PRIME Engineering

Final Design Report:
Mental Health Counseling Mobile Office Space

Bret Burkes
Kristen Henderson
Edwin Perez
Danielle Yamson

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CENE - 486C
Department of Civil and Environmental Engineering
College of Engineering, Informatics, and Applied Sciences

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Acknowledgments

Prime Engineering would like to express their gratitude to our client for allowing the team to design the Tiny Mobile Office and be a part of their professional plans. The client was gracious enough to provide time and input to ensure that both parties were satisfied with the direction of the project.

Special thanks to William Mancini P.E. and Gary Miller P.E. for providing constructive feedback as the team's Grading Instructors throughout this process. This project was successful due to the guidance, supervision, and technical support that was provided.

Technical advisement was provided by Professor Jeffrey Heiderscheidt, Ph.D. This advisement was helpful in developing the processes in developing a design, interacting with a client, and processing all the components to complete a project. Dr. Heiderscheidt's support earned our deepest gratitude.

1.0 Project Introduction

1.1 Basic Project Information

The title of the project is the Mental Health Counseling Mobile Office Space. The client is a licensed professional counselor. The structure that was designed is a tiny mobile office with no specific location. The client expects to use the structure within the Yavapai and Coconino Counties in Arizona, most of the time, with the possibility of traveling outside of Arizona.

1.2 Constraints/Limitations

The constraints and limitations in this project include, but are not limited to, budgeting and design choices. The client provided a rough $50,000 budget proposal for the overall cost. The team attempted to design a mobile office within this cost limit. This meant choosing building materials and appliances that are sturdy, not too expensive, and still in line with the design requirements provided by the client.

The client requested an aesthetically pleasing design while also incorporating certain specifics such as removable solar panels to power the mobile office. She requested the counseling room be sound proof to maximize client-patient privacy. The largest client-requested constraint came from the request to have the office be completely run by means of electricity using solar panels instead of propane or gas generators. The client also specified that she wanted the counseling space to have a removable wall to maximize the space of the mobile trailer office.

Another constraint the project had was figuring out what codes to follow in the design process. The client plans on mainly using the mobile office space within Yavapai and Coconino County, but also plans on taking the vehicle out-of-state. This required the team to come up with a design that complied with not only local county and state codes, but also with federal codes that are listed throughout the report. The team used their engineering judgement and design according to certain codes they felt were most appropriate for the project. This constraint required the team members to constantly compare and comply with the codes during the design process.

1.3 Major Deliverables

The major deliverables of the project aligned with the progression of the design process. The first major deliverable was completing the conceptual structural and architectural floor plan. Once completed, a conceptual mechanical, electrical, and plumbing floor plan was created based on the layout created by the structural and architectural floor plans. Changes were made until the final design plans for the structural, architectural, mechanical, electrical, and plumbing were finished. The last major deliverable to be finalized was a cost estimate of construction – this included the materials, contracting, and engineering services costs. The cost estimate of construction was provided to the client as well as costs of material for the trailer, solar array, electrical system, sound proofing, water tanks, and kitchen equipment. The codes that were used for the design include the International Building Code, the National Design Specification for Wood Construction, the Special Design Provisions for Wind & Seismic activity, the National Fire Protection Agency 70 (NFPA 70), and the Recreational Vehicle Industry Association.

1.4 Impacts Analysis

The three subcategories of the impacts that were analyzed were the social, economic, and environmental impacts. The social impact of the implementation of this project would be giving better access to the client's patients. The client can expand her operation by bringing her services to those who would typically not be able to receive these amenities. The economic impact for the client is her ability to expand her operation to more people, in turn, being able to gain more clients and increasing her overall income. The implementation of the mobile office would create a positive environmental impact. By bringing the office to communities, it prevents the clients from having to drive long distances, reducing the amount of gas used which reduces the amount of vehicle emissions.

2.0 Design Plans

2.1 Final Architectural Plan

Initial floor plans were sent to the client to give options of the best overall layout for the trailer. The three floor options that were sent to the client can be seen in Appendix G. The client chose the desired floor layout and the final design was conducted from there. Once the architectural layout was significantly completed, the client requested to shorten the trailer by six to eight feet. The reason for the reduction in size was the client was worried about the turning radius and overall length of the trailer setup. It was decided that the fifth wheel setup would supply more turning radius than the client expected, and that the layout was almost complete, the team decided that the current setup was satisfactory.

The final architectural plans contain all aspects that fit the client's needs and also provide the final layout of the mobile office. The final architectural layout was approved by the client and the final layout influenced the rest of the final designs for the structural, electrical, plumbing, and mechanical aspects of the mobile office. The architectural plans contain all details related to the interior and exterior lining of the walls, type of doors, windows, plumbing systems, such as where sinks and toilets are placed, and the sound proofing for the counseling room.

The type of soundproofing used is acoustic insulation. The acoustic soundproofing has a noise reduction coefficient rating of 0.95, which is a high-quality soundproofing rating [8]. The soundproofing material will only be used in the counseling space. The soundproofing material used is in accordance to the ASTM fire safety requirement standards [9]. The final architectural design was influenced by the cost of materials, such as type of walls, floor panels, and design materials used for the mobile office. The budget the client provided, also influenced the final architectural aspects of the mobile office. These final plans can be found in Appendix B.

2.2 Final Structural Plan

The structural plans were designed in conjunction with the architectural plans because the architectural layout influenced the structural design of the tiny mobile office. These plans were designed in accordance with the specified chosen trailer frame that can be found in Appendix A using the National Design Specification for Wood Construction, the Special Design Provisions for Wind & Seismic, and the specified loading factors and loading reductions found in the International Building Code. These final structural plans were designed as close to construction documents as possible, however, they should not be considered construction ready documents and should be reviewed further. These structural drawing plans can be found in Appendix C.

2.3 Final Plumbing Plan

The final plumbing plans detail all components such as the pipe layout, water connections, tank locations, and placement of the sinks, shower, and toilet. The final plumbing plans were designed around the finished architectural and structural plans, while also working with the electrical and mechanical plans to avoid connection collisions and other possible conflicts. The plumbing consists of a freshwater tank system, a grey water system, and a black water waste system. The client requested a 30-gallon freshwater tank that will be filled using either a city water hookup or a freshwater gravity fed hose. A 12V water pump will distribute the water to the plumbing fixtures and into the water heater. The water distribution pipes will be PVC pipes with a ½ inch diameter. The grey water tank will collect the waste from the sinks and shower while the toilet waste will be collected in the black water tank. A ventilation system will be included to prevent gas and odor from being trapped within the system and mobile office. The final designs were created using plumbing codes from the Recreational Vehicle Industry Association (RVIA) and the guidelines provided in the "Tiny House Design & Construction Guide: Your Guide to Building a Mortgage Free, Environmentally Sustainable Home; 2nd Edition" [7][10]. Client must dispose of waste in accordance with local Environmental Protection Agency laws in whichever area they plan on dumping the waste [7]. These final plans can be found in Appendix E.

2.4 Final Electrical Plan

The final electrical plans consist of the power input, power acquisition, and power distribution throughout the mobile office to the required aspects of the design. These designs worked in conjunction with the final architectural, structural, plumbing, and mechanical plans that were also developed. The final plan is in accordance with state and federal law, while representing a plan that can be verified for construction. The codes that were used came from the International Building Code that told the designer to use the NFPA 70 Electrical Codes for all designs. Chapter three from the NFPA 70 Electrical code displayed the general requirements that are in use for the final design. The main source of power, when off the grid, will be a solar panel array system [3]. The system consists of twelve, 275-Watt, polycrystalline solar panels, twelve, 200 Amp, absorbent glass mat lead batteries, and an 8000-Watt Pure Sine AC Inverter. These final plans can be found in Appendix D.

2.5 Final Mechanical Plan

The mechanical plan consists of the HVAC (heating, ventilation, and air conditioning) system. The HVAC system will be installed to provide comfort inside the mobile office. A premanufactured HVAC system is recommended for the final design. An example of the recommended HVAC system can be found in Appendix F. Although this is the team's recommendation, due to our limited knowledge on the subject, it is highly recommended that the client seek outside professional help for this portion of the design.

3.0 Cost Estimate of Construction

3.1 Materials Cost Estimate

The materials cost estimate includes the total cost of all materials that make up the structure, from the frame to the architectural finishes. Table one below shows the cost of materials that are currently known. Appendix A shows the quote for the cost of the trailer and the quote for the solar array system before tax.

Table 1: Material Cost Estimate

Materials Cost Estimate				
Material	**Description**	**Units**	**Cost/Unit**	**Material Cost**
Soundproofing	Acoustic Insulation	318.88 ft^2	\$94.22/48 ft^2	\$660
Trailer	Trailer Frame	1 Trailer	\$10,176	\$10,176
Wood Frame	Whitewood 2x4x96 Stud	124 2x4s	\$2.86/Stud	\$355
Solar Array	Solar Array Complete System	1 System	\$12,638	\$12,638
Lighting	6" Recessed Lighting Fixture	9 Lights	\$24.39/Light	\$220
Dimmer Switch	Dimmer Switch	1 Switch	\$22	\$22
Regular Switch	One-Way Switch	3 Switches	\$5/Switch	\$15
Three Pole Switch	Three-Way Switch	2 Switches	\$20/Switch	\$40
Stove	Electric Oven and Range	1 System	\$545	\$545
Microwave	700W Microwave	1 System	\$100	\$100
Refrigerator	Top Freezer Refrigerator	1 System	\$549	\$549
HVAC	Ductless Heat Pump System	1 System	\$1,601	\$1,601
Water Tank	30 Gal RV Water Tank	1 Tank	\$100	\$100
Holding Tank	25 Gal RV Holidng Tank	2 Tanks	\$158/Tank	\$316
Water Pump	12V Potable Water Pump	1 Pump	\$55	\$55
PVC Pipe	Schedule 40 PVC End Pipe	7 Pipes	\$2.20/Pipe	\$16
PVC -DWV Pipe	Schedule 40 PVC -DWV Pipe	7 Pipes	\$8.44/Pipe	\$60
PVC Trap	2in PVC DWV Hub	3 Traps	\$3.86/Trap	\$12
Shower	RV/Tiny Home Complete Shower	1 Shower	\$182	\$182
Sink	Porcelain sink	1 Sink	\$126	\$126
Toilet	Macerator toilet	1 Toilet	\$573	\$573
Water Heater	ECOTOUCH Electric Tankless	1 Heater	\$110	\$110
Material Hose	Food Grade PVC Handling Hose	1 Hose	\$170	\$170
Door	Exterior 36"X84"	3 doors	\$480/door	\$1,440
Door	Interior 34"X84"	1 door	\$395.18/door	\$395
Door	Interior 34"X71"	1 door	\$1500/door	\$1,500
Interior Wall Panels	5/16"X 3-11/16"X 8' Knotty Pine Hakwood	37 boxes	\$55.23/box	\$2,044
Exterior Wall Panels	1"X6"X8' Pattern Stock Cedar Panels	48 boxes	100.88/box	\$4,842
Windows	Exterior 24"X24" window	7 windows	\$101.42/window	\$710
Subfloor Sheathing	23/32" Tongue and Groove plywood	11 boxes	\$35.98/box	\$396
Wall Sheathing	15/32" Plywood	11 boxes	\$20.25/ box	\$223
Floor Underlayment	Silicone Vapor Shield	2 rolls	\$15.99/ roll	\$32
Wood Flooring	Plano Marsh 3/4" flooring. 22 ft2 case	18 cases	\$87.77/case	\$1,580
Roof	15/32" Plywood. 32 ft2 case	11 cases	\$20.25/case	\$223
Roof Underlayment	1000 ft2 tough skin roofing underlayment	1 roll	\$88/roll	\$88
Roof	Metal roofing. 8ft steel roof panel	15 panels	\$28.48/panel	\$427
			TOTAL	**\$42,540**

3.2 Contracting Cost Estimate

The team provided the client with an estimated cost of construction that can be expected when requesting a quote from a general contractor. The cost estimate includes an estimated cost of the services that will be needed to construct the structure with the material that is listed above. The contracting costs are broken up into the construction of the trailer frame, building frame, solar array, architectural finishes, electrical system, and plumbing system. The cost of the trailer frame and solar array is already incorporated into the materials cost. The cost of the electrical work is quoted at $1500 and the cost of the plumbing work is also quoted to be $1500. The estimate for the framing and architectural finishes is contracted out to an estimated 120 hours at $25 per hour, the average contractor cost in the state of Arizona, for a total of $3000. This brings the total cost of construction to approximately $6000. Combining the material cost and contracting cost totaled out to $48,540, staying under the client's total budget of $50,000.

4.0 Statistical Analysis

The statistical aspects of the project consist of the code and standards that are to be met when designing the mobile structure. The major codes that the mobile office adheres to is the Federal Motor Vehicle Safety Standards for the trailer framing and the National Fire Protection Association (NFPA) for the electrical aspects of the structure. American National Standards Institute (ANSI) for recreational vehicles were used as a reference for the mobile office and a Tiny House Design & Construction Guide [7] were used as a design recommendation for the mobile office. The International Building Code (IBC) were utilized for the design of the tiny mobile office structure regarding the architectural and structural design [11]. The National Design Specification for Wood Construction and the Special Design Provisions for Wind & Seismic were used for the structural design [12][13]. Coconino and Yavapai County codes were adhered to for this project. ASTM standards for fire safety requirements were applied to the acoustic soundproofing material used. The Arizona Department of Transportation (ADOT) standards was researched and used due to the mobile office being primarily operated within the boundaries of Arizona as well as obtaining, at minimum, a trailer registration through the Department of Motor Vehicles (DMV).

5.0 Engineering Work

The completion date for the conceptual architectural plans were adjusted to February 12, 2019 due to advice that was given by the technical advisor that having conceptual architectural plans for the 30% submittal would be a good pace for the scope of the project. The completion date for the conceptual structural plans were adjusted to after the due date of the 30% submittal due to the architectural plans' completion date adjustment, however, these plans were commenced with the chosen trailer frame. The plans were then completed on schedule according to the Gantt chart. A final architectural, structural, electrical, and plumbing plan have since been completed for this project. These date changes gave the team some more time to work through the more detailed work for the project. However, the smaller detail items such as the electrical, plumbing, and HVAC plans were given a stricter time constraint to complete. The proposed and updated schedules can be found in Appendix H.

6.0 Staffing and Cost of Engineering Services

6.1 Staffing

Table two below indicates the tasks listed within the team's scope and the staffing that was provided for the project, as well as an estimate of how many eight-hour days each employee will invest. Table one gives an estimated total of 828 hours that would be devoted to designing the mobile office space. Table two breaks down how the 828 hours will be divided up among the staff, in order to complete the project. The Commenced Total Column on Table Two depicts the actual hours that have been put into the entire project.

Initially, the team had expected to spend a significant amount of time on the project management and preliminary layouts. Due to the team working diligently and communicating well with the client, the preliminary layouts were able to be completed quickly. In terms of the project management hours, the team was able to create a schedule and stick to it, making minimal time-wasting errors that were initially estimated. Due to these reasons, the actual hours spent were significantly less than was previously expected.

Table 2: Project Tasks

	Staff (hrs)				Task	Commenced
Project Tasks	**ENG**	**SENG**	**INT**	**PM**	**Total**	**Total**
1.0 Preliminary Layout	**129**	**13**	**39**	**41**	**222**	**145**
1.1 Design Constraints & Criteria	17	2	6	8		
1.2 Architectural Layout	20	2	8	7		
1.3 Electrical Layout	29	4	7	7		
1.4 Plumbing Layout	16	1	5	7		
1.5 Structural Layout	19	1	7	6		
1.6 Mechanical Layout	28	3	6	6		
2.0 Design Plans	**138**	**47**	**63**	**7**	**255**	**196**
2.1 Architectural Plan	38	12	20	2		
2.2 Plumbing Plan	*18*	*5*	*10*	*1*		
2.3 Electrical Plan	*20*	*7*	*10*	*1*		
2.4 Structural Plan	45	18	14	2		
2.5 Mechanical Plan	17	5	9	1		
3.0 Cost Estimate	**27**	**13**	**9**	**42**	**91**	**84**
3.1 Materials Cost	15	6	4	15		
3.2 Construction Cost	12	7	5	27		
4.0 Project Management	**62**	**29**	**9**	**160**	**260**	**118**
4.1 Scheduling	42	20	5	110		
4.1.1 Preliminary Design	*10*	*4*	*2*	*28*		
4.1.2 Design Plans	*15*	*5*	*1*	*14*		
4.1.3 Cost Estimate	*8*	*6*	*1*	*32*		
4.1.4 Final Proposal/Final Presentation	*9*	*5*	*1*	*36*		
4.2 Deliverables	0	4	1	22		
4.3 Meetings	20	5	3	28		
Staff Total	**356**	**102**	**120**	**250**	**828**	**543**

6.2 Cost of Engineering Services

Table three below presents the multipliers used to indicate the billing rate for each employer. The multiplier identified in table three represents the benefits and profit portions that comes with employment of each worker. This multiplier is used in conjunction with the base pay that each employee receives to calculate the billing rate that the employees will acquire for the services that they provided for the project.

Table 3: Billing Rate per Hour

Classification	Base Pay $/hr	Multiplier	Billing Rate $/hr
Senior Engineer	80	2.42	194
Engineer	33	2.95	98
Intern	19	2.19	42
Project Manager	60	2.15	129

Table four below presents the estimated total amount of hours that each employee invests into the project. Table four is a combination of the estimated hours from table two and the engineering billing rates from table three. Table four gives a total budget needed to design the tiny mobile office space using the hours that were initially estimated. There are no supplies needed due to computers and software needed for design being covered in the overhead costs. Due to there being no site and the client meetings taking place through video conference, there are no travel expenses. Table five below shows the actual cost of engineering services using the actual number of hours that were put into the project.

Table 4: Estimated Cost of Engineering Services

		Classification	Hours	Rate/Hour	Cost
1.0	Personnel	Senior Engineer	102	194	$19,788
		Engineer	356	98	$34,888
		Intern	120	42	$5,040
		Project Manager	250	129	$32,250
				Total Cost	**$91,966**

Table 5: Actual Cost of Engineering Services

		Classification	Hours	Rate/Hour	Cost
1.0	Personnel	Senior Engineer	67	194	$12,998
		Engineer	233	98	$22,834
		Intern	79	42	$3,318
		Project Manager	164	129	$21,156
				Total Cost	**$60,306**

7.0 Conclusion

The initial goal of the project was to design a functional office that is portable for the team's client. The main requests for the trailer was that it ran only on electricity, had a composting water system, and had a soundproof room while maintaining an overall budget of roughly $50,000 – withholding the cost of engineering services. The designs consisted of architectural plans, structural plans, electrical plans, and plumbing plans. The final designs for all sections of the trailer are completed at this time. Overall, the cost of materials and construction were determined to be $48,540, staying below the client's budget. The results that were created met all objectives that were requested by the client.

8.0 References

[1] Client, ‘Client Meetings’, Flagstaff, AZ. 2018.

[2]"American Institute of Steel Construction", *Aisc.org*, 2018. [Online]. Available: https://www.aisc.org/.

[3] "NFPA", *Nfpa.org*, 2018. [Online]. Available: https://www.nfpa.org/.

[4]"Codes/Ordinances", *Yavapai.us*, 2018. [Online]. Available: http://www.yavapai.us/devserv/codes-ordinances.

[5] ”ANSI-American National Standards Institute”, *Ansi.org*, 2018. [Online]. Available: https://www.ansi.org/.

[6]"Health Information Privacy", *HHS.gov*, 2018. [Online]. Available: https://www.hhs.gov/hipaa/index.html.

[7] D. Louche, “Tiny House Design & Construction Guide: Your Guide to Building a Mortgage Free, Environmentally Sustainable Home; 2nd Edition”, 2016

[8] Soundproof Cow. (2019). *Quiet Batt 30 Premium Soundproofing Insulation*. [online] Available at: https://www.soundproofcow.com/product/

[9] Compass.ASTM.org (2018). *Standard Test Method for Surface Burning Characteristics of Building Materials* [online] Available at: https://compass.astm.org/download/E84.17660.pdf [Accessed 10 Mar. 2019].

[10]"Association and ANSI Standards | RVIA", *Rvia.org*, 2019. [Online]. Available: https://www.rvia.org/standards-regulations/standards-compliance/association-and-ansi-standards.

[11] International building code. (2015). Country Club Hills, IL: International Code Council, Inc.

[12] National Design Specification for Wood Construction. (2015). Washington, D.C.: The American Wood Council.

[13] Special Design Provisions for Wind & Seismic. (2015). Leesburg, VA: The American Wood Council.

9.0 Appendices

9.1 Appendix A – Material Quotes

TINY HOME BUILDERS

6060 Hickory Hills Rd
Cumming GA 30041
877-413-7965

Quote #Q-7507
2/7/2019

Billing	Shipping
Edwin Perez Arizona ebp24@nau.edu 6232518858	Delivery from Logan UT Delivery to 86001 (635 miles) at $1.30 per mile.

Order Items

Name	Description	Price
Trailer - 32ft	New 32' x 90" Tiny House Trailer. 2" x 6" x 3/16" Frame, 2" x 2" Runners, 1" x 3" Cross Members (16" On-Center), Triple 7000 lb Axles Equipped w/ Electric Brakes, Radial Tires, Complete Running and Brake Lights, Heavy Duty Adjustable Hitch Assembly, Heavy Duty Jack, Breakaway Kit, Safety Chains, 7-Way Connector, Black, MFG Warranty. Conforms to all US and Canada Motor Vehicle Safety Standards.	$6,200.00 USD
Trailer Type - Gooseneck Platfm	***UPGRADE*** Substitute hitch listed above for gooseneck with 8 foot long platform the same width as the main deck, suitable for building on.	$2,000.00 USD
Trailer Frame - UPG Width 2	***UPGRADE*** Extend the width of the trailer to the dimension specified	$300.00 USD
Trailer Bonuses	Up to an $800 value. See https://www.tinyhomebuilders.com/tiny-house-trailers#trailer-bonuses for full details.	$0.00 USD

Make checks payable to:

Tiny Home Builders
6060 Hickory Hills Rd
Cumming GA 30041

Subtotal	$8,500.00 USD
Steel Surcharge	$850.00 USD
Tax (0%)	$0.00 USD
Delivery	$826.00 USD
Total	$10,176.00 USD

Thank you for your business!

- All prices are subject to change without notice.
- A $1000 minimum deposit is required. Once your order is confirmed by email or phone, and it enters our production queue, your deposit is no longer refundable. For orders placed on or prior to April 10th, 2018, there is a 3% transaction fee on credit card payments after the first $1000. For orders placed after April 10th, 2018, there are no transaction fees.
- Your balance is due when you pick up or prior to delivery of your trailer.
- You have 30 days to take delivery of your trailer once you are notified that it has been completed. If you are not able to take delivery of your trailer within 30 days you will be assessed a storage fee of $5 per day. If you are not able to take delivery of your trailer within 60 days we may attempt to sell your trailer to a new buyer.
- Any timeline given is an estimate and not a guarantee. Please verify the completion of your trailer prior to making any arrangements for pickup.
- By placing an order with us you are deemed to have read, understood, and agreed to these terms and conditions. If you are unclear on any

Figure 1: Quote of Frame Construction and Delivery

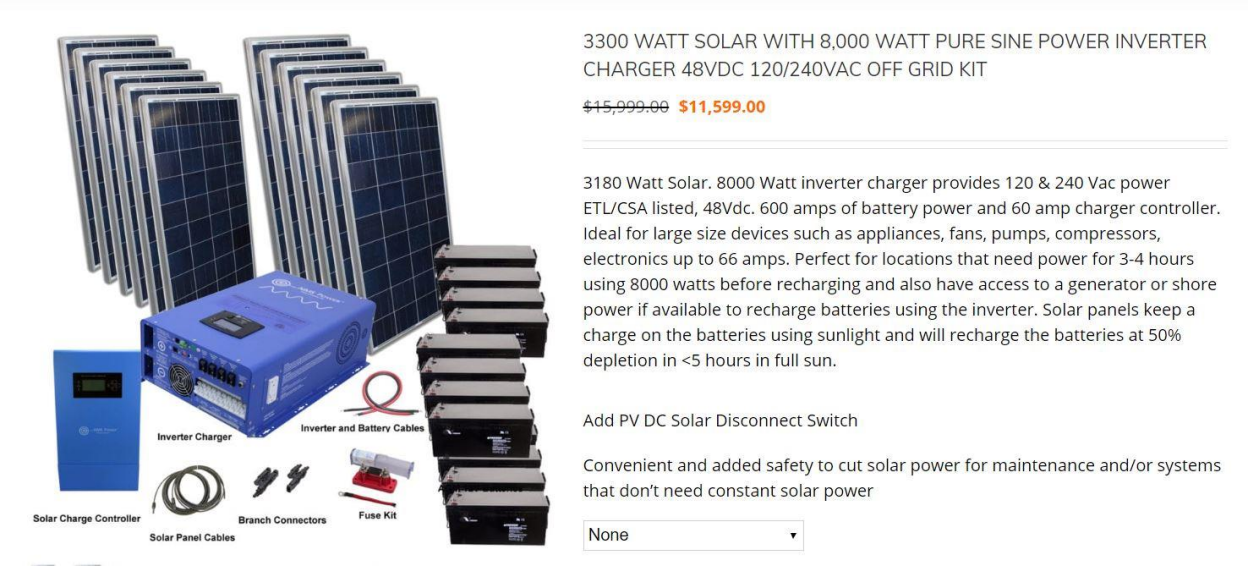


Figure 2: Quote of Solar Array (Without Taxes)

9.2 Appendix B – Architectural Drawings

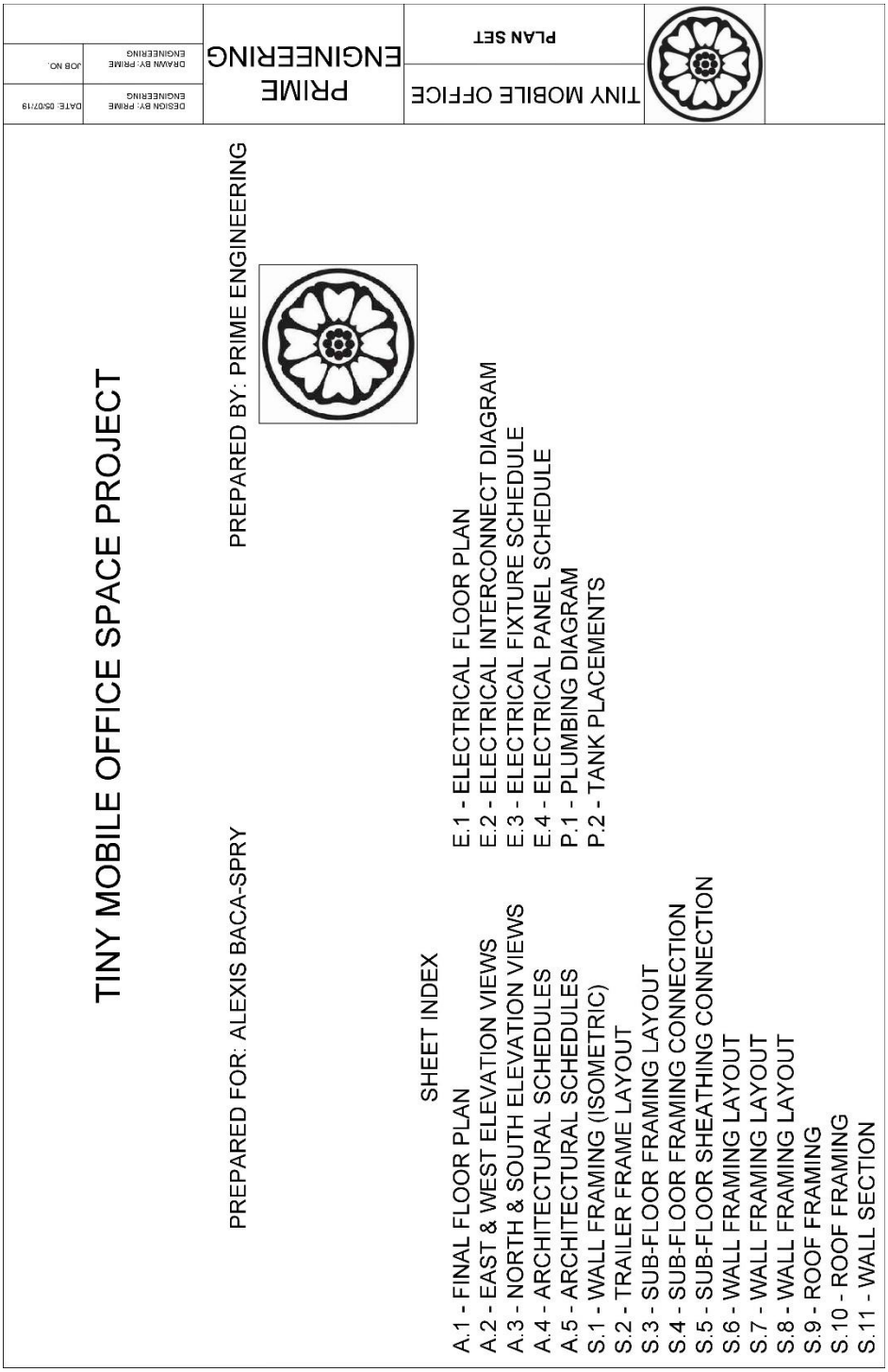


Figure 3: Cover Sheet

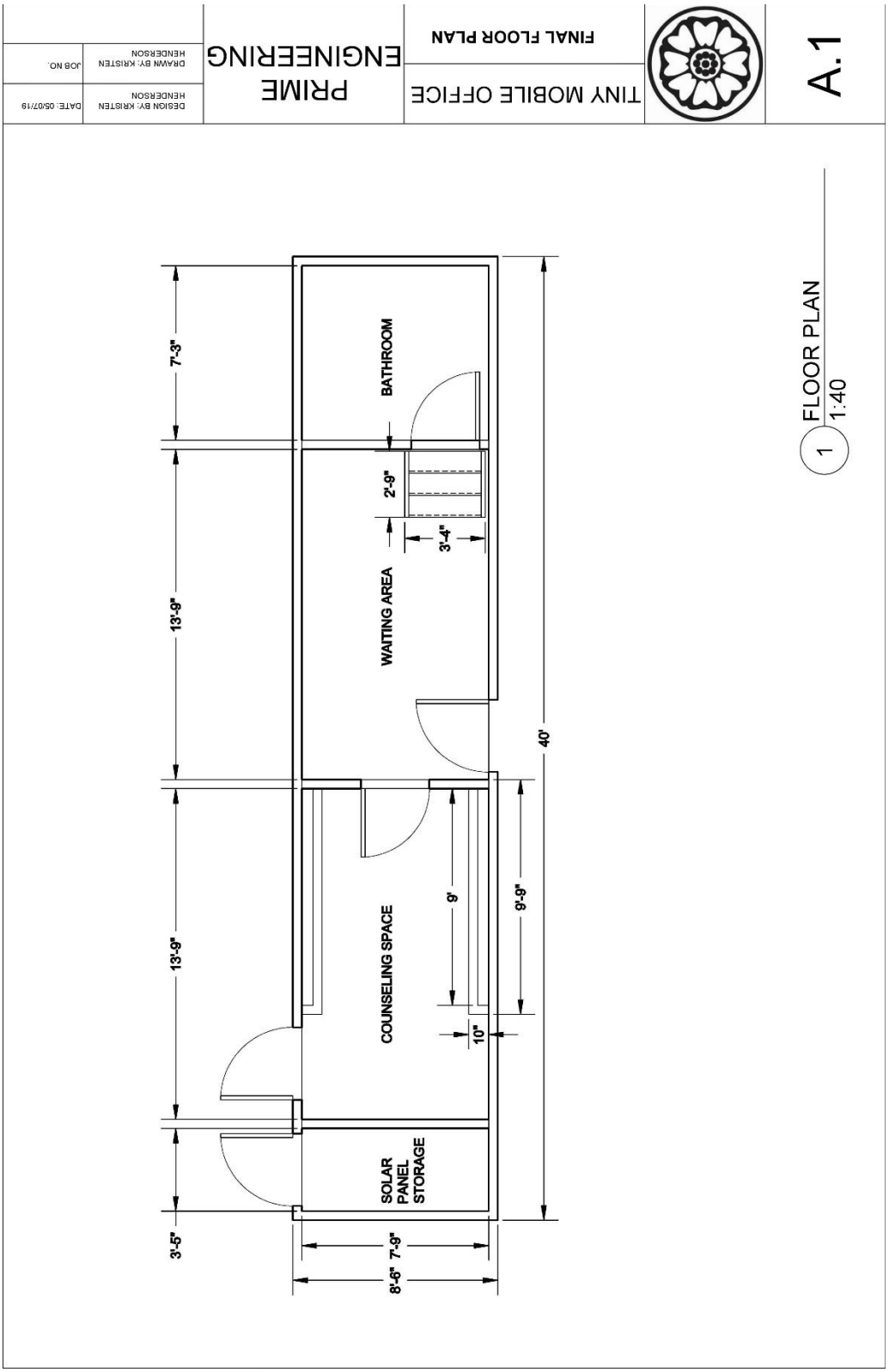


Figure 4: Final Floor Plan

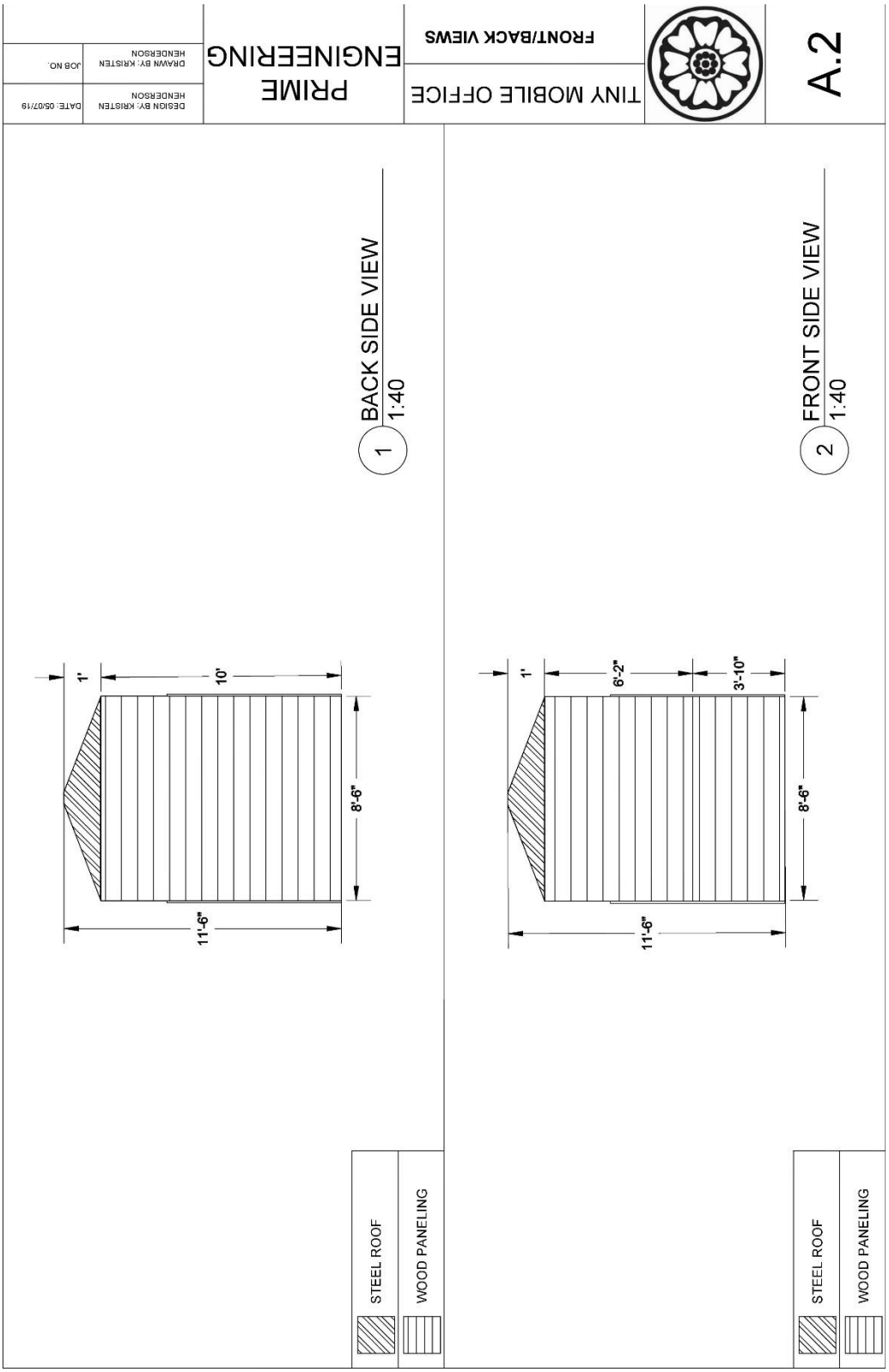


Figure 5: Elevation Views

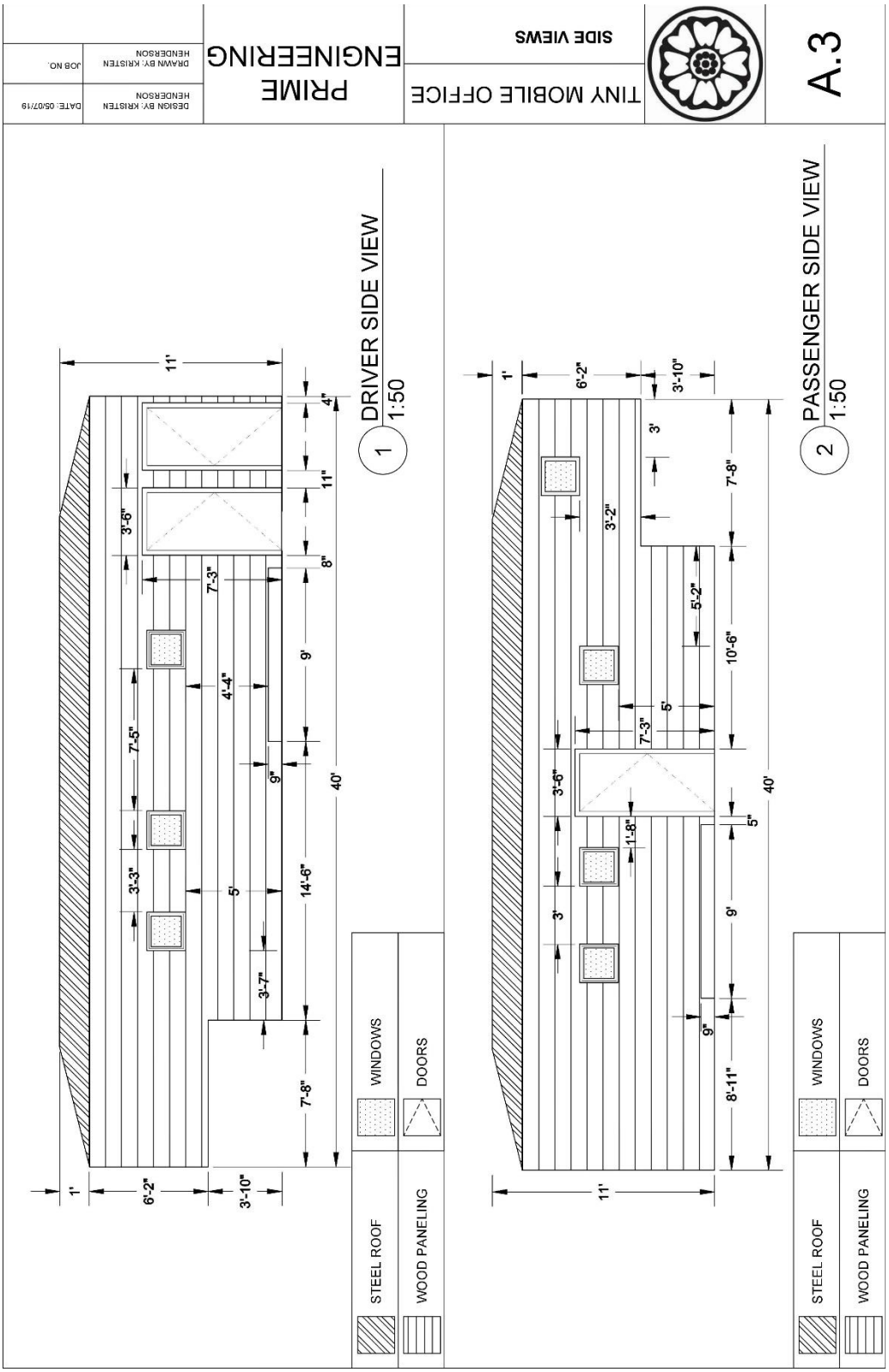


Figure 6: Side View

Wall Schedule

Area	Assembly Code	Assembly Description	Base Constraint	Family	Function	Length	Roughness	Top Constraint	Type	Width
86 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	8' - 1 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
10 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	0' - 10"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
132 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	14' - 1"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
119 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	14' - 1"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
51 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	7' - 3 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
44 SF	B2010	Exterior Walls	03 Goose Neck	Basic Wall	Interior	7' - 7 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
51 SF	B2010	Exterior Walls	03 Goose Neck	Basic Wall	Interior	8' - 1 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
46 SF	B2010	Exterior Walls	03 Goose Neck	Basic Wall	Interior	7' - 7 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
61 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	8' - 1 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
82 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	8' - 1 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
6 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	9' - 4 1/2"	3	Up to level: 02 Top of Fender	Generic - 4.5"	0' - 4 1/2"
34 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	3' - 9 3/4"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
6 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	9' - 4 1/2"	3	Up to level: 02 Top of Fender	Generic - 4.5"	0' - 4 1/2"
45 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	4' - 8 3/4"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
42 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	8' - 6 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
1 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	0' - 10"	3	Up to level: 02 Top of Fender	Generic - 4.5"	0' - 4 1/2"
1 SF	B2010	Exterior Walls	01 Main Deck	Basic Wall	Interior	0' - 10"	3	Up to level: 02 Top of Fender	Generic - 4.5"	0' - 4 1/2"
78 SF	B2010	Exterior Walls	02 Top of Fender	Basic Wall	Interior	9' - 4 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"
82 SF	B2010	Exterior Walls	02 Top of Fender	Basic Wall	Interior	9' - 4 1/2"	3	Up to level: 04 Top Wall	Generic - 4.5"	0' - 4 1/2"

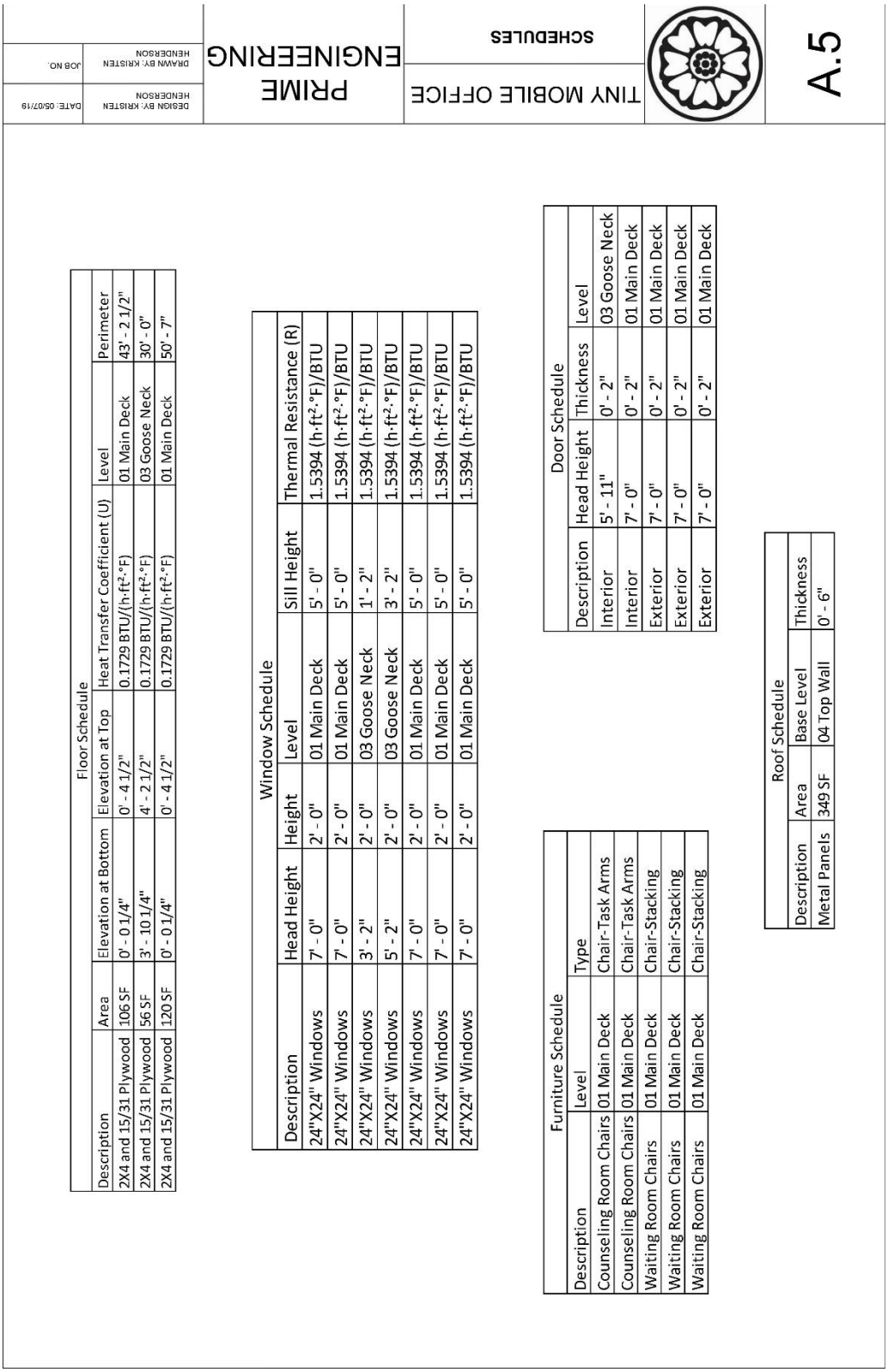
DESIGN BY: KRISTEN HENDERSON
DATE: 05/07/19
DRAWN BY: KRISTEN HENDERSON
JOB NO.

PRIME ENGINEERING

TINY MOBILE OFFICE
SCHEDULES

A.4

Figure 7: Wall Schedule



Floor Schedule

Description	Area	Elevation at Bottom	Elevation at Top	Heat Transfer Coefficient (U)	Level	Perimeter
2X4 and 15/31 Plywood	106 SF	0' - 0 1/4"	0' - 4 1/2"	0.1729 BTU/(h·ft²·°F)	01 Main Deck	43' - 2 1/2"
2X4 and 15/31 Plywood	56 SF	3' - 10 1/4"	4' - 2 1/2"	0.1729 BTU/(h·ft²·°F)	03 Goose Neck	30' - 0"
2X4 and 15/31 Plywood	120 SF	0' - 0 1/4"	0' - 4 1/2"	0.1729 BTU/(h·ft²·°F)	01 Main Deck	50' - 7"

Window Schedule

Description	Head Height	Height	Level	Sill Height	Thermal Resistance (R)
24"X24" Windows	7' - 0"	2' - 0"	01 Main Deck	5' - 0"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	7' - 0"	2' - 0"	01 Main Deck	5' - 0"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	3' - 2"	2' - 0"	03 Goose Neck	1' - 2"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	5' - 2"	2' - 0"	03 Goose Neck	3' - 2"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	7' - 0"	2' - 0"	01 Main Deck	5' - 0"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	7' - 0"	2' - 0"	01 Main Deck	5' - 0"	1.5394 (h·ft²·°F)/BTU
24"X24" Windows	7' - 0"	2' - 0"	01 Main Deck	5' - 0"	1.5394 (h·ft²·°F)/BTU

Door Schedule

Description	Head Height	Thickness	Level
Interior	5' - 11"	0' - 2"	03 Goose Neck
Interior	7' - 0"	0' - 2"	01 Main Deck
Exterior	7' - 0"	0' - 2"	01 Main Deck
Exterior	7' - 0"	0' - 2"	01 Main Deck
Exterior	7' - 0"	0' - 2"	01 Main Deck

Furniture Schedule

Description	Level	Type
Counseling Room Chairs	01 Main Deck	Chair-Task Arms
Counseling Room Chairs	01 Main Deck	Chair-Task Arms
Waiting Room Chairs	01 Main Deck	Chair-Stacking
Waiting Room Chairs	01 Main Deck	Chair-Stacking
Waiting Room Chairs	01 Main Deck	Chair-Stacking

Roof Schedule

Description	Area	Base Level	Thickness
Metal Panels	349 SF	04 Top Wall	0' - 6"

Figure 8: Schedules

9.3 Appendix C – Structural Drawings

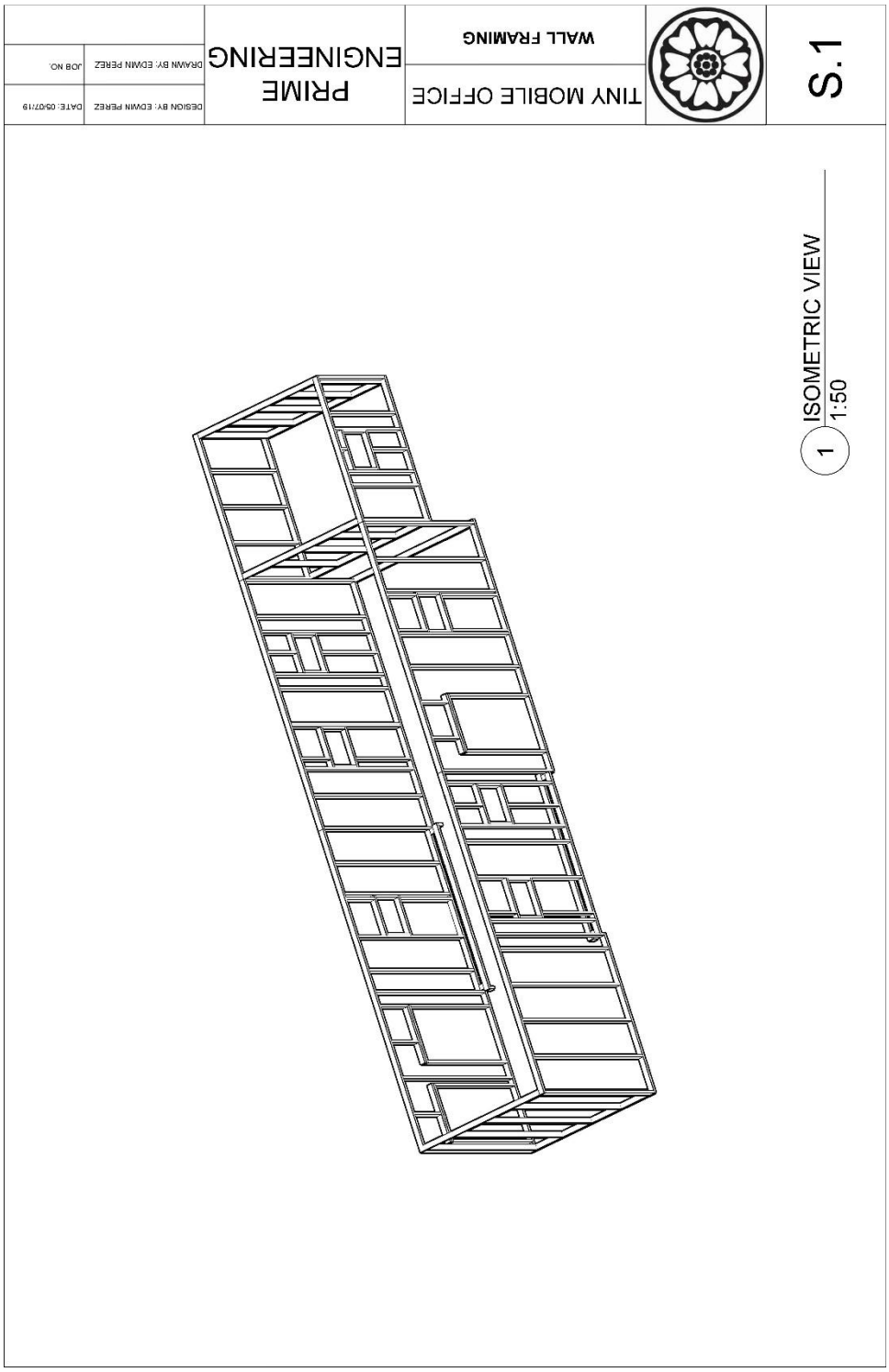


Figure 9: Isometric View

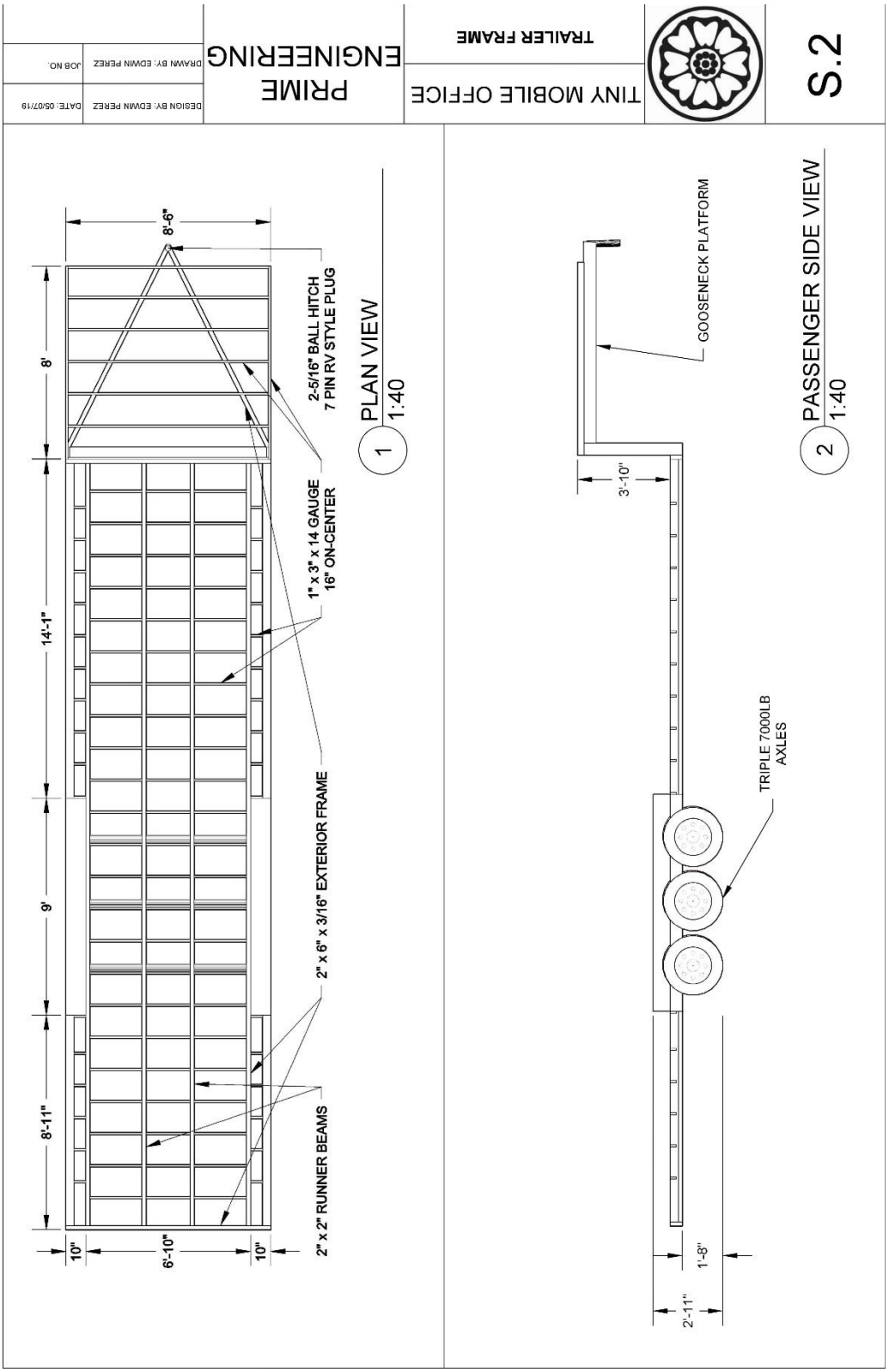


Figure 10: Structural Trailer Frame

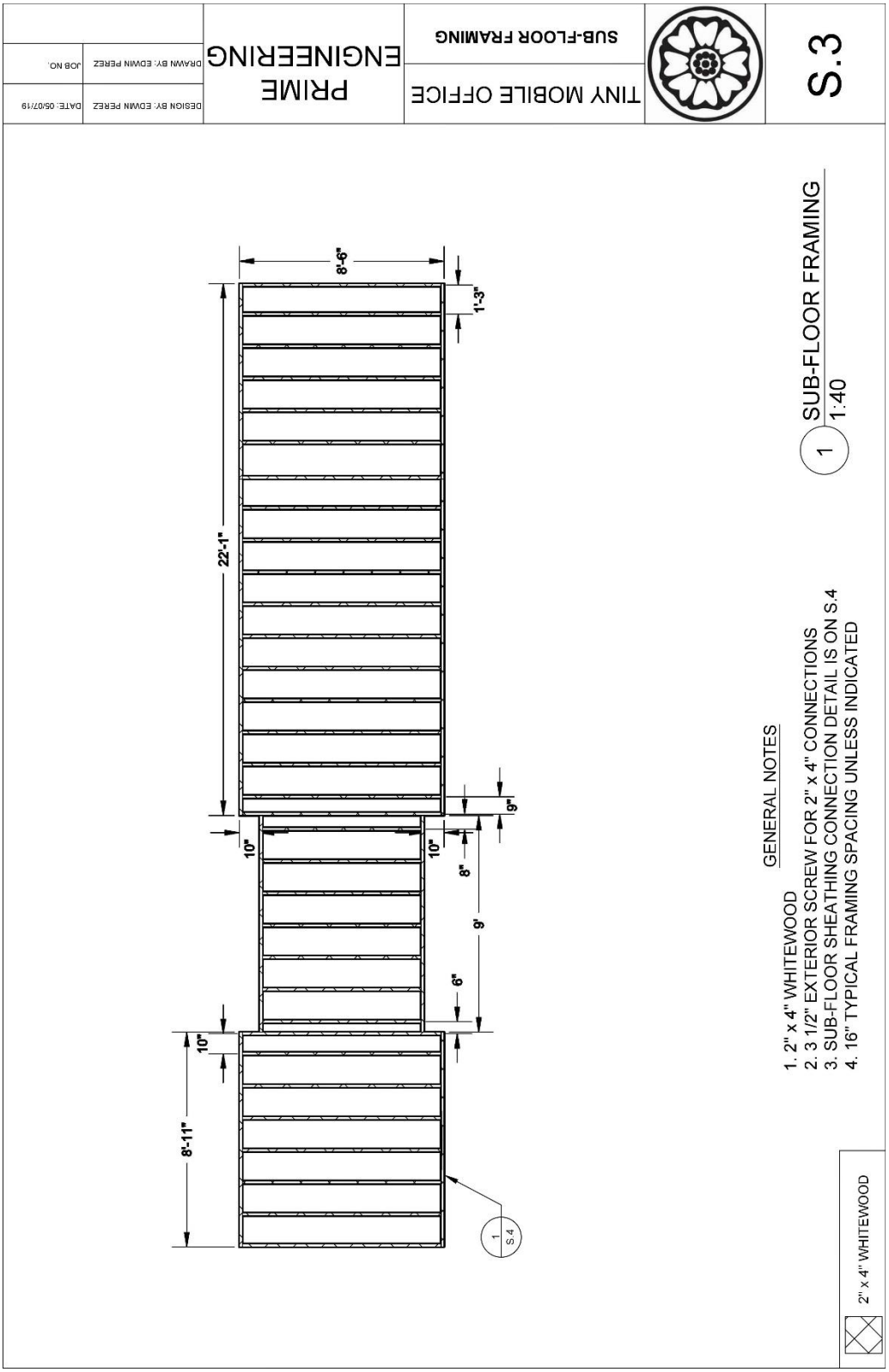


Figure 11: Structural Sub – Floor Framing

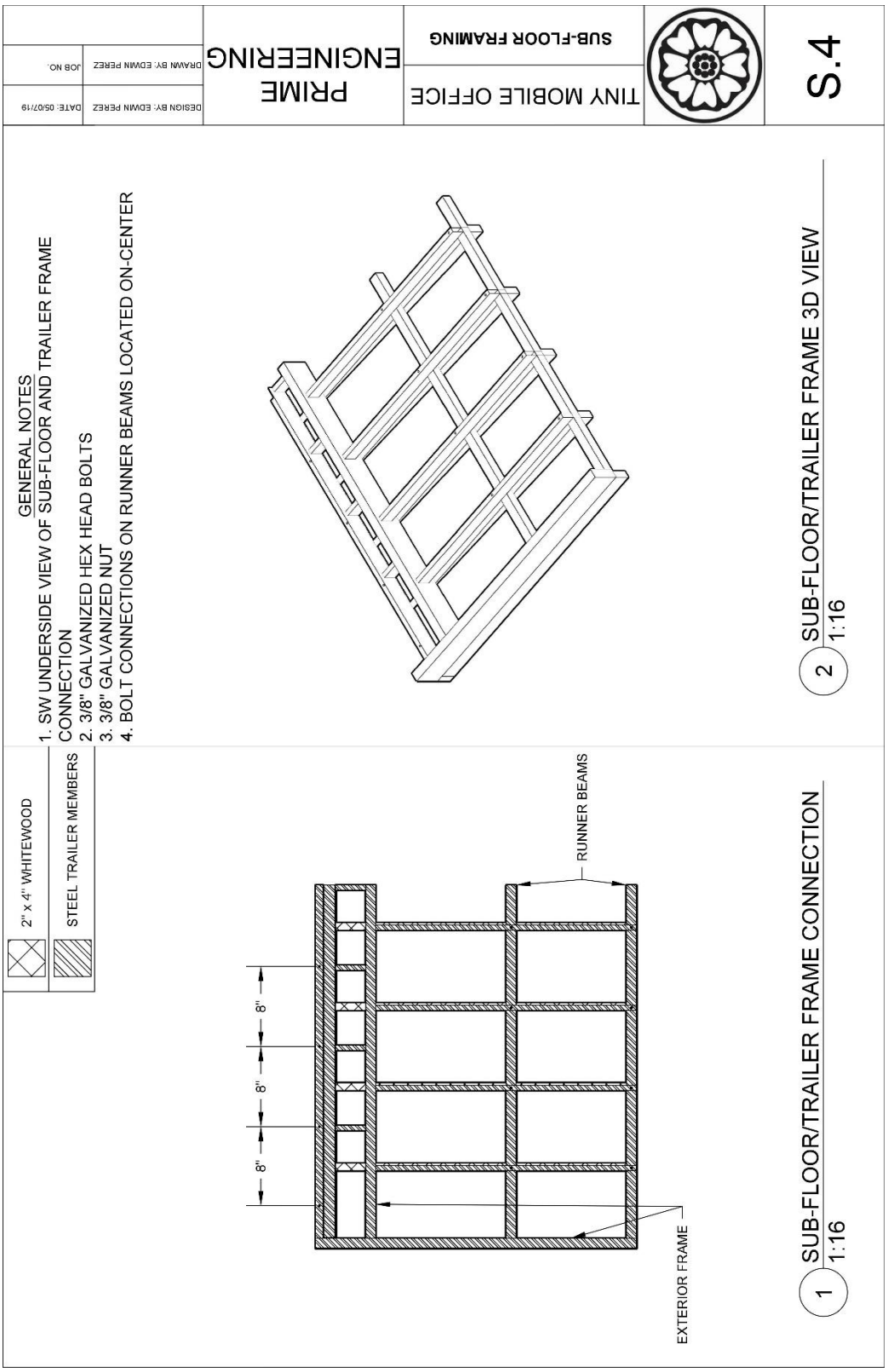


Figure 12: Sub-Floor Framing

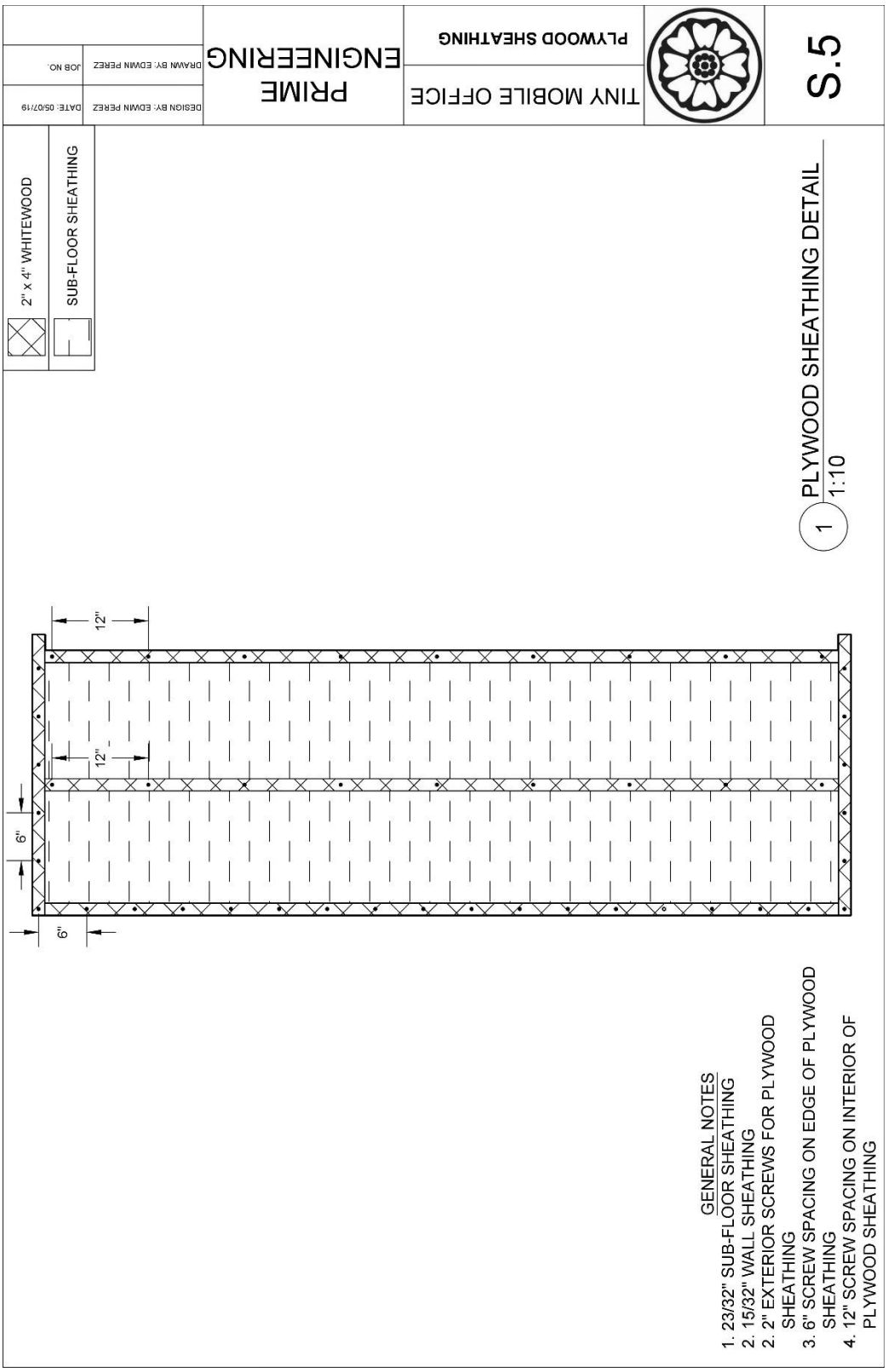


Figure 13: Plywood Sheathing

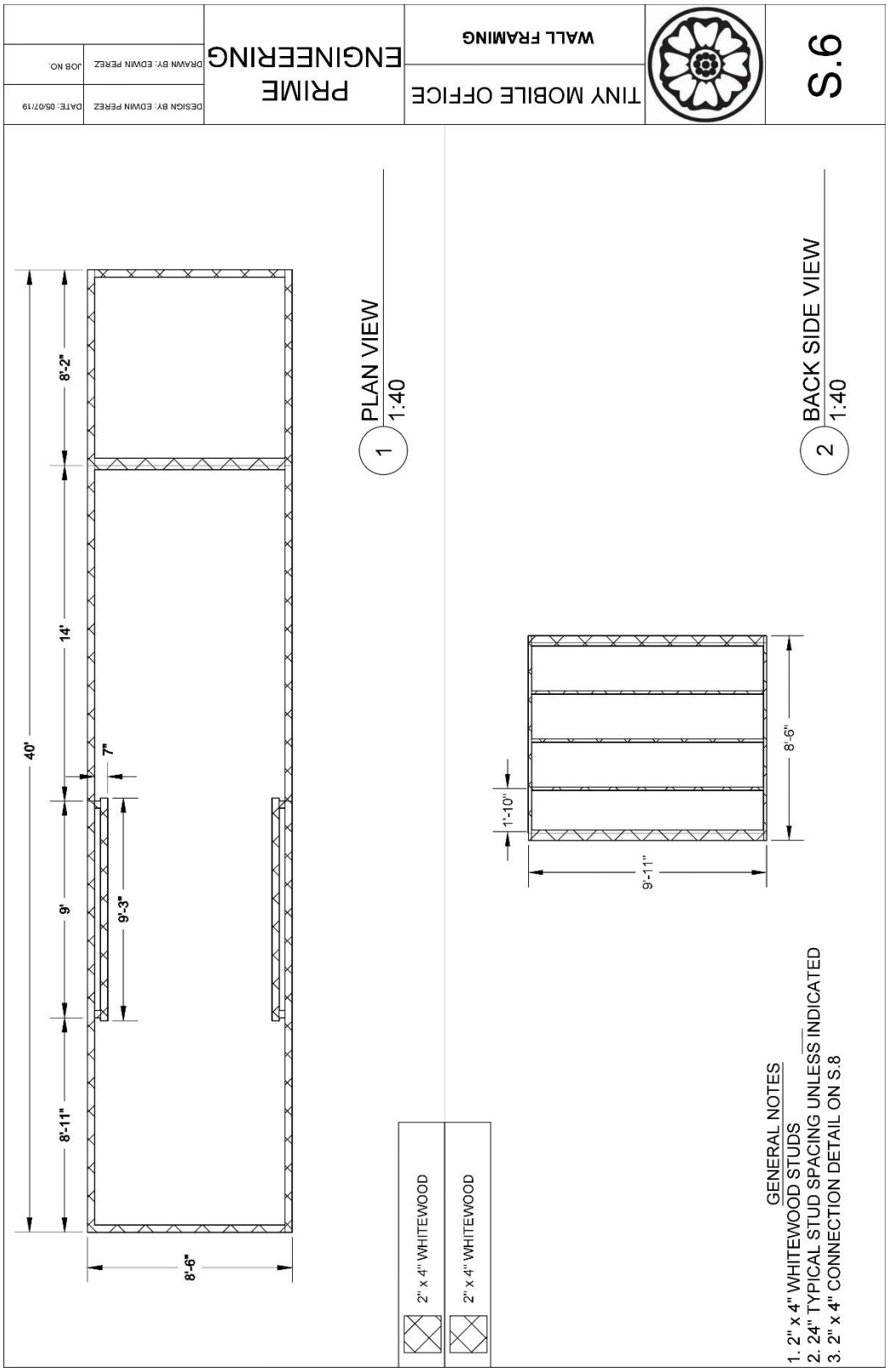


Figure 14: Wall Framing

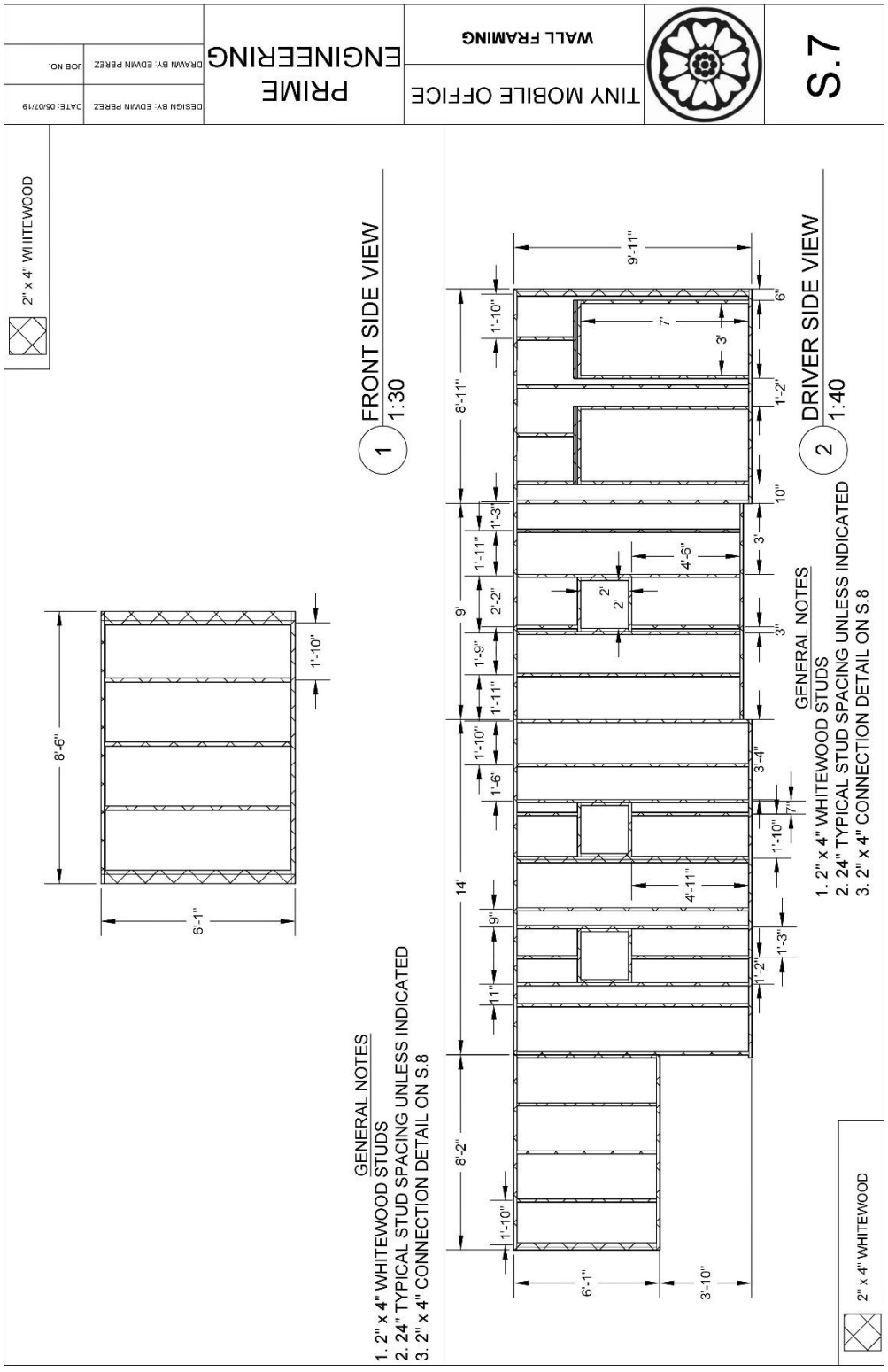


Figure 15: Wall Framing (2)

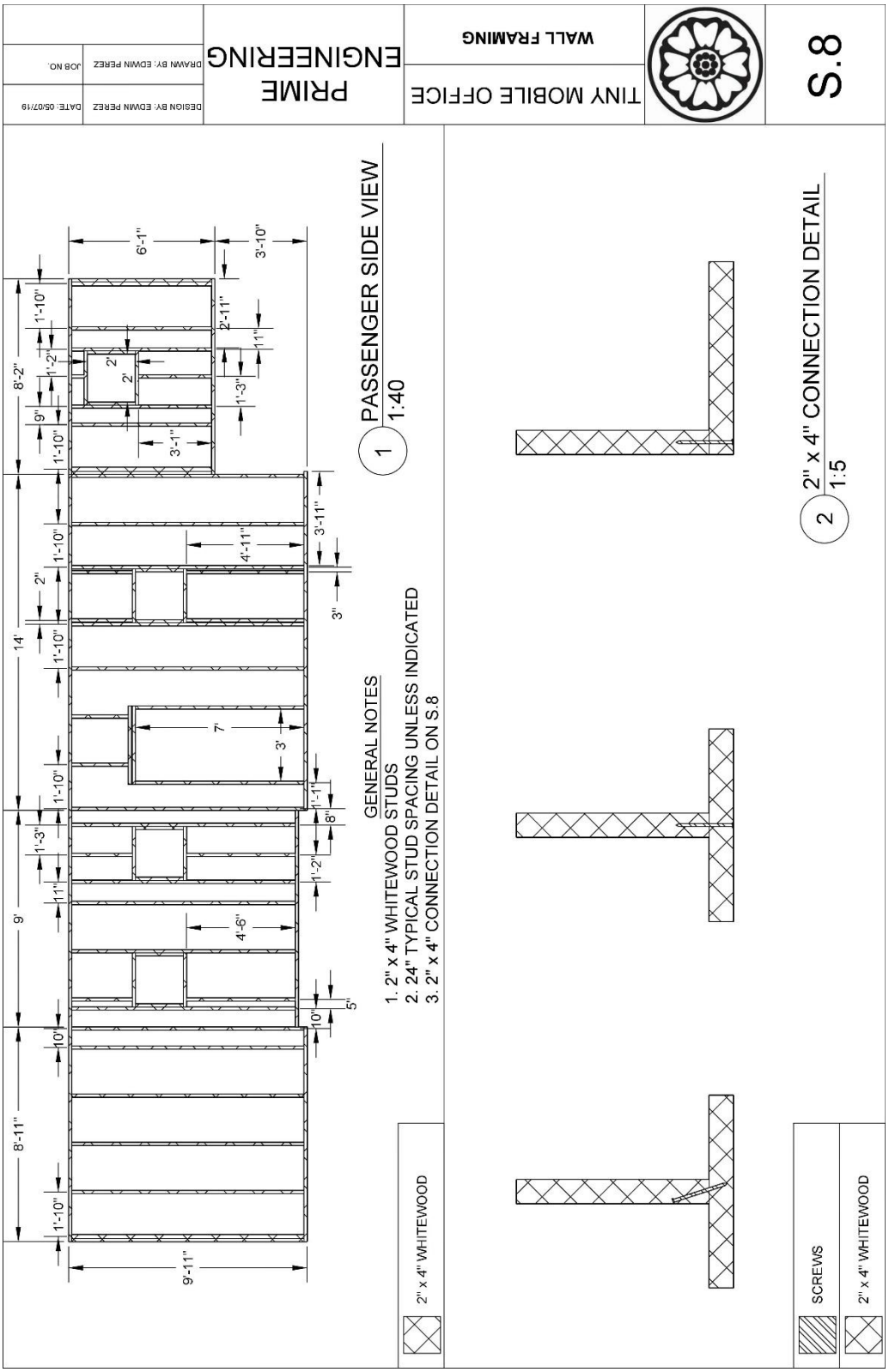


Figure 16: Wall Framing (3)

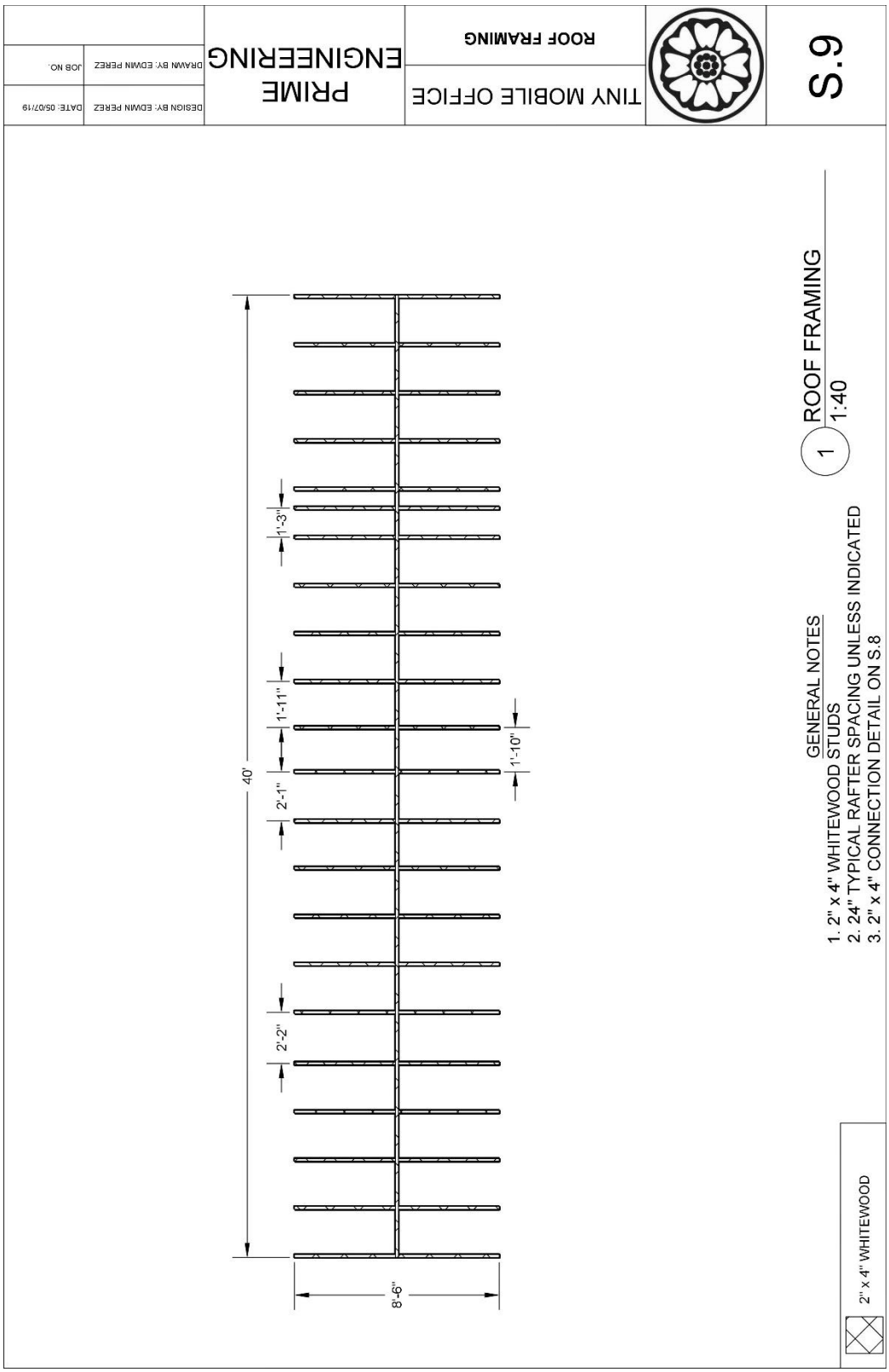


Figure 17: Roof Framing

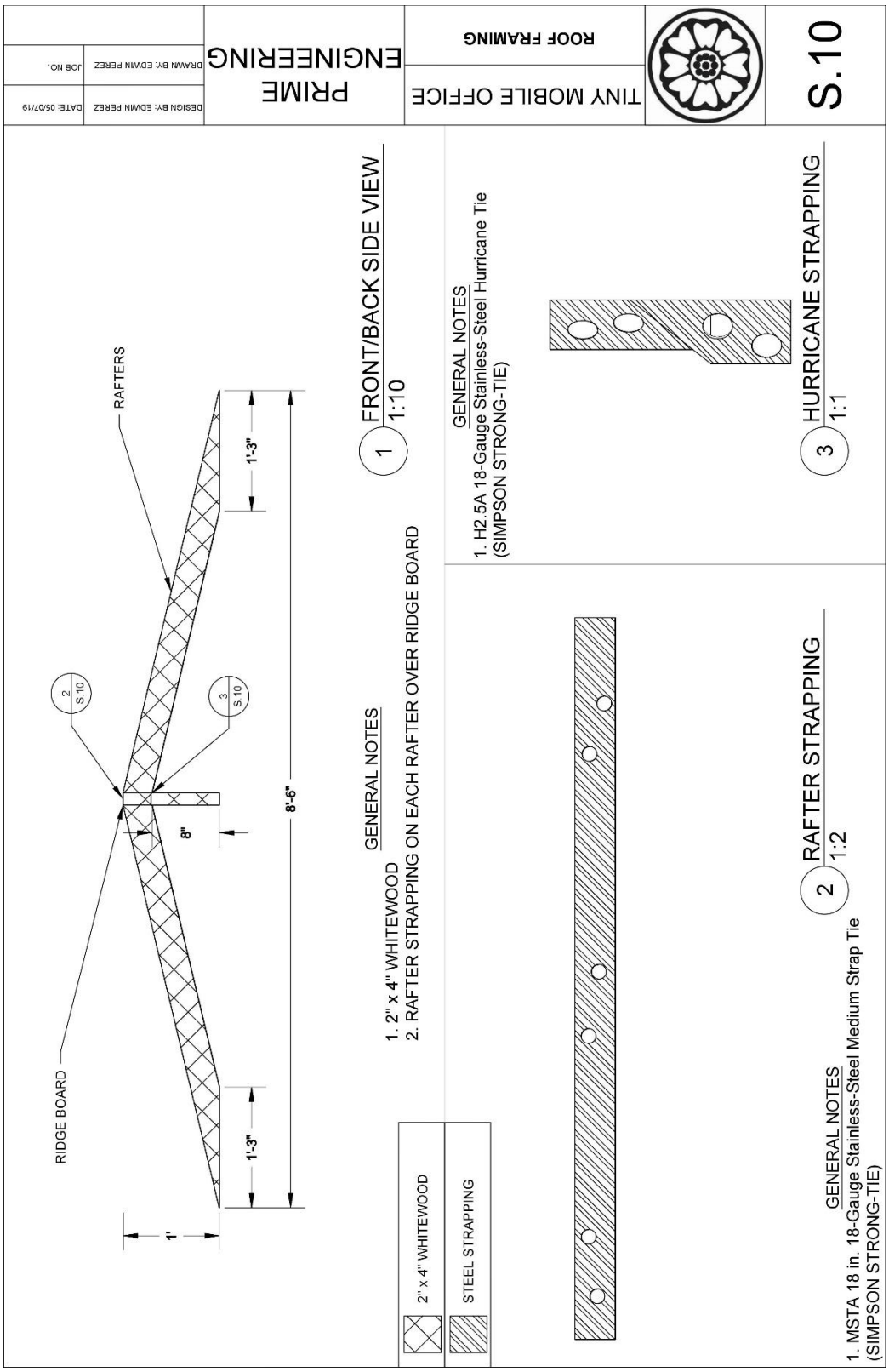


Figure 18: Roof Framing (2)

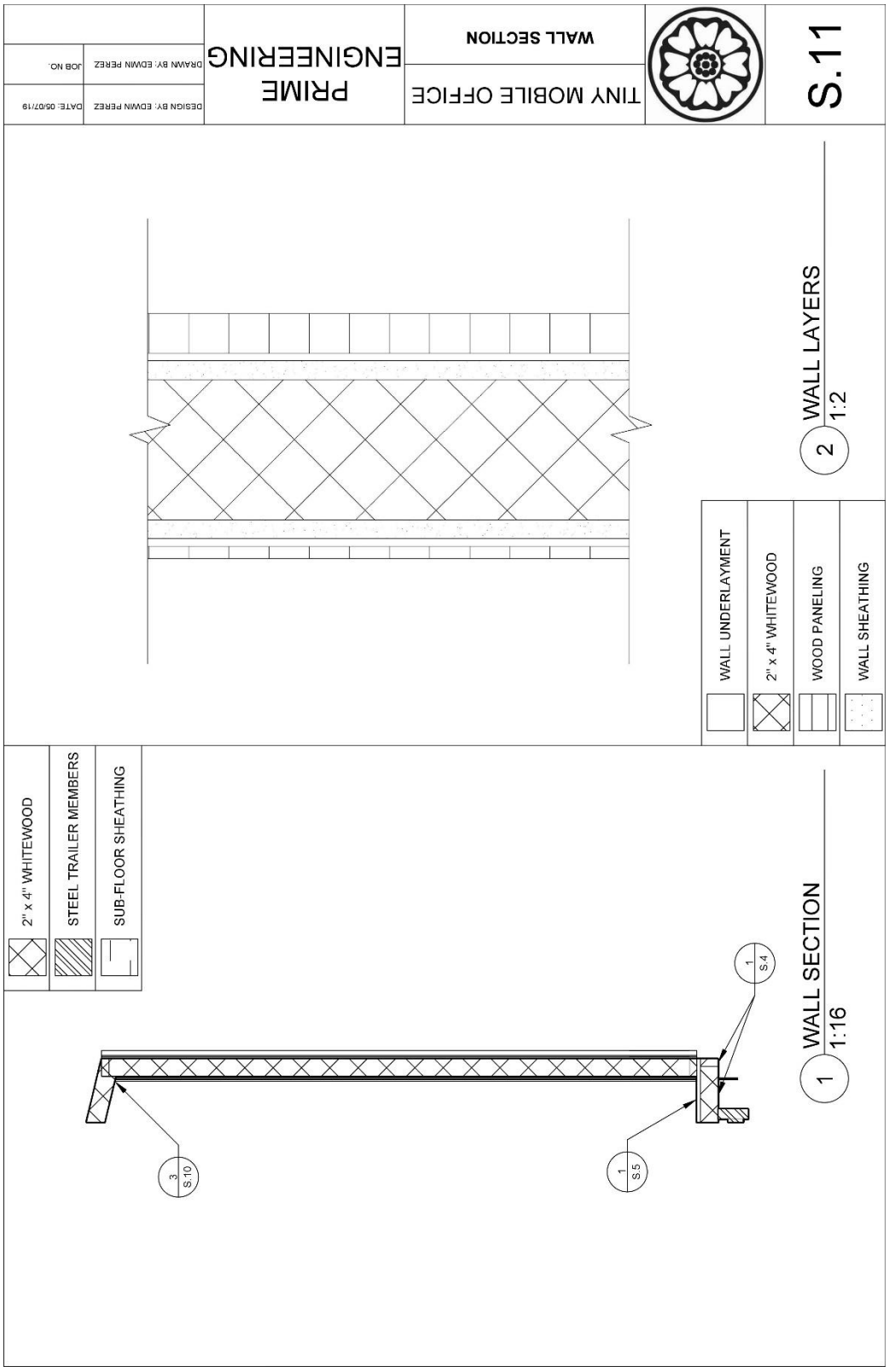


Figure 19: Wall Section

9.4 Appendix D – Electrical Drawings

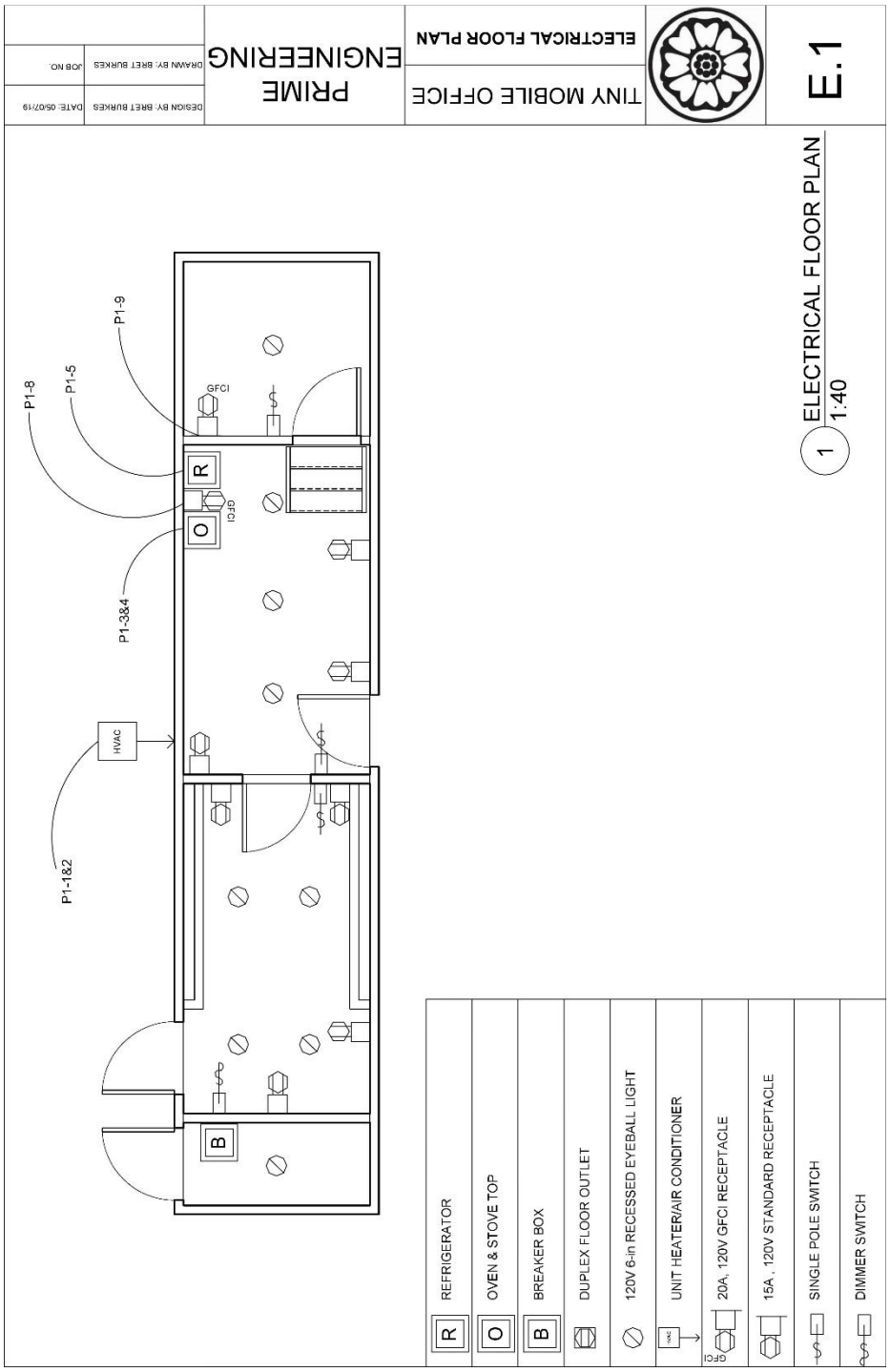


Figure 20: Electrical Layout

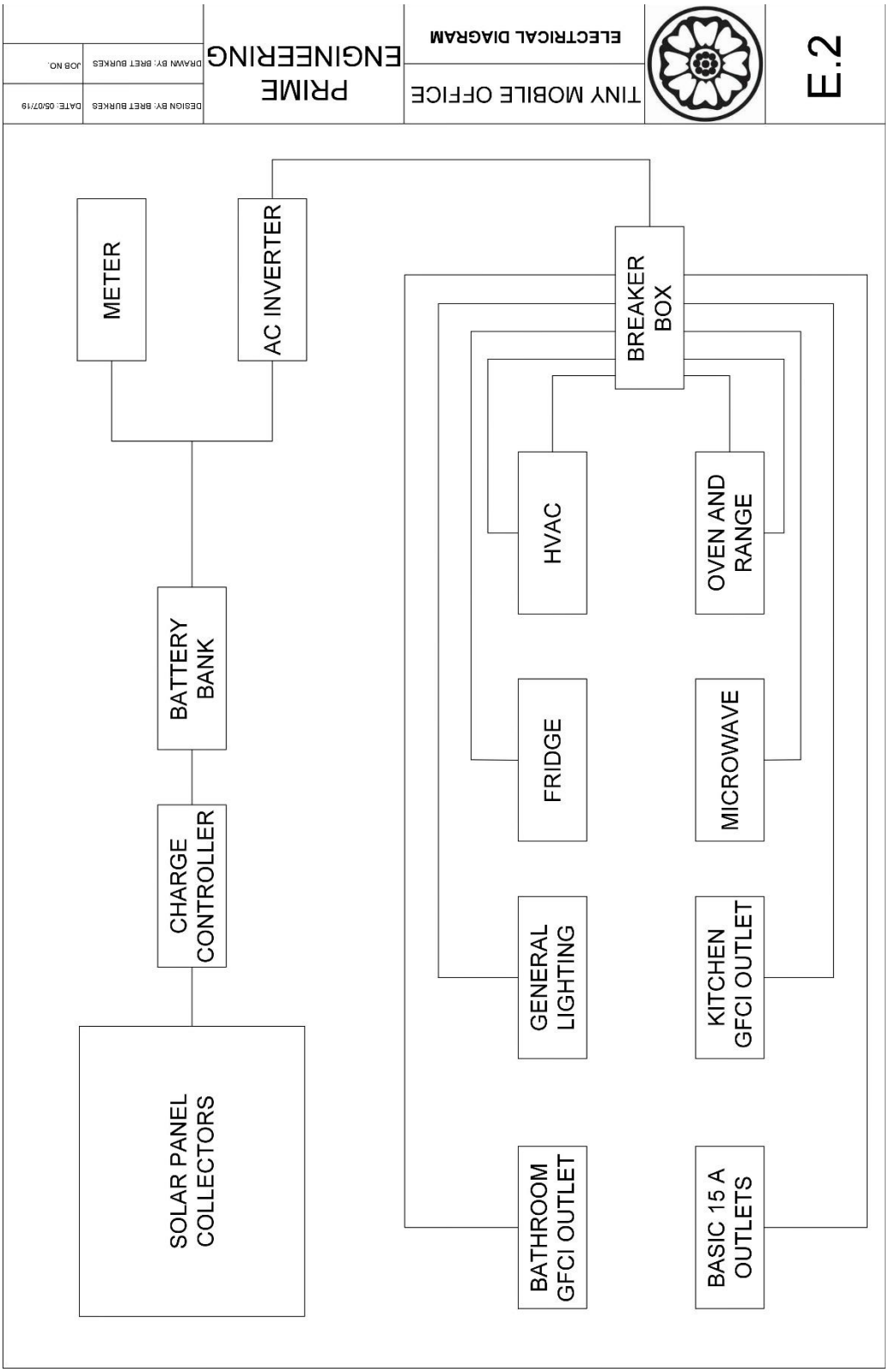


Figure 21: Wiring Diagram

Figure 22: Electrical Fixture Schedule

Figure 23: Electrical Panel Schedule

BRANCH PANEL: OFFICE SPACE

LOCATION:
SUPPLY FROM: MAIN
MOUNTING: GROUND
ENCLOSURE: CLOSET

VOLTS:
PHASES:
WIRES:

A.I.C. RATING:
MAINS TYPE:
MAINS RATING:
MCB RATING:

NOTES:

CKT	SCHEDULE CIRCUIT NOTES	TRIP	POLES	A	B
P1-1	HVAC	30 A	2	550 W	
P1-2	--	--	--		550 W
P1-3	Oven & Range	30 A	2	1200 W	
P1-4	--	--	--		1200 W
P1-5	Refrigerator	20 A	1	1080 W	
P1-6	Microwave	20 A	1		700W
P1-7	General Lighting	20 A	1	117 W	
P1-8	GFCI Kitchen Outlet	20 A	1		215 W
P1-9	GFCI Bathroom Outlet	15 A	1	175 W	
P1-10	Basic Outlets	15 A	1		123 W
P1-11					
P1-12					
P1-13					
P1-14					
P1-15					
P1-16					
				3122 W	2788 W

DESIGN BY: BRET BURKES | DATE: 05/07/19
DRAWN BY: BRET BURKES | JOB NO.

PRIME ENGINEERING

TINY MOBILE OFFICE

PANEL SCHEDULE

E.4

9.5 Appendix E – Plumbing Drawings

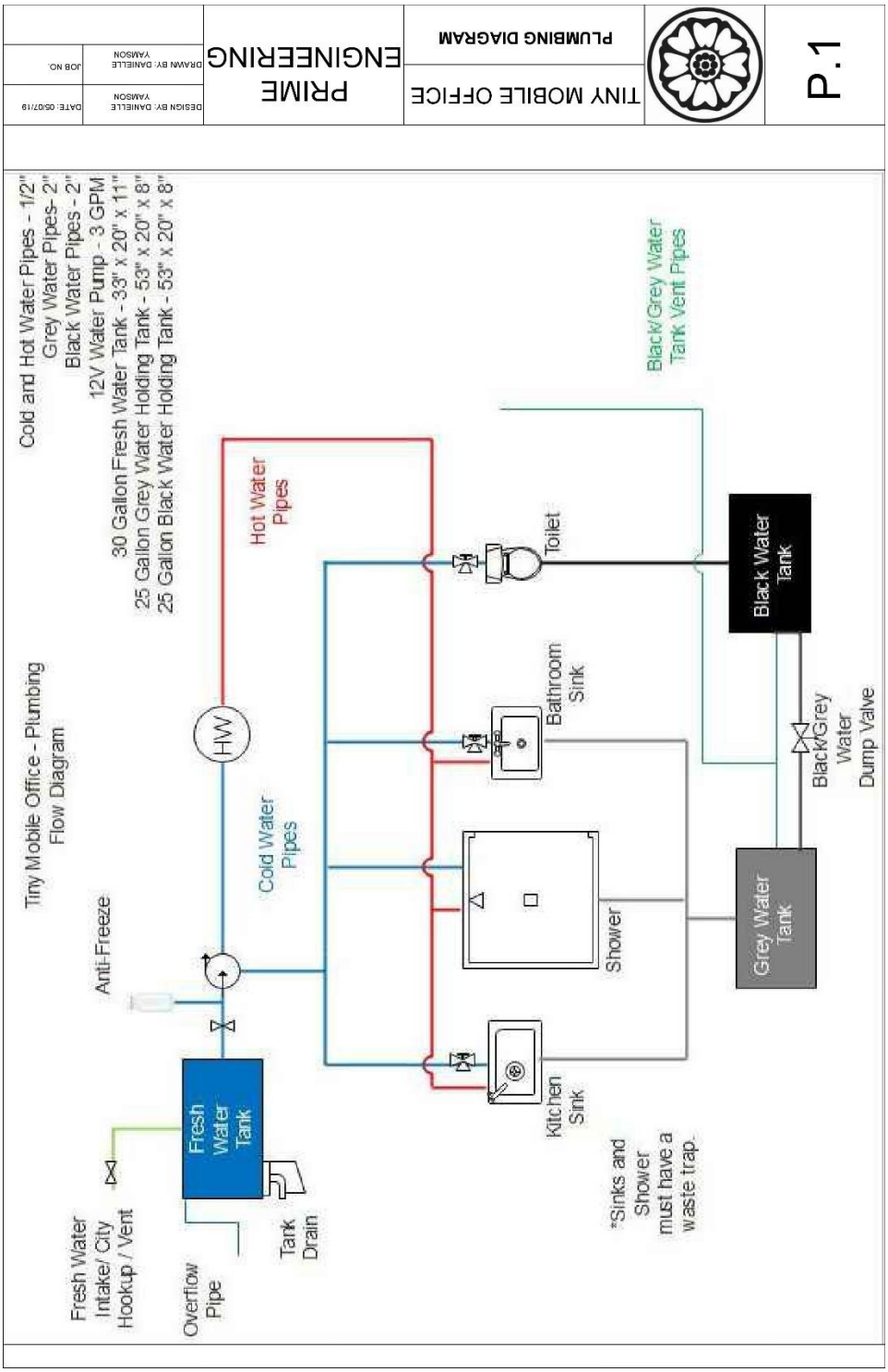


Figure 24: Plumbing Diagram

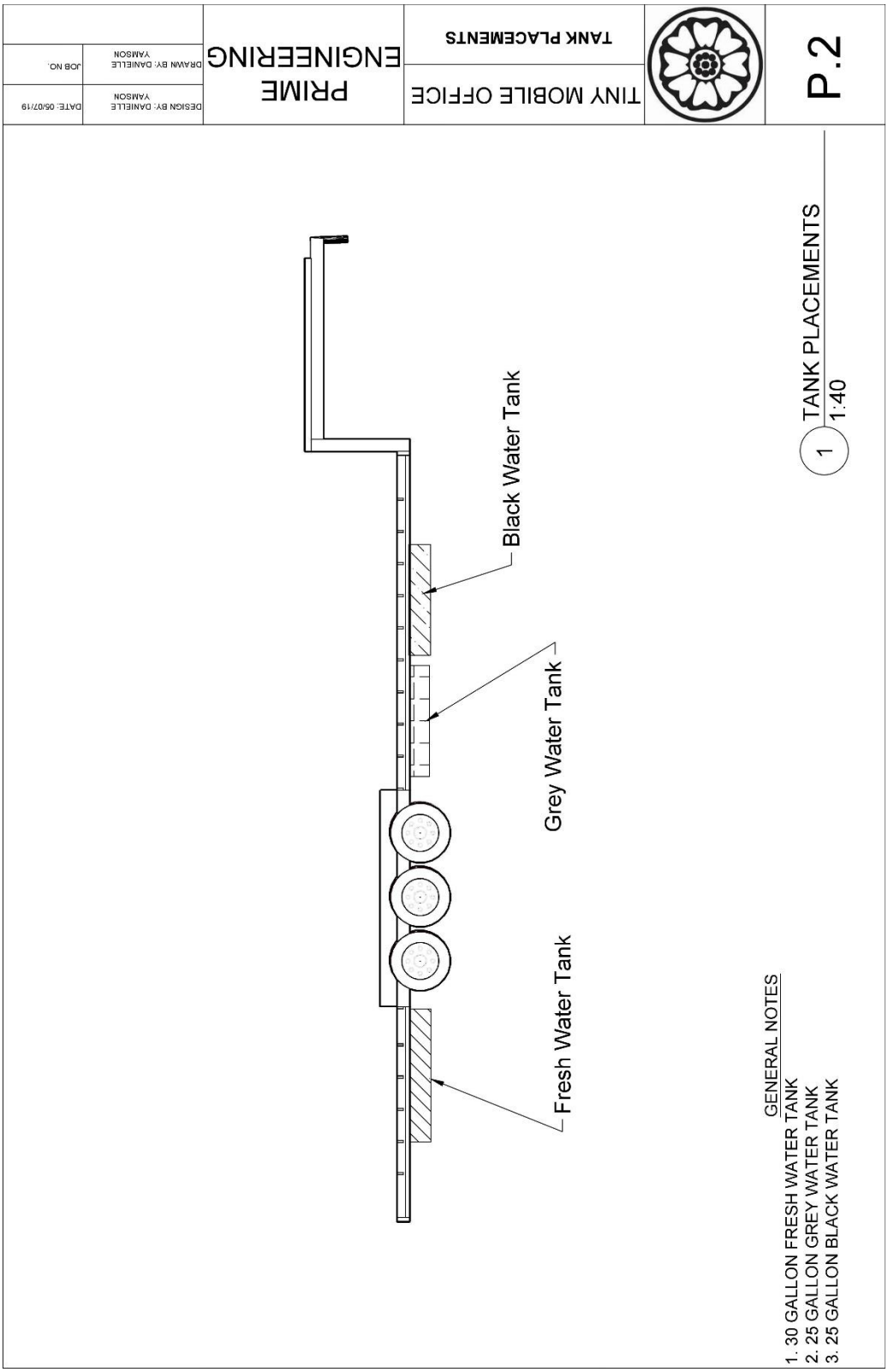


Figure 25: Plumbing Tank Placement

9.6 Appendix F – HVAC System

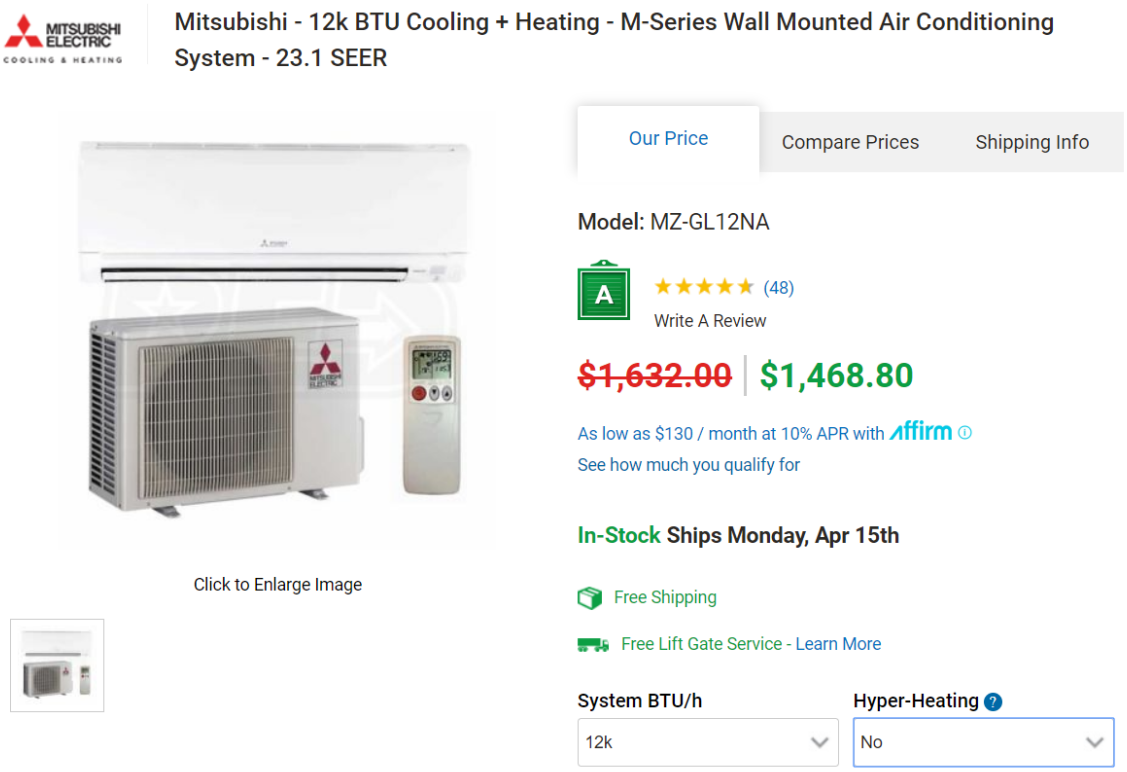


Figure 26: Mechanical Plan

9.7 Appendix G – Preliminary Layouts

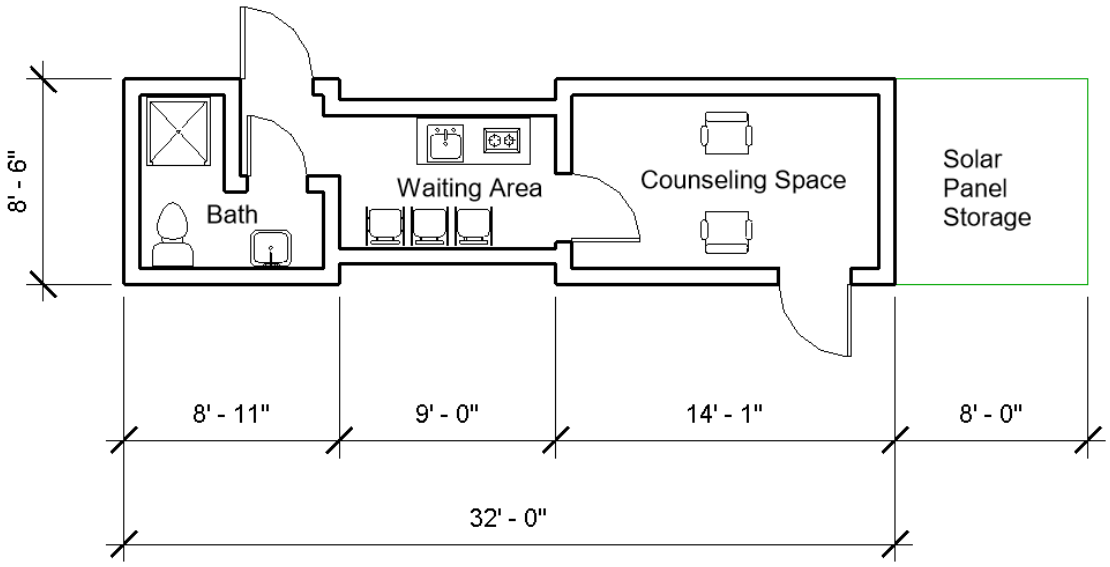


Figure 27: Layout 1 Option

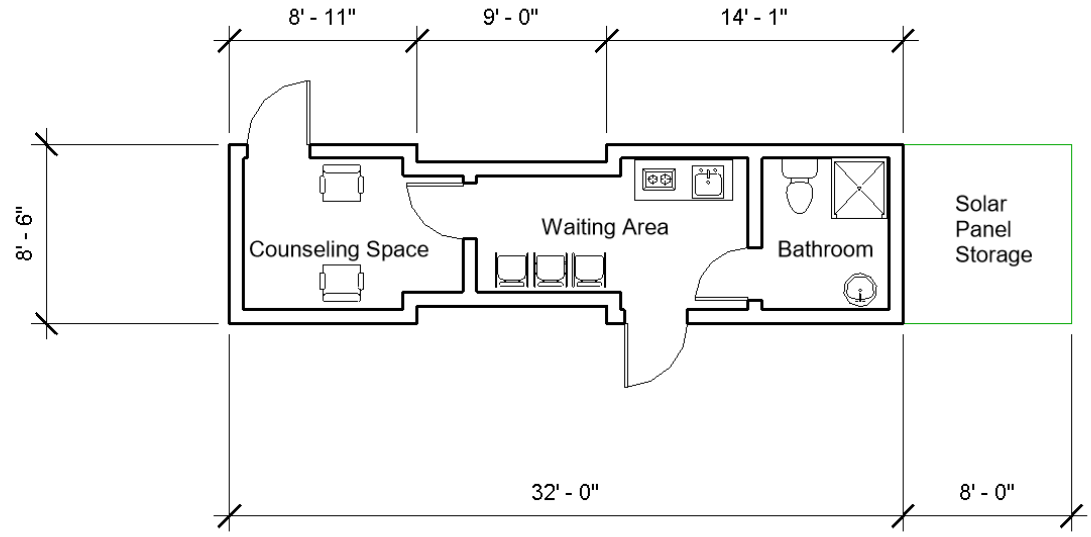


Figure 28: Layout 2 Option

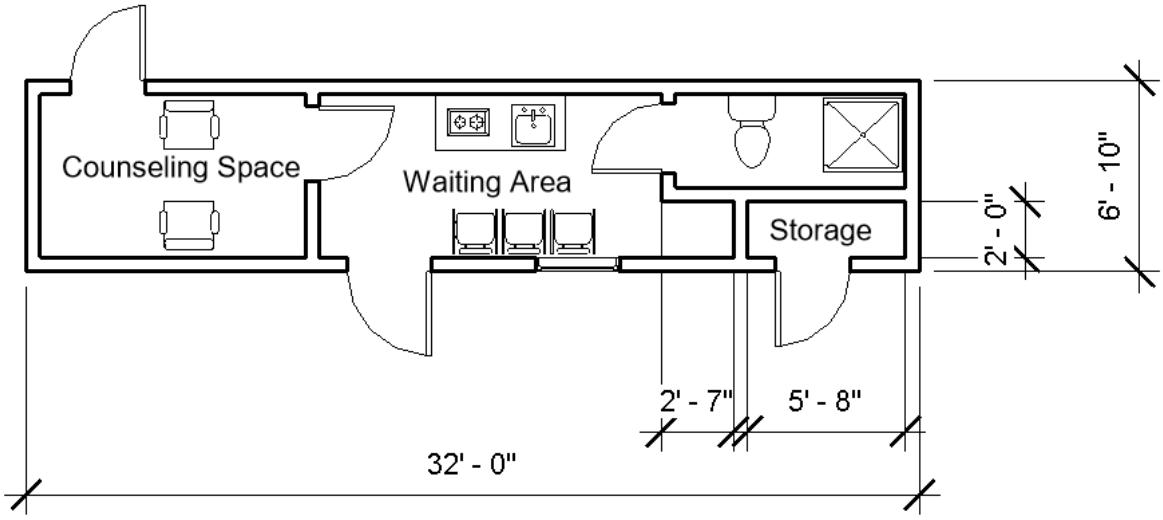


Figure 29: Layout 3 Option

9.8 Appendix H – Gantt Charts

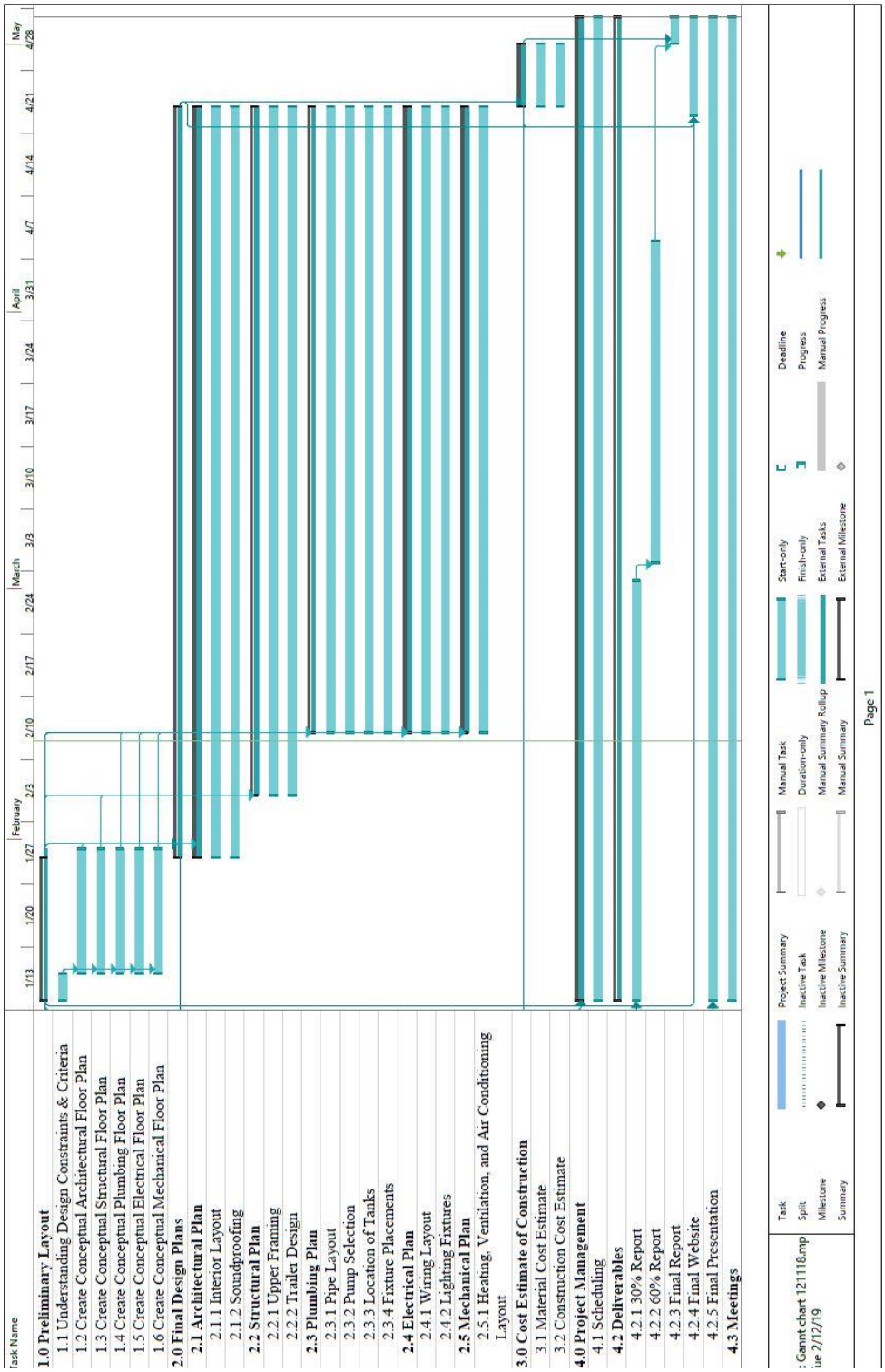


Figure 30: 2018 Gantt Chart

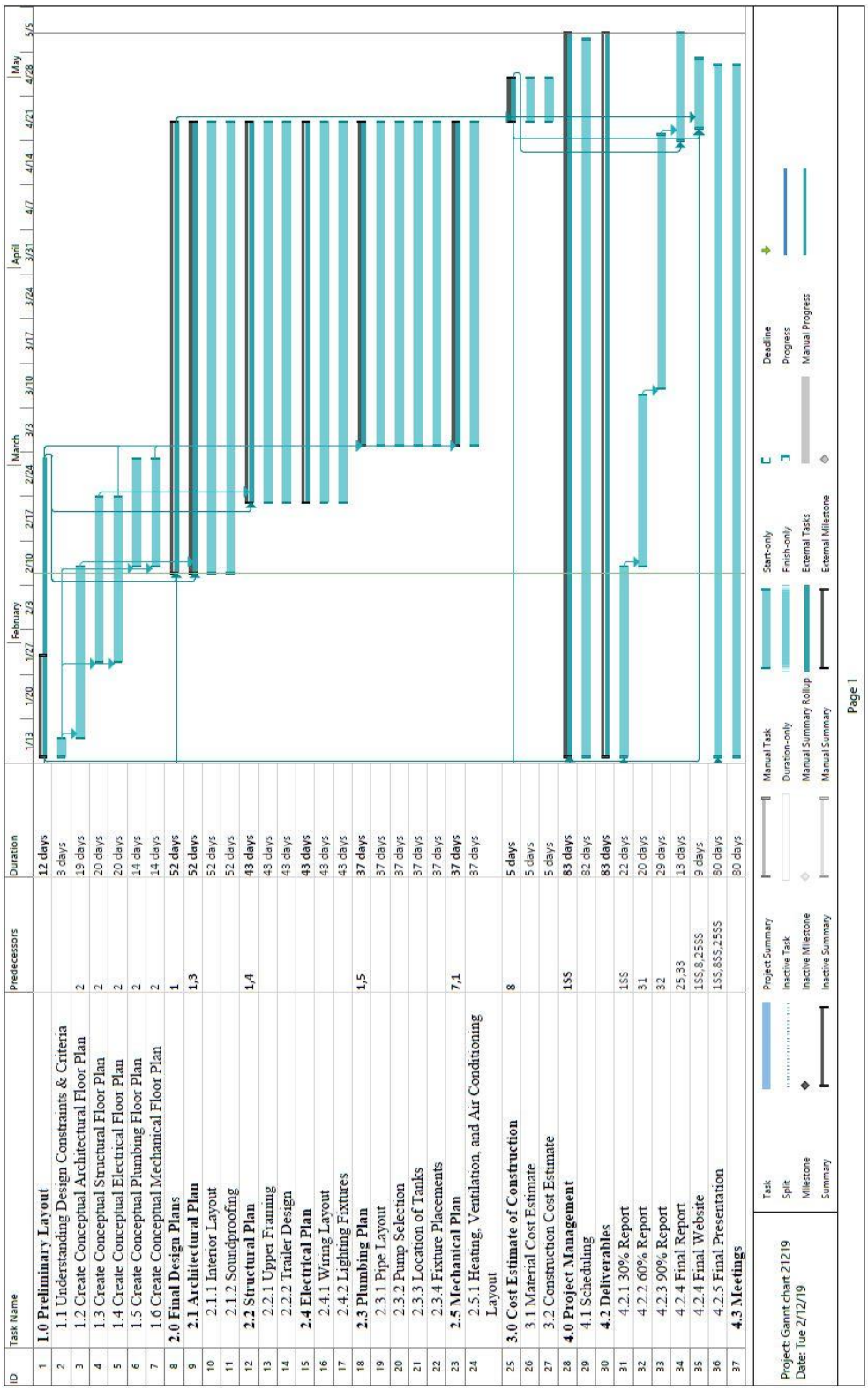


Figure 31: Updated Gantt Chart