. They shall extend over walls as needed to provide for overhang and soffit. They shall be fastened in accordance with IBC Table 2304.9.1.
2. Sleepers shall be composed of 2'x2" dimensional lumber or equivalent, be fastened in accordance with IBC Table 2304.9.1, and be placed at 4' O.C. maximum spacing. Verify with steel panel roof manufacturer. Rigid insulation shall be of same thickness as sleepers.
3. Optional geogrid material (of approximately 1/4" thickness or similar) may be added, with engineer's design and product approval, as an underlayment to corrugated steel roof panels for ventilation through roofing system.
4. Corrugated roof paneling system shall be of green-painted, galvanized steel panels, implementing an exposed-fastener system. Appropriate trim, flashing, and other necessary elements must be supplied and assembled according to manufacturer instructions.

*Refer to S102 and S103 for truss system details.

*Refer to IBC Table 2304.9.1 for standard Fastening Schedule.

*Refer to ACI-530-1.14.2.2, ACI-318, IRC, IBC, OBC and NDS for Wood Construction for applicable code.

*Refer to Material Cost Spreadsheet for product specifications.



Rob Paugh

Logan Nazarene Campground

No.	Description	Date

Roof

Project number	Project Number	S103
Date	Issue Date	
Drawn by	Author	Scale As indicated
Checked by	Checker	

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Team Picture for Rob