Mattamy Homes

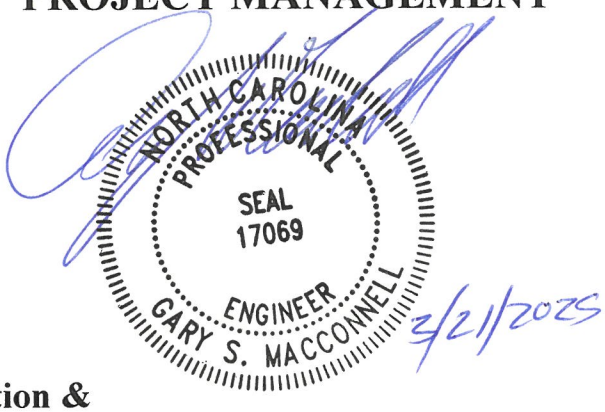
Flow Reduction Request

23 Barrow Ct.
(Lot 1 River Fall Ph.1)
Harnett County, North Carolina

Project Number: A75541.00

Date of Preparation: March 21, 2025

PROJECT MANAGEMENT



Supporting Information &
Technical Specifications Prepared By:
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MacCONNELL & Associates, P.C.
"Engineering Today For Tomorrow's Future"

501 Cascade Pointe Lane
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Cary, NC 27513

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Technical Memorandum

To: Harnett County Health Department
Client: Mattamy Homes
Subject: 23 Barrow Ct. (Lot 1 River Fall Ph.1)

Date: March 21, 2025
From: Gary S. MacConnell, P.E.
Project No.: A75541.00

This technical memorandum is a request for a design daily flow exemption to a residential dwelling using low flow fixtures as provided for in Session Law 2013-413 (House Bill 74) and Session Law 2014-120 Section 53 which relates to Rule 15A NCAC 18E .1949. Neither the State nor local health department shall be liable for any damages caused by an engineered system approved or permitted pursuant to Session Law 2014-120 Section 53.

Mattamy Homes is developing the property located at Lot 23 Barrow Ct. (Lot 1 River Fall Ph.1) in Harnett County, NC. A copy of the soils report can be found in the Soils Evaluation section of this application package. MacConnell & Associates, P.C. (M&A) is requesting a 25 percent flow reduction, using low-flow fixtures, to be incorporated into the design so that the home may be permitted as a 4-bedroom without needing to increase the size of the drainfield. The proposed treatment system is sized for the unadjusted flow of 480-GPD. The proposed initial and repair drainfields are sized for the reduced design flow of 360-GPD.

This request is for a flow reduction per provisions provided in Session Law 2013-413 and Session Law 2014-120. Typically, the basis for the design flow is provided in 15A NCAC 18E and prior regulations. The applicable regulations which preceded the 15A NCAC 18E rules and which served as the basis in determining flow in the 15A NCAC 18E rules: dates well before The Energy Policy Act of 1992 which established maximum flow rates for various fixtures in a nationwide effort to reduce both energy and water use. The flows which were established in the Act have recently been further reduced through the WaterSense program, which allows for labeling of fixtures which meet minimum criteria and conserve water.

Specifications for each fixture model can be found in the Proposed Fixtures section of this application package. A summary of the fixtures and flow rates can be found below in Table 1. A washing machine will be installed by the Owner in the future, so to calculate flow rates, M&A has elected to go with the base-rule flow to provide a conservative estimate

Table 1. Flow rates of proposed fixtures installed by builder.

Fixture	Manufacturer	Flow Rate	Units
Kitchen Faucet	Moen/7594SRS	1.5	GPM
Bathroom Faucet	Moen/64925	1.2	GPM
Master Showerhead	MoenTL182EP	1.75	GPM
Showerheads	Moen/TL183EP	1.75	GPM
Toilets	Gerber/GMX21962	1.28	GPF

Table 2 identifies the type of fixture, flows for fixtures based on the 15A NCAC 18E rules (Flow A), and flows for proposed fixtures (Flow B). The savings or water conservation from both the rule-based flows and proposed conditions are presented in both flow and percent below (Table 2).

Table 2. Savings of water from rule-based flows with the proposed fixtures.

Fixture

Fixture	Units	Base/Rule Flow A	Proposed Flow B	A to B Savings	A to B % Savings
Kitchen Faucet	GPM	3.0	1.50	1.50	50%
Bathroom Faucet	GPM	3.0	1.20	1.80	60%
Showerhead	GPM	5.5	1.75	3.75	68%
Toilet	GPF	3.5	1.28	2.22	63%
Clothes Washer	GPL	32.0	32.0	0.0	0%

Documentation for the above values is presented at the end of this discussion. The documentation includes:

1. Rule basis of flow and effective dates of rule.
2. Typical indoor water use.
3. Proposed fixtures.
4. Supporting documentation including historical flow rates for fixtures.
5. Technical Advisory Council Report for Wastewater Flows from Single Family Dwellings
6. Existing Information.

The projected flows using rule-based design flowrates would be:

Unadjusted Design Flow per Rule (15A NCAC 18A and prior regulations)

Description	No.	Flow/Unit	Total
Bedrooms	4	120 GPD	480 GPD
Total			480 GPD

Using the information presented above on flow A and B, the projected water use is presented in Table 3 below. The savings presented are from fixture rates when the rules were made effective in comparison to the flow rates with the proposed fixtures.

Fixture	% Use	Base Flow GPD	% Savings	Savings GPD	Adjusted GPD	
Kitchen Faucet	6%	29	50%	14.4	14.4	
Bathroom Faucet	10%	48	60%	28.8	19.2	
Showerhead*	19%	91	68%	62.2	29.0	
Toilet	28%	134	63%	85.2	49.2	
Clothes Washer	22%	106	0%	0	105.6	
Leaks & Other	15%	72	0%	0	72.0	
Total	100%	480	40%	190.6	289.4	60%

Notes:

*Highest water use shower head used in analysis.

The projected flow of 289.4 GPD is approximately sixty percent of the design flow which we have found to be typical of homes with water conscious fixtures. We are requesting a 25 percent reduction or a design flow for subsurface disposal of 360 GPD.

Analysis of wastewater shows that with the flow reduction, the waste is not considered high strength at presented below:

	Base Flow Concentration	Reduced Flow Concentration (220/1-.25)	High Strength
BOD_5	220 mg/l	293 mg/l	350 mg/l
TSS	220 mg/l	293 mg/l	350 mg/l

Thus, the effluent from the septic tank is expected to be similar to a non-reduced flow effluent. Based on this analysis, the use of low-flow fixtures provides sufficient remaining capacity. We respectfully ask for acceptance of this proposal.

Table of Contents

1. Rule basis of flow and effective dates of rule.

SECTION .0400 – DESIGN DAILY FLOW AND EFFLUENT CHARACTERISTICS

15A NCAC 18E .0401 DESIGN DAILY FLOW

(a) The minimum DDF for dwelling units shall be based on:

(1) 175 gpd for a one bedroom dwelling unit with no more than two occupants and 400 square feet of living space or less; or

(2) 120 gpd per bedroom with a minimum of 240 gpd per dwelling unit or 60 gpd per person when occupancy exceeds two persons per bedroom, whichever is greater.

(b) DDF for facilities other than dwelling units shall be in accordance with Table II as follows:

TABLE II. Design daily flow for Facilities

Facility type	Design daily flow
Commercial	
Airports, railroad stations, bus and ferry terminals, etc.	5 gal/traveler, food preparation not included
Barber shops	50 gal/chair
Bars, cocktail lounges∞	20 gal/seat, food preparation not included
Beauty shops, style shops, hair salons	125 gal/chair
Bed and breakfast homes and inns	Dwelling unit DDF based on Paragraph (a) of this Rule plus 120 gal/rented room which includes the following: Meals served to overnight guests Laundry for linens 150 gal/room with cooking facilities in individual rooms
Event Center∞	5 gal/person with toilets and hand sinks up to 4 hrs 10 gal/person with toilets and hand sinks up to 8 hrs 15 gal/person with toilets and hand sinks greater than 8 hrs Add 5 gal/person with full kitchen
Markets open less than four days/week, such as a flea market or farmers market	30 gal/stall or vendor, food preparation not included
Marinas with no holding tank discharge included	30 gal/boat slip, with bathhouse 10 gal/boat slip, wet slips or slips on dock 5 gal/boat slip, dry storage or warehouse
Motels/hotels	120 gal/room includes the following: No cooking facilities in individual rooms other than a microwave or other similar devices No food service or limited food service establishment Laundry for linens 150 gal/room with cooking facilities in individual rooms
Offices and factories with no IPWW included	12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift Add 10 gal/employee for showers
Stores, shopping centers, and malls	100 gal/1,000 ft^2 of retail sales area, food preparation not included
Warehouse that are not retail sales warehouses	100 gal/loading bay or 12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift
Storage warehouse including self-storage facilities and does not include caretaker residence	12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift
Alcoholic beverage tasting areas with no process wastewater included	200 gal/1,000 ft^2 of tasting area floor space and includes glass washing equipment Food preparation and food clean up not included 12 gal/employee/≤ 8 hr shift
Camps/Campgrounds	
Summer camps with overnight stays*	60 gal/person, applied as follows:

	15 gal/person/food preparation 20 gal/person/toilet facilities 10 gal/person/bathing facilities 15 gal/person/laundry facilities
Day camps not inclusive of swimming area bathhouse*	20 gal/person and 5 gal/meal served with multiuse service or 3 gal/meal served with single-service articles
Temporary Labor Camp or Migrant Housing Camp with overnight stays*	60 gal/person, applied as follows: 15 gal/person/food preparation 20 gal/person/toilet facilities 10 gal/person/bathing facilities 15 gal/person/laundry facilities
Travel trailer or RV in an RV park*	100 gal/space
Recreational Park Trailer or Park Model Trailer 400 ft^2 or less in an RV park*	150 gal/space
Bathhouse for campsites and RV park sites with no water and sewer hook ups with a maximum of four people per campsite	70 gal/campsite
Food preparation facilities	
Food Establishments with multiuse articles*	25 gal/seat or 25 gal/15 ft^2 of floor space open 6 hrs/day or less 40 gal/seat or 40 gal/15 ft^2 of floor space open 6 to 16 hrs/day Add 4 gpd/seat for every additional hour open beyond 16 hrs
Food Establishments with single service articles*	20 gal/seat or 20 gal/15 ft^2 of floor space open 6 hrs/day or less 30 gal/seat or 30 gal/15 ft^2 of floor space open 6 to 16 hrs/day Add 3 gpd/seat for every additional hour open beyond 16 hrs
Food stand with up to eight seats, mobile food units, and commissary kitchens*	50 gal/100 ft^2 of food stand, food unit, or food prep floor space and 12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift
Other food service facilities*	5 gal/meal served with multiuse articles 3 gal/meal served with single service articles
Meat markets or fish markets with no process wastewater included*	50 gal/100 ft^2 of floor space and 12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift
Health care and other care institutions	
Hospitals*	300 gal/bed
Rest homes, assisted living homes, and nursing homes*	150 gal/bed with laundry 75 gal/bed without laundry Add 60 gal/resident employee with laundry
Day care facilities	15 gal/person open ≤ 12 hr shift without laundry Add 1 gal/person/hr open for more than 12 hrs per day Add 5 gal/person with full kitchen
Group homes, drug rehabilitation, mental health, and other care institutions	75 gal/person with laundry
Orphanages	60 gal/student or resident employee with laundry
Public access restrooms	
Convenience store, service station, truck stop*	250 gal/toilet or urinal meeting the following: Open less than 16 hrs/day Food preparation not included Retail space not included
	325 gal/toilet or urinal meeting the following:

	Open 16 to 24 hrs/day Food preparation not included Retail space not included
Highway rest areas and visitor centers*	325 gal/toilet or urinal or 10 gal/parking space, whichever is greater
Recreational facilities	
Bowling center	50 gal/lane, food preparation not included
Community center, gym∞	5 gal/person plus 12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift or 50 gal/100 ft^2, whichever is greater
Country club or golf course	10 gal/person 12 gal/employee/≤ 8 hr shift Add 2 gal/employee/hr for more than 8 hr shift 3 gal/person for convenience stations Food preparation not included
Fairground	250 gal/toilet or urinal
Fitness center, spas, karate, dance, exercise∞	50 gal/100 ft^2 of floor space used by clientele Food preparation not included
Recreational park, State park, county park, and other similar facilities with no sports facilities	10 gal/parking space
Outdoor sports facilities, mini golf, batting cages, driving ranges, motocross, athletic park, ball fields, stadium, and other similar facilities	250 gal/toilet or urinal, 5 gal/seat, or 10 gal/parking space, whichever is greater Food preparation not included
Auditorium, theater, amphitheater, drive-in theater	2 gal/seat or 10 gal/parking space, whichever is greater Food preparation not included
Swimming pools and bathhouses	5 gal/person domestic waste only, bathing load of pool may be used as an alternative method of sizing
Sports facilities courts or other similar facilities	250 gal/toilet or urinal or 50 gal/court, whichever is greater
Institutions	
Church or other religious institution*	2 gal/seat sanctuary only 3 gal/seat with warming kitchen in same structure as sanctuary 5 gal/seat with full kitchen in same structure as sanctuary
Public or private assembly halls used for recreation, regularly scheduled meetings, events, or amusement∞* For churches, flow shall be in addition to sanctuary structure flow	2 gal/person with toilets and hand sinks 3 gal/person with addition of a warming kitchen 5 gal/person with full kitchen
Schools	
Day schools*	6 gal/student with no cafeteria or gymnasium 9 gal/student with cafeteria only 12 gal/student with cafeteria and gymnasium
After school program	5 gal/student in addition to flow for regular school day
Boarding schools	60 gal/student and resident employee with laundry

* Facility has potential to generate HSE.

∞Designer shall use the maximum building occupancy assigned by the local fire marshal in calculating DDF unless another method for determining DDF is proposed, including the justification for not using the maximum building occupancy.

(c) The minimum DDF from any facility other than a dwelling unit shall be 100 gpd. For facilities with multiple design units, the minimum DDF shall be 100 gpd per design unit. The DDF of the facility shall be the sum of all design unit flows.

(d) DDF determination for wastewater systems with facilities not identified in this Rule shall be determined using available water use data, capacity of water-using fixtures, occupancy or operation patterns, and other measured data from the facility itself or a comparable facility.

(e) Where laundry is not specified for a facility in Table II, but is proposed to be provided, the DDF shall be adjusted to account for the proposed usage and machine water capacity. The applicant or a licensed professional shall provide cut-sheets for laundry machines proposed for use in facilities.
(f) HVAC unit or ice machine condensate, gutter or sump pump discharge, water treatment system back flush lines, or similar incidental flows shall not discharge to the wastewater system, unless a PE designs the wastewater system for these flows.
(g) Unless otherwise noted in Table II, the DDF per unit includes employees.
(h) Food service facilities and other facilities that are projected to generate wastewater with constituent levels greater than DSE, as defined in Rule .0402 of this Section, are identified in Table II with a single asterisk (*) as HSE. Any facility that has a food service component that contributes 50 percent or more of the DDF shall be considered to generate HSE. Determination of wastewater strength shall be based on projected or measured levels of one or more of the following: BOD, TSS, FOG, or TN. Table III of Rule .0402(a) of this Section identifies the constituent limits for DSE.
(i) Wastewater with constituents other than those listed in Table III of Rule .0402(a) of this Section may be classified as IPWW as defined in G.S. 130A-334(2a) on a site-specific basis.
(j) A request for an adjusted DDF shall be made in accordance with Rule .0403 of this Section.

History Note: *Authority G.S. 130A-335(e); S.L. 2013-413, s.34; S.L. 2014-120, s. 53;*
Eff. January 1, 2024.

15A NCAC 18E .0402 SEPTIC TANK EFFLUENT CHARACTERISTICS
(a) Septic tank effluent standards for DSE shall be as set forth in Table III of this Paragraph. Effluent that exceeds these standards for any constituent shall be considered HSE. When measured, effluent characteristics shall be based on at least two effluent samples collected during normal or above-normal operating periods. A normal period is when the occupancy, operation, or use of the facility is average when compared to the occupancy, operation, or use over a time frame of a minimum of one year. The samples shall be taken from the existing or a comparable facility on non-consecutive days of operation. A comparable facility is based on documentation showing that the hours of operation, floor plan, water use practices, water-using fixtures, location, etc., are similar to the facility listed in the application. The samples shall be analyzed for a minimum of BOD_5, TSS, TN, and FOG.

Table III. Septic tank effluent standards for DSE

Constituent	Maximum DSE mg/L
BOD	≤ 350
TSS	≤ 100
TN*	≤ 100
FOG	≤ 30

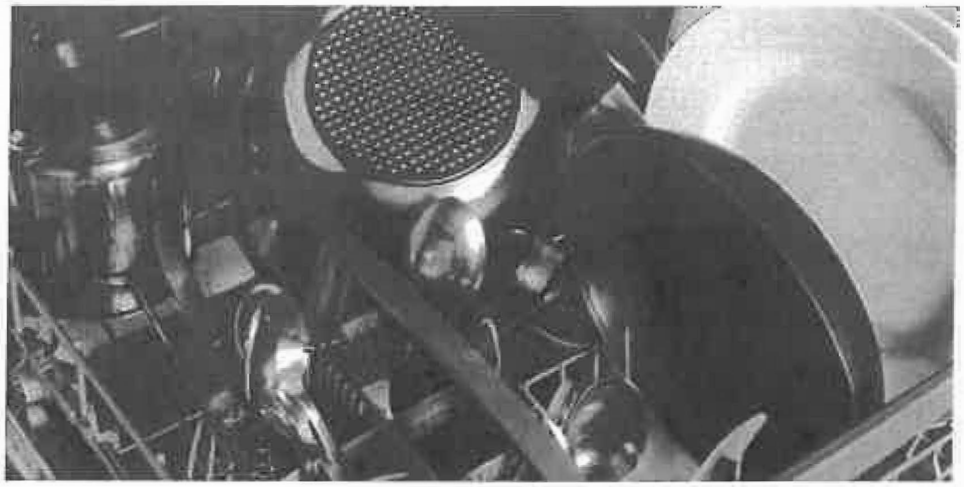
*TN is the sum of TKN, nitrate nitrogen, and nitrite nitrogen

(b) Designs for facilities that generate HSE or when an adjusted DDF is proposed in accordance with Rule .0403 shall address the issue of wastewater strength in accordance with one of the following:
(1) Wastewater systems that meet one of the following criteria shall utilize advanced pretreatment, designed in accordance with Rule .1201(b) of this Subchapter, to produce DSE or better prior to dispersal:
(A) DDF greater than 1,500 gpd and HSE;
(B) any proposed flow reduction in accordance with Rule .0403 of this Section where the DDF is greater than 1,500 gpd; or
(C) any proposed flow reduction in accordance with Rule .0403 of this Section with projected or measured effluent characteristics that exceed DSE as set forth in Table III of this Rule; or
(2) A licensed professional, in accordance with G.S. 89C, 89E, or 89F, may justify not using advanced pretreatment by providing the following, as applicable:

2. Typical indoor water use.

Indoor Water Use at Home

gracelinks.org/124/indoor-water-use-at-home



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Fortunately, when we want fresh, clean water, all most of us have to do is turn on a faucet. On average, our direct indoor water use (water you use from your tap, toilet, dishwasher, etc.) adds up to about 60 gallons of water a day per person.

Here's how indoor water use breaks down:

- Toilets (28 percent)
- Washing Machines (22 percent)
- Showers and Baths (19 percent)
- Sinks (16 percent)
- Household Leaks (14 percent)

That last number is surprising – it's almost 10 gallons of water per person per day lost to leaky toilets and faucets.

Conserving Water with Water-Efficient Toilets, Showerheads and More

Fortunately, saving water around the house is easier today than ever before. Newer (low-flow) toilets, showerheads and faucets are designed to be more efficient than older models and can save your household gallons every day. For example, older toilets use up to 7 gallons per flush, whereas low-flow toilets use 1.5 gallons or less.

Likewise, older showerheads flow over 4 gallons per minute, while low-flow models can flow as low as 1.5 gallons per minute. Be careful what showerhead you purchase, though, because some fixtures, especially those with multiple nozzles, exceed the federal limit of 2.5 gallons per minute. If you use one of those, consider cutting back your shower time.

Check out EPA's WaterSense website for water- and energy- saving products. In addition, you can find energy- and water-saving appliances like dishwashers and washing machines through DOE's ENERGY STAR label. By switching to water-saving fixtures and appliances you can reduce your indoor water use by a third on average.

Heating is a Water and Energy Hog!

In most households water heating is a huge energy user, after indoor heating and cooling, appliances, electronics and lighting. So sadly, long hot showers waste both water and energy! Although modern fixtures and appliances are a great way to save gallons, it's still important to simply turn off the tap.

By taking simple steps to reduce your water use at home you can save gallons, energy and dollars every day! To find lots of ways to save water and energy visit the Water Saving Tips page.

***

Did You Know? Washing dishes by hand takes about 20 gallons per load but Energy Star dishwashers only use 4 to 6 gallons. Even standard machines use only 6 to 8 gallons. If you do wash dishes by hand, turn off the tap until you're ready to rinse.

3. Proposed fixtures.

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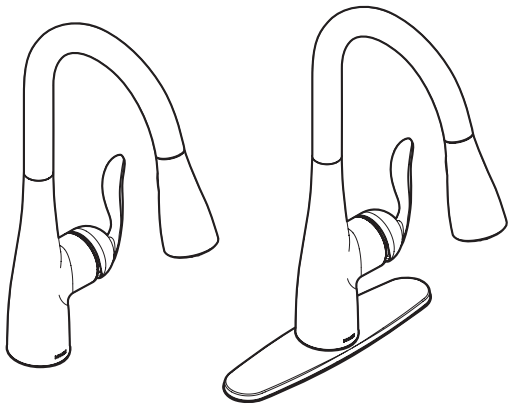
Specifications

There is more than one version of this model.
Page down to identify the version you have.



ARBOR™
Single Handle High Arc Pulldown Kitchen Faucet

Models: 7594 series

NOTE: THIS FAUCET IS DESIGNED TO BE INSTALLED THROUGH 1 OR 3 HOLES, 1-1/2" (38mm) MIN. DIA.

GREEN UPC ®

FAUCET DESCRIPTION
- Reflex™ pulldown system offers smooth operation, easy movement and secure docking
- Metal construction with various finishes identified by suffix
- Duralock™ quick connect system
- Pullout spray with 68" braided hose
- Flexible supply lines with 3/8" compression fittings
- High arc spout provides height and reach to fill or clean large pots while pull out wand provides the maneuverability for cleaning or rinsing
- 360˚ rotating spout
- Power Boost™ Spray Technology

OPERATION
- Lever style handle
- Temperature controlled by 100˚ arc of handle travel
- Operates with less than 5 lbs. of force
- Operates in stream or spray mode in the pullout or retracted position

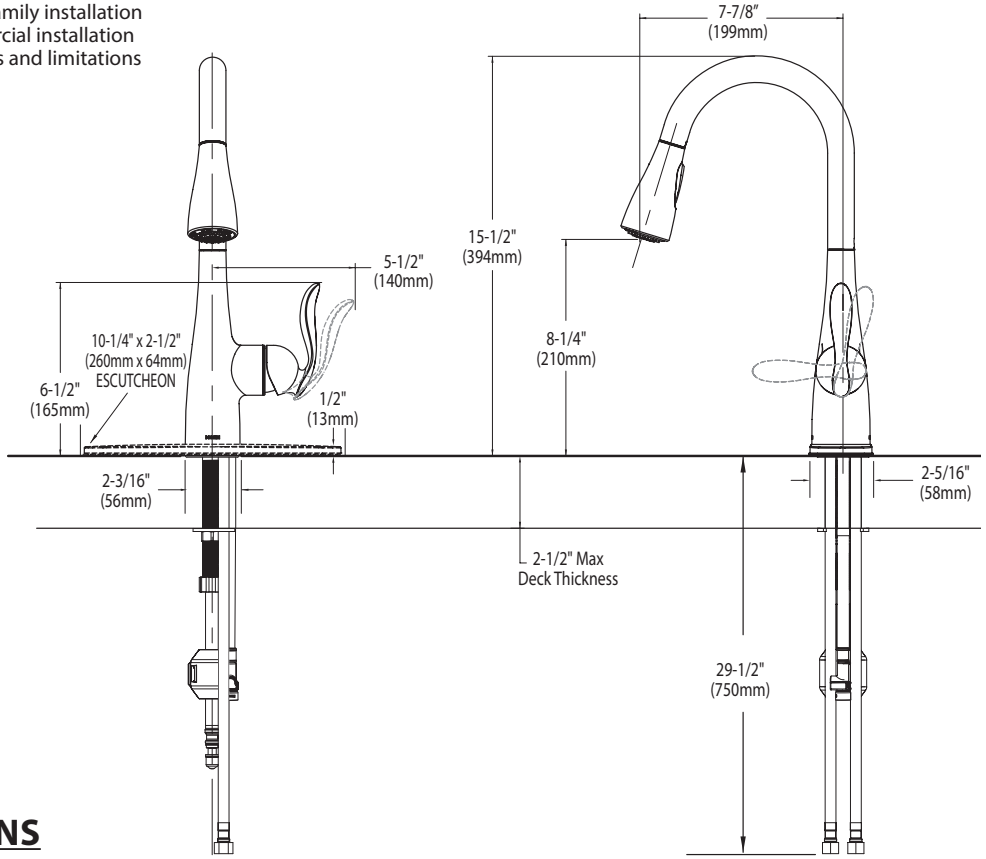
FLOW
- Flow is limited to 1.5 gpm (5.7 L/min) at 60 psi

CARTRIDGE
- 1255™ Duralast™ cartridge for Single-Handle Faucets

STANDARDS
- Third party certified to IAPMO Green, ASME A112.18.1/CSA B125.1 and all applicable requirements referenced therein
- Certified to NSF 61/9 & 372
- Meets CalGreen and Georgia SB370 requirements
- Complies with California Proposition 65 and with the Federal Safe Drinking Water Act
- The backflow protection system in the device consists of two independently operating check valves, a primary and a secondary which prevent backflow
- **ADA** for lever handle

WARRANTY
- Lifetime limited warranty against leaks, drips and finish defects to the original homeowner
- 10 year limited warranty when used in a multifamily installation
- 5 year limited warranty when used in a commercial installation

Visit www.moen.com/support for complete details and limitations



CRITICAL DIMENSIONS

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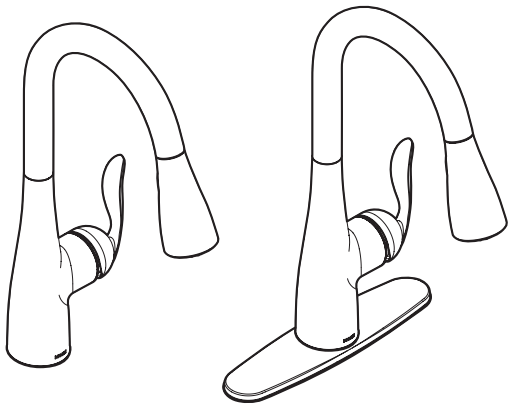
Specifications



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- Reflex™ pulldown system offers smooth operation, easy movement and secure docking
- Metal construction with various finishes identified by suffix
- Quick connect system
- Pullout spray with 68" braided hose
- Flexible supply lines with 3/8" compression fittings
- High arc spout provides height and reach to fill or clean large pots while pull out wand provides the maneuverability for cleaning or rinsing
- 360˚ rotating spout
- Power clean spray

OPERATION
- Lever style handle
- Temperature controlled by 100˚ arc of handle travel
- Operates with less than 5 lbs. of force
- Operates in stream or spray mode in the pullout or retracted position
- When filling a vessel outside the sink, the pause feature conveniently stops the flow of water as the wand passes over the counter top

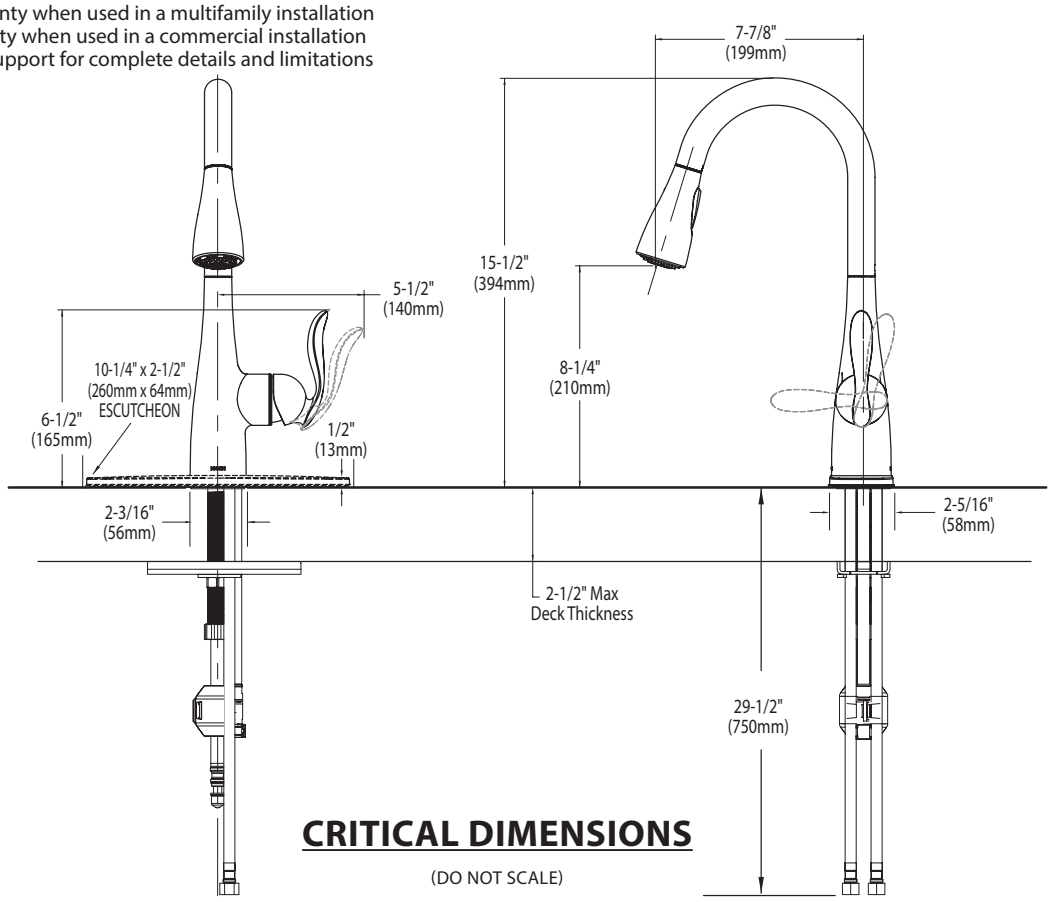
FLOW
- Flow is limited to 1.5 gpm (5.7 L/min) at 60 psi

CARTRIDGE
- 1255™ Duralast™ cartridge for Single-Handle Faucets

STANDARDS
- Third party certified to IAPMO Green, ASME A112.18.1/CSA B125.1 and all applicable requirements referenced therein
- Certified to NSF 61/9 & 372
- Meets CalGreen and Georgia SB370 requirements
- Complies with California Proposition 65 and with the Federal Safe Drinking Water Act
- The backflow protection system in the device consists of two independently operating check valves, a primary and a secondary which prevent backflow
- **ADA** for lever handle

WARRANTY
- Lifetime limited warranty against leaks, drips and finish defects to the original homeowner
- 10 year limited warranty when used in a multifamily installation
- 5 year limited warranty when used in a commercial installation

Visit www.moen.com/support for complete details and limitations



CRITICAL DIMENSIONS

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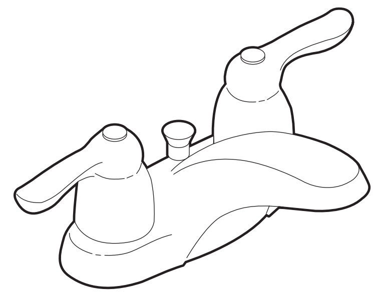
Specifications

There is more than 1 version of this model.
Page down to identify the version you have.



CHATEAU®

Two-Handle 4" Centerset Lavatory Faucet

Models:
4925 series includes metal waste

Bulk Models (12 per carton):
64925 includes 50/50 waste
64922 less waste*

* *Models less waste include removable plug button in lift rod hole, and can be installed through 2 holes, 1" min. diameter, and 4" on center*

WaterSense Meets EPA Criteria
Certified by IAPMO R&T

DESCRIPTION
- Metal construction with finishes identified by suffix
- ½" IPS connections will accept standard ball nose connection for 3/8" tubing
- Installation through 3 holes, 1" min. diameter, and 4" on center
- Includes pop-up waste assembly except in model 64922
- Includes hot and cold temperature indicators

OPERATION
- Lever handles
- Maximum handle rotation angle is 90° to full on
- Hot side counterclockwise to open (clockwise to close)
- Cold side clockwise to open (counterclockwise to close)

FLOW
- Water usage is limited to the maximum flow rates as indicated by the corresponding product markings
  - 1.2 gpm max (4.5 L/min) at 60 psi

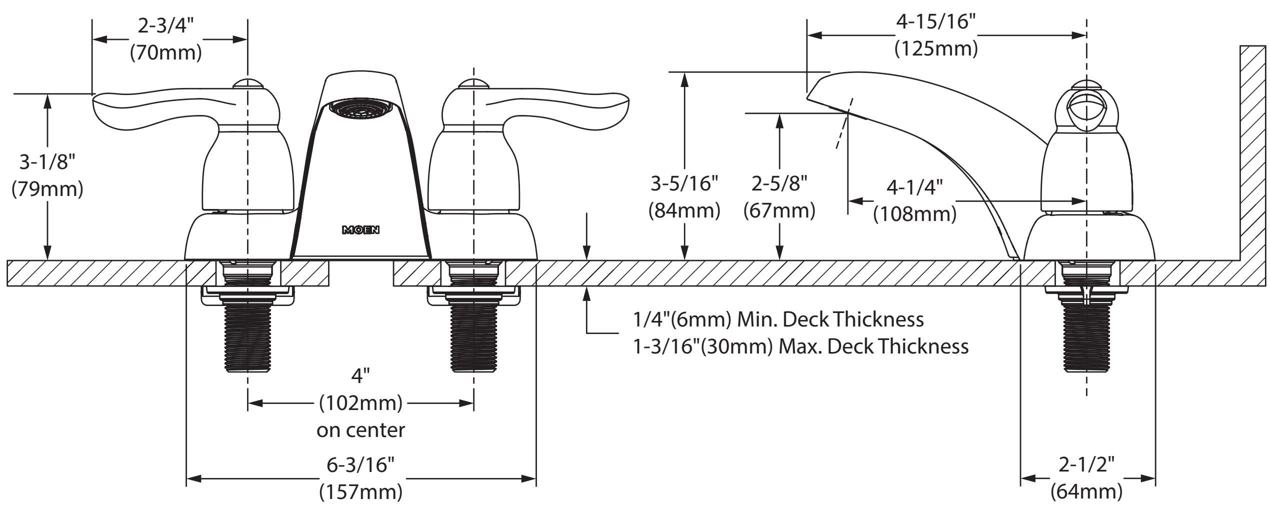
CARTRIDGE
- 1234 Duralast® cartridge
- Nonmetallic and stainless steel material

STANDARDS
- Third party certified at WaterSense®, ASME A112.18.1/CSA B125.1, and all applicable requirements referenced therein including NSF 61/9 & 372
- Products marked with 1.2 gpm are compliant with California water efficiency regulations
- Complies with California Proposition 65 and with the Federal Safe Drinking Water Act
- ADA ♿ for lever handles

WARRANTY
- Lifetime limited warranty against leaks, drips and finish defects to the original homeowner
- 10 year limited warranty when used in a multifamily installation
- 5 year limited warranty when used in a commercial installation

Visit www.moen.com/support for complete details and limitations

OPTIONS *(See Illustrated Parts page)*
- Thin and thick deck mounting hardware kits available



CRITICAL DIMENSIONS

(DO NOT SCALE)

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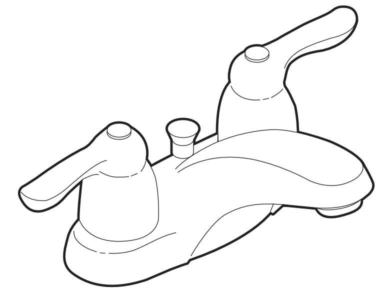
Specifications



CHATEAU®

Two-Handle 4" Centerset Lavatory Faucet

Models:
4925 series includes metal waste

Bulk Models (12 per carton):
64925 includes 50/50 waste
64922 less waste*

* *Models less waste include removable plug button in lift rod hole, and can be installed through 2 holes, 1" min. diameter, and 4" on center*

WaterSense Meets EPA Criteria
Certified by IAPMO R&T

DESCRIPTION
- Metal construction with various finishes identified by suffix
- 1/2" IPS connections
- Includes metal pop-up type waste assembly except in model 64922

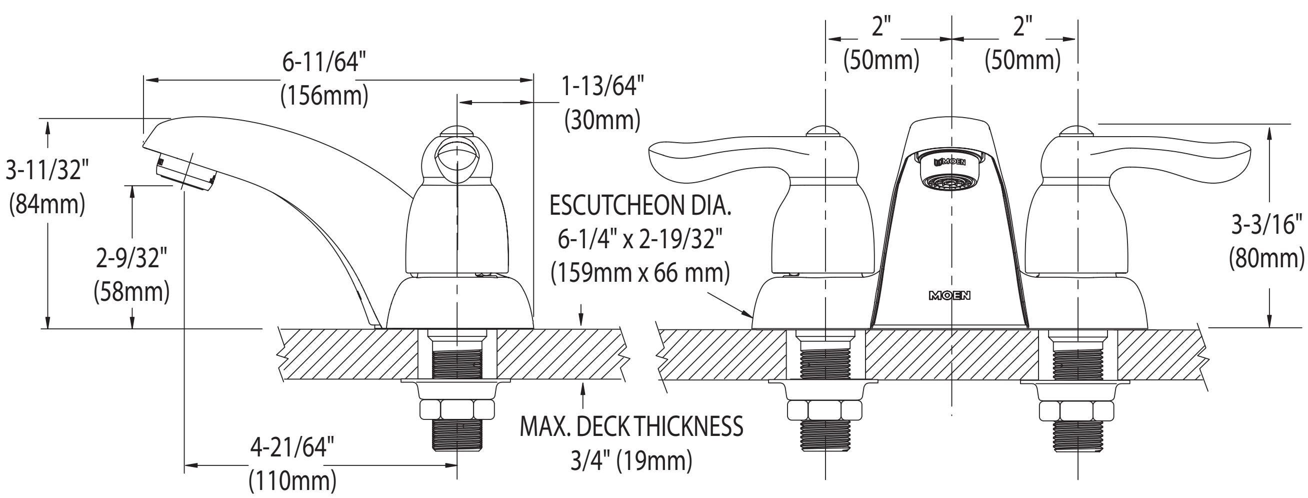
OPERATION
- Lever style handles with hot and cold color indicators
- Hot side counterclockwise to open (clockwise to close)
- Cold side clockwise to open (counterclockwise to close)

FLOW
- Water usage is limited to these maximum flow rates as indicated by the corresponding product markings
  - 1.2 gpm max (4.5L/min) at 60 psi
  - 1.5 gpm max (5.7L/min) at 60 psi
  - 2.2 gpm max (8.3L/min) at 60 psi

CARTRIDGE
- 1224 cartridge design
- Nonmetallic and stainless steel material

STANDARDS
- Third party certified to WaterSense®, ASME A112.18.1/CSA B125.1 and all applicable requirements referenced therein
- Certified to NSF 61/9 & 372
- Products marked with 1.2 gpm are compliant with California water efficiency regulations
- Complies with California Proposition 65 and with the Federal Safe Drinking Water Act
- ADA ♿ for lever handles

WARRANTY
- Lifetime limited warranty against leaks, drips and finish defects to the original consumer purchaser
- 5 year warranty if used in commercial installations



CRITICAL DIMENSIONS

(DO NOT SCALE)

Rev. 1/17

FOR MORE INFORMATION CALL: 1-800-BUY-MOEN
www.moen.com

12/13/2017 SPC10747 50000271229
Released 02

MOEN

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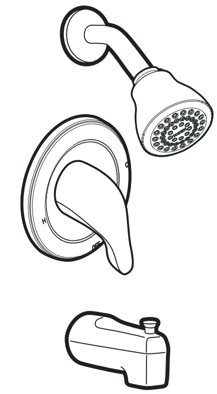
Specifications

There is more than 1 version of this model.
Page down to identify the version you have.



CHATEAU® POSI-TEMP®
Single-Handle Tub/Shower Trim Kit

Models: TL181 series - valve trim only
(Bulk Packed 12 per carton)
TL182 series - shower trim only
(Bulk Packed 12 per carton)
TL183 series - tub/shower trim
(Bulk Packed 12 per carton)

Valves: 62300 series
2500 series

WaterSense Meets EPA Criteria
Certified by IAPMO R&T
EP Suffix Models Only

DESCRIPTION
- Metal construction with various finishes identified by suffix
- Includes non-metalic showerhead, arm, flange and non-metalic diverter tub spout

OPERATION
- Handle operates counterclockwise through a 270° arc with off at 6 o'clock and maximum hot at the 9 o'clock position. Shut off in clockwise direction
- Adjustable temperature limit stop to control maximum hot water temperature
- Pressure balancing mechanism maintains selected discharge temperature to ± 3°

FLOW
- Showerhead is limited to 2.5 gpm (9.5 L/min) at 80 psi
- EP suffix models are limited to 1.75 gpm (6.6 L/min) at 80 psi
- NH suffix models contain no showerhead

CARTRIDGE
- 1222 cartridge design
- Accommodates back to back installations
- Nonmetallic/nonferrous and stainless steel material

STANDARDS
- Third party certified to meet ASME A112.18.1/CSA B125.1 and all applicable requirements referenced therein
- EP suffix models are third party certified to WaterSense®
- **ADA** for lever handle

WARRANTY
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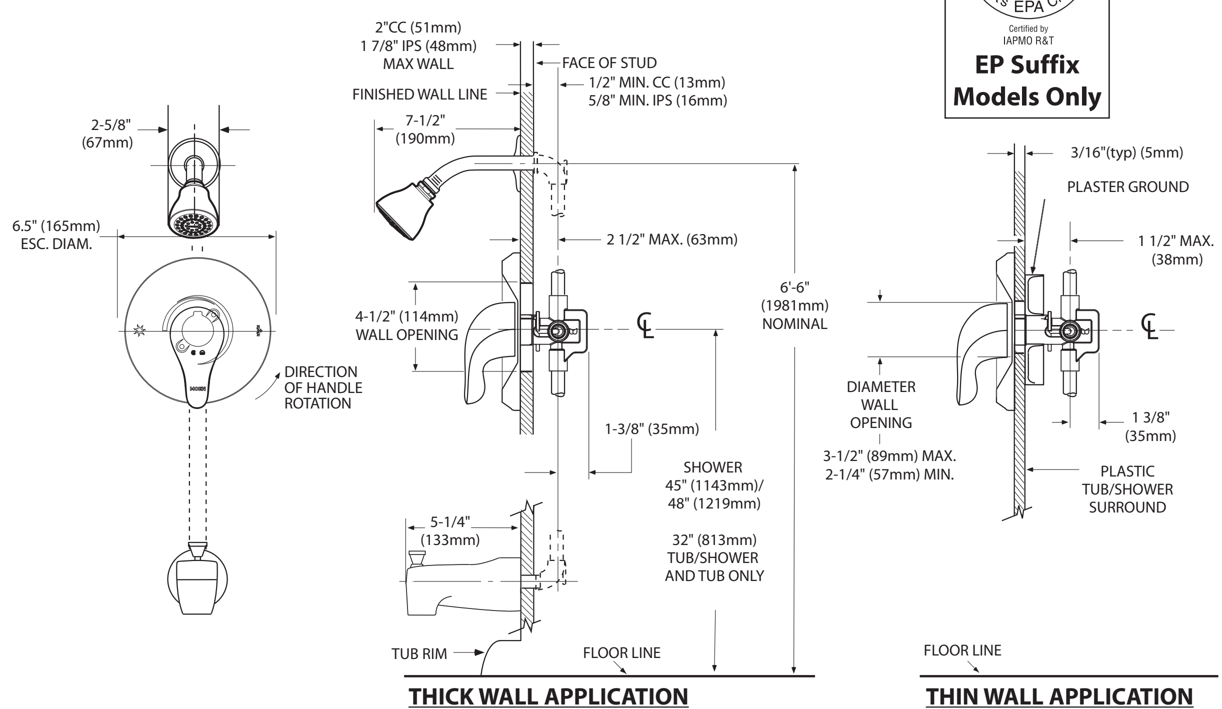
- 5 year warranty if used in commercial installations



CRITICAL DIMENSIONS

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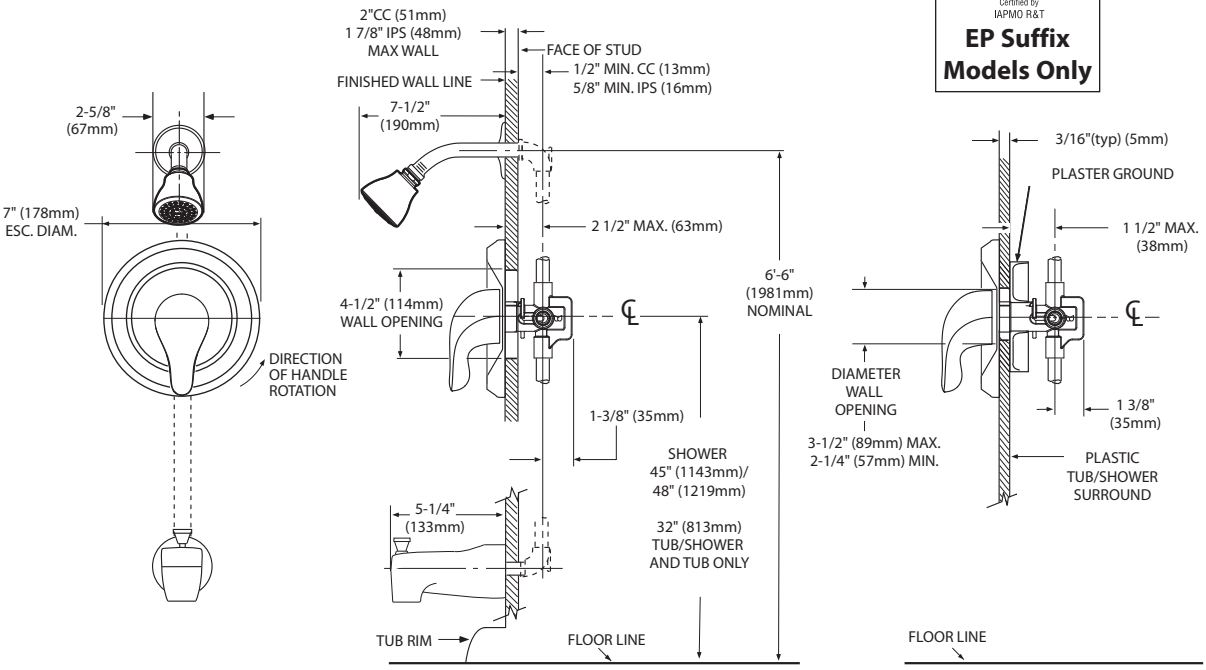

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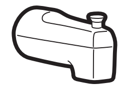

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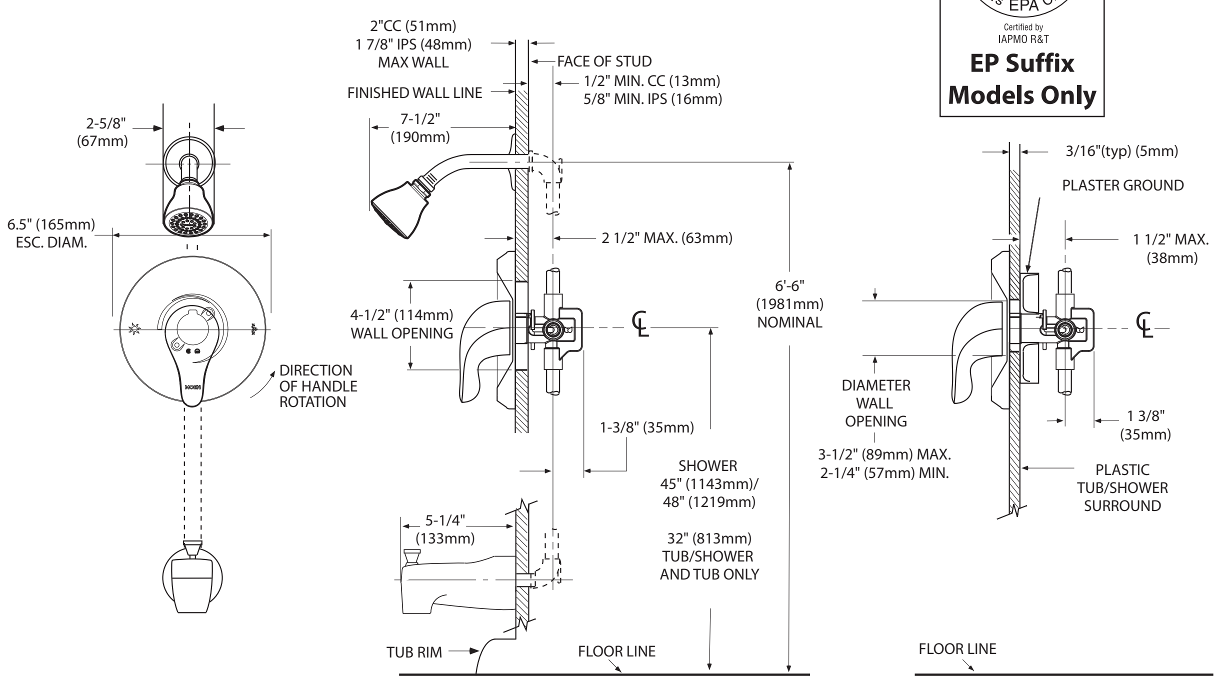

CRITICAL DIMENSIONS
(DO NOT SCALE)

TL183sp: Rev. 5/13

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www.moen.com

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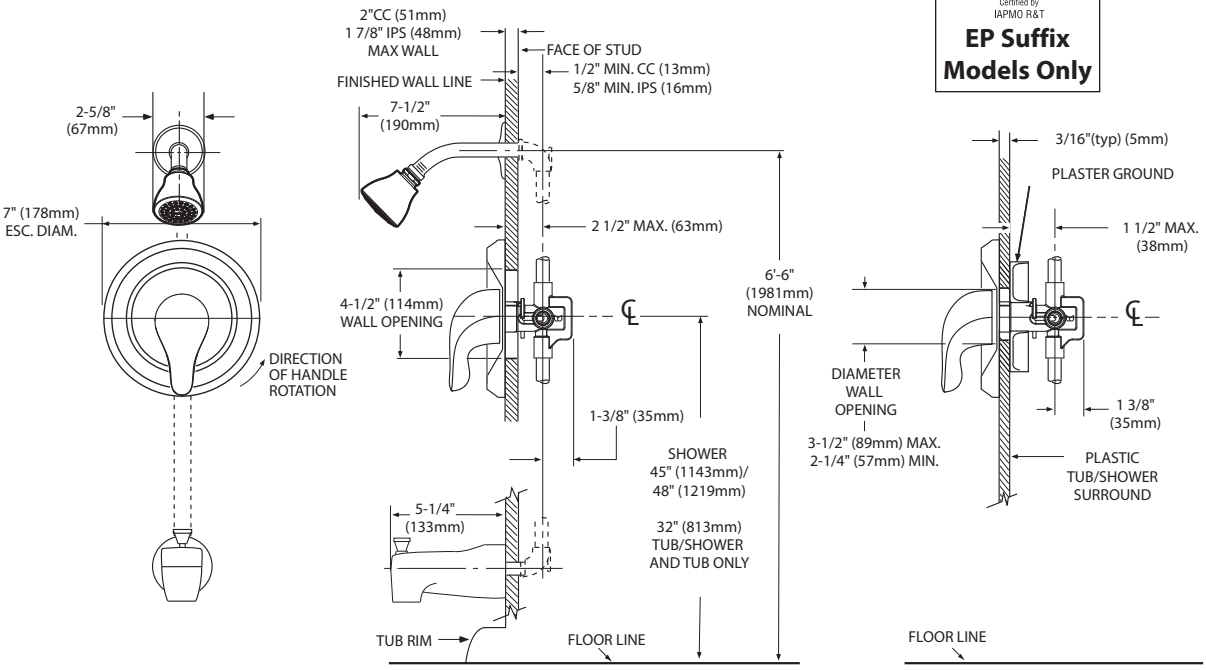


CRITICAL DIMENSIONS

(DO NOT SCALE)

Maxwell® 1.6 GPF Elongated Toilet

12" Rough-in

Features:

☐ MX-20-912

- Vitreous china
- Combination bowl and tank
- 3" Flush valve
- 12" Rough-in
- Elongated bowl
- Dual-fed siphon jet action bowl (no splashing)
- 2" Fully Glazed trapway for effective waste removal
- Color matched metal tank lever
- 6 point tank to bowl connection for tank stability
- Sanitary bead for easy cleaning
- Color matched Bolt caps included
- Toilet seat not included

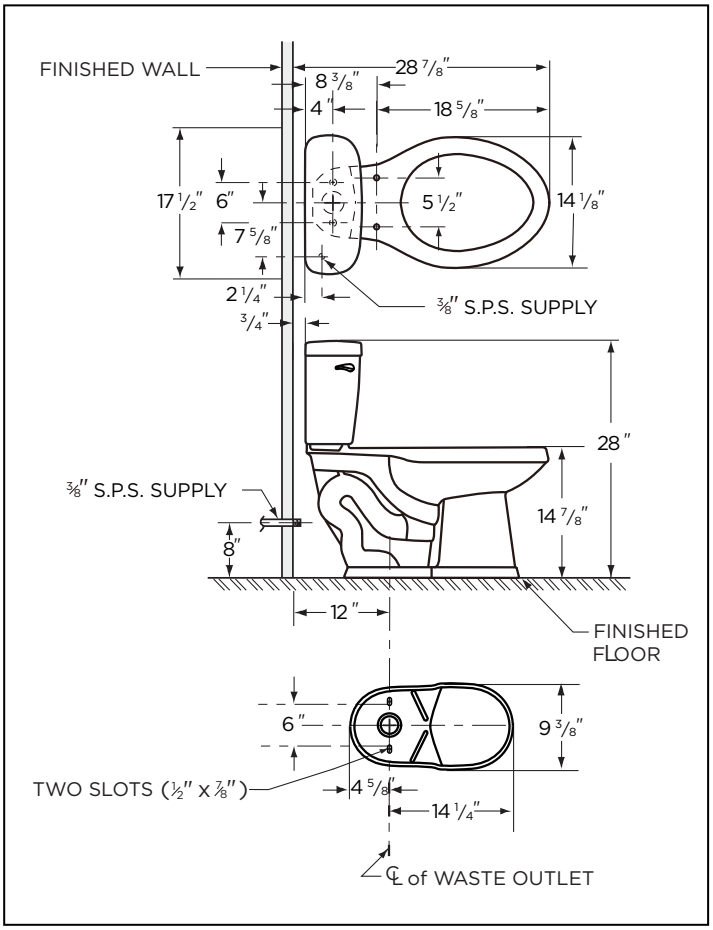
Technical Information:

Included Components:

☐ Combination	MX-20-912
☐ Bowl	MX-21-962
☐ Tank	MX-28-990

Other Tank Options: (bowl to be purchased separately)

☐ Insulated Tank	MX-28-992
☐ Tank with Right Hand Lever	MX-28-990-97



Fixtures:

Configuration	Two-piece, elongated
Water per Flush	1.6 gpf (6 lpf)
Rough-In	12"
Height	28"
Width	17 1/2"
Depth	28 1/8"
Trapway	2"
Large Water Surface	10 7/8" x 7 1/2"
Shipping Weight	79.5 lbs

Accessories:

Soft Close Toilet Seat	99-213

Colors/Finishes:

- White
- Other: Refer to Price Book for additional colors/finishes

Warranty:

- Limited lifetime warranty

NOTES: All dimensions are in inches. Illustrations may not be drawn to scale.

IMPORTANT:
Dimensions of fixtures are nominal and may vary within the range of tolerances established by ASME standard A 112.19.2
THIS FIXTURE QUALIFIES ACCORDING TO ASME TEST PROCEDURES AS A LOW CONSUMPTION WATER CLOSET WITH AN AVERAGE CONSUMPTION OF 1.6 gpf (6 Lpf) OR LESS.

4. Supporting documentation including historical flow rates for fixtures and washer.

WaterSense® High-Efficiency Lavatory Faucet Specification

Supporting Statement

I. Introduction

The WaterSense program released its High-Efficiency Lavatory[1] Faucet Specification (specification) on October 1, 2007, to promote and enhance the market for water-efficient lavatory faucets. The goal of this specification is to allow consumers to identify and differentiate products in the marketplace that meet this specification's criteria for water efficiency and performance.

This specification addresses lavatory faucets and lavatory faucet accessories[2] in private use, such as those found in residences, and private restrooms in hotels and hospitals. Since these types of faucets are used primarily for hand washing and other sanitary activities, such as face washing and razor rinsing, WaterSense believes that maximum flow rates can be reduced enough to impact national water consumption while at the same time not negatively impacting user satisfaction. This specification is not intended to address kitchen faucets, which have a very different set of uses and performance criteria, or public restroom faucets (e.g., airports, theaters, arenas, stadiums, offices, and restaurants), which already have national performance standards and criteria to which they should conform.

II. Current Status of Faucets

WaterSense estimates that currently there are 222 million residential lavatory faucets in the United States. This estimate is based on an assumed one-to-one ratio of lavatory faucets to residential bathrooms.[3] In addition to the existing stock, approximately 25 million new faucets are sold each year for installation in new homes or replacement of aging fixtures in existing homes.[4] Of these 25 million faucets, roughly two-thirds of those are lavatory faucets (approximately 17 million units). Residential lavatory and kitchen faucets account for

[1] Lavatory is the terminology used in the Energy Policy Act of 1992 and ASME A112.18.1 to describe the types of faucets to which the standards apply. In this specification, lavatory means any bathroom sink faucets intended for private use.

[2] Accessory, as defined in ASME 112.18.1, means a component that can, at the discretion of the user, be readily added, removed, or replaced, and that, when removed, will not prevent the fitting from fulfilling its primary function. For the purpose of this specification, an accessory can include, but is not limited to lavatory faucet flow restrictors, flow regulators, aerator devices, laminar devices, and pressure compensating devices.

[3] U.S. Census Bureau, American Housing Surveys for the United States, 1970-2003.

[4] Business Trend Analysts, 2006. "2005/2006 Outlook for the U.S. Plumbing Fixtures and Fittings Industry." <www.mindbranch.com/catalog/print_product_page.jsp?code=R225-358>

approximately 15.7 percent of indoor residential water use in the United States[5]—equivalent to more than 1.1 trillion gallons of water used each year.

The Energy Policy Act of 1992 originally set the maximum flow rate for both lavatory and kitchen faucets at 2.5 gallons per minute (gpm) at 80 pounds per square inch (psi) static pressure. In 1994, American Society of Mechanical Engineers (ASME) A112.18.1M-1994–Plumbing Supply Fittings set the maximum flow rate for lavatory faucets at 2.2 gpm at 60 psi. In response to industry requests for conformity with a single standard, in 1998, the U.S. Department of Energy adopted the 2.2 gpm at 60 psi maximum flow rate standard for all faucets (see 63 FR 13307; March 18, 1998). This national standard is codified in the *U.S. Code of Federal Regulations* at 10 *CFR* Part 430.32. As a point of reference, the maximum flow rates of many of the pre-1992 faucets range from 3 to 7 gpm. Other than the aforementioned maximum flow rate standards, there currently are no universally accepted performance tests or specifications (e.g., rinsing or wetting performance standards) for faucets.

III. WaterSense High-Efficiency Lavatory Faucet Specification

Scope

The WaterSense program developed this specification to address criteria for improvement and recognition of water-efficient and high-performance lavatory faucets and lavatory faucet accessories. WaterSense labeled lavatory faucet accessories can be incorporated into the design of new faucets to control the flow rate and provide the mechanism for meeting this specification's criteria, or can be purchased separately and retrofit onto existing older faucets to provide water efficiency and performance. This specification focuses solely on the category of lavatory faucets intended for private use because of the differences in the uses and performance expectations between private lavatory faucets and kitchen or public restroom faucets. Lavatory faucets are used primarily for hand washing and other sanitary activities, such as teeth brushing, face washing, and shaving. For these activities, discussions with faucet manufacturers and water utility representatives provided a general consensus that a reduction in the maximum flow rate from 2.2 gpm (the current federal water-efficiency standard) to 1.5 gpm, as established by this specification, is not very noticeable for most users. The most noticeable differences are increased wait times when filling the basin or waiting for hot water. While decreasing a faucet's maximum flow rate increases user wait time for these activities, WaterSense determined the potential water savings gained from the primary use of lavatory faucets (i.e., washing and rinsing) outweigh any potential inconvenience caused by increased wait times and will not negatively impact overall user satisfaction.

Kitchen sink faucets were excluded from this specification because the different uses and user expectations require other considerations for defining performance. One major performance consideration is a kitchen faucet's ability to effectively rinse dishes. Kitchen faucets also are commonly used for pot or container filling, and significantly increased wait times might not be acceptable to most users. WaterSense determined that reducing the maximum flow rates of kitchen faucets would create issues of user satisfaction and be counter to its program goals of

[5] Mayer, Peter W. and William B. DeOreo. Residential End Uses of Water. Aquacraft, Inc. Water Engineering and Management. American Water Works Association. 1998.

increasing efficiency while maintaining or improving performance. In order to maintain user satisfaction and ensure a high level of performance, a maximum flow rate greater than what is suitable for lavatory faucets might need to be considered for kitchen faucets. Some type of wetting or rinsing performance test also might need to be included. In addition, there is an emerging area of research and development in multiposition control lever faucet technologies that offer users "high" and "low" settings for different activities. While performance data are not yet available, these technologies might prove to be effective in using water more efficiently. For these reasons, WaterSense intends to evaluate the possibility of developing a WaterSense specification for kitchen faucets at a later date.

Public restroom and metering faucets (faucets that are set to discharge a specific amount of water or run for a specified period of time for each use) also were excluded from this specification because of their differing uses and performance expectations and because standards governing their maximum flow rate already exist. Public restroom faucets, for example, are used almost exclusively for hand washing or simple rinsing, compared to lavatory faucets in homes and in other private bathrooms that face a myriad of uses. As a consequence, the maximum flow rate for these public restroom and metering fixtures can be set significantly lower than the flow rate for private lavatory faucets without negatively impacting user satisfaction. Also, a separate set of standards already apply to these types of fixtures. Codified in the *U.S. Code of Federal Regulations* at 10 *CFR* Part 430 (specifically §430.32(o) Faucets) are standards setting the maximum flow rate for metering faucets at 0.25 gallons/cycle. Section 5.4.1 and Table 1 of ASME A112.18.1/CSA B125.1–Plumbing Supply Fittings also establish the maximum flow rates for public lavatory (other than metering) faucets at 0.5 gpm. As a consequence, this category of faucet is not covered by the current specification. If WaterSense decides to address water efficiency and performance for these types of faucets, it will do so under a separate specification at a later time.

Water-Efficiency and Performance Criteria

The water-efficiency component of this specification establishes a maximum flow rate of 1.5 gpm at an inlet pressure of 60 psi. Lowering the maximum flow rate from 2.2 gpm to 1.5 gpm (both at 60 psi) represents a 32 percent reduction, which is consistent with WaterSense's stated goal of improving efficiency by at least 20 percent. Even when installed in systems with high water pressure (up to 80 psi), faucets designed to this specification will have maximum flow rates of approximately 1.75 gpm, which still represents a greater than 20 percent increase in efficiency. WaterSense chose to specify a test pressure of 60 psi to maintain consistency with the current industry standard (ASME A112.18.1–Plumbing Supply Fittings) to which all faucets sold in the United States must comply.

The requirements of this specification are also in harmony with other international standards. The Joint Standards Australia/Standards New Zealand Committee established standards for the rating and labeling of water-efficient products (AS/NZS 6400:2005). As part of the standard, water-efficient faucets are rated on a scale of 1 to 6 based on maximum flow rates. Under this system, comparable 1.5 gpm WaterSense labeled lavatory faucets would receive a 5 out of 6 star rating, meeting criteria for maximum flow rates between 4.5 liters per minute (L/min) (1.2 gpm) and 6.0 L/min (1.6 gpm).

Meeting or exceeding user expectations via the establishment of performance criteria for WaterSense labeled products is an important aspect of the WaterSense program. From the outset of discussions with interested parties, WaterSense was aware that performance of water-efficient lavatory faucets is affected by low water pressures. To ensure user satisfaction with WaterSense labeled lavatory faucets or lavatory faucet accessories across a range of possible user conditions, WaterSense has established a minimum flow rate of 0.8 gpm at 20 psi in the specification.

In developing these water-efficiency and performance criteria, WaterSense evaluated comments received during the draft specification's public forum and public comment period (see *Response to Issues Raised During Public Comment on February 2007 Draft Specification for WaterSense[SM] Labeling of High-Efficiency Lavatory Faucets*). WaterSense also considered user satisfaction data generated from four high-efficiency lavatory faucet retrofit studies and the impact of pressure changes on product flow rates for various types of lavatory faucet accessories.

WaterSense established a maximum flow rate of 1.5 gpm at 60 psi because interested parties that provided comments on the draft specification generally agreed that a flow rate of 1.5 gpm would provide no noticeable difference for most users. In addition, data collected from retrofit studies demonstrate a high level of user satisfaction with high-efficiency lavatory faucets that have maximum flow rates of 1.0 and 1.5 gpm. Aquacraft, Inc. conducted retrofit studies in Seattle, Washington (2000)[6] and East Bay Municipal Utility District (EBMUD), California (2003)[7] in which they replaced existing lavatory faucet aerators with 1.5 gpm pressure compensating aerators. In the Seattle study, 58 percent of the participants felt their faucets with the new aerators performed the same or better than their old faucet fixtures and 50 percent stated they would recommend these aerators to others. In the EBMUD study, 80 percent of the participants felt their faucets with the new aerators performed the same or better than their old faucet fixtures, and 67 percent stated they would recommend these aerators to others. A third Aquacraft, Inc. retrofit study conducted in Tampa, Florida (2004)[8] replaced existing lavatory faucet aerators with 1.0 gpm pressure compensating aerators. The participants in this study were receptive to an even higher-efficiency fixture, with 89 percent saying their new aerators performed the same or better than their old faucet fixtures and would recommend them to others. Seattle Public Utilities also provided WaterSense with survey results of customer use and satisfaction with 1.0 gpm pressure compensating aerators distributed through the utility's direct-mail showerhead and faucet aerator pilot program. According to its survey, 94 percent of the participants that received the free aerators installed them and only 2 percent disliked the aerators and removed them.[9]

[6] Seattle Home Water Conservation Study: The Impacts of High-Efficiency Plumbing Fixture Retrofits in Single-Family Homes, December 2000.

[7] Water Conservation Study: Evaluation of High-Efficiency Indoor Plumbing Fixture Retrofits in Single-Family Homes in the East Bay Municipal Utility District Service Area, July 2003.

[8] Tampa Water Department Residential Water Conservation Study: The Impacts of High-Efficiency Plumbing Fixture Retrofits in Single-Family Homes, January 2004.

[9] Seattle Public Utilities. "Showerhead/Aerator Pilot Program Summary." Unpublished.

WaterSense established a minimum flow rate of 0.8 gpm at 20 psi for several reasons. First, WaterSense felt this minimum flow rate was reasonable to ensure user satisfaction in homes with low water pressure based on comments that were received regarding the draft specification. Second, WaterSense received comments from several utilities regarding programs in which 1.0 gpm lavatory faucet aerators are provided to customers. These products have shown a high level of user satisfaction, and WaterSense wants to recognize these products and the efforts of the utilities to ensure that additional water savings can be achieved through such programs. Third, WaterSense wants to avoid restricting design options to the extent possible. The specification leaves open the possibility for the use of fixed orifice flow control devices (with a maximum flow rate of 1.5 gpm) instead of restricting manufacturers to the use of pressure compensating devices. Under the specification, a 1.5 gpm maximum flow rate fixed orifice aerator could qualify for use of the label (according to currently available product specifications and flow curves). Pressure compensating devices with maximum flow rates between 1.5 and 1.0 gpm could also qualify for the use of the WaterSense label (according to currently available product specifications and flow curves). WaterSense believes that this approach allows for the greatest degree of design freedom for manufacturers and supports existing utility programs, while still ensuring a high level of performance and user satisfaction.

In order for high-efficiency lavatory faucets to effectively emerge in the market following the release of the final version of this specification, the market must ideally be equipped to produce the faucets or faucet technology that the specification requires. WaterSense is not currently aware of any lavatory faucets on the market with a maximum flow rate of 1.5 gpm. There are, however, several types and models of faucet components and accessories currently available that have the capability to control the flow to the level that is required by this specification. As a result, WaterSense is confident that faucets and faucet accessories that meet the requirements of this specification can be readily brought to market.

Potential Water and Energy Savings

To estimate water and energy savings that can be achieved by products that meet this specification, WaterSense examined the Seattle (2000) and EBMUD (2003) Aquacraft retrofit studies, which provided actual water consumption reductions generated by the installation of high-efficiency, pressure-compensating 1.5 gpm aerators on lavatory faucets. WaterSense expects the results under this specification to be similar to what was found in these two studies. These studies indicate that installing high-efficiency aerators can yield significant reductions in household water consumption. Post faucet retrofit, the weighted average daily per capita reduction in water consumption achieved was 0.6 gallons per capita per day (gcpd). It is important to note that in both of these studies, kitchen faucets in each household were retrofitted with 2.2 gpm pressure compensating aerators. While these retrofits contributed in part to overall reductions in household water consumption, the retrofits simply brought those kitchen sink faucets up to current water-efficiency standards, therefore, WaterSense decided to set aside this confounding influence in order to estimate the water savings. Assuming the average household consists of 2.6 people, this equates to an average annual household savings of approximately 570 gallons of water (see Calculation 1).

Calculation 1. Average Household Water Savings
0.6 gpcd · 2.6 people/household · 365 days = 570 gallons annually

Extrapolated to the national level, potential estimated water savings could be as great as 61 billion gallons annually (see Calculation 2). These estimates clearly demonstrate the significant water savings potential of high-efficiency lavatory faucets and accessories.

Calculation 2. National Water Savings
570 gal/year · 107,574,000[10] occupied residences w/ plumbing fixtures = 61 billion gallons

Based upon these estimates, the average household could save more than 70 kWh of electricity (see Calculation 3) or 350 cubic feet of natural gas (see Calculation 4) each year. National savings could exceed 3 billion kWh hours and 20 billion cubic feet (Bcf) of natural gas each year (see Calculations 5 and 6).

Calculation 3. Electricity Saving Per Household
(570 gal/year · 0.70) · (176.5 kWh of electricity/1,000 gal) = 70 kWh of electricity per year

Calculation 4. Natural Gas Savings Per Household
(570 gal/year · 0.70) · (0.8784 Mcf of natural gas/1,000 gal) = 0.35 Mcf (350 cubic feet) of natural gas per year

Calculation 5. National Electricity Savings Potential
(61,000,000,000 gal · 0.70 · 0.40) · (176.5 kWh of electricity/1,000 gal) = 3 billion kWh of electricity nationwide

Calculation 6. National Natural Gas Savings Potential
(61,000,000,000 gal · 0.70 · 0.56) · (0.8784 Mcf of natural gas/1,000 gal) = 20 million Mcf of natural gas nationwide = 20 Bcf of natural gas nationwide

These calculations are based upon the following assumptions:

- Approximately 70 percent of faucet water used in a household is hot water (Tampa and Seattle Aquacraft studies).
- 42,788,000 (approximately 40 percent) of occupied residences in the United States heat their water using electricity.[11]
- 60,222,000 (approximately 56 percent) of occupied residences in the United States heat their water using natural gas.[12]

[10] U.S. Department of Housing and Urban Development and U.S. Census Bureau. American Housing Survey for the United States 2005. Table 1A-4 page 5.

[11] U.S. Department of Housing and Urban Development and U.S. Census Bureau. American Housing Survey for the United States 2005. Table 1A-5, page 6.

[12] U.S. Department of Housing and Urban Development and U.S. Census Bureau. American Housing Survey for the United States 2005. Table 1A-5, page 6.

- Water heating consumes 0.1765 kWh of electricity per gallon of water heated assuming:
  - Specific heat of water = 1.0 BTU/lb · º F
  - 1 gallon of water = 8.34 lbs
  - 1 kWh = 3,412 BTUs
  - Incoming water temperature is raised from 55º F to 120º F (Δ 65 º F).
  - Water heating process is 90 percent efficient, electric hot water heater.

Calculation 7.
[(1 gal · 1.0 BTU/lbs · º F) (1KWh/3,412 BTUs) / (1 gallon/8.34 lbs) · 65º F] / 0.90
= 0.1765 kWh/gal

- Water heating consumes 0.8784 Mcf of natural gas per 1,000 gallons of water heated assuming:
  - Specific heat of water = 1.0 BTU/lb · º F
  - 1 gallon of water = 8.34 lbs
  - 1 Therm = 99,976 BTUs
  - Incoming water temperature is raised from 55º F to 120º F (Δ 65 º F)
  - Water heating process is 60 percent efficient, natural gas hot water heater

Calculation 8.
[(1 gal · 1.0 BTU/lbs · º F) (1Therm/99,976 BTUs) / (1 gallon/8.34 lbs) · 65º F] / 0.60
= 0.009053 Therms/gal

Calculation 9.
0.010428 Therms/gal · 1,000 gal · 1Mcf/10.307 Therms = 0.8784 Mcf/kgal

Cost Effectiveness and Payback Period

The average homeowner retrofitting their lavatory faucets with WaterSense labeled high-efficiency lavatory faucet accessories (e.g., aerator, laminar flow device, flow restrictor) will realize accompanying $3.26 savings on water and wastewater cost annually due to lower water consumption (see Calculation 10).

Calculation 10. Annual Water and Wastewater Cost Savings
570 gallons/year · $5.72/1,000 gallons[13] = $3.26/year

Factoring in the accompanying energy savings, the average household with electric water heating may save an additional $6.65 (70 kWh/year · $.095/kWh), for a combined annual savings of $9.91. The average household with natural gas water heating, may save an additional $4.56.(0.35 Mcf/year · $13.04/Mcf), for a combined annual savings of $7.82.

[13] Raftelis Financial Consulting. Water and Wastewater Rate Survey. American Water Works Association. 2004.

Assuming that the average household has two lavatory faucets[14], replacing the aerators in each lavatory faucet with a WaterSense labeled aerator would save $1.63 per faucet on annual water and wastewater costs. The average payback period for the replacement of two lavatory faucet aerators would be approximately 10 months for those with electric water heating and 12 months for those heating with natural gas (See Calculations 11 and 12).

Calculation 11. Average Payback Period (Electric Water Heating)
$8.00 / [$3.26/year + (70 kWh/year · $.095/kWh)] = 0.8 years (~10 months)

Calculation 12. Average Payback Period (Natural Gas Water Heating)
$8.00 / [$3.26/year + (0.35 Mcf/year · $13.04 /Mcf)] = 1.0 years (~12 months)

These calculations are based upon the following assumptions:

- WaterSense labeled retrofit devices retail for $4.00 each.
- Average cost of electricity is $0.095/kWh[15].
- Average cost of natural gas is $13.04/Mcf[16].

Unit Abbreviations:
Bcf = billion cubic feet
BTU = British thermal unit
F = Fahrenheit
gal = gallon
gpcd = gallons per capita per day
gpm = gallons per minute
kgal = kilogallons
kWh = kilowatt hour
lbs = pounds
L/min = liters per minute
Mcf = thousand cubic feet
psi = pressure per square inch

WaterSense assumes that the cost of new faucets manufactured and sold as WaterSense labeled fixtures will not increase significantly since in many cases the manufacturer will simply need to substitute the current flow regulating device with a similar, more efficient rated device. In many cases this will be as simple as switching from the current 2.2 gpm aerator or laminar flow device to a comparable 1.5 gpm WaterSense labeled device

[14] U.S. Department of Housing and Urban Development and U.S. Census Bureau. American Housing Survey for the United States 2005. Table 1A-3 page 4.

[15] Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, Energy Information Administration. <www.eia.doe.gov/cneaf/electricity/epa/epat7p4.html>

[16] Short-Term Energy Outlook, Energy Information Administration. <www.eia.doe.gov/steo>

WaterSense® Specification for Showerheads

1.0 Scope and Objective

This specification establishes the criteria for showerheads labeled under the U.S. Environmental Protection Agency's (EPA's) WaterSense® program. It is applicable to showerhead fixture fittings, inclusive of:

- Fixed showerheads that direct water onto a user (excluding body sprays) for bathing purposes; and
- Hand-held showers, a subset of showerheads that are moveable devices for directing water onto a user. Hand-held showers can be installed on a support to function as a fixed showerhead.

When used in this document the term "showerhead" shall also include hand-held showers.

This specification is designed to ensure sustainable, efficient water use and a high level of user satisfaction with showerhead performance.

2.0 General Requirements

2.1 The showerhead shall conform to applicable requirements in ASME A112.18.1/CSA B125.1.[1]

2.2 If the showerhead has more than one mode, all modes must meet the maximum flow rate requirement outlined in Section 3.1.1 and at least one of the modes, as specified by the manufacturer, must meet all of the requirements outlined in this specification.

2.3 The showerhead shall not be packaged, marked, or provided with instructions directing the user to an alternative water-use setting that would override the maximum flow rate, as established by this specification. Any instruction related to the maintenance of the product, including changing or cleaning showerhead components, shall direct the user on how to return the product to its intended maximum flow rate.

3.0 Water-Efficiency Criteria

3.1 The flow rate of the showerhead shall be tested in accordance with the procedures in ASME A112.18.1/CSA B125.1 and shall meet the following criteria:

3.1.1 The manufacturer shall specify a maximum flow rate value (rated flow) of the showerhead. This specified value must be equal to or less than 2.0 gallons per minute (gpm) (7.6 liters per minute [L/min]).

[1] References to this and other standards apply to the most current version of those standards.

3.1.2 The maximum flow rate shall be the highest value obtained through testing at flowing pressures of 20, 45, and 80 ± 1 pounds per square inch (psi) (140, 310, and 550 ± 7 kilopascal [kPa]), when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(b). This maximum flow rate shall not exceed the maximum flow rate value specified in Section 3.1.1.

3.1.3 The minimum flow rate, determined through testing at a flowing pressure of 20 ± 1 psi (140 ± 7 kPa) and when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(a), shall not be less than 60 percent of the maximum flow rate value specified in Section 3.1.1.

3.1.4 The minimum flow rate shall be the lowest value obtained through testing at flowing pressures of 45 and 80 ± 1 psi (310 and 550 ± 7 kPa), when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(a). This minimum flow rate shall not be less than 75 percent of the maximum flow rate value specified in Section 3.1.1.

4.0 Spray Force Criteria

4.1 The spray force of the showerhead shall be tested in accordance with the procedures outlined in Appendix A and shall meet the following criteria:

4.1.1 The minimum spray force shall not be less than 2.0 ounces (0.56 newtons [N]) at a pressure of 20 ± 1 psi (140 ± 7 kPa) at the inlet when water is flowing.

5.0 Spray Coverage Criteria

5.1 The spray coverage of the showerhead shall be tested in accordance with the procedures outlined in Appendix B and shall meet the following criteria:

5.1.1 The total combined maximum volume of water collected in the 2- and 4-inch [in.] (50-, 101-millimeter [mm]) annular rings shall not exceed 75 percent of the total volume of water collected, and;

5.1.2 The total combined minimum volume of water collected in the 2-, 4-, and 6-in. (50-, 101-, 152-mm) annular rings shall not be less than 25 percent of the total volume of water collected.

6.0 Marking

In addition to the marking requirements in ASME A112.18.1/CSA B125.1, the following markings shall apply:

6.1 The product shall be marked with the maximum flow rate value in gpm and L/min as specified by the manufacturer, verified through testing and in compliance with this specification.

6.2 The product packaging shall be marked with the maximum flow rate value in gpm and L/min as specified by the manufacturer, verified through testing and in compliance with this specification.

6.3 The product packaging shall be marked with the minimum flow rate value in gpm and L/min at 45 psi, calculated in Section 3.1.4 as 75 percent of the manufacturer's specified maximum flow rate value, verified through testing and in compliance with this specification.

6.4 Flow rate marking shall be in gpm and L/min in two or three digit resolutions (e.g., 2.0 gpm [7.6 L/min]).

7.0 Effective Date

This specification is effective on February 9, 2010.

8.0 Future Specification Revisions

EPA reserves the right to revise this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Revisions to the specification would be made following discussions with industry partners and other interested stakeholders.

9.0 Definitions

Definitions within ASME A112.18.1/CSA B125.1 are included by reference

ASME – American Society of Mechanical Engineers

ASME PTC – American Society of Mechanical Engineers Performance Test Codes

ANSI – American National Standards Institute

CFR – Code of Federal Regulations

CSA – Canadian Standards Association

ISA – International Society of Automation

WaterSense® Specification for Showerheads Supporting Statement

I. Introduction

Showering is one of the leading uses of water inside the home, representing approximately 17 percent of annual residential indoor water use in the United States. This translates into more than 1.2 trillion gallons of water consumed each year[1],[2]. The WaterSense program released its final specification for showerheads on March 4, 2010, to capitalize on this opportunity to further improve the nation's water and energy efficiency by raising consumer awareness and promoting the use of more efficient showerheads. The intent of this specification is to help consumers identify those products that have met EPA's criteria for water efficiency and performance.

WaterSense collaborated with the American Society of Mechanical Engineers (ASME)/Canadian Standards Association (CSA) Joint Harmonization Task Force to develop the specification criteria for high-efficiency showerheads. This task force is open to the public and comprises a wide variety of stakeholders, including showerhead manufacturers, water and energy utilities, testing laboratories, consultants, and other water-efficiency and conservation specialists. Their participation, resources, and expertise enabled WaterSense to evaluate showerhead efficiency and performance and develop meaningful testing protocols that can effectively differentiate showerhead performance.

Prior to the task force's work there were no universally accepted criteria for measuring showerhead performance. Federal water-efficiency legislation and national performance standards only establish product flow rates that dictate water consumption—they do not address what makes a satisfactory, or unsatisfactory, shower. Now, with this specification, WaterSense and the task force have bridged this consumer information gap by incorporating performance requirements for products seeking to earn the WaterSense label. The requirements address flow rates across a range of pressures, spray force, and spray coverage, three key attributes of showerhead performance, according to consumer testing. These new requirements are designed to ensure a high level of performance and user satisfaction with high-efficiency showerheads.

II. Current Status of Showerheads

With nearly 110 million occupied housing units in the United States[3] and an average of two showerheads per household[4], WaterSense estimates that there are 220 million showerheads

[1] Assumes a per capita shower use of 11.6 gallons. See Mayer, Peter W. and William B. DeOreo. *Residential End Uses of Water.* Aquacraft, Inc. Water Engineering and Management. American Water Works Association. 1998. Page 102.
[2] According to the U.S. Census Bureau, there are 300 million persons in the United States.
[3] See U.S. Census Bureau and the U.S. Department of Housing and Urban Development's *American Housing Survey for the United States*. 2007.
[4] Mayer and DeOreo, op. cit., 99.

currently installed in homes across the United States. WaterSense also estimates that approximately 10 percent of the existing 220 million showerheads are replaced each year due to wear, remodeling, or other reasons. This means that the vast majority of these existing showerheads have flow rates equal to or less than the federal standard of 2.5 gallons per minute (gpm), which was mandated by the Energy Policy Act (EPAct) of 1992. With normal replacements and units sold for new construction, WaterSense estimates that approximately 25.6 million[5] new showerheads are sold each year. Since Congress enacted the federal requirements in the early 1990s, manufacturers have gone on to develop showerheads that use significantly less water than the flow rates set in EPAct 1992. These high-efficiency showerheads can save at least 20 percent compared to standard fixtures, resulting in a potential savings of more than 1,200 gallons per showerhead per year.

III. WaterSense Specification for Showerheads

Scope

This specification applies to showerheads and hand-held showers. Showerheads are fixed devices for directing water onto a user for bathing purposes. Hand-held showers, a subset of showerheads, are moveable devices for directing water onto a user. Hand-held showers can be installed on a support to function as a showerhead.

Multiple showerheads are eligible to receive the WaterSense label provided the showerheads are sold in combination in a single device intended to be connected to a single shower outlet. Further, each showerhead must meet all of the requirements of the specification and the entire multiple-head system must meet the maximum flow rate requirement of the specification in all possible operating modes.

Body sprays are excluded from this specification because their function and design are wholly different than that of a showerhead or hand-held shower. Retrofit devices, including aftermarket flow control devices, are also excluded because the intent of the specification is to recognize and label complete, fully functioning fixtures or fittings, and not individual components.

General Requirements

Many showerheads are sold with multiple modes to provide the user with options for different spray types (e.g., misting, massaging, or pause). WaterSense wants to maintain manufacturing flexibility and consumer choice for multiple mode showerheads, thus the specification addresses these types of showerheads by requiring all modes to meet the maximum flow rate requirement (i.e., no mode can exceed 2.0 gallons per minute [gpm]) and at least one of the modes, as specified by the manufacturer, must meet all of the requirements contained in the specification, including the maximum and minimum flow rates, spray force, and spray coverage requirements.

Water-Efficiency Criteria

[5] Units sold for replacement is based upon a 10 percent natural replacement rate. Units sold for new construction is based on 1,797,000 new housing starts per year based on the average number of new housing starts from 2003–2007.from U.S. Census. 2007 American Housing Survey, Table 1A-1. www.census.gov/prod/2008pubs/h150-07.pdf.

The water-efficiency component of this specification establishes a maximum flow rate of 2.0 gpm (7.6 liter per minute [L/min]). WaterSense settled on this flow rate after examining the range of products currently available on the market. This maximum flow rate represents a 20 percent reduction from the current federally allowable maximum flow rate of 2.5 gpm established by EPAct 1992, which is consistent with WaterSense's stated water-efficiency goal.

The specification also includes minimum flow rate requirements at 80, 45, and 20 pounds per square inch (psi) of pressure (the upper, mid, and lower range of potential household pressures) to ensure performance and user satisfaction under a variety of household conditions. Specifically, at 45 and 80 psi the tested flow rate cannot be less than 75 percent of the showerhead's maximum "rated"[6] flow rate value. This minimum requirement is specified at both 45 and 80 psi because some showerheads that are designed to compensate and adjust for changes in water pressure will actually produce maximum flow at 45 psi and not at 80 psi. As a result, WaterSense wants to ensure that this minimum flow rate requirement is met at both pressures. Likewise, at 20 psi the tested flow rate cannot be less than 60 percent of the showerhead's maximum rated flow rate value. Table 1 below provides some examples of the allowable minimum flow rates for showerheads with various rated flow rates. Defining minimum flow rate requirements in this manner ensures that the showerhead is designed to provide consistent flow across a range of pressures.

Table 1. Example Minimum Flow Rates

Showerhead Rated Flow Rate	Minimum Allowable Flow Rate		
	80 psi	45 psi	20 psi
2.0 gpm	1.5 gpm	1.5 gpm	1.2 gpm
1.75 gpm	1.3 gpm	1.3 gpm	1.1 gpm
1.5 gpm	1.1 gpm	1.1 gpm	0.9 gpm
1.0 gpm	0.8 gpm	0.8 gpm	0.6 gpm

WaterSense is requiring both the maximum and minimum flow rates of the showerhead to meet the testing and verification protocols for sampling outlined in the *Code of Federal Regulations* (see 10 CFR 430 Subpart F, Appendix B, Steps 6[b] and 6[a], respectively). The U.S. Department of Energy currently uses the sampling plan outlined in the CFR for assessing compliance of showerhead flow rates with EPAct 1992 requirements, and thus referencing it in this specification provides specific and familiar guidance to third-party certifying bodies for determining whether a showerhead meets the flow rate requirements established by WaterSense.

Performance Criteria

Establishing performance-based criteria for WaterSense labeled showerheads is critical to ensuring user satisfaction and maintaining the integrity of the WaterSense label. Prior to this specification, however, there were no universally agreed-upon testing protocols for showerhead performance or measures that adequately defined user satisfaction. WaterSense worked with

[6] The "rated" flow rate is the showerhead's maximum flow rate, as specified by the manufacturer, verified through testing, and in compliance with this specification.

the task force to determine, through its expertise and supported by consumer testing, the key performance attributes of showerheads.

To measure those attributes in a laboratory setting, the task force undertook an intensive effort to develop test protocols. The spray force and spray coverage requirements contained in the specification are a result of these efforts. Both test protocols subsequently underwent several iterations of round robin testing in various laboratories by multiple manufacturers and independent third-party certifiers in order to ensure that the procedures are repeatable and the results reproducible. Laboratory test data were then compared back to the consumer test data for a variety of showerheads to determine the specific performance levels that are included in the specification. These performance levels define the boundaries for user satisfaction for both spray force and spray coverage.

The spray force component of the specification requires a showerhead's spray force to be at least 2.0 ounces (0.56 newtons [N]) at an inlet pressure of 20 psi when the water is flowing. The testing procedure, described in Appendix A of the specification, is a pass/fail test that assesses the relative force of the shower spray through the use of a force balance fixture. The force balance fixture is equipped with a force target on one side that receives the shower spray and counterbalancing weights on the other side, set to the specified force (i.e., 2.0 ounces). As the shower spray hits the force target, the force balance fixture measures the rotation angle of the balance at the pivot point of the two sides (the spray and counterbalancing weights).

If the shower spray force is greater than the specified minimum, it will overcome, or move, the counterbalancing weights to or beyond the point of balance, achieved when the angle rotates within 0.1^{o} of zero or past it. Under this scenario the showerhead would pass the force requirements. If the showerhead's force is less than the specified minimum, it will not overcome the counterbalancing weights and the angle of balance will not rotate within 0.1^{o} of zero or past it. Under this scenario, the showerhead would fail the force requirements. The target force of 2.0 ounces specified in the specification represents the lower bounds of user satisfaction based on results from consumer tests using a variety of showerheads.

The spray coverage component of the specification, as described in Appendix B of the specification, requires the use of an annular ring gauge consisting of a series of concentric rings, starting with a 2-inch diameter center ring and each successive ring increasing in diameter by 2 inches out to 20 inches. The showerhead is positioned and turned on directly above the surface of the annular ring gauge. The relative amount of water captured in each set of concentric rings provides a representation of the distribution of the spray pattern and can be used to evaluate the showerhead's spray coverage.

Simultaneous to the development of the test apparatus, WaterSense gathered consumer test data to determine user preferences with respect to spray coverage. Data showed general dissatisfaction with showerheads that spray with a hollow spot in the center or that have too much water flowing in the center to form a very narrow beam. Thus the criteria contained in the specification were crafted to capture and disqualify showerheads with these types of coverage characteristics. Specifically, to meet the spray coverage requirement, the total volume of water collected in the two center rings (out to 4 inches) cannot exceed 75 percent of the total collected water volume (i.e., the showerhead cannot deliver all its water through a narrow beam in the center). In addition, the total combined volume of water collected in the three center rings (out to

6 inches) must be at least 25 percent of the total collected water volume (i.e., the showerhead cannot have a hollow spot in the center).

Marking

With this specification, WaterSense has adopted a new approach to product and package flow rate marking. The requirements are designed to clarify and clearly indicate which maximum flow rate value the manufacturer is to use. At the outset of certification, the manufacturer specifies a maximum flow rate value ("rated" flow rate), not to exceed 2.0 gpm, which is subsequently verified through testing. WaterSense requires the manufacturer to mark the product and product packaging with this rated flow rate value, so that the information provided to the consumer is both informative and accurate.

In addition to marking the product and packaging with the maximum rated flow rate, the product packaging (but not the product itself) must also be marked with the showerhead's minimum flow rate at 45 psi. This minimum flow rate is calculated as 75 percent of the manufacturer's specified maximum flow rate value and is subsequently verified through testing. The purpose of this marking requirement is to assist installers in properly matching showerheads and automatic-compensating mixing valves for installation in order to provide protection against thermal shock and scalding events (see Section V below for more information).

Potential Water and Energy Savings

Note: Refer to Appendix A for the assumptions and calculations used to derive these estimates.

Showerheads with a flow rate of 2.0 gpm or less have the potential to save significant amounts of water both individually and at the national level. Replacing standard showerheads with WaterSense labeled showerheads could save more than 1,200 gallons per showerhead or 2,300 gallons of water per household per year. Based upon the amount of water saved, the average household could save 300 kilowatt hours (kWh) of electricity or 1,500 cubic feet of natural gas that would otherwise be required to heat the water.

Nationwide, if WaterSense labeled showerheads were purchased for all normal showerhead replacements and installed in all new construction, WaterSense estimates that water savings could reach 30.3 billion gallons per year. National energy savings could exceed 1.6 billion kWh of electricity and 10.9 million cubic feet (Mcf) of natural gas each year.

Cost-Effectiveness

Note: Refer to Appendix A for the assumptions and calculations used to derive these estimates.

The average homeowner retrofitting his or her showerheads with WaterSense labeled showerheads will realize an accompanying $14 savings on water and wastewater costs annually due to lower water consumption. Factoring in the accompanying energy savings, the average household with electric water heating may save an additional $36, for a combined annual savings of $50. The average household with natural gas water heating may save an additional $18 for a combined annual savings of $32.

If the average showerhead costs $30 retail, the average payback period for the replacement of two standard showerheads per household with WaterSense labeled models would be approximately 14 months for those with electric water heating and about two years for those heating with natural gas.

IV. Certification and Labeling

WaterSense has established an independent third-party product certification process, described on the WaterSense Web site at www.epa.gov/watersense/partners/certification.html. Under this process, products are certified to conform to applicable WaterSense specifications by accredited third-party licensed certifying bodies. Manufacturers are then authorized to use the WaterSense label in conjunction with certified products.

V. Other Issues

Detailed Drawings for the Force Balance Test Apparatus

As the specification indicates, the spray force performance requirement is measured via a force balance test apparatus. This force balance test apparatus was developed by the task force specifically for the purpose of determining a showerhead's compliance with the specification's force requirements; therefore it is not a readily available or mass-produced piece of testing equipment. In addition, the test apparatus needs to be manufactured with very specific tolerances to ensure the results are repeatable and reproducible in any laboratory setting. WaterSense has made available the specification drawings to facilitate the construction of this test equipment. Detailed drawings for the force balance test apparatus are available on the WaterSense Web site at www.epa.gov/watersense/products/showerheads.html.

Health and Safety

In developing this specification, WaterSense and the task force considered potential negative impacts of reducing the flow rate on consumer satisfaction, including potential health and safety issues once these products are installed in the plumbing system. Of particular concern is the potential for increasing the risk of thermal shock or scalding as shower flow rates are reduced. Thermal shock or scalding can be caused when a hot- or cold-water-using device is activated (e.g., flushing the toilet or running the dishwasher) while the shower is running. Water is diverted away from the shower, causing a pressure drop in either the hot or cold water supply line to the shower. As a consequence, the balance of hot and cold water is shifted either to a hotter or colder temperature mix. This sudden change in temperature can either cause a user to abruptly move away from the shower stream, potentially resulting in an injury or fall, or if the temperature increase is severe enough, scalding can occur.

To mitigate the risks of temperature-related shower injuries, most U.S. plumbing codes require showers to be outfitted with individual automatic-compensating mixing valves that comply with either the American Society of Sanitary Engineers (ASSE) 1016 or ASME A112.18.1/CSA B125.1 standards. An automatic-compensating mixing valve is a device that is installed as part of the shower's flow control that helps to regulate water temperature; it is not part of the showerhead itself. The valve works either through balancing the incoming hot and cold water

pressures or through controlling the mixed outlet temperature with a thermostatic element that can maintain water temperature to within +/- 3.6°F.

Despite advances in plumbing codes and mixing valve technology, thermal shock and scalding risks are still present under two scenarios. First, automatic-compensating mixing valves are currently only required to be tested and certified at a flow rate of 2.5 gpm at 45 psi. When these devices are outfitted with a showerhead that has a lower flow rate, there may not be adequate assurance that the valve is sensitive enough to provide the required protection. This is potentially true for all showerheads, as standard showerheads are currently tested and certified at a flow rate of 2.5 gpm at 80 psi. Second, not all homes are equipped with an automatic-compensating mixing valve. The risks are of particular concern for showerhead retrofits in homes built prior to 1987.

As a part of the development of the criteria for showerheads, WaterSense and the task force evaluated the link between flow rate and temperature deviations associated with pressure and temperature changes. The task force gathered and presented data to compare the temperature profiles that result from a drop in hot and cold water pressure for both standard and high-efficiency showerheads under the two risk scenarios: (1) installation with various types of automatic-compensating mixing valves (thermostatic, pressure balancing, or combination) designed for a flow rate of 2.5 gpm at 45 psi and (2) installation without the protection of an automatic-compensating mixing valve. The data showed that the risks are present for showerheads of all flow rates, but that more efficient showerheads are more sensitive to sudden changes in water pressure. As a consequence, a temperature change in water exiting the shower may be amplified when the pressure within the cold water or hot water supply plumbing suddenly changes.

Ultimately, WaterSense and the task force came to the conclusion that the thermal shock and scalding risks cannot be fully addressed through the specification for showerheads. First, there is a clear disconnect between the showerhead and automatic-compensating mixing valve compatibility, as the products are tested at different pressures (80 psi and 45 psi, respectively) and currently automatic-compensating mixing valves are only tested at a flow rate of 2.5 gpm. Second, the potential temperature of the hot water is controlled by the design of the hot water heater and delivery system, which can discharge water well in excess of the code required 140°F due to “layering” and the location of the thermostat at a point that is not necessarily the location of the hottest water. Because of the interrelated nature of these three components in the plumbing system, the control of the risks cannot solely rest on the design of the showerhead. In fact, the showerhead itself has very little, if any, control over the outlet water temperature.

To the extent possible, WaterSense has addressed this issue in the specification by requiring manufacturers to mark the product packaging with the minimum flow rate at 45 psi as determined by testing at that pressure. This is a vital step toward providing the information necessary to "match" the showerhead with a compatible automatic-compensating mixing valve that is rated to perform at the same flow rate and tested pressure. In addition, industry is currently working to harmonize automatic-compensating mixing valve standards and showerhead standards to address potential incompatibilities of these plumbing system components. This will go a long way toward addressing the risks of thermal shock and scalding associated with the installation of a WaterSense labeled showerhead, indeed with all

showerheads, particularly in new construction. WaterSense is also educating consumers and program partners regarding the issue and associated risks so that consumers can continue to make informed purchasing decisions.

Appendix A: Calculations and Key Assumptions

Potential Water Savings Calculations

Assumptions:

- Average actual flow rate for an existing showerhead is 2.22 gpm[7] (the average flow rate is less than the standard rated flow rate of 2.5 gpm most likely because the products are rated at 80 psi, but installed in homes with less pressure)
- Average shower duration is 8.2 minutes[11]
- The average person takes 0.67 showers per day[8]
- A WaterSense labeled showerhead reduces the flow rate by 20 percent
- An estimated 10 percent of existing showerheads are replaced each year due to wear, remodeling, or other reasons
- There are an estimated 1,797,000 new housing starts per year based on the average number of new housing starts from 2003–2007[9]

Equation 1. Annual Water Savings Potential from Replacing a 2.5 gpm Rated Showerhead

(((2.22 gpm – (2.22 gpm x (1-0.2))) x 8.2 minutes/shower x 0.67 showers/person/day x 2.6 people/household x 365 days/year) = 2,300 gal/household/year

(2,300 gal/household/year / 2 showerheads/household) = 1,200 gal/showerhead/year

Equation 2. Annual National Water Savings Potential from Replacing All Existing 2.5 gpm Showerheads

(1,200 gal/showerhead/year x 220 million existing showerheads) = 260 billion gal/year

Equation 3. Annual National Water Savings Potential from Natural Replacement with WaterSense Labeled Showerheads

(1,200 gal/showerhead/year x 220 million showerheads * 0.10) = 26 billion gal/year

Equation 4. Annual National Water Savings Potential from Installation of WaterSense Labeled Showerheads in New Construction

(1,200 gal/showerhead/year x 1,797,000 annual new housing starts x 2 showerheads/household) = 4.3 billion gal/year

Unit Abbreviations:
gal = gallon
gpm = gallons per minute
psi = pressure per square inch

Potential Energy Savings Calculations

[7] Mayer and DeOreo, Op. cit., 102.
[8] Calculated based upon an assumed 17.2 gallons per shower and 11.6 gallons per day for showering. (Ibid.)
[9] U.S. Census. 2007 American Housing Survey, Table 1A-1. www.census.gov/prod/2008pubs/h150-07.pdf.

Assumptions:

- Approximately 73 percent of showerhead water used in a household is hot water[10]
- 42,239,000 (approximately 40 percent) of occupied residences in the United States heat their water using electricity[11]
- 60,998,000 (approximately 56 percent) of occupied residences in the United States heat their water using natural gas[11,12]
- Water heating consumes 0.18 kWh of electricity per gallon of water heated assuming:
    - Specific heat of water = 1.0 Btu/lb x º F
    - 1 gallon of water = 8.34 lbs
    - 1 kWh = 3,412 Btus
    - Incoming water temperature is raised from 55º F to 120º F (Δ 65 º F)
    - Water heating process is 90 percent efficient for electric hot water heaters
- Water heating consumes 0.88 Mcf of natural gas per 1,000 gallons of water heated assuming:
    - Specific heat of water = 1.0 Btu/lb x º F
    - 1 gallon of water = 8.34 lbs
    - 1 Therm = 99,976 Btus
    - Incoming water temperature is raised from 55º F to 120º F (Δ 65 º F)
    - Water heating process is 60 percent efficient for natural gas hot water heaters

Electricity

Equation 5. KWh Required to Raise 1 Gallon of Water 65º F
[(1.0 Btu/lbs x º F) (1kWh/3,412 Btus) / (1 gal/8.34 lbs) x 65º F] / 0.90 = 0.18 kWh/gal

Equation 6. Electricity Saving Potential per Household
(2,300 gal/year x 0.73) x (180 kWh of electricity/1,000 gal) = 300 kWh of electricity per year

Equation 7. National Electricity Savings Potential from Replacing All Existing 2.5 gpm Showerheads
(260 billion gal/year x 0.73 x 0.40) x (180 kWh of electricity/1,000 gal) = 14 billion kWh of electricity nationwide

Equation 8. National Electricity Savings Potential from Natural Replacement with WaterSense Labeled Showerheads
(26 billion gal/year x 0.73 x 0.40) x (180 kWh of electricity/1,000 gal) = 1.4 billion kWh of electricity nationwide

Equation 9. National Electricity Savings Potential from Installation of WaterSense Labeled Showerheads in New Construction

[10] DeOreo, William B., and Peter W. Mayer. *The End Uses of Hot Water in Single Family Homes From Flow Trace Analysis*. 2000. Aquacraft, Inc.
[11] U.S. Department of Housing and Urban Development and U.S. Census Bureau. *American Housing Survey for the United States: 2007.* 2008. Table 1A-5, page 7.
[12] Ibid.

(4.3 billion gal/year x 0.73 x 0.40) x (180 kWh of electricity/1,000 gal) = 230 million kWh of electricity nationwide

Natural Gas

Equation 9. Therms Required to Raise 1 Gallon of Water 65º F
[(1.0 Btu/lbs x º F) (1 Therm/99,976 Btus) / (1 gal/8.34 lbs) x 65º F] / 0.60 = 0.009 Therms/gal

Equation 10. Converting Therms to Mcf
0.009 Therms/gal x 1,000 gal/kgal x 1 Mcf/10.307 Therms = 0.88 Mcf/kgal

Equation 11. Natural Gas Savings Potential per Household
(2,300 gal/year x 0.73) x (0.88 Mcf of natural gas/1,000 gal) = 1.5 Mcf (1,500 cubic feet) of natural gas per year

Equation 12. National Natural Gas Savings Potential from Replacing All 2.5 gpm Showerheads
(260 billion gal x 0.73 x 0.56) x (0.88 Mcf of natural gas/1,000 gal) = 94 million Mcf of natural gas nationwide

Equation 13. National Natural Gas Savings Potential from Natural Replacement with WaterSense Labeled Showerheads
(26 billion gal x 0.73 x 0.56) x (0.88 Mcf of natural gas/1,000 gal) = 9.4 million Mcf of natural gas nationwide

Equation 14. National Natural Gas Savings Potential from Installation of WaterSense Labeled Showerheads in New Construction
(4.3 billion gal/year x 0.73 x 0.56) x (0.88 Mcf of natural gas/1,000 gal) = 1.5 million Mcf of natural gas nationwide

Unit Abbreviations:
Bcf = billion cubic feet
Btu = British thermal unit
F = Fahrenheit
kgal = kilogallons
kWh = kilowatt hour
lbs = pounds
Mcf = thousand cubic feet

Cost-Effectiveness Calculations

Assumptions:
- Price of water and wastewater is $6.06/1000 gallons[13]
- 2009 Price of electricity is $0.12/kWh[14]
- 2009 Price of natural gas is $11.98/Mcf[15]

[13] Raftelis Financial Consulting. *Water and Wastewater Rate Survey*. American Water Works Association. 2006.
[14] U.S. Department of Energy, www.eia.doe.gov/cneaf/electricity/epm/table5_3.html.

Equation 15. Annual Household Water and Wastewater Cost Savings
2,300 gallons/year x $6.06/1,000 gallons = $14/year

Equation 16. Annual Household Electricity Savings
(300 kWh/household/year * $0.12/kWh) = $36/year

Equation 17. Annual Household Natural Gas Savings
(1.5 Mcf/household/year * $11.98/Mcf) = $18/year

Equation 18. Annual Water, Wastewater, and Electricity Savings
($14/year + $36/year) = $50/year

Equation 19. Annual Water, Wastewater, and Natural Gas Savings
($14/year + $18/year) = $32/year

Equation 11. Average Full Payback Period (Electric Water Heating)
($30/showerhead x 2 showerheads/household) / $50/year = 1.2 years (~14 months)

Equation 12. Average Full Payback Period (Natural Gas Water Heating)
($30/showerhead x 2 showerheads/household) / $32/year = 1.9 years (~ 23 months)

[15] U.S. Department of Energy, www.eia.doe.gov/steo.

WaterSense® Specification for Tank-Type Toilets

Version 1.2

June 2, 2014

WaterSense® Specification for Tank-Type Toilets

1.0 Scope and Objective

This specification establishes the criteria for a tank-type high-efficiency toilet under the U.S. Environmental Protection Agency's (EPA's) WaterSense program. It is applicable to:

- Single-flush, tank-type gravity toilets
- Dual-flush, tank-type gravity toilets
- Dual-flush, tank-type flushometer tank (pressure-assist) toilets
- Tank-type, flushometer tank (pressure-assist) toilets
- Tank-type electrohydraulic toilets
- Any other tank-type technologies that meet these performance specifications

The specification is designed to ensure both sustainable, efficient water use and a high level of user satisfaction with flushing performance.

2.0 General Requirements

2.1 The toilet shall conform to applicable water closet requirements in ASME A112.19.2/CSA B45.1,[1] except as otherwise indicated in this specification.

2.2 If the toilet has dual-flush capabilities, it shall conform to requirements in ASME A112.19.14.

3.0 Water Efficiency Criteria

3.1 Single-flush toilets: The effective flush volume shall not exceed 1.28 gallons (4.8 liters) when evaluated in accordance with the sampling plan contained in 10 CFR 429.30. For single-flush toilets, the effective flush volume is the average flush volume when tested in accordance with ASME A112.19.2/CSA B45.1.

3.2 Dual-flush toilets: The effective flush volume shall not exceed 1.28 gallons (4.8 liters) when evaluated in accordance with the sampling plan contained in 10 CFR 429.30. For dual-flush toilets, the effective flush volume is the average flush volume of two reduced flushes and one full flush. Flush volumes shall be tested in accordance with ASME A112.19.2/CSA B45.1 and ASME A112.19.14.

3.3 Samples with average flush volume in excess of 0.10 gallon (0.4 liter) greater than their rated flush volume shall be deemed to fail testing requirements due to excessive flush volume.[2]

[1] References to this and other standards apply to the most current version of that standard.
[2] For example, fixtures rated at 1.28 gallons per flush (the maximum flush volume) but flushing at greater than 1.38 gallons (5.2 liter) when adjusted in accordance with the water consumption test procedure in ASME A112.19.2/CSA B45.1 shall be deemed to have "failed" the requirements of this specification.

3.4 Samples with average flush volumes less than or equal to 0.10 gallon (0.4 liter) greater than their rated flush volume shall be adjusted, if possible, to their rated flush volume prior to performance testing.

3.5 Samples with average flush volumes less than their rated flush volume shall be tested at measured volume and this volume shall be recorded on the test report.

4.0 Flush Performance Criteria

4.1 Toilet model performance is identified as either a "pass" or "fail" depending upon whether it can successfully and completely clear all test media from the fixture in a single flush in at least four of five attempts. Flush performance testing shall be conducted in accordance with the waste extraction test protocol provided in ASME A112.19.2/CSA B45.1.

5.0 Product Marking

5.1 Toilet fixtures shall be marked in accordance with requirements in ASME A112.19.2/CSA B45.1 with the exception identified in Section 5.1.1 below.

5.1.1 Toilet bowls intended to be used with tanks of varying consumption levels (e.g., 1.6 and 1.28 gallons per flush) shall be marked with a dual consumption marking or a consumption range, as indicated in ASME A112.19.2/CSA B45.1; however, toilet bowls shall not be marked with the words "or less" to indicate compatibility with tanks of varying consumption levels.

5.2 Toilet tanks shall not be packaged, marked, nor provided with instructions directing the user to an alternative water use setting that would override the rated flush volume, as established by this specification. Any instruction related to the maintenance of the product shall direct the user on how to return the product to its rated flush volume.

6.0 Effective Date

This specification is effective on June 2, 2014.

7.0 Future Specification Revisions

EPA reserves the right to revise this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Revisions to the specification would be made following discussions with industry partners and other interested stakeholders.

8.0 Definitions

Definitions within ASME A112.19.2/CSA B45.1 and ASME A112.19.14 are included by reference.

- **Pressure-assist toilet:** A water closet that uses a flushometer tank as a flushing device, as defined in ASME A112.19.2/CSA B45.1.

- **Rated flush volume:** The maximum flush volume, as specified by the manufacturer, verified through testing and in compliance with this specification.

Appendix A: Requirements for WaterSense Labeling

The following requirements must be met for products to be bear the WaterSense label.

1.0 WaterSense Partnership

The manufacturer[3] of the product must have a signed partnership agreement in place with EPA.

2.0 Conformity Assessment

Conformance to this specification must be certified by an EPA licensed certifying body accredited for this specification in accordance with the *WaterSense Product Certification System*.

3.0 Clarifications

3.1 Adjustability

Toilet tanks with adjustable water use settings that can be identified and activated by a user or plumbing professional to override the rated flush volume, as established by this specification, do not comply with the intent of this specification or the WaterSense program and do not qualify for use of the WaterSense label.

3.2 Tanks and Bowls Manufactured and Sold by Different Companies

WaterSense requires every combination tank and bowl to be tested and certified for conformance to this specification in order to ensure that the toilet as a whole provides the expected water efficiency and performance. Wall-hung bowls and in-wall carrier systems manufactured and sold by different companies can earn the WaterSense label, provided that the combination unit is tested and certified. However, since these products might not necessarily be sold as a unit, WaterSense has established some additional certification requirements that these products must meet in order to earn the WaterSense label. Both manufacturers must agree to have their products tested and certified together in order for the tank and bowl combination to receive the WaterSense label.

Certification Listing

In order to control the use of the WaterSense label, EPA is requiring each manufacturer (e.g., the tank manufacturer and the bowl manufacturer) to obtain a certification listing with one of EPA's licensed certifying bodies to show that the toilet, formed by the combination tank and bowl, was certified for conformance to the specification. The listings must identify both components, along with the respective manufacturers' names,

[3] Manufacturer, as defined in the WaterSense program guidelines, means: "Any organization that produces a product for market that might be eligible to meet WaterSense criteria for efficiency and performance. Manufacturers can also produce 'private label' products that are sold under the brand name of a separate organization, which is treated as a separate partner/application from the original product manufacturer." In the case of private labeling, the private labeling organization that ultimately brands the product for sale must have a signed WaterSense partnership agreement in place with EPA.

brand names, model names, and model numbers by which the products are identified and sold. Separate listings will allow the licensed certifying body to directly authorize each manufacturer to use the WaterSense label on their tanks or bowls. Note that though a certification listing is required for each manufacturer, WaterSense is not requiring the combination toilet to be tested more than once. The licensed certifying body must ensure that the listing information is complete prior to issuing the certification and the WaterSense label to either manufacturer.

As an alternative to separate listings, and at the discretion of the licensed certifying body, the manufacturer of one of the components (e.g., either the tank or bowl manufacturer) can become listed as an additional company under the certification listing of the manufacturer of the corresponding component (e.g., the bowl or tank). However, both components, along with the respective manufacturer's names, brand names, model names, and model numbers by which the products are identified and sold, must be identified under both the certification file owner's listing and the additional company's listing. This will ensure that there is no confusion about which products were certified in combination to earn the WaterSense label.

3.3 Product Packaging Marking and Labeling

Though every combination tank and bowl must be tested and certified for conformance to this specification in order to ensure that the toilet as a whole provides the expected water efficiency and performance, in some cases the tank and bowl might be packaged individually and/or sold separately. To ensure that it is clear to the purchaser that a particular combination tank and bowl is labeled, EPA is providing clarification regarding how the packaging must be marked and how the WaterSense label must be used. These marking and labeling requirements apply to tanks and bowls made by the same company and those made by different companies, as is the case for some wall-hung bowls and in-wall carrier systems.

Manufacturers must adhere to the following product packaging marking and labeling requirements for toilet tanks and bowls packaged and sold individually:

- In all cases, the toilet tank and toilet bowl packaging must bear the WaterSense label.

- Toilet bowl packaging must indicate all of the specific brand names, model names, and model numbers, as applicable, of the counterpart tanks it can be used with to form a WaterSense labeled tank-type toilet. For example, the toilet bowl packaging might say:

  > "This [insert description of bowl] is WaterSense labeled when used with [list brand names, model names, and model numbers, as applicable, of the tank(s) that the bowl can be used with to form a WaterSense labeled tank-type toilet]."

- Product specification sheets or other product documentation for both the toilet tank and bowl must indicate all of the specific brand names, model names, and model numbers, as applicable, of the counterpart products (e.g., the bowl or tank) that the product can be used with to form a WaterSense labeled tank-type toilet.

Note that for toilet tanks and bowls packaged and sold together as a unit, the packaging must bear the WaterSense label.

Summary of Revisions to the WaterSense® Specification for Tank-Type Toilets Version 1.2

The U.S. Environmental Protection Agency's (EPA's) WaterSense program is announcing the release of Version 1.2 of its *WaterSense Specification for Tank-Type Toilets* (specification). The purpose of this document is to summarize the revisions made to the specification, share the reasoning for the changes, and provide a timeline for compliance with the new requirements.

It is important to note that EPA considers the revisions made in Version 1.2 of the specification to be minor in nature. The revisions are meant to provide clarification of the existing requirements and do not materially affect the scope, performance, or efficiency requirements. The revisions also do not affect the status of existing certified, WaterSense labeled tank-type toilets.

Background

WaterSense released its initial *Tank-Type High-Efficiency Toilet Specification* in January 2007 and issued the first revision to the specification in May 2011. Since that time, the American Society of Mechanical Engineers (ASME) and Canadian Standards Association (CSA) have revised ASME A112.19.2/CSA B45.1 *Ceramic Plumbing Fixtures* to include the waste media extraction test, fill valve integrity test, and tank trim adjustability test protocols established in the *WaterSense Specification for Tank-Type Toilets*. To align with the revised ASME A112.19.2/CSA B45.1 standard, to the extent possible, WaterSense is issuing Version 1.2 of the specification. The changes to the specification, described in this document, will ensure consistency and reduce redundancy in toilet testing for manufacturers seeking the WaterSense label. WaterSense has also taken this opportunity to make some additional minor revisions to the specification to align it with the other WaterSense product specifications. All of the revisions contained in Version 1.2 will ensure that tank-type toilets receiving the WaterSense label are certified and labeled consistently, in accordance with EPA's intent, and will continue to meet consumer expectations for efficiency and performance.

Section 2.0 General Requirements

EPA has revised the title of the section from "Summary of Criteria" to "General Requirements." This change does not affect the specification's original scope of objective, but rather aligns the organization of the specification with other WaterSense product specifications.

Similarly, to align with other WaterSense product specifications, EPA has revised the content of Section 2.0 to provide the general and overarching requirements that products must meet to earn the WaterSense label, rather than a summary of the specification requirements. This section now indicates that all tank-type toilets shall conform to the applicable water closet requirements in ASME A112.19.2/CSA B45.1, and all dual-flush tank-type toilets must conform to applicable requirements within ASME A112.19.14 *Six-Liter Water Closets Equipped With a*

Dual Flushing Device. This change now more fully and clearly aligns the specification with the requirements of the guiding national standards for tank-type toilets.

Section 3.0 Water Efficiency Criteria

Flush Volume Measurement Requirements

The majority of the fixture performance testing protocol, originally provided in Appendix A of the specification, is included in the recent revisions to the ASME A112.19.2/CSA B45.1 standard. The fixture performance testing protocol is now incorporated by reference in Section 2.0 of the specification. However, the ASME/CSA standard does not address the average flush volume limits that dictate whether a toilet is deemed to pass or fail the flush volume test or whether the flush volume should be adjusted to complete the test. As a result, WaterSense has retained these requirements in the specification. As discussed below, Appendix A was removed from the specification because a majority of the requirements are now redundant with the A112.19.2/CSA B45.1 standard; therefore, WaterSense moved these flush volume limit requirements to *Section 3.0 Water Efficiency Criteria*. This change does not affect the specification's original requirements or intent.

Section 4.0 Flush Performance Criteria

Testing Protocol Reference

In Version 1.1 of the specification, the fixture performance testing protocol was identified in Appendix A. Since the protocol is now included in the recent revisions to the ASME A112.19.2/CSA B45.1 standard, WaterSense has updated *Section 4.0 Flush Performance Criteria* to reference compliance with the standard rather than Appendix A (Appendix A has been subsequently deleted). In addition, under Version 1.1, this section summarized the test media requirements. It also stipulated that the protocol was only applicable to single-flush toilets and to the full flush option of dual-flush toilets. These requirements are also covered in the referenced standards and, therefore, WaterSense removed them from this section to minimize redundancy.

In addition, in the development of the revised ASME A112.19.2/CSA B45.1 standard, there was consensus that the casing used for the test media did not materially affect the results of the test. Either cased or uncased media were deemed acceptable for performance testing. In view of this decision and because of the desire for the WaterSense specification to be consistent with the standard, EPA has determined that performance testing using cased or uncased media is acceptable under this specification. This allowance is included by reference to the standard.

Section 5.0 Supplementary Requirements for Flush Volume Adjustability (Version 1.1)

Section Removal

In Version 1.1 of the specification, *Section 5.0 Supplementary Requirements for Flush Volume Adjustability* included testing protocols intended to limit the flush volume adjustability of certified tank-type toilets. These testing protocols included the fill valve integrity test protocol (Appendix B of Version 1.1 of the specification) and the tank trim adjustability testing protocol (Appendix C of Version 1.1 of the specification). These testing protocols were adopted by the ASME A112.19.2/CSA B45.1 standard, which is now incorporated by reference in Section 2.0 of the specification. Therefore, WaterSense removed these requirements from the specification to minimize redundancy. This change does not affect the specification's original requirements or intent.

Section 5.0 Product Marking

Tank Marking Requirements

Toilet tank marking requirements identified in ASME A112.19.5 *Flush valves and spuds for water closets, urinals, and tanks* (referenced in Version 1.1 of the specification) require manufacturers to permanently mark or label the tank with information pertaining to the appropriate flush valve replacement parts. These requirements have subsequently been incorporated into ASME A112.19.2/CSA B45.1. Therefore, WaterSense updated the specification to reference compliance with the toilet fixture marking requirements identified in the ASME A112.19.2/CSA B45.1 standard.

Bowl Marking

Version 1.1 of the specification allowed toilet bowls to be marked in a manner that indicated compatibility with flush volumes below 1.6 gallons per flush (gpf). This requirement was intended to alleviate confusion because many manufacturers were marking their toilet bowls with a 1.6 gpf flush volume despite compatibility and certification with tanks that flush at lower volumes (e.g., 1.28 gpf). The revisions to ASME A112.19.2/CSA B45.1 now include provisions clarifying the marking requirements for bowls that are compatible with lower (or varying) flush volumes. Specifically, the standard allows toilet bowls to be marked using the words "or less," a dual consumption marking, or a consumption range.

WaterSense is incorporating by reference the bowl marking requirements from the ASME/CSA standard, which will provide clarity on the appropriate ways to mark bowls that are compatible with a range of flush volumes. However, WaterSense is taking exception to the allowance for the use of the words "or less." Placing a marking on the bowl that identifies a maximum flush volume along with the words "or less" could imply that the bowl is compatible with tanks of any flush volume, potentially below the minimum the flush volumes with which the bowl was certified to perform.

Section 8.0 Definitions

Referenced Standards

WaterSense has removed the reference to ASME A112.19.5, as the marking requirements have been incorporated into ASME A112.19.2/CSA B45.1.

Definitions

WaterSense has removed the definition of an electrohydraulic toilet because it is incorporated by reference in ASME A112.19.2/CSA B45.1.

WaterSense has revised the definition of a pressure-assist toilet to use language consistent with definitions included in ASME A112.19.2/CSA B45.1.

WaterSense has revised the definition of rated flush volume to be consistent with the definition included in other WaterSense product specifications. The new definition clarifies that the rated flush volume is specified by the manufacturer and verified through testing to ensure compliance with the specification.

Appendix A: Fixture Performance Testing Protocol (Version 1.1)

Section Removal

As mentioned previously, a majority of the fixture performance testing protocol, originally provided in Appendix A of Version 1.1 of the specification, is now incorporated by reference in the ASME A112.19.2/CSA B45.1 standard. One exception is the flush volume measurement limits that dictate whether the toilet passes, fails, or should be readjusted for testing. To reduce redundancy with the standard, WaterSense has subsequently moved these requirements to Section 3.0 and has removed the entirety of Appendix A from the specification. This change does not affect the specification's original requirements or intent.

Appendix B: Fill Valve Integrity Test Protocol (Version 1.1)

Section Removal

As mentioned previously, the fill valve integrity test protocol, originally provided in Appendix B of Version 1.1 of the specification, is now incorporated by reference in the ASME A112.19.2/CSA B45.1 standard. To reduce redundancy with the standard, WaterSense has subsequently removed the entirety of Appendix B from the specification. This change does not affect the specification's original requirements or intent.

Appendix C: Tank Trim Adjustability Testing Protocol (Version 1.1)

Section Removal

As mentioned previously, the tank trim adjustability testing protocol, originally provided in Appendix C of Version 1.1 of the specification, is now incorporated by reference in the ASME A112.19.2/CSA B45.1 standard. To reduce redundancy with the standard, WaterSense has

subsequently removed the entirety of Appendix C from the specification. This change does not affect the specification's original requirements or intent.

Appendix A: Requirements for WaterSense Labeling

Section 3.3 Product Packaging Marking and Labeling

Section 3.3 of Appendix A provides additional product packaging marking and labeling requirements for toilet tanks and bowls that are packaged and sold individually. Version 1.1 prohibited the WaterSense label on toilet bowl packaging that indicated compatibility with flush volumes greater than the rated flush volume identified in this specification. WaterSense developed that requirement to prevent confusion about whether a bowl with an advertised flush volume higher than the maximum allowed by the specification was actually labeled.

The new bowl marking requirements identified in ASME A112.19.2/CSA B45.1, and now incorporated by reference in the specification, should eliminate this confusion as toilet bowls can be marked with a dual consumption marking or a consumption range to indicate compatibility with multiple flush volumes. Therefore, EPA is now requiring the toilet tank and bowl packaging, in all cases, to bear the WaterSense label.

Timeline for Compliance with Version 1.2 of the Specification

Version 1.2 of this specification goes into effect June 2, 2014. EPA is providing manufacturers with a six-month grace period to begin complying with the new requirements. By December 2, 2014 all certification activities must be completed in accordance with Version 1.2 of this specification, in order for tank-type toilets to earn the WaterSense label. The existing licensing agreements between EPA and the licensed certifying body will remain in full force and effect.

Clothes Washer

Crisp, Clean Clothes Without the Waste

Washing laundry is a significant use of water in the average home; accounting for 15% to 40% of the overall water consumption inside the typical household of four persons. The average American family washes almost 400 loads of laundry each year.

Water Factor

Because washers come in various sizes and capacity, the water efficiency of clothes washers is rated using the term "Water Factor" to accurately compare water use. Water Factor (WF) is measured by the quantity of water (gallons) used to wash each cubic foot of laundry.

Older Washers

An old school washer will use approximately 40 to 45 gallons (151.4 L to 170.3 L) of water per load and have a water factor of 10 or higher. A family of four using a standard clothes washer will generate more than 300 loads per year, consuming 12,000 gallons (45.4 m^3) of water annually.

High Efficiency Washers

New, High-Efficiency Washers (HEW) (front loading or top loading machines are available) can use 14 to 25 gallons (53 L to 94.6 L) of water per load and will have a water factor of 8 or less. Replacing an old and inefficient clothes washer can reduce this water use by more than 6,000 gallons per year (22.7 m^3), save energy, clean the clothes better, and reduce fabric wear.

Clothes Washer Water Saving Tips

1. Run full loads only, even if the washer has an adjustable load setting. A full load is the most efficient way to wash clothes.
2. Replace the old inefficient clothes washer with a new high-efficiency model to save water and energy.

More Information About Clothes Washers

Standard Washers

The standard top loading clothes washer, using a vertical-axis drum, has changed little from General Electric's design in 1947. The vertical axis design requires enough water in the drum to suspend the fabric in the soapy water while the agitator churns the clothes to help remove dirt and stains. The large amount of water required to suspend the fabric in the tub limits the ability for this type of washer to efficiently use water. Historically, vertical axis washers consumed 45 gallons per load (170 L), though newer models of the past few years have reduced this to less than 40 gallons per load (151.4 L). Even the best designs manufactured today require more than 9 gallons (34.1 L) of water per cubic foot of capacity (28.31 L).

High-Efficiency Washers

High-efficiency front or top loading washers facilitate greater efficiency because they use less water and energy. These high-tech machines are proven to be more effective in cleaning the clothes with less water, and is gentler on the fabric when compared to old-school vertical axis washers. Additional benefits of lower water use are: a) less laundry detergent is required; and, b) less water needs to be heated resulting in energy conservation. Most high-efficiency washers use only 15 to 30 gallons (56.8 to 113.6 L) of water to wash the same amount of clothes as older washers (29 to 45 gallons per load (109.7 to 170 L). The most efficient washers use less than 5 gallons (18.9 L) per cubic foot of capacity.

Water Efficiency of Washers

The smaller the water factor rating, the more water efficient the clothes washer. A typical residential clothes washer has a capacity of approximately 3 cubic foot, though sizes range from 1.7 cubic feet (48.13 L) to more than 4.2 cubic feet (118.9 L) for the extra large capacity machines. The Water Factor provides a means to directly compare water efficiency of different sized machines.

Efficiency Example

Washer A uses 32 gallons of water per load (wash and rinse cycles) with a 4 cubic foot capacity of laundry; thus, has a Water Factor rating of 8 (32÷4=8).

Washer B uses 30 gallons of water (wash and rinse cycles) with a 2.5 cubic foot capacity; thus, has a Water Factor rating of 12 (30÷2.5=12).

Washer A uses water more efficiently (WF=8) than Washer B (WF=12). While Washer A uses slightly more water per load, it can clean 40% more clothes per load.

Looking for a New Water Efficient Washer?

When buying a new machine, finding the Water Factor rating of a clothes washer is not always easy. Though manufacturers measure Water Factors for each model of washer, manufacturers are not required to display the rating on the machine. Fortunately, the Energy Star Program reports **Water Factors and energy use for nearly every HEW in the market**.

Listing of High Efficiency Clothes Washers

Are you in the market for a new clothes washer? The most recent listings of high-efficiency clothes washers are provided here:

- **CEE Residential Clothes Washers Qualifying Product List**

CLOTHES WASHERS

For Partners

OVERVIEW

SPECIFICATION

BUYING GUIDANCE

PROMOTIONS

The average American family washes about 300 loads of laundry each year. ENERGY STAR can help families cut their related energy and water costs. ENERGY STAR certified clothes washers use about 25% less energy and 33% less water than regular washers. Over the lifetime of the product, models that have earned the ENERGY STAR can save $380 in energy costs.

They have a greater tub capacity which means you can wash fewer loads to clean the same amount of laundry. They are available in front-load and top-load models from brands including Blomberg, Asko, GE, Kenmore, LG, Samsung, Whirlpool, and many more. ENERGY STAR top-load models utilize new technologies that do not require the tub to fill with water. They clean using sophisticated wash systems to flip or spin clothes through a stream of water. Many have sensors to monitor incoming water levels and temperature. They also rinse clothes with repeated high-pressure spraying instead of soaking them in a full tub of water.
Consider the following:

- **Use less energy.** On average, a new ENERGY STAR certified clothes washer uses 316 kWh of electricity and can save you about $35 a year on your utility bills compared to a standard model.
- **Use less water.** A full-sized ENERGY STAR certified clothes washer uses 14 gallons of water per load, compared to the 20 gallons used by a standard machine. That's a savings of more than 2,000 gallons of water, per year!!
- **Is your washer over 10 years old?** It's estimated that there are 74 million top-loading washers and 24 million front-loading washers - 26 million of which are at least 10 years old, still in use across the country. Washers that are approximately 10 years old are significantly less efficient than newer models. Together, these inefficient washers cost consumers about $4.7 billion each year in energy and water. If you have a standard clothes washer that is approximately 10 years old, it's costing you, on average $185 a year.

If every clothes washer purchased in the U.S. was ENERGY STAR certified, we could save more than $3.3 billion each year and prevent more than 19 billion pounds of annual greenhouse gas emissions, equal to the emissions from more than 1.8 million vehicles.

5. Technical Advisory Council Report for Wastewater Flows from Single Family Dwellings.

Executive Summary
Wastewater Flows from Single Family Dwellings

Study done for the Michigan Technical Advisory Council for Onsite Wastewater Treatment
Danielle N. McEachin and Ted L. Loudon
Student Intern and Professor, respectively,
Agricultural Engineering Department
Michigan State University

The purpose of this study was to collect, organize and present what is known about the amount of wastewater that can be expected to flow from dwellings. Th goal is to provide designers and regulators with an actual flow based data set from which to develop design flow numbers for sizing systems. The data in this document comes from a variety of sources. Most were found on the Internet, some were found in the library, and others were provided from file data collected by entities in Michigan. The study was restricted to data collected during the years 1980-2000, so that the values determined would be representative of life styles of the present generation. In fact, only two numbers in the data tables are from before 1987.

A group of studies providing metered home water use rates presented in units of gpd per capita from around the country were reviewed and summarized. When averages were weighted based on the number of homes per study, the overall weighted average per capita daily water use was just under 51 gpd (Table 1). The value of this data is limited by the fact that much of the data was total use, including outdoor water use, and had to have a correction factor applied. Numerous sources containing recommended per capita design flows were reviewed. Most recommendations are in the 50-70 gpd/c range (Table 4).

Perhaps the most valuable data is data gathered in Michigan. A study of metered data from 700 homes in southern Michigan showed an average daily use per home of 214.3 gallons. The three bedroom home average was 221.3 gpd (74 gpd/br) and the four bedroom average was 285.5 gpd (71 gpd/br). A study of measured flows from 66 homes in Jackson County showed flows of 56 gpd per bedroom.

Average per person flows, averaged over large numbers of people, appear to be in the 50-55 gpd/c range. Average flows expressed per bedroom, for 3-4 bedroom homes appear to be in the 70-75 gpd/br range. While bedrooms do not generate flow, people do, it is common to design on the basis of number of bedrooms since occupancy varies. For large clusters of homes, designing on the basis of 75 gpd/br would appear to be supported by the data available. For an individual home design, a significant safety or peaking factor must be applied. Many of the references consulted suggest a factor of 2 or even 2.5. Use of a high design flow for individual homes helps to compensate for the state of the art in site evaluation and the occasional high water use occupancy.

The Technical Advisory Council will produce a companion guidance document providing recommendations for applying this data in design recommendations.

Wastewater Flows from Single Family Dwellings

Study done for the Michigan Technical Advisory Council for Onsite Wastewater Treatment

Danielle N. McEachin and Ted L. Loudon
Student Intern and Professor, respectively,
Agricultural Engineering Department
Michigan State University

Purpose: Rational design of wastewater treatment and dispersal systems is based on the flow that the system must be able to handle. This is usually expressed on a daily flow basis and typically includes a factor of safety which is large for individual home systems and may be reduced as systems are clustered together. The purpose of this study was to collect, organize and present what is known about the amount of wastewater that can be expected to flow from dwellings. The goal is to provide designers and regulators with an actual flow based data set from which to develop design flow numbers for sizing systems.

The data in this document comes from a variety of sources. Most were found on the Internet, some were found in the library, and others were provided from file data collected by entities in Michigan. Every effort was made to ensure that the data reflect indoor water use, which eliminates most consumptive uses and represents the flow that would be expected in the wastewater system. Because consumptive uses are hard to eliminate completely, particularly in arid climates, we restricted our data to the more humid states. One exception is that a study from Denver, CO is included in which a significant effort was made to eliminate outdoor consumptive uses in the design of the study. The numbers in the Colorado study are higher than those from more humid states but we cannot determine exactly what the reason for this might be. Wherever total water use numbers were encountered they were multiplied by a factor of 0.70 to give indoor water use only. These values are indicated by a *. This factor is based on the findings of multiple studies which measured both indoor and outdoor usage. We restricted our selection of data to include only data collected during the years 1980-2000, so that the values determined would be representative of life styles of the present generation. In fact, only two numbers in the data tables are from before 1987, and these are from a study deemed to be sufficiently reliable that we did not wish to exclude it.

The data are divided into four tables. Table 1 contains data from literature and internal sources that were obtained through actual measurement. This means that the numbers were derived from meter readings at occupied residences. These numbers are from studies where multiple homes were metered and the indoor water use was determined. Only some of these studies reported indoor water use only. For those where the reported values were total use, the 0.70 factor was used to obtain indoor water use numbers. See footnotes following the tabulated data for the basis of this factor. The study done by the American

Water Works Association Research Foundation metered 1188 homes to obtain their data. The Denver Board of Water Commissioners metered 5649 homes in the city and county of Denver.

The U.S. Department of Housing and Urban Development has conducted many studies on residential water use. In some of their work, they designed studies to obtain as diverse a group of homes as possible by gathering data on each household through issuing a questionnaire to each resident. Their study entitled "Water Saved by Low-flow Fixtures" included water meter data from over 200 homes. They also conducted a study of flow from apartment buildings in which they collected data from 23 buildings. The apartments were noted to be especially leaky and they found unusually high per capita water use. The U.S. Geological Survey published a table with water use values for every state. We selected data from the more humid states and applied the 0.70 factor to obtain indoor water use values. Data were collected from homes where the water supply was from both self-supplied (SS) and public-supplied (PS) sources.

Table 2 contains data that was found through actual measurement but is presented as gallons per day per home. The Michigan study done by Equinox Inc. for use in the design of the Mill Valley Condominium Subdivision metered over 700 homes in Livingston and Oakland counties and determined average water use per dwelling. The first 7 entries in Table 2 represent flows averaged over multiple single family dwellings and would be representative of flows to be expected from a cluster of homes. The average flow equals 159 GPD/home over 640 homes. The Michigan Department of Environmental Quality study involved determination of metered flows from over 500 homes in Oakland County and Highland Township. Both of these Michigan studies are believed to be highly reliable but resulted in per home flows that were higher.

Table 3 contains data found through actual measurement but the values were presented in the original studies in units of gallons per day per bedroom. This data is from a study done by the Michigan Department of Environmental Quality. In this study, 66 homes were metered in Jackson County and the size of home determined so that the data could be presented in terms of a per bedroom water use average.

Table 4 contains data from publications which give representative numbers that are recommended for design of wastewater systems. These are not well referenced so it is unclear whether they originally came from actual use studies or are estimates, possibly including a safety factor, that are simply repeated from another publication. These sources were mostly found on the Internet.

After the tables are a set of statements and observations gleaned from literature. The effect of income level and household size on water use is analyzed. Our reasons for using the 0.70 factor are given, a comparison of self-supplied and public-supplied water use is given. Typical times of peak water use are analyzed as are the effects of metering and water pressure.

Conclusions that can be drawn:

From Table 1, the per capita metered indoor water use data from nationwide studies show an average value of 69 gallons per person per day. The per capita data obtained by applying the 0.70 factor to total water use data found in humid climates shows an average value of 55.2 gallons per day, with a self-supplied average of 50.5, a public-supplied average of 57.7 and a range of 35-86.8. The weighted average per capita water use data for all homes in Table 1 show an overall average use of 50.7 gallons per day, with a self-supplied use of 51.1 and a public-supplied use of 50.47.

The per home metered indoor data in Table 2 shows an average of 214.3, with a 3 bedroom average of 221.3, a 4 bedroom average of 285.5 and a range of 140-327. The first 7 entries in Table 2 represents measured flow data from 640 Michigan homes and shows an average of 159 GPD/home.

The nationwide data sets show somewhat higher per capita water use. Humid region data suggest that average per capita indoor water use averages between 50 and 70 gpd. Total water use per home averages between 160 and 285 GPD with the larger figure for larger homes.

This should be considered a work in progress. We would like to include additional data. If the reader has or is aware of additional data that could be included, we would like to receive it. This summary will be modified if additional data are received or otherwise located.

Residential Water Consumption Data, From a Variety of Sources — Report by: Danielle McEachin

Table 1. Sources whose data was found by actual measurement, measured in GPD/Person

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
AWWA Research Foundation	http://www.awwarf.com/exsums/90781.htm	Residential End Uses of Water [Project#241]	12 study sites, across the U.S.	Copyright1999	Indoor	1,188 Single-family homes	69.3, Including Leakage
Denver Board of Water Commissioners	Litke and Kauffman, "Analysis of Residential Use of Water in the Denver Metropolitan Area, CO, 1980-87		16 groups of homes in the city and county of Denver	Data From 1980-87	Indoor	5,649 Single-family homes	64-119 Mean = 85.6
Rhode Island Governor's Office of Housing, Energy, and Intergovernmental Relations	M. A. Horn, P.A. Craft & Lisa Bratton, "Estimation of Water Withdrawal and Distribution, Water Use, and Wastewater Collection and Return Flow in Cumberland, Rhode Island, 1988		Cumberland, Rhode Island	Data From 1988	Indoor and Total	Single-family homes	70 SS (Total) 77 PS (Indoor) & 90 PS (Total)
U.S. Department of Housing and Urban Development, Office	Brown and Caldwell, "Residential Water Conservation Projects, Summary Report", 1984	Water Saved by Low-flow Fixtures	Nationwide	Data from 1983	Indoor	200 Single-family homes	66.2

of Policy Development and Research		Retrofit of Apartment Buildings	Washington, D. C.	Data From 1981	Indoor	23 Apartment buildings	100** Including Leakage

Table 1. (cont.)

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
United States Geological Survey	http://water.usgs.gov//watuse/tables/dotab.st.html	Table12. Domestic Freshwater Use by State (States chosen with humidity similar to that of Michigan)	Alabama	Data From 1990	Indoor	Single-family homes	52.5* SS 70* PS
			Arkansas	Data From 1990	Indoor	Single-family homes	61.6* SS 74.2* PS
			Connecticut	Data From 1990	Indoor	Single-family homes	52.5* SS 49* PS
			Delaware	Data From 1990	Indoor	Single-family homes	55.3* SS 54.6* PS
			Georgia	Data From 1990	Indoor	Single-family homes	52.5* SS 80.5* PS
			Illinois	Data From 1990	Indoor	Single-family homes	58.8* SS 63* PS
			Indiana	Data From 1990	Indoor	Single-family homes	53.2* SS 53.2* PS
			Kentucky	Data From 1990	Indoor	Single-family homes	35* SS 49* PS
			Louisiana	Data From 1990	Indoor	Single-family homes	58.1* SS 86.8* PS
			Maine	Data From 1990	Indoor	Single-family homes	63* SS 40.6* PS
			Maryland	Data From 1990	Indoor	Single-family homes	58.1* SS 73.5* PS
			Massachusetts	Data From 1990	Indoor	Single-family homes	50.4* SS 46.2* PS
			Michigan	Data From 1990	Indoor	Single-family homes	51.1* SS 53.9* PS
			Mississippi	Data From 1990	Indoor	Single-family homes	35* SS 86.1* PS

Table 1. (cont.)

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
United States Geological Survey	http://water.usgs.gov//watuse/tables/dotab.st.html	Table12. Domestic Freshwater Use by State (States chosen with humidity similar to that of Michigan) (cont.)	Missouri	Data From 1990	Indoor	Single-family homes	42* SS 59.5* PS
			New Hampshire	Data From 1990	Indoor	Single-family homes	45.5* SS 49.7* PS
			New Jersey	Data From 1990	Indoor	Single-family homes	52.5* SS 52.5* PS
			New York	Data From 1990	Indoor	Single-family homes	40.6* SS 83.3* PS
			North Carolina	Data From 1990	Indoor	Single-family homes	38.5* SS 39.9* PS

			Ohio	Data From 1990	Indoor	Single-family homes	52.5* SS 37.5* PS
			Pennsylvania	Data From 1990	Indoor	Single-family homes	36.4* SS 43.4* PS
			Rhode Island	Data From 1990	Indoor	Single-family homes	49* SS 46.9* PS
			South Carolina	Data From 1990	Indoor	Single-family homes	52.5* SS 53.2* PS
			Tennessee	Data From 1990	Indoor	Single-family homes	45.5* SS 59.5* PS
			Vermont	Data From 1990	Indoor	Single-family homes	50.4* SS 56* PS
			Virginia	Data From 1990	Indoor	Single-family homes	52.5* SS 52.5* PS
			West Virginia	Data From 1990	Indoor	Single-family homes	56* SS 51.8* PS
			Wisconsin	Data From 1990	Indoor	Single-family homes	42.7* SS 36.4* PS

Table 1. (cont.)

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
United States Geological Survey	http://oh.water.usgs.gov/water_use/95huc.html	Estimated Water Use for Ohio, 1995, by Hydrologic Cataloging Unit	Ohio	Data From 1995	Indoor	Single-family homes	70 SS* 50 PS*
Michigan Department of Public Health		Oakland County Water Use/Population Study	Oakland County, MI	Data From 1991	Total	151 2 bedroom homes	56.7*
						445 3 bedroom homes	49*
						186 4 bedroom homes	51.8*
						30 5 bedroom homes	57.4*

SS = Self-supplied
PS = Public-supplied
*Converted to Indoor Use From Total Use by using the formula Indoor Use = (0.70) Total Use
** This study stated these apartments to have an especially large amount of leakage and therefore the numbers from these apartments were not used in any averages

Average per capita indoor water use = 50.76
SS average per capita indoor water use = 51.1
PS average per capita indoor water use = 50.47
Range of per capita water use = 35-100

Table 2. Sources whose data was found by actual measurement, measured in GPD/Home

Sponsor	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	GPD/ Home
Equinox, Inc., Stephens Consulting, Inc.	Daniel C. Schrauben and David R. Beschke, "Basis of Design, Flow Adjustment, Wastewater System, Mill Valley Condominium Subdivision", June 17, 1999.	Deer Creek	Data From 1990	Indoor	3 single-family homes	148
		Greenock Hills No. 3	Data From 1990	Indoor	20 single-family homes	158
		Lake Tyrone	Data From 1990	Indoor	182 single-family homes	165
		Portage Bay	Data From 1990	Indoor	20 single family homes	140
		Runyan Lake	Data From 1990	Indoor	274 single-family homes	164
		Sandy Creek	Data From 1990	Indoor	5 single-family homes	154
		Tanglewood	??	Indoor	136 single-family	145

					homes	
		City of Novi	Data From 1990-1992	Indoor	4 bedroom home	327
		City of Novi	Data From 1990-1992	Indoor	3 bedroom home	234
		Eagle Ravine	Data From 1990	Indoor	8 Single-family homes	270
		Milford Bluffs	Data From 1990	Indoor	3 bedroom home	222
		Milford Bluffs	Data From 1990	Indoor	4 bedroom home	255
		Settler's Pointe	Data From 1990	Indoor	3 bedroom home	213

Table 2. (cont.)

Sponsor	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	GPD/ Home
Equinox, Inc., Stephens Consulting, Inc.	Daniel C. Schrauben and David R. Beschke, "Basis of Design, Flow Adjustment, Wastewater System, Mill Valley Condominium Subdivision", June 17, 1999. (cont.)	Settler's Pointe	Data From 1990	Indoor	4 bedroom home	281
		Village of Milford	??	Indoor	4 bedroom home	209
		Village of Milford	??	Indoor	3 bedroom home	206
Michigan Department of Public Health	Oakland County Water Use/Population Study	Oakland County, MI	Data From 1991	Total	3 Bedroom home	197
					4 Bedroom home	257
	Highland Township, Four Bedroom and Three Bedroom Water Usage Comparison	Highland Township	Data From 1993	Total	3 Bedroom home	256
					4 Bedroom home	284

Average per home indoor water use (all homes) = 214.3
Average indoor water use (3 bedroom homes) = 221.3
Average indoor water use (4 bedroom homes) = 285.5
Range of indoor water use (all homes) = 140-327

Table 3. Sources whose data was found by actual measurement, measured in GPD/BR

Sponsor	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	GPD/ Bedroom
Michigan Department of Public Health	Engineering Company Review of One Subdivision, Jackson County	Jackson County	Data From 1991	Total	66 single-family homes (3 & 4 bedrooms)	56

Table 4. Sources using published numbers (recommended for design use)

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
Auburn University	http://hermes.ecn.purdue.edu/cgi/convertwq?7696	Conserving Water, Developing Water-Conserving Habits: A Checklist	Alabama	Data From 1995	Indoor	Single-family homes	50-70
Domestic Wastewater Systems & Pump Talk, R.L. Peeks Pump Sales	http://freehosting1.at.webjump.com/6eba64886/pu/pumpman-webjump/plan.htm	Planning Your Water System	N/A	Last Modified May 2000	Indoor	Single-family homes	75
Individual Sewage Treatment System (ISTS), Scott County	http://www.co.scott.mn.us/EH/ISTS/septic.htm	Water Usage and Your On-Site Sewage Treatment System	Minnesota	Data From 1990	Indoor	Single-family homes	52.5*-70*
Kennewick Public Works Department	http://www.ci.kennewick.wa.us/pw/watercon.htm	32 Tips on Water Conservation	Washington	Last Modified June 2000	Indoor	Single-family homes	63.75
Michigan State	http://hermes.ecn.purdue.edu/cgi/convertwq?5373	How to Conserve	Michigan	Data from	Indoor	Single-family	50-70

University, Extension		Water in Your Home and Yard		1987		homes	
Missouri Department of Natural Resources, Energy Center	http://www.dnr.state.mo.us/de/residential/waterusage.htm	Residential Energy Efficiency, Water Usage	Missouri	Last Modified Mar. 2000	Indoor	Single-family homes	50
North Carolina Cooperative Extension Services	http://www.bae.ncsu.edu/bae/programs/extension/publicat/wqwm/he250.html	Focus on Residential Water Conservation	North Carolina	Last Modified Mar. 1996	Indoor	Single-family homes	52.5*
Polk County, Department of Water Conservation	http://www.co.polk.ia.us/departments/conserv/kids.asp.html	Water Conservation for Kids	Iowa	Last Modified June 2000	Indoor	Single-family homes	50

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
Prairie Water News, Vol. 12, no. 1	http://www.quantumlynx.com/water/back/vol12no1/v21_st2.html	Bill Anderson, "Water Use Trends on the Prairies"	Saskatchewan	Spring, 1992	Indoor	Single-family homes	50 SS
Ron Crites and George Tchobanoglous, "Small and Decentralized Wastewater Management Systems, 1999.			N/A	Copyright, 1999	Indoor	High rise	55
						Low rise	55
						Hotel	40
						Newer home	70
						Older home	50
						Summer cottage	40
						Motel w/kitchen	100
						Motel w/o kitchen	95
						Trailer park	40
United States Environmental Protection Agency (EPA), Office of Water	http://www.epa.gov/OGWDW/wot/howmuch.html	How Much Drinking Water Do We Use in Our Homes	N/A	Last Modified June 2000	Indoor	Single-family homes	54.5
United States Geological Survey	http://water.usgs.gov/outreach/poster3/grade_school/Page7.html	Water Resources Outreach Program	N/A	Last Modified Mar. 2000	Indoor	Single-family homes	79
University of Arkansas	http://hermes.ecn.purdue.edu/cgi/convertwq?7541	Home Water Use Management	Arkansas	Data From 1992	Indoor	Single-family homes	63.75
University of Georgia	http://hermes.ecn.purdue.edu/cgi/convertwq?6229	Conserving Water at Home	Georgia	Data From 1991	Indoor	Single-family homes	50-75
University of Maine	http://hermes.ecn.purdue.edu/cgi/convertwq?6453	Conserving Water at Home	Maine	Data From 1991	Indoor	Single-family homes	45-50

Sponsor	Source	Study	Area of Study	Time Period	Indoor use or Total use?	Type of Dwelling	Per capita daily water use
University of Maryland	http://hermes.ecn.purdue.edu/cgi/covertwq?5321	Margaret T. Ordonez, "Water Conservation	Maryland	??	Indoor	Single-family homes	50-75

		In the Home."					
University of Minnesota	http://www.extension.umn.edu/distribution/youthdevelopment/components/0328-05.html	Water Use and Conservation	Minnesota	Last Modified June 2000	Indoor	Single-family homes	50
University of Rhode Island	http://hermes.ecn.purdue.edu/cgi/convertwq?6425	Alyson McCann and Thomas P. Husband, "Water Conservation In and Around the Home.", 1999.	Rhode Island	Data From 1991	Indoor	Single-family homes	50-75

SS = Self-supplied
PS = Public-supplied
*Converted to indoor use from total use by using the formula Indoor Use = (0.70) Total Use

Range of per capita water use for homes = 40-79

Interesting Observations on the Effects of Some Factors on Water Use

- Water-conserving toilets were shown to leak more often than non-conserving ones in the "Water Saved by Low-flow Fixtures" study done by the U.S. Department of Housing and Urban Development.
- Effects of income level and household size on water use:
  - To determine the effects of income on residential water use, the study "Water Saved by Low-flow Fixtures" by the U.S Department of Housing and Urban Development compared the average interior water use in gallons per capita-day for each household with the average income range for that household. The scatter plot of this data showed a wide variation of per capita water use within each income range.
  - The average interior water use values for each income bracket were also compared, and showed little or no correlation between income and water use.
  - In this same study, the average interior water use in gpcd was compared with household size. A wide variation of water usage within each household size was observed. However, the comparison of average interior water use for each group of household sizes did show a decreasing trend in per capita use as the number of people in the house increased.
  - If outside use were also included in this study, a correlation between income and water use would most likely be observed, due to bigger yard size and pools.
  - In the study, "Analysis of Residential Use of Water in the Denver Metropolitan Area, Co", it was found that Indoor water use correlated best with persons per household and that correlation with assessed value was very low.
  - The Oakland County Water Use/Population Study also showed little or no correlation between assessed value and water use.
  - It is interesting to note, however, that homes with low incomes may not have washing machines or dishwashers, while homes with higher incomes usually do. This could have a great effect on water use.
- Indoor water use as a function of total water use:
  - Indoor water use is said to be about seventy-five percent of total water use in the document, "Focus on Residential Water Conservation" by the North Carolina Cooperative Extension Service.
  - The book "Small and Decentralized Wastewater Management Systems" states that, "If a community has a water system but not a wastewater collection system, the average wastewater flow-rate can be estimated by multiplying the water use by a factor of sixty-eighty percent, depending on the landscaping." This is approximately equivalent to saying that base water use is sixty-eighty percent of total water use.
  - The Oakland County Water Use/Population Study shows a difference between winter and summer water use of sixty-six percent.
  - Based on these observations some of the total water use data in the above table was multiplied by a factor of 0.70 to get the indoor water use.
  - The study "Analysis of Residential use of Water in the Denver Metropolitan Area, Co" states that, "Water used to grow lawns in Denver is forty-two percent of water consumption." This is because Colorado is a very dry state.

- Times of peak water use:
  - In the study, "Analysis of Residential Use of Water in the Denver Metropolitan Area, Co", it is stated that, "more water is used in the summer, on Sundays, and from 7 a.m.– 9 a.m."
  - On the EPA's website "How Much Drinking Water Do We Use In Our Homes?", it states that
    - The lowest rate of use is from 11:30 p.m. to 5:00 a.m.
    - There is a sharp rise in use from 5:00 a.m. to noon, with a peak hourly use from 7:00 a.m. to 8:00 a.m.
    - There is a moderate use from noon to 5:00 p.m., with a lull around 3:00 p.m.
    - There is an increase in use in the evening from 5:00 to 11:00 p.m., with the second minor peak from 6:00 to 8:00 p.m.
- Metered versus flat rate customers:
  - The study, "Water Saved by Metering", done by the U.S. Department of Housing and Urban Development compares metered customers' water use with that of flat rate customers.
  - Denver is unique because it has both metered and flat rate customers. Since 1957, all new homes have been required to be metered. In spite of this, most customers are flat rate because they pre-existed this policy. Because of this, nearly identical homes in the same area can have different billing systems.
  - To study the effect of metering, one group of twenty-five metered homes and two groups of flat-rate homes (forty-two homes total) were identified, and there water use data collected for a period of three-years.
  - The test groups were selected so those factors such as fire hydrants and downstream water uses were eliminated.
  - Over the three-year period of data collection, water use in metered homes averaged about 453 gallons per day (total, 42% is yard watering), and water use in flat-rate homes averaged about 566 gpd. Thus, metered homes used twenty-percent less water than flat-rate homes.
  - The basic effect of metering is to reduce the amount of water used for irrigation. Therefore, water use would be reduced more in a dry area such as Denver than a more humid area.
- Effect of water pressure on water use:
  - Reducing water pressure can be one means of reducing water use. A decrease in water pressure causes a decrease in water flow related to the square root of pressure drop.

- Many water use appliances regulate the volume of water they use, eliminating the effect of water pressure. Water pressure does, however, have an effect on water leakage and outdoor water use.
- The U. S. Department of Housing and Urban Development did a study on water pressure entitled, “Effect of Water Pressure on Water Use”, in which they studied different pressure zones in Denver, Los Angeles, and Atlanta. They found a difference of about two-three percent in the water use of homes with high compared to low pressure (difference of about 35 psi).

- Equations Related to Water Use
  - The book, “Small and Decentralized Wastewater Management Systems”, states that the equation for flow from a residence can be given as: Flow, gal/home*day = 40 gal/home*day + 35 gal/person*day x (number of persons/home).
  - The document, “Water Use”, given to me by Larry Stephens describes three types of residences, with separate equations for estimating water use.
    - In a Type I residence the total floor area of the residence divided by the number of bedrooms is more than 800 square feet, or more than two of the following water-use appliances are installed: automatic washer, dishwasher. In a Type I residence the estimated water use is equal to 150 gpd/bedroom. This assumes an occupancy of two people per bedroom, each using 75 gpd.
    - In a Type II residence the total floor area of the residence divided by the number of bedrooms is more than 500 square feet and there are no more than two water-use appliances. Water use in a Type II residence is obtained by multiplying 75 times a factor equal to the number of bedrooms plus one.
    - In a Type III residence the total floor area of the residence divided by the number of bedrooms is more than 500 square feet and there are no more than two water-use appliances. Water use in a Type III residence is obtained from the formula: 66+38(number of bedrooms +1).

References

Anderson, Bill. 2000. Water Use Trends on the Prairies. Prairie Water News Vol. 12, No. 1 (1992) August 2000. <http://www.quantumlynx.com/water/back/vol2no1/v21_st2.html>.

AWWA Research Foundation Webpage. 2000. “Residential End Uses of Water [Project#241]” June 2000 <http://www.awwarf.com/exsums/90781.htm>.

Brown and Caldwell. 1984. Residential Water Conservation Projects, Summary Report. USDHUD.

University of Georgia. August 2000. Conserving Water At Home. <http://hermes.ecn.purdue.edu/cgi/convertwq?6229>.

University of Maine. August 2000. Conserving Water At Home. <http://hermes.ecn.purdue.edu/cgi/convertwq?6453>.

Auburn University. August 2000. Conserving Water, Developing Water-Conserving Habits: A Checklist. <http://hermes.ecn.purdue.edu/cgi/convertwq?7696>.

Crites, Ron and Tchobanoglous, George, “Small and Decentralized Wastewater Management Systems”, 1999.

R. L. Peeks Pump Sales. July 2000. Domestic Wastewater Systems and Pump Talk. <http://freehosting1.at.we.bjump.com/6eba64886/pu/pumpman webjump/plan.htm>.

United States Geological Survey. August 2000. Estimated Use of Water in the U. S. in 1990. <http://water.usgs.gov//watuse/tables/dotab.st.html>.

United States Geological Survey. August 2000. Estimated Water Use for Ohio, 1995. <http://oh.water.usgs.gov/water_use/95huc.html>.

North Carolina Cooperative Extension Service. August 2000. Focus on Residential Water Conservation. <http://www.bae.ncsu.edu/bae/programs/extension/publicat/wqwm/he250.html.

University of Arkansas. August 2000. Home Water Use Management. <http://hermes.ecn.purdue.edu/cgi/convertwq?7541>.

Horn, M.A., Craft, P.A., Bratton, Lisa. 1988. Estimation of Water Withdrawal and Distribution, Water Use, and Wastewater Collection and Return Flow in Cumberland, Rhode Island. Rhode Island’s Governor’s Office of Housing, Energy and Intergovernmental Relations.

United States Environmental Protection Agency (EPA), Office of Water. August 2000. How Much Drinking Water Do We Use in Our Homes. <http://www.epa.gov/OGWDW/wot/howmuch.html>.

Michigan State University Extension. July 2000. How to Conserve Water in Your Home and Yard. <http://hermes.en.purdue.edu/cgi/convertwq?5373>.

Litke and Kauffman. 1988. Analysis of Residential use of Water in the Denver Metropolitan Area. Denver Board of Water Commissioners.

Michigan Department of Environmental Quality. 1999. Oakland County Water Use/Population Study, 1991, Highland Township Water Use Data, 1993, and Jackson County Sanitary Flow Comparison.

Missouri Department of Natural Resources Energy Center. August 2000. Residential Energy Efficiency. <http://www.dnr.state.mo.us/de/residential/waterusage.htm>.

Schrauben, Daniel and David Beschke. 1999. Basis of Design Flow Adjustment, Wastewater System Mill Valley Condominium Subdivision. Equinox Inc. June 1999.

Polk County, Department of Water Conservation. August 2000. Water Conservation For Kids.
<http://www.co.polk.ia.us/departments/conserv/kids.asp.html>

U of Rhode Island. August 2000. Water Conservation In and Around the Home.
<http://hermes.ecn.purdue.edu/cgi/convertwq?6425>.

University of Maryland. August 2000. Water Conservation In the Home.
<http://hermes.ecn.purdue.edu/cgi/convertwq?5321>.
Unites States Geological Survey. August, 2000. Water Resources Outreach Program Page.
<http://water.usgs.gov/outreach/poster3/grade_school/Page7.html>.

_____Water Usage and Your Onsite Sewage Treatment System. Individual Sewage Treatment System (ISTS), Scott County, MN. July 2000.
<http://www.co.scott.mn.us/EH/ISTS/septic.htm>.

University of Minnesota. August 2000. Water Use and Conservation.
<http://www.extension.umn.edu/distribution/youthdevelopment/components/0328-05.html>.

Kennewick Public Works Department. July, 2000. 32 Tips on Water Conservation <http://www.ci.kennewick.wa.us/pw/watercom.htm>.

6. Existing information.

North Carolina Onsite Wastewater Contractor Inspector Certification Board
Authorized Onsite Wastewater Evaluator Permit Option for Non-Engineered Systems
Notice of Intent (NOI) to Construct

x New ____ Expansion ____ Repair ____ Relocation ____ Relocation of Repair Area

Owner or Legal Representative Information:
Name: Mattamy Homes, LLC
Mailing address: 11000 Regency Parkway, Suite 110 City: Cary State: NC Zip: 27518
Phone: 919-625-9546 Email: drew.brody@mattamycorp.com

Authorized Onsite Wastewater Evaluator Information:
Name: Hal Owen Certification #: 10036E
Mailing address: PO Box 400 City: Lillington State: NC Zip: 27546
Phone: 910-893-8743 Email: hal@halowensoil.com

Site Location Information:
Site address: Barrow Ct, Angier, NC 27501
Tax parcel identification number or subdivision lot, block number of property:
0682-29-4945.000, Riverfall SD Ph 1, Lot 1 County: Harnett

System Information:
Wastewater System Type: IIIbg (Pump to Accepted Status 25% reduction)
Daily Design Flow: 360 gpd
Saprolite System: ____Yes x No Subsurface Operator Required: ____ Yes x No
Water Supply Type: ____Private Well x Public Water Supply ____ Spring ____Other: ____

Facility Type:
x Residential 3 # Bedrooms 6 Maximum # of Occupants
____Business Type of Business and Basis for Flow: ____
____Public Assembly Type of Public Assembly and Basis for Flow: ____

Required Attachments:
✓ Plat or Site Plan
✓ Evaluation of Soil and Site Features by Licensed Soil Scientist

Attest: On this the 20 day of June, 2024 by signature below I hereby attest that the information required to be included with this NOI to Construct is accurate and complete to the best of my knowledge. Furthermore, I hereby attest that I have adhered to the laws and rules governing onsite wastewater systems in the state of North Carolina.
This NOI shall expire on 20 day of June, 2029.

Signature of Authorized Onsite Wastewater Evaluator: Hal Owen

Signature of Owner or Legal Representative: ____

Disclosure: The owner may apply for a building permit for the project upon submitting a complete NOI to Construct and the fee required (if any) to the local health department. An onsite wastewater system authorized by an authorized onsite wastewater evaluator shall be transferable to a new owner with the consent of the authorized onsite wastewater evaluator.

Local Health Department Receipt Acknowledgement:
Signature of Local Health Department Representative: ____ Date: ____

HALOWE1 OP ID: SGW

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 03/11/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER 910-893-5707 INSURANCE SERVICE CTR -LILLING LILLINGTON BRANCH OFFICE PO Box 1565 LILLINGTON, NC 27546 DANIEL L. BABB	CONTACT NAME: SHARON WOODY PHONE (A/C, No, Ext): 910-893-5707 FAX (A/C, No): 910-893-2077 E-MAIL ADDRESS: SWOODY@ISCFAY.COM
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : STARSTONE NATIONAL
INSURED HAL OWEN & ASSOCIATES, INC. PO BOX 400 LILLINGTON, NC 27546	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	CLAIMS-MADE OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	N / A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	PROFESSIONAL LIAB.			42ESP00143901	01/27/2024	01/27/2025	PER OCC.	1,000,000
							AGGREGATE	2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

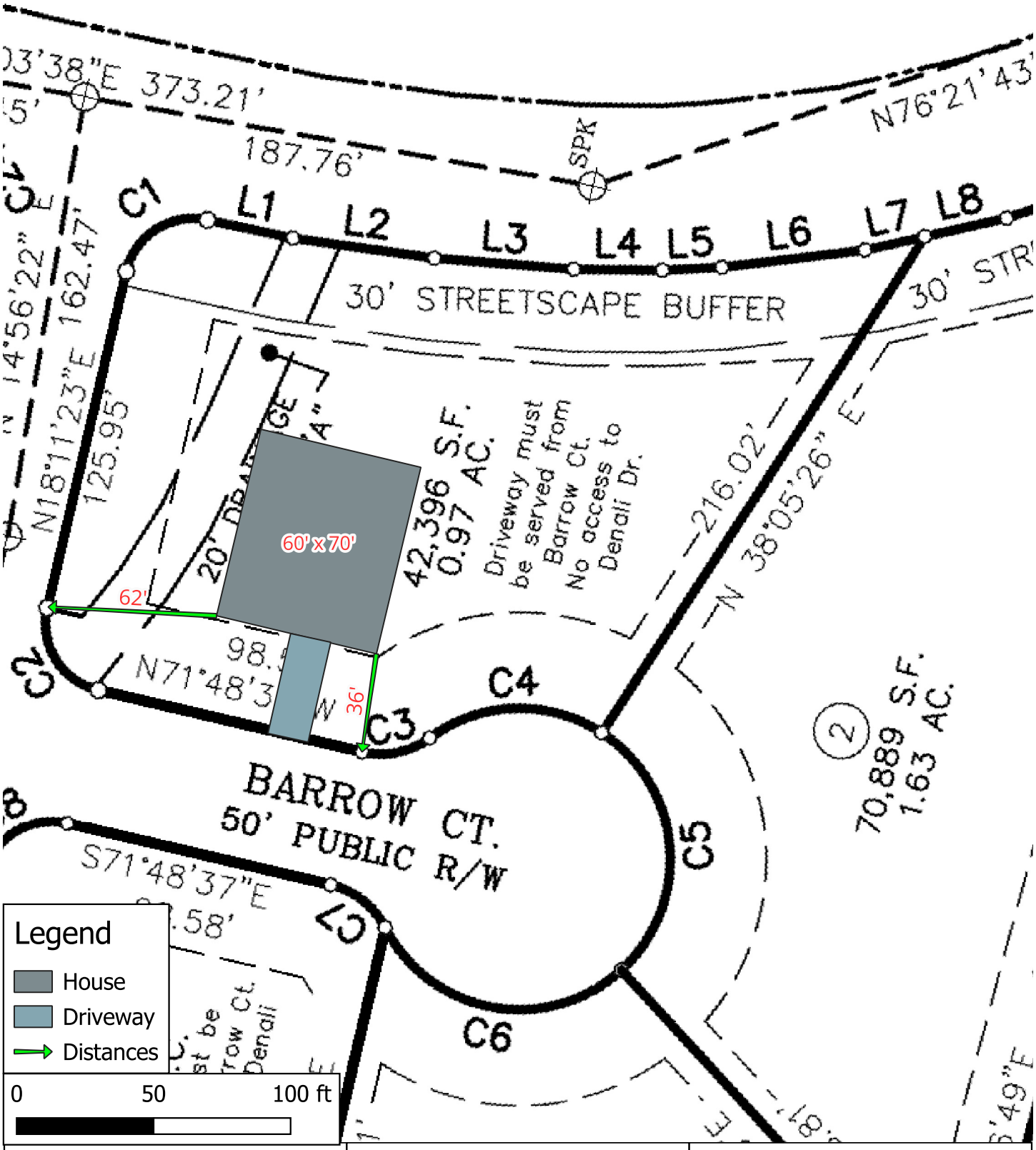
CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Sharon K. Woody



Hal Owen & Associates Inc. PO Box 400, Lillington, NC 27546 www.halowensoil.com 919-893-8743	Riverfall SD, Ph 1 Lot 1 17 June 2024	Site Plan For reference only. Not a survey.

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

HOA-AOWE-2406-10

Issue date 6/20/2024
Expiration 6/20/2029

APPLICANT INFORMATION

Name	Mattamy Homes, LLC		
Mailing Address	11000 Regency Parkway, Suite 110; Cary NC 27518		
E-mail Address	Drew.Brody@mattamycorp.com	Telephone Number	919-625-9546

PROPERTY IDENTIFIERS

County	Harnett	PIN	0682-29-4945.000
Size (Acre)	0.97	County PID	
Site Address	Barrow Ct, Angier, NC 27501		
S/D Name and Lot#	Riverfall SD, Ph 1 Lot 1		

PROJECT INFORMATION

Wastewater System	New		.0403 Eng Low Flow	No
Wastewater Strength	Domestic		Effluent Standard	DSE
Facility Type	Residential		Water Supply	Public Water
Design Wastewater Flow	360	gpd	gal/unit	120
Basis for Flow	3	bedrooms	max occupancy	6
Basement	No		Fixtures in basement?	No
Crawl Space	No		Slab Foundation	Yes

CONSULTANT INFORMATION

Company Name	Hal Owen & Associates, Inc.		
Mailing Address	PO Box 400, Lillington, NC 27546		
E-mail Address	hal@halowensoil.com	Telephone Number	910-893-8743
Licensed Soil Scientist	Britt Wilson, LSS#1351	AOWE	Hal Owen, #10036E

A soil and site evaluation has been conducted for the referenced property for the purpose of permitting a subsurface wastewater system. This evaluation was prepared based on information provided by the applicant to include the basis for design flow, proposed structure location(s), and property boundaries. Any false, inaccurate, or incomplete information provided by the applicant, owner, or legal representatives may result in denial or revocation of applications, approvals, or permits.

This AOWE Evaluation is being submitted pursuant to and meets the requirements of G.S.130A-336.2. This evaluation includes a soil and site evaluation, specifications, plans, and reports for the site layout and construction of a proposed onsite wastewater system by an Authorized On-Site Wastewater Evaluator (AOWE). The evaluation of soil conditions and site features is provided in accordance with G.S. 130A-335(e), the Rules for "Wastewater Treatment and Dispersal Systems", 15A NCAC 18E, and local septic regulations (if any). This report represents my professional opinion as a Licensed Soil Scientist and Authorized Onsite Wastewater Evaluator.

Britt Wilson

LICENSED SOIL SCIENTIST JOSEPH BRITT WILSON 1351 STATE OF NORTH CAROLINA

NC ONSITE WASTEWATER Certification Number 10036E EVALUATOR

Hal Owen

LICENSED SOIL SCIENTIST HAL OWEN 1102 STATE OF NORTH CAROLINA

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

WASTEWATER SYSTEM DESIGN SPECIFICATIONS

Proposed Design Daily Flow	360	gpd	Drainfield Meeets Requirements:	
Septic Tank Size (minimum)	1000	gallons	.0508 Available Space	Yes
Pump Tank Size (minimum)	1000	gallons, if required	.0601 Setbacks	Yes

Initial System

System Type	IIIbg –Pump to Other non-conventional systems					
Pump Required	Yes		10.3	ft TDH at	27.3	GPM
Trenches:	Accepted (25% reduction) System					
Design LTAR	0.40	gal/day/ft^2		Saprolite System	No	
Total Trench/ Bed Length	225	feet		Fill System	No	
Trench Spacing	9	ft on center				
Usable soil depth to LC	48	inches				
Maximum Trench Depth	24	inches, measured on downhill side of trench				
Minimum Soil Cover	6	inches				
Artificial Drainage Required	No					

Repair System

System Type:	IIIbe – Pump to PPBPS system				
Pump Required	Yes				
Trenches:	PPBPS, horizontal				
Design LTAR	0.30	gal/day/ft^2	Saprolite System	No	
Total Trench/ Bed Length	201	feet	Fill System	No	
Trench Spacing	9	ft on center			
Usable soil depth to LC	48	inches			
Maximum Trench Depth of	24	inches, measured on downhill side of trench			
Minimum Soil Cover	6	inches			

Potential Drainlines flagged at site on 9-ft centers.

Line #	Color	Rel. Elev. NE	Rel. Elev. SW	Drainline Length(ft)	Field Length(ft)	
1	B	98.77	99.27	67	80	Repair
2	W	98.68	99.18	67	80	
3	Y	98.84	99.34	67	75	
4	R	98.36	-	80	129	Initial
5	B	97.40	-	85	99	
6	W	97.11	-	60	61	
Septic Tank:		97.11				
Pump Tank:		97.40				
Reference Elev:		**100.00**				

Notes:
*No grading or removal of soil in initial or repair areas
*Property lines per owner
*Trench bottoms shall be level to +/- 1/4" in 10ft
*All parts of septic system must meet minimum setbacks

AOWE EVALUATION

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PERMIT CONDITIONS

The requirements of 15A NCAC 18E are incorporated by reference into this permit and shall be met.

System shall be installed in accordance with the attached Wastewater System Design Specificaitons.
See attached SYSTEM LAYOUT for wastewater system design and location.

Any changes to the site plan or intended use must be approved by Hal Owen & Associates. Permit modification and resubmittal to the LHD may be necessary to ensure regulatory compliance.

Conformance to all regulatory setbacks shall be maintained. Local regulations (such as well or riparian buffer ordinances) may require more stringent setbacks than specified in the septic regulations.

Minimum soil cover of six inches shall be established over dispersal field. Soil cover above the original grade shall be placed at a uniform depth over the entire dispersal field and shall extend laterally five feet beyond the dispersal trench. Site shall be graded to shed water away from field and a vegetative cover established to prevent erosion.

The dispersal field and repair area shall not be subject to vehicular traffic. Vehicular traffic can damage soils, pipes, and valve boxes. Do not use septic areas for parking.

Do not allow underground utilities, water lines, or sprinkler systems to be installed in the septic areas. Damage to the septic areas could result in the septic permit being revoked.

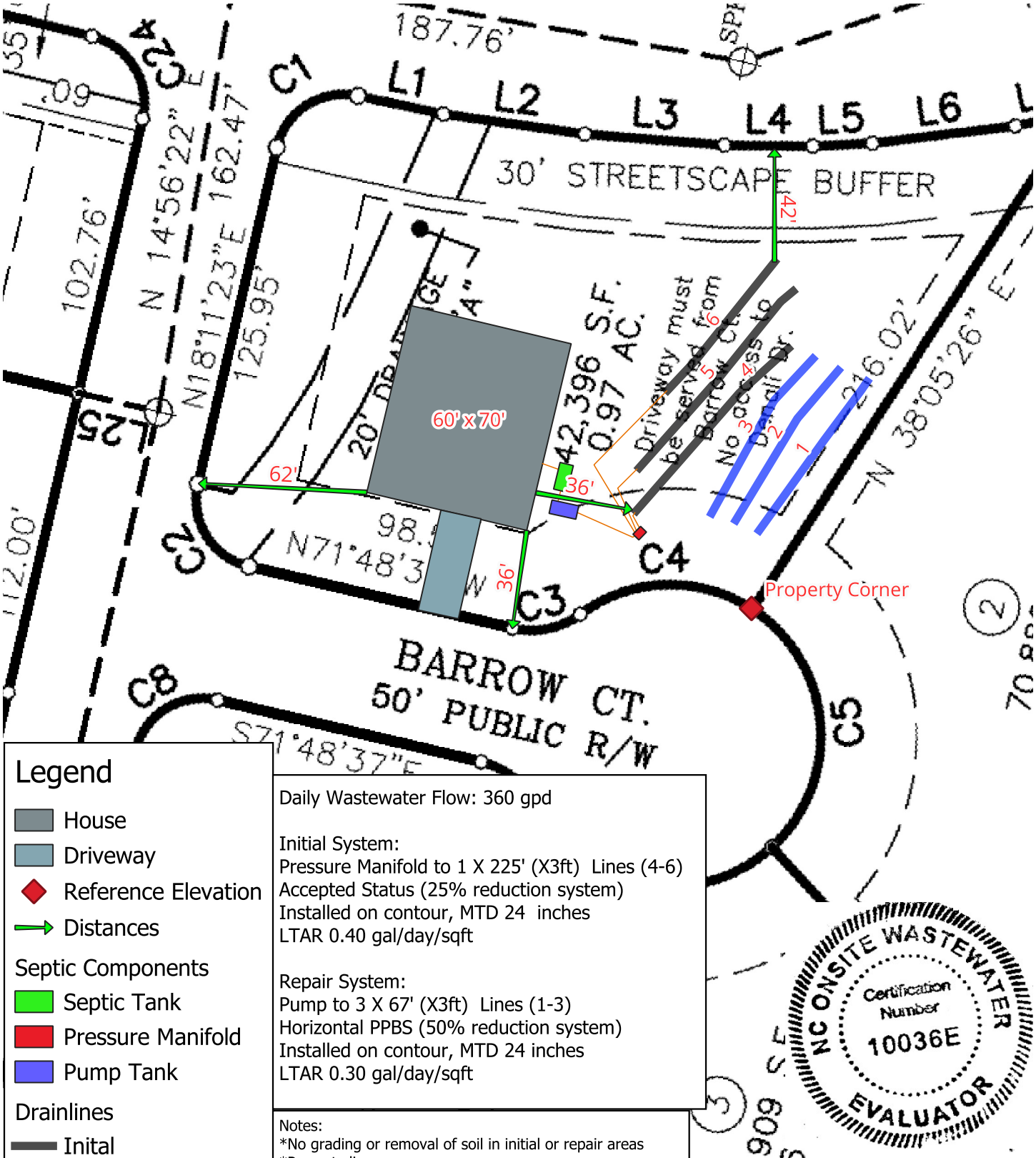
The wastewater system shall not be covered until inspected by Hal Owen & Associates and shall not be placed into use until an Authorization to Operate is issued.

SPECIFIC REQUIREMENTS

A pre-construction conference with the septic contractor is required prior to installation.
Call Hal Owen & Associates at least five days in advance to schedule 910-893-8743

The inlet and outlet of all tanks shall be equipped with an approved pipe penetration boot.

The pump tank may be eliminated if gravity distribution can be demonstrated.



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PO Box 400, Lillington, NC 27546
www.halowensoil.com
919-893-8743

Riverfall SD, Ph 1

Lot 1

17 June 2024

Figure 2

Septic Layout

For reference only. Not a survey.

AOWE EVALUATION

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INITIAL WASTEWATER SYSTEM

Pressure Manifold Design Criteria

DESIGN DAILY FLOW 360 gallons/day **SOIL LTAR:** 0.40 gpd/ft^2

TANKS (min) Septic Tank: 1000 gallons Pump Tank: 1000 gallons

SUPPLY LINE Length: 22 ft Diameter: 2 " SCH 40 PVC

Minimum flow (gpm) to maintain 2fps scour velocity: 20.9 gpm

TRENCHES Drainline Type: Accepted (25% reduction) System

Maximum Trench Depth of 24 inches, measured on low side of trench

Trench width: 3 feet Effective Trench Width: 4 ft

Absorption Area: 675 ft^2 Minimum Linear Length: 225 ft

MANIFOLD Length (ft): 3 Diameter: 4" sch 80 pvc Elevation: 99.36

Taps 3 Tap Configuration: 6in. spacing, 1 side of manifold

TAP CHART

Line	Color	Relative Elevation	Length(ft)	Tap Size/ Schedule	flow/tap gpm	gpd/ft	LTAR (gpd/ft^2)
4	R	98.36	80	3/4"sch 80	10.10	1.664	0.555
5	B	97.4	85	3/4"sch 80	10.10	1.566	0.522
6	W	97.11	60	1/2"sch 40	7.11	1.562	0.521
	Total Drainline:		225	Total Flow:	27.31		

Target LTAR:* 0.53

LTAR + 5%: 0.560

PUMP CALCULATIONS

Dose Volume: 110.19 gallons, with Pipe Volume at 75 % *65.3gal/100ft pipe

Dose Pump Run Time (min): 4.03 Daily Pump Run Time (min): 13.18

Drawdown (in.): 110 gallons ÷ 20.25 gal/ inch = 5.44 inches

Pump Tank Elevation (ft): 97.4 Pump Elevation (ft): 92.4

Friction Head: 1.38 *Hazen Williams Formula (use supply line length+70' for fittings in pump tank)

Elevation Head: 7.0

Design Head: 2.0 Total Dynamic Head (TDH): 10.34 ft

Pump to Deliver: **27.3** gpm @ **10.3** ft TDH

NEMA 4X Simplex Control Panel with elapsed time meter, event counter, audible and visible alarm (w/ silence button), hand-off-automatic (HOA) switch, pump run light, and pump on separate circuits is required. Control panel bottom shall be mounted a minimum of 24 in. above finished grade within 50 ft of pump tank. A septic tank filter is required. Floats to be determined by type of pump tank used.

Possible Septic Tank: Brantley 1000 STB-499 *Possible Septic Filter:*

Possible Pump Tank: Brantley 1000_PT-237 *Vol(gal):* 1000 *GPI:* 20.25

Possible Pump: *pump height (in) =* 14

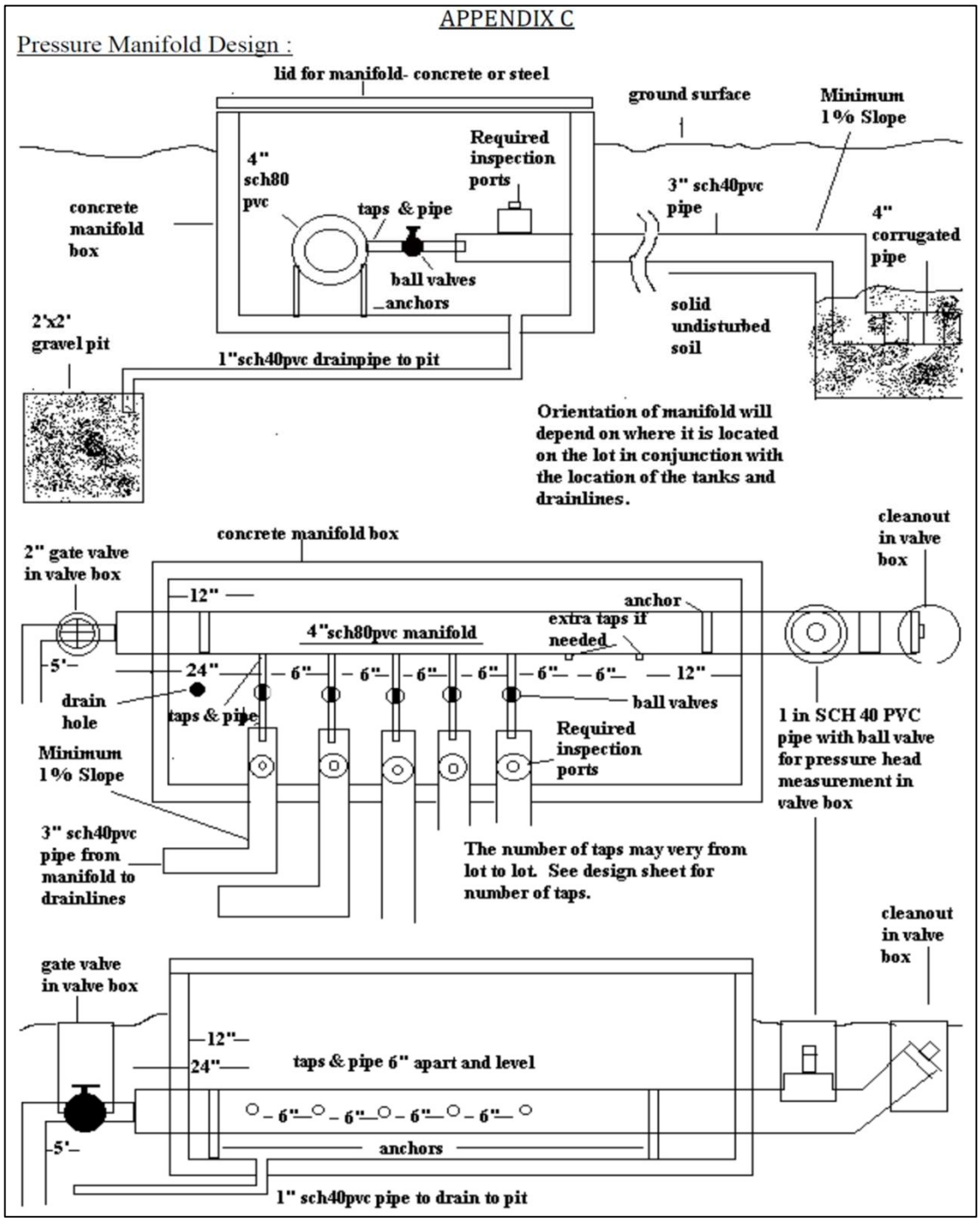
Possible Control Panel:

INITIAL WASTEWATER SYSTEM

Pressure Manifold Diagram

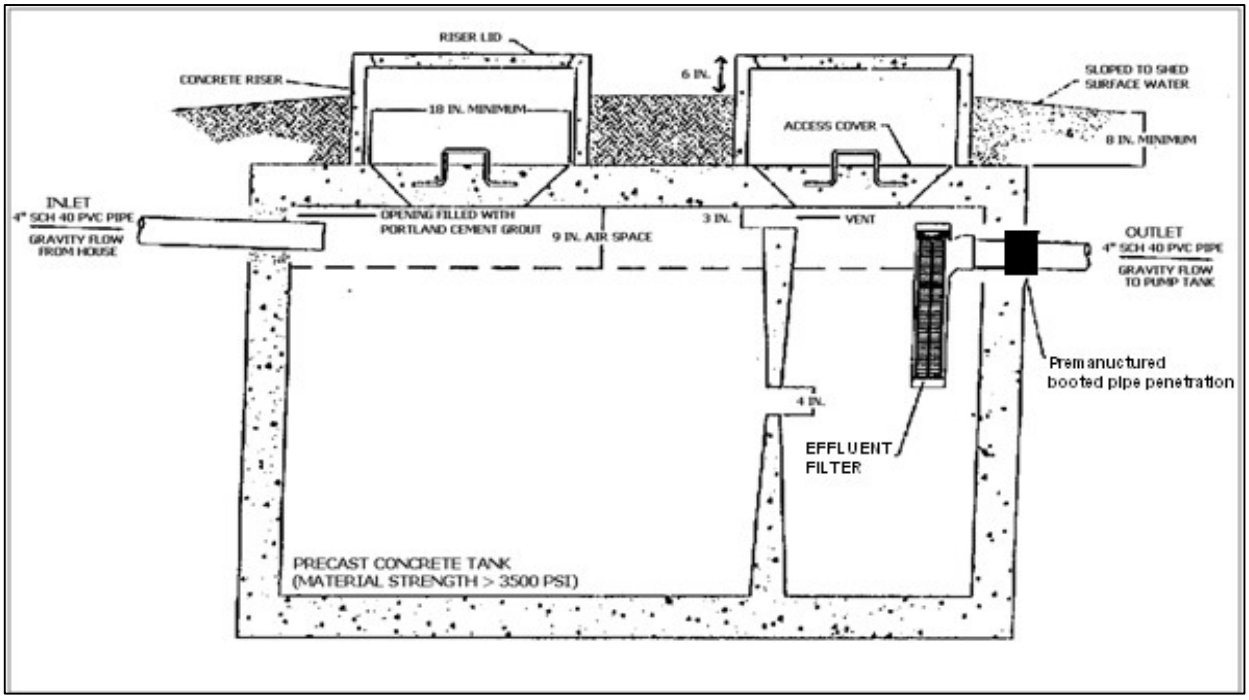
Tap #	1	2	3
	Manifold 4"SCH 80 PVC		
tap size	3/4"sch 80	3/4"sch 80	1/2"sch 40
flow (gpm)	10.10	10.10	7.11
length (ft)	80	85	60

Typical

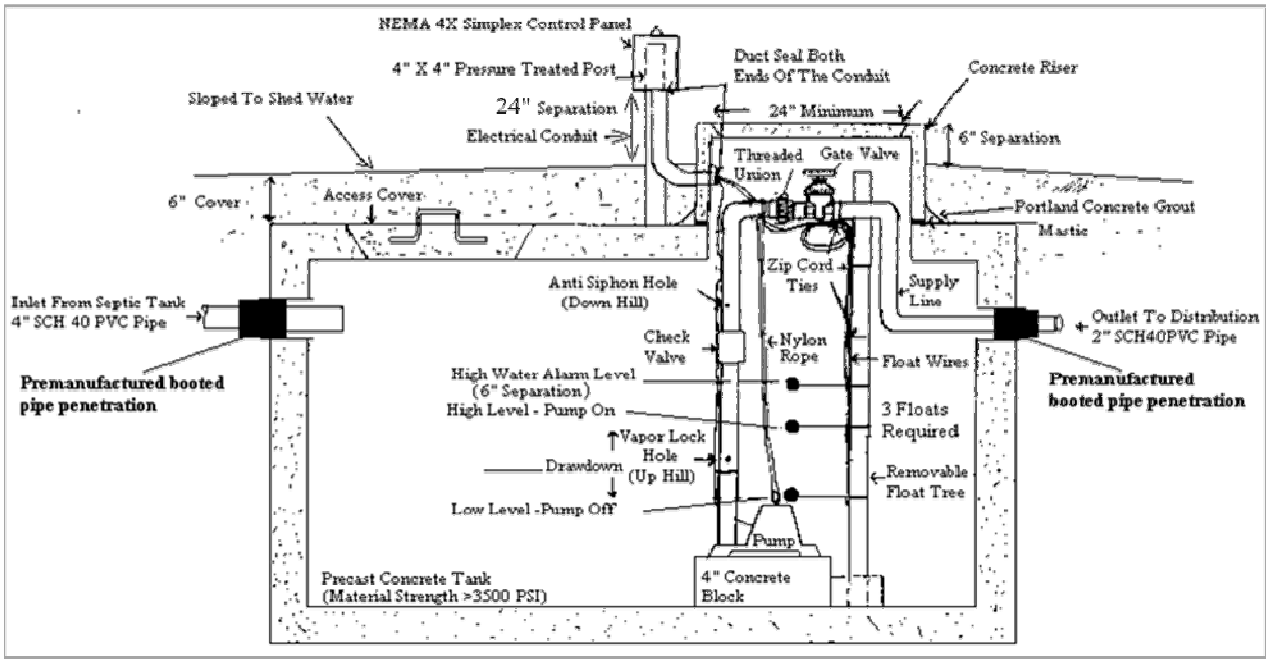


INITIAL WASTEWATER SYSTEM

Typical Septic Tank **1000 GALLON SEPTIC TANK, minimum**



Typical Pump Tank **1000 GALLON PUMP TANK, minimum**



AOWE EVALUATION

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INITIAL WASTEWATER SYSTEM

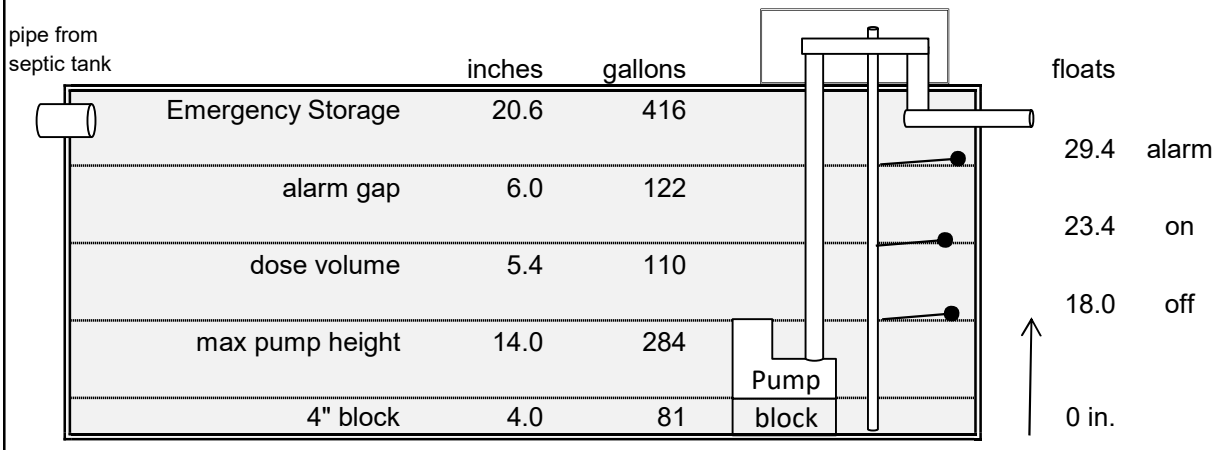
Pump Tank Calculations:

Possible pump tank: Brantley 1000_PT-237 *Possible Pump:*

tank GPI (gal/in): 20.25 calculated height: 14 in

tank volume (gal): 1000 per manufacturer

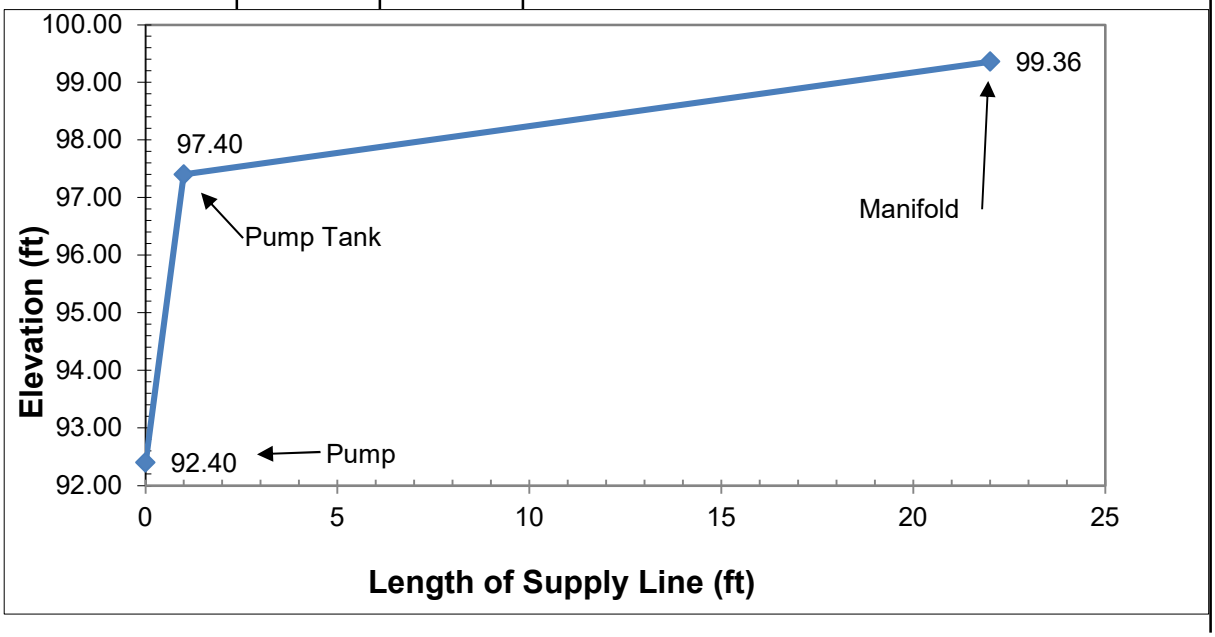
tank height (in): 50.0 *per manufacturer* minimum emergency storage: 180 gal



Drawing N.T.S.

Supply Line Profile:

	Distance	Elevation
Pump	0	92.40
pump tank	1	97.40
Pressure manifold	22	99.36



AOWE EVALUATION

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INITIAL WASTEWATER SYSTEM

DESIGN DAILY FLOW 360 gallons/day **SOIL LTAR:** 0.30 gpd/ft²

TANKS (minimum) Septic Tank 1000 gallons Pump Tank 1000 gallons

SUPPLY LINE Length (ft): 68 Diameter: 2 " sch 40 pvc

Min total flow (gpm) to maintain 2 fps scour velocity = 20.89

TRENCHES Drainline Type: PPBPS, horizontal

Maximum Trench Depth of 24 inches, measured on low side of trench

Trench width: 3 feet Effective Trench Width: 6 ft

Absorption Area: 600 ft² Minimum Linear Length: 200 ft

÷ 4.33 ft per panel : 46 panels

PRESSURE MANIFOLD

Taps 3 Tap Configuration: 6in. spacing, 1 side of manifold

Length (ft): 3 Diameter: 4" sch 80 pvc Elevation: 100.27

TAP CHART

Tap #	Line #	Color	Elevation (ft)	Drainline Length(ft)	Number of Panels	Tap Size/ Schedule	Flow/tap (gpm)	LTAR (gpd/ft²)
1	1	B	99.27	67	16	3/4"sch 40	12.50	0.597
2	2	W	99.18	67	16	3/4"sch 40	12.50	0.597
3	3	Y	99.34	67	16	3/4"sch 40	12.50	0.597
			Totals:	201	48	Total Flow:	37.50	

Target LTAR*: 0.60

LTAR + 5%: 0.630

Pump Calculations:

Number of Panels: 48

Dose Volume: 172.8 gallons # of panels * 3.6 gallons/ panel

Dose Pump Run Time: 4.61 minutes Dose volume/total flow

Daily Pump Run Time: 9.60 minutes Daily Flow/total flow

Drawdown (in.): 173 gallons ÷ 20.25 gal/ inch = 8.53 inches

Pump Tank Elevation (ft): 97.40 Pump Elevation (ft): 92.4

Friction Head: 3.71 *Hazen Williams Formula (use supply line length+70' for fittings in pump tank)

Elevation Head: 7.87 Design Head: 2.0 Total Head: 13.58 feet

Pump to Deliver: **37.50** gpm @ **13.58** ft head

NEMA 4X Simplex Control Panel with elapsed time meter, event counter, audible and visible alarm (w/ silence button), hand-off-automatic (HOA) switch, pump run light, and pump on separate circuits is required. Control panel bottom shall be mounted a minimum of 24 in. above finished grade within 50 ft of pump tank. A septic tank filter is required. Floats to be determined by type of pump tank used.

Possible Septic Tank: Brantley 1000 STB-499 *Septic Filter:*

Possible Pump Tank: *Brantley 1000_PT-237* *Vol(gal):* 1000 *GPI:* 20.25

Possible Pump: *pump height (in) =* 14

Possible Control Panel:

Hal Owen & Associates Inc. PO Box 400, Lillington, NC 27546 www.halowensoil.com 919-893-8743	Riverfall SD, Ph 1 Lot 1 20 June 2024	Figure 1 Soil Map for Septic Suitability For reference only. Not a survey.

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

Soil/Site Evaluation Form for On-Site Wastewater System

OWNER NAME: Mattamy Homes, LLC

PROPOSED FACILITY: Residential DESIGN DAILY FLOW: 360 WATER SUPPLY Public Water

LOCATION OF SITE: Barrow Ct, Angier, NC 27501 PIN: 0682-29-4945.000

WASTEWATER TYPE: Domestic COUNTY: Harnett

EVALUATION METHOD: AUGER BORING ■ PIT ☐ CUT ☐

EVALUATED BY: Britt Wilson, LSS#1351 DATE EVALUATED: 6/10/24

	INITIAL SYSTEM	REPAIR SYSTEM
AVAILABLE SPACE	675 ft^2 trench bottom	600 ft^2 trench bottom
SYSTEM TYPE	Accepted (25% reduction) System	PPBPS, horizontal
SITE LTAR	0.40 gpd/ft^2	0.30 gpd/ft^2
MAX TRENCH DEPTH	24 inches (measured on downhill side)	24 inches (measured on downhill side)

SITE CLASSIFICATION Suitable OTHER FACTORS

COMMENTS:

PROFILE 1

HORIZON DEPTH	COLOR	CONSIS TENCE	TEXTURE	STRUCTURE	MINERA LOGY	OTHER PROFILE FACTORS	
0-10	10YR 5/3	VFR	LS	GR	SEXP	LANDSCAPE POSITION	L
10-17	10YR 6/4	VFR	LS	GR	SEXP	SOIL WETNESS DEPTH	>48"
17-38	10YR 5/6	FR	SL	GR	SEXP	SOIL WETNESS COLOR	
38-48	10YR 6/8	FI	SCL	SBK	SEXP	SOIL DEPTH	48"
						SAPROLITE CLASS	NA
						RESTRICTIVE HORIZON	NA
						SLOPE %	1
PROFILE CLASSIFICATION			**Suitable**	LTAR gpd/ft^2	**0.6**	SLOPE CORRECTION (IN)	0.4
COMMENT							

PROFILE 2

HORIZON DEPTH	COLOR	CONSIS TENCE	TEXTURE	STRUCTURE	MINERA LOGY	OTHER PROFILE FACTORS	
0-9	10YR 5/3	VFR	LS	GR	SEXP	LANDSCAPE POSITION	L
9-21	10YR 6/4	VFR	LS	GR	SEXP	SOIL WETNESS DEPTH	>48"
21-40	10YR 6/6	FR	SCL	SBK	SEXP	SOIL WETNESS COLOR	
40-48	10YR 6/8	FI	SCL	SBK	SEXP	SOIL DEPTH	48"
						SAPROLITE CLASS	NA
						RESTRICTIVE HORIZON	NA
						SLOPE %	10
PROFILE CLASSIFICATION			**Suitable**	LTAR gpd/ft^2	**0.45**	SLOPE CORRECTION (IN)	3.6
COMMENT							

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

PROFILE 3

HORIZON DEPTH	COLOR	CONSIS TENCE	TEXTURE	STRUCTURE	MINERA LOGY	OTHER PROFILE FACTORS	
0-10	10YR 5/3	VFR	LS	GR	SEXP	LANDSCAPE POSITION	L
10-29	10YR 5/2	VFR	LS	GR	SEXP	SOIL WETNESS DEPTH	39"
29-48	10YR 6/6	FI	C	SBK	SEXP	SOIL WETNESS COLOR	10YR 7/1
						SOIL DEPTH	48"
						SAPROLITE CLASS	NA
						RESTRICTIVE HORIZON	NA
						SLOPE %	7
PROFILE CLASSIFICATION			**Suitable**	LTAR gpd/ft^2	**0.3**	SLOPE CORRECTION (IN)	2.5
COMMENT							

PROFILE 4

HORIZON DEPTH	COLOR	CONSIS TENCE	TEXTURE	STRUCTURE	MINERA LOGY	OTHER PROFILE FACTORS	
0-15	10YR 5/3	VFR	LS	GR	SEXP	LANDSCAPE POSITION	L
15-37	10YR 6/6	FR	SCL	SBK	SEXP	SOIL WETNESS DEPTH	>48"
37-48	10YR 6/8	FI	SC	SBK	SEXP	SOIL WETNESS COLOR	
						SOIL DEPTH	48"
						SAPROLITE CLASS	NA
						RESTRICTIVE HORIZON	NA
						SLOPE %	3
PROFILE CLASSIFICATION			**Suitable**	LTAR gpd/ft^2	**0.4**	SLOPE CORRECTION (IN)	1.1
COMMENT							

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

Soil/Site Evaluation Form for On-Site Wastewater System

LEGEND OF ABBREVIATIONS

LANDSCAPE POSITION	TEXTURE GROUP	TEXTURE CLASS	LTAR (gal/day/sqft)
CC - Concave Slope	I	S - Sand	1.2-0.8
CV - Convex Slope		LS - Loamy Sand	
DS - Debris Slump			
D - Depression	II	SL - Sandy Loam	0.8 – 0.6
DW - Drainage Way		L - Loam	
FP - Flood Plain			
FS - Foot Slope	III	SCL - Sandy Clay Loam	0.6 – 0.3
H - Head Slope		CL - Clay Loam	
L - Linear Slope		SiL - Silt Loam	
N - Nose Slope		Si - Silt	
R - Ridge		SiCL - Silt Clay Loam	
S - Shoulder Slope			
T - Terrace	IV	SC - Sandy Clay	0.4 – 0.1
TS - Toe Slope		C - Clay	
		SiC - Silty Clay	
		O - Organic	none

STRUCTURE	MOIST CONSISTENCE	WET CONSISTENCE
G - Single Grain	VFR - Very Friable	NS - Non Stick
M - Massive	FR - Friable	SS - Slightly Sticky
CR - Crumb	FI - Firm	MS - Moderately Stick
GR - Granular	VFI - Very Firm	VS - Very Sticky
SBK - Subangular Blocky	EFI - Extremely Firm	
ABK - Angular Blocky		NP - Non Plastic
PL - Platy	**MINERALOGY**	SP - Slightly Plastic
PR - Prismatic	SEXP - Slightly Expansive	MP - Moderately Plastic
	EXP - Expansive	VP - Very Plastic

MOTTLES			
	f – few	1 - fine	F - Faint
	c – common	2 - medium	D - Distinct
	m – many	3 - coarse	P - Prominent

Give Horizon Depth in inches below natural soil surface and Fill Depth in inches above land surface.

Depth to Soil Wetness: inches below land surface to free water or to soil colors with chroma 2 or less.

Classification: S – Suitable U – Unsuitable

All soil characteristics were described in accordance with the USDA Field Book for Describing and Sampling Soils. The soils were evaluated under moist soil conditions. This evaluation included observations of topography and landscape position, soil morphology (texture, structure, clay mineralogy, organics), soil wetness, soil depth, and restrictive horizons.

AOWE EVALUATION

HAL OWEN ASSOCIATES
www.halowensoil.com

TERMS AND CONDITIONS

This AOWE Evaluation is intended to file a Notice of Intent to construct a wastewater system with the Local Health Department and shall expire in five years. This evaluation is not a permit to develop. The owner and subcontractors will need to abide by all state and local rules and regulations pertaining to planning, zoning, and land use development.

Notice of Intent to Construct – Prior to commencing or assisting in the construction, siting, relocation, or repair of a wastewater system, a complete Notice of Intent (NOI) to Construct a wastewater system using an AOWE must be submitted to the Local Health Department (LHD). The owner may apply for a building permit for the project upon submitting a complete NOI and the required fee.

Plan Alterations – If there are any changes in the site plan that can impact the wastewater system, such as moving the house or driveway, site alterations, or if the applicant chooses to change the design daily flow prior to wastewater system construction, a new NOI shall be submitted to the LHD. The applicant shall request in writing that the PE or AOWE invalidate the prior NOI with a signed and sealed letter sent to the applicant and LHD.

Site Alterations – The applicant shall be responsible for preventing modifications or alterations of the site for the wastewater system and the system repair area before, during, and after any construction activities for the facility, unless approved by the AOWE.

On-Site Wastewater System Contractor – The AOWE shall assist the owner in the selection of a certified on-site wastewater system contractor who shall be under contractual obligation to the owner and have sufficient errors and omissions, liability, or other insurance for the system constructed.

Inspections, Construction Observations, and Reports – The AOWE shall make periodic visits to the site to observe the progress and quality of the construction of the wastewater system.

Authorization to Operate (ATO) – Upon determining that the wastewater system has been properly installed and is capable of being operated in accordance with the conditions of the permit, the AOWE shall provide the owner with a report that includes inspection reports, a written operation and management program, any special reports, and an Authorization to Operate. The owner shall sign confirming acceptance and receipt of the report, and then provide a copy to the LHD who will issue the certificate of occupancy for the facility.

Operation and Management – The owner shall be responsible for continued adherence to the operations and management program established by the AOWE. This permit shall in no way be taken as a guarantee or implied warranty that the septic system will function satisfactorily for any given period of time.

Change in System Ownership – An authorized wastewater system shall be transferrable to a new owner with the consent of the AOWE. The new owner and the AOWE shall enter a contract for the wastewater system.

Revocation – The AOWE permit is subject to revocation if the site plan, plat, or the intended use changes. This permit is subject to compliance with the provisions of the laws and Rules for Wastewater Treatment and Dispersal Systems and to the conditions of this permit.

Repair of Malfunctioning Systems – The owner may apply for an Improvement Permit and a Construction Authorization from the LHD or obtain a NOI from an AOWE to repair a malfunctioning wastewater system.

HARNETT COUNTY TAX ID#
040682 0131

02-24-2023 BY TC

Matthew S. Willis Register of Deeds
Harnett County, NC
Electronically Recorded
02/24/2023 04:34:32 PM NC Rev Stamp: $4,120.00
Book: 4183 Page: 1669 - 1674 (6) Fee: $26.00
Instrument Number: 2023002830

Revenue stamps: $4,120.00
PIN: 0682-28-1492.000

Prepared by & Return to: Suzanne B. Allaire, K&L Gates LLP
P.O. Box 17047, Raleigh, NC 27609

Brief Description for the Index	Approximately 73.07 acres, Harnett County, North Carolina

NORTH CAROLINA GENERAL WARRANTY DEED

THIS DEED made this 24th day of February, 2023, by and between

GRANTOR	GRANTEE
RIVER RUN DEVELOPERS, LLC, a North Carolina limited liability company with a mailing address of: 170 Ellerslie Drive Fayetteville, NC 28303	**MATTAMY HOMES LLC,** a North Carolina limited liability company with a mailing address of: 11000 Regency Parkway, Suite 110 Cary, NC 27518

Enter in appropriate block for each party: name, address, and, if appropriate, character of entity, e.g. corporation or partnership.

The designation Grantor and Grantee, as used herein, shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

Submitted electronically by K&L Gates LLP in compliance with North Carolina statutes governing recordable documents and the terms of the submitter agreement with the Harnett County Register of Deeds.

WITNESSETH, that Grantor, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, transferred, conveyed and confirmed and by these presents does grant, bargain, sell, and convey unto the Grantee in fee simple, all of that certain tract or parcel of land lying and being in Harnett County, North Carolina, being more particularly described on **Exhibit A** attached hereto and incorporated herein by reference (the "Property").

All or a portion of the Property herein conveyed does not include the primary residence of Grantor.

TO HAVE AND TO HOLD the aforesaid Property and all privileges an appurtenances thereto belonging to the Grantee in fee simple.

And Grantor covenants with Grantee that Grantor is seized of the premises in fee simple, has the right to convey the same in fee simple, that title is marketable and free and clear of all encumbrances, and that Grantor will warrant and defend the title against the lawful claims all persons whomsoever, except for the exceptions listed on **Exhibit B** attached hereto and incorporated herein by reference.

[Signature page follows]

[The remainder of this page has been intentionally left blank.]

IN WITNESS WHEREOF, Grantor has caused this instrument to be executed as of the date set forth in the notary acknowledgement below, and delivered as of the date indicated on the first page of this Deed.

RIVER RUN DEVELOPERS, LLC,
a North Carolina limited liability company

By: _____
Print Name: John D. Horndaday, Jr.
Title: Managing Member

Cumberland County, North Carolina

I certify that the following person personally appeared before me this day and acknowledged to me that he or she voluntarily signed the foregoing document for the purpose stated therein and in the capacity indicated: **John D. Hornaday, Jr.**

Date: February 22, 2023

My Commission Expires:

11-9-2024

_____
Notary Public

Print Name: William Lockett Tally

[Affix Notary Stamp or Seal below]

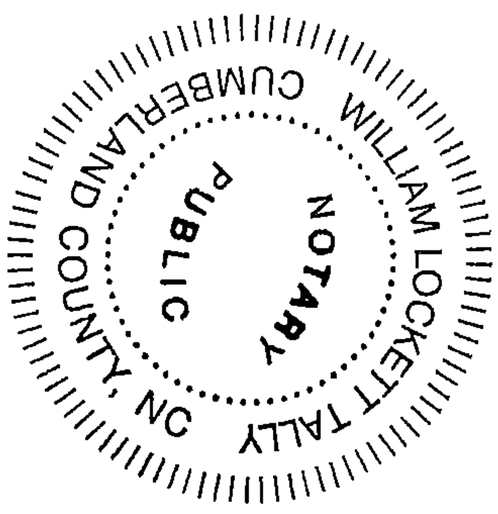


Exhibit A

BEING all of that certain tract or parcel of land lying and being in Harnett County, North Carolina and being more particularly described as follows:

COMMENCING from an existing pk nail located in the centerline of Ennis Road (S.R. 1543 – 60 foot public right of way) the northwest corner of the 72.58 acre tract "Property of: John B. Britt, Jr. & wife, Rhonda R. Britt" as described and recorded in Plat Book 2019, Page 117, Harnett County Registry, said existing pk nail also being the **TRUE POINT AND PLACE OF BEGINNING**;

THENCE as and with the centerline of Ennis Road the following calls:
South 71 degrees 10 minutes 15 seconds East for a distance of 229.75 feet to a point;
South 72 degrees 54 minutes 21 seconds East for a distance of 100.04 feet to a point;
South 76 degrees 56 minutes 35 seconds East for a distance of 50.06 feet to a point;
South 80 degrees 29 minutes 34 seconds East for a distance of 49.06 feet to a point;
South 84 degrees 25 minutes 05 seconds East for a distance of 30.30 feet to a point;
South 87 degrees 45 minutes 59 seconds East for a distance of 19.77 feet to a point;
North 88 degrees 03 minutes 58 seconds East for a distance of 49.93 feet to a point;
North 82 degrees 21 minutes 53 seconds East for a distance of 50.03 feet to a point;
North 76 degrees 32 minutes 19 seconds East for a distance of 49.99 feet to a point;
North 70 degrees 23 minutes 02 seconds East for a distance of 49.99 feet to a point;
North 63 degrees 57 minutes 09 seconds East for a distance of 49.92 feet to a point;
North 60 degrees 20 minutes 55 seconds East for a distance of 50.16 feet to a point;
North 58 degrees 55 minutes 21 seconds East for a distance of 5.08 feet to a point;

THENCE and leaving the centerline of Ennis Road, South 14 degrees 02 minutes 55 seconds West for a distance of 42.92 feet to an existing iron rebar located in the southern right of way margin of said road;
THENCE South 13 degrees 59 minutes 19 seconds West for a distance of 227.88 feet to an existing iron rebar;
THENCE North 69 degrees 51 minutes 13 seconds West for a distance of 33.39 feet to an existing iron rebar;
THENCE South 42 degrees 15 minutes 17 seconds West for a distance of 95.57 feet to an existing iron rebar;
THENCE South 19 degrees 55 minutes 09 seconds West for a distance of 208.54 feet to an existing iron rebar;
THENCE South 73 degrees 29 minutes 29 seconds East for a distance of 115.32 feet to an existing iron rebar;
THENCE South 18 degrees 21 minutes 57 seconds West for a distance of 410.01 feet to an existing iron rebar;
THENCE South 19 degrees 48 minutes 20 seconds East for a distance of 207.45 feet to an existing iron rebar;
THENCE South 57 degrees 53 minutes 34 seconds East for a distance of 114.99 feet to an existing iron rebar;

THENCE South 18 degrees 16 minutes 28 seconds West for a distance of 1591.49 feet to an existing iron rebar;
THENCE North 83 degrees 24 minutes 12 seconds East for a distance of 48.02 feet to an existing iron rebar;
THENCE South 19 degrees 28 minutes 48 seconds West for a distance of 647.07 feet to a set iron rebar;
THENCE North 86 degrees 04 minutes 14 seconds West for a distance of 267.95 feet to an existing pinched iron pipe;
THENCE North 84 degrees 12 minutes 35 seconds West for a distance of 813.64 feet to an existing iron rebar;
THENCE North 18 degrees 21 minutes 02 seconds East for a distance of 3396.35 feet to an existing iron rebar located in the southern right of way margin of Ennis Road;
THENCE North 18 degrees 21 minutes 02 seconds East for a distance of 30.00 feet to an existing pk nail located in the centerline of Ennis Road, said pk nail also being the **TRUE POINT AND PLACE OF BEGINNING**, containing 73.07 acres (3,187,556 square feet), as shown on that certain ALTA/NSPA Land Title Survey entitled "River Run Developers, LLC" dated February 8, 2023, prepared by W. Larry King, professional land surveyor of Larry King & Associates, R.L.S., P.A.

Exhibit B

1. Taxes and assessments for the year 2023 and subsequent years, not yet due and payable.
2. Matters affecting the Property disclosed by that certain ALTA/NSPS Land Title Survey dated February 8, 2023, by W. Larry King, PLS, File Reference P19-037 ("the Survey"):
    a. Wetlands;
    b. Ditch; and
    c. Pond.
3. Deed for Highway Right of Way with Permanent Easements and Access provisions to Department of Transportation recorded in Book 4031, Page 195, Harnett County Registry, and permanent utility and drainage easements as shown on the Survey.
4. Matters affecting the Property as shown on plat recorded in Map Book 2019, Page 117, Harnett County Registry, and shown on the Survey.
5. Thirty (30) foot wide Ingress-Egress & Public Utilities Easement shown on plat recorded in Map Book 2000, Page 389, Harnett County Registry, and originally granted in deed recorded in Book 1426, Page 566, Harnett County Registry, and shown on the Survey.

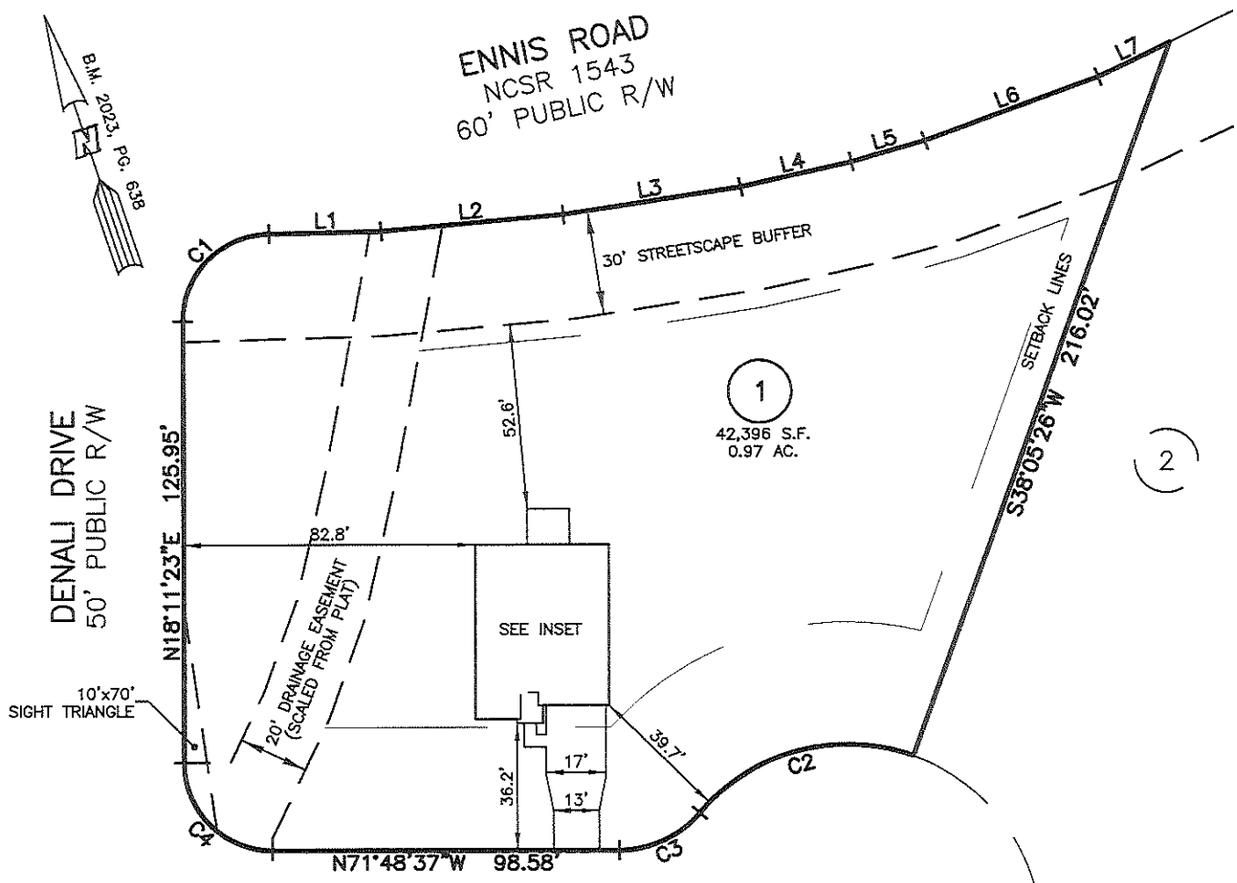
SITE PLAN FOR

MATTAMY HOMES, LLC

23 BARROW COURT

LOT 01, RIVERFALL SUBDIVISION, PHASE ONE

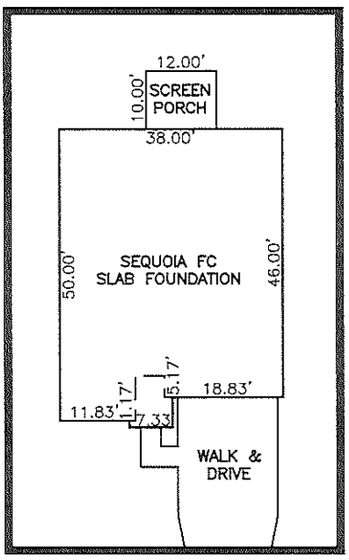
BLACK RIVER TOWNSHIP, HARNETT COUNTY, NORTH CAROLINA



LINE	BEARING	DISTANCE
L1	S72°54'21"E	31.87'
L2	S76°56'35"E	52.05'
L3	S80°29'34"E	51.02'
L4	S84°25'05"E	32.20'
L5	S87°45'59"E	21.74'
L6	N88°03'58"E	52.52'
L7	N82°21'53"E	22.60'

IMPERVIOUS SURFACES	S.F.
HOUSE	1,840
WALK & DRIVE	670
PORCH	120
TOTAL	2,630
MAX. IMPERVIOUS	5,500

NUM	RADIUS	ARC	DELTA	CHORD BRG	CHORD
C1	25.00'	38.79'	88°54'16"	N62°38'31"E	35.02'
C2	55.00'	66.79'	69°34'50"	N86°41'59"W	62.76'
C3	30.00'	26.01'	49°40'47"	S83°20'59"W	25.21'
C4	25.00'	39.27'	90°00'00"	N26°48'37"W	35.36'



INSET SCALE: 1'=30"

LEGEND

AC	AIR CONDITIONER	INV.	INVERT
BC	BACK of CURB	IPS	IRON PIPE SET
BFP	BACK FLOW PREVENTER	IRS	IRON ROD SET
CO	CLEANOUT	LP	LIGHT POLE
CI	CURB INLET	MNS	MAGNETIC NAIL SET
DHS	DRILL HOLE SET	MHS	MANHOLE SANITARY SEWER
ECM	EXISTING CONCRETE MONUMENT	MHS	MANHOLE STORM SEWER
EDH	EXISTING DRILL HOLE	OHW	OVERHEAD WIRES
EIS	EXISTING IRON STAKE	PKS	PK NAIL SET
EIP	EXISTING IRON PIPE	PNS	POINT NOT SET
EM	ELECTRIC METER	RRS	RAIL ROAD SPIKE
EPK	EXISTING PK NAIL	T	TELEPHONE PEDESTAL
ES	ELECTRIC STUB	E	TRANSFORMER
FES	FLARED END SECTION	TV	CABLE TV PEDESTAL
FH	FIRE HYDRANT	UP	UTILITY POLE
FOP	FIBER OPTIC PEDESTAL	WM	WATER METER
GM	GAS METER	WV	WATER VALVE
GUY	GUY	YI	YARD INLET
		( )	FIELD MEASUREMENT

SETBACK INFO

FRONT: 35'
REAR: 25'
SIDES: 10'

REFERENCES:

B.M. 2023, PG. 638

50 0 50

SCALE: 1" = 50'

THIS IS A SITE PLAN AS DEFINED BY G.S. 160D-102 AND IS NOT INTENDED TO BE ATTACHED TO ANY INSTRUMENT RECORDED IN THE REGISTER OF DEEDS OFFICE

SITE PLAN

NOT FOR RECORDATION, CONVEYANCE OR SALES

REV CODE: 1.FLIP, 2.PLAN, 3.ROTATE, 4.MOVE, 5.SS 6.SEVERAL OF ABOVE, 7.LAND FEATURE, 8. OTHER

DATE: NOV. 06, 2024

F.B. _____

RWK, PA

ENGINEERING ~ SURVEYING

CORPORATE LICENSE: C-1771

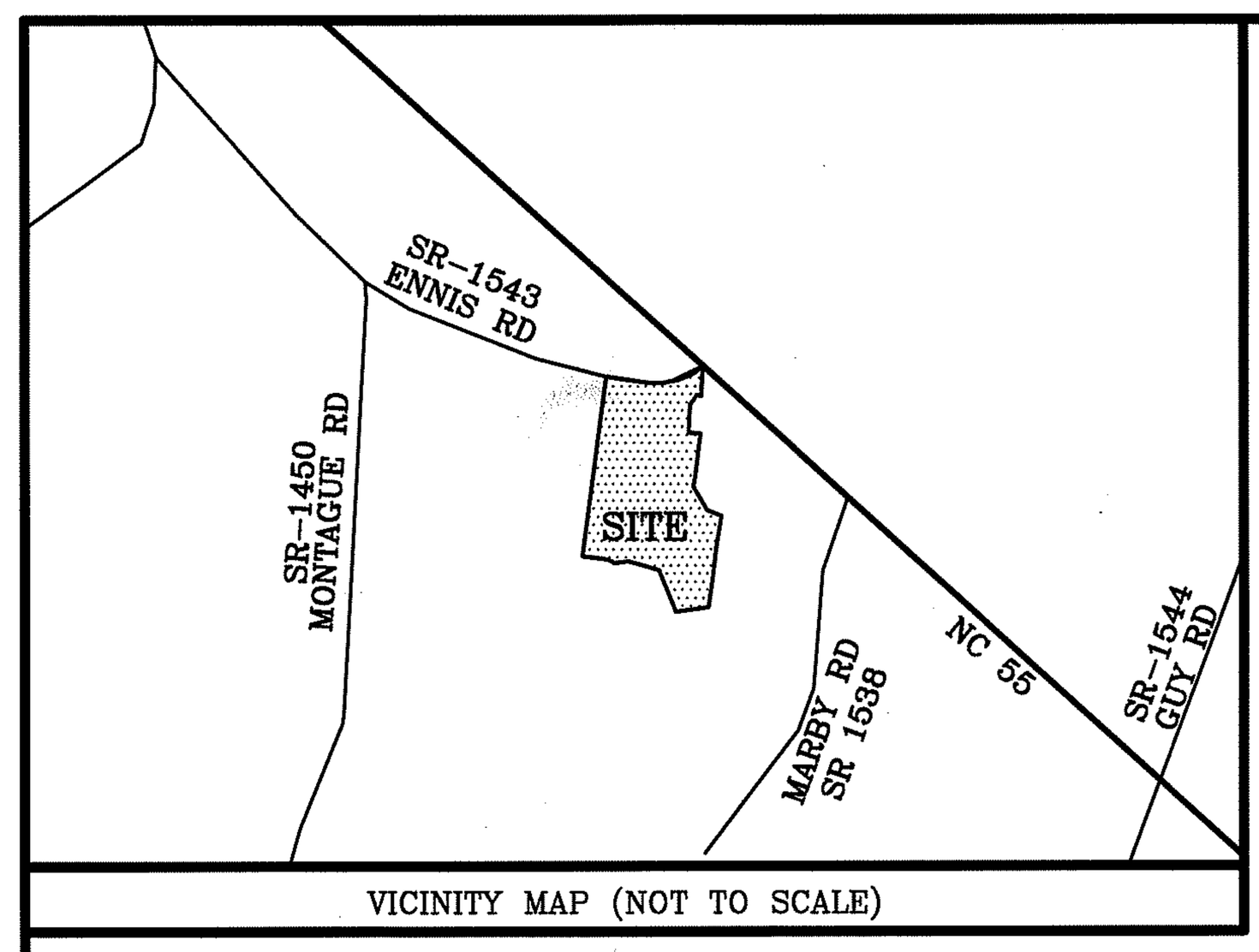
101 W. MAIN ST., SUITE 202

GARNER, NC 27529

PHONE (919) 779-4854

FAX (919) 779-4056

O:\RIVERFALL\RVFL1\RVFL1.DWG



VICINITY MAP (NOT TO SCALE)

LEGEND

- BOUNDARY LINE
- ADJOINERS
- TIE LINE
- RIGHT OF WAY
- SETBACK
- TYPICAL 5'X7' UTILITY EASEMENT
- CONTROL CORNER
- SET IRON REBAR - SIR
- WETLANDS
- EIR - EXISTING IRON REBAR
- S.F. - SQUARE FEET
- AC. - ACRES
- ∗ ALL PROPERTY CORNERS FLUSH WITH GROUND UNLESS OTHERWISE NOTED

~~STATE OF NORTH CAROLINA~~
~~COUNTY OF HARNETT~~

~~I, ____________ REVIEW OFFICER OF THE COUNTY OF HARNETT THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.~~

~~REVIEW OFFICER ________ DATE~~

State of North Carolina
County of Harnett
I, Sheila K. Bennett, Review Officer of Harnett County, certify that the map or plat to which this certificate is affixed meets all statutory requirements for recording.

Sheila K. Bennett — 12.14.23
Review Officer — Date

I, W. LARRY KING, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DESCRIBED IN PLAT / DEED BOOK 4183 PAGE 1669); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN ~~PLAT / DEED~~ BOOK 000 , PAGE 000 ; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS, MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL, THIS 06 DAY OF DEC , A.D., 2023. 12-07-23

W. Larry King PLS 1339
PROFESSIONAL LAND SURVEYOR
(W. LARRY KING, P.L.S.)
LICENSE NUMBER L-1339

NORTH CAROLINA PROFESSIONAL SEAL L-1339 LAND SURVEYOR W. LARRY KING

I, W. LARRY KING, HEREBY CERTIFY THAT THE CHECKED ITEM BELOW APPLIES TO THIS MAP.

(A.) THAT THE SURVEY CREATES A SUBDIVISION OF LAND WITHIN THE AREA OF A COUNTY OR MUNICIPALITY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND.

B. THAT THE SURVEY IS LOCATED IN A PORTION OF A COUNTY OR MUNICIPALITY THAT IS UNREGULATED AS TO AN ORDINANCE THAT REGULATES PARCELS OF LAND.

C. ANY ONE OF THE FOLLOWING:
1. THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND OR ONE OR MORE EXISTING EASEMENTS AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET.
2. THAT THE SURVEY IS OF AN EXISTING FEATURE, SUCH AS A BUILDING OR OTHER STRUCTURE, OR NATURAL FEATURE, SUCH AS A WATERCOURSE.
3. THAT THE SURVEY IS A CONTROL SURVEY.
4. THAT THE SURVEY IS OF A PROPOSED EASEMENT FOR A PUBLIC UTILITY AS DEFINED IN G.S. 62-3.

D. THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE DEFINITION OF SUBDIVISION.

E. THAT THE INFORMATION AVAILABLE TO THE SURVEYOR IS SUCH THAT THE SURVEYOR IS UNABLE TO MAKE A DETERMINATION TO THE BEST OF THE SURVEYOR'S PROFESSIONAL ABILITY AS TO PROVISIONS CONTAINED IN (A) THROUGH (D) ABOVE.

THE UNDERSIGNED HEREBY ACKNOWLEDGE THAT THE LAND SHOWN ON THIS PLAT IS WITHIN THE SUBDIVISION REGULATION JURISDICTION OF HARNETT COUNTY AND THAT THIS PLAT IS OUR FREE ACT AND DEED. I DO HEREBY DEDICATE FOR PUBLIC USE OF ALL RIGHTS-OF-WAY AND EASEMENTS AS SHOWN ON THIS MAP.

Joseph P. Conlan
PROPERTY OWNER

STATE OF NORTH CAROLINA
COUNTY OF HARNETT

I, LORI SIMPSON EPLER, A NOTARY OF THE COUNTY AND STATE, AFORESAID, CERTIFY THAT, Joseph P. Conlan SUBJECT PROPERTY OWNER PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE EXECUTION OF THE FOREGOING INSTRUMENT. WITNESS MY HAND AND OFFICIAL STAMP OR SEAL.
THIS 7th DAY OF December , 2023.

Lori Simpson Epler
NOTARY PUBLIC

11/14/2024
MY COMMISSION EXPIRES

Notary Public Lori Simpson Epler Cumberland County North Carolina

NOTES:
1. PROPERTY SUBJECT TO ALL EASEMENTS, RIGHTS-OF-WAY AND RESTRICTIVE COVENANTS OF RECORD.
2. AREAS COMPUTED BY COORDINATE METHOD.
3. RATIO OF PRECISION > 1:10,000
4. DASHED LINES NOT SURVEYED.
5. TAX PIN - 0682-28-1492.
6. ANY LOCATION OF UNDERGROUND UTILITIES AS SHOWN ARE BASED ON VISIBLE EVIDENCE AND DRAWINGS IF PROVIDED TO THE SURVEYOR. LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON, AND ADDITIONAL BURIED UTILITIES MAY EXIST. CONTACT THE APPROPRIATE UTILITY COMPANIES FOR INFORMATION REGARDING BURIED UTILITIES.
7. EXCEPT AS SPECIFICALLY STATED OR SHOWN, THIS SURVEY DOES NOT REPORT ANY OF THE FOLLOWING: EASEMENTS, OTHER THAN THOSE VISIBLE DURING FIELD EXAMINATION OR AS IN DOCUMENTATION PROVIDED BY THE CLIENT OR ATTORNEY, BUILDING SETBACKS, RESTRICTIVE COVENANTS, ZONING OR LAND USE REGULATIONS AND ANY FACTS WHICH A TITLE SEARCH MAY DISCLOSE.
8. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES.
9. THIS SURVEY WAS DONE WITHOUT A TITLE SEARCH AND IS BASED ON REFERENCED INFORMATION. THERE MAY EXIST OTHER DOCUMENTS OF RECORD, WHICH COULD AFFECT THIS PROPERTY. ALL RESEARCH DATA CURRENT AS OF 12/6/23.
10. ALL BUILDINGS, SURFACE AND SUBSURFACE IMPROVEMENTS ON AND ADJACENT TO THIS PROPERTY ARE SHOWN, IF REQUIRED.
11. BUILDING SETBACKS ARE AS SHOWN HEREON. IF NO SETBACKS ARE SPECIFIED, ANY STRUCTURES OR IMPROVEMENTS PLACED ON THIS SUBJECT PROPERTY MUST COMPLY WITH RESTRICTIVE COVENANTS, ZONING, DOCUMENTS OF RECORD GOVERNING SUCH IMPROVEMENTS AND ANY BINDING AGREEMENT BETWEEN THE DEVELOPER AND THE BUILDER/OWNER.
12. IF THIS PLAT IS OF THE CATEGORY DETERMINED TO BE A RECOMBINATION OF PREVIOUSLY PLATTED OR RECORDED PROPERTY, ANY RESTRICTIONS AND SPECIFICS APPLICABLE TO THAT PREVIOUSLY FILED DOCUMENT APPLY TO THIS SUBJECT PROPERTY ALSO, EXCEPT AS ALLOWED FOR BY THE ORDINANCE FOR THE JURISDICTION THAT OVERSEES AND GOVERNS THIS SUBJECT PROPERTY.
13. UNLESS OTHERWISE NOTED, THIS PROPERTY HAS NOT BEEN INVESTIGATED WITH REGARDS TO WETLANDS AND NO DETERMINATION HAS BEEN MADE AS TO THE EXISTENCE OF WETLANDS WITHIN THE BOUNDARIES SHOWN HEREON.
14. IF WETLAND AREAS ARE SHOWN ON THIS SUBJECT PROPERTY, THOSE AREAS WERE STAKED AND DETERMINED TO BE SUCH BY OTHERS. THE SURVEYOR'S CERTIFICATION HEREON CERTIFIES TO THE LOCATION OF THOSE AREAS, AS STAKED BY OTHERS, BUT LOCATED UNDER THIS SURVEYOR'S SUPERVISION AND PLATTED HEREON.
15. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED DURING THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND CONTAINERS, WHICH MAY AFFECT THE USE OF THIS TRACT.
16. NON-CONFORMING STRUCTURES HAVE NOT BEEN CREATED BY THIS SUBDIVISION.
17. UNLESS NOTED OTHERWISE, THERE WERE NO U.S.G.S., N.C.G.S. OR OTHER GOVERNMENTALLY RECOGNIZED HORIZONTAL CONTROL MONUMENTATION FOUND WITHIN 2,000 FEET OF THIS SUBJECT PROPERTY.
18. IF THIS PLAT IS LABELED "ZERO LOT LINE" THERE ARE, IN ADDITION TO OTHER EASEMENTS SHOWN, MAINTENANCE EASEMENTS ON ALL INTERIOR LOT LINES, SAID EASEMENTS BEING 10 FEET IN WIDTH AND UNLESS OTHERWISE NOTED, 5 FEET EACH SIDE OF SAID INTERIOR LOT LINE.
19. IF THE STREETS AND ROADS SHOWN ON THIS MAP ARE LABELED AS PRIVATE STREETS, THE FOLLOWING NOTICE APPLIES TO THOSE STREETS: NO PUBLIC AGENCY IS PRESENTLY RESPONSIBLE FOR MAINTENANCE OF THE PRIVATE STREETS SHOWN ON THIS PLAT. PRIVATE STREETS ARE FOR THE USE OF ALL OWNERS OF PROPERTY WITHIN THIS SUBDIVISION, THEIR GUESTS AND ALL REPRESENTATIVES OF GOVERNMENTAL AGENCIES FOR INGRESS AND EGRESS, AND FOR THE CONSTRUCTION, INSPECTION AND MAINTENANCE OF PUBLIC STREETS, UTILITIES, AND DRAINAGE STRUCTURES. THE STREETS ARE THE SOLE RESPONSIBILITY OF THE HOMEOWNERS ASSOCIATION.
20. ANY COMMON AREA SHALL NOT BE FURTHER SUBDIVIDED, DEVELOPED OR CONVEYED BY THE OWNERS ASSOCIATION, EXCEPT WHERE APPROVED UNDER THE PROVISIONS OF THIS ORDINANCE AND THE COUNTY ZONING ORDINANCE.
21. ALL DRAINAGE EASEMENTS ARE PRIVATELY OWNED AND SHALL BE MAINTAINED BY THE HOA AS IS ENFORCIBLE BY THE RESTRICTIVE COVENANTS.
22. FENCES AND OTHER STRUCTURES ARE PROHIBITED WITHIN ALL PUBLIC AND PRIVATE EASEMENTS.
23. OPEN SPACE TO BE MAINTAINED BY THE HOA AS ENFORCIBLE BY THE RESTRICTIVE COVENANTS.

NOTES:
OWNER-MATTAMY HOMES, LLC
11000 REGENCY PARKWAY, SUITE 110
CARY, NC 27518

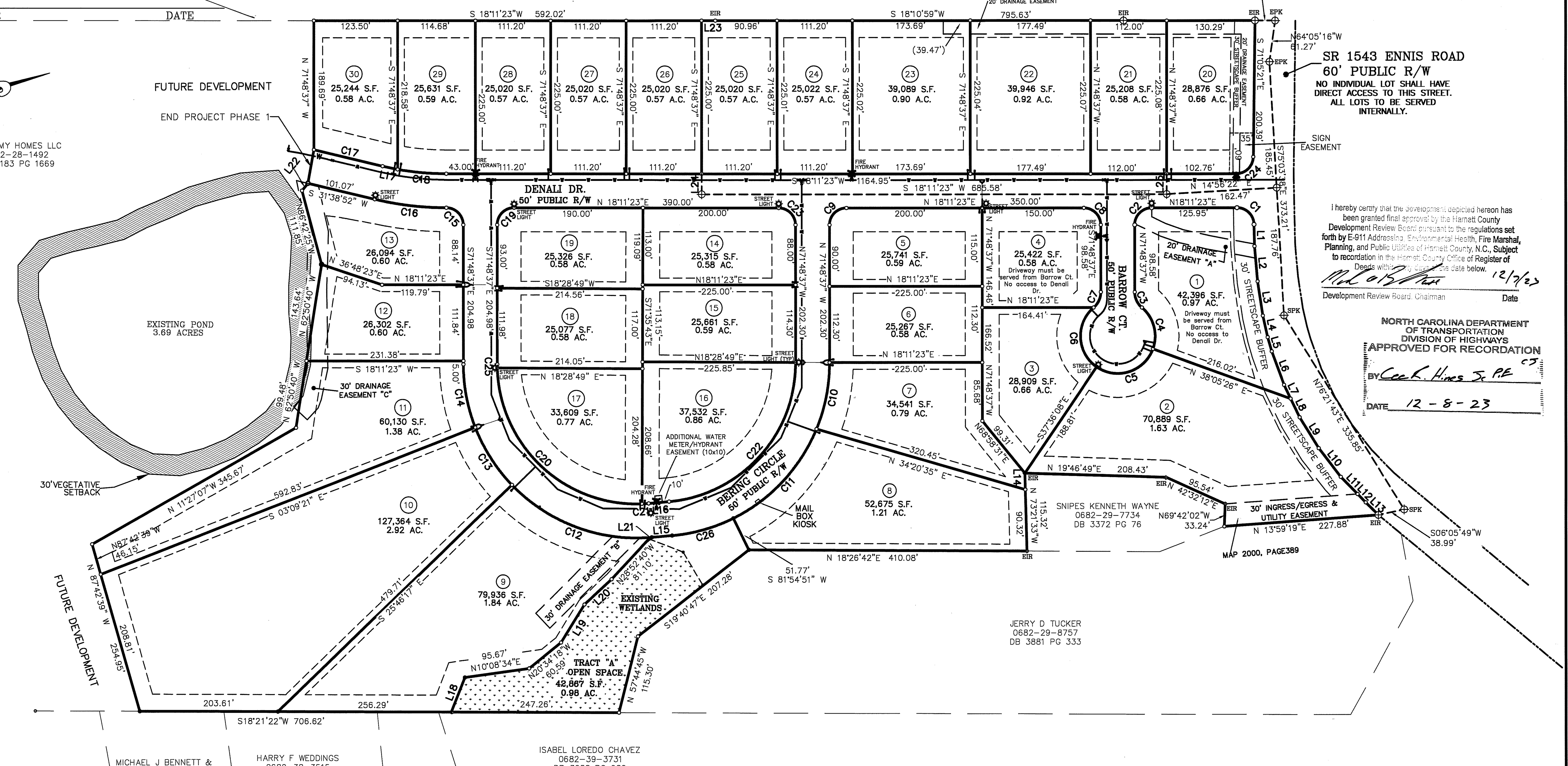
PIN= 0682-28-1492.000
LOTS TO BE RECORDED=30 (PHASE 1)
OPEN SPACE TO BE RECORDED=0.98 ACRES (PHASE 1)
ZONE= RA-30
CASE # SUB2310-0022 (FINAL PLAT)
CASE # SUB2002-0030 (PRELIMINARY PLAT)

ALL COMMON AREAS, MAIL KIOSK LOCATIONS, AND EASEMENTS WILL BE MAINTAINED BY THE HOME OWNERS ASSOCIATION.

ALL STREET LIGHTS AND FIRE HYDRANTS SHALL MEET HARNETT COUNTY UDO REGULATIONS.

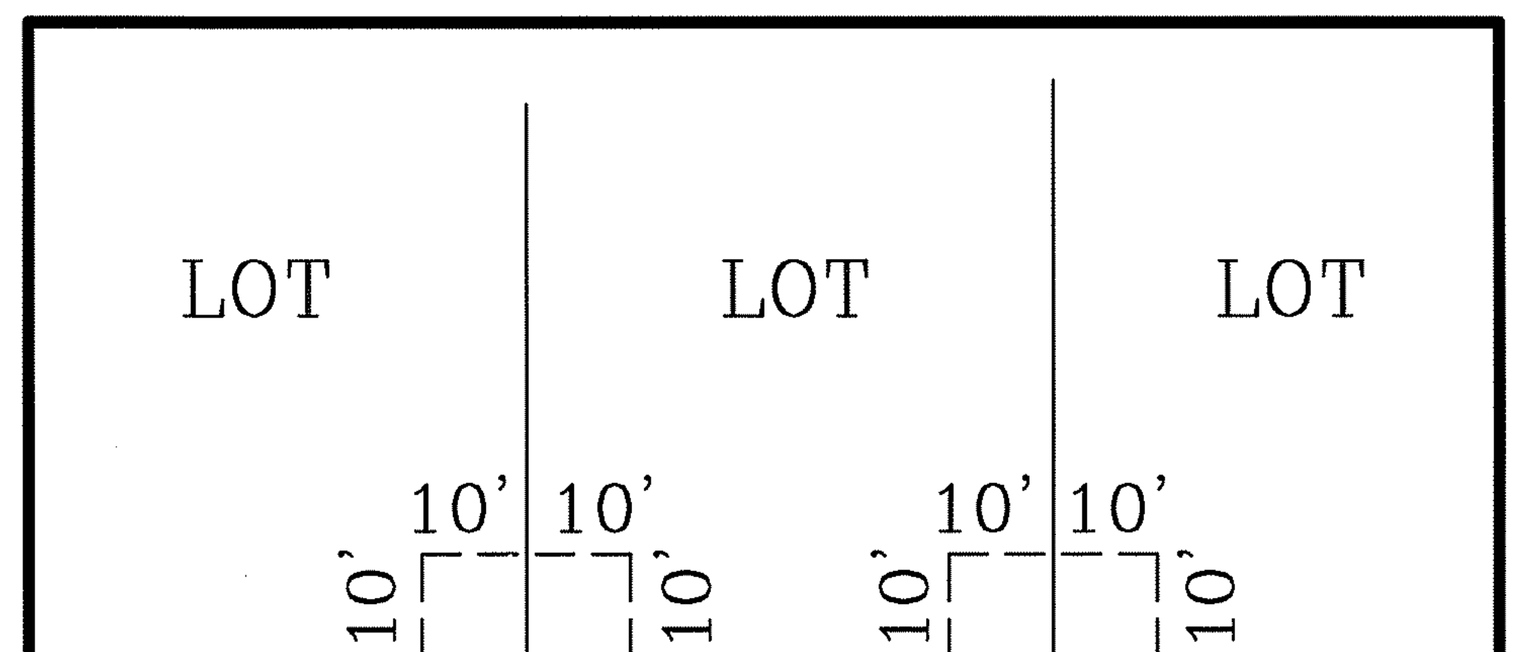
LAND USE CLASSIFICATION=AGRICULTURAL & LOW DENSITY RESIDENTIAL
25,000SF MIN LOT
MIN. LOT WIDTH=100'

SETBACKS
FRONT=35'
REAR=25'
SIDE=10'



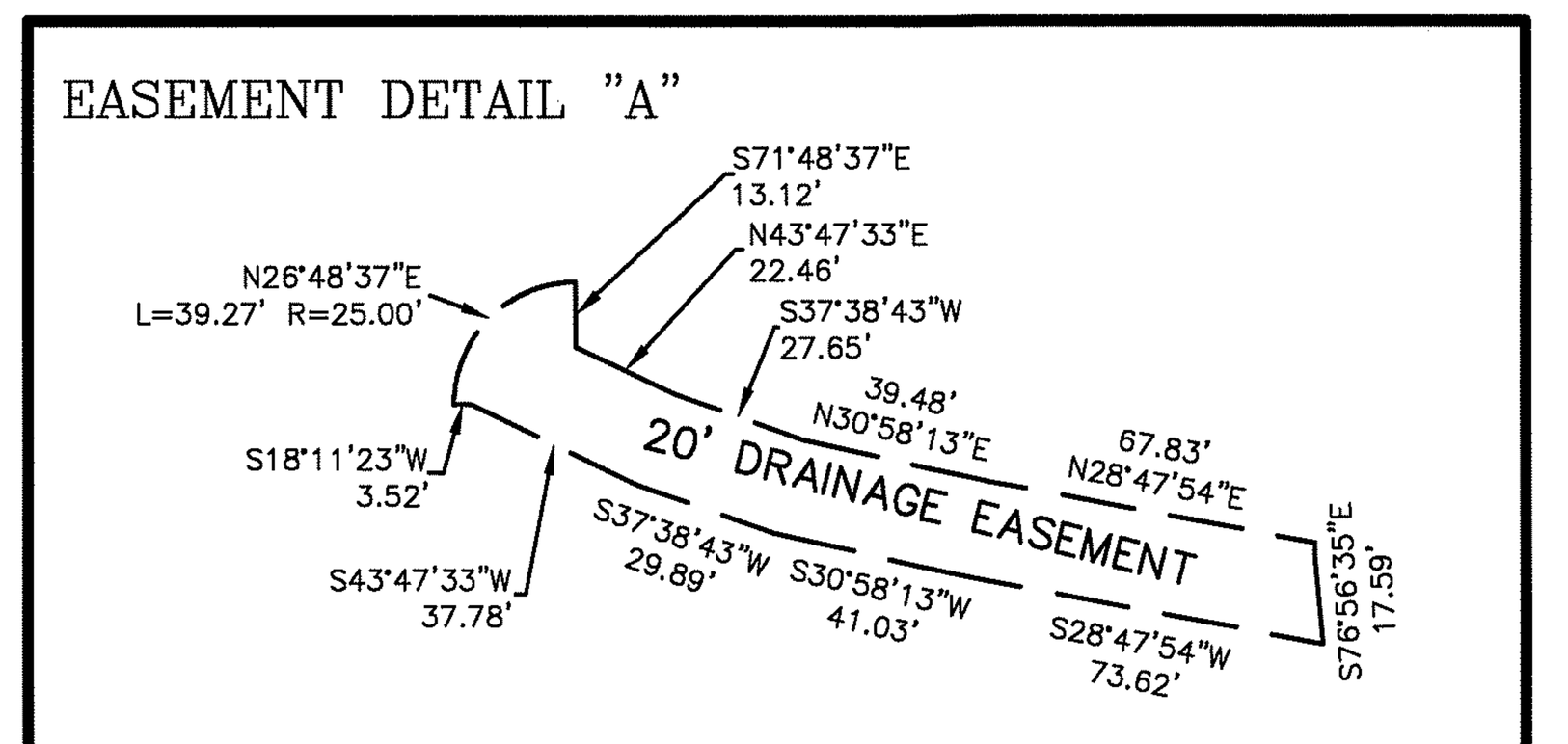
I hereby certify that the development depicted hereon has been granted final approval by the Harnett County Development Review Board pursuant to the regulations set forth by E-911 Addressing, Environmental Health, Fire Marshal, Planning, and Public Utilities of Harnett County, N.C., Subject to recordation in the Harnett County Office of Register of Deeds within [illegible] of the date below. 12/7/23
Development Review Board Chairman — Date

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
APPROVED FOR RECORDATION
BY Cecil K. Hines Jr. PE
DATE 12-8-23

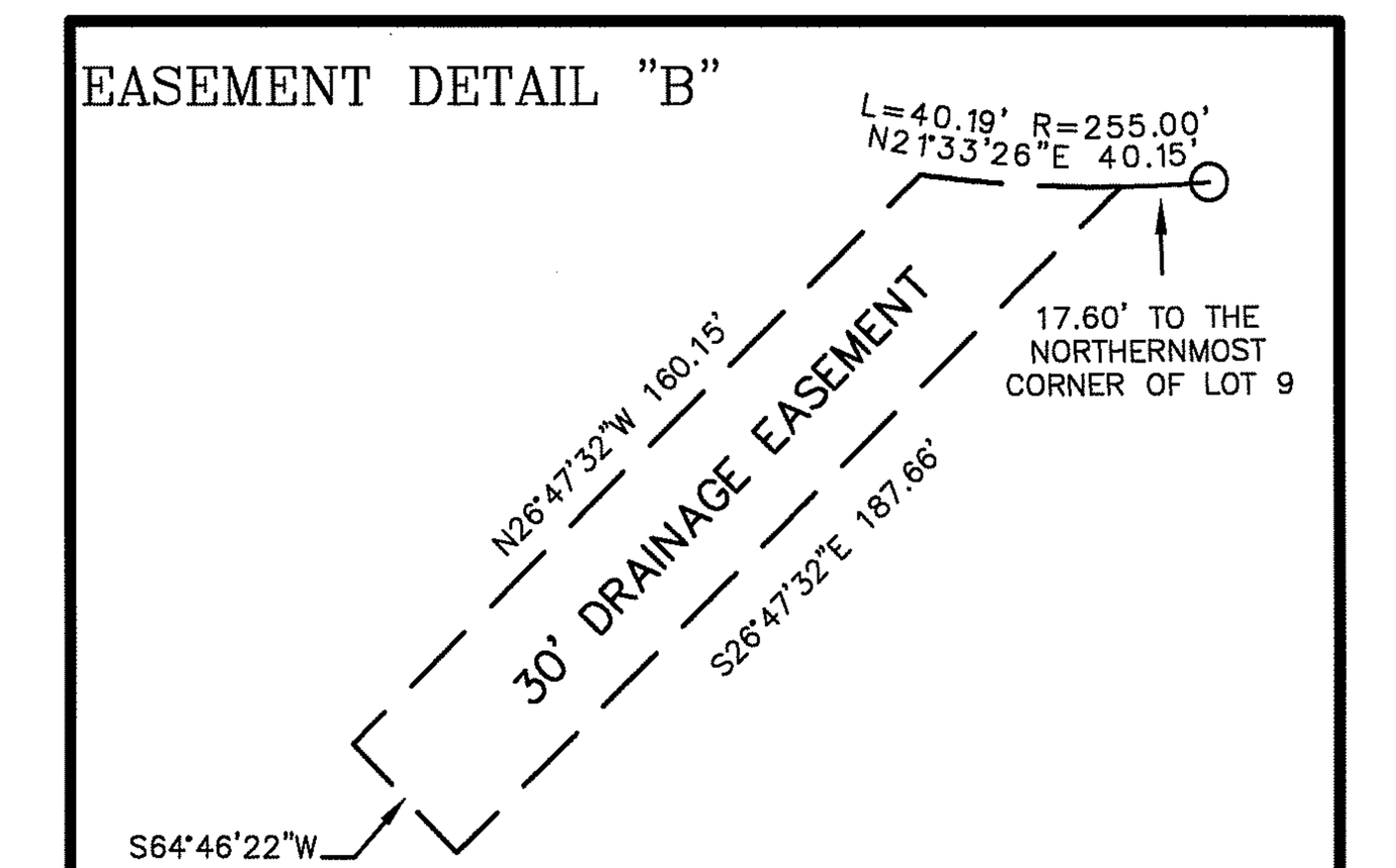


ADJACENT (BOTH SIDES) TO EVERY PROPERTY LINE AND ABUTTING THE RIGHT OF WAY OF THE STREET IS A 10' X 10' EASEMENT FOR THE INSTALLATION AND MAINTENANCE OF WATER METERS AND FIRE HYDRANTS.

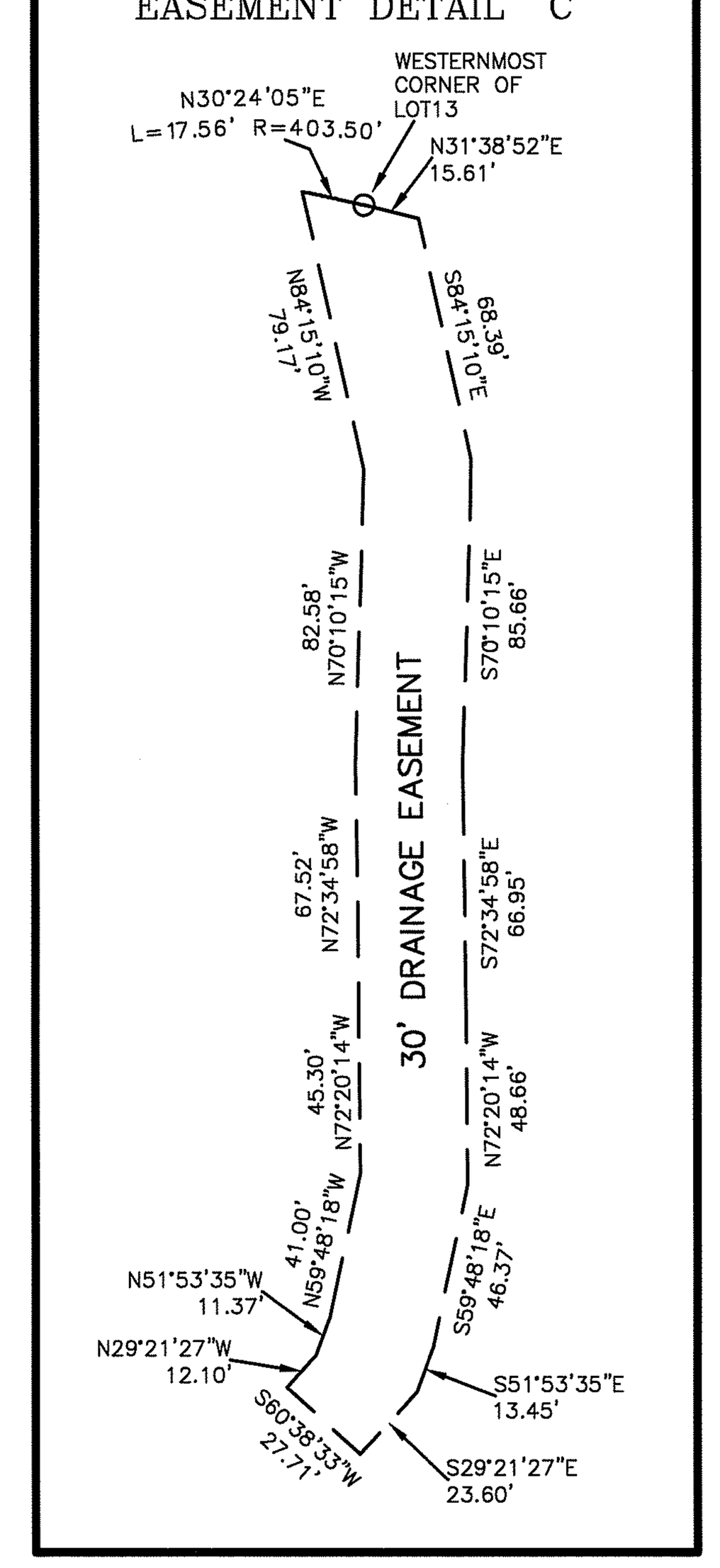
EASEMENT DETAIL "A"



EASEMENT DETAIL "B"



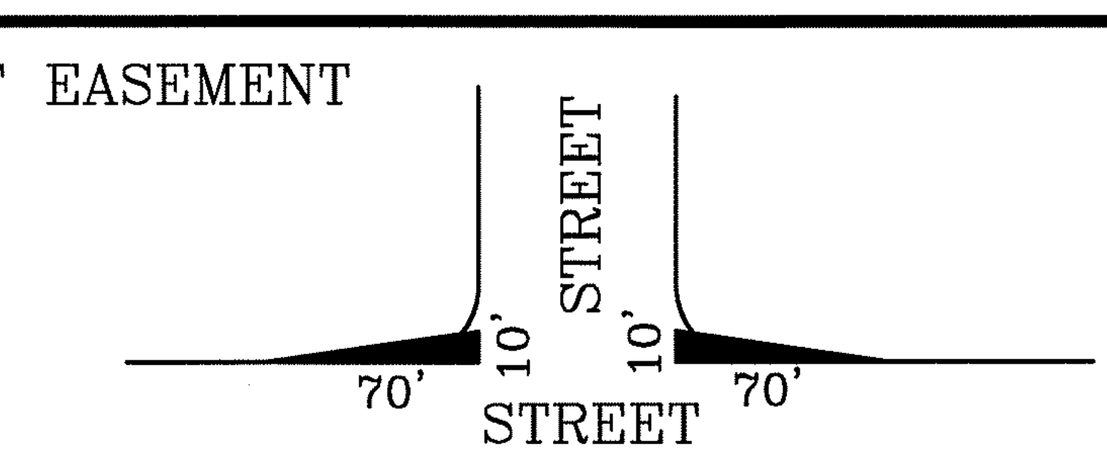
EASEMENT DETAIL "C"



LINE TABLE		
LINE	BEARING	DISTANCE
L1	S72°54'21"E	31.87'
L2	S76°56'35"E	52.05'
L3	S80°29'34"E	51.02'
L4	S84°25'05"E	32.20'
L5	S87°45'59"E	21.74'
L6	N88°03'58"E	52.52'
L7	N82°21'53"E	22.60'
L8	N82°21'53"E	30.45'
L9	N76°32'19"E	53.13'
L10	N70°23'02"E	53.29'
L11	N63°57'09"E	35.43'
L12	N63°57'09"E	17.12'
L13	N62°41'01"E	26.53'
L14	N 73°21'33" W	23.99'
L15	S13°05'13"W	30.12'
L16	N13°05'13"E	30.12'
L17	N30°02'09"E	22.70'
L18	S 50°20'52" E	54.55'
L19	N40°04'48"W	65.69'
L20	N24°52'09"W	54.70'
L21	N 08°44'03" W	4.61'
L22	N 32°42'21" W	14.14'
L23	S 18°11'23" W	20.24'
L24	N 71°48'37" W	30.00'
L25	N 71°48'37" W	30.00'

CURVE TABLE				
CURVE	CHORD BEARING	RADIUS	ARC LENGTH	CHORD LENGTH
C1	S 62°38'31" W	25.00'	38.79'	35.02'
C2	S 26°48'37" E	25.00'	39.27'	35.36'
C3	N 83°20'59" E	30.00'	26.01'	25.21'
C4	S 86°41'59" E	55.00'	66.79'	62.76'
C5	S 00°20'03" W	55.00'	100.30'	86.97'
C6	N 74°46'35" W	55.00'	101.07'	87.44'
C7	N 46°58'13" W	30.00'	26.01'	25.21'
C8	S 63°11'23" W	25.00'	39.27'	35.36'
C9	S 26°48'37" E	25.00'	39.27'	35.36'
C10	S 60°34'32" E	255.00'	100.00'	99.36'
C11	N 28°42'48" W	255.00'	183.61'	179.67'
C12	S 38°39'28" W	255.00'	227.61'	220.13'
C13	S 75°32'11" W	255.00'	100.65'	100.00'
C14	N 82°28'59" W	255.00'	95.00'	94.45'
C15	S 63°11'23" W	25.00'	39.27'	35.36'
C16	S 24°55'08" W	453.50'	106.52'	106.28'
C17	N 31°38'32" E	231358.54'	104.14'	104.14'
C18	N 23°18'24" E	403.50'	72.07'	71.98'
C19	S 26°48'37" E	25.00'	39.27'	35.36'
C20	N 61°19'05" E	205.00'	325.36'	292.27'
C21	N 14°28'07" E	205.00'	9.89'	9.89'
C22	N 29°21'42" W	205.00'	303.76'	276.72'
C23	S 63°11'23" W	25.00'	39.27'	35.36'
C24	N 26°29'25" W	25.00'	38.99'	35.16'
C25	N 72°30'44" W	205.00'	5.02'	5.02'
C26	N 02°30'02" E	255.00'	94.23'	93.70'

SIGHT EASEMENT



AT EVERY STREET INTERSECTION THERE IS A 10 X 70' SIGHT DISTANCE EASEMENT

Instrument #:2023020806
Recorded: 12/14/2023 04:20:50 PM
Fee Amt: $21.00 Page 1 of 1
Harnett County, North Carolina
Matthew S. Willis, Register of Deeds
BK 2023 PG 638 - 638 (1)

FLOOD ZONE
THIS SITE IS LOCATED WITHIN AN AREA HAVING A ZONE DESIGNATION X, MINIMAL FLOOD RISK AS SHOWN ON FLOOD INSURANCE RATE MAP NO. 3720068200J, PANEL 0682, COMMUNITY NUMBER CID 370328, IN HARNETT COUNTY, STATE OF NORTH CAROLINA, MAP REVISED OCTOBER 03, 2006.

MAXIMUM IMPERVIOUS AREA
THE MAXIMUM ALLOWED IMPERVIOUS AREA ON ANY LOT SHOWN ON THE MAP IS 5500 SQUARE FEET.

RESTRICTIVE COVENANTS AND STORM WATER MAINTENANCE DOCUMENTS ARE RECORDED IN DEED BOOK 4217 , PAGE 737 , HARNETT COUNTY REGISTRY.

GRAPHIC SCALE
1" = 100'
0 100 200 300

REVISIONS	RIVERFALL PHASE ONE	LARRY KING & ASSOCIATES, R.L.S., P.A. P.O. BOX 53787 1333 MORGANTON ROAD, SUITE 201 FAYETTEVILLE, N.C. 28305 TELEPHONE: (910) 483-4300 FAX: (910)483-4052 (NC FIRM LICENSE C-0887)		
	TOWNSHIP: BLACK RIVER STATE: NORTH CAROLINA	DATE: 12/6/23	SURVEYED BY: LKA	FIELD BOOK: LKA
	COUNTY: HARNETT	SCALE: 1:100	DRAWN: JIR/LSE	FILE REF: P:DRIVE
	PROPERTY OF: MATTAMY HOMES LLC	CHECKED & CLOSED BY: LARRY KING		DRAWING No: PLAT

PLANS FOR: Lot 1, Riverfall

MATTAMY HOMES - SEQUOIA RH

ABBREVIATION LEGEND

AB	Anchor Bolt	EQ	Equal	MIN	Minimum	SQ	Square
ABV	Above	E.W.	Each Way	MIR	Mirror	SS	Solid Surface
AC	Air Conditioner	EXIST	Existing	MISC	Miscellaneous	SS	Sanitary Sewer
ACC	Access/ Accessible	EXP	Exposed	MM	Millimeter	SST	Stainless Steel
ACFL	Access Floor	EXT	Exterior	MO	Masonry Opening	ST	Steel
ADJ	Adjacent	F.A.	Flat Archway	MOV	Movable	STA	Station
ADJ	Adjustable	FD	Floor Drain	MTD	Mounted	STC	Sound Transmission Class
AFF	Above Finished Floor	FDTN	Foundation	MTFR	Metal Furring	STD	Standard
AGGR	Aggregate	FF	Finish Floor	MTL	Metal	STOR	Storage
ALT	Alternate	FG	Fixed Glass	MULL	Mullion	STRUCT	Structural
ALUM	Aluminum	FIN	Finish	NIC	Not In Contract	SYS	System
ANC	Anchor/Anchorage	FLEX	Flexible	NOM	Nominal	T	Tread
AP	Access Panel	FLR	Floor	NR	Noise Reduction	T.A.	Trimmed Archway
APPROX	Approximate	F.O.	Framed Opening	NRC	Noise Reduction Coefficient	TB	Towel Bar
ARCH	Architect(ural)	FOC	Face of Concrete	NTS	Not to Scale	TEL	Telephone
AUTO	Automatic	FOF	Face of Finish	OA	Overall	TEMP	Temporary/ Temperature
BD	Board	FOM	Face of Masonry	OC	On Center	T&G	Tongue and Groove
BLDG	Building	FOS	Face of Studs	OD	Outside Diameter	THK	Thick(ness)
BLK	Block(ing)	FPL	Fireplace	OH	Overhead (Overhang)	THRES	Threshold
BOC	Bottom of Curb	FR	Frame	OPNG	Opening	TJ	Triple Joist
BRG	Bearing	FTG	Footing	PED	Pedestal	TMPD	Tempered
BRG PL	Bearing Plate	FUR	Furring/ Furred	PL	Plate	TOC	Top of Curb/ Concrete
BSMT	Basement	GA	Gauge	PL	Property Line	TOL	Tolerance
BUR	Built up Roof	GALV	Galvanized	PLAM	Plastic Laminate	TOS	Top of Slab
C.A.	Curved Archway	GD	Grade/ Grading	PLAS	Plastic	TOST	Top of Steel
CAB	Cabinet	GL	Glass/ Glazing	PLAS	Plaster	TOW	Top of Wall
CB	Catch Basin	G.T.	Girder Truss	PL GL	Plate Glass	TPD	Toilet Paper Dispenser
CER	Ceramic	GYP	Gypsum	PLYWD	Plywood	TV	Television
CIR	Circle	HB	Hose Bib	PNL	Panel	TYP	Typical
CJ	Control Joint	HC	Hollow Core	P.T.	Pressure Treated Lumber	UFIN	Unfinish(ed)
CLG	Ceiling	HDBD	Hard Board	PT	Paint(ed)	UNO	Unless Noted Otherwise
CLG HT	Ceiling Height	HDR	Header	PT	Point	UR	Urinal
CLO	Closet	HM	Hollow Metal	PT	Porcelain Tile	VB	Vinyl Base
CM	Centimeter	HORIZ	Horizontal	PTN	Partition	VCT	Vinyl Composition Tile
CMU	Concrete Masonry Unit	HP	High Point	PR	Pair	VER	Verify
COL	Column	HT	Height	PRKG	Parking	VERT	Vertical
CONC	Concrete	HTG	Heating	PSI	Pounds per Square Inch	VEST	Vestibule
CONST	Construction	HVAC	Heating/ Ventilation/ Air Conditioning	PVC	Polyvinyl Chloride	VF	Vinyl Flooring
CONT	Continuous/ Continue			PVMT	Pavement	VJ	V(ee) Joint
CORR	Corridor	ID	Inside Diameter	QT	Quarry Tile	VNR	Veneer
CPB	Carpet Base	INCL	Include(d)	R	Radius	VWC	Vinyl Wall Covering
CPT	Carpet	INSUL	Insulate/ Insulation	R	Riser	WB	Wood Base
CSMT	Casement	INT	Interior	RA	Return Air	WD	Wood
CT	Ceramic Tile	INV	Invert	RB	Rubber Base	WDW	Window
CTR	Center	J-Box	Junction Box	RCP	Reinforced Concrete Pipe	WGL	Wired Glass
CU FT	Cubic Foot	JST	Joist	RD	Roof Drain	WH	Water Heater
CU YD	Cubic Yard	JT	Joint	REF	Reference	WM	Wire Mesh
CWT	Ceramic Wall Tile	Kit	Kitchen	REFR	Refrigerator	W/O	Without
DBL	Double	L	Length	REINF	Reinforced	WPT	Working Point
DH	Double Hung	LAM	Laminate	REQD	Required	WSC	Wainscot
DIA	Diameter	LB	Lag Bolt	RESIL	Resilient	WT	Wall Tile
DIAG	Diagonal	LH	Left Hand	RET	Return	WT	Weight
DIM	Dimension	LT	Light	REV	Revision	WWF	Welded Wire Fabric
DISP.	Garbage Disposal	LTL	Lintel	RFG	Roofing		
DJ	Double Joist	LT WT	Light Weight	RM	Room	℄	Center Line
DN	Down	LVL	Laminated Veneer Lumber	RO	Rough Opening	C	Channel
DP	Deep	LVR	Louver	ROW	Right of Way	PL	Plate
DS	Downspout	M	Meter	RVS	Reverse	±	Plus or Minus
DTL	Detail	MAS	Masonry	SCHED	Schedule	℄	Property Line
DWG	Drawing	MATL	Material	SD	Storm Drain		
DWR	Drawer	MAX	Maximum	SECT	Section		
EA	Each	MC	Medicine Cabinet	SF	Square Foot		
EJ	Expansion Joint	MECH	Mechanical	SHT	Sheet		
ELEC	Electric	MED	Medium	SHT GL	Sheet Glass		
ELEV	Elevation	MEMB	Membrane	SHWR	Shower		
EMER	Emergency	MFR	Manufacture(er)(ing)	SIM	Similar		
EPB	Electric Panel Board	MH	Man Hole	SPEC	Specification		

PLAN SET COMPOSITION

PAGE #	LAYOUT
T1.0-T1.1	TITLE SHEET AND REVISION LOG
GN1.0-GN1.1	GENERAL NOTES
0.10-0.15	ELEVATIONS
0.20-0.21	BASEMENT FLOOR PLANS
1.0-1.4	1ST FLOOR PLANS
2.0-2.2	2ND FLOOR PLANS
3.0-3.1	3RD FLOOR PLANS
4.0-4.1	SECTIONS / DETAILS
5.0-8.0	ELECTRICAL / HVAC PLANS

ELEVATION

FRENCH COUNTRY

CODE

2018
NORTH CAROLINA STATE BUILDING CODE: RESIDENTIAL CODE

SEQUOIA SQUARE FOOTAGES

AREA	COLONIAL	CRAFTSMAN	FRENCH COUNTRY	TUDOR	FARM HOUSE
1st FLOOR	1300 SQ. FT.	1300 SQ. FT.	1300 SQ. FT.	1300 SQ. FT.	1300 SQ. FT.
2nd FLOOR	1523 SQ. FT.	1509 SQ. FT.	1523 SQ. FT.	1521 SQ. FT.	1521 SQ. FT.
TOTAL LIVING	***2823 SQ. FT.***	***2809 SQ. FT.***	***2823 SQ. FT.***	***2821 SQ. FT.***	***2821 SQ. FT.***
GARAGE - 2 CAR	482 SQ. FT.	482 SQ. FT.	482 SQ. FT.	482 SQ. FT.	482 SQ. FT.
FRONT PORCH COVERED	56 SQ. FT.	34 SQ. FT.	49 SQ. FT.	36 SQ. FT.	42 SQ. FT.

GLOBAL OPTIONAL SQUARE FOOTAGES

OPT. COVERED VERANDA	120 SQ. FT.
OPT. SCREENED PORCH	120 SQ. FT.
OPT. MORNING ROOM	120 SQ. FT.
OPT. 3RD CAR GARAGE	227 SQ. FT.

MATTAMY HOMES
CHARLOTTE DIVISION
PH: 704-375-9373

MATTAMY HOMES
RALEIGH DIVISION
PH: 919-752-4898

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INFO@JDSCONSULTING.NET; WWW.JDSCONSULTING.NET

CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334
DATE: 09/12/2024
DRAWN BY: VLT

TITLE SHEET

T1.0

PLAN REVISION LOG

DATE	REVISION DESCRIPTION	SHEETS	DFTR
06/29/2022	FLIPPED KITCHEN ORIENTATION AND ADDED OPT WET BAR, SHIFTED STAIRS ON FIRST FLOOR 6" TO THE REAR OF HOUSE, RAISED 2ND FLOOR WINDOW ON FH ELEVATION UP TO BE 7'-4" A.F.F., REMOVED WATER HEATER BOLLARD/WALL FROM PLANS, ADDED FLOOR BREAKS THROUGH OUT HOUSE, ADDED DINING ROOM PPO, MADE SHOWER STANDARD IN OWNERS BATH, NOTED OPT 2ND SINK IN SECONDARY BATHS ONLY, REMOVED SPA SHOWER PPO FROM RALEIGH OPTIONS, ADDED (1) LED DOWN-LIGHT & 4 WAY SWITCH AT 2ND FLOOR HALL. UPDATED HEATED SF. REMOVED ALL OUTLETS OTHER THAN HALF-HOTs, GFIs, WPGFIs, AND 220V	ALL	CAR
09/08/2022	FLIPPED SIGNATURE KITCHEN ISLAND & CABINET RUN. FLIPPED TUB/SHOWER IN BATH 3. MADE TRANSOM WINDOW IN BATH 3 STANDARD ON ENHANCED SIDE ELEVATION.	0.13, 1.0, 1.1	VLT
11/01/2022	REMOVED INTERIOR DOOR HEIGHTS FROM PLANS, REVISED PDS SIZE TO BE "PER COMM. SPECS", RENAMED ENHANCED SIDES TO UPGRADES SIDES, REVISED SUPER SHOWER HALF WALL HEIGHT TO BE 42", REVISED FLOOR PLAN GENERAL NOTES, REVISED ELEVATION NOTES PER BLDR	ALL	CNC
12/13/2022	CREATED RALEIGH SPECIFIC ELECTRICAL PAGES.	6.0-7.2 RDU	VLT
01/19/2023	CREATED 9' SECOND FLOOR OPTION ELEVATION PAGES	0.13-0.16	VLT
02/22/2023	CREATED THIRD CAR GARAGE PPO. CHANGED SUNROOM TO MORNING ROOM	0.15, 1.2, 6.2	VLT
03/27/2023	ADDED (2) 3/0x5/0 OPT. WINDOWS TO OWNERS SUITE SIDE WALL	2.0, 2.1	CAR
05/04/2023	ADDED SIDE LOAD GARAGE PPO. RENAMED COVERED PORCH TO COVERED VERANDA. REVISED SUPER SHOWER PPO.	ALL	VLT
08/01/2023	ADDED UPGRADE SIDE ELEVATIONS TO COLONIAL & FARMHOUSE ELEVATIONS. RENAMED SIGNATURE KITCHEN TO GOURMET KITCHEN	ALL	VLT
09/25/2023	REVISED ROOF PITCH ON FRENCH COUNTRY ELEVATION. REVISED SLIDING DOOR TAG.	ALL	VLT
10/20/2023	REVISED GARAGE DOOR GLASS & INSERTS. ADDED FRIEZE TRIM TO UPGRADED SIDE ELEVATIONS. REVISED FIRST FLOOR BATH 3 TO HAVE SHOWER. REMOVED TILE NOTE FROM SHOWERS. REMOVED SHELF COUNT FROM FLOOR PLANS NOTES BOX.	ALL	VLT
11/08/2023	ADDED OPTIONAL 3/0x5/0 WINDOW TO LOFT/BEDROOM 6	ALL	VLT
03/18/2024	REMOVED CONCRETE PAD SIZE AT OPTIONAL GARAGE SERVICE DOOR - NOTED AS "OPT. CONC. PAD PER SPEC." NOTED "DOUBLE FRENCH DOORS AT STUDY PPO. REDUCED OPENING AT THIRD CAR GARAGE PPO TO 12'-0". CREATED BATH 4 AT BEDROOM 2 PPO. REVISED DOOR SWING AT WIC IN BEDROOM 5. ADDED WINDOWS FROM UPGRADE SIDE ELEVATION TO BASE FLOOR PLAN & ELEVATIONS AS OPTIONAL WINDOWS	ALL	VLT
05/09/2024	CREATED FRENCH COUNTRY 2 ELEVATION - ADDING FULL HEIGHT STONE AT GARAGE	0.19	VLT
05/30/2024	REMOVED OPTIONAL WET BAR AREA FROM KITCHEN.	1.0, 1.1, 1.2	VLT
09/12/2024	ADDED TEMPERED NOTE TO WINDOW FOR BATH 4 AT BEDROOM 2 PPO.	2.2	VLT

mattamyHOMES

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CLIENT: MATTAMY HOMES

PROJECT: SEQUOIA - RH

LOCATION: NORTH CAROLINA

SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334

DATE: 09/12/2024

DRAWN BY: VLT

REVISION LOG

T1.1

1. ROOF CONSTRUCTION
ROOF SHINGLES OVER #15 FELT PAPER (DOUBLE LAYER UNDERLAYMENT FOR ROOFS WITH A PITCH OF LESS THAN 4:12), 7/16" OSB SHEATHING WITH "H" CLIPS ON APPROVED ROOF TRUSSES. (SEE ROOF TRUSS DESIGNS). PREFIN. ALUM. EAVESTROUGH, FASCIA, & VENTED SOFFIT U.N.O.
(refer TO SHEET GN1.1 FOR N.C. ENERGY REQUIREMENTS.)

ROOF VENTILATION
OPTION 1: MIN. VENTILATION AREA OF 1:300 OF TOTAL ATTIC AREA WITH MIN. 50% & MAX. 80% OF REQUIRED CROSS VENTILATION PROVIDED VENTILATORS LOCATED IN THE UPPER PORTION OF THE SPACE ARE MIN. 36" ABOVE EAVE OR CORNICE VENTS WITH THE BALANCE OF THE REQUIRED VENTILATION PROVIDED BY EAVE OR CORNICE VENTS
OPTION 2: MIN. VENTILATION AREA OF 1:300 OF TOTAL ATTIC AREA WITH REDUCTION IN CROSS VENTILATION WITH USE OF VAPOR BARRIER LOCATED BETWEEN INSULATION & DRYWALL.

2. FRAME WALL CONSTRUCTION (2"x4") – SIDING
SIDING AS PER ELEVATION, APPROVED HOUSE WRAP, 7/16" OSB EXTERIOR SHEATHING, 2"x4" STUDS @ 16" O.C. TO 10' MAX HEIGHT. R13 BATT INSULATION, 1/2" INT. DRYWALL FINISH.
(refer TO SHEET GN1.1 FOR N.C. ENERGY REQUIREMENTS.)

3. FRAME WALL CONSTRUCTION (2"x4") – STONE
SYNTHETIC STONE, SCRATCH COAT PER MANUFACTURERS SPECS. OVER GALV. MTL. LATH & APPROVED WEATHER RESISTANT BARRIER, 7/16" OSB EXTERIOR SHEATHING, 2"x4" STUDS @ 16" O.C. TO 10' MAX. HEIGHT. 1/2" INT. DRYWALL FINISH.
(refer TO SHEET GN1.1 FOR N.C. ENERGY REQUIREMENTS.)

4. DRAINAGE
SITE SHALL GRADE TO PROVIDE DRAINAGE UNDER ALL PORTIONS OF STRUCTURE & TO DRAIN SURFACE WATER AWAY FROM THE STRUCTURE. GRADE SHALL FALL 6" WITHIN FIRST 10'. ALL PLUMBING WORK SHALL COMPLY WITH THE CURRENT RESIDENTIAL & PLUMBING CODES.

5. GROUND FLOOR SLAB ON GRADE
CONCRETE SLAB PER STRUCTURAL DRAWINGS OVER CLEAN TERMITE TREATED COMPACT FILL. CHEMICAL PRE-TREATMENT OF SOIL IS REQUIRED BEFORE CASTING OF SLAB. SAW CUT EVERY ±200 S.F.

6. EXPOSED FLOOR TO EXTERIOR
PROVIDE MIN. R19 BATT INSULATION IN FLOORS BETWEEN CONDITIONED & UNCONDITIONED SPACES, APPROVED HOUSE WRAP, FINISHED SOFFIT.

7. ATTIC INSULATION: refer TO SHEET GN1.1. FOR N.C. REQUIREMENT.
1/2" INT. DRYWALL CEILING FINISH OR APPROVED EQUAL

8. INTERIOR STAIRS: SITE BUILT
1. STRINGERS SHALL BE 2"x12" SYP.#2 (PRESSURE TREATED AT BASE) EQUALLY SPACED & ANCHORED TO 2"x8" HEADER & P.T. 2"x4" PLATE
2. TREADS SHALL BE 2"x12" SYP.#2 RIPPED DOWN AS REQUIRED. (GLUED & NAILED)
3. RISERS SHALL BE 1"x8" SYP.#2 RIPPED DOWN AS REQUIRED. (GLUED & NAILED)
4.

MIN. TREAD	= 9"
MAX. NOSING	= 1-1/4"
MIN. TREAD & NOSING	= 9-3/4"
MAX. RISER	= 8-1/4"
MIN. HEADROOM	= 6'-8"
MAX. VERTICAL RISE FOR FLIGHT OF STAIRS	= 12'-0"
MIN. STAIR WIDTH	= 3'-0"
MIN. CLEAR STAIR WIDTH	= 31.5"

FOR WINDER STAIRS

MIN. WINDER TREAD MEASURED 12" FROM INSIDE EDGE	= 9"
MIN. WINDER TREAD MEASURED AT ANY POINT	= 4"
MAX. WINDER DEPTH	= 12"

9. HAND RAIL

MIN. STAIR / RAMP HANDRAIL HEIGHT	= 34"
MAX. STAIR / RAMP HANDRAIL HEIGHT	= 38"
MIN. INTERIOR GUARD HEIGHT	= 36"
MIN. EXTERIOR GUARD HEIGHT	= 36"

FINISHED RAILING AND GUARD RAIL PICKETS SHALL BE SPACED 4" O.C. MAXIMUM BETWEEN PICKETS. GUARDS AND RAILINGS SHALL NOT HAVE OPENINGS FROM THE WALKING SURFACE TO THE REQUIRED GUARD HEIGHT WHICH ALLOW THE PASSAGE OF A SPHERE 4" IN DIAMETER.

10. WALLS BACKING ONTO ATTIC
WALLS WHICH SEPARATE CONDITIONED LIVING SPACE FROM UNCONDITIONED ATTIC SPACE SHALL BE INSULATED AND SEALED WITH AN AIR BARRIER SYSTEM TO LIMIT INFILTRATION. IE. VAULTED CEILING, SKYLIGHT, RAISED COFFERED CEILING.
(refer TO SHEET GN1.1 FOR N.C. ENERGY REQUIREMENTS.)

11. BEAM POCKET OR 8"x8" CONCRETE BLOCK NIB WALLS. MINIMUM BEARING 3-1/2".

12. WALL & CEILING BETWEEN GARAGE & LIVING SPACE
5/8" TYPE 'X' DRYWALL ON CEILING OF GARAGE W/ LIVING SPACE ABOVE & 1/2" DRYWALL ON WALLS SUPPORTING 5/8" TYPE 'X' GWB W/ HABITABLE SPACE ABOVE AND BETWEEN HOUSE AND GARAGE. INSULATE WALLS AND CEILING BETWEEN GARAGE AND CONDITIONED SPACE. TAPE, SEAL & STRUCTURALLY SUPPORT ALL JOINTS, IN ORDER TO BE GAS/FUME TIGHT.
(refer TO SHEET GN1.1 FOR N.C. ENERGY REQUIREMENTS.)

13. DOOR AND FRAME GASPROOFED. DOOR EQUIPPED WITH SELF CLOSING DEVICE AND WEATHERSTRIPPING.

14. CLOTHES DRYER VENT
DRYER EXHAUST VENTED TO EXTERIOR & EQUIPPED W/ BACK DRAFT DAMPER. MAX. 35' DUCT LENGTH FROM THE CONNECTION TO THE TRANSITION DUCT FROM THE DRYER TO THE OUTLET TERMINAL. WHERE FITTINGS ARE USED REFER TO MECHANICAL CODE FOR MAX. LENGTH REDUCTIONS. SEAL WITH NON-COMBUSTIBLE MATERIAL, APPROVED FIRE CAULKING OR NON COMBUSTIBLE DRYER EXHAUST DUCT WALL RECEPTACLE

15. ATTIC ACCESS
ATTIC ACCESS HATCH 20"x30" WITH WEATHER- STRIPPING INTO ANY ATTIC EXCEEDING 30 SF x 30" VERT. HEIGHT. ALLOW 30" HEADROOM IN ATTIC AT HATCH LOCATION. r-10 MIN INSULATION
OR
PULL DOWN STAIR (PDS) (SIZE PER PLAN) WITH WEATHER-STRIPPING & INSULATED WITH (R5) RIGID INSULATION. (NON-RIGID INSULATION MATERIALS ARE NOT ALLOWED)

16. FIREPLACE CHIMNEYS
TOP OF FIREPLACE CHIMNEY SHALL BE MIN. 3'-0" ABOVE THE HIGHEST POINT AT WHICH IT COMES IN CONTACT WITH THE ROOF AND 2'-0" ABOVE THE ROOF SURFACE WITHIN A HORIZ. DISTANCE OF 10'-0" FROM THE CHIMNEY.

17. LINEN CLOSET OR PANTRY W/ MIN. 12" DEEP SHELVES. PROVIDE MAX. OF 4 SHELVES.

18. MECHANICAL VENTILATION
MECHANICAL EXHAUST FAN, VENTED DIRECTLY TO EXTERIOR, TO PROVIDE 50cfm INTERMITTENT OR 20cfm CONTINUOUS IN BATHROOMS & TOILET ROOMS. PROVIDE DUCT SCREEN. SEE HVAC DESIGNS

19. CABINET BLOCKING
36" A.F.F. FOR BASE CABINETS
54" A.F.F. FOR BOTTOM OF UPPER CABINETS
84" A.F.F. FOR TOP OF A 30" UPPER CABINET
96" A.F.F. FOR TOP OF OPTIONAL 42" UPPERS

20. STUD WALL REINF. FOR HANDICAP BATHROOM
WHERE HANDICAPPED ACCESSIBILITY IS REQUIRED, PROVIDE WOOD BLOCKING REINFORCEMENT TO STUD WALLS FOR GRAB BAR INSTALLATION IN BATHROOM, 33"-36" A.F.F. BEHIND TOILET. 33" A.F.F. ON THE WALL OPPOSITE THE THE ENTRANCE TO THE BATHTUB OR SHOWER

21. RANGE HOOD VENT
RANGE HOOD VENTED TO EXTERIOR. & EQUIPPED W/ BACK DRAFT DAMPER. MICROWAVES LOCATED ABOVE A COOKING APPLIANCE SHALL CONFORM TO UL923.

22. SLAB ON GRADE PORCH
CONCRETE SLAB PER STRUCTURAL DRAWINGS OVER CLEAN TERMITE TREATED COMPACT FILL. SUBTERRANEAN TERMITE POST-TREATMENT MAY BE BORACARE APPLIED TO GROUND FLOOR WOOD SURFACES; ILO SOIL TREATMENT.

23. DIRECT VENT FURNACE TERMINAL. SEE APPENDIX-C "EXIT TERMINALS OF MECHANICAL DRAFT AND DIRECT VENT VENTING SYSTEM" FOR MINIMUM CLEARANCES TO WINDOW & DOOR OPENINGS, GRADE, EXHAUST & INTAKE VENTS. REFER TO GAS UTILIZATION CODE.

24. DIRECT VENT GAS FIREPLACE. SEE APPENDIX-C "EXIT TERMINALS OF MECHANICAL DRAFT AND DIRECT VENT VENTING SYSTEM" FOR MINIMUM CLEARANCES TO WINDOW & DOOR OPENINGS, GRADE, EXHAUST & INTAKE VENTS. REFER TO GAS UTILIZATION CODE.

25. SUBFLOOR & FLOOR TRUSSES
3/4" T & G SUBFLOOR ON PRE-ENGINEERED FLOOR TRUSSES BY REGISTERED TRUSS MANUFACTURER. (SEE STRUCT. ENGINEER'S NAILING SCHEDULE)
PROVIDE DRAFT STOPPING EVERY 1000 SF.
BRACING IN ACCORDANCE W/ TPI/WTCA BCSI.
(1/4") PANEL TYPE UNDERLAY UNDER RESILIENT & PARQUET FLOORING.

26. EXPOSED BUILDING FACE
WALLS LESS THAN 5'-0" FROM PROPERTY LINE SHALL HAVE A FIRE RATING OF NO LESS THAN 1 HOUR IN ACCORDANCE WITH ASTM E 119 OR UL 263 WITH EXPOSURE FROM BOTH SIDES
PROJECTIONS BETWEEN 2'-0" & 5'-0" FROM PROPERTY LINE MUST HAVE A RATING ON THE UNDERSIDE OF NO LESS THAN 1 HOUR IN ACCORDANCE WITH ASTM E 119 OR UL 263
PROJECTIONS LESS THAN 5'-0" FROM PROPERTY LINE CANNOT HAVE A VENTILATED SOFFIT
OPENINGS IN A WALL LESS THAN 3'-0" FROM PROPERTY LINE ARE NOT ALLOWED
OPENINGS IN A WALL BETWEEN 3'-0" & 5'-0" FROM THE PROPERTY LINE CANNOT EXCEED 25% OF THE MAXIMUM WALL AREA
PENETRATIONS LESS THAN 5'-0" FROM THE PROPERTY LINE MUST COMPLY WITH CURRENT NC CODE
WHERE BUILDING FACE IS WITHIN 10'-0" OF PROPERTY LINE, ADD 5/8" GYPSUM BOARD UNDERLAYMENT @ SOFFIT

27. STEMWALL FOUNDATION & FOOTING
WHERE GROUND FLOOR SLAB EXTENDS TOO FAR ABOVE FIN. GRADE FOR A MONOLITHIC SLAB, CONSTRUCT STEMWALL DETAIL PER STRUCTURAL ENGINEER'S SPECIFICATIONS.

28. TWO STORY VOLUME SPACES
BALLOON FRAMING PER STRUCTURAL ENGINEER – REFER TO FLOOR PLANS

29. TYP. 1 HOUR RATED PARTYWALL. REFER TO DETAILS FOR TYPE AND SPECS.

WOOD FRAME & CONCRETE BLOCK CONSTRUCTION NOTES:

1. TERMITE & DECAY PROTECTION

CHEMICAL SOIL TREATMENT
THE CONCETRATION RATE OF APPLICATION AND TREATMENT METHOD OF THE TERMITICIDE SHALL BE CONSISTENT WITH AND NEVER LESS THAN THE TERMITICIDE LABEL AND SHALL BE APPLIED ACCODING TO THE STANDARDS OF THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE

FIELD CUTS, NOTCHES AND DRILLED HOLES SHALL BE TREATED IN THE FIELD IN ACCORDANCE WITH AWPA M4.

ALL WOOD IN DIRECT CONTACT WITH CONCRETE OR MASONRY FOUNDATION WALLS SHALL EITHER BE PRESSURE TREATED WOOD IN ACCORDANCE WITH AWPA U1 STANDARDS OR PROTECTED FROM CONTACT BY AN APPROVED IMPERVIOUS MOISTURE BARRIER

2. SEE STRUCTURAL ENGINEER'S DRAWINGS FOR STEEL LINTELS SUPPORTING ANY BRICK VENEER

WINDOWS:

1. MIN. EMERGENCY ESCAPE WINDOW OPENING SIZES
MIN. OF ONE EMERGENCY ESCAPE WINDOW REQ. IN EVERY SLEEPING ROOM
MIN. AREA FOR GROUND FLOOR EMERGENCY ESCAPE OPENING = 5.0 Sq.Ft.
MIN. AREA FOR SECOND FLOOR EMERGENCY ESCAPE OPENING = 5.7 Sq.Ft.
MIN. HEIGHT DIMENSION FOR EMERGENCY ESCAPE OPENING = 22"
MIN. WIDTH DIMENSION FOR EMERGENCY ESCAPE OPENING = 20"
MAX. SILL HEIGHT FOR EMERGENCY ESCAPE OPENING = 44" ABOVE FLOOR

2. MINIMUM WINDOW SILL HEIGHT
IN DWELLING UNITS WHERE THE OPENING OF AN OPERABLE WINDOW IS MORE THAN 72" ABOVE FINISHED GRADE, OR SURFACE BELOW, THE LOWEST PART OF THE CLEAR OPENING SHALL BE A MINIMUM OF 24" ABOVE THE FINISHED FLOOR. ANY WINDOW 24" OR LESS FROM FINISHED FLOOR SHALL BE EQUIPPED WITH AN OPENING LIMITING DEVICE.

3. FIXED GLASS REQUIREMENTS: FIXED GLASS IS REQ. FOR WINDOWS LESS THAN 24" ABOVE FINISHED FLOOR.

4. FLASHING, SEALANTS AND WEATHERSTRIPPING: INSTALL APPROVED CORROSION-RESISTANT FLASHING AT ALL EXTERIOR DOORS & WINDOWS TO EXTEND TO THE SURFACE OF THE EXTERIOR WALL FINISH OR WATER RESISTIVE BARRIER. WINDOWS SHALL BE SEALED WITH MINIMUM QUALITY OF CAULKING TO BE ASTM Spec 920 OR 1281 WITH TESTING & PERFORMANCE Class 25 OR AAMA Class 800 OR 812. RECOMMEND SIKA 201.

5. MAXIMUM TOLERANCE FOR MASONRY ROUGH OPENING SIZE: MASONRY ROUGH OPENING DIMENSIONS SHALL PROVIDE FOR A WINDOW PERIMETER SEALANT JOINT A MAXIMUM OF 1/4" IN WIDTH.

6. MINIMUM ENERGY CODE REQUIREMENTS FOR WINDOWS. INSTALLED WINDOWS SHALL HAVE PROPERTIES AS EFFICIENT AS WINDOWS USED TO CALCULATE FORM 1100A. WINDOW PERFORMANCE CRITERIA ARE CONTAINED IN THE ENERGY GAUGE USA/FLA/RES COMPUTER PROGRAM.
refer TO SHEET GN1.1 FOR MINIMUM N.C. SOLAR HEAT GAIN COEFFICIENT (SHGC).
WINDOWS WITH CERTIFIED PERFORMANCE SHALL HAVE THE NFRC LABEL PROVIDING U-VALUE & SHGC TO REMAIN ON THE WINDOW UNTIL FINAL ENERGY INSPECTION.

7. ANY GLASS OR WINDOW MUST BE TEMPERED THAT IS:
LESS THAN 18" ABOVE FINISH FLOOR.
WITHIN 60" OF A TUB OR SHOWER.
WHERE NEAREST VERTICAL EDGE IS WITHIN 24" OF A DOOR AND BOTTOM WINDOW EDGE IS LESS THAN 60" ABOVE FLOOR.
OVER 9 s.f. OF GLASS AREA.
LESS THAN 60" FROM STAIR TREAD OR LANDING.

GENERAL

1. THE FOLLOWING, WHERE PRESENT, SHALL BE CAULKED, GASKETED, WEATHER-STRIPPED OR OTHERWISE SEALED WITH AN AIR BARRIER MATERIAL:
   A. BLOCKING AND SEALING FLOOR / CEILING SYSTEMS AND UNDER KNEE WALLS OPEN TO UNCONDITIONED OR EXTERIOR SPACE
   B. CAPPING AND SEALING SHAFTS OR CHASES INCLUDING FLUE SHAFTS
   C. CAPPING AND SEALING SOFFIT OR DROPPED CEILING AREAS
   D. TOP AND BOTTOM PLATES
2. PENETRATIONS WILL BE SEALED WITH A PRODUCT THAT MEETS ASTM E119. FIBERGLASS INSULATION IS NOT PERMITTED TO SEAL ANY PENETRATIONS.
3. GUARDS SHALL BE LOCATED ALONG OPEN-SIDED WALKING SURFACES, INCLUDING FLOORED ATTIC AREAS.

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PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334
DATE: 09/12/2024
DRAWN BY: VLT

GENERAL NOTES

GN1.0

North Carolina
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT
(note a)

CLIMATE ZONE	FENESTRATION *U*-FACTOR (notes b, j)	SKYLIGHT *U*-FACTOR (note b)	GLAZED FENESTRATION SHGC (notes b, k)	CEILING *R*-VALUE (note m)	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE (note i)	FLOOR *R*-VALUE	BASEMENT WALL *R*-VALUE (notes c, o)	SLAB *R*-VALUE AND DEPTH (note d)	CRAWL SPACE WALL *R*-VALUE (note c)
3	0.35	0.55	0.30	38 or 30ci	15 or 13 + 2.5 (note h)	5/13 or 5/10ci	19	5/13 (note f)	0	5/13
4	0.35	0.55	0.30	38 or 30ci	15 or 13 + 2.5 (note h)	5/13 or 5/10ci	19	10/15	10	10/15
5	0.35	0.55	NR	38 or 30ci	19 (note n) or 13 + 5 or 15 + 3 (note h)	13/17 or 13/12.5ci	30 (note g)	10/15	10	10/19

a. *R*-VALUES ARE MINIMUMS. *U*-FACTORS AND SHGC ARE MAXIMUMS.
b. THE FENESTRATION *U*-FACTOR COLUMN EXCLUDES SKYLIGHTS. THE SHGC COLUMN APPLIES TO ALL GLAZED FENESTRATION.
c. "10/15" MEANS R-10 CONTINUOUS INSULATED SHEATHING ON THE INTERIOR OR EXTERIOR OF THE HOME OR R-15 CAVITY INSULATION AT THE INTERIOR OF THE BASEMENT WALL OR CRAWL SPACE WALL.
d. R-5 SHALL BE ADDED TO THE REQUIRED SLAB EDGE *R*-VALUES FOR HEATED SLABS. FOR MONOLITHIC SLABS, INSULATION SHALL BE APPLIED FROM THE INSPECTION GAP DOWNWARD TO THE BOTTOM OF THE FOOTING OR A MAXIMUM OF 24 INCHES BELOW GRADE, WHICHEVER IS LESS. FOR FLOATING SLABS, INSULATION SHALL EXTEND TO THE BOTTOM OF THE FOUNDATION WALL OR 24", WHICHEVER IS LESS.
e. NOT USED.
f. BASEMENT WALL INSULATION IS NOT REQUIRED IN WARM-HUMID LOCATIONS AS DEFINED BY FIGURE N1101.7 AND TABLE N1101.7.
g. OR INSULATION SUFFICIENT TO FILL THE FRAMING CAVITY, R-19 MINIMUM.
h. THE FIRST VALUE IS CAVITY INSULATION, THE SECOND VALUE IS CONTINUOUS INSULATION, SO "13 + 5" MEANS R-13 CAVITY INSULATION PLUS R-5 CONTINUOUS INSULATION. IF STRUCTURAL SHEATHING COVERS 25 PERCENT OR LESS OF THE EXTERIOR, INSULATING SHEATHING IS NOT REQUIRED WHERE STRUCTURAL SHEATHING IS USED. IF STRUCTURAL SHEATHING COVERS MORE THAN 25 PERCENT OF EXTERIOR, STRUCTURAL SHEATHING SHALL BE SUPPLEMENTED WITH INSULATED SHEATHING OF AT LEAST R-2.
i. THE SECOND *R*-VALUE APPLIES WHEN MORE THAN HALF THE INSULATION IS ON THE INTERIOR OF THE MASS WALL.
j. IN ADDITION TO THE EXEMPTION IN SECTION N1102.3.3, A MAXIMUM OF TWO GLAZED FENESTRATION PRODUCT ASSEMBLIES HAVING A U-FACTOR NO GREATER THAN 0.55 SHALL BE PERMITTED TO BE SUBSTITUTED FOR MINIMUM CODE COMPLIANT FENESTRATION PRODUCT ASSEMBLIES WITHOUT PENALTY.
k. IN ADDITION TO THE EXEMPTION IN SECTION N1102.3.3, A MAXIMUM OF TWO GLAZED FENESTRATION PRODUCT ASSEMBLIES HAVING A SHGC NO GREATER THAN 0.70 SHALL BE PERMITTED TO BE SUBSTITUTED FOR MINIMUM CODE COMPLIANT FENESTRATION PRODUCT ASSEMBLIES WITHOUT PENALTY.
l. R-30 SHALL BE DEEMED TO SATISFY THE CEILING INSULATION REQUIREMENT WHEREVER THE FULL HEIGHT OF UNCOMPRESSED R-30 INSULATION EXTENDS OVER THE WALL TOP PLATE AT THE EAVES. OTHERWISE R-38 INSULATION IS REQUIRED WHERE ADEQUATE CLEARANCE EXISTS OR INSULATION MUST EXTEND TO EITHER THE INSULATION BAFFLE OR WITHIN 1" OF THE ATTIC ROOF DECK.
m. TABLE VALUE REQUIRED EXCEPT FOR ROOF EDGE WHERE THE SPACE IS LIMITED BY THE PITCH OF THE ROOF, THERE THE INSULATION MUST FILL THE SPACE UP TO THE AIR BAFFLE.
n. R-19 FIBERGLASS BATTS COMPRESSED AND INSTALLED IN A NOMINAL 2x6 FRAMING CAVITY IS DEEMED TO COMPLY. FIBERGLASS BATTS RATED R-19 OR HIGHER COMPRESSED AND INSTALLED IN A 2x4 WALL IS NOT DEEMED TO COMPLY.
o. BASEMENT WALL MEETING THE MINIMUM MASS WALL SPECIFIC HEAT CONTENT REQUIREMENT MAY USE THE MASS WALL R-VALUE AS THE MINIMUM REQUIREMENT.

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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334
DATE: 09/12/2024
DRAWN BY: VLT

GENERAL NOTES

GN1.1

USE CORROSION-RESISTANT FLASHING AT ALL ROOF-TO-WALL INTERSECTIONS

FRONT ELEVATION - FRENCH COUNTRY

REAR ELEVATION - FRENCH COUNTRY

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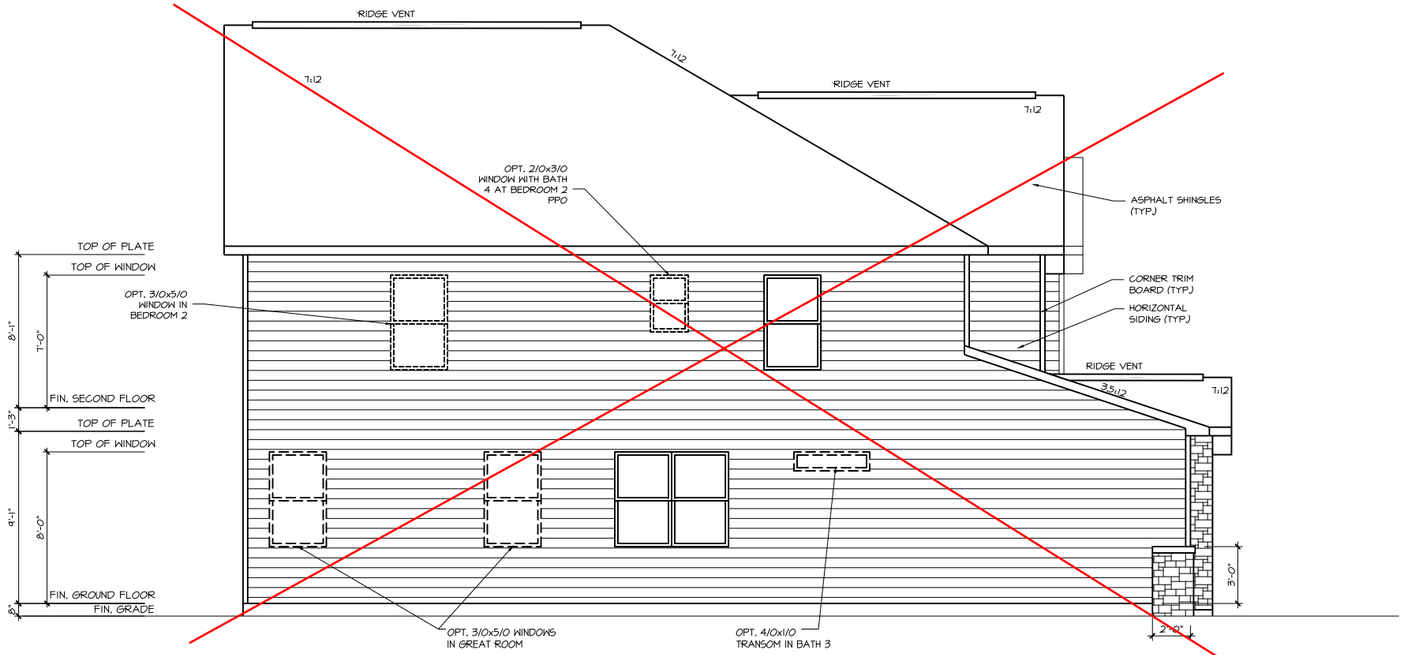
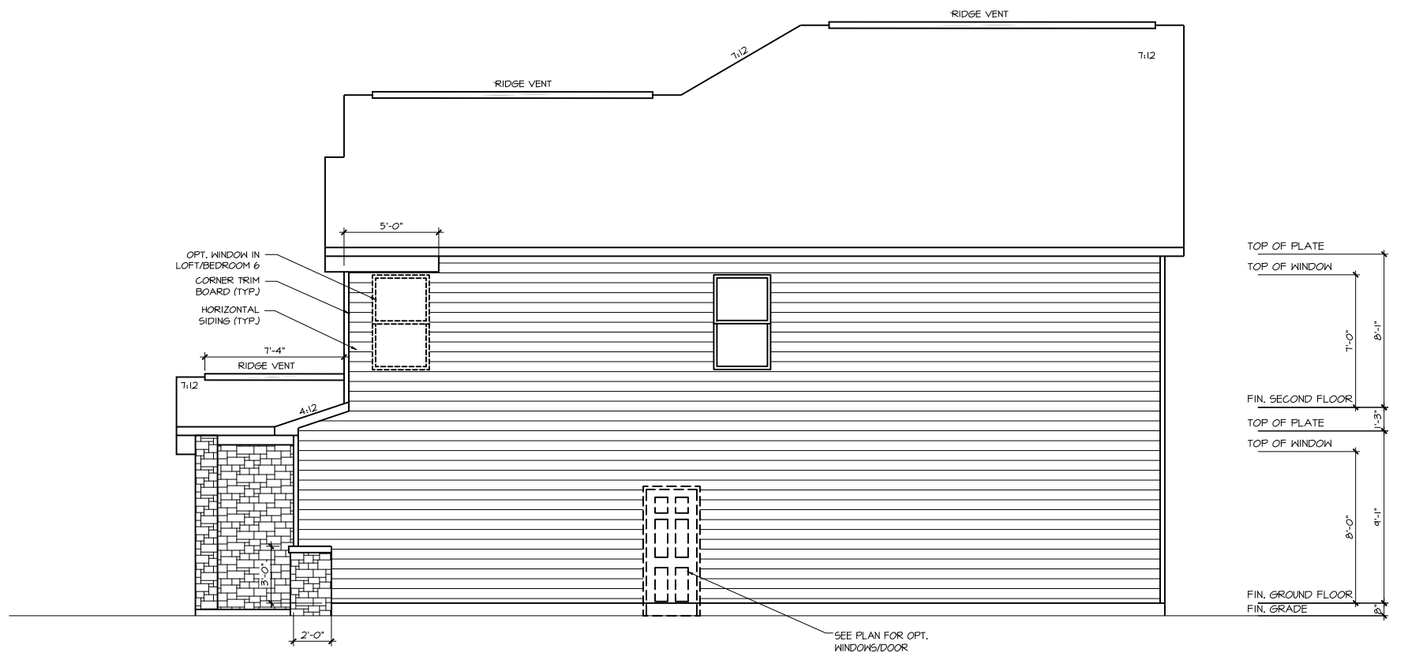
EXTERIOR ELEVATIONS

0.10

USE CORROSION-RESISTANT FLASHING AT ALL ROOF-TO-WALL INTERSECTIONS



LEFT SIDE ELEVATION - FRENCH COUNTRY



RIGHT SIDE ELEVATION - FRENCH COUNTRY

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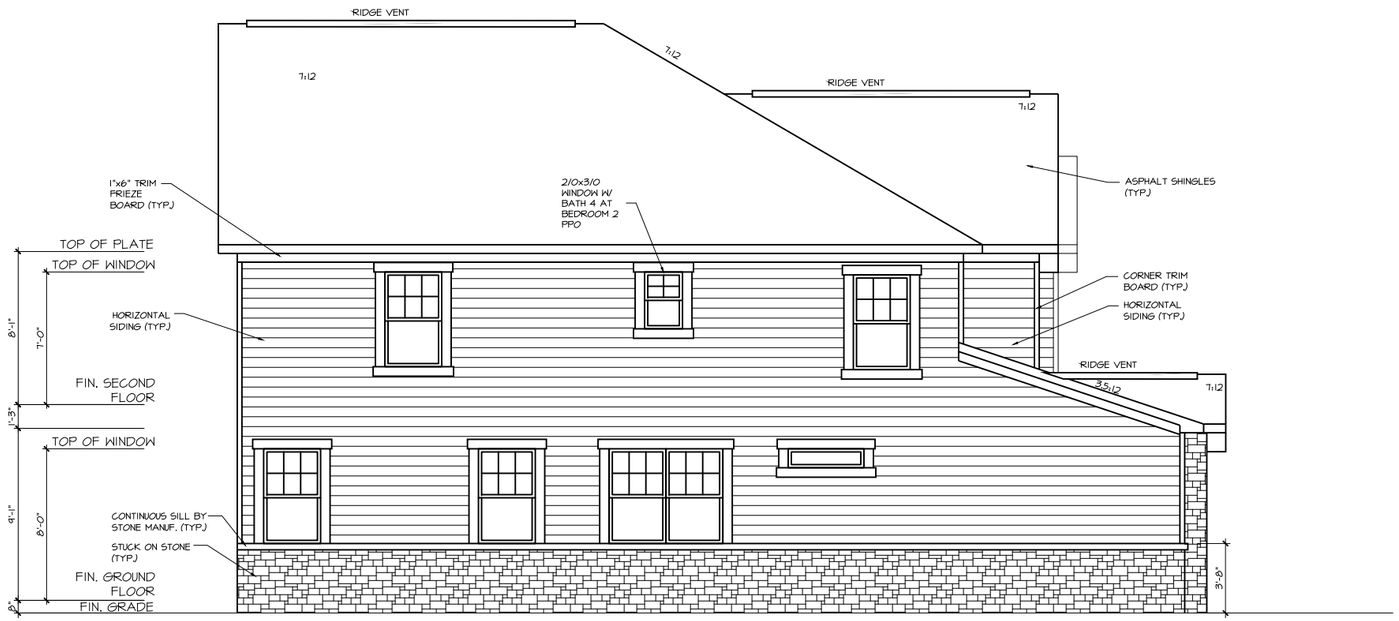
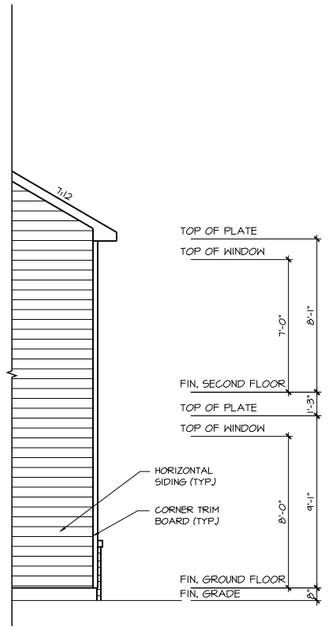
EXTERIOR ELEVATIONS

0.11

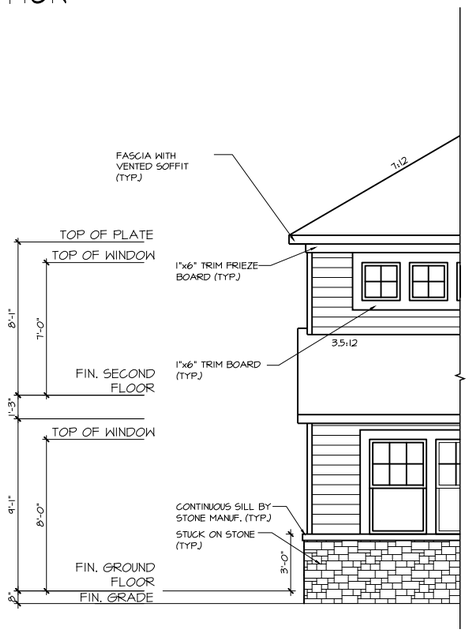
USE CORROSION-RESISTANT FLASHING AT ALL ROOF-TO-WALL INTERSECTIONS



UPGRADED SIDE ELEVATION - LEFT SIDE ELEVATION FRENCH COUNTRY



UPGRADED SIDE ELEVATION - PARTIAL REAR ELEVATION FRENCH COUNTRY



UPGRADED SIDE ELEVATION - PARTIAL FRONT ELEVATION FRENCH COUNTRY

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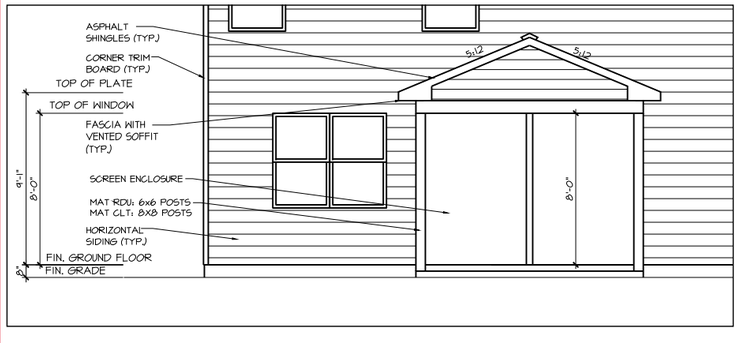
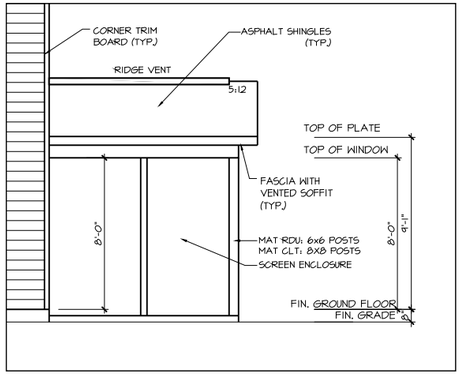
EXTERIOR ELEVATIONS

0.17

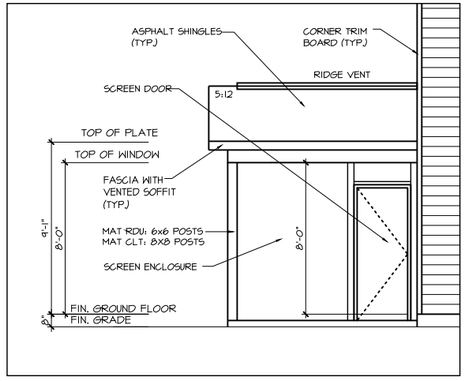
USE CORROSION-RESISTANT FLASHING AT ALL ROOF-TO-WALL INTERSECTIONS



SCREENED PORCH PPO - REAR ELEVATION (CHARLOTTE & RDU)



SCREENED PORCH PPO - RIGHT SIDE ELEVATION (CHARLOTTE & RDU)



SCREENED PORCH PPO - LEFT SIDE ELEVATION (CHARLOTTE & RDU)

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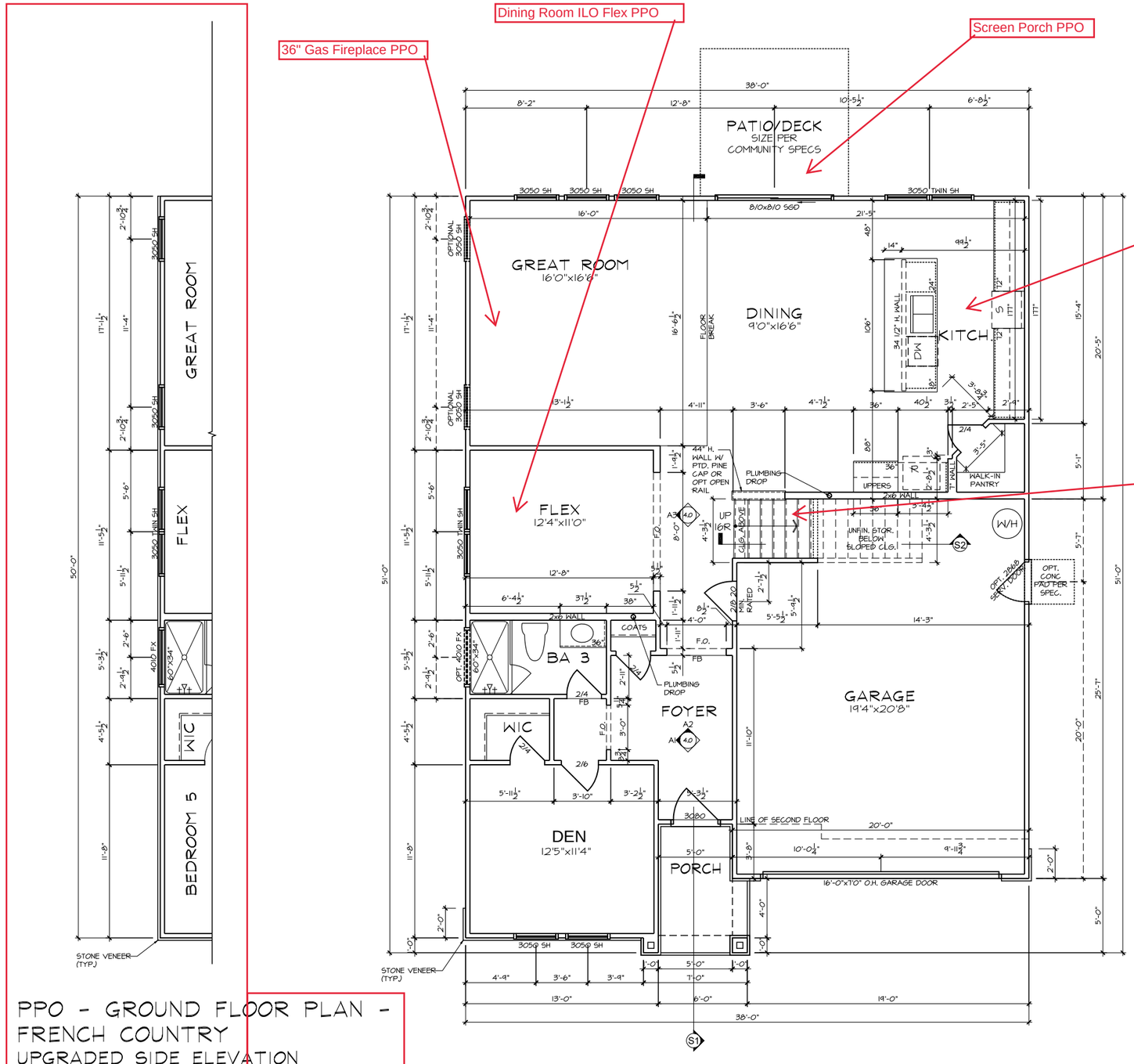
CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334
DATE: 09/12/2024
DRAWN BY: VLT

EXTERIOR ELEVATIONS

0.12



PPO - GROUND FLOOR PLAN - FRENCH COUNTRY
UPGRADED SIDE ELEVATION

GROUND FLOOR PLAN - FRENCH COUNTRY

FLOOR PLAN NOTES

1. ALL FRAMED OPENINGS (F.O.) @ 96" ON 9'H PLATES AND 84" ON 8'H PLATES.
2. REFER TO COMMUNITY SPECIFICATIONS FOR NUMBER OF PANTRY & LINEN SHELVES.
3. REFER TO GARAGE FRAMING DETAIL ON SHT. MISC3 FOR GOAL POST FRAMING.
4. ALL STUD POCKETS TO BE 4 1/2" (3) STUDS U.N.O.
5. ALL STUDS BEHIND SHOWER STALLS @ 16" O.C.
6. ALL INTERIOR DOOR HEIGHTS PER COMMUNITY SPECS U.N.O.

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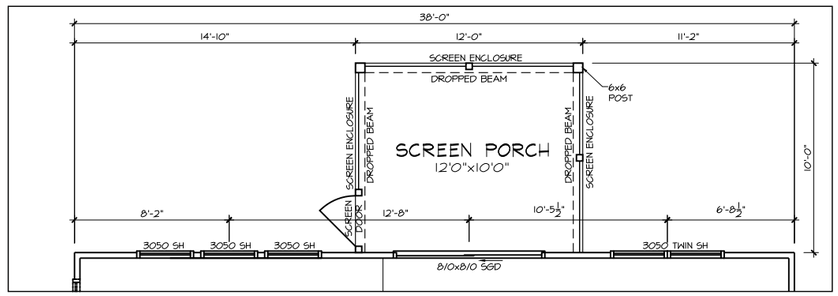
FIRST FLOOR PLAN
1.0



PPO - GROUND FLOOR PLAN
SCREEN PORCH - RALEIGH

FLOOR PLAN NOTES

1. ALL FRAMED OPENINGS (F.O.) @ 96" ON 9'H PLATES AND 84" ON 8'H PLATES.
2. REFER TO COMMUNITY SPECIFICATIONS FOR NUMBER OF PANTRY & LINEN SHELVES.
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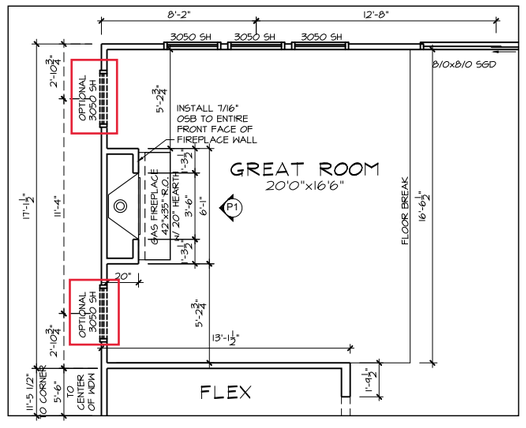
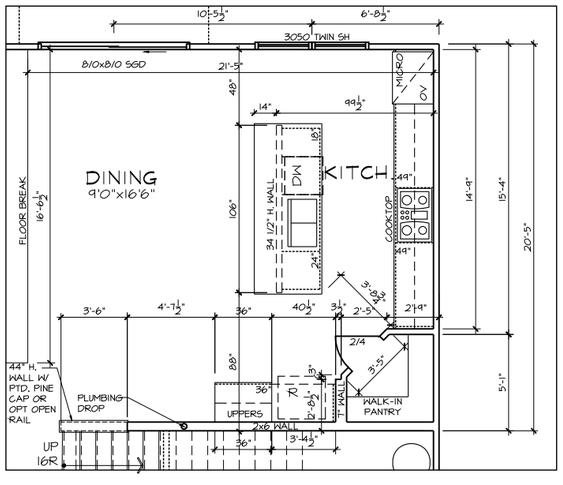
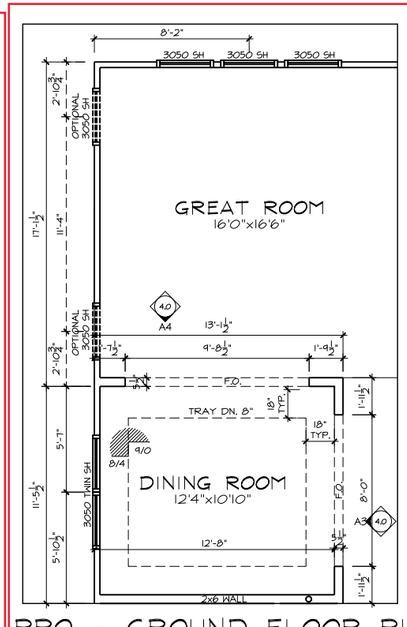


PPO - GROUND FLOOR PLAN
GAS FIREPLACE



PPO - GROUND
FLOOR PLAN
GOURMET KITCHEN



PPO - GROUND FLOOR PLAN
DINING ROOM

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PROJECT NO.: 24901334
DATE: 09/12/2024
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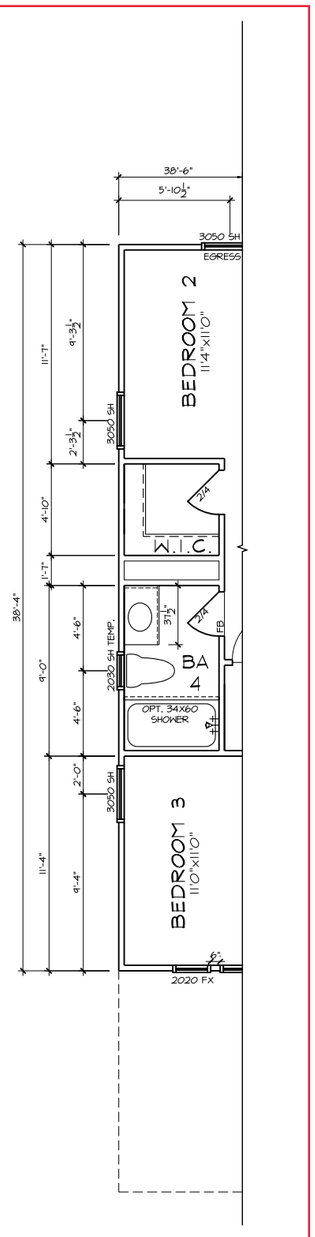
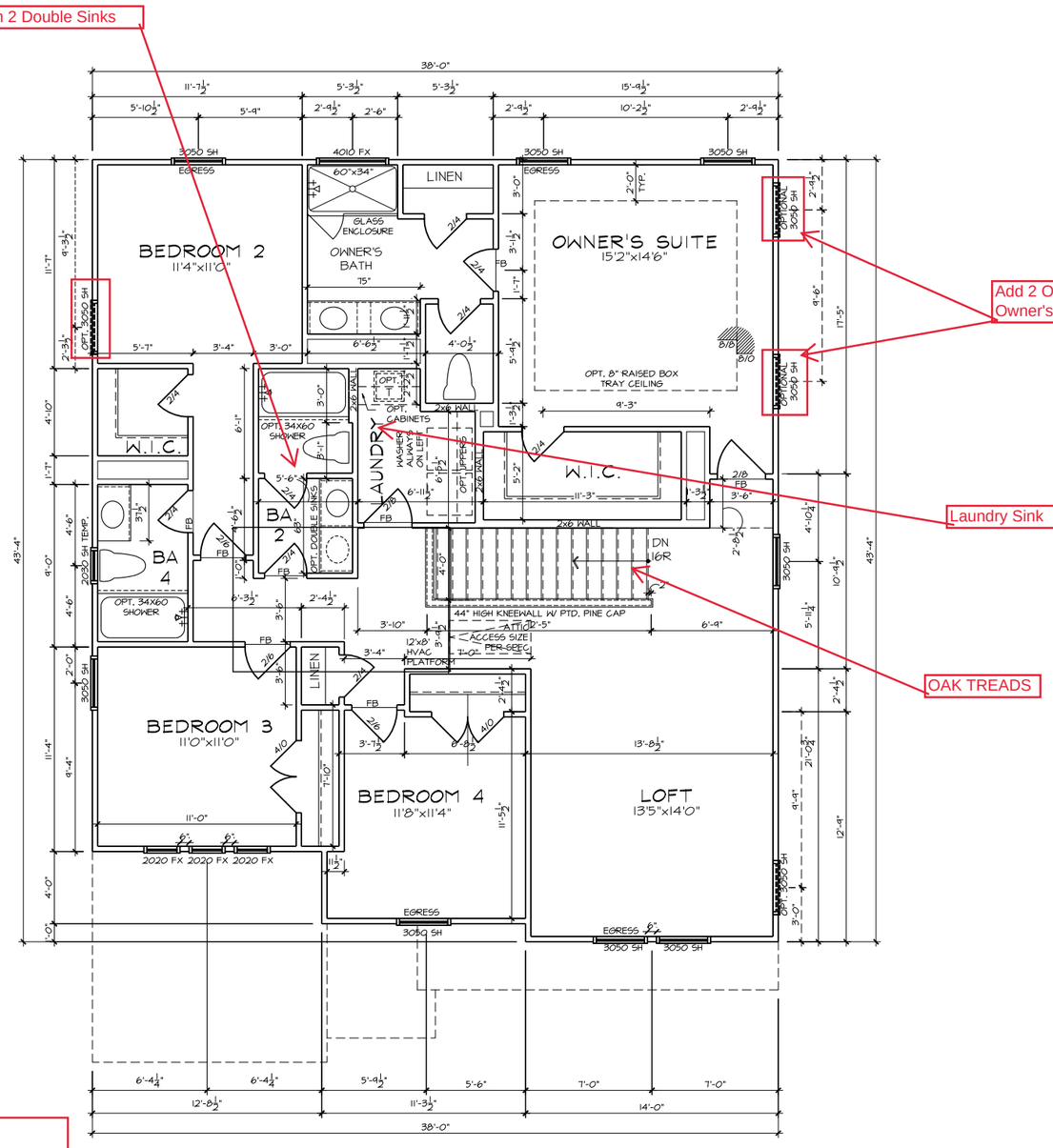
FIRST FLOOR OPTIONS
FLOOR PLANS

1.1





Bath 2 Double Sinks

Add 2 Optional 3050 Windows in Owner's Suite

Laundry Sink

OAK TREADS

FLOOR PLAN NOTES

1. ALL FRAMED OPENINGS (F.O.) @ 96" ON 9'H PLATES AND 84" ON 8'H PLATES.
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6. ALL INTERIOR DOOR HEIGHTS PER COMMUNITY SPECS U.N.O.

PPO - SECOND FLOOR PLAN - BATH 4 AT BEDROOM 2 - FRENCH COUNTRY
UPGRADED SIDE ELEVATION

PPO - SECOND FLOOR PLAN - BATH 4 AT BEDROOM 2 - FRENCH COUNTRY

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PROJECT NO.: 24901334
DATE: 09/12/2024
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SECOND FLOOR OPTIONS FLOOR PLANS

2.2

FLOOR PLAN NOTES

1. ALL FRAMED OPENINGS (F.O.) @ 96" ON 9'H PLATES AND 84" ON 8'H PLATES.
2. REFER TO COMMUNITY SPECIFICATIONS FOR NUMBER OF PANTRY & LINEN SHELVES.
3. REFER TO GARAGE FRAMING DETAIL ON SHT. MISC3 FOR GOAL POST FRAMING.
4. ALL STUD POCKETS TO BE 4 1/2" (3) STUDS U.N.O.
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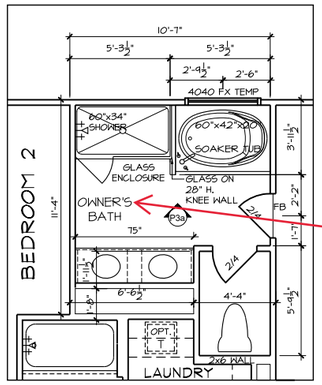

Tub DropIn w/ Tile Skirt, Tub Deck, Face, Splash

PPO - SECOND FLOOR PLAN
BATH OASIS

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CLIENT: **MATTAMY HOMES**
PROJECT: **SEQUOIA - RH**
LOCATION: **NORTH CAROLINA**

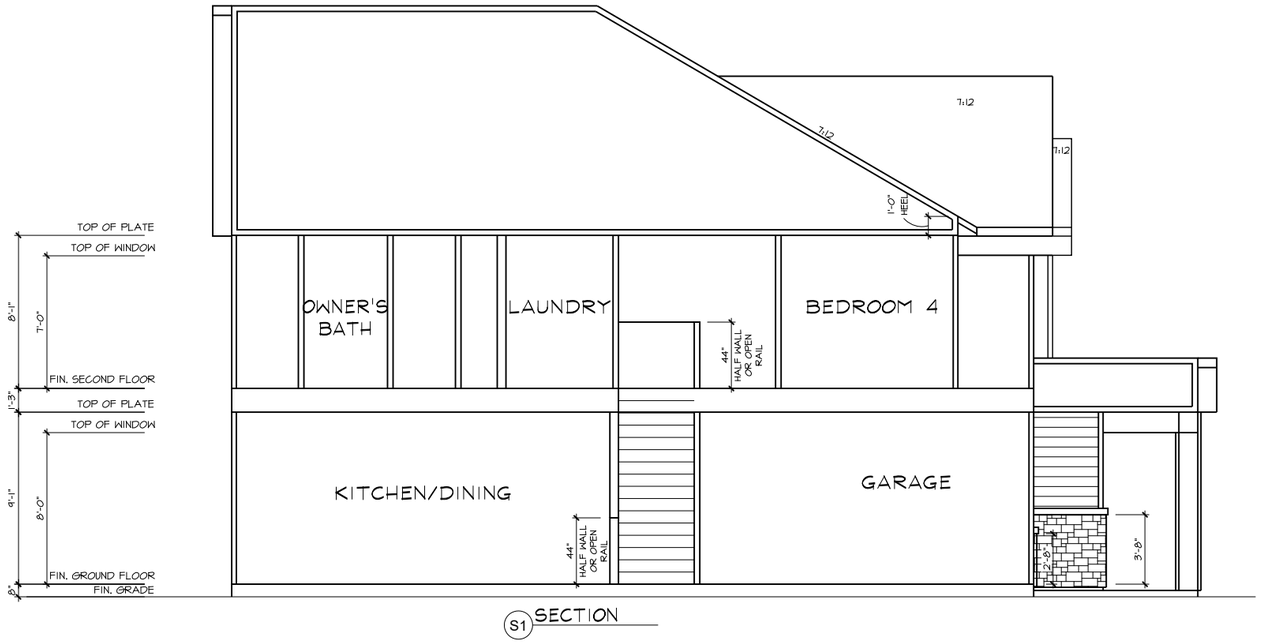
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: **24901334**

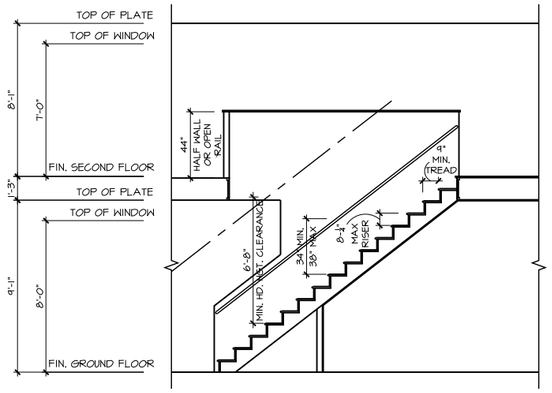
DATE: **09/12/2024**
DRAWN BY: **VLT**

SECOND FLOOR OPTIONS FLOOR PLANS

2.3



S1 SECTION



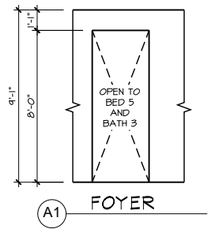
S2 STAIR SECTION

DECORATIVE GABLE DETAIL

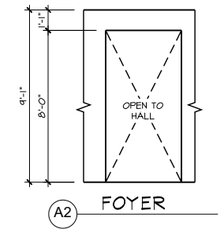
P1 GATHERING ROOM
GAS FIREPLACE

2"x¾" ON 8"x¾" PAINTED PVC HEADER TRIM BOARDS

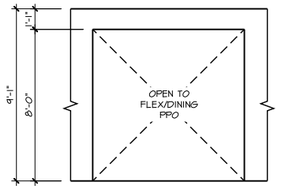
DETAIL: COACH LIGHT AT GARAGE



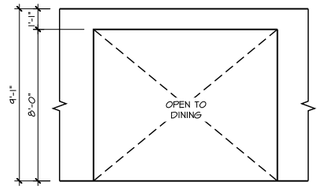
A1 FOYER



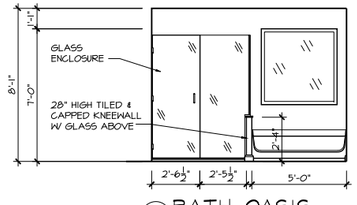
A2 FOYER



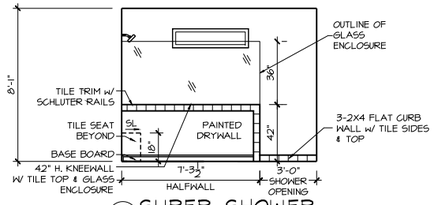
A3 FOYER/HALLWAY



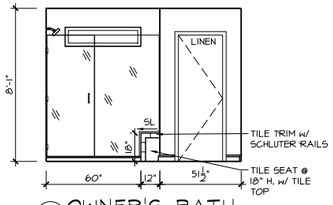
A4 GREAT ROOM
DINING ROOM PPO



P3a BATH OASIS
GLASS SHOWER ENCLOSURE



P3b SUPER SHOWER
GLASS SHOWER ENCLOSURE



P3c OWNER'S BATH
SHOWER W/ SEAT

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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA

SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24901334

DATE: 09/12/2024
DRAWN BY: VLT

SECTIONS & DETAILS

4.0

STRUCTURAL PLANS FOR:

MATTAMY HOMES - SEQUOIA RH

PLAN RELEASE / REVISIONS

REV. DATE	ARCH PLAN VERSION	REVISION DESCRIPTION	DRFT
09/20/2021	SEQUOIA	SET UP & DESIGNED STRUCTURE	NWS
03/09/2022	SEQUOIA	ADDED WINDOW TO BEDROOM 3 REQUIRED FOR EGRESS, REMOVED WALL/BOLLARD AT WATER HEATER PER RDU SPECIFICATIONS	VLT
06/23/2022	SEQUOIA	ADDED HVAC PLATFORM & ATTIC ACCESS DIMS AND NOTES TO SHEET 7.0, SHIFTED GARAGE/KITCHEN WALL 6" TO THE REAR, ADDED DINING ROOM PPO AND FLOOR TRUSS INFO	CAR
11/02/2022	SEQUOIA	RENAMED ENHANCED SIDE ELEVATION "UPGRADED SIDE", ADDED SUPPORT UNDER BED 5/FOYER WALL ON FDN'S	CNC
02/27/2023	SEQUOIA	ADDED THIRD CAR GARAGE PPO STRUCTURAL INFORMATION. RENAMED SUNROOM TO MORNING ROOM	VLT
03/27/2023	SEQUOIA	ADDED OPT. WINDOWS TO OWNERS SUITE	CAR
05/10/2023	SEQUOIA	ADDED SIDE LOAD GARAGE PPO STRUCTURAL INFORMATION. RENAMED COVERED PORCH TO COVERED VERANDA.	VLT
05/30/2023	SEQUOIA	CREATED SEPARATE PLUMBING PLAN	VLT
08/02/2023	SEQUOIA	ADDED UPGRADE SIDE ELEVATION TO COLONIAL & FARMHOUSE ELEVATIONS.	VLT
09/25/2023	SEQUOIA	REVISED FRENCH COUNTRY ROOF PITCH AT PORCH. REVISED SCREENED PORCH & COVERED VERANDA FRAMING.	VLT
03/19/2024	SEQUOIA	REVISED COVERED/SCREENED PORCH FRAMING. REVISED FRONT PORCH STEP PAD ON STEM WALL AND CRAWL FOUNDATIONS. ADDED EXTRA JOISTS/TRUSS PER EVALUATIONS. ADDED BATH 4 AT BEDROOM 2 FRAMING PLAN. REDUCED OPENING AT THIRD CAR GARAGE TO 12'-0" TO REDUCE LVL FRAMING AT OPENING. ADDED WINDOW IN BEDROOM 2 FROM UPGRADE SIDE ELEVATION TO BASE PLAN AS OPTIONAL WINDOW.	VLT

NOTES

1. ENGINEER'S SEAL APPLIES TO STRUCTURAL COMPONENTS ONLY. ENGINEER'S SEAL DOES NOT CERTIFY DIMENSIONAL ACCURACY OR ARCHITECTURAL LAYOUT, INCLUDING ROOF GEOMETRY. JDS CONSULTING, PLLC ASSUMES NO LIABILITY FOR CHANGES MADE TO THESE PLANS BY OTHERS, OR FOR CONSTRUCTION METHODS, OR FOR ANY DEVIATION FROM THE PLANS. ENGINEER TO BE NOTIFIED PRIOR TO CONSTRUCTION IF ANY DISCREPANCIES ARE NOTED ON THE PLANS.
2. DIMENSIONS SHALL GOVERN OVER SCALE, AND CODE SHALL GOVERN OVER DIMENSIONS.
3. PLANS MUST HAVE SIGNED SEAL TO BE VALID AND ARE LIMITED TO THE FOLLOWING USES:
   A. IF THESE PLANS ARE ISSUED AS A MASTER-PLAN SET, THE SET IS VALID FOR 18 MONTHS FROM THE DATE ON THE SEAL, UNLESS ANY CODE-REQUIRED UPDATES ARE PLACED IN EFFECT BY THE MUNICIPALITY.
   B. IF THESE PLANS ARE NOT ISSUED AS A MASTER-PLAN SET, THE SET IS VALID FOR A CONDITIONAL, ONE-TIME USE FOR THE LOT OR ADDRESS SPECIFIED ON THE TITLE BLOCK.

CODE

ALL CONSTRUCTION, WORKMANSHIP, AND MATERIAL QUALITY AND SELECTION SHALL BE PER:

2018
NORTH CAROLINA
STATE BUILDING CODE:
RESIDENTIAL CODE

ENGINEER OF RECORD

JDS Consulting, PLLC
ENGINEERING - DESIGN - ENERGY
543 PYLON DRIVE
RALEIGH, NC 27606
FIRM LIC. NO: P-0961
PROJECT REFERENCE: 24900749

NORTH CAROLINA PROFESSIONAL
Uchenna Onwuemene
SEAL 050218
3/21/24
ENGINEER
UCHENNA ONWUEMENE

P-0961

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LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

PROJECT NO.: 24900749
DATE: 03/19/2024
DRAWN BY: NWS

TITLE SHEET

T

NOTE: ALL CHAPTERS, SECTIONS, TABLES, AND FIGURES CITED WITHOUT A PUBLICATION TITLE ARE FROM THE APPLICABLE RESIDENTIAL CODE (SEE TITLE SHEET).

GENERAL

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. FURTHERMORE, CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, AND SAFETY ON SITE. NOTIFY JDS CONSULTING, PLLC IMMEDIATELY IF DISCREPANCIES ON PLAN EXIST.

2. BRACED-WALL DESIGN IS BASED ON **SECTION R602.10 - WALL BRACING**. PRIMARY PRESCRIPTIVE METHOD TO BE CS-WSP. SEE WALL BRACING PLANS AND DETAILS FOR ADDITIONAL INFORMATION.

   ALL NON-PRESCRIPTIVE SOLUTIONS ARE BASED ON GUIDELINES ESTABLISHED IN THE AMERICAN SOCIETY OF CIVIL ENGINEERS PUBLICATION *ASCE 7* AND THE *NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION - SPECIAL DESIGN PROVISIONS FOR WIND AND SEISMIC*.

3. SEISMIC DESIGN SHALL BE PER **SECTION R301.2.2 - SEISMIC PROVISIONS**, INCLUDING ASSOCIATED TABLES AND FIGURES, BASED ON LOCAL SEISMIC DESIGN CATEGORY.

DESIGN LOADS

ASSUMED SOIL BEARING-CAPACITY	2,000 PSF
	LIVE LOAD
ULTIMATE DESIGN WIND SPEED	UP TO 120 MPH, EXPOSURE B
GROUND SNOW	15 PSF
ROOF	20 PSF

RESIDENTIAL CODE TABLE R301.5	**LIVE LOAD (PSF)**
DWELLING UNITS	40
SLEEPING ROOMS	30
ATTICS WITH STORAGE	20
ATTICS WITHOUT STORAGE	10
STAIRS	40
DECKS	40
EXTERIOR BALCONIES	60
PASSENGER VEHICLE GARAGES	50
FIRE ESCAPES	40
GUARDS AND HANDRAILS	200 (pounds, concentrated)

COMPONENT AND CLADDING LOADS, INCLUDING THOSE FOR DOORS AND WINDOWS, SHALL BE DERIVED FROM **TABLES R301.2(2)** AND **R301.2(3)** FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 35 FEET, LOCATED IN EXPOSURE B.

ABBREVIATIONS

ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
BRG	BEARING
BSMT	BASEMENT
CANT	CANTILEVER
CJ	CEILING JOIST
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
CO	CASED OPENING
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
D	CLOTHES DRYER
DBL	DOUBLE
DIAM	DIAMETER
DJ	DOUBLE JOIST
DN	DOWN
DP	DEEP
DR	DOUBLE RAFTER
DSP	DOUBLE STUD POCKET
EA	EACH
EE	EACH END
EQ	EQUAL
EX	EXTERIOR
FAU	FORCED-AIR UNIT
FDN	FOUNDATION
FF	FINISHED FLOOR
FLR	FLOOR(ING)
FP	FIREPLACE
FTG	FOOTING
HB	HOSE BIBB
HDR	HEADER
HGR	HANGER
JS	JACK STUD COLUMN
KS	KING STUD COLUMN
LVL	LAMINATED VENEER LUMBER
MAX	MAXIMUM
MECH	MECHANICAL
MFTR	MANUFACTURER
MIN	MINIMUM
NTS	NOT TO SCALE
OA	OVERALL
OC	ON CENTER
PT	PRESSURE TREATED
R	RISER
REF	REFRIGERATOR
RFG	ROOFING
RO	ROUGH OPENING
RS	ROOF SUPPORT
SC	STUD COLUMN
SF	SQUARE FOOT (FEET)
SH	SHELF / SHELVES
SHTG	SHEATHING
SHW	SHOWER
SIM	SIMILAR
SJ	SINGLE JOIST
SP	STUD POCKET
SPEC'D	SPECIFIED
SQ	SQUARE
T	TREAD
TEMP	TEMPERED GLASS
THK	THICK(NESS)
TJ	TRIPLE JOIST
TOC	TOP OF CURB / CONCRETE
TR	TRIPLE RAFTER
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
W	CLOTHES WASHER
WH	WATER HEATER
WWF	WELDED WIRE FABRIC
XJ	EXTRA JOIST

MATERIALS

1. INTERIOR / TRIMMED FRAMING LUMBER SHALL BE #2 SPRUCE PINE FIR (SPF) WITH THE FOLLOWING DESIGN PROPERTIES (#2 SOUTHERN YELLOW PINE MAY BE SUBSTITUTED):

   Fb = 875 PSI Fv = 70 PSI E = 1.4E6 PSI

2. FRAMING LUMBER EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND, CONCRETE, OR MASONRY SHALL BE PRESSURE TREATED #2 SOUTHERN YELLOW PINE (SYP) WITH THE FOLLOWING DESIGN PROPERTIES:

   Fb = 975 PSI Fv = 95 PSI E = 1.6E6 PSI

3. LVL STRUCTURAL MEMBERS TO BE LAMINATED VENEER LUMBER WITH THE FOLLOWING MINIMUM DESIGN PROPERTIES:

   Fb = 2600 PSI Fv = 285 PSI E = 1.9E6 PSI

4. PSL STRUCTURAL MEMBERS TO BE PARALLEL STRAND LUMBER WITH THE FOLLOWING MINIMUM DESIGN PROPERTIES:

   Fb = 2900 PSI Fv = 290 PSI E = 2.0E6 PSI

5. LSL STRUCTURAL MEMBERS TO BE LAMINATED STRAND LUMBER WITH THE FOLLOWING MINIMUM DESIGN PROPERTIES:

   Fb = 2250 PSI Fv = 400 PSI E = 1.55E6 PSI

6. STRUCTURAL STEEL WIDE-FLANGE BEAMS SHALL CONFORM TO ASTM A992. Fy = 50 KSI

7. REBAR SHALL BE DEFORMED STEEL CONFORMING TO ASTM A615, GRADE 60.

8. POURED CONCRETE COMPRESSIVE STRENGTH TO BE A MINIMUM 3,000 PSI AT 28 DAYS. MATERIALS USED TO PRODUCE CONCRETE SHALL COMPLY WITH THE APPLICABLE STANDARDS LISTED IN AMERICAN CONCRETE INSTITUTE STANDARD ACI 318 OR ASTM C1157.

9. CONCRETE SUBJECT TO MODERATE OR SEVERE WEATHERING PROBABILITY PER **TABLE R301.2(1)** SHALL BE AIR-ENTRAINED WHEN REQUIRED BY **TABLE R402.2**.

10. CONCRETE MASONRY UNITS (CMU) SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE PUBLICATION 530: *BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES AND COMPANION COMMENTARIES* AND THE MASONRY SOCIETY PUBLICATION TMS 402/602: *BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES*.

11. MORTAR SHALL COMPLY WITH ASTM INTERNATIONAL STANDARD C270.

12. INDICATED MODEL NUMBERS FOR ALL METAL HANGERS, STRAPS, FRAMING CONNECTORS, AND HOLD-DOWNS ARE SIMPSON STRONG-TIE BRAND. EQUIVALENT USP BRAND PRODUCTS ARE ACCEPTABLE.

13. REFER TO I-JOIST EQUIVALENCE CHART ON I-JOIST DETAIL SHEET FOR SUBSTITUTION OF MANUFACTURER SERIES.

FOUNDATION

1. MINIMUM ALLOWABLE SOIL BEARING CAPACITY IS ASSUMED TO BE 2,000 PSF. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY SOIL BEARING CAPACITY IF UNSATISFACTORY CONDITIONS EXIST.

2. CONCRETE FOUNDATION WALLS TO BE SELECTED AND CONSTRUCTED PER **SECTION R404** OR AMERICAN CONCRETE INSTITUTE STANDARD ACI 318.

3. MASONRY FOUNDATION WALLS TO BE SELECTED AND CONSTRUCTED PER **SECTION R404** AND/OR AMERICAN CONCRETE INSTITUTE PUBLICATION 530: *BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES AND COMPANION COMMENTARIES* AND/OR THE MASONRY SOCIETY PUBLICATION TMS 402/602: *BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES*.

4. CONCRETE WALL HORIZONTAL REINFORCEMENT TO BE PER **TABLE R404.1.2(1)** OR AS NOTED OR DETAILED. CONCRETE WALL VERTICAL REINFORCEMENT TO BE PER **TABLES R404.1.2(3 AND 4)** OR AS NOTED OR DETAILED. ALL CONCRETE WALLS SHALL COMPLY WITH APPLICABLE PROVISIONS OF **CHAPTER 6**.

   A. TABLES ASSUME THAT WALLS HAVE PERMANENT LATERAL SUPPORT AT THE TOP AND BOTTOM.
   B. FOUNDATION DRAINS ARE ASSUMED AT ALL WALLS PER **SECTION R405**.

5. PLAIN-MASONRY WALL DESIGN TO BE PER **TABLE R404.1.1(1)** OR AS NOTED OR DETAILED. MASONRY WALLS WITH VERTICAL REINFORCEMENT TO BE PER **TABLES R404.1.1 (2 THROUGH 4)** OR AS NOTED OR DETAILED. ALL MASONRY WALLS SHALL COMPLY WITH APPLICABLE PROVISIONS OF **CHAPTER 6**.

   A. TABLES ASSUME THAT WALLS HAVE PERMANENT LATERAL SUPPORT AT THE TOP AND BOTTOM.
   B. WALL REINFORCING SHALL BE PLACED ACCORDING TO FOOTNOTE (c) OF THE TABLES (REINFORCING IS NOT CENTERED IN WALL).
   C. FOUNDATION DRAINS ARE ASSUMED AT ALL WALLS PER **SECTION R405**.

6. WOOD SILL PLATES TO BE ANCHORED TO THE FOUNDATION WITH 1/2" DIAMETER ANCHOR BOLTS WITH MINIMUM 7" EMBEDMENT, SPACED A MAXIMUM OF 6'-0" OC AND WITHIN 12" FROM THE ENDS OF EACH PLATE SECTION. INSTALL MINIMUM (2) ANCHOR BOLTS PER SECTION. SEE **SECTION R403.1.6** FOR SPECIFIC CONDITIONS.

7. THE UNSUPPORTED HEIGHT OF SOLID MASONRY PIERS **SHALL NOT EXCEED TEN TIMES THEIR LEAST DIMENSION**. UNFILLED, HOLLOW PIERS MAY BE USED IF THE UNSUPPORTED HEIGHT IS NOT MORE THAN **FOUR TIMES THEIR LEAST DIMENSION**.

8. CENTERS OF PIERS TO BEAR IN THE MIDDLE THIRD OF THE FOOTINGS, AND GIRDERS SHALL CENTER IN THE MIDDLE THIRD OF THE PIERS.

9. ALL FOOTINGS TO HAVE MINIMUM 2" PROJECTION ON EACH SIDE OF FOUNDATION WALLS (SEE DETAILS).

10. ALL REBAR NOTED IN CONCRETE TO HAVE AT LEAST 2" COVER FROM EDGE OF CONCRETE TO EDGE OF REBAR.

11. FRAMING TO BE FLUSH WITH FOUNDATION WALLS.

12. WITH CLASS 1 SOILS, VAPOR BARRIER AND CRUSHED STONE MAY BE OMITTED.

FRAMING

1. ALL BEARING HEADERS TO BE (2) 2x6 SUPPORTED W/ MIN (1) JACK STUD AND (1) KING STUD EACH END, UNO.

2. ALL NON-BEARING HEADERS TO BE (2) 2x4, UNO.

3. NON-BEARING INTERIOR WALLS NOT MORE THAN 10' NOMINAL HEIGHT AND NOT SHOWN AS BRACED WALLS MAY BE FRAMED WITH 2x4 STUDS @ 24" OC.

4. SOLID BLOCKING TO BE PROVIDED AT ALL POINT LOADS THROUGH FLOOR LEVELS TO THE FOUNDATION OR TO OTHER STRUCTURAL COMPONENTS.

5. ALL BEAMS SPECIFIED ARE MINIMUM SIZES ONLY. LARGER MEMBERS MAY SUBSTITUTED AS NEEDED FOR EASE OF CONSTRUCTION.

6. ALL EXTERIOR WALLS TO BE FULLY SHEATHED WITH 7/16" OSB.

7. PORCH / PATIO COLUMNS TO BE 4x4 MINIMUM PRESSURE-TREATED LUMBER.
   A. ATTACH PORCH COLUMNS TO SLAB / FDN WALL USING ABA, ABU, ABW, OR CPT SIMPSON POST BASES TO FIT COLUMN SIZES NOTED ON PLAN -OR- ANY OTHER COLUMN CONNECTION WITH 500# UPLIFT CAPACITY.
   B. ATTACH PORCH COLUMNS TO PORCH BEAMS USING AC OR BC SIMPSON POST CAPS TO FIT COLUMN SIZES NOTED ON PLAN -OR- ANY OTHER COLUMN CONNECTION WITH 500# UPLIFT CAPACITY.
   C. TRIM OUT COLUMN(S) AND BEAM(S) PER BUILDER AND DETAILS.

7. ALL ENGINEERED WOOD PRODUCTS (LVL, PSL, LSL, ETC.) SHALL BE INSTALLED WITH CONNECTIONS PER MANUFACTURER SPECIFICATIONS.

8. ENGINEERED WOOD FLOOR SYSTEMS AND ROOF TRUSS SYSTEMS:
   A. SHOP DRAWINGS FOR THE SYSTEMS SHALL BE PROVIDED TO THE ENGINEER OF RECORD FOR REVIEW AND COORDINATION BEFORE CONSTRUCTION.
   B. TRUSS PROFILES SHALL BE SEALED BY THE TRUSS MANUFACTURER.
   C. INSTALLATION OF THE SYSTEMS SHALL BE PER MANUFACTURER'S INSTRUCTIONS.
   D. TRUSS LAYOUT AND PLACEMENT BY MANUFACTURER TO COINCIDE WITH THE SUPPORT LOCATIONS SHOWN IN THESE DRAWINGS.

9. ALL BEAMS TO BE CONTINUOUSLY SUPPORTED LATERALLY AND SHALL BEAR FULL WIDTH ON THE SUPPORTING WALLS OR COLUMNS INDICATED, WITH A MINIMUM OF THREE STUDS, UNO.

10. ALL STEEL BEAMS TO BE SUPPORTED AT EACH END WITH A MIN BEARING LENGTH OF 3 1/2" AND FULL FLANGE WIDTH. BEAMS MUST BE ATTACHED AT EACH END WITH A MINIMUM OF FOUR 16d NAILS OR TWO 1/2" x 4" LAG SCREWS, UNO.

11. STEEL FLITCH BEAMS TO BE BOLTED TOGETHER USING (2) ROWS OF 1/2" DIAMETER BOLTS (ASTM 307) WITH WASHERS PLACED UNDER THE THREADED END OF THE BOLT. BOLTS TO BE SPACED AT 24" OC (MAX) AND STAGGERED TOP AND BOTTOM OF BEAM (2" EDGE DISTANCE), WITH TWO BOLTS TO BE LOCATED AT 6" FROM EACH END OF FLITCH BEAM.

12. WHEN A 4-PLY LVL BEAM IS USED, ATTACH WITH (1) 1/2" DIAMETER BOLT, 12" OC, STAGGERED TOP AND BOTTOM, 1 1/2" MIN FROM ENDS. ALTERNATE EQUIVALENT ATTACHMENT METHOD MAY BE USED, SUCH AS SDS, SDW, OR TRUSSLOK SCREWS (SEE MANUFACTURER SPECIFICATIONS).

13. FOR STUD COLUMNS OF 4-OR-MORE STUDS, INSTALL SIMPSON STRONG-TIE CS16 STRAPS ACROSS STUDS @ 30" OC, 6" MAX FROM PLATES, ON INSIDE FACE OF COLUMN (EXTERIOR WALL), ON BOTH FACES OF COLUMN (INTERIOR WALL).

14. FLOOR JOISTS ADJACENT AND PARALLEL TO THE EXTERIOR FOUNDATION WALL SHALL BE PROVIDED WITH FULL-DEPTH SOLID BLOCKING, NOT LESS THAN TWO (2) INCHES NOMINAL IN THICKNESS, PLACED PERPENDICULAR TO THE JOIST AT SPACING NOT MORE THAN FOUR (4) FEET. THE BLOCKING SHALL BE NAILED TO THE FLOOR SHEATHING, THE SILL PLATE, THE JOIST, AND THE EXTERIOR RIM JOIST / BOARD.

NORTH CAROLINA PROFESSIONAL SEAL 050218 3/21/24 ENGINEER UCHENNA ONWUEMENE

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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: 24900749

DATE: 03/19/2024
DRAWN BY: NWS

GENERAL NOTES

GN1.0

FASTENER SCHEDULE		
CONNECTION	**3" x 0.131" NAIL**	**3" x 0.120" NAIL**
JOIST TO SILL PLATE	(4) TOE NAILS	(4) TOE NAILS
SOLE PLATE TO JOIST / BLOCKING	NAILS @ 8" OC (typical) (4) PER 16" SPACE (at braced panels)	NAILS @ 8" OC (typical) (4) PER 16" SPACE (at braced panels)
STUD TO SOLE PLATE	(4) TOE NAILS	(4) TOE NAILS
TOP OR SOLE PLATE TO STUD	(3) FACE NAILS	(4) FACE NAILS
RIM JOIST OR BAND JOIST TO TOP PLATE OR SILL PLATE	TOE NAILS @ 6" OC	TOE NAILS @ 4" OC
BLOCKING BETWEEN JOISTS TO TOP PLATE OR SILL PLATE	(4) TOE NAILS	(4) TOE NAILS
DOUBLE STUD	NAILS @ 8" OC	NAILS @ 8" OC
DOUBLE TOP PLATES	NAILS @ 12" OC	NAILS @ 12" OC
DOUBLE TOP PLATES LAP (24" MIN LAP LENGTH)	(12) NAILS IN LAPPED AREA, EA SIDE OF JOINT	(12) NAILS IN LAPPED AREA, EA SIDE OF JOINT
TOP PLATE LAP AT CORNERS AND INTERSECTING WALLS	(3) FACE NAILS	(3) FACE NAILS
OPEN-WEB TRUSS BOTTOM CHORD TO TOP PLATES OR SILL PLATE (PARALLEL TO WALL)	NAILS @ 6" OC	NAILS @ 4" OC
BOTTOM CHORD OF TRUSS TO TOP PLATES OR SILL PLATE (PERPENDICULAR TO WALL)	(3) TOE NAILS	(3) TOE NAILS

SEE TABLE R602.3(1) FOR ADDITIONAL STRUCTURAL-MEMBER FASTENING REQUIREMENTS.

DETAILS AND NOTES ON DRAWINGS GOVERN.

BALLOON WALL FRAMING SCHEDULE

FRAMING MEMBER SIZE	MAX HEIGHT (PLATE TO PLATE) UP TO 120 MPH ULTIMATE DESIGN WIND SPEED
2x4 @ 16" OC	10'-0"
2x4 @ 12" OC	12'-0"
2x6 @ 16" OC	15'-0"
2x6 @ 12" OC	17'-9"
2x8 @ 16" OC	19'-0"
2x8 @ 12" OC	22'-0"
(2) 2x4 @ 16" OC	14'-6"
(2) 2x4 @ 12" OC	17'-0"
(2) 2x6 @ 16" OC	21'-6"
(2) 2x6 @ 12" OC	25'-0"
(2) 2x8 @ 16" OC	27'-0"
(2) 2x8 @ 12" OC	31'-0"

a. ALL HEIGHTS ARE MEASURED SUBFLOOR TO TOP OF WALL PLATE.

b. WHEN SPLIT-FRAMED WALLS ARE USED FOR HEIGHTS OVER 12', THE CONTRACTOR SHALL ADD 6' MINIMUM OF CS16 COIL STRAPPING (FULLY NAILED), CENTERED OVER THE WALL BREAK.

c. FINGER-JOINTED MEMBERS MAY BE USED FOR CONTINUOUS HEIGHTS WHERE TRADITIONALLY MILLED LUMBER LENGTHS ARE LIMITED.

d. FOR GREATER WIND SPEED, SEE ENGINEERED SOLUTION FOR CONDITION IN DRAWINGS.

ROOF SYSTEMS

TRUSSED ROOF - STRUCTURAL NOTES

1. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
2. DENOTES OVER-FRAMED AREA
3. MINIMUM 7/16" OSB ROOF SHEATHING
4. TRUSS LAYOUT AND PLACEMENT BY MANUFACTURER TO COINCIDE WITH THE SUPPORT LOCATIONS SHOWN. TRUSS PROFILES SHALL BE SEALED BY THE TRUSS MANUFACTURER. TRUSS PLANS TO BE COORDINATED WITH THE SEALED STRUCTURAL DRAWINGS. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
5. MANUFACTURER TO PROVIDE REQUIRED UPLIFT CONNECTION.
6. PROVIDE H2.5A (MINIMUM) OR EQUIVALENT AT EACH TRUSS-TO-TOP PLATE CONNECTION AT OVER-FRAMED AREAS, UNLESS NOTED OTHERWISE.
7. UPLIFT CONNECTION TO BE CARRIED THROUGH TO FLOOR SYSTEM.

STICK-FRAMED ROOF - STRUCTURAL NOTES

1. PROVIDE 2x4 COLLAR TIES AT 48" OC AT UPPER THIRD OF RAFTERS, UNLESS NOTED OTHERWISE.
2. FUR RIDGES FOR FULL RAFTER CONTACT.
3. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
4. DENOTES OVER-FRAMED AREA
5. MINIMUM 7/16" OSB ROOF SHEATHING
6. PROVIDE 2x4 RAFTER TIES AT 16" OC AT 45° BETWEEN RAFTERS AND CEILING JOISTS. USE (4) 16d NAILS AT EACH CONNECTION. RAFTER TIES MAY BE SPACED AT 48" OC AT LOCATIONS WHERE NO KNEE WALLS ARE INSTALLED.
7. PROVIDE H2.5A (MINIMUM) OR EQUIVALENT AT EACH RAFTER-TO-TOP PLATE CONNECTION AT OVER-FRAMED AREAS, UNLESS NOTED OTHERWISE.
8. UPLIFT CONNECTION TO BE CARRIED THROUGH TO FLOOR SYSTEM.

BRICK VENEER LINTEL SCHEDULE		
SPAN	**STEEL ANGLE SIZE**	**END BEARING LENGTH**
UP TO 42"	L3-1/2"x3-1/2"x1/4"	8" (MIN. @ EACH END)
UP TO 72"	L6"x4"x5/16"* (LLV)	8" (MIN. @ EACH END)
OVER 72"	L6"x4"x5/16"* (LLV) ATTACH LINTEL w/ 1/2" THRU BOLT @ 12" OC, 3" FROM EACH END	

* FOR QUEEN BRICK: LINTELS AT THIS CONDITION MAY BE 5"x3-1/2"x5/16"

NOTE: BRICK LINTELS AT SLOPED AREAS TO BE 4"x3-1/2"x1/4" STEEL ANGLE WITH 16D NAILS IN 3/16" HOLES IN 4" ANGLE LEG AT 12" OC TO TRIPLE RAFTER. WHEN THE SLOPE EXCEEDS 4:12 A MINIMUM OF 3"x3"x1/4" PLATES SHALL BE WELDED AT 24" OC ALONG THE STEEL ANGLE.

NORTH CAROLINA PROFESSIONAL SEAL 050218 ENGINEER UCHENNA ONWUEMENE
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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: 24900749

DATE: 03/19/2024
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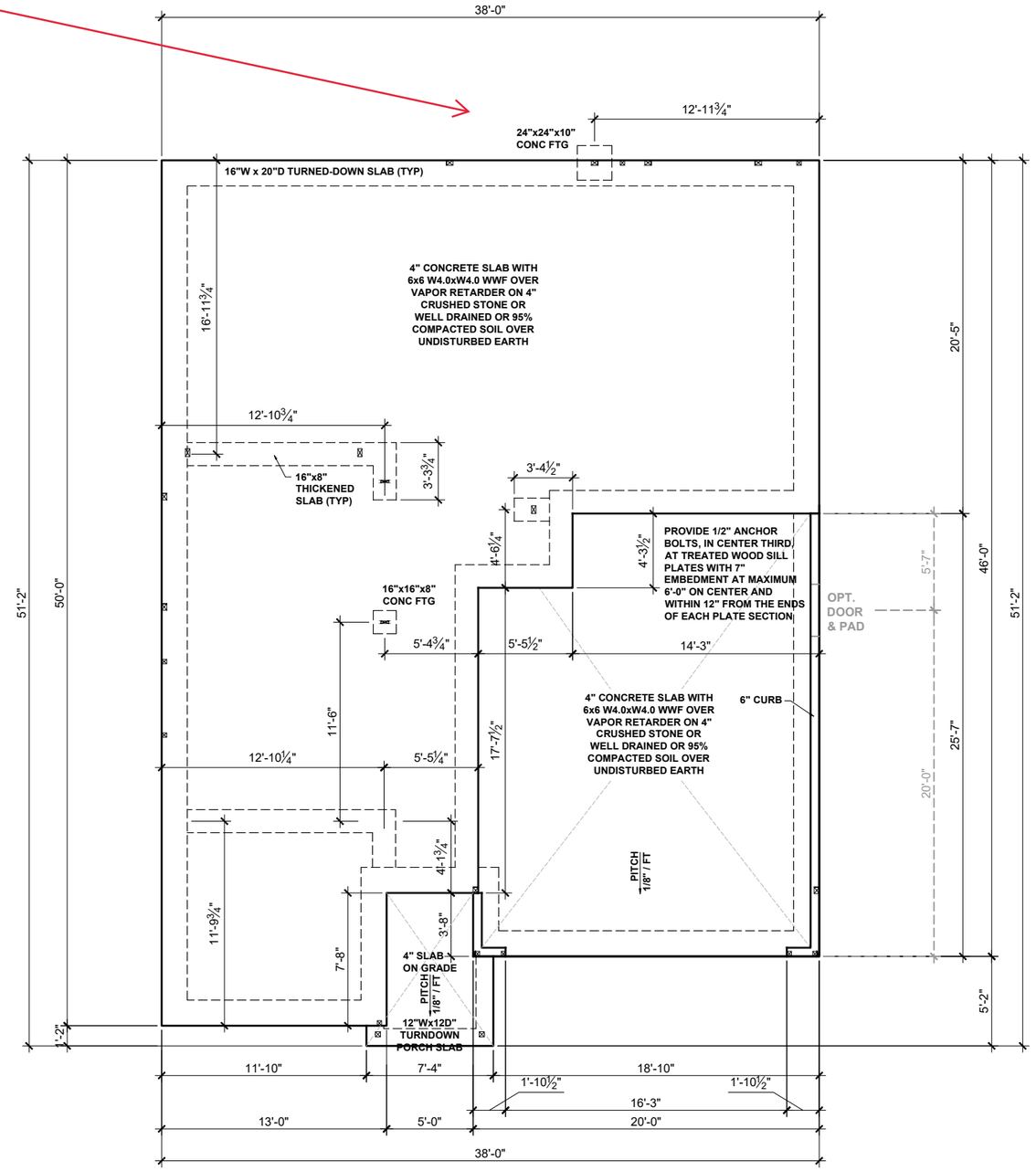
GENERAL NOTES

GN1.1

Screen Porch PPO See Next Page



SLAB FOUNDATION PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

CONCRETE SLAB REINFORCING SUBSTITUTION OF SYNTHETIC FIBER MIX IN LIEU OF WWF IN NON STRUCTURAL SLABS:

- NO SUBSTITUTION ALLOWED IN SLABS INSTALLED ON RAISED METAL DECKING
- NO SUBSTITUTION ALLOWED IN SLABS WITH GRADE BEAMS UNLESS A REBAR MAT IS INSTALLED
- NO SUBSTITUTION ALLOWED IF ANY SOILS HAVE BEEN FOUND TO BE EXPANSIVE SOILS ON SITE
- NO SUBSTITUTION ALLOWED FOR SLAB POURS DIRECTLY ON GRADE; A 4" BASE MATERIAL OF CRUSHED STONE OR WELL DRAINING CLEAN SAND IS REQUIRED FOR SUBSTITUTION
- NO SUBSTITUTION ALLOWED FOR ANY SITES WITH A DCP BLOW COUNT OF 10 OR LESS.
- FIBER MIX VOLUMES MUST BE FOLLOWED PER THE MANUFACTURES SPECIFICATIONS

MAT CLT ONLY: ALL FOOTINGS TO HAVE CONTINUOUS (2) #4 REBAR.

UPGRADED SIDE ELEVATION DOES NOT AFFECT FOUNDATION PLAN

VAPOR RETARDER REQUIREMENT
SLAB VAPOR RETARDER TO BE 6 MIL. CLASS C

NORTH CAROLINA PROFESSIONAL SEAL 050218 ENGINEER UCHENNA ONWUEMENE 3/21/24

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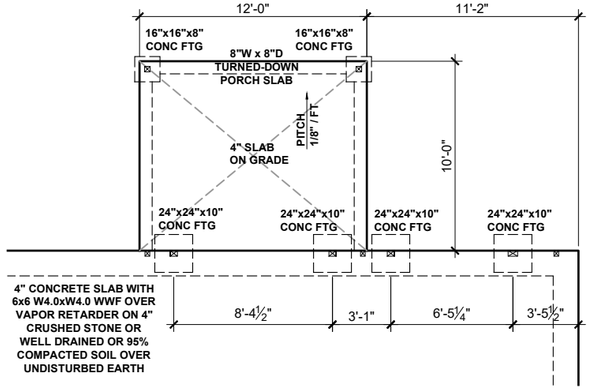
SLAB FOUNDATION PLAN

S.10



COVERED VERANDA/SCREENED PORCH MAT RDU/CLT

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

MAT CLT ONLY: ALL FOOTINGS TO HAVE CONTINUOUS (2) #4 REBAR.

SEE FULL PLAN FOR ADDITIONAL INFORMATION

UPGRADED SIDE ELEVATION DOES NOT AFFECT FOUNDATION PLAN

VAPOR RETARDER REQUIREMENT
SLAB VAPOR RETARDER TO BE 6 MIL. CLASS C

SLAB FOUNDATION PLAN OPTIONS - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 050218 3/21/24 UCHENNA ONWUEMENE

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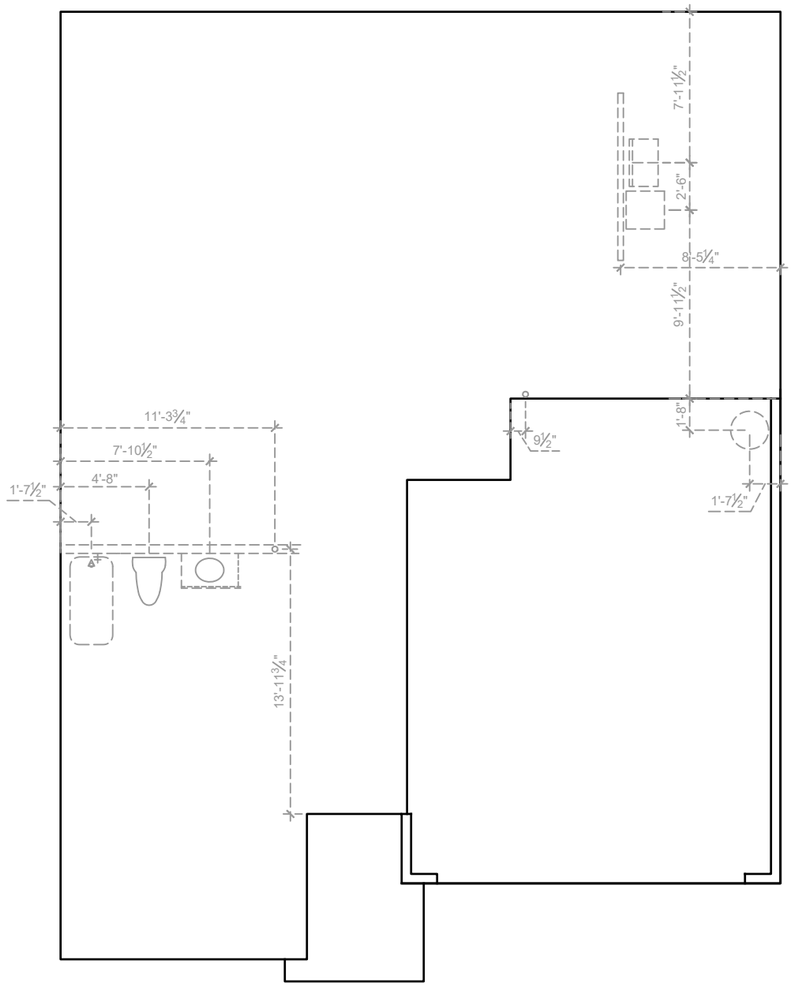
PLAN OPTIONS
SLAB FOUNDATION PLANS

S.11

PLUMBING LINES MAY PASS PERPENDICULARLY THROUGH THE BOTTOM THIRD OF A FOOTING IF INSTALLED WITH APPROPRIATE SLEEVE AND (2) 48" LONG #4 REBAR ARE INSTALLED CENTERED OVER THE SLEEVE.



PLUMBING PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

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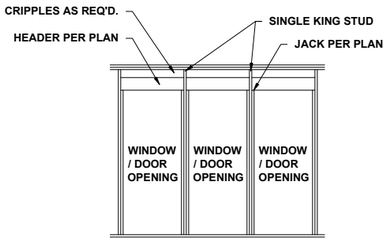
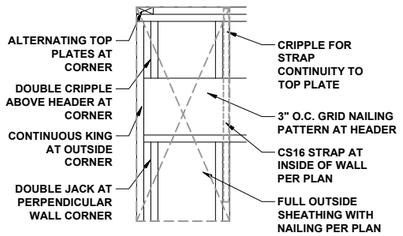
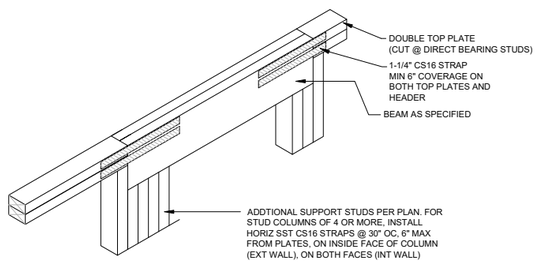
S.13



MULTI HEADER DETAIL
SINGLE COMMON KING STUD NTS



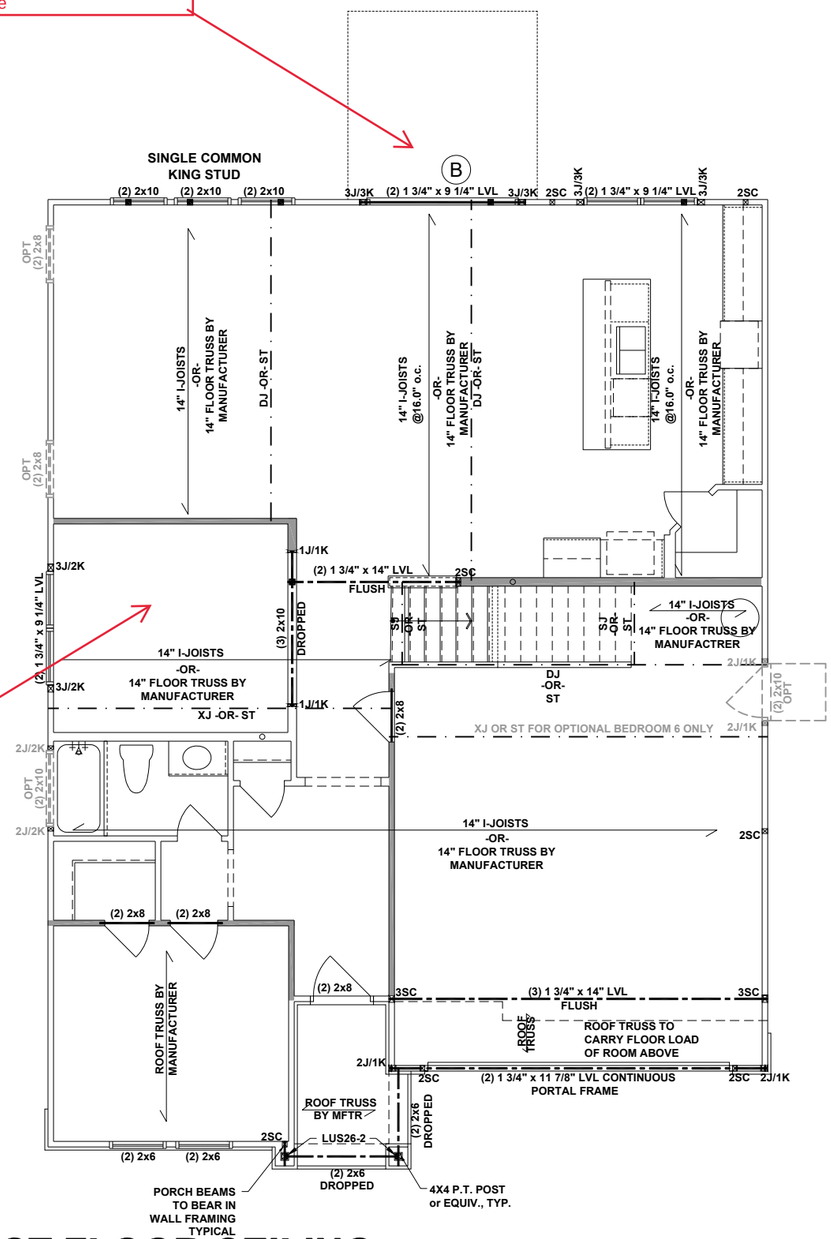
PORTAL FRAMED OR ENGINEERED OPENING OUTSIDE CORNER DETAIL
NTS



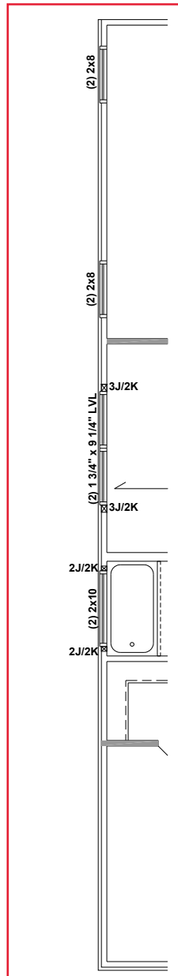
Ⓑ FLUSH TOP HEADER
WITH POINT LOAD NTS

Screen Porch PPO See Next Page

Dining Room ILO Flex PPO See Next Page



FIRST FLOOR CEILING FRAMING PLAN - FRENCH COUNTRY
SCALE: 1/8" = 1'-0"



UPGRADE SIDE ELEVATION
SCALE: 1/8"=1'-0"

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

STRUCTURAL FRAMING NOTES - (SEE GENERAL NOTES SHEET FOR ADDITIONAL REQUIREMENTS.)

1. ALL FRAMING TO BE #2 SPF MINIMUM.
2. ALL BEARING HEADERS TO BE (2) 2x6 SUPPORTED w/ MIN (1) JACK AND (1) KING EACH END, UNO.
3. EXTERIOR WALL OPENINGS OVER 3' TO HAVE MULTIPLE KING STUDS AS NOTED ON PLAN.
4. ALL NON-BEARING HEADERS TO BE (2) 2x4 (1) J / (1) K, UNO.
5. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
6. ALL HANGERS AND CONNECTORS SPECIFIED ARE TO BE SIMPSON STRONG-TIE OR EQUIVALENT.
7. ALL BEAMS SPECIFIED ARE MINIMUM SIZES ONLY. LARGER MEMBERS MAY SUBSTITUTED AS NEEDED FOR EASE OF CONSTRUCTION. MINIMUM BEAM SUPPORT IS (1) 2x4 STUD.
8. ALL EXTERIOR WALLS TO BE FULLY SHEATHED WITH 7/16" OSB.
9. FRONT PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT TOP AND BOTTOM USING SIMPSON (OR EQUIV) COLUMN BASE OR SST A24 BRACKETS. TRIM OUT PER BUILDER.
10. PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT BOTTOM USING SIMPSON (OR EQUIV) ABA44 AND AT TOP USING CS 16 STRAPPING (12" MIN) TO PORCH HEADER / BAND.
11. WHEN A 4-PLY LVL IS USED, ATTACH WITH (1) 1/2" Ø BOLT 12" OC STAGGERED, TOP AND BOTTOM, 1-1/2" MIN FROM ENDS. ALTERNATE ATTACHMENT EQUIVALENT METHOD MAY BE USED, SUCH AS SDW OR TRUSSLOK SCREWS (SEE MANUFACTURER'S SPECIFICATIONS).
12. FOR STUD COLUMNS OF 4 OR MORE, INSTALL SST CS16 STRAPS @ 30" OC, 6" MAX FROM PLATES, ON INSIDE FACE OF COLUMN (EXTERIOR WALL), ON BOTH FACES OF COLUMN (INTERIOR WALL).

**REFER TO I-JOIST EQUIVALENCE CHART ON I-JOIST DETAIL SHEET FOR SUBSTITUTION OF MANUFACTURER SERIES

FLOOR FRAMING TO BE 14" DEEP TJI 210 SERIES OR EQUAL, 19.2" OC MAXIMUM SPACING UNLESS OTHERWISE NOTED ON THE PLAN

ALL FLUSH BEAMS TO BE DIRECTLY SUPPORTED BY (2) 2X_ STUDS UNLESS OTHERWISE NOTED. STUD COLUMNS TO BE SUPPORTED BY SOLID BLOCKING TO FOUNDATION OR TO BEARING COMPONENT BELOW.

FLOOR TRUSSES TO BE DESIGN FOR A 19.2"oc SPACING; PROVIDE EOR THE LAYOUT AND THE SEALED TRUSS PROFILES FOR REVIEW PRIOR TO MANUFACTURING TRUSSES

TRUSSED FLOOR - STRUCTURAL NOTES

1. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
2. TRUSS LAYOUT AND PLACEMENT BY MANUFACTURER TO COINCIDE WITH THE SUPPORT LOCATIONS SHOWN. TRUSS PROFILES SHALL BE SEALED BY THE TRUSS MANUFACTURER. TRUSS PLANS TO BE COORDINATED WITH THE SEALED STRUCTURAL DRAWINGS. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
3. ALL TRUSS-TO-TRUSS CONNECTIONS SHALL BE SPECIFIED BY THE TRUSS MANUFACTURER AND INCLUDED IN THE TRUSS PROFILES.

NORTH CAROLINA PROFESSIONAL SEAL 050218 3/21/24 ENGINEER UCHENNA ONWUEMENE

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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

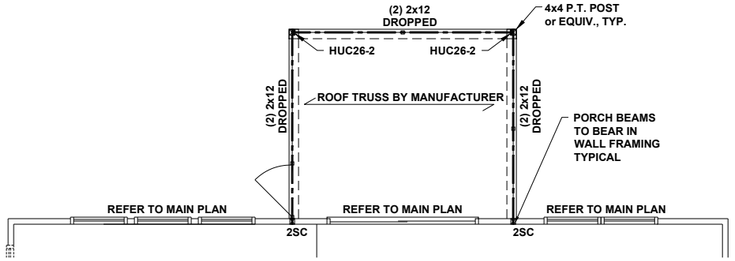
mattamyHOMES

PROJECT NO.: 24900749

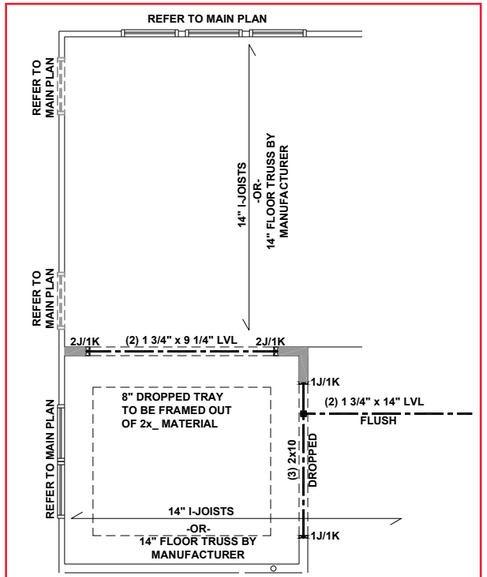
DATE: 03/19/2024
DRAWN BY: NWS

FIRST FLOOR I-JOIST CEILING FRAMING PLAN

S1.0



SCREENED PORCH - MAT RALEIGH



DINING ROOM FRAMING

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

STRUCTURAL FRAMING NOTES - (SEE GENERAL NOTES SHEET FOR ADDITIONAL REQUIREMENTS.)

1. ALL FRAMING TO BE #2 SPF MINIMUM.
2. ALL BEARING HEADERS TO BE (2) 2x6 SUPPORTED w/ MIN (1) JACK AND (1) KING EACH END, UNO.
3. EXTERIOR WALL OPENINGS OVER 3' TO HAVE MULTIPLE KING STUDS AS NOTED ON PLAN.
4. ALL NON-BEARING HEADERS TO BE (2) 2x4 (1) J / (1) K, UNO.
5. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
6. ALL HANGERS AND CONNECTORS SPECIFIED ARE TO BE SIMPSON STRONG-TIE OR EQUIVALENT.
7. ALL BEAMS SPECIFIED ARE MINIMUM SIZES ONLY. LARGER MEMBERS MAY SUBSTITUTED AS NEEDED FOR EASE OF CONSTRUCTION. MINIMUM BEAM SUPPORT IS (1) 2x4 STUD.
8. ALL EXTERIOR WALLS TO BE FULLY SHEATHED WITH 7/16" OSB.
9. FRONT PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT TOP AND BOTTOM USING SIMPSON (OR EQUIV) COLUMN BASE OR SST A24 BRACKETS. TRIM OUT PER BUILDER.
10. PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT BOTTOM USING SIMPSON (OR EQUIV) ABA44 AND AT TOP USING CS 16 STRAPPING (12" MIN) TO PORCH HEADER / BAND.
11. WHEN A 4-PLY LVL IS USED, ATTACH WITH (1) 1/2" Ø BOLT 12" OC STAGGERED, TOP AND BOTTOM, 1-1/2" MIN FROM ENDS. ALTERNATE ATTACHMENT EQUIVALENT METHOD MAY BE USED, SUCH AS SDW OR TRUSSLOK SCREWS (SEE MANUFACTURER'S SPECIFICATIONS).
12. FOR STUD COLUMNS OF 4 OR MORE, INSTALL SST CS16 STRAPS @ 30" OC, 6" MAX FROM PLATES, ON INSIDE FACE OF COLUMN (EXTERIOR WALL), ON BOTH FACES OF COLUMN (INTERIOR WALL).

TRUSSED FLOOR - STRUCTURAL NOTES

1. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
2. TRUSS LAYOUT AND PLACEMENT BY MANUFACTURER TO COINCIDE WITH THE SUPPORT LOCATIONS SHOWN. TRUSS PROFILES SHALL BE SEALED BY THE TRUSS MANUFACTURER. TRUSS PLANS TO BE COORDINATED WITH THE SEALED STRUCTURAL DRAWINGS. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
3. ALL TRUSS-TO-TRUSS CONNECTIONS SHALL BE SPECIFIED BY THE TRUSS MANUFACTURER AND INCLUDED IN THE TRUSS PROFILES.

SEE FULL PLAN FOR ADDITIONAL INFORMATION

UPGRADED SIDE ELEVATION DOES NOT AFFECT FRAMING PLAN

FIRST FLOOR CEILING FRAMING PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

NORTH CAROLINA PROFESSIONAL SEAL 050218 3/21/24 ENGINEER UCHENNA ONWUEMENE

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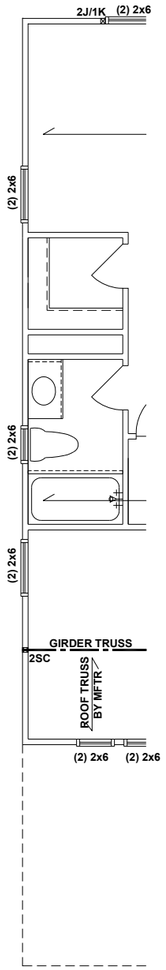
CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: 24900749
DATE: 03/19/2024
DRAWN BY: NWS

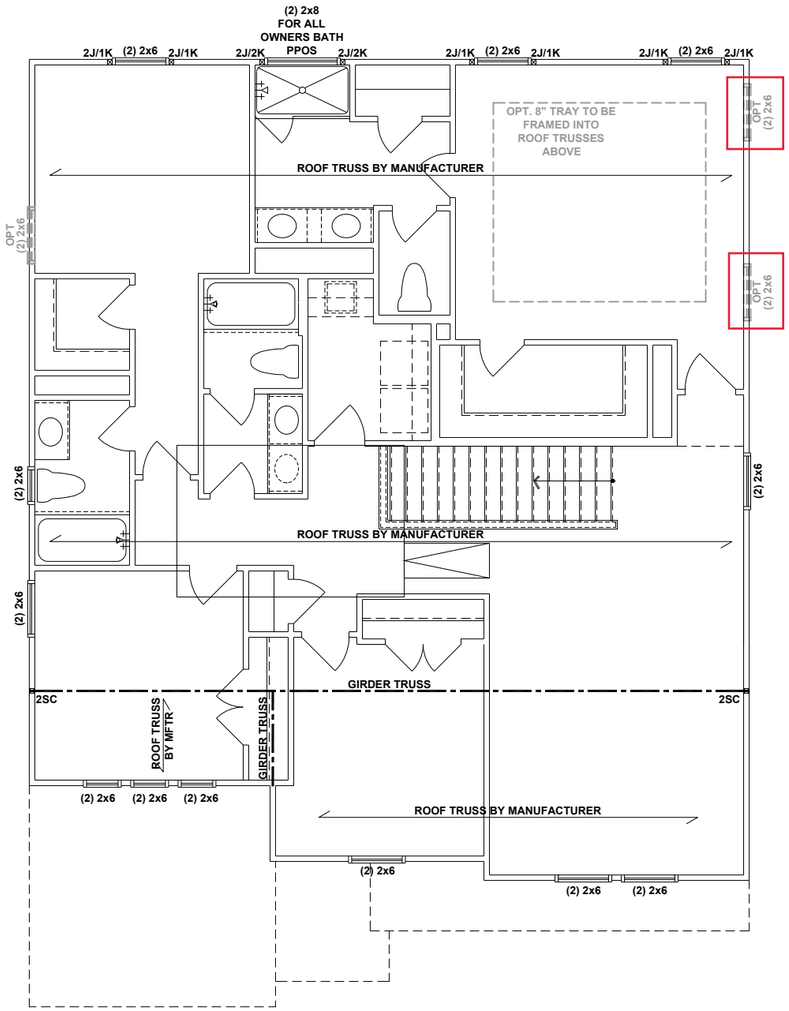
FIRST FLOOR TRUSS CEILING FRAMING PLANS

S1.1



UPGRADE SIDE ELEVATION - BATH 4 AT BEDROOM 2 - FRENCH COUNTRY

SCALE: 1/8"=1'-0"



SECOND FLOOR CEILING FRAMING PLAN - BATH 4 AT BEDROOM 2 - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

STRUCTURAL FRAMING NOTES - (SEE GENERAL NOTES SHEET FOR ADDITIONAL REQUIREMENTS.)

1. ALL FRAMING TO BE #2 SPF MINIMUM.
2. ALL BEARING HEADERS TO BE (2) 2x6 SUPPORTED w/ MIN (1) JACK AND (1) KING EACH END, UNO.
3. EXTERIOR WALL OPENINGS OVER 3' TO HAVE MULTIPLE KING STUDS AS NOTED ON PLAN.
4. ALL NON-BEARING HEADERS TO BE (2) 2x4 (1) J / (1) K, UNO.
5. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
6. ALL HANGERS AND CONNECTORS SPECIFIED ARE TO BE SIMPSON STRONG-TIE OR EQUIVALENT.
7. ALL BEAMS SPECIFIED ARE MINIMUM SIZES ONLY. LARGER MEMBERS MAY SUBSTITUTED AS NEEDED FOR EASE OF CONSTRUCTION. MINIMUM BEAM SUPPORT IS (1) 2x4 STUD.
8. ALL EXTERIOR WALLS TO BE FULLY SHEATHED WITH 7/16" OSB.
9. FRONT PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT TOP AND BOTTOM USING SIMPSON (OR EQUIV) COLUMN BASE OR SST A24 BRACKETS. TRIM OUT PER BUILDER.
10. PORCH COLUMNS TO BE MIN 4x4 PT ATTACHED AT BOTTOM USING SIMPSON (OR EQUIV) ABA44 AND AT TOP USING CS 16 STRAPPING (12" MIN) TO PORCH HEADER / BAND.
11. WHEN A 4-PLY LVL IS USED, ATTACH WITH (1) 1/2" Ø BOLT 12" OC STAGGERED, TOP AND BOTTOM, 1-1/2" MIN FROM ENDS. ALTERNATE ATTACHMENT EQUIVALENT METHOD MAY BE USED, SUCH AS SDW OR TRUSSLOK SCREWS (SEE MANUFACTURER'S SPECIFICATIONS).
12. FOR STUD COLUMNS OF 4 OR MORE, INSTALL SST CS16 STRAPS @ 30" OC, 6" MAX FROM PLATES, ON INSIDE FACE OF COLUMN (EXTERIOR WALL), ON BOTH FACES OF COLUMN (INTERIOR WALL).

ALL FLUSH BEAMS TO BE DIRECTLY SUPPORTED BY (2) 2X_ STUDS UNLESS OTHERWISE NOTED. STUD COLUMNS TO BE SUPPORTED BY SOLID BLOCKING TO FOUNDATION OR TO BEARING COMPONENT BELOW.

BEDROOM 6 OPTION DOES NOT AFFECT THE STRUCTURAL LAYOUT

NORTH CAROLINA PROFESSIONAL SEAL 050218 3/21/24 ENGINEER UCHENNA ONWUEMENE

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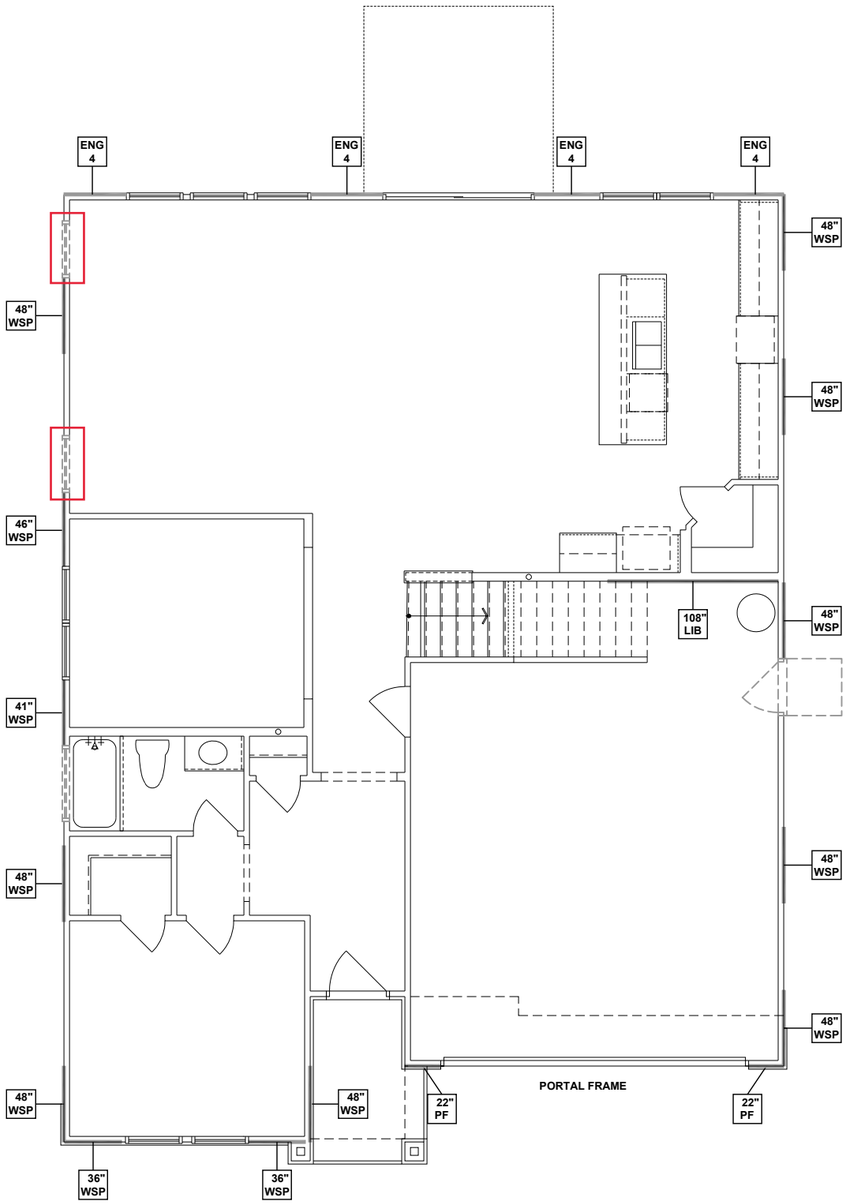
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: 24900749
DATE: 03/19/2024
DRAWN BY: NWS

SECOND FLOOR OPTIONS CEILING FRAMING PLANS

S2.1

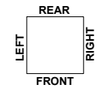


FIRST FLOOR WALL BRACING PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

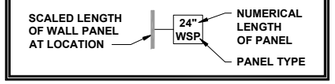
WALL BRACING REQUIREMENTS

- MINIMUM PANEL WIDTH IS 24"
- FIGURES BASED ON THE CONTINUOUS SHEATHING METHOD USING THE RECTANGLE CIRCUMSCRIBED AROUND THE FLOOR PLAN OR PORTION OF THE FLOOR PLAN. IF NO RECTANGLE IS NOTED, THE STRUCTURE HAS BEEN FIGURED ALL WITHIN ONE RECTANGLE.
- PANELS MAY SHIFT UP TO 36" EITHER DIRECTION FOR EASE OF CONSTRUCTION (NAILING & BLOCK REQUIREMENTS STILL APPLY).
- FOR ADDITIONAL WALL BRACING INFORMATION, REFER TO WALL BRACING DETAIL SHEET(S).
- SCHEMATIC BELOW INDICATES HOW SIDES OF RECTANGLE ARE TO BE INTERPRETED IN BRACING CHART WHEN APPLIED TO STRUCTURE:



◆ CS16 STRAP FROM STUD, CROSS HEADER, TO WALL TOP PLATE, 36" LONG MINIMUM

▶ SIMPSON MSTA15 HOLD DOWN CAPACITY OF 970 POUNDS PER ANCHOR WITH (12) 10d NAILS. STRAP TO BE LOCATED AT EDGE OF BRACED WALL PANEL. (CS16 STRAPPING MAY BE SUBSTITUTED w/ SIMILAR LENGTH AND NAILING PATTERN.) USE HTT4 FOR ATTACHMENT TO CONCRETE.



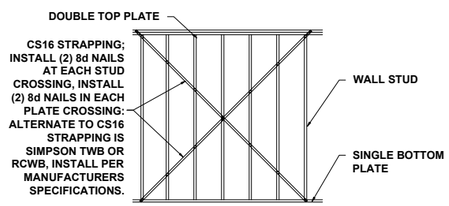
WALL BRACING NOTE:

WALLS WITH REQUIRED LENGTH LISTED AS "N/A" DO NOT MEET THE REQUIREMENTS OF PRESCRIPTIVE WALL BRACING FOUND IN THE NCRC. THESE WALLS HAVE BEEN ENGINEERED BASED ON DESIGN GUIDELINES ESTABLISHED IN ASCE-07 AND THE NDS: WIND & SEISMIC PROVISIONS SUPPLEMENT.

WALL BRACING: RECTANGLE 1

SIDE	REQUIRED LENGTH	PROVIDED LENGTH
FRONT	14.5 FT.	16.25 FT.
RIGHT	12.0 FT.	20.0 FT.
REAR	14.5 FT.	N/A
LEFT	12.0 FT.	19.25 FT.

UPGRADED SIDE ELEVATION DOES NOT AFFECT WALL BRACING PLAN



CROSS BRACED LIB
CS16 STRAPPING METHOD
SCALE: 1/4" = 1'-0" STRAP ANGLES TO BE NO MORE THAN 60° AND NO LESS THAN 40°

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CLIENT: MATTAMY HOMES
PROJECT: SEQUOIA - RH
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: 24900749

DATE: 03/19/2024
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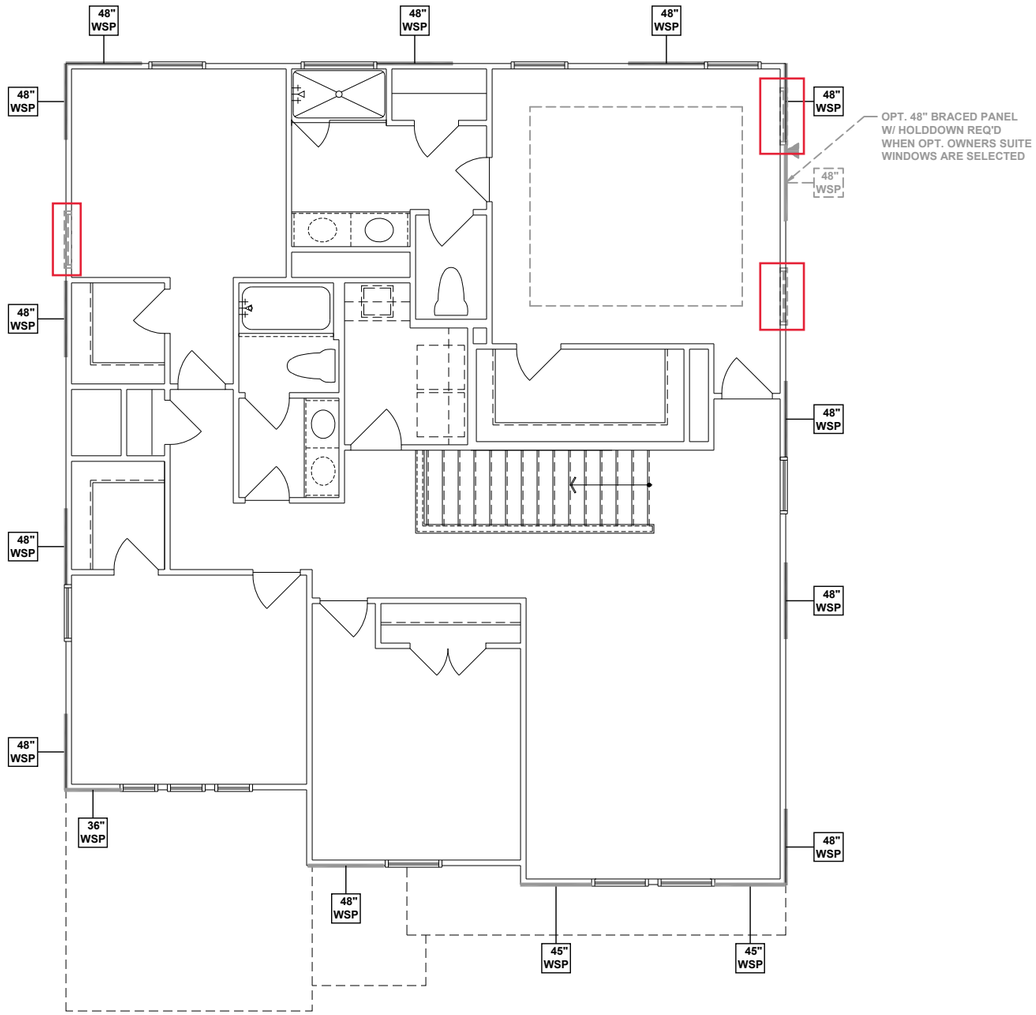
FIRST FLOOR WALL BRACING PLAN

S4.0



SECOND FLOOR WALL BRACING PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

WALL BRACING REQUIREMENTS

- MINIMUM PANEL WIDTH IS 24"
- FIGURES BASED ON THE CONTINUOUS SHEATHING METHOD USING THE RECTANGLE CIRCUMSCRIBED AROUND THE FLOOR PLAN OR PORTION OF THE FLOOR PLAN. IF NO RECTANGLE IS NOTED, THE STRUCTURE HAS BEEN FIGURED ALL WITHIN ONE RECTANGLE.
- PANELS MAY SHIFT UP TO 36" EITHER DIRECTION FOR EASE OF CONSTRUCTION (NAILING & BLOCK REQUIREMENTS STILL APPLY).
- FOR ADDITIONAL WALL BRACING INFORMATION, REFER TO WALL BRACING DETAIL SHEET(S).
- SCHEMATIC BELOW INDICATES HOW SIDES OF RECTANGLE ARE TO BE INTERPRETED IN BRACING CHART WHEN APPLIED TO STRUCTURE:

REAR / LEFT / RIGHT / FRONT

◆ CS16 STRAP FROM STUD, CROSS HEADER, TO WALL TOP PLATE, 36" LONG MINIMUM

▶ SIMPSON MSTA15 HOLD DOWN CAPACITY OF 970 POUNDS PER ANCHOR WITH (12) 10d NAILS. STRAP TO BE LOCATED AT EDGE OF BRACED WALL PANEL. (CS16 STRAPPING MAY BE SUBSTITUTED w/ SIMILAR LENGTH AND NAILING PATTERN.) USE HTT4 FOR ATTACHMENT TO CONCRETE.

SCALED LENGTH OF WALL PANEL AT LOCATION — 24" WSP — NUMERICAL LENGTH OF PANEL / PANEL TYPE

WALL BRACING NOTE:

WALLS WITH REQUIRED LENGTH LISTED AS "N/A" DO NOT MEET THE REQUIREMENTS OF PRESCRIPTIVE WALL BRACING FOUND IN THE NCRC. THESE WALLS HAVE BEEN ENGINEERED BASED ON DESIGN GUIDELINES ESTABLISHED IN ASCE-07 AND THE NDS: WIND & SEISMIC PROVISIONS SUPPLEMENT.

WALL BRACING: RECTANGLE 1

SIDE	REQUIRED LENGTH	PROVIDED LENGTH
FRONT	7.0 FT.	15.25 FT.
RIGHT	6.0 FT.	20.0 FT.
REAR	7.0 FT.	12.0 FT.
LEFT	6.0 FT.	20.0 FT.

UPGRADED SIDE ELEVATION DOES NOT AFFECT WALL BRACING PLAN

BATH 4 AT BEDROOM 2 PPO DOES NOT AFFECT WALL BRACING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 050218 3/21/24 UCHENNA ONWUEMENE

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LOCATION: NORTH CAROLINA
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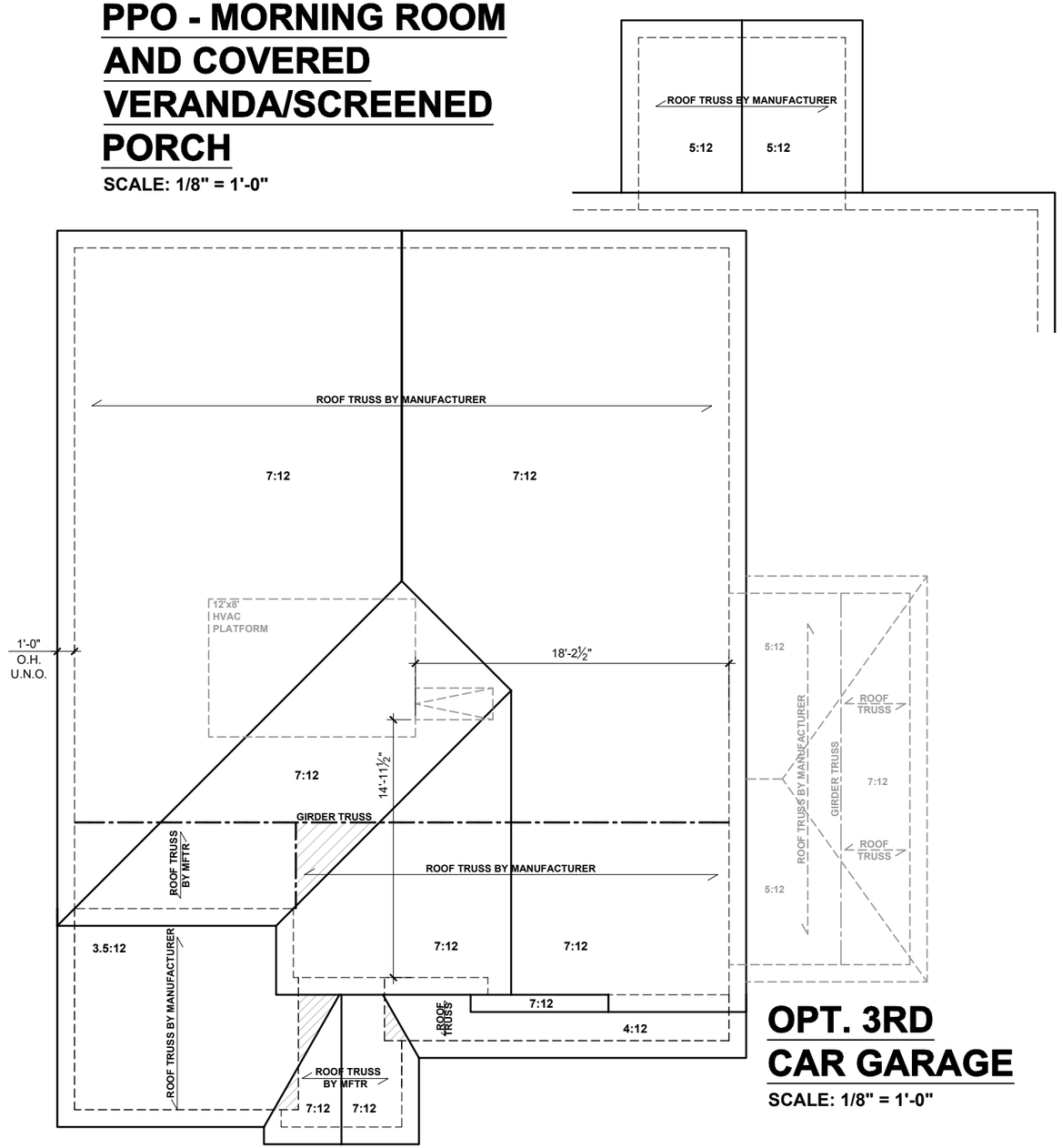
SECOND FLOOR WALL BRACING PLAN

S5.0

PPO - MORNING ROOM AND COVERED VERANDA/SCREENED PORCH

SCALE: 1/8" = 1'-0"



OPT. 3RD CAR GARAGE

SCALE: 1/8" = 1'-0"

ROOF FRAMING PLAN - FRENCH COUNTRY

SCALE: 1/8" = 1'-0"

BEAM & POINT LOAD LEGEND:

- LOAD BEARING WALL
- ROOF RAFTER/TRUSS SUPPORT
- DOUBLE RAFTER / DOUBLE JOIST
- STRUCTURAL BEAM / GIRDER
- WINDOW / DOOR HEADER
- ⊠ POINT LOAD TRANSFER
- ■ POINT LOAD FROM ABOVE BEARING ON BEAM / GIRDER

TRUSSED ROOF - STRUCTURAL NOTES

1. PROVIDE CONTINUOUS BLOCKING THROUGH STRUCTURE FOR ALL POINT LOADS.
2. DENOTES OVER-FRAMED AREA
3. MINIMUM 7/16" OSB ROOF SHEATHING
4. TRUSS LAYOUT AND PLACEMENT BY MANUFACTURER TO COINCIDE WITH THE SUPPORT LOCATIONS SHOWN. TRUSS PROFILES SHALL BE SEALED BY THE TRUSS MANUFACTURER. TRUSS PLANS TO BE COORDINATED WITH THE SEALED STRUCTURAL DRAWINGS. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
5. MANUFACTURER TO PROVIDE REQUIRED UPLIFT CONNECTION.
6. PROVIDE H2.5A (MINIMUM) OR EQUIVALENT AT EACH TRUSS-TO-TOP PLATE CONNECTION AT OVER-FRAMED AREAS, UNLESS NOTED OTHERWISE.
7. UPLIFT CONNECTION TO BE CARRIED THROUGH TO FLOOR SYSTEM.

TRUSS UPLIFT CONNECTORS: EXPOSURE B, 115 MPH, ANY PITCH, 24" O.C. MAX ROOF TRUSS SPACING

TRUSSES SHALL BE ATTACHED TO SUPPORT WALL FOR UPLIFT RESISTANCE. CONTINUOUS OSB WALL SHEATHING BELOW PROVIDES CONTINUOUS UPLIFT RESISTANCE TO FOUNDATION. ALL TRUSSES SUPPORTED BY INTERMEDIATE SUPPORT WALLS, KNEEWALLS, OR BEAMS SHALL BE ATTACHED TO SUPPORTING MEMBER PER SCHEDULE:

ROOF SPAN IS MEASURED HORIZONTALLY BETWEEN FURTHEST SUPPORT POINTS.

ROOF PLAN	CONNECTOR
UP TO 28'	NAILING PER TABLE 602.3(1) NCRBC 2018 EDITION
OVER 28'	(1) SIMPSON H2.5A HURRICANE CLIP TO DBL TOP PLATE OR BEAM
	OR (1) SIMPSON H3 CLIP TO SINGLE 2x4 PLATE

ATTIC VENTILATION

THE TOTAL NET-FREE VENTILATION AREA SHALL NOT BE LESS THAN 1/150 OF THE AREA OF THE ATTIC SPACE TO BE VENTILATED. THE TOTAL VENTILATION MAY BE REDUCED TO 1/300 PROVIDED AT LEAST 50% BUT NOT MORE THAN 80% OF THE REQUIRED VENTILATION BE LOCATED IN THE UPPER PORTION OF THE AREA TO BE VENTILATED, OR AT LEAST 3' ABOVE THE SOFFIT VENTILATION INTAKE.

__2013__ SQUARE FEET OF TOTAL ATTIC / 150 =

__13.42__ SQUARE FEET OF NET-FREE VENTILATION REQUIRED

ATTIC VENTILATION FOR 3RD CAR GARAGE

THE TOTAL NET-FREE VENTILATION AREA SHALL NOT BE LESS THAN 1/150 OF THE AREA OF THE ATTIC SPACE TO BE VENTILATED. THE TOTAL VENTILATION MAY BE REDUCED TO 1/300 PROVIDED AT LEAST 50% BUT NOT MORE THAN 80% OF THE REQUIRED VENTILATION BE LOCATED IN THE UPPER PORTION OF THE AREA TO BE VENTILATED, OR AT LEAST 3' ABOVE THE SOFFIT VENTILATION INTAKE.

__247__ SQUARE FEET OF TOTAL ATTIC / 150 =

__1.64__ SQUARE FEET OF NET-FREE VENTILATION REQUIRED

ATTIC VENTILATION: PPO - REAR COVERED OPTIONS

THE TOTAL NET-FREE VENTILATION AREA SHALL NOT BE LESS THAN 1/150 OF THE AREA OF THE ATTIC SPACE TO BE VENTILATED. THE TOTAL VENTILATION MAY BE REDUCED TO 1/300 PROVIDED AT LEAST 50% BUT NOT MORE THAN 80% OF THE REQUIRED VENTILATION BE LOCATED IN THE UPPER PORTION OF THE AREA TO BE VENTILATED, OR AT LEAST 3' ABOVE THE SOFFIT VENTILATION INTAKE.

__120__ SQUARE FEET OF TOTAL ATTIC / 150 =

__0.80__ SQUARE FEET OF NET-FREE VENTILATION REQUIRED

UPGRADED SIDE ELEVATION DOES NOT AFFECT ROOF FRAMING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 050218 3/21/24 ENGINEER UCHENNA ONWUEMENE

Uchenna Onwuemene

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PROJECT: SEQUOIA - RH

LOCATION: NORTH CAROLINA

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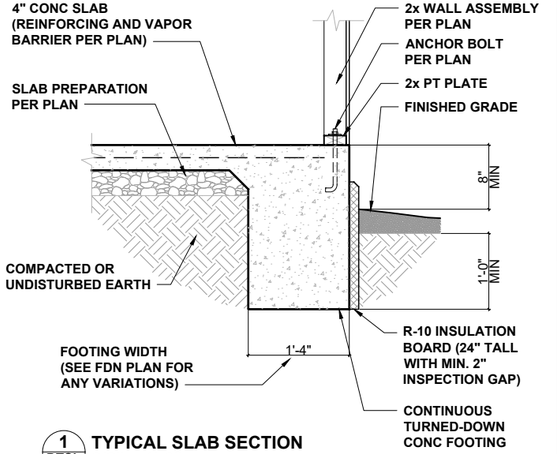
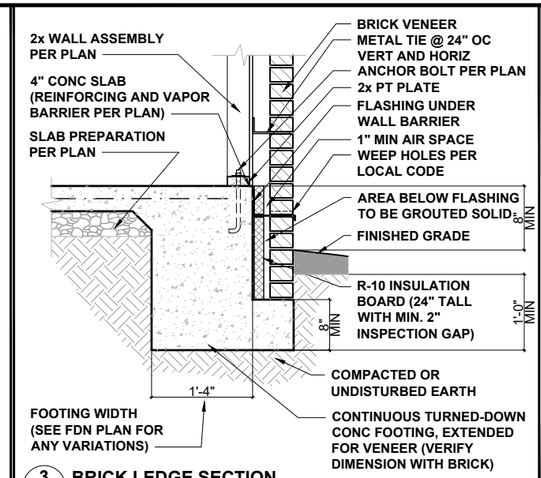
DRAWN BY: NWS

ROOF FRAMING PLAN

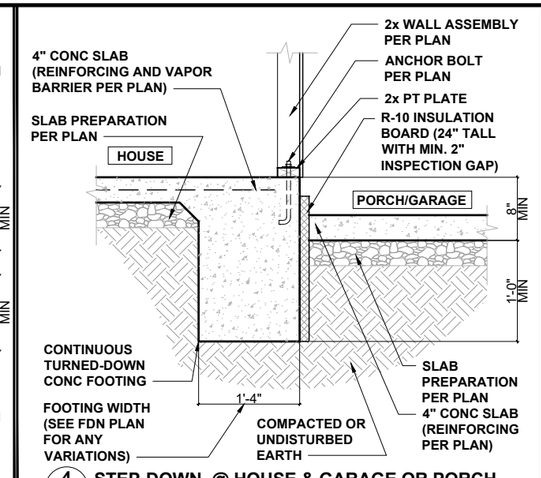
S7.0



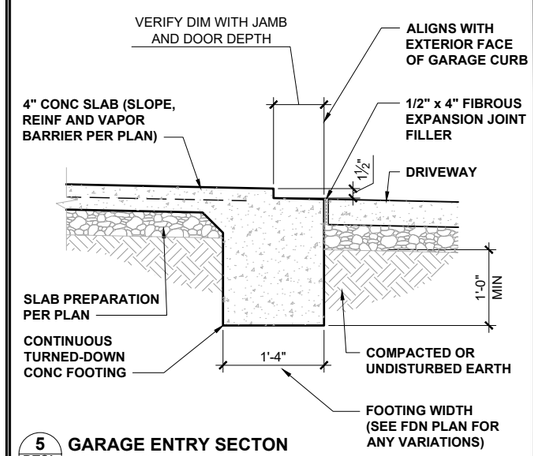
1 DTSL **TYPICAL SLAB SECTION**
3/8" = 1'-0"



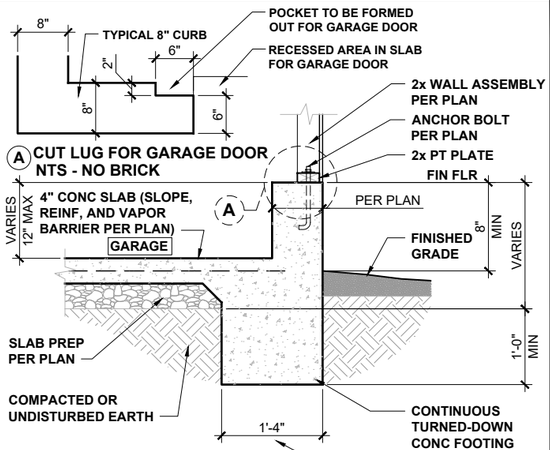
3 DTSL **BRICK LEDGE SECTION**
3/8" = 1'-0"



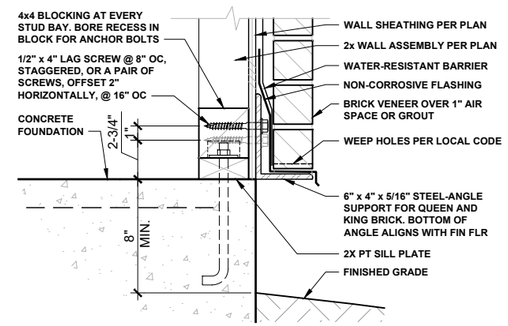
4 DTSL **STEP-DOWN. @ HOUSE & GARAGE OR PORCH**
3/8" = 1'-0"



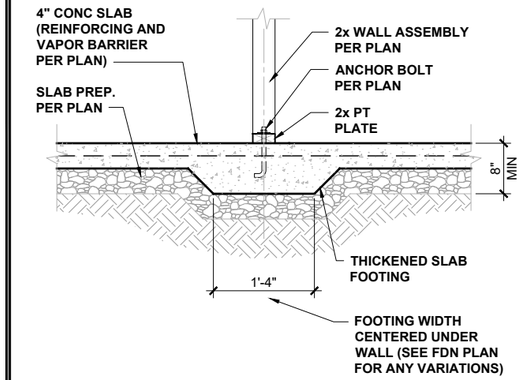
5 DTSL **GARAGE ENTRY SECTON**
3/8" = 1'-0"



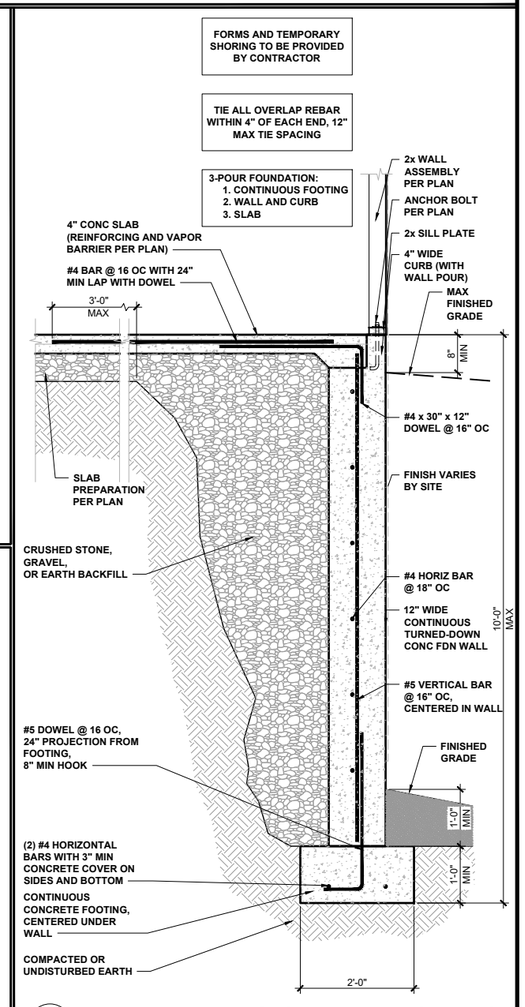
6 DTSL **GARAGE CURB SECTION**
3/8" = 1'-0"



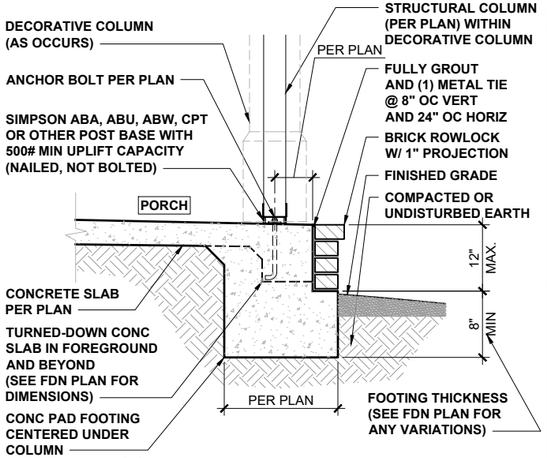
7 DTSL **FOUNDATION LINTEL SUPPORT FOR BRICK VENEER**
NTS



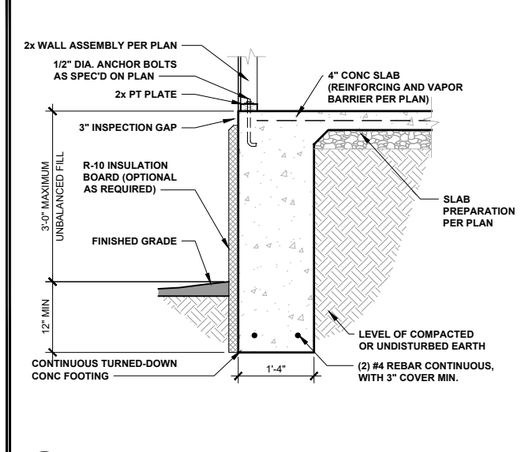
8 DTSL **INTERIOR FOOTING SECTION**
3/8" = 1'-0"



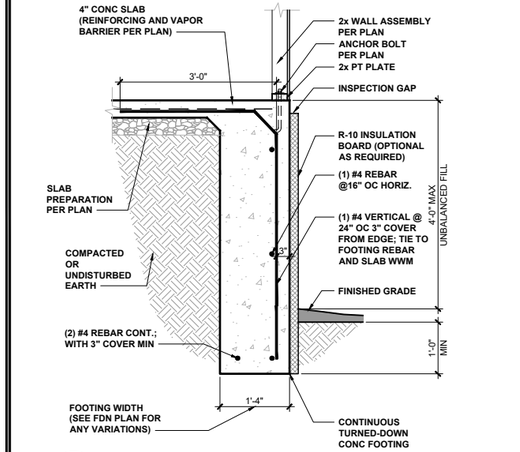
12 DTSL **6' EXTENDED, REINFORCED TURNED DOWN FTG.**
3/8" = 1'-0"



9 DTSL **PORCH SLAB W/ BRICK LEDGE SECTION (OPTIONAL STONE)**
3/8" = 1'-0"



10 DTSL **3' EXTENDED TURNED DOWN FOOTING.**
3/8" = 1'-0"



11 DTSL **EXTENDED RETAINED FOOTING SECTION**
3/8" = 1'-0"

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CLIENT: MATTAMY HOMES
PROJECT: STANDARD DETAILS
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

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PROJECT NO.: STANDARD DETAILS
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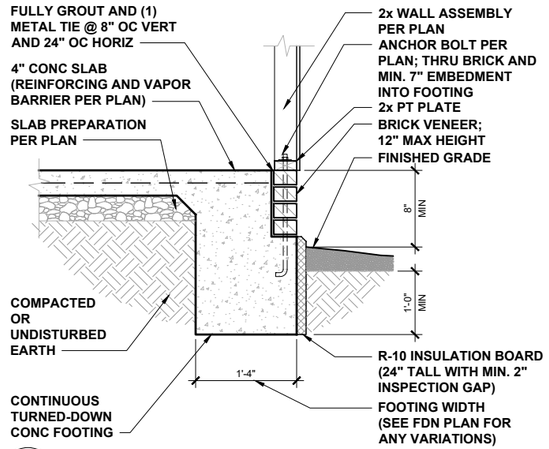
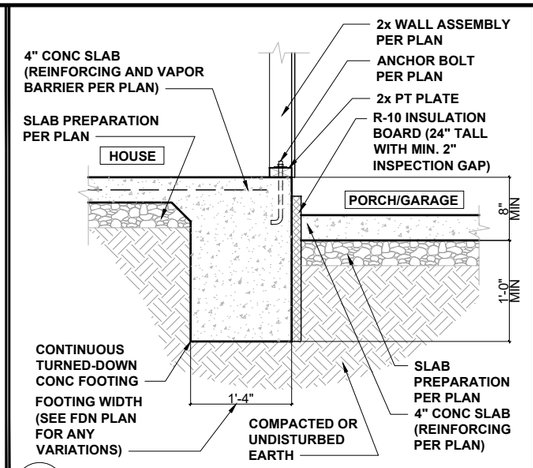
SLAB FOUNDATION DETAILS

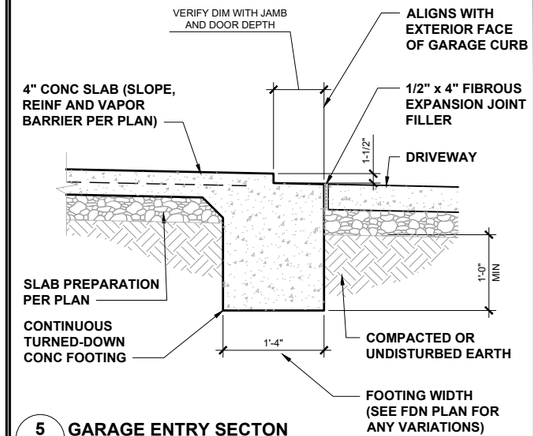
DTSL



1 DTSLB **TYPICAL SLAB WITH BRICK SECTION**
1/2" = 1'-0"

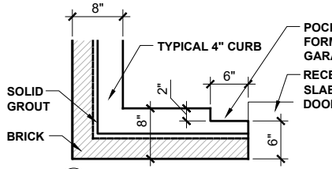


4 DTSLB **STEP-DOWN. BETWEEN HOUSE & GARAGE**
3/8" = 1'-0"



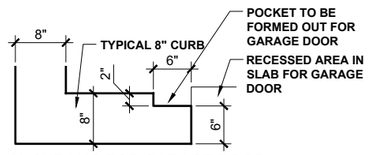
5 DTSLB **GARAGE ENTRY SECTON**
3/8" = 1'-0"

CURB W/ BRICK MAY NOT BE USED FOR PORTAL FRAMED OPENINGS

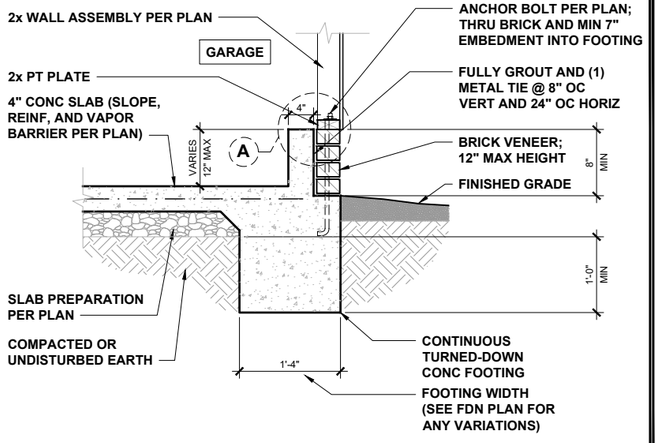


A **CUT LUG FOR GARAGE DOOR**
NTS - BRICK

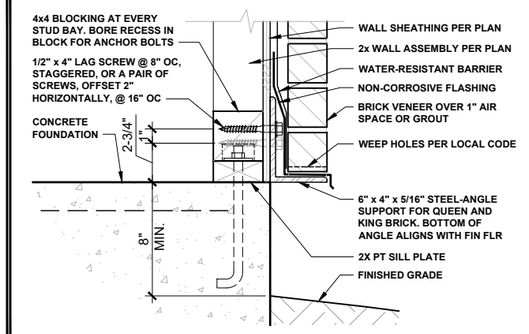
SOLID CURB MAY BE USED FOR PORTAL FRAMED OPENINGS



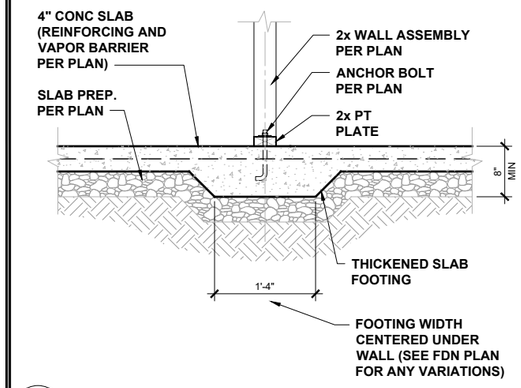
A **CUT LUG FOR GARAGE DOOR**
NTS - NO BRICK



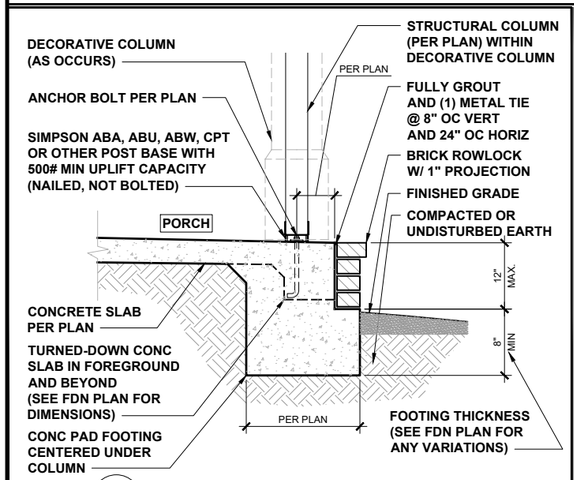
6 DTSLB **GARAGE CURB SECTION WITH BRICK**
3/8" = 1'-0"



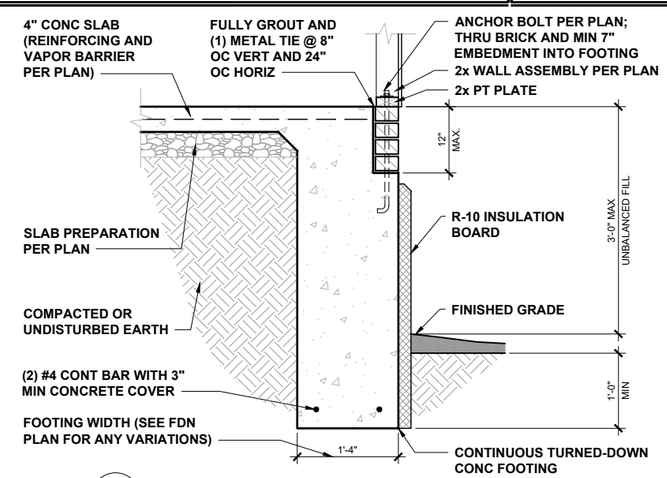
7 DTSLB **FOUNDATION LINTEL SUPPORT FOR BRICK VENEER**
NTS



8 DTSLB **INTERIOR FOOTING SECTION**
3/8" = 1'-0"



9 DTSLB **PORCH SLAB W/ BRICK LEDGE SECTION**
3/8" = 1'-0"



10 DTSLB **3' EXTENDED TURNED DOWN FOOTING**
3/8" = 1'-0"

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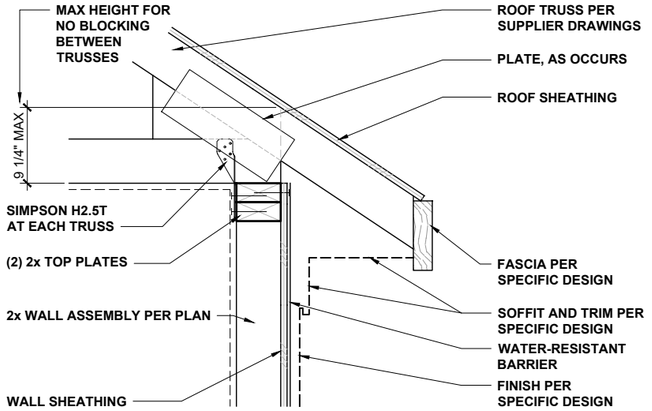
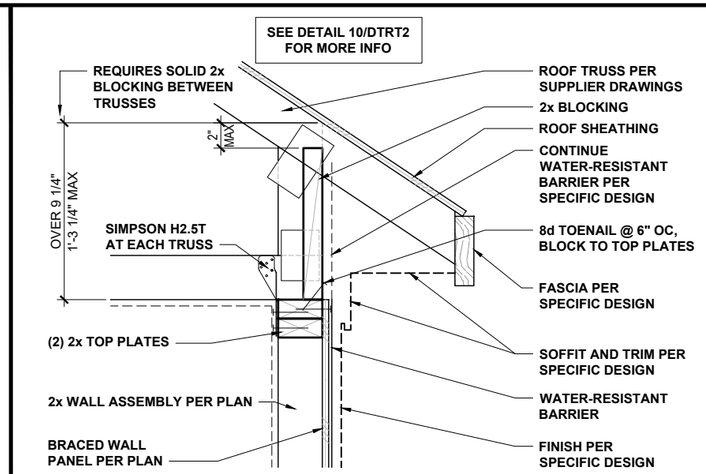
SLAB FOUNDATION DETAILS WITH BRICK

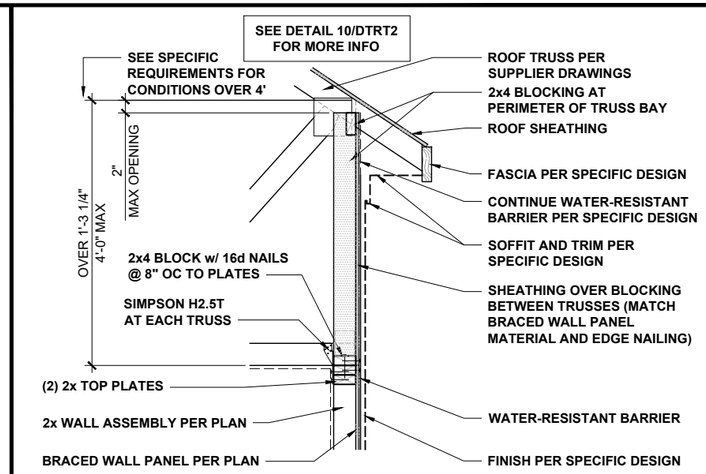
DTSLB



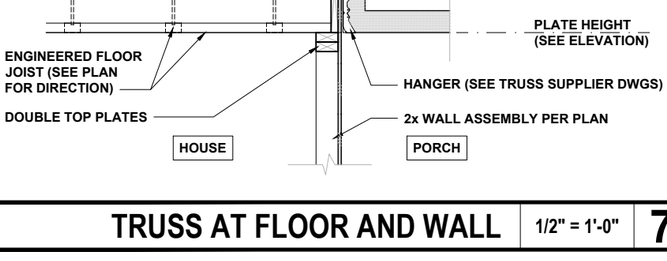
LOW-HEEL TRUSS AT WALL | 1" = 1'-0" | 1



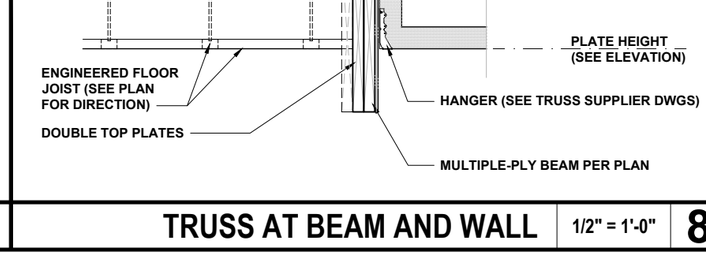
TYPICAL TRUSS AT BRACED WALL | 1" = 1'-0" | 2



HIGH-HEEL TRUSS AT BRACED WALL | 1/2" = 1'-0" | 3



END TRUSS AT WALL | 1" = 1'-0" | 4



TRUSS AT BEAM AND WALL | 1/2" = 1'-0" | 5

TRUSS AT FLOOR AND WALL | 1/2" = 1'-0" | 6

TRUSS AT FLOOR AND WALL | 1/2" = 1'-0" | 7

TRUSS AT BEAM AND WALL | 1/2" = 1'-0" | 8

GIRDER TRUSS AT WALL | 1/2" = 1'-0" | 9

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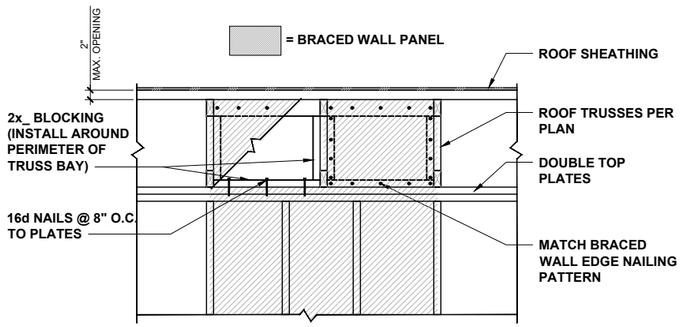
ROOF TRUSS FRAMING DETAILS

DTRT



BWP CONNECTION TO ROOF FRAMING

NTS

10

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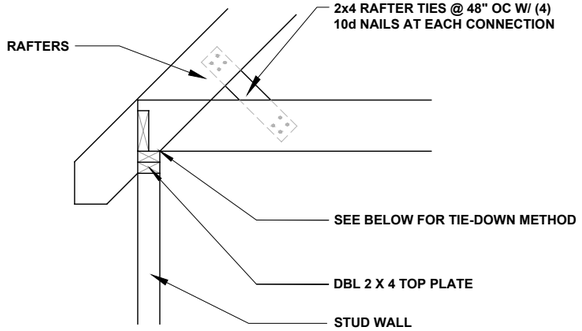
DATE: 04/27/2023

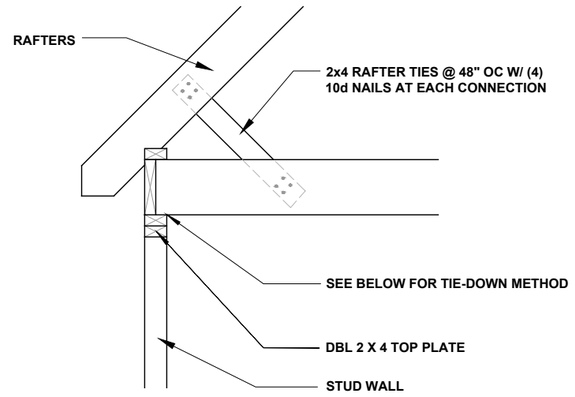
DRAWN BY: CAR

ROOF TRUSS FRAMING DETAILS

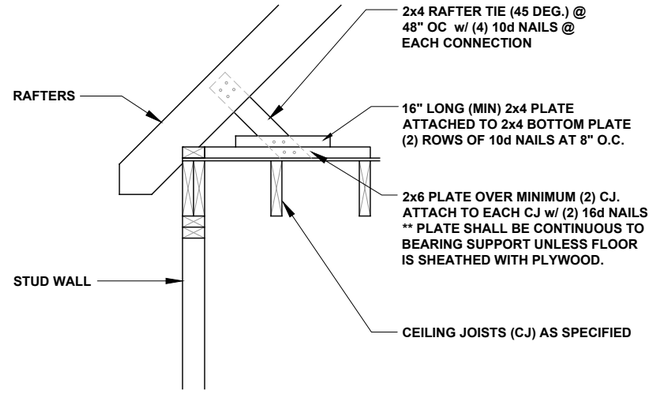
DTRT2



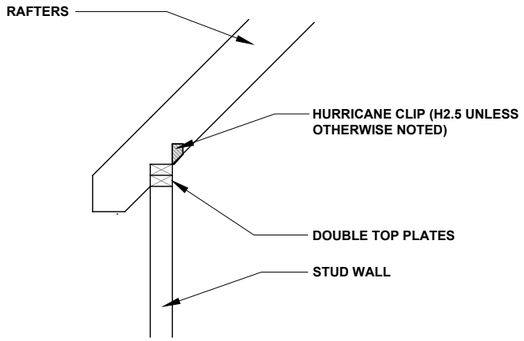
RAFTER TIE | 1/2" = 1'-0" | 1



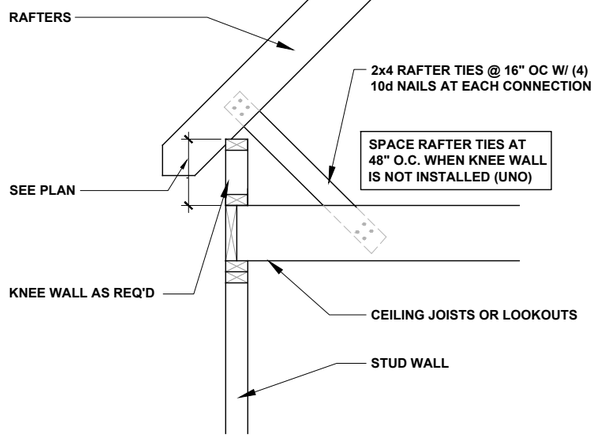
RAFTER TIE | 1/2" = 1'-0" | 2



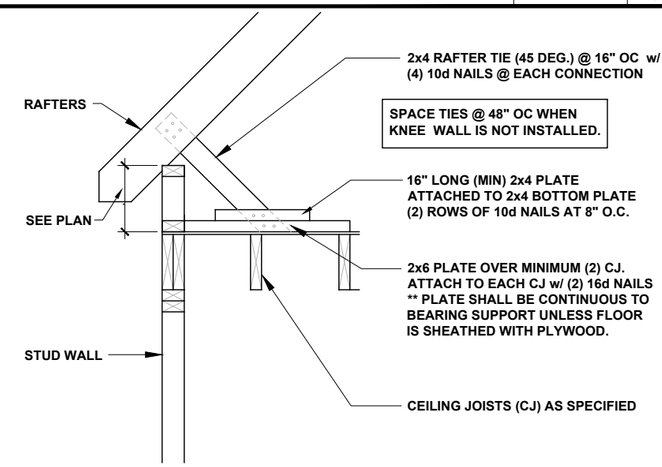
RAFTER TIE | 1/2" = 1'-0" | 3



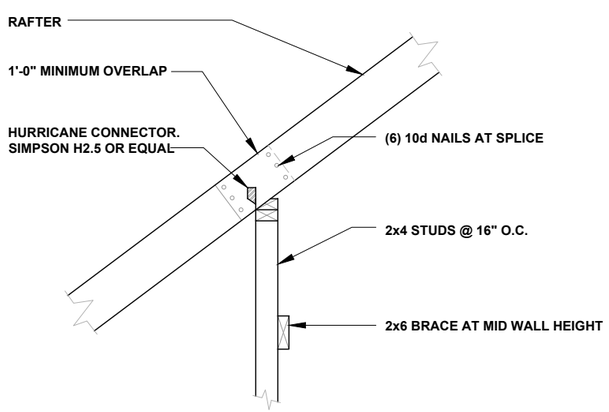
RAFTER-TO-PLATES CONNECTION | 1/2" = 1'-0" | 4



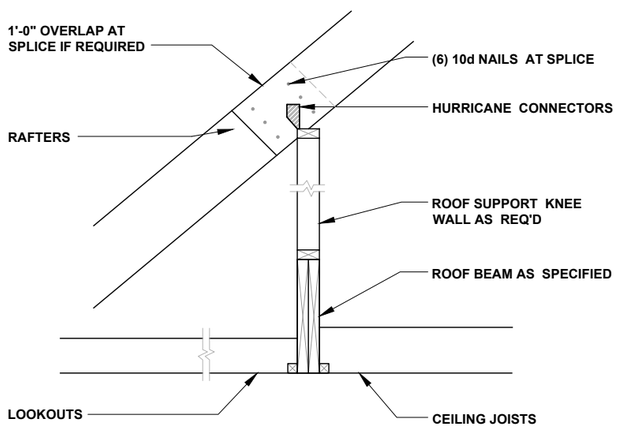
RAFTER AT KNEE WALL | 1/2" = 1'-0" | 5



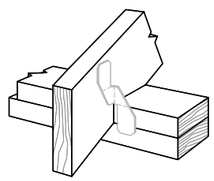
RAFTER AT KNEE WALL | 1/2" = 1'-0" | 6



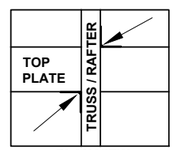
RAFTER SPLICE AT BEARING WALL | 1/2" = 1'-0" | 7



ROOF BEAM | 1/2" = 1'-0" | 8

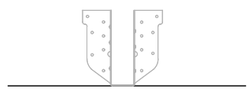


A SIMPSON H2.5A HOLD-DOWN: CAPACITY OF 535 POUNDS PER ANCHOR



PLAN VIEW

A2 SIMPSON H2.5A HOLD-DOWN CAPACITY OF 1070 POUNDS WITH TWO ANCHORS



K SIMPSON HUS26 HANGER: UPLIFT CAPACITY OF 1550 POUNDS PER ANCHOR. ALLOWABLE VERTICAL LOAD 2720 POUNDS.

NOTES:
ALL HOLD DOWN VALUES ARE BASED ON SPF LUMBER AND ARE FROM SIMPSON C-2011 CATALOG

FRAMING CONNECTORS | NTS | 9

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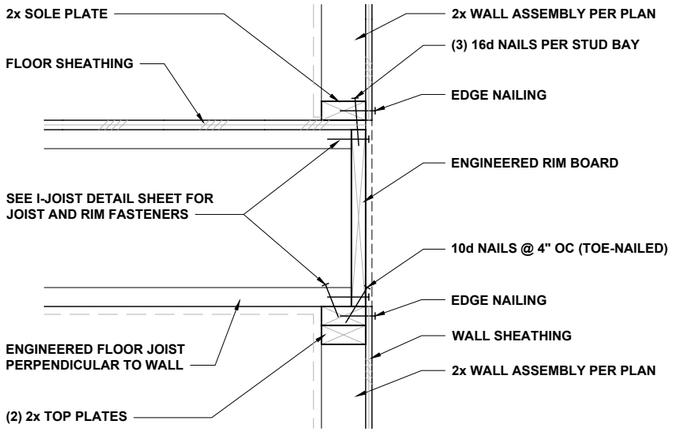
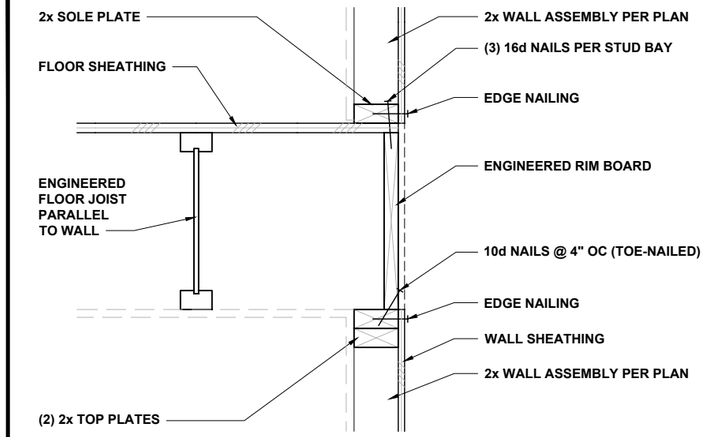
CONVENTIONAL FRAMING DETAILS

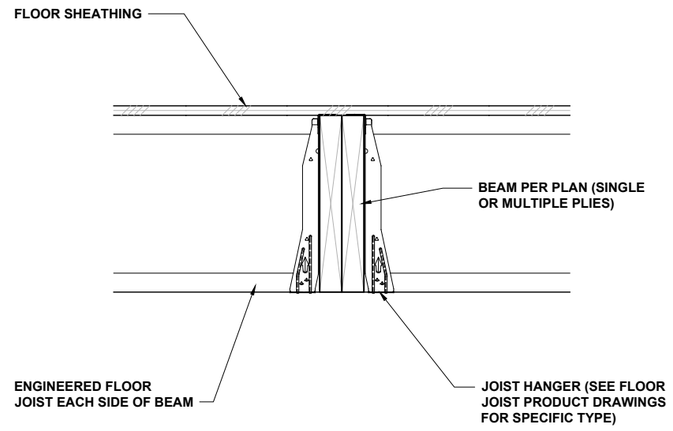
DTRR



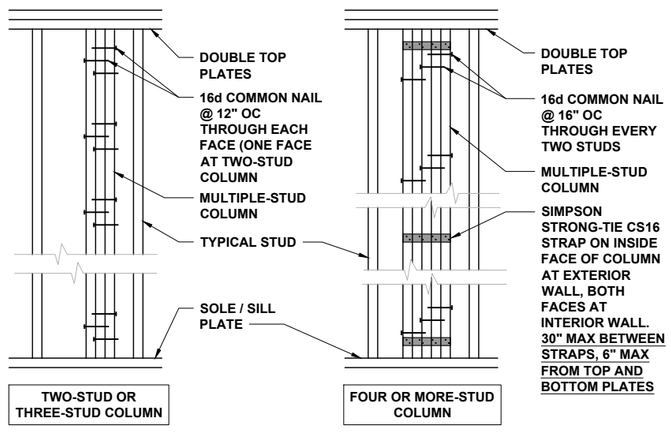
FLOOR JOISTS PERP TO WALL | 1" = 1'-0" | 1



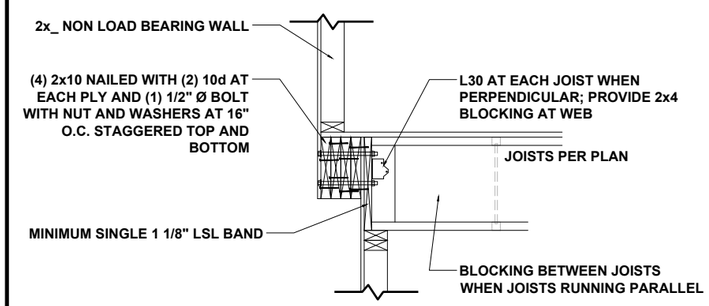
FLOOR JOISTS PARALLEL TO WALL | 1" = 1'-0" | 2



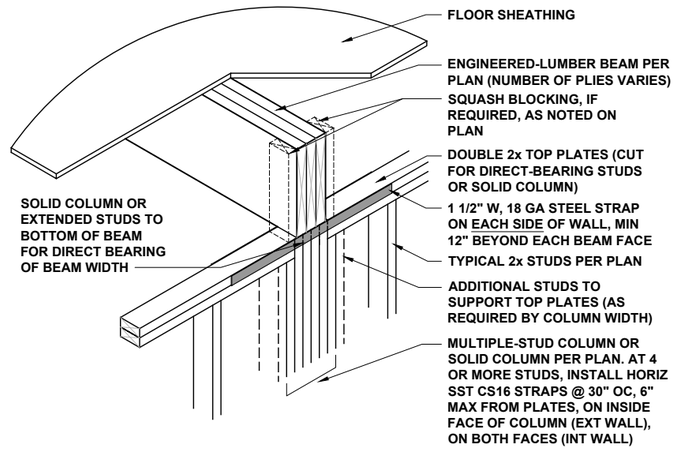
FLOOR JOISTS AT FLUSH BEAM | 3/4" = 1'-0" | 3



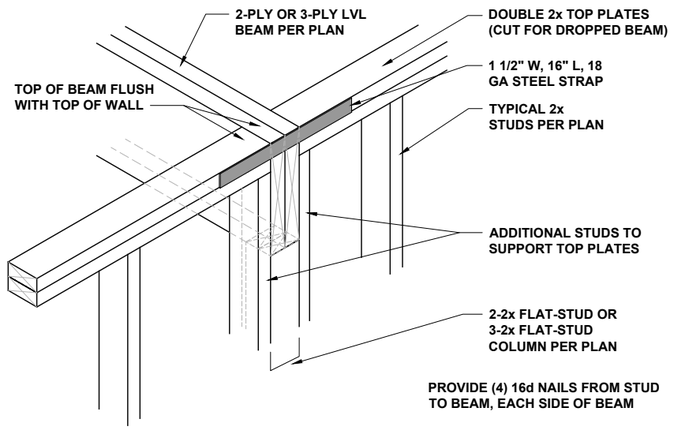
MULTIPLE-STUD COLUMN FASTENING | 1/2" = 1'-0" | 4



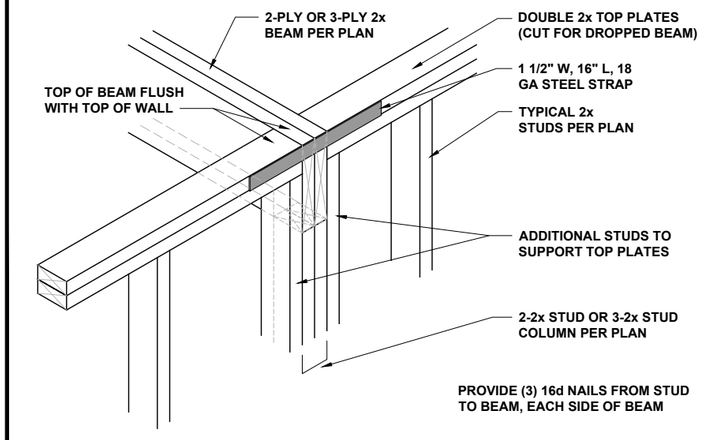
6 IN. SIDE UPGRADE CONNECTION | 1/2" = 1'-0" | 5



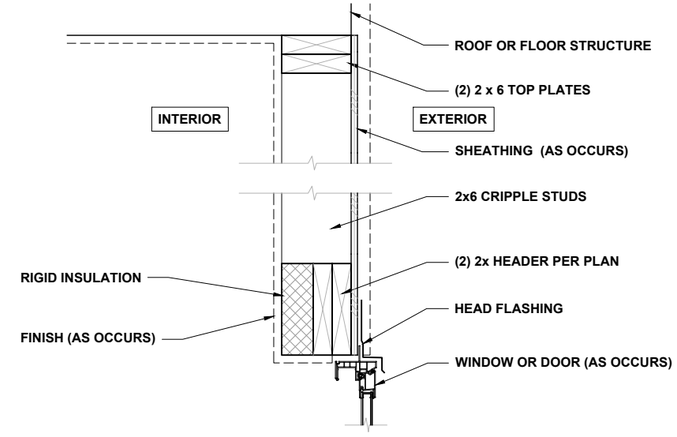
FLUSH BEAM AT WALL | 1/2" = 1'-0" | 6



DROPPED LVL BEAM AT WALL | 3/4" = 1'-0" | 7



DROPPED 2x BEAM AT WALL | 3/4" = 1'-0" | 8



HEADER WITH INSULATION | 1" = 1'-0" | 9

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PROJECT: STANDARD DETAILS
LOCATION: NORTH CAROLINA
SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

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PROJECT NO.: STANDARD DETAILS
DATE: 04/27/2023
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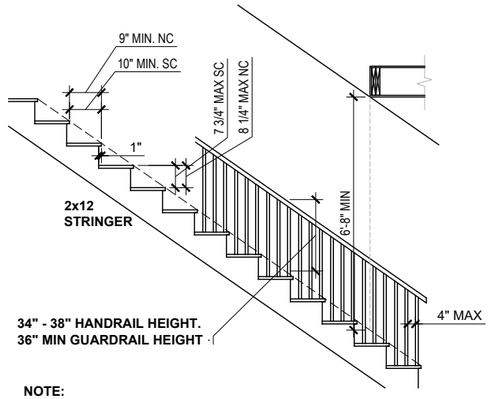
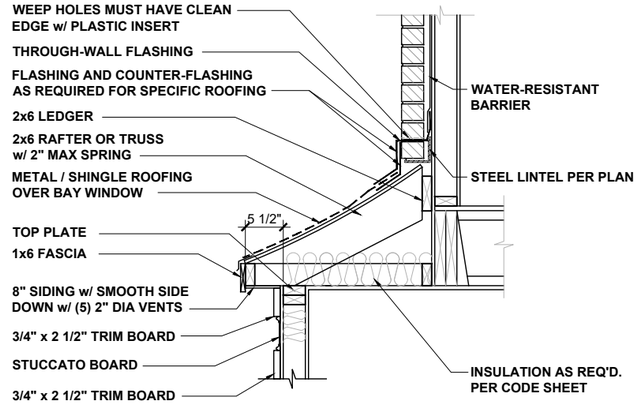
MISCELLANEOUS FRAMING DETAILS

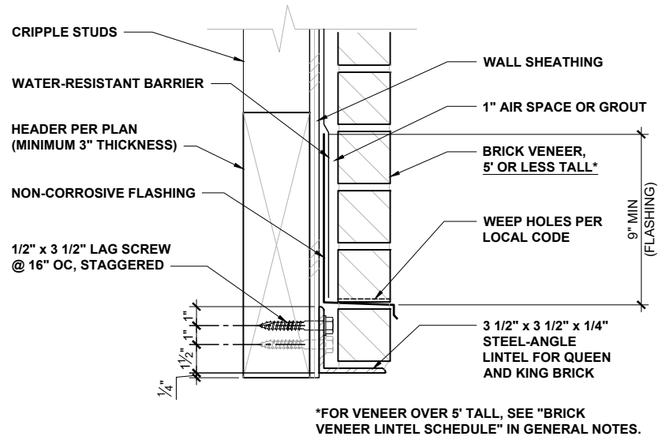
MISC1



TYPICAL STAIR REQUIREMENTS | 1/4" = 1'-0" | 1

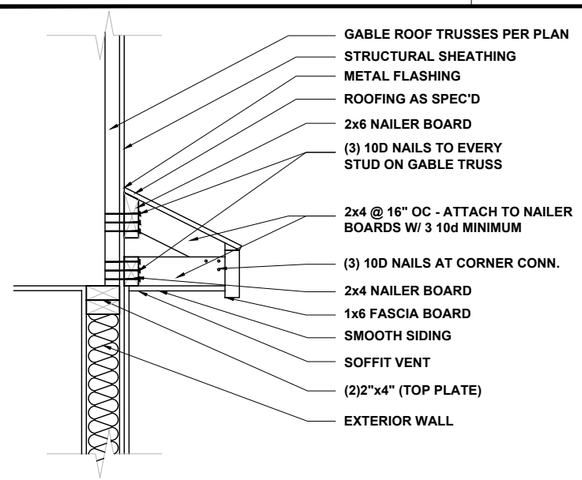


BAY ROOF | 1/2" = 1'-0" | 2

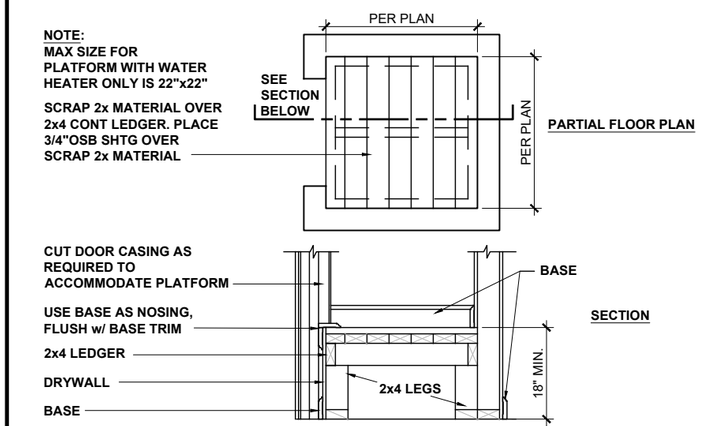


*FOR VENEER OVER 5' TALL, SEE "BRICK VENEER LINTEL SCHEDULE" IN GENERAL NOTES.

ALTERNATE LINTEL AT WIDE OPENING | 1 1/2" = 1'-0" | 3

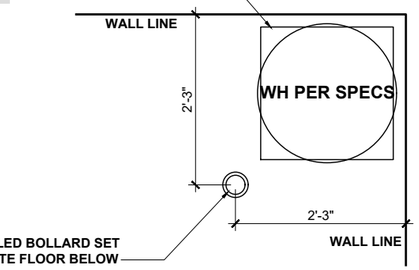


GABLE ROOF RETURN | 3/4" = 1'-0" | 4

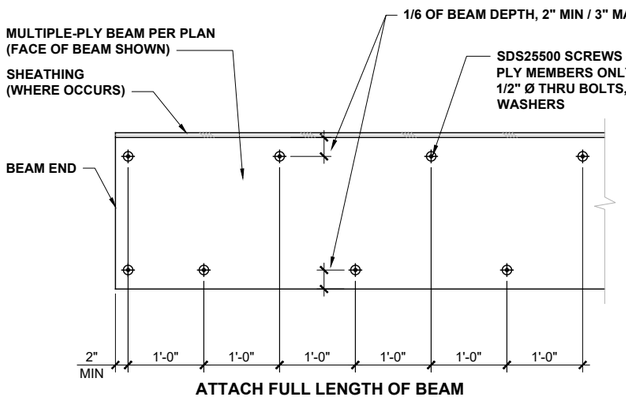


NOTE: PROVIDE PT SILL PLATE WHEN PLATFORM IS ON SLAB FOUNDATION.

HVAC / WATER HEATER CLOSET | 1/2" = 1'-0" | 5



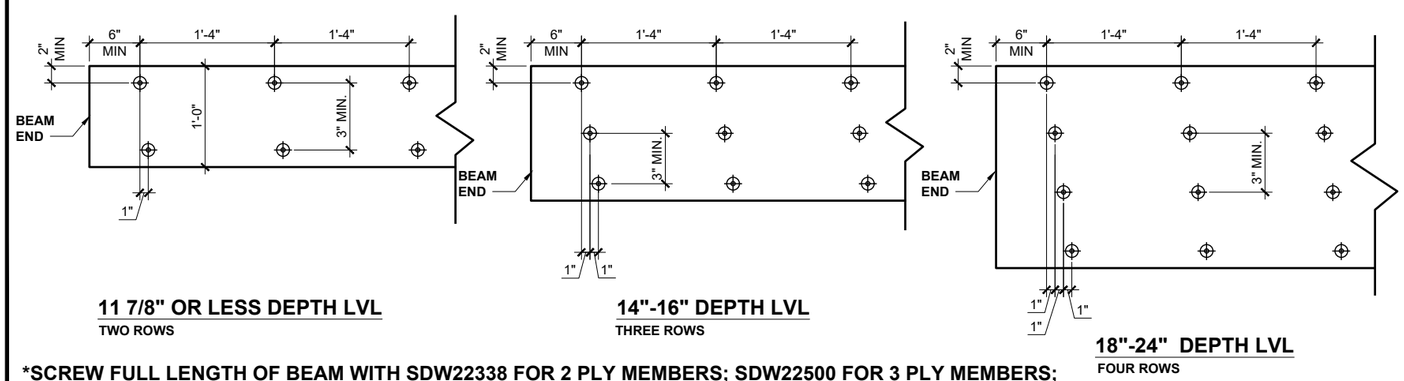
WATER HTR PLATFORM IN GARAGE | 1/2" = 1'-0" | 6



ATTACH FULL LENGTH OF BEAM

APPLIES AT BEAMS OF FOUR PLIES OR MORE

2x_ BEAM ATTACHMENT | 1/2" = 1'-0" | 7



11 7/8" OR LESS DEPTH LVL
TWO ROWS

14"-16" DEPTH LVL
THREE ROWS

18"-24" DEPTH LVL
FOUR ROWS

*SCREW FULL LENGTH OF BEAM WITH SDW22338 FOR 2 PLY MEMBERS; SDW22500 FOR 3 PLY MEMBERS; SDW22634 OR TRUSSLOK EWS670-F6.7 SCREWS FOR 4 PLY MEMBERS

**SCREWS ARE TO BE INSTALLED FROM THE SIDE THAT IS CARRYING THE GREATER SPAN OF LOAD FROM ADJACENT STRUCTURE, OR AS CALLED OUT ON THE PLAN AT THE BEAM.

LVL BEAM SCREW ATTACHMENT METHODS | NTS | 8

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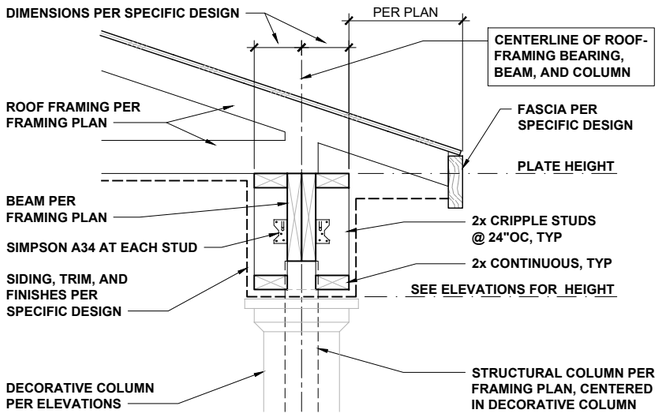
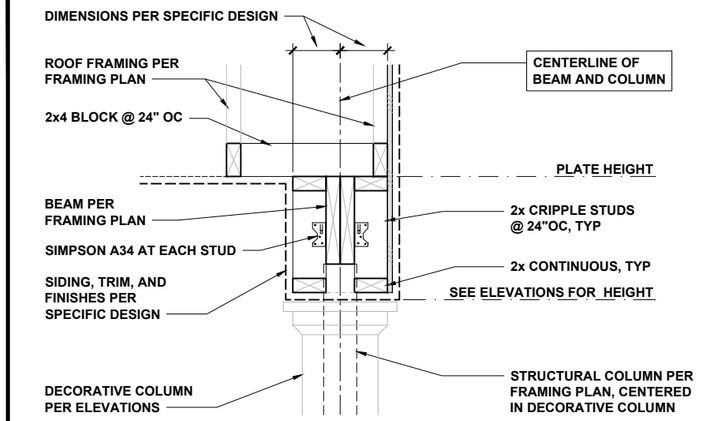
MISCELLANEOUS FRAMING DETAILS

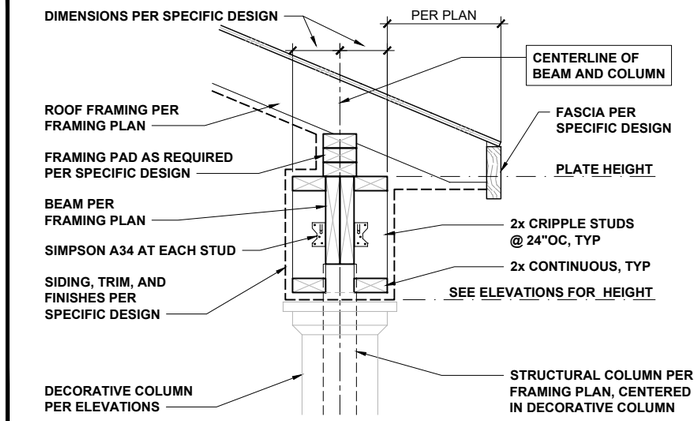
MISC2



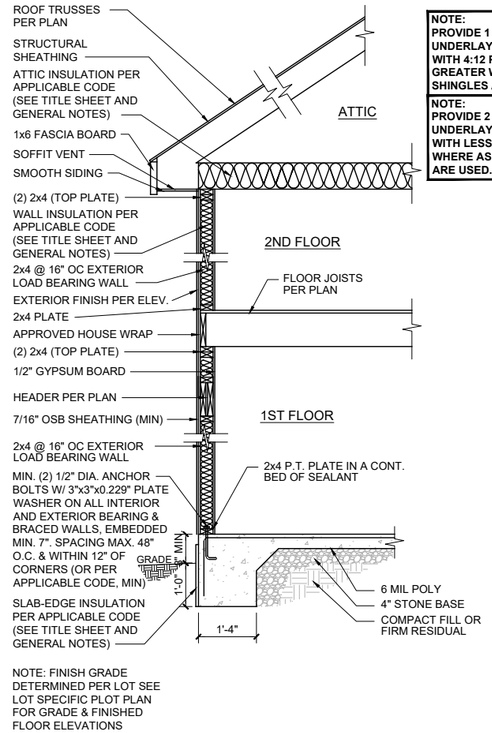
COVERED PORCH EAVES | 3/4" = 1'-0" | 1



COVERED PORCH RAKE | 3/4" = 1'-0" | 2



COVERED PORCH WITH SLOPING CLG | 3/4" = 1'-0" | 3



NOTE:
PROVIDE 1 LAYER OF UNDERLAYMENT ON ROOF WITH 4:12 PITCH OR GREATER WHERE ASPHALT SHINGLES ARE USED.

NOTE:
PROVIDE 2 LAYERS OF UNDERLAYMENT ON ROOF WITH LESS THAN 4:12 PITCH WHERE ASPHALT SHINGLES ARE USED.

NOTE: FINISH GRADE DETERMINED PER LOT SEE LOT SPECIFIC PLOT PLAN FOR GRADE & FINISHED FLOOR ELEVATIONS

TWO-STORY ON SLAB | NTS | 4

DK POST HOLD-DOWN | NTS | 5

GOAL-POST FRAMING | NTS | 6

INTERIOR COL. | 3/4" = 1'-0" | 7

6" ENHANCED SIDE BOXOUT DETAILS | 1/2" = 1'-0" | 8

****FOR ALL EAVES THAT CROSS PROPERTY LINES, REFER TO U305 OVERHANG DETAIL 3 ON SHEET DTRT FOR EAVE FIRE-RATED CONSTRUCTION PER R302.2.6 NCRC 2012**

U305 SEC. AT OVERHANG | 1/2" = 1'-0" | 9

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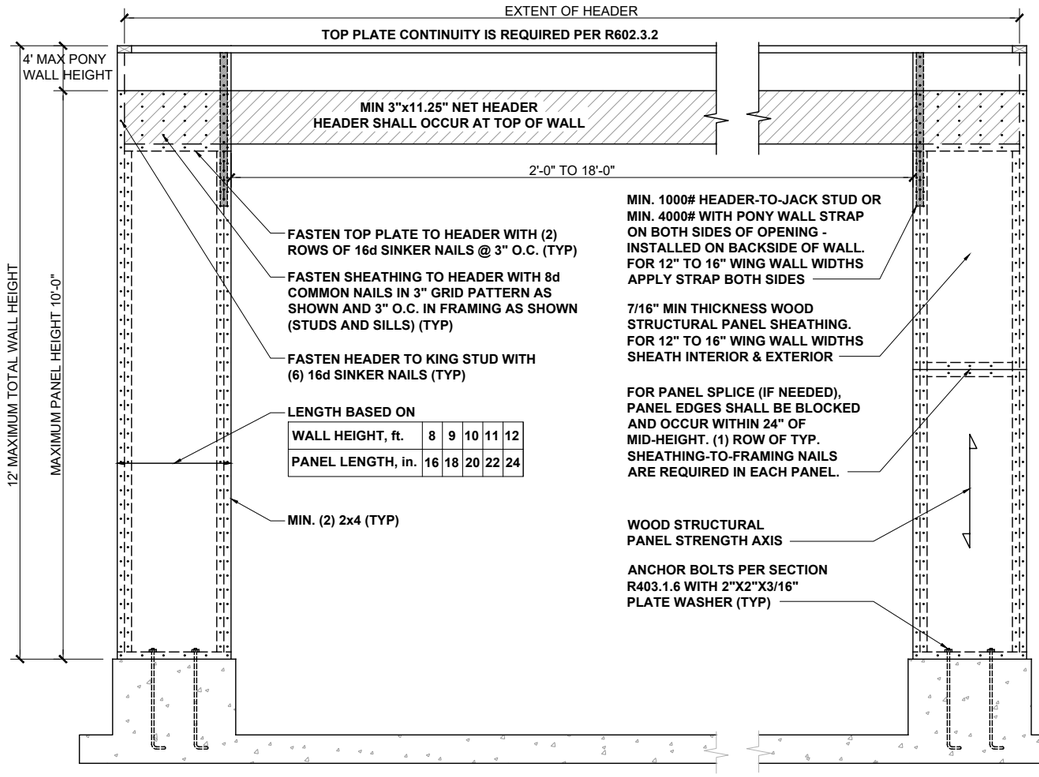
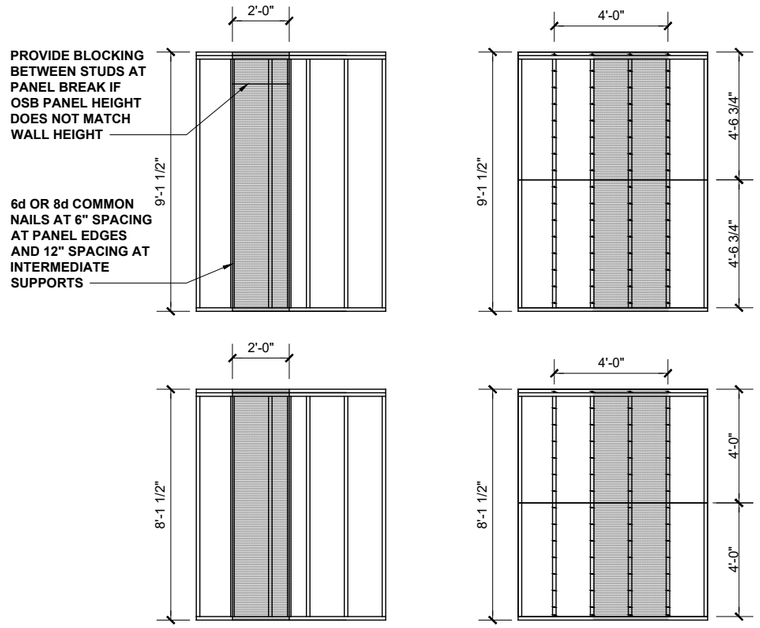
MISCELLANEOUS FRAMING DETAILS

MISC3



WALL HEIGHT, ft.	8	9	10	11	12
PANEL LENGTH, in.	16	18	20	22	24

METHOD PF: PORTAL FRAME PANEL CONSTRUCTION | 3/8" = 1'-0" | 1



CS-WSP - WOOD STRUCTURAL PANEL (CONTINUOUSLY SHEATHED)

BRACED WALL PANEL 7/16" MIN. OSB SHEATHING ON ONE SIDE OF WALL. MINIMUM PANEL LENGTH 24".

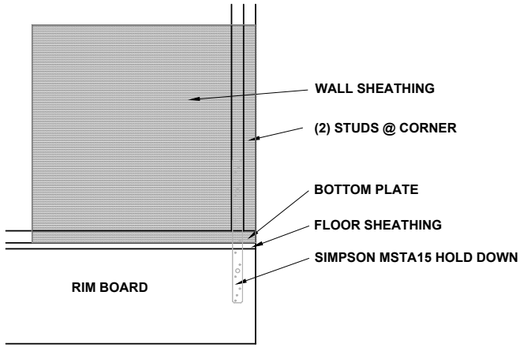
GB - GYPSUM BOARD

BRACED WALL PANEL 1/2" GYPSUM BOARD NAILED TO STUDS AT 7" O.C. USING 5d COOLER NAILS OR #6 SCREWS. MINIMUM PANEL LENGTH 48" WHEN APPLIED TO BOTH SIDES OF WALL AND 96" WHEN APPLIED TO ONE SIDE OF WALL.

HIGH-SPEED WIND ZONES

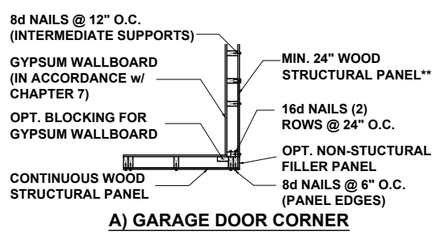
FOR LOCATIONS OF 130 MPH OR MORE ULTIMATE DESIGN WIND SPEED (110 MPH OR MORE BASIC WIND SPEED IN VIRGINIA AND GEORGIA), WALLS SHALL BE BRACED PER THE LATEST ADOPTED EDITION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS PUBLICATION *ASCE 7* OR *STANDARD FOR RESIDENTIAL CONSTRUCTION IN HIGH-WIND REGIONS* (ICC 600).

BRACING METHODS | 3/16" = 1'-0" | 2

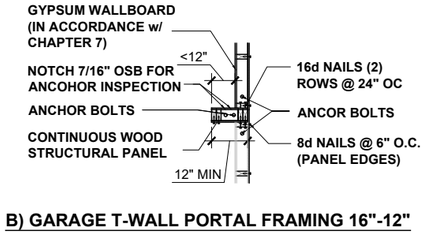


▶ SIMPSON MSTA15 HOLD DOWN CAPACITY OF 970 POUNDS PER ANCHOR WITH (12) 10d NAILS. STRAP TO BE LOCATED AT EDGE OF BRACED WALL PANEL.

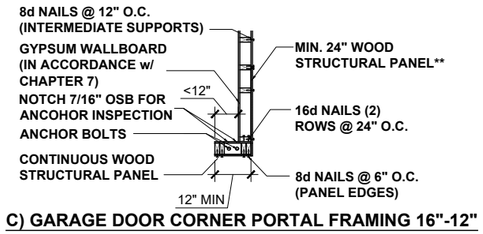
BRACED WALL HOLD-DOWN | NTS | 3



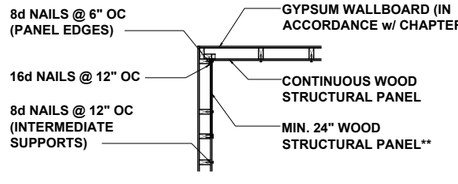
A) GARAGE DOOR CORNER



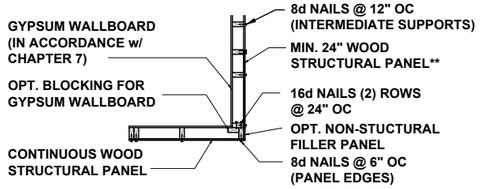
B) GARAGE T-WALL PORTAL FRAMING 16"-12"



C) GARAGE DOOR CORNER PORTAL FRAMING 16"-12"



D) ALT. INSIDE CORNER DETAIL



E) ALT. OUTSIDE CORNER DETAIL

** IN LIEU OF THE CORNER RETURN, A HOLD-DOWN DEVICE WITH A MINIMUM UPLIFT DESIGN VALUE OF 800# SHALL BE FASTENED TO THE CORNER STUD AND TO THE FOUNDATION OR FRAMING BELOW.

CORNER FRAMING FOR CONTINUOUS SHEATHING | 1/4" = 1'-0" | 4

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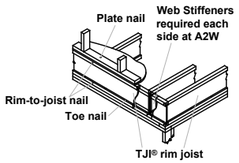
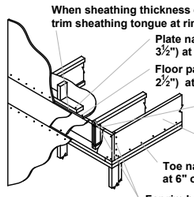
WALL BRACING DETAILS

DTWB

JOIST DETAILS



A2 A2W *Must have 1¼" minimum joist bearing at ends. Attach rim joist per A3 detail.*

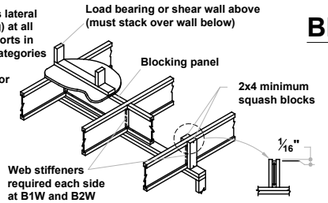


A3 A3W

For rim board thicker than 1 ¾"
- Attach Joist to rim board with one 10d (0.128"x3") nail. Top nail from joist into rim board.
- Connect corner with four 10d (0.128"x3") nails. Toe nail from side of parallel closure into rim board

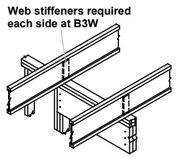
IRC 502-7 requires lateral restraint (blocking) at all intermediate supports in Seismic Design Categories D0, D1, and D2 to strengthen the floor diaphragm.

B1 B1W

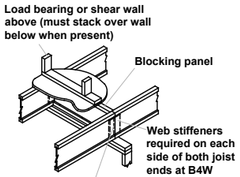


B2 B2W Blocking panels may be required with shear walls above or below - see detail B1

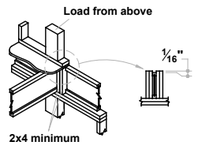
INTERMEDIATE BEARING
NO LOAD BEARING WALL ABOVE



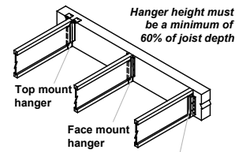
B3 B3W Blocking panels may be required with shear walls above or below (See detail B1)



B4 B4W



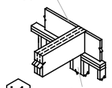
CS *Use 2x4 minimum squash blocks to transfer load around joist*



H1 Web stiffeners required if sides of hanger do not laterally support at least ⅜" of joist top flange

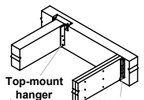
BEAM and COLUMN DETAILS

BEARING AT WALL
1¼" rim board or blocking for lateral support



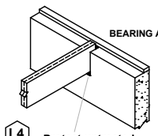
L1 Column

BEAM TO BEAM CONNECTION



L3

BEARING AT CONCRETE WALL



L4

BEARING AT COLUMN

L5 Verify column capacity and beam bearing length.

FASTENING of FLOOR PANELS

Guidelines for Closest On-Center Spacing per Row

* SEE I-JOIST EQUIVALENCE CHART

Nail Size	I-JOIST *		Rim Board	1½" LSL or wider	LVL	PSL
	110, 210, and 230 EQ.	360 and 560 EQ.	1¼" LSL			
8d (0.131" x 2½")	4"	3"	4"	3"	3"	3"
10d (0.148"x 3"), 12d (0.148"x 3¼")	4"	4"	4"	4"	4"	4"
16d (0.162"x 3½")	6"	6"	6"(2)	6"(2)	8"	6"

(1) One row of fasteners permitted (two at abutting panel edges) for diaphragms. Stagger nails when using 4" on-center spacing and maintain ⅜" joist and panel edge distance. For other applications, multiple rows of fasteners are permitted if the rows are offset at least ½" and staggered.

(2) Can be reduced to 4" on-center if nail penetration into the narrow edge is no more than 1⅜" (to avoid splitting).

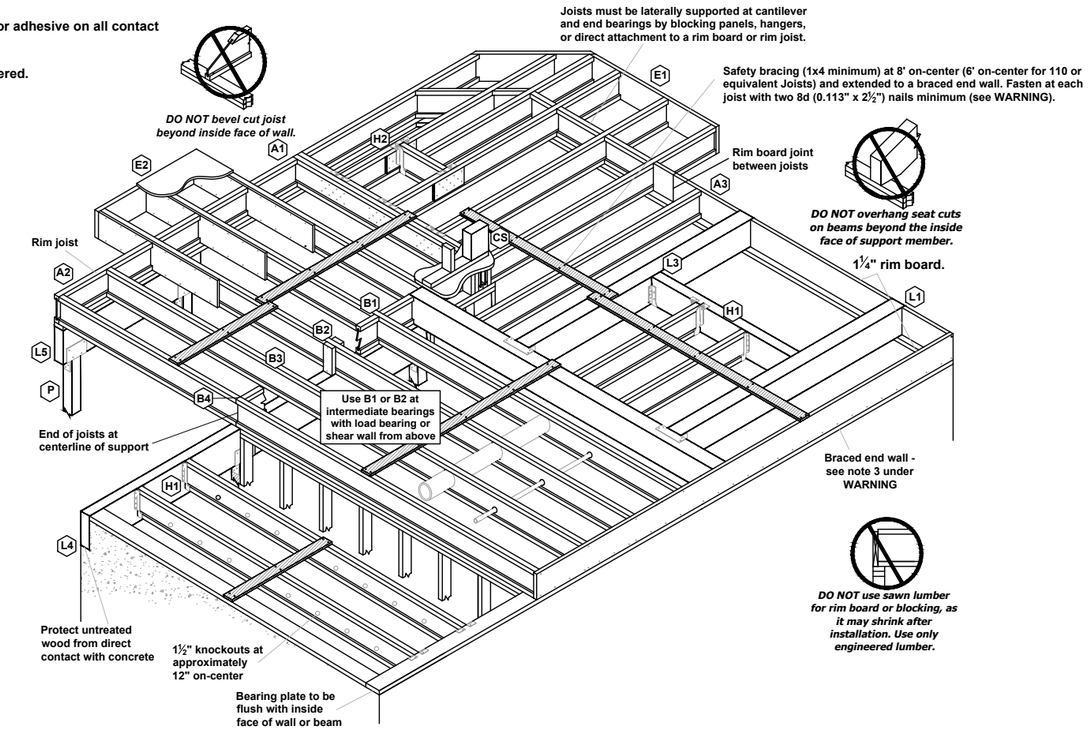
- Recommended nailing is 12" on-center in field and 6" on-center along panel edge. Fastening requirements on engineered drawings supersede recommendations listed above.
- Recommended use of a non-polyurethane subfloor adhesive on all contact points between panels and floor framing.
- Nailing rows must be offset at least ½" and staggered.
- 14 ga. staples may be substituted for 8d (0.113" x 2½") nails if minimum penetration of 1" into the joist or rim board is achieved.
- Maximum spacing of nails is 18" on-center for joists.

FILLER and BACKER BLOCK SIZES

* SEE I-JOIST EQUIVALENCE CHART

I-Joists	110 EQ. *		210 EQ. *		230 or 360 EQ. *			560 EQ. *		
Depth	9½" or 11⅞"	14"	9½" or 11⅞"	14" or 16"	9½" or 11⅞"	14" or 16"	18" or 20"	11⅞"	14" or 16"	18" or 20"
Filler Block (1) (Detail H2)	2x6	2x8	2x6 + ⅜" sheathing	2x8 + ⅜" sheathing	2x6 + ½" sheathing	2x8 + ½" sheathing	2x12 + ½" sheathing	Two 2x6	Two 2x8	Two 2x12
Cantilever Filler (Detail E4)	2x6 4'-0" long	2x10 6'-0" long	2x6 + ⅜" sheathing 4'-0" long	2x10 + ⅜" sheathing 6'-0" long	2x6 + ½" sheathing 4'-0" long	2x10 + ½" sheathing 6'-0" long	Not applicable	Not applicable		
Backer Block (1) (Detail F1 or H2)	⅝" or ¾"		¾" or ⅞"		1" Net			2x6	2x8	2x12

(1) If necessary, increase filler and backer block height for face mount hangers and maintain ⅛" gap at top of joist; see detail W. Filler and backer block lengths should accomodate required nailing without splitting (12" minimum for backer blocks and 24" minimum for filler blocks).



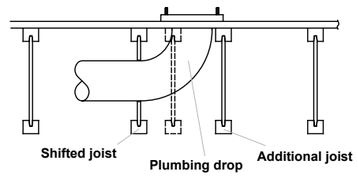
INSTALLATION TIPS

Subfloor adhesive will improve floor performance, but may not be required.

Squash blocks and blocking panels carry stacked vertical loads (details B1 and B2). Packing out the web of a joist (with web stiffeners) is not a substitute for squash blocks or blocking panels.

When joists are doubled at non-load bearing parallel partitions, space joists apart the width of the wall for plumbing or HVAC.

Additional joist at plumbing drop (see detail).



* I-JOIST EQUIVALENCY CHART

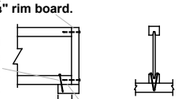
EQUIVALENT IN SPAN AND SPACING			
Depth	Mftr & Series	Mftr & Series	Mftr & Series
9 ¼"	TJI - 110	BCI 4500	
	TJI - 210	BCI 5000	
	TJI - 230	BCI 6000	EverEdge 20
		BCI 6500	
11 ⅞"	TJI - 110	BCI 4500	
	TJI - 210	BCI 5000	
	TJI - 230	BCI 6000	EverEdge 20
		BCI 6500	
	TJI - 360	BCI 60'S	EverEdge 30
	TJI - 560	BCI 90'S	EverEdge 50/60
14"	TJI - 110	BCI 4500	
	TJI - 210	BCI 5000	
	TJI - 230	BCI 6000	EverEdge 20
		BCI 6500	
	TJI - 360	BCI 60'S	EverEdge 30
	TJI - 560	BCI 90'S	EverEdge 50/60
16"	TJI - 110	BCI 4500	
	TJI - 210	BCI 5000	
	TJI - 230	BCI 6000	EverEdge 20
		BCI 6500	
	TJI - 360	BCI 60'S	EverEdge 30
	TJI - 560	BCI 90'S	EverEdge 50/60

JOIST NAILING REQUIREMENTS at BEARING

Joist to Bearing Plate

1¼" rim board.

One 8d (0.113" x 2½") nail each side. Drive nails at an angle at least 1½" from end.

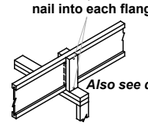


1¾" minimum bearing at end support; 3½" minimum at intermediate support

Shear transfer: Connections equivalent to floor panel nailing schedule

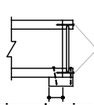
Squash Blocks to Joist
(Load bearing wall above)

One 10d (0.128" x 3") nail into each flange



Also see detail B2

Rim to Joist



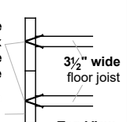
1¾" minimum bearing

1¼" rim board or 1¾" wide rim joist: One 10d (0.128" x 3") nail into each flange

2 ⅛" - 2 ⅝" wide rim joist: One 16d (0.135" x 3½") nail into each flange

3½" wide rim joist: Toe nail with 10d (0.128" x 3") nails, one each side of TJI® joist flange

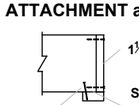
3½" wide rim joist



Locate rim board joint between joists.

BEAM ATTACHMENT at BEARING

One 10d (0.128" x 3") nail each side of member at bearing, 1½" minimum from end



Drive nails at an angle to minimize splitting of plate

1¼" rim board.

See framing plan (if applicable) or iLevel® Framer's Pocket Guide for minimum end and intermediate bearing lengths.

NORTH CAROLINA PROFESSIONAL SEAL 051518 ENGINEER JONATHAN M. CROUCH
Jonathan M Crouch 5/4/23

P-0961

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CLIENT: MATTAMY HOMES

PROJECT: STANDARD DETAILS

LOCATION: NORTH CAROLINA

SCALE: 1/8" = 1'-0" FOR 11x17 PAPER, 1/4" = 1'-0" FOR 22x34 PAPER, OR AS NOTED

mattamyHOMES

PROJECT NO.: STANDARD DETAILS

DATE: 04/27/2023

DRAWN BY: CAR

ENGINEERED JOIST DETAILS

DTIJ