Village of Hartland
210 Cottonwood Avenue
Hartland WI 53029
PH: 262-367-2714
FAX: 262-367-2430
www.villageofhartland.wi.gov

JOINT ARCHITECTURAL BOARD/PLAN COMMISSION AGENDA
MONDAY, MARCH 16, 2026 ▪ 6:30 PM
BOARD ROOM, MUNICIPAL BUILDING, 210 COTTONWOOD

Roll Call

Pledge of Allegiance

Public Comments: Please be advised the Joint Architectural Board/Plan Commission will receive comments from the public related to any item(s) on the agenda for a three-minute time period per person, with time extensions per the Chairman's discretion.

1. Consideration of a motion to approve the Jt. Architectural Board/Plan Commission minutes of February 16, 2026

2. Architectural Board review and consideration of an application for residential addition to 320 Prospect

3. Architectural Board review and consideration of an application for installation of exterior door at 375 Cottonwood Avenue

4. Architectural Board review and consideration of sign application for 418 Merton Avenue, Tropitana

5. Plan Commission review and consideration of fence installation at 313 Circle Drive, St. Charles

6. Announcements: The following individuals will be given an opportunity to make announcements at the meeting regarding (1) activities taken since the previous meeting on behalf of the community, (2) future municipal activities, and (3) communications received from citizens. It is not contemplated that these matters will be discussed or acted upon. The following individuals may provide announcements: Village President or individual Village Board members or Village Administrator or other Village Staff members.

7. Adjourn

Ryan Bailey, Village Manager

A complete packet of meeting materials is normally available by 5:00 pm on the Friday before the meeting on the Village website: www.villageofhartland.wi.gov (Government/Agendas and Minutes). Notice: Please note that upon reasonable notice, efforts will be made to accommodate the needs of disabled individuals through appropriate aids and services. For additional information or to request this service, contact Sandee Policello, Village Clerk, at 262-367-2714. The Municipal Building is handicap accessible. To participate in the Village of Hartland "Zoom" meeting with video: https://us02web.zoom.us/j/89246536894?pwd=JDPby9eNVxhDUs01kcYE4bEilpSC9f.1
The Meeting ID is 892 4653 6894, Passcode is 244886. To participate in the Village of Hartland "Zoom" meeting (audio only), please dial 1(312)626-6799.

JOINT ARCHITECTURAL BOARD/PLAN COMMISSION MINUTES
MONDAY FEBRUARY 16, 2026
6:30 PM, BOARD ROOM
MUNICIPAL BUILDING, 210 COTTONWOOD AVE.

Present: Jeff Pfannerstill, Ann Wallschlager, Jeff Bierman, Chip Schneeberger, David DeCourcy-Bower and Mike Demet.
Excused: Tim Hallquist
Others Present: Ryan Bailey, Tonia Smith, Tom Jenson, Scott Hussinger, Ryan Amtmann and Robert Talbot.
Public Comments:
No Public Comments.

1. **Consideration of a motion to approve the Jt. Architectural Board/Plan Commission minutes of December 15, 2025**

Motion (DeCourcy-Bower/Schneeberger) to approve the minutes of the December 15, 2026, meeting. Carried (6-0).

2. **Architectural Board review and consideration of an application for addition of an attached garage at 216 Merton Avenue**

Robert Couden, property owner at 216 Merton Avenue, was present and explained the attached garage addition. He explained that there is currently no garage and that the proposed structure will include attic storage to compensate for the lack of storage in the existing small, old house.
Commissioner Wallschlager inquired about the unusual property configuration, noting that there are two homes on the lot and questioning the driveway access to the back house. Couden clarified that while the survey may not clearly show it, there is a gravel driveway that extends to a stone sidewalk leading to the rear house, approximately 40 feet from the parking area. He mentioned plans to pave the driveway with asphalt next year and install a concrete sidewalk to the back house.
Regarding materials, Couden confirmed that the garage siding will match the existing home's siding. The roof will use identical shingles to those installed in 2022, ensuring consistency with the existing structure.
Building inspector Hussinger confirmed that the proposed garage meets all village setback requirements. The question of permissibility for the walkway configuration was raised, with confirmation that the village does not regulate sidewalks or driveways, making the current setup acceptable given the unique nature of the property.

Motion: (DeCourcy-Bower/Schneeberger) moved to approve the addition of the attached garage at 216 Merton Avenue. Carried (6-0).

3. **Architectural Board review and consideration of an application for signage for 122 E. Capitol Drive -**

Scott Baisie from Bower Sign and Lighting was present via zoom and explained the application on behalf of Palmer Steakhouse. The project involves replacing the existing deteriorating blade sign with a new, more durable version constructed of HDU (high-density urethane) panels that will be painted to look like wood but offer superior weather resistance.
The new sign will feature top-down lighting and include a neon "open and immediate seating" sign below, replacing a larger non-functioning sign currently in place. The design will maintain the restaurant's branding while providing improved durability and functionality.

Motion: (DeCourcy-Bower/Schneeberger) moved the application for signage at 122 E. Capitol Dr. Carried (6-0).

4. **Plan Commission review and consideration of an Extraterritorial Certified Survey Map for the Braden property at N30 W29315 Hillcrest Drive -**

Village Manager Bailey explained that this property is within the village's extraterritorial boundary but not in an area planned for future expansion. It was confirmed that the village is required to approve certified survey maps in extraterritorial areas, even when no new construction is involved.

Motion: (DeCourcy-Bower/Schneeberger) to approve the Extraterritorial Certified Survey Map for the Braden property at N30 W29315 Hillcrest Dr. Carried (6-0).

5. **Discussion and consideration to erect a bulk water filling station at 570 Progress Drive, The Village's Number 3 Wellhouse Site -**

DPW Director Tom presented the proposal to install a prefabricated bulk water filling station to replace the current honor-system arrangement using a fire hydrant. The existing system requires customers to fill out forms indicating water usage, which creates accountability issues and potential revenue loss.

Jenson explained that the new 4 x 6.5-foot prefabricated building will include a backflow preventer, pressure relief system, and customer interface allowing payment via PIN pad or credit card, similar to a gas station. The system will provide exact quantity measurements and immediate payment processing, eliminating the need for year-end billing reconciliation.

The new location offers operational advantages, including easier access for large trucks and the elimination of the need for vehicles to turn around in the dead-end area where the current hydrant has been struck multiple times. Jenson noted that other municipalities using similar systems have seen doubled water usage quantities, suggesting significant unreported usage under the current system.

The facility will use the village's blue, white, and black color scheme and will be positioned on a concrete slab with proper drainage. Fire department access will be maintained through PIN code access. A question was asked about other potential revenue loss areas, which Jenson confirmed this addresses the only bulk water sales location.

Motion: (Wallschlager/Schneeberger) to approve a bulk water filling station at 570 Progress Drive. Carried (6-0).

6. **Plan Commission review and consideration of Landscape Plans for Sandhill single-family condominiums**

Jim Siepman presented the landscape plan as a continuation of the existing Sandhill development aesthetic. The proposal includes extending the black equestrian-style fencing along Winkelman Road and creating a fence line to demarcate the boundary between the existing multifamily and new single-family sections.

The plan features matching monument signs at the Terry Lane entrance, similar to those on Homestead Road, though with different naming to distinguish the single-family section. A stone wall using matching split-face fieldstone will separate the two phases along Sandhill Boulevard, with appropriate signage for each section.

Landscaping will maintain consistency with the existing development, including a colonnade of trees at the Terry Lane entrance and planting beds around monuments. Common areas will remain as meadow grass or prairie restoration. The walking path will extend around the perimeter and into the northern woods, with interior paved paths remaining private to residents.

Siepman clarified the HOA structure, explaining there will be two individual HOAs plus one overarching HOA for common elements like roads and fences. Snow removal and landscaping for

single-family units will be managed separately from the existing multifamily units, though street maintenance will remain unified for efficiency.
Siepman was asked about winter path maintenance and he explained that paths are not currently plowed due to cost considerations and variability of weather conditions.

Motion: (Wallschlager/Schneeberger) to the landscape plans for Sandhill single-family condominiums. Carried (6-0).

7. **Architectural Board review and consideration of architectural standards for Sandhill single-family dwellings to allow developer review of individual plans -**

Siepman said the proposal establishes architectural standards that mirror those used in Windrush, with some modifications for the site's constraints. Key requirements include natural exterior materials, matching shingle roofs consistent with the existing Sandhill development, and traditional roof lines rather than low-pitch or prairie styles. Three-and-a-half car garages represent the maximum allowed to preserve lot space utilization.
Village Administrator Bailey explained that this system allows staff to review individual home plans rather than requiring each home to come before the planning commission, streamlining the approval process while maintaining design standards. Scott will review each home's architectural plans and grading plans individually, similar to the successful Windrush process.
de Coursey-Bower asked about setback requirements between homes in this condominium development versus typical single-family standards. The minimum side setback was confirmed at 20 feet between homes, which provides adequate access for maintenance while avoiding the challenges of tighter setbacks seen in some communities.
Bierman inquired about parking adequacy given the road width and parking restrictions. The development will follow the existing Sandhill model with parking allowed on only one side of the streets to maintain emergency vehicle access. Front setbacks of approximately 30 feet will provide adequate driveway parking for multiple vehicles.

Motion: (deCourcy-Bower/Schneeberger) to the architectural standards for Sandhill single-family dwellings to allow developer review of individual plans. Carried (6-0).

8. **Architectural Board and Plan Commission review and consideration of resubmittal of approved addition for T-Lon at 1110 Richards Road -**

Daniel from Oliver Construction presented the revised proposal for T-lon products, explaining that after receiving initial approval, the property owner decided to proceed with a smaller scope. The revised addition reduces the footprint by 2,700 square feet while maintaining the same overall height and main facade fenestration as previously approved.
Changes include eliminating overhead door access on the south side, which will now be a solid brick wall, and reducing the scope on the east side to use split-face block instead of brick accents, consistent with the existing building's rear facade. The interior program remains the same open warehouse space, and all materials will match the existing building to maintain visual consistency.
Scott confirmed that the curb appeal and street view will remain effectively the same as the previously approved proposal, ensuring the reduction in scope does not negatively impact the building's appearance from public areas.

Motion: (deCourcy-Bower/Schneeberger) to approve the resubmittal of approved addition for T-Lon at 1110 Richards Road. Carried (6-0).

9. **Plan Commission review of conceptual plan for Haight Drive**

Village Manager Bailey introduced this conceptual proposal that had been presented to the village board the previous week. The project involves permanently closing the dangerous intersection at

Haight Drive to create a community space, with funding being sought through a Vibrant Spaces Grant worth $50,000.
Village Engineer Amtmann presented two conceptual alternatives for transforming the roadway into a shared space that could serve both businesses (Beer Snobs and the Inn) and provide public amenities. The closure would eliminate the problematic two-way stop that has created safety hazards, including nearby misses with vehicles almost driving into Beer Snobs.
The concept envisions tables, igloos, and other amenities that could create a vibrant downtown space during warmer months. The area would feature different zones, potentially including private seating for the restaurants and public areas such as a holiday tree location and general sitting areas near the library.
Several design considerations were discussed, including the use of decorative concrete rather than grass due to maintenance challenges, the installation of bollards to prevent vehicle access, and the approximately six-foot elevation change across the site. The businesses would maintain the space under a potential lease arrangement, removing the burden from taxpayers while providing them with operational benefits.
Schneeberger raised concerns about pedestrian circulation, suggesting that a central walkway might better serve foot traffic than requiring people to navigate around restaurant seating areas. This led to broader discussion about improving connectivity between this space and other village amenities like the park to the east.
DeCourcy-Bower emphasized the need to consider the broader pedestrian network, noting that removing stop signs on Cottonwood would affect crossing patterns and that the space should connect well with surrounding areas. He suggested examining the entire intersection redesign and considering improvements to pedestrian access along Haight Drive, including the bridge crossing where sidewalks currently disappear.
The conversation expanded to consider the relationship with potential future development, particularly regarding the former gas station property and planned Cottonwood Avenue improvements. Bailey noted that major Cottonwood reconstruction, including buried power lines, is planned but delayed pending area redevelopment to avoid road damage from construction traffic.
Practical concerns were addressed, including parking impacts (removal of nine spaces), the need for agreements with property owners regarding liquor license boundaries, and winter maintenance considerations. The engineering timeline includes initial meetings with adjacent property owners before returning to the commission with refined concepts.
Bailey emphasized that multiple iterations would return to the board and encouraged ongoing communication with staff.
It was suggested public input opportunities, such as displaying concepts at the library to gauge community interest and gather feedback on this significant change to the village center.
The project timeline is driven by grant requirements, with applications already submitted for 2026 funding and potential 2027 alternatives available. Work could be completed in 2027 even with 2026 grant approval. Total project cost is estimated at $250,000, budgeted from cash reserves without borrowing.

Motion: (Schneeberger/Demet) to approve the conceptual plan for Haight Drive. Carried (6-0).

10. Announcements -

- Pfannerstill announced the upcoming election primary for Swallow School District, with voting available at Village Hall for Village of Hartland residents.
- The recent "Sleep Out for Veterans" fundraising event was highlighted as a tremendous community success. It was stated there was stated there was exceptional attendance with favorable weather conditions, with activities both inside and outside the venue. It was noted record-breaking donations with 131 baskets available for auction, demonstrating

strong community support for homeless veterans. The event traditionally occurs around Valentine's Day weekend.

11. **Adjourn -**
    Motion: (deCourcy-Bower/Schneeberger) to adjourn. Carried (6-0).

Meeting adjourned at 8:51 pm.

Respectfully submitted by
Recording Secretary,
Deidre Bushéy, Deputy Clerk

VILLAGE OF HARTLAND WISCONSIN EST. 1892

DEPARTMENT OF BUILDING INSPECTION
APPLICATION FOR ARCHITECTURAL BOARD

Job Address				
Lot 26	Block 5	Subdivision Pawlings	Key No. HAV 0729168	
Owner Shawn Hoppe			Phone 262-505-2604	
Address 320 Prospect Ave		City Hartland	State WI	Zip 53029
Contractor Fortitude Construction LLC	Phone 262-505-2604	FAX	E-Mail Address Fortitudeconstructionllc@gmail.com	
Address Po Box 381		City Hartland	State WI	Zip 53029

The Architectural Board meets on the THIRD MONDAY of the Month at 6:30 p.m. in the Board Room of the Hartland Municipal Building located at 210 Cottonwood Avenue in the Village of Hartland.

The DEADLINE for filing is TEN WORKING DAYS PRIOR TO THE MEETING DATE at 4:30 p.m. All of the following information must be received prior to the deadline in order to be placed on the agenda.

All applications for consideration by the Architectural Board are subject to the policies described in this document.

One & Two Family

- ☐ One (1) bound set of construction plans and application material and one (1) electronic copy of all submittals. Plans must be stamped "approved by the developer" if required.
- ☐ These plans may be reused to apply for the building permit. Building elevations are all that is necessary to obtain Architectural Board approval. Although it is recommended that complete construction plans along with other building permit application material be submitted in order to begin the permit process as soon as possible after the meeting.
- ☐ Elevations must show all sides of the structure and state the building materials and colors. Additions must be shown with the existing building.
- ☐ One (1) site plan. The site plan must be detailed and dimensioned and may also be reused to apply for the building permit. One set of site plans must be stamped "approved by the developer" (if applicable).
- ☐ One (1) plat of survey is required for new dwellings at the time of building permit application.

NOTE: Approval by the Architectural Board is not permission to begin construction; a building permit must first be obtained.

Date Applied:_____ Date of Meeting: 3-16-26 Item No. _____

SURVEYING ASSOCIATES, INC.

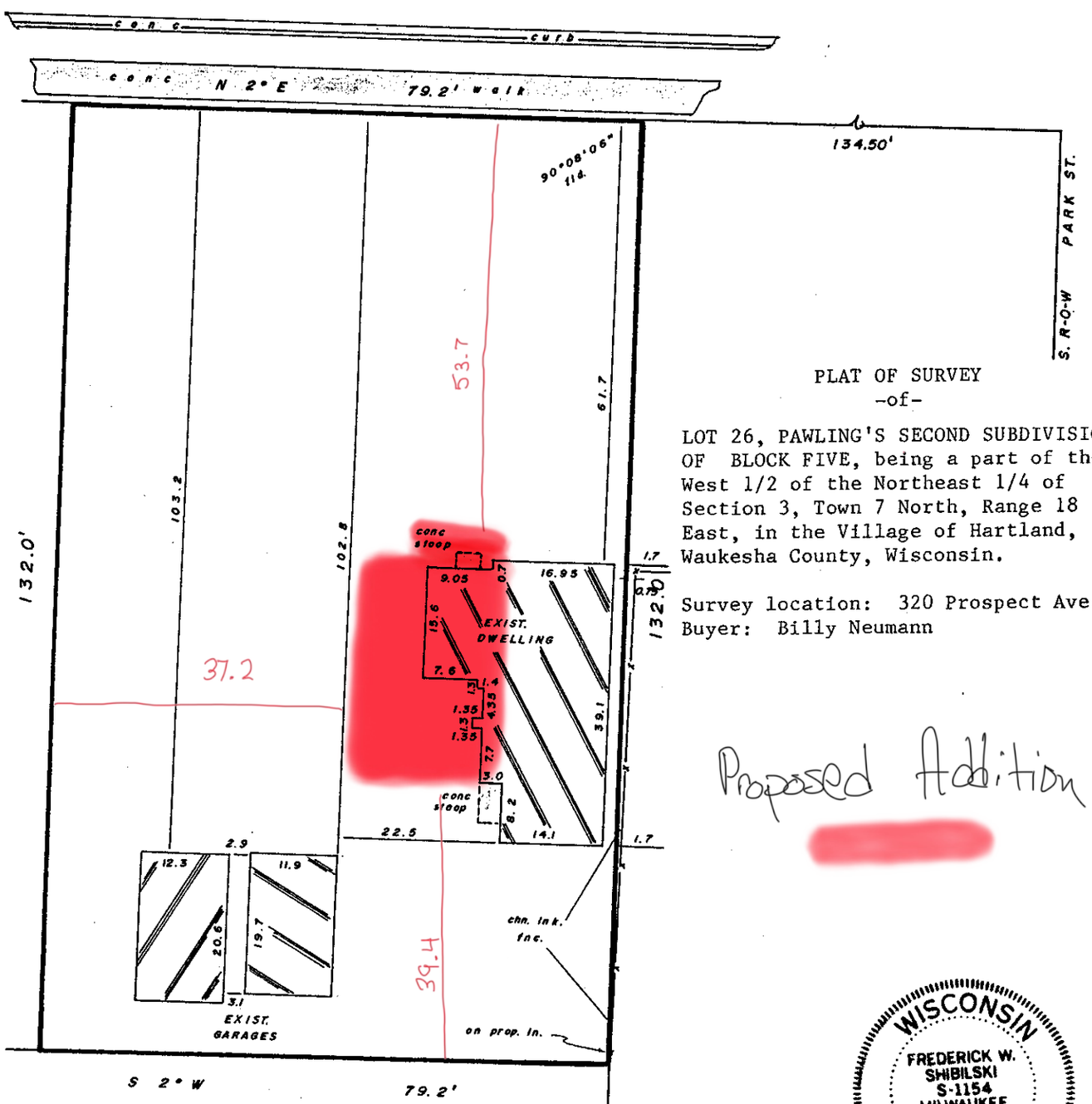
MEMBER ACSM WSLS

2554 N. 100th STREET
WAUWATOSA, WISCONSIN 53226

FREDERICK W. SHIBILSKI RLS
(414) 257-2212

SCALE 1" = 20'

60' WIDE PROSPECT AVE.



PLAT OF SURVEY
-of-

LOT 26, PAWLING'S SECOND SUBDIVISION OF BLOCK FIVE, being a part of the West 1/2 of the Northeast 1/4 of Section 3, Town 7 North, Range 18 East, in the Village of Hartland, Waukesha County, Wisconsin.

Survey location: 320 Prospect Ave.
Buyer: Billy Neumann

Proposed Addition

WISCONSIN
FREDERICK W. SHIBILSKI
S-1154
MILWAUKEE, WIS.
LAND SURVEYOR

Surveyed for: I D L MORTGAGE CORP.

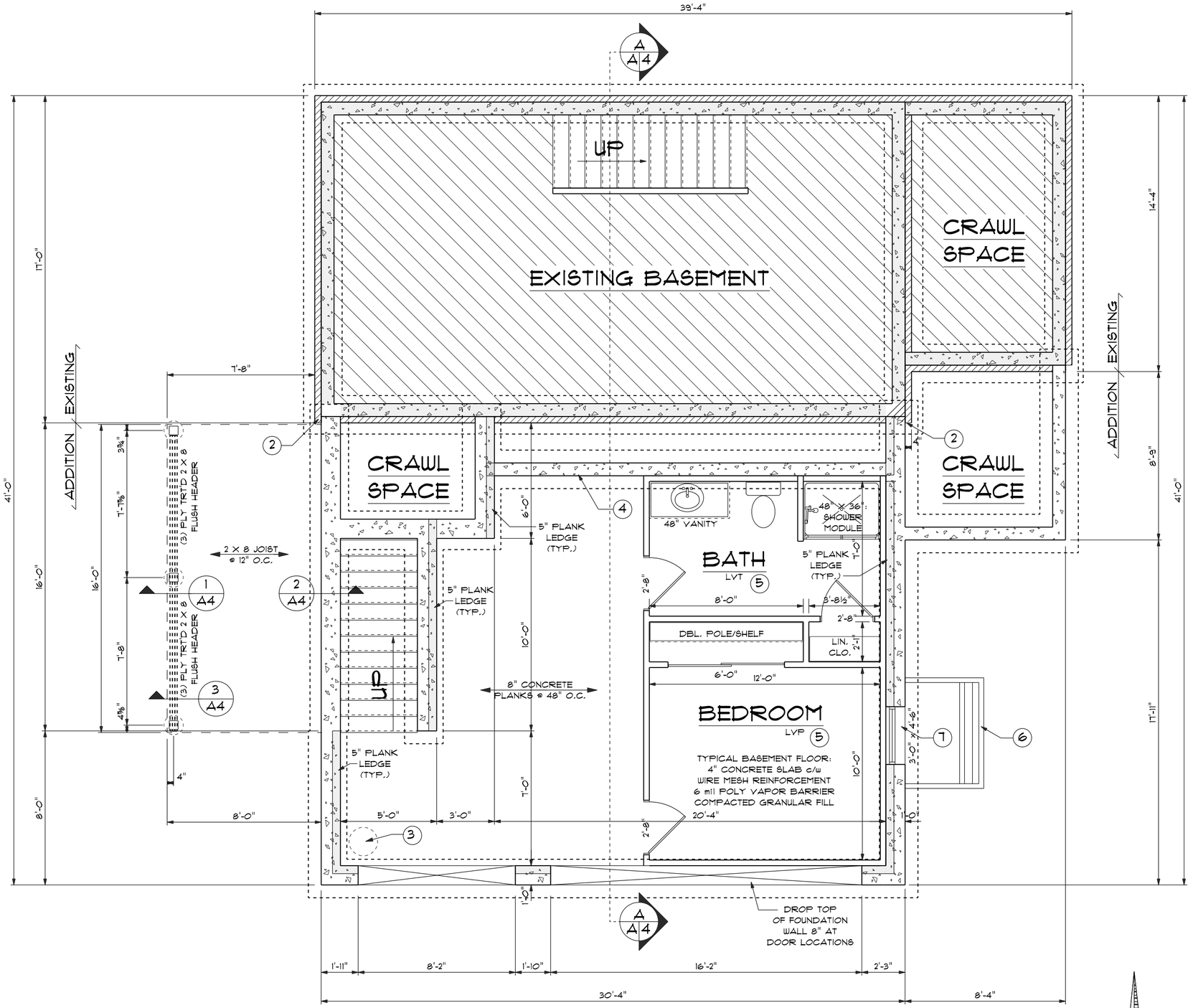
"I hereby certify that I have surveyed the above described property and that the above map is a true representation thereof and shows the size and location of the property, its exterior boundaries, the location of all visible structures and dimensions of all principal buildings thereon, boundary fences, apparent easements, roadways and encroachments, if any.

"This survey is made for the use of the present owners of the property, and also those who purchase, mortgage, or guarantee the title thereto within one year from date hereof."

MONUMENTATION BY WRITTEN AGREEMENT WITH THE ABOVE NAMED CLIENT (HAS NOT) BEEN WAIVED IN ACCORDANCE WITH A-E 6.01 (1) (b) OF THE WISCONSIN ADMINISTRATIVE CODE

"THIS IS NOT AN ORIGINAL SURVEY UNLESS THIS SEAL IS RED."

WISCONSIN REGISTERED LAND SURVEYOR	DATE	FIELD WORK BY	DRAWN BY	JOB NUMBER
	JULY 22, 1986	bjw / tjf	klk / bjk	13115



FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

ALL DIMENSIONS MUST BE VERIFIED IN FIELD. G.C. TO COORDINATE AND CONFIRM ANY VARIABLES THAT OCCUR DUE TO EXISTING SITE CONDITIONS.

FRAMING/FINISH NOTES:

1. CONTACT DIGGERS HOTLINE TO VERIFY LOCATION OF UNDERGROUND SERVICE LINES.
2. G.C./EXCAVATOR TO COORDINATE EXTENT OF EXISTING FOUNDATION MATERIALS AND HGT. TO ACCOMMODATE TIEING IN OF NEW FOOTINGS AND FOUNDATION WALLS. ADJUST ALL DIMENSIONS AND DETAILS ACCORDINGLY.
3. SUMP PUMP CROCK. VERIFY LOCATION IN FIELD.
4. G.C./EXCAVATOR TO VERIFY HGT OF EXISTING FOUNDATION AND COORDINATE UNDERPINNING FOUNDATION WALL.
5. ADJUST BEDROOM/BATH DIMENSIONS ACCORDINGLY BASED ON IMPLEMENTATION OF UNDERPINNED FOUNDATION WALL.
6. "BILCO" SCAPEWELL.
7. EGRESS CASEMENT WINDOW. INCREASE UNIT R.O. FOR MASONRY OPENING 6" W/DBL. TREATED WOOD BUCKS.

NOTES

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THIS PLAN FOR ACCURACY, THE OWNER/GENERAL CONTRACTOR MUST CHECK ALL DIMENSIONS AND VERIFY EACH DETAIL AND BE RESPONSIBLE FOR THE SAME.

EXTERIOR DIMENSIONS ARE TO FACE OF MASONRY AND/OR SHEATHING UNLESS NOTED OTHERWISE.

INTERIOR DIMENSIONS ARE TO FACE OF STUDS UNLESS NOTED OTHERWISE.

ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MINIMUM REQUIREMENTS AS NOTED BY THE STATE OF WISCONSIN "UNIFORM BUILDING CODE" EXCEPT WHERE MORE RESTRICTIVE LOCAL ORDINANCES SHALL GOVERN.

THE OWNER/GENERAL CONTRACTOR SHALL VERIFY AS REQUIRED AND COORDINATE PLACEMENT AND INSTALLATION OF ALL MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND UTILITY SERVICE LINES/EQUIPMENT.

FOR PLACEMENT OF BUILDING ON LOT, REFER TO SURVEYORS DRAWINGS. GRADE LINES SHOWN ARE FOR REFERENCE ONLY. CONFIRM FINAL GRADE LINES WITH SURVEY AND EXCAVATOR AT JOB SITE AS REQUIRED.

WINDOWS NOTED ARE CLAD UNITS W/INSUL LOW "E" GLASS SEE SCHEDULE ELSEWHERE.

DO NOT SCALE DIMENSIONS FROM DRAWINGS. CONSULT WITH GENERAL CONTRACTOR AND/OR DESIGNER FOR VERIFICATION

KETTLE MORAINE HOME
KMH
DESIGN SERVICES, LLC
HOME DESIGNS CRAFTED FOR YOUR LIFESTYLE
612 KETTLE MORAINE DRIVE, S.
SLINGER WIS. 53086
414-315-1148
E-MAIL = KMHDESIGN@FRONTIER.COM

FORGUIDE CONSTRUCTION

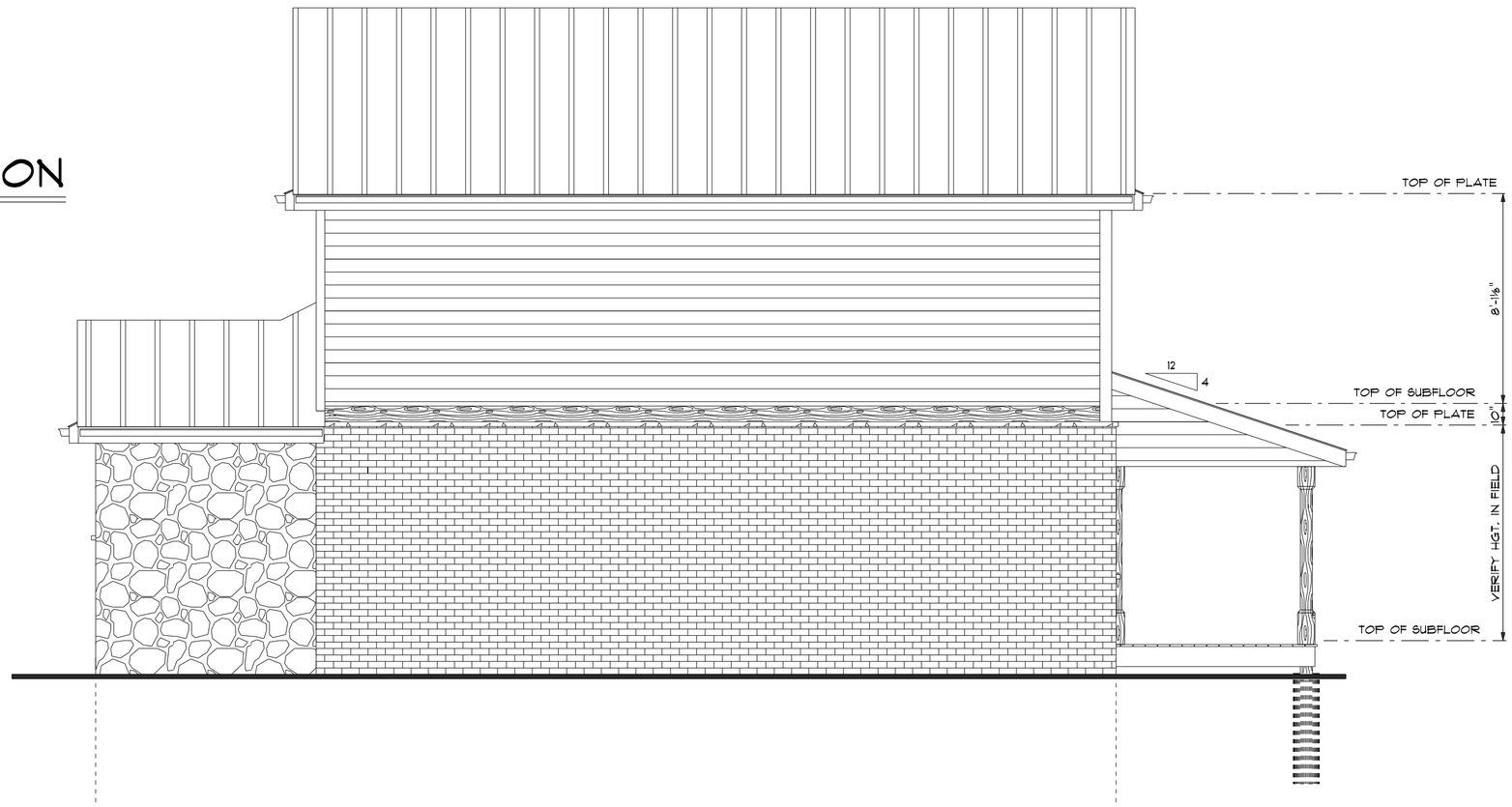
ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53029

TITLE: FOUNDATION PLAN	DATE: 1-26-2026	REV.
DRAWN BY: TERRY	SCALE: 1/4" = 1'-0"	

SHEET A1

EAST ELEVATION

SCALE: 1/4" = 1'-0"



NORTH ELEVATION

SCALE: 1/4" = 1'-0"

ELEVATION NOTES:

1. GUTTERS AND DOWNSPOUTS SHOWN FOR REFERENCE ONLY. G.C. TO COORDINATE LOCATIONS WITH INSTALLER TO ACCOMODATE FINISH GRADE LINES.
2. PLUMBING AND HVAC VENTS SHALL BE LOCATED TO LIMIT VIEW FROM PUBLIC. VENTS SHALL BE COLORED TO MATCH ROOF/SIDING.
3. PROVIDE ATTIC VENTILATION TO MEET STATE/LOCAL CODES.
4. G.C. TO VERIFY ALL EXTERIOR TRIM SIZES AND DETAILS PRIOR TO ORDERING/INSTALLATION OF MATERIAL.

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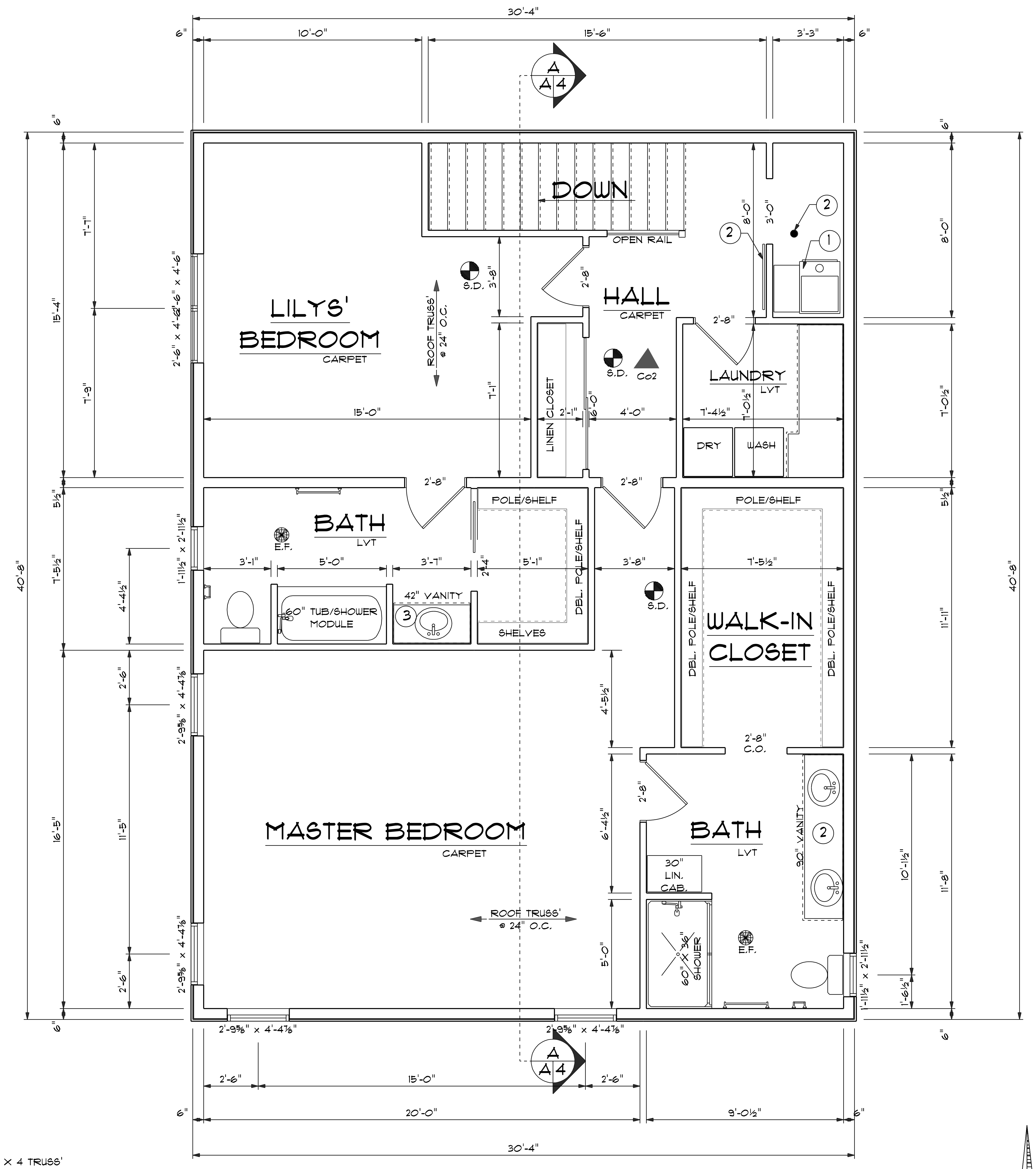
FORTITUDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53028

TITLE: ELEVATIONS
DATE: 1-26-2026
REV.
DRAWN BY: TERRY
SCALE: 1/4" = 1'-0"
SHEET: A7



2ND FLOOR LAYOUT

SCALE: 1/4" = 1'-0"

FRAMING/FIISH NOTES:

1. GAS FORCED AIR FURNACE.
2. CONDENSATE FLOOR DRAIN.
3. SOLID SURFACE COUNTERTOP ON 34 1/2" VANITY CABINET.

LEGEND

Symbol	Meaning
S.D.	SMOKE DETECTOR
Co2	CARBON MONOXIDE DETECTOR
E.F.	EXHAUST FAN
HB	HOSE BIBB
(A)	WINDOW KEY
(1)	CALLOUT KEY

NOTES

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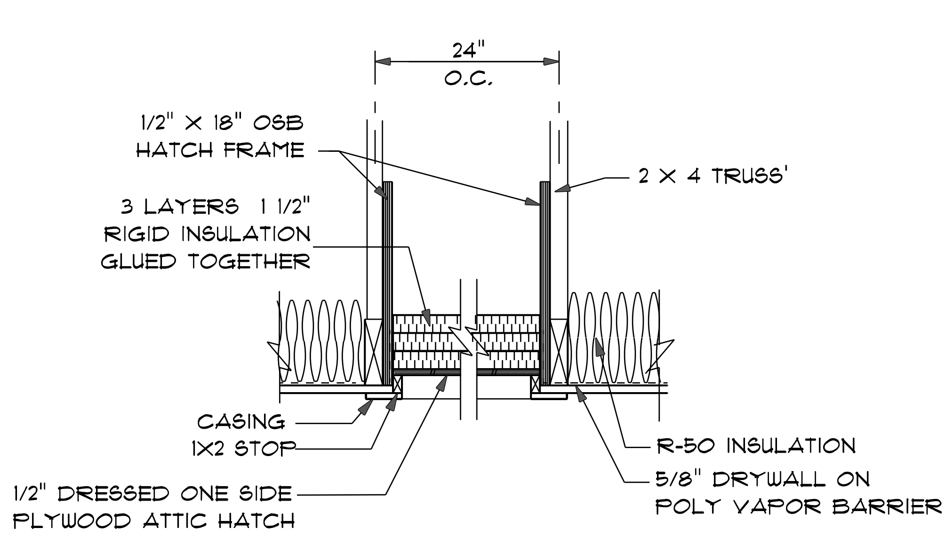

TYP ATTIC HATCH SECTION

NOTE: FIELD LOCATE

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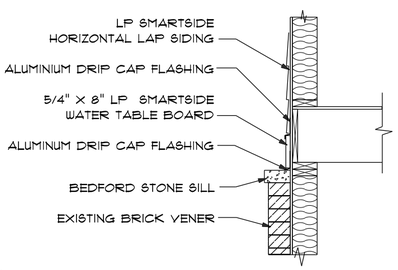
FORTITUDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53028

TITLE	UPPER FLOOR PLAN
DRAWN BY	TERRY
DATE	1-26-2026
SCALE	1/4" = 1'-0"
REV.	
SHEET	A3

WEST ELEVATION

SCALE: 1/4" = 1'-0"



1/A5 DETAIL @ WATER TABLE BOARD

NOT TO SCALE

FRAMING/FINISH NOTES:

1. 18" DIA. (MIN.) CONCRETE PIER
2. TRT'D. 6 X 6 POST WRAPPED W/TRIM BOARDS.
3. EXISTING BRICK VENEER.
4. BEDFORD STONE SILL W/ALUMINUM DRIPCAP FLASHING.
5. 5/4" X 8" LP SMARTSIDE WATERTABLE BD.
6. LP SMARTSIDE HORIZINTAL SIDING.
7. 5/4" X 6" LP SMARTSIDE CORNER TRIM.
8. 5/4" X 4" LP SMARTSIDE OPENING TRIM.
9. 5/4" X 6" LP SMARTSIDE HEAD TRIM.
10. COMTINUOAUS ALUMINUM GUTTER W/DOWNSPOUTS.
11. METAL ROOFING PANELS. VERIFY PROFILE W/CLIENT.

ELEVATION NOTES:

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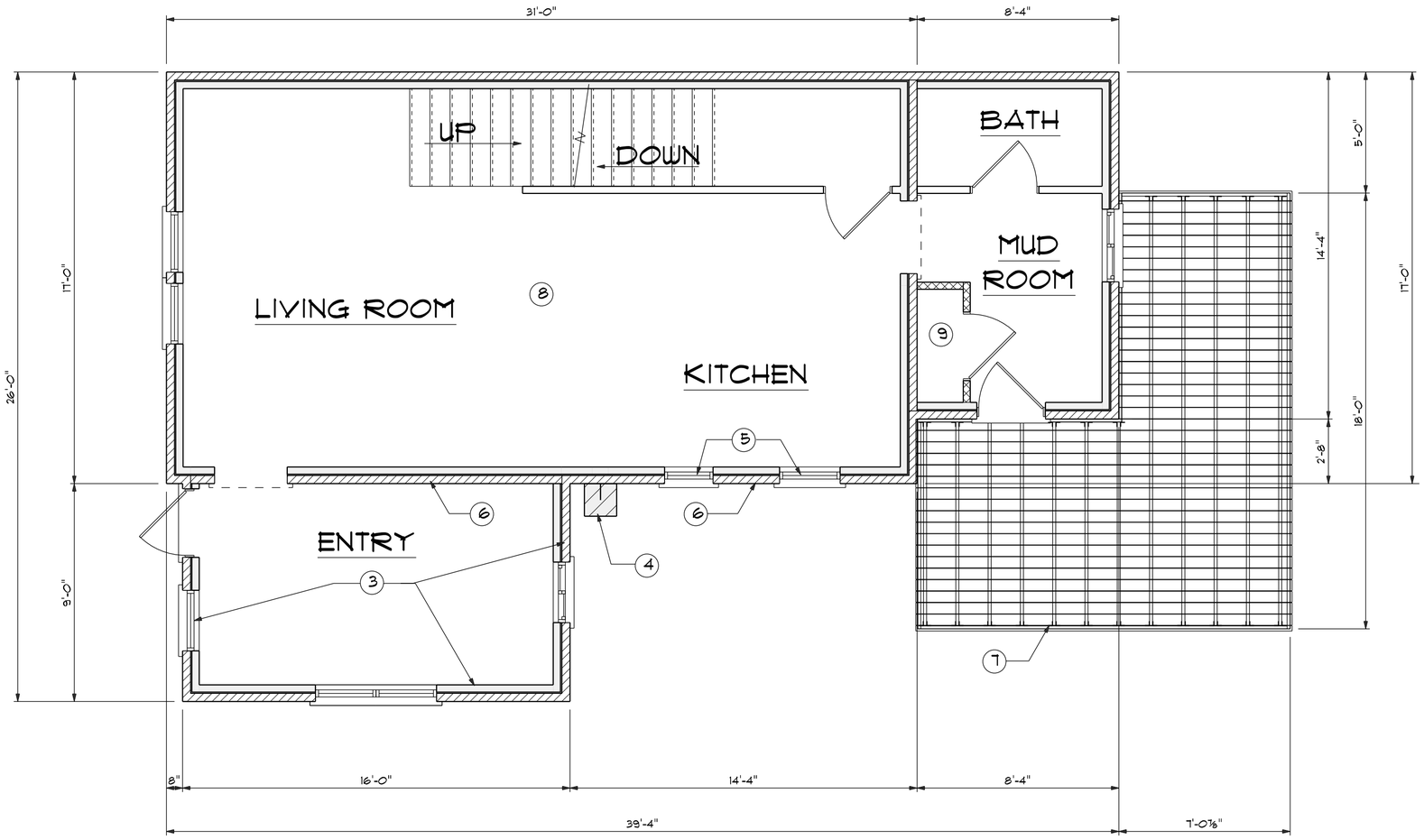
FORTGUIDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53028

TITLE	DATE	REV.
ELEVATIONS	1-26-2026	
DRAWN BY: TERRY	SCALE: 1/4" = 1'-0"	

SHEET A5



DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

DEMOLITION NOTES:

1. CLIENT TO REMOVE ALL PERSONAL ITEMS INTO STORAGE LOCATED IN PROPOSED WORK AREAS.
2. COORDINATE WITH HVAC, ELECTRICAL & PLUMBING SUB-CONTRACTORS TO DISCONNECT AND/OR SHUT DOWN ALL RELATED SUPPLY/RETURN LINES.
3. REMOVE ENTIRE ENTRY AREA INCLUDING ROOF, WALLS AND FOUNDATION.
4. REMOVE COMPLETE MASONRY CHIMNEY.
5. REMOVE WINDOW UNITS. FILL-IN OPENINGS. PATCH/REPAIR TO MATCH EXISTING.
6. REMOVE BRICK VENEER IN ALL DSIGNATED AREA'S WHERE ADDITION IS PLANNED. REFER TO DRAWINGS ELSWHERE.
7. REMOVE COMPLETE DECK SYSTEM.
8. REMOVE COMPLETE STRUCTURE ABOVE UPPER FLOOR INCLUDING ROOF SYSTEM, INTERIOR WALLS, EXTERIOR WALLS AND BRICK VENEER.
9. REMOVE MUDROOM CLOSET COMPLETE. PATCH/REPAIR WALLS/CEILING TO MATCH.
10. CLIENT/G.C. TO COORDINATE ANY ADDITIONAL DEMOLITION NEEDS BASED ON ADDITION PLANS AND MAKE ADJUSTMENTS IN FIELD AS NEEDED.

ALL DIMENSIONS MUST BE VERIFIED IN FIELD. G.C. TO COORDINATE AND CONFIRM ANY VARIABLES THAT OCCUR DUE TO EXISTING SITE CONDITIONS.

LEGEND

- = EXISTING EXTERIOR WALLS
- = REMOVE EXTERIOR WALLS
- = EXISTING INTERIOR WALLS
- = REMOVE INTERIOR WALLS
- (1) = CALLOUT KEY

DEMOLITION GENERAL NOTES:

1. DEMOLISH AS REQUIRED TO ACCOMPLISH WORK INDICATED IN THESE DOCUMENTS. ALL REQUIRED DEMOLITION WORK SHALL BE INCLUDED IN THE BASE BID PACKAGE SUBMITTED BY THE CONTRACTOR.

2. DO NOT ALLOW MATERIALS AND DEBRIS GENERATED BY DEMOLITION ACTIVITIES TO ACCUMULATE ON THE JOB SITE. REMOVE DEBRIS DAILY AND DISPOSE OF IN A LEGAL MANNER. NO ONSITE SALE OR BURNING OF REMOVED ITEMS IS PERMITTED.

3. THIS PLAN IS TO BE USED IN CONJUNCTION WITH THE ENTIRE SET OF CONSTRUCTION DRAWINGS. DO NOT REMOVE ANY ITEMS WITHOUT VERIFYING AND COORDINATING WITH ALL GENERAL TRADES AS TO HOW THEY RELATE TO THE OVERALL PROJECT.

4. THE CONTRACTOR MUST TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THE SAFETY OF THE PUBLIC AND/OR WORKMEN ON THE SITE TO PREVENT ACCIDENTS OR INJURY TO ANY PERSON ON OR ABOUT, OR ADJACENT TO THE PREMISES. THE CONTRACTOR SHALL COMPLY WITH ALL LAWS, ORDINANCES, CODES, AND REGULATIONS PERTAINING TO THE SAFETY AND THE PREVENTION OF ACCIDENTS.

5. THE CONTRACTOR MUST MAINTAIN ADEQUATE SUPPORT, INSULATION, WATERPROOFING, EMERGENCY LIGHTING, SECURITY, ALARMS, ETC., FOR ALL OR PART OF ITEMS WHICH ARE TO REMAIN

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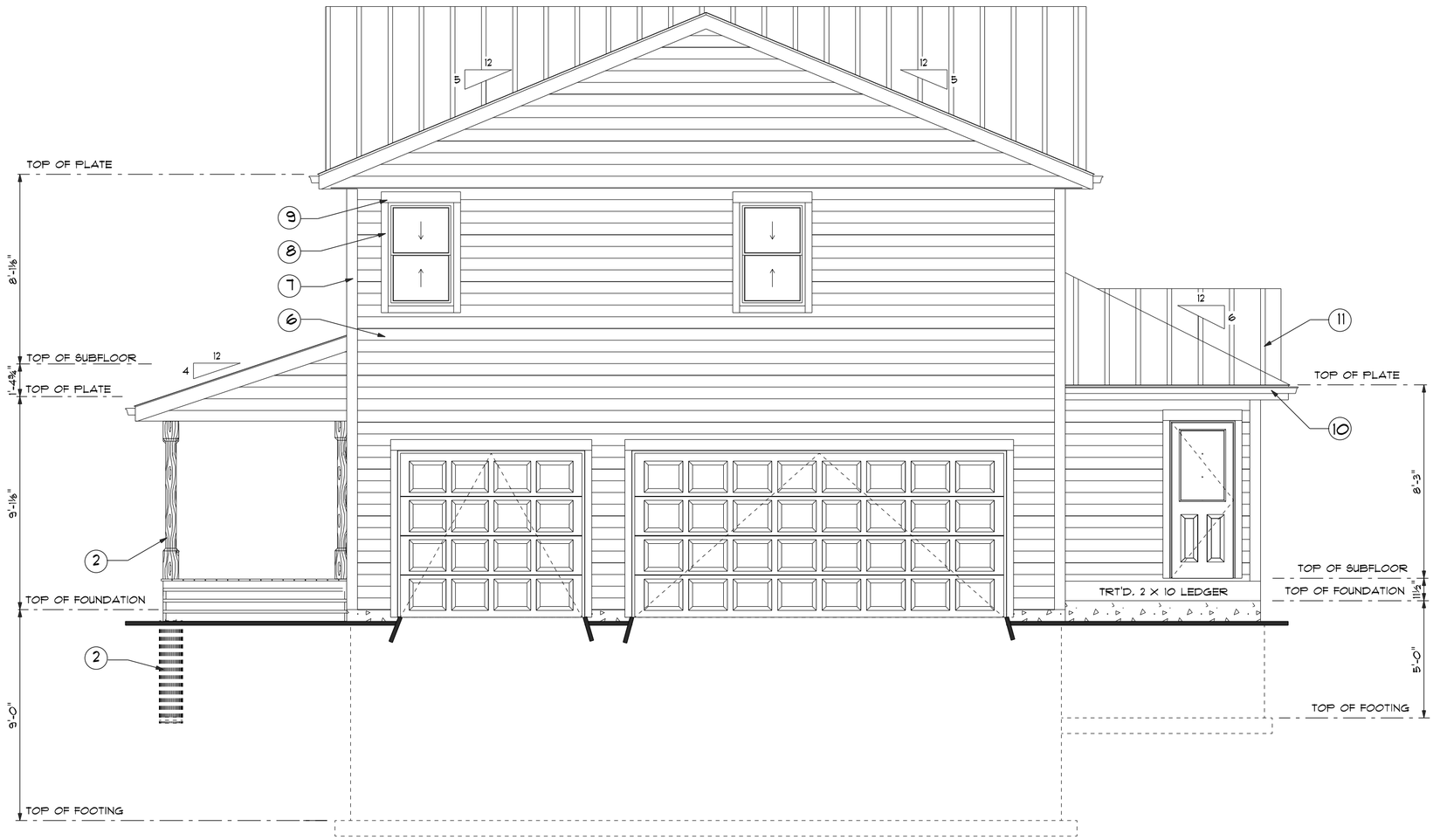
E-MAIL = KMHDESIGN@FRONTIER.COM

FORECLOSURE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53029

TITLE: DEMOLITION MAIN FLOOR PLAN
DATE: 1-26-2026
REV.:
DRAWN BY: TERRY
SCALE: 1/4" = 1'-0"

SHEET D1



SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

FRAMING/FINISH NOTES:

1. 18" DIA. (MIN.) CONCRETE PIER
2. TRT'D. 6 X 6 POST WRAPPED W/TRIM BOARDS.
3. EXISTING BRICK VENEER.
4. BEDFORD STONE SILL W/ALUMINUM DRIPCAP FLASHING.
5. 5/4" X 8" LP SMARTSIDE WATERTABLE BD.
6. LP SMARTSIDE HORIZINTAL SIDING.
7. 5/4" X 6" LP SMARTSIDE CORNER TRIM.
8. 5/4" X 4" LP SMARTSIDE OPENING TRIM.
9. 5/4" X 6" LP SMARTSIDE HEAD TRIM.
10. COMTINUOAUS ALUMINUM GUTTER W/DOWNSPOUTS.
11. METAL ROOFING PANELS. VERIFY PROFILE W/CLIENT.

ELEVATION NOTES:

1. GUTTERS AND DOWNSPOUTS SHOWN FOR REFERENCE ONLY. G.C. TO COORDINATE LOCATIONS WITH INSTALLER TO ACCOMODATE FINISH GRADE LINES.
2. PLUMBING AND HVAC VENTS SHALL BE LOCATED TO LIMIT VIEW FROM PUBLIC. VENTS SHALL BE COLORED TO MATCH ROOF/SIDING.
3. PROVIDE ATTIC VENTILATION TO MEET STATE/LOCAL CODES.
4. G.C. TO VERIFY ALL EXTERIOR TRIM SIZES AND DETAILS PRIOR TO ORDERING/INSTALLATION OF MATERIAL.

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FORTITUDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53029

TITLE: ELEVATION	DATE: 1-26-2026	REV.
	DRAWN BY: TERRY	SCALE: 1/4" = 1'-0"

SHEET A6

ROOF SYSTEM

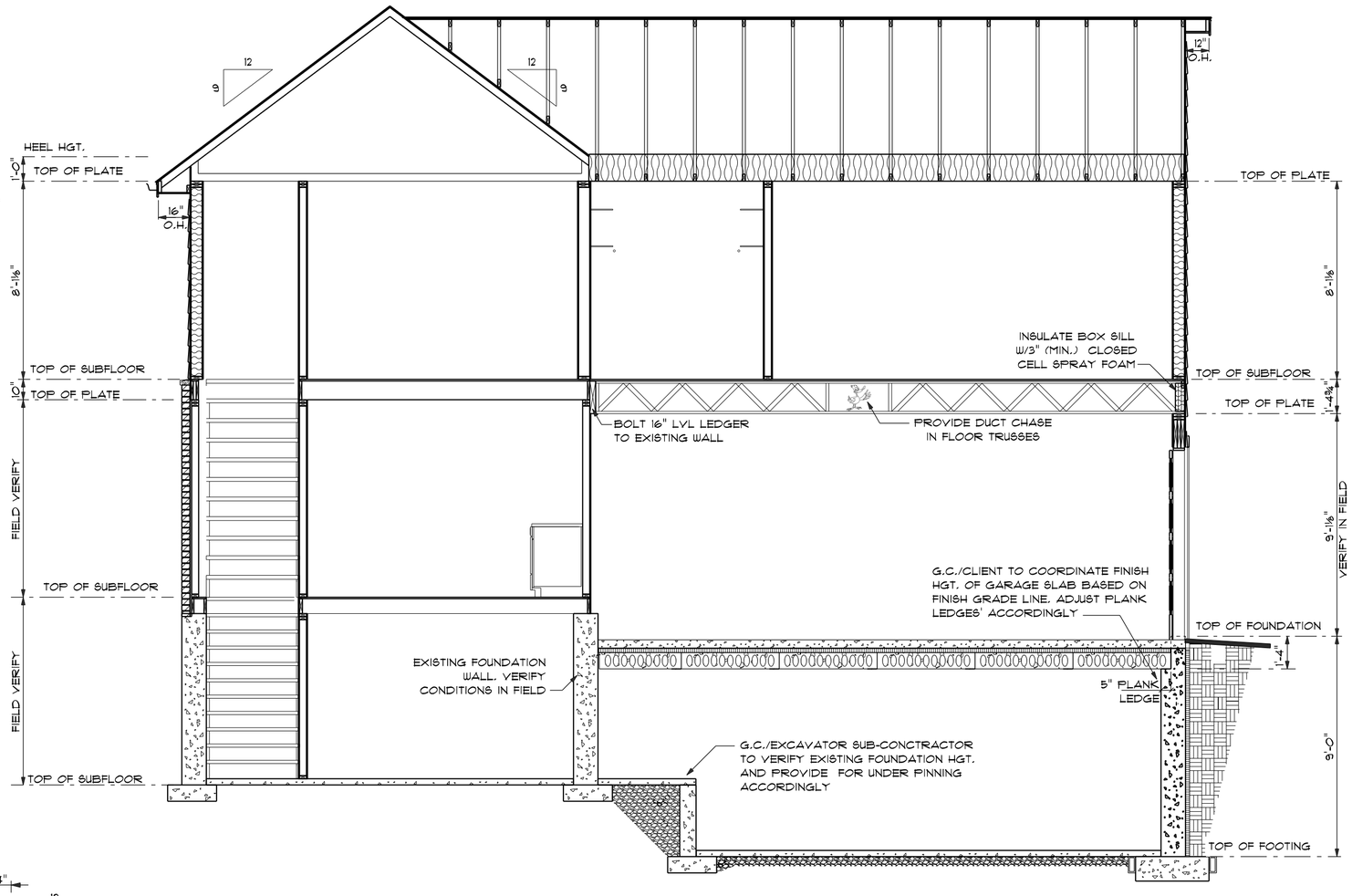
RIBBED METAL ROF PANELS
COLOR BY OWNER
15# ROOFING FELT
1/2" OSB SHEATHING
ROOF TRUSS' @ 24" O.C.
R-50 INSULATION
4 MIL POLY VAPOR BARRIER
1/2" HI-STRENGTH DRYWALL
TAPED & SANDED

FASCIA/SOFFIT SYSTEM

CONTINUOUS ALUMINUM GUTTERS
W/DOWNSPOUT'S AS REQ'D.
2 X 6 SUB FASCIA
1 X 8 LP "SMARTSIDE" FASCIA TRIM BOARD
VENTED LP "SMARTSIDE" SOFFIT PANELS
SOFFIT VENT TUBES @ 24" O.C.

WALL SYSTEM

LP "SMARTSIDE" PANELS
W/4/4" X 2" BATTENS
TYVEK HOME WRAP
1 1/2" ZIP WALL SHEATHING
2 X 6 STUDS @ 16" O.C.
R-19 INSULATION
POLY VAPOR BARRIER
1/2" DRYWALL TAPED, SANDED & TEXTURED



ROOF SYSTEM

RIBBED METAL ROOF PANELS
COLOR BY OWNER
15# ROOFING FELT
1/2" OSB SHEATHING
ROOF TRUSS' @ 24" O.C.
R-50 INSULATION
4 MIL POLY VAPOR BARRIER
1/2" HI-STRENGTH DRYWALL
TAPED & SANDED

FASCIA/SOFFIT SYSTEM

CONTINUOUS ALUMINUM GUTTERS
W/DOWNSPOUT'S AS REQ'D.
2 X 6 SUB FASCIA
1 X 8 LP "SMARTSIDE" FASCIA TRIM BOARD
VENTED LP "SMARTSIDE" SOFFIT PANELS
SOFFIT VENT TUBES @ 24" O.C.

WALL SYSTEM

LP "SMARTSIDE" PANELS
W/4/4" X 2" BATTENS
TYVEK HOME WRAP
1 1/2" ZIP WALL SHEATHING
2 X 6 STUDS @ 16" O.C.
R-19 INSULATION
POLY VAPOR BARRIER
1/2" DRYWALL TAPED, SANDED & TEXTURED

FLOOR SYSTEM

FINISHED FLOOR MATERIAL
VERIFY W/OWNERS
3/4" T&G/OSB GLUED & NAILED
16" FLOOR TRUSS' @ 24" O.C.

WALL SYSTEM

LP "SMARTSIDE" HORIZONTAL LAP SIDING
W/6" EXPOSURE
TYVEK HOME WRAP
1 1/2" ZIP WALL SHEATHING
2 X 6 STUDS @ 16" O.C.
R-19 INSULATION
POLY VAPOR BARRIER
1/2" DRYWALL TAPED, SANDED & TEXTURED

FLOOR SYSTEM

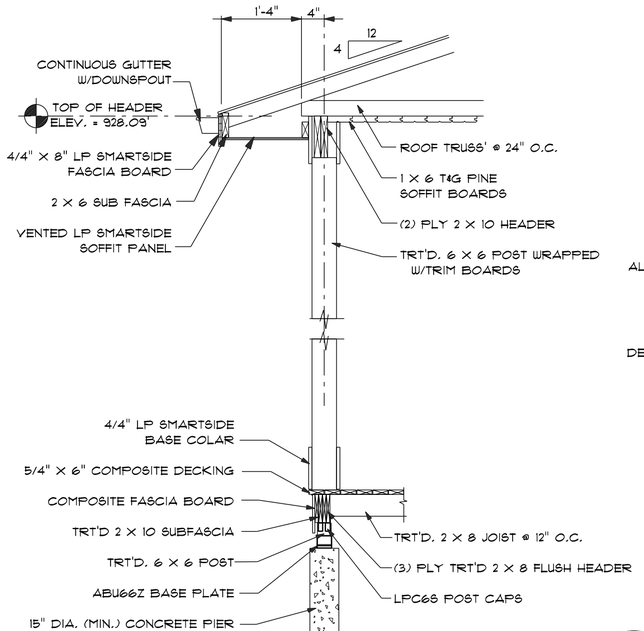
4" CONCRETE TOPPING
EPDM RUBBER MEMBRANE
2" RIGID INSUALTION
8" CONCRETE PLANKS.

FOUNDATION SYSTEM

1/2" DIA. ANCHOR BOLTS @ 72" o.c MAX.
AND 18" FROM EACH CORNER
12" X 108" POURED CONCRETE WALL
W/5" X 16" PLANK LEDGE
2" (MIN.) RIGID INSULATION
DAMPPROOF COATING
FORM-A-DRAIN DRAIN TILE SYS.
36" X 12" (MIN.) CONCRETE FOOTING
W/(2) ROWS #4 RE-BAR ON
UNDISTURBED SOIL

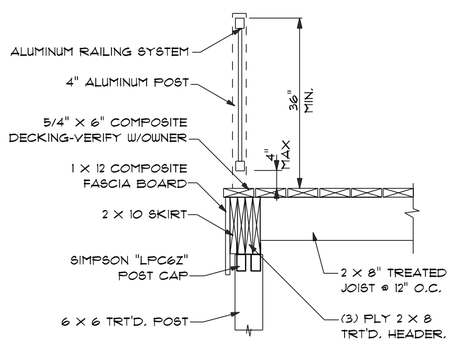
A-A / A4 HOUSE WALL SECTION

SCALE" 1/4" = 1'-0"



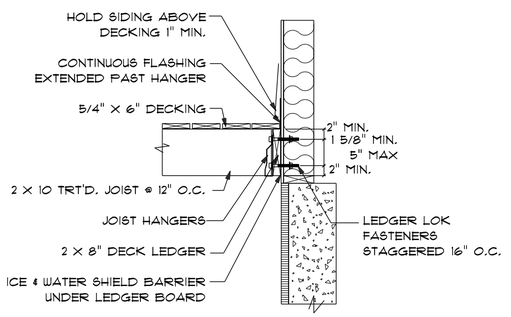
4 / A4 POST DETAIL

SCALE: 1/2" = 1'-0"



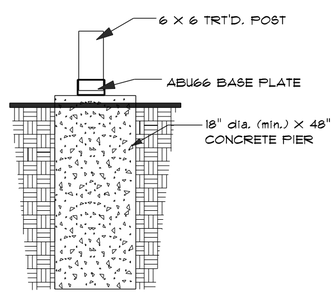
3 / A4 POST/RAIL/HEADER DETAIL

NOT TO SCALE



2 / A4 DECK LEDGER DETAIL

NOT TO SCALE



1 / A4 POST DETAIL

NOT TO SCALE

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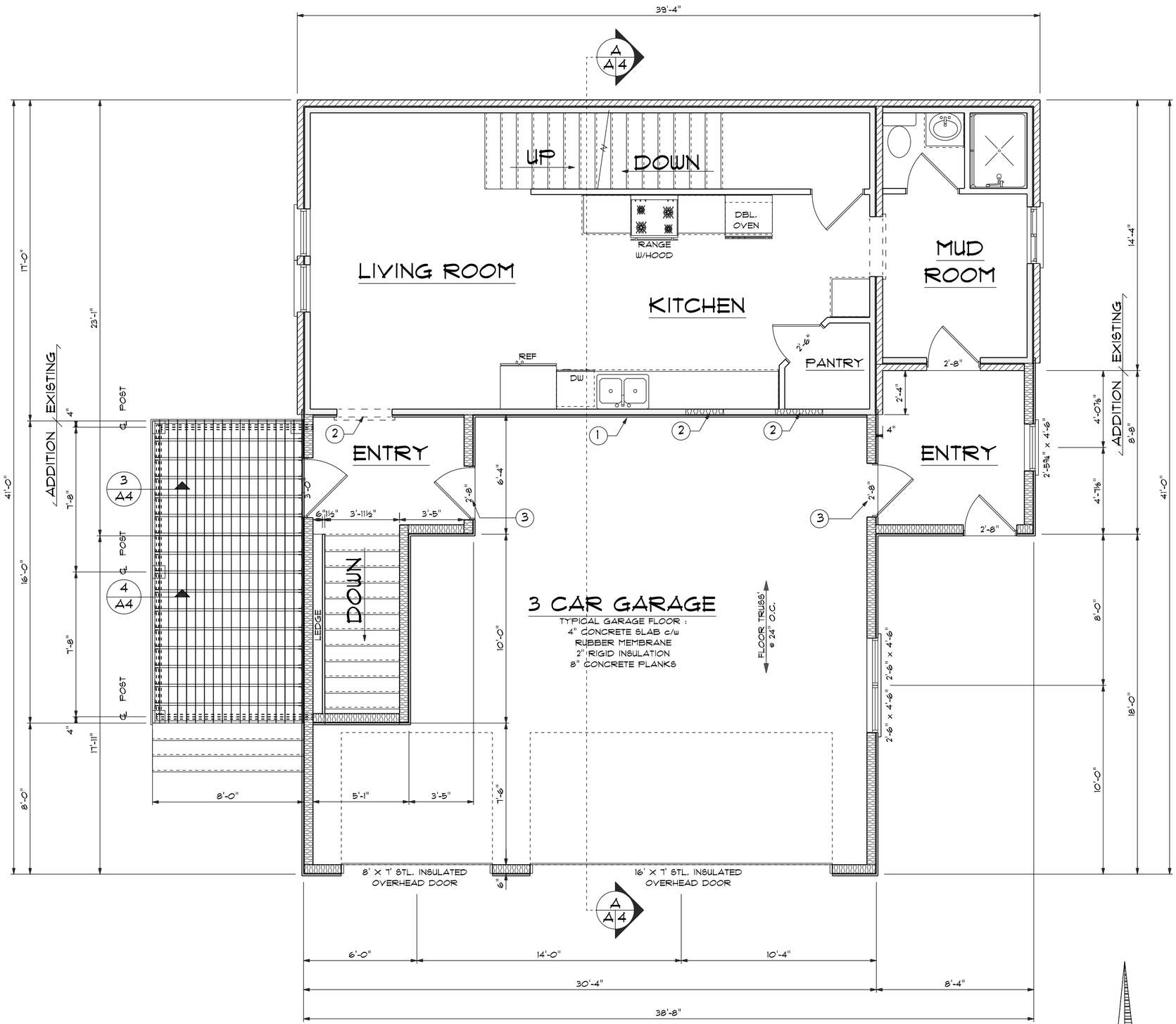
FORRIGUIDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53028

TITLE	DATE	REV.
SECTION/DETAILS	1-26-2026	
DRAWN BY: TERRY	SCALE: 1/4" = 1'-0"	

SHEET A4



1ST FLOOR PLAN

SCALE: 1/4" = 1'-0"

ALL DIMENSIONS MUST BE VERIFIED IN FIELD. G.C. TO COORDINATE AND CONFIRM ANY VARIABLES THAT OCCUR DUE TO EXISTING SITE CONDITIONS.

FRAMING/FINISH NOTES:

1. REMOVE EXISTING BRICK VENEER. INSPECT WALL SURFACE. PATCH/REPAIR TO MATCH AS NEEDED.
2. FILL OPENINGS OF REMOVED WINDOW UNITS PATCH/REPAIR TO MATCH EXISTING.
3. 20 MIN. FIRE RATED DOOR SLAB/FRAME.
4. ADJUST/REFRAME OPENING AS NEEDED.

LEGEND

- S.D. = SMOKE DETECTOR
- CO2 = CARBON MONOXIDE DETECTOR
- E.F. = EXHAUST FAN
- HB = HOSE BIBB
- A = WINDOW KEY
- 1 = CALLOUT KEY
- = EXISTING EXT. WALL
- = NEW 2 X 6 EXT. WALL
- = NEW 2 X 4 INT. WALL

NOTES

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THIS PLAN FOR ACCURACY, THE OWNER/GENERAL CONTRACTOR MUST CHECK ALL DIMENSIONS AND VERIFY EACH DETAIL AND BE RESPONSIBLE FOR THE SAME.

EXTERIOR DIMENSIONS ARE TO FACE OF MASONRY AND/OR SHEATHING UNLESS NOTED OTHERWISE.

INTERIOR DIMENSIONS ARE TO FACE OF STUDS UNLESS NOTED OTHERWISE.

ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MINIMUM REQUIREMENTS AS NOTED BY THE STATE OF WISCONSIN "UNIFORM BUILDING CODE" EXCEPT WHERE MORE RESTRICTIVE LOCAL ORDINANCES SHALL GOVERN.

THE OWNER/GENERAL CONTRACTOR SHALL VERIFY AS REQUIRED AND COORDINATE PLACEMENT AND INSTALLATION OF ALL MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND UTILITY SERVICE LINES/EQUIPMENT.

FOR PLACEMENT OF BUILDING ON LOT, REFER TO SURVEYORS DRAWINGS. GRADE LINES SHOWN ARE FOR REFERENCE ONLY. CONFIRM FINAL GRADE LINES WITH SURVEY AND EXCAVATOR AT JOB SITE AS REQUIRED.

WINDOWS NOTED ARE CLAD UNITS W/INSUL LOW "E" GLASS SEE SCHEDULE ELSEWHERE.

DO NOT SCALE DIMENSIONS FROM DRAWINGS. CONSULT WITH GENERAL CONTRACTOR AND/OR DESIGNER FOR VERIFICATION

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FORGUIDE CONSTRUCTION

ADDITION
320 PROSPECT AVE.
HARTLAND, WIS.53029

TITLE: MAIN FLOOR PLAN
DATE: 1-26-2026
REV.
DRAWN BY: TERRY
SCALE: 1/4" = 1'-0"
SHEET: A2

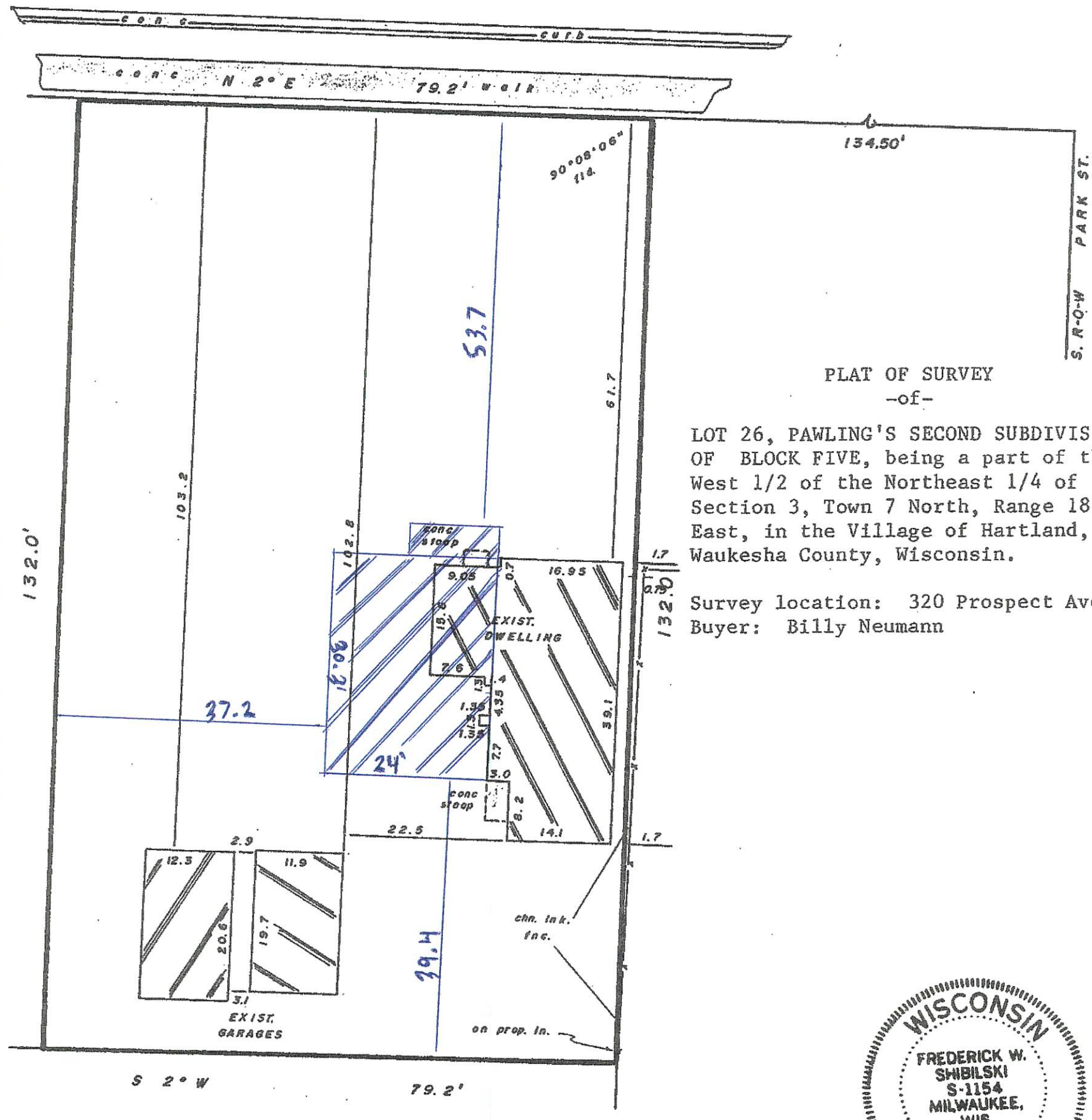
SURVEYING ASSOCIATES, INC.

MEMBER ACSM WSLS

2554 N. 100th STREET
WAUWATOSA, WISCONSIN 53226

FREDERICK W. SHIBILSKI RLS
(414) 257-2212

SCALE 1" = 20'



PLAT OF SURVEY
-of-

LOT 26, PAWLING'S SECOND SUBDIVISION OF BLOCK FIVE, being a part of the West 1/2 of the Northeast 1/4 of Section 3, Town 7 North, Range 18 East, in the Village of Hartland, Waukesha County, Wisconsin.

Survey location: 320 Prospect Ave.
Buyer: Billy Neumann

WISCONSIN
FREDERICK W. SHIBILSKI
S-1154
MILWAUKEE, WIS.
LAND SURVEYOR

Surveyed for: I D L MORTGAGE CORP.

"I hereby certify that I have surveyed the above described property and that the above map is a true representation thereof and shows the size and location of the property, its exterior boundaries, the location of all visible structures and dimensions of all principal buildings thereon, boundary fences, apparent easements, roadways and encroachments, if any.

"This survey is made for the use of the present owners of the property, and also those who purchase, mortgage, or guarantee the title thereto within one year from date hereof."

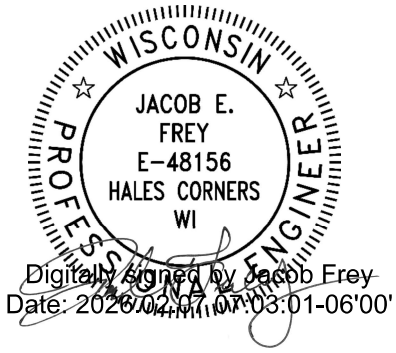
MONUMENTATION BY WRITTEN AGREEMENT WITH THE ABOVE NAMED CLIENT (HAS NOT) BEEN WAIVED IN ACCORDANCE WITH A-E 6.01 (1) (b) OF THE WISCONSIN ADMINISTRATIVE CODE

"THIS IS NOT AN ORIGINAL SURVEY UNLESS THIS SEAL IS RED."

WISCONSIN REGISTERED LAND SURVEYOR	DATE	FIELD WORK BY	DRAWN BY	JOB NUMBER
	JULY 22, 1986	bjw / tjf	klk / bjk	13115

Client	Kettle Moraine Home 612 Kettle Moraine Drive Slinger, WI 53086
Owner	Fortitude Construction
Project	320 Prospect Ave Hartland, WI 53028
Date	2/7/2026
Description	Home Addition

Structural Calculation Package



Design Performed by:

J.E. Frey LLC
5210 S Froemming Dr. Hales Corners, WI 53130
Jacob Frey, P.E.
48156-6

Project # 26-012

Bookmark Summary

Service Load Cases

Name	Source	SelfWeight	Loads	Pattern
Attic DL	Dead Loads	Exclude	4	0
Attic LL	Live Loads	Exclude	4	0
D	Dead Loads	Vertical Direction	0	0
Garage Floor DL	Dead Loads	Exclude	4	0
Garage LL	Live Loads	Exclude	4	0
S	Snow Loads	Exclude	4	0
Second Floor DL	Dead Loads	Exclude	4	0
Second Floor LL	Live Loads	Exclude	4	0
Wall DL	Dead Loads	Exclude	4	0

Factored Load Combinations

Name	Code	Effective Equation	Design	Deflection
1. D	ASCE 7-16 ASD	D + Garage Floor DL + Second Floor DL + Attic DL + Wall DL	Allowable	Other
2. D+L	ASCE 7-16 ASD	D + Garage LL + Second Floor LL + Attic LL + Garage Floor DL + Second Floor DL + Attic DL + Wall DL	Allowable	Dead Plus Live
3. D+S	ASCE 7-16 ASD	D + S + Garage Floor DL + Second Floor DL + Attic DL + Wall DL	Allowable	Other
4. D+0.75 (L+Lr)	ASCE 7-16 ASD	D + 0.75Garage LL + 0.75Second Floor LL + 0.75Attic LL + Garage Floor DL + Second Floor DL + Attic DL + Wall DL	Allowable	Dead Plus Live
4. D+0.75 (L+S)	ASCE 7-16 ASD	D + 0.75S + 0.75Garage LL + 0.75Second Floor LL + 0.75Attic LL + Garage Floor DL + Second Floor DL + Attic DL + Wall DL	Allowable	Other
7. 0.6D+0.6W	ASCE 7-16 ASD	0.6D + 0.6Garage Floor DL + 0.6Second Floor DL + 0.6Attic DL + 0.6Wall DL	Allowable	Other

Member Loads, Uniform

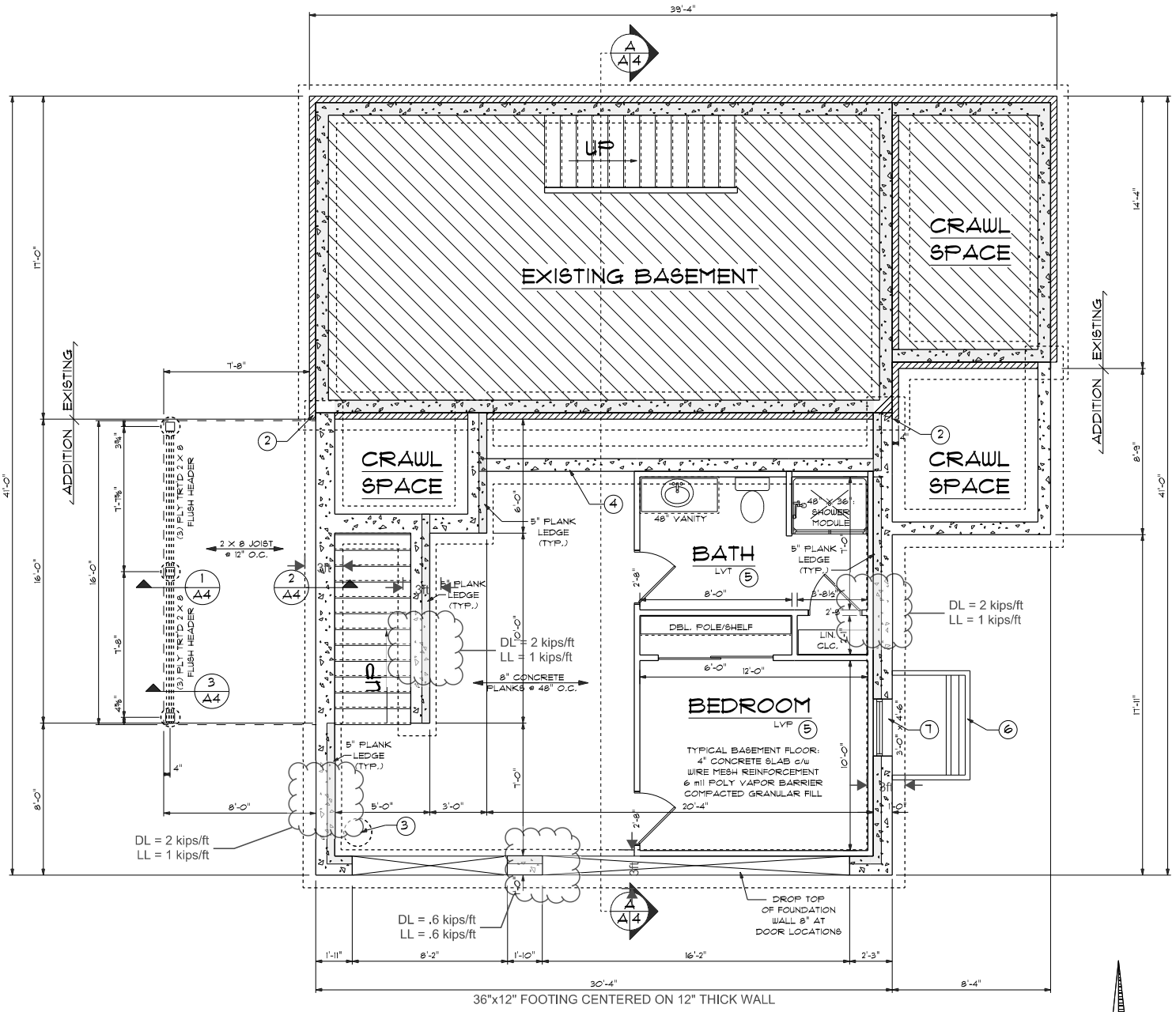
Member	Service Case	Direction	Magnitude	Full Length?	Start Offset ft	End Offset ft	Projected?	Predefined Load
EW1	Attic DL	Shear y	-0.3087 K/ft	Yes	0.0000	1.0000	No	Attic Ceiling 2X8, 17.15 psf, W= 18 ft
EW1	Attic LL	Shear y	-0.1500 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; Uninhabitable attics w/o storage, 10 psf, W= 15 ft
EW1	Garage Floor DL	Shear y	-1.5000 K/ft	Yes	0.0000	1.0000	No	8" Precast + 4" Topping, 100 psf, W= 15 ft
EW1	Garage LL	Shear y	-0.7500 K/ft	Yes	0.0000	1.0000	No	Garage Floor, 50 psf, W= 15 ft
EW1	S	Shear y	-0.5400 K/ft	Yes	0.0000	1.0000	No	N.A.
EW1	Second Floor DL	Shear y	-0.0335 K/ft	Yes	0.0000	1.0000	No	Residential Floor, 16.75 psf, W= 2 ft
EW1	Second Floor LL	Shear y	-0.0800 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; All other areas except stairs, 40 psf, W= 2 ft
EW1	Wall DL	Shear y	-0.2400 K/ft	Yes	0.0000	1.0000	No	Ext Wall - Siding, 12 psf, W= 20 ft
EW2	Attic DL	Shear y	-0.3087 K/ft	Yes	0.0000	1.0000	No	Attic Ceiling 2X8, 17.15 psf, W= 18 ft
EW2	Attic LL	Shear y	-0.1500 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; Uninhabitable attics w/o storage, 10 psf, W= 15 ft
EW2	Garage Floor DL	Shear y	-1.5000 K/ft	Yes	0.0000	1.0000	No	8" Precast + 4" Topping, 100 psf, W= 15 ft
EW2	Garage LL	Shear y	-0.7500 K/ft	Yes	0.0000	1.0000	No	Garage Floor, 50 psf, W= 15 ft
EW2	S	Shear y	-0.5400 K/ft	Yes	0.0000	1.0000	No	N.A.
EW2	Second Floor DL	Shear y	-0.0335 K/ft	Yes	0.0000	1.0000	No	Residential Floor, 16.75 psf, W= 2 ft
EW2	Second Floor LL	Shear y	-0.0800 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; All other areas except stairs, 40 psf, W= 2 ft
EW2	Wall DL	Shear y	-0.2400 K/ft	Yes	0.0000	1.0000	No	Ext Wall - Siding, 12 psf, W= 20 ft

Member Loads, Uniform (continued)

Member	Service Case	Direction	Magnitude	Full Length?	Start Offset ft	End Offset ft	Projected?	Predefined Load
South1	Attic DL	Shear y	-0.0343 K/ft	Yes	0.0000	1.0000	No	Attic Ceiling 2X8, 17.15 psf, W= 2 ft
South1	Attic LL	Shear y	-0.0200 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; Uninhabitable attics w/o storage, 10 psf, W= 2 ft
South1	Garage Floor DL	Shear y	-0.2000 K/ft	Yes	0.0000	1.0000	No	8" Precast + 4" Topping, 100 psf, W= 2 ft
South1	Garage LL	Shear y	-0.1000 K/ft	Yes	0.0000	1.0000	No	Garage Floor, 50 psf, W= 2 ft
South1	S	Shear y	-1.0000 K/ft	Yes	0.0000	1.0000	No	N.A.
South1	Second Floor DL	Shear y	-0.2010 K/ft	Yes	0.0000	1.0000	No	Residential Floor, 16.75 psf, W= 12 ft
South1	Second Floor LL	Shear y	-0.4800 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; All other areas except stairs, 40 psf, W= 12 ft
South1	Wall DL	Shear y	-0.2400 K/ft	Yes	0.0000	1.0000	No	Ext Wall - Siding, 12 psf, W= 20 ft
South2	Attic DL	Shear y	-0.0343 K/ft	Yes	0.0000	1.0000	No	Attic Ceiling 2X8, 17.15 psf, W= 2 ft
South2	Attic LL	Shear y	-0.0200 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; Uninhabitable attics w/o storage, 10 psf, W= 2 ft
South2	Garage Floor DL	Shear y	-0.2000 K/ft	Yes	0.0000	1.0000	No	8" Precast + 4" Topping, 100 psf, W= 2 ft
South2	Garage LL	Shear y	-0.1000 K/ft	Yes	0.0000	1.0000	No	Garage Floor, 50 psf, W= 2 ft
South2	S	Shear y	-1.0000 K/ft	Yes	0.0000	1.0000	No	N.A.
South2	Second Floor DL	Shear y	-0.2010 K/ft	Yes	0.0000	1.0000	No	Residential Floor, 16.75 psf, W= 12 ft
South2	Second Floor LL	Shear y	-0.4800 K/ft	Yes	0.0000	1.0000	No	Residential - 1 & 2 family; All other areas except stairs, 40 psf, W= 12 ft
South2	Wall DL	Shear y	-0.2400 K/ft	Yes	0.0000	1.0000	No	Ext Wall - Siding, 12 psf, W= 20 ft

Node Reactions

Node	Result Case	FY K
East West Bearing Wall	1. D	2.0822
East West Bearing Wall	2. D+L	3.0622
East West Bearing Wall	3. D+S	2.6222
South Bearing Wall	1. D	0.6753
South Bearing Wall	2. D+L	1.2753
South Bearing Wall	3. D+S	1.6753



36"x12" FOOTING CENTERED ON 12" THICK WALL

FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

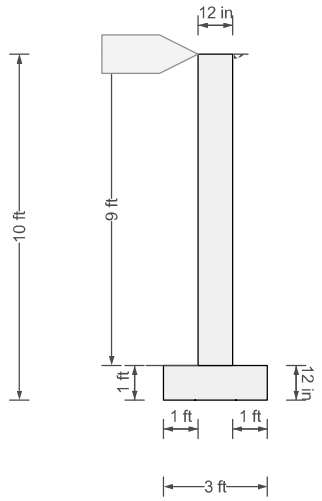
ALL DIMENSIONS MUST BE VERIFIED IN FIELD. G.C. TO COORDINATE AND CONFIRM ANY VARIABLES THAT OCCUR DUE TO EXISTING SITE CONDITIONS.

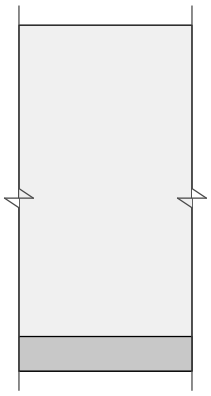
JACOB FREY
J.E. FREY LLC

Restrained Wall @ Floor Bearing

Design Detail

Concrete f'c = 3000 psi
Rebar Fy = 60000 psi
Unit Weight = 150 lb/ft³





Check Summary

Ratio	Check	Provided	Required	Combination
----- Stability Checks -----				
✓ 0.721	Bearing Pressure	3000 psf	2163 psf	1.0D + 1.0L + 1.0H
✓ 0.381	Bearing Eccentricity	2.28 in	6 in	1.0D + 1.0L + 1.0H
----- Toe Checks -----				
✓ 0.131	Shear	5.26 k/ft	0.69 k/ft	1.2D + 1.6L + 1.6H
✓ 0.444	Moment	2.74 ft·k/ft	1.21 ft·k/ft	1.2D + 1.6L + 1.6H
----- Heel Checks -----				
✓ 0.280	Shear	5.26 k/ft	1.47 k/ft	1.4D
✓ 0.268	Moment	2.74 ft·k/ft	0.74 ft·k/ft	1.4D
----- Stem Checks -----				
✓ 0.925	Moment	3.94 ft·k/ft	3.65 ft·k/ft	0.9D + 1.6H
✓ 0.338	Shear	6.31 k/ft	2.14 k/ft	0.9D + 1.6H

Criteria

Use basic criteria from common projec...	Yes
Building Code	IBC 2018
Concrete Load Combs	IBC 2018 (Strength)
Masonry Load Combs	ASCE 7-16 (ASD)
Stability Load Combs	IBC Retaining Wall St...
Apply Sds Factor to Seismic Combinat...	No
Restrained Against Sliding	Yes
Neglect Bearing At Heel	Yes
Use Vert. Comp. for OT	No
Use Vert. Comp. for Sliding	No
Use Vert. Comp. for Bearing	Yes
Use Surcharge for Sliding & OT	Yes
Use Surcharge for Bearing	Yes
Neglect Soil Over Toe	No
Neglect Backfill Wt. for Coulomb	No
Factor Soil Weight As Dead	Yes
Use Passive Force for OT	Yes
Assume Pressure To Top	Yes
Extend Backfill Pressure To Key Bottom	No
Use Toe Passive Pressure for Bearing	No
Required F.S. for OT	1.50
Required F.S. for Sliding	1.50
Has Different Safety Factors for Seismic	No
Allowable Bearing Pressure	3000 psf
Req'd Bearing Location	Middle third
Wall Friction Angle	25°
Friction Coefficent	0.35
Soil Reaction Modulus	172800 lb/ft³

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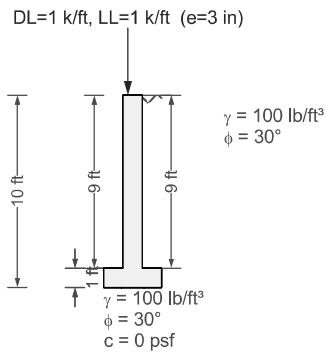
Restrained Wall @ Floor Bearing

Loads



Loading Options/Assumptions

➔ Passive pressure neglects top 0 ft of soil.

Load Combinations

IBC 2018 (Strength)

1.2D + 1.6L + 1.6H
1.2D + 1.6L + 0.9H
1.2D + 0.5L + 1.6H
1.2D + 0.5L + 0.9H
1.2D + 1.6H
1.2D + 0.9H
0.9D + 1.6H
0.9D + 0.9H
1.4D

Strength Check Results Summary

Load Combination	Stem M-applied (ft-k/ft)	Stem M-allow (ft-k/ft)	Stem V-applied (k/ft)	Stem V-allow (k/ft)	Heel M-applied (ft-k/ft)	Heel M-allow (ft-k/ft)
1.2D + 1.6L + 1.6H	3.45	3.94	2.08	6.31	0.63	2.74
1.2D + 1.6L + 0.9H	1.82	3.94	1.14	6.31	0.63	2.74
1.2D + 0.5L + 1.6H	3.56	3.94	2.11	6.31	0.63	2.74
1.2D + 0.5L + 0.9H	1.93	3.94	1.17	6.31	0.63	2.74
1.2D + 1.6H	3.62	3.94	2.13	6.31	0.63	2.74
1.2D + 0.9H	1.98	3.94	1.18	6.31	0.63	2.74
0.9D + 1.6H	3.65	3.94	2.14	6.31	0.47	2.74
0.9D + 0.9H	2.01	3.94	1.19	6.31	0.47	2.74
1.4D	0.35	3.94	0.04	6.31	0.74	2.74

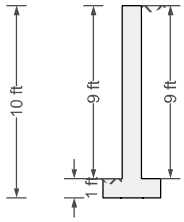
Load Combination	Heel V-applied (k/ft)	Heel V-allow (k/ft)	Toe M-applied (ft-k/ft)	Toe M-allow (ft-k/ft)	Toe V-applied (k/ft)	Toe V-allow (k/ft)
1.2D + 1.6L + 1.6H	1.26	5.26	1.21	2.74	0.69	5.26
1.2D + 1.6L + 0.9H	1.26	5.26	1.21	2.74	0.69	5.26
1.2D + 0.5L + 1.6H	1.26	5.26	0.98	2.74	0.56	5.26
1.2D + 0.5L + 0.9H	1.26	5.26	0.98	2.74	0.56	5.26
1.2D + 1.6H	1.26	5.26	0.87	2.74	0.49	5.26
1.2D + 0.9H	1.26	5.26	0.87	2.74	0.49	5.26
0.9D + 1.6H	0.95	5.26	0.65	2.74	0.37	5.26
0.9D + 0.9H	0.95	5.26	0.65	2.74	0.37	5.26
1.4D	1.47	5.26	1.01	2.74	0.58	5.26

Stability Check Results Summary

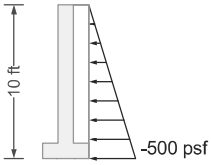
Load Combination	Sliding Force (lb/in)	Resisting Force (lb/in)	Sliding F.S.	Sliding F.S. Req'd	Sliding F.S. Req'd Seis...	Bearing Pressure Actual (psf)	Bearing Pressure Allowable (psf)	Bearing Eccentricity Actual (in)	Bearing Eccentricity Allowable (in)
1.0D + 1.0L + 1.0H	208.3	210.5	1.010	1.500	1.500	2163	3000	2.28	6
1.0D + 1.0H	208.3	179	0.859	1.500	1.500	1703	3000	2.28	6

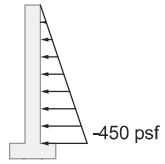
Restrained Wall @ Floor Bearing

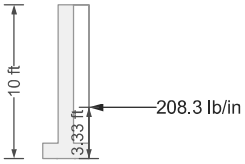
Backfill Pressure

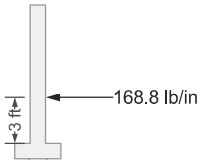


γ = 100 lb/ft³
ϕ = 30°









Lateral Earth Pressure

At - Rest Earth Pressure Theory

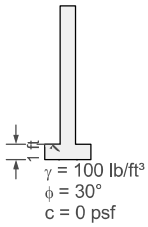
$K_o = 1 - \sin(\phi) = 1 - \sin((30°)) = 0.50$

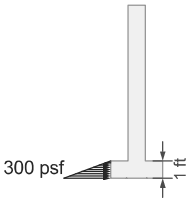
$\sigma_h = K_o \gamma H = (0.50)(100 \text{ lb / ft}^3)(10 \text{ ft}) = 500 \text{ psf}$

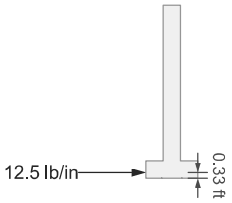
Lateral Earth Pressure (stem only)

$\sigma_h = K_o \gamma H = (0.50)(100 \text{ lb / ft}^3)(9 \text{ ft}) = 450 \text{ psf}$

Passive Pressure







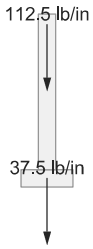
Lateral Earth Pressure

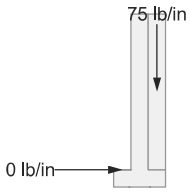
Rankine Passive Earth Pressure Theory

$$K_p = \tan^2\left(45° + \frac{\phi}{2}\right) = \tan^2\left[45° + \frac{(30°)}{2}\right] = 3.0$$

$$\sigma_p = \gamma H K_p + 2c\sqrt{K_p} = (100\ lb/ft^3)(1\ ft)(3.0) + 2(0\ psf)\sqrt{3.0} = 300\ psf$$

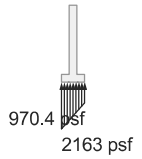
Wall/Soil Weights

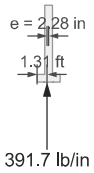


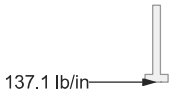


Restrained Wall @ Floor Bearing

Bearing Pressure







Friction

$F = \mu R = (0.350)(391.7\ \text{lb/in}) = 137.1\ \text{lb/in}$

Bearing Pressure Calculation

Contributing Forces

	Vert Force	...offset	Horz Force	...offset	OT Moment
Backfill Pressure	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Axial Dead Load	-83.33 lb/in	1.25 ft	0 lb/in	-	-15000 in·lb/ft
Axial Live Load	-83.33 lb/in	1.25 ft	0 lb/in	-	-15000 in·lb/ft
Footing Weight	-37.5 lb/in	1.5 ft	0 lb/in	-	-8100 in·lb/ft
Stem Weight	-112.5 lb/in	1.5 ft	0 lb/in	-	-24300 in·lb/ft
Backfill Weight	-75 lb/in	2.5 ft	0 lb/in	-	-27000 in·lb/ft
Soil over toe Weight	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Stem Base Shear	-0 lb/in	-	-107.87 lb/in	1 ft	15533 in·lb/ft
Stem Base Moment	0 lb/in	-	0 lb/in	-	0 in·lb/ft
	-391.67 lb/in				-73866.67 in·lb/ft

$$\frac{-73866.67\ \text{in·lb/ft}}{-391.67\ \text{lb/in}} = 1.31\ \text{ft}$$

Stability Checks [1.0D + 1.0L + 1.0H]

Overturning Check

Check not performed; wall has lateral support.

Sliding Check

Check not performed; restrained against sliding.

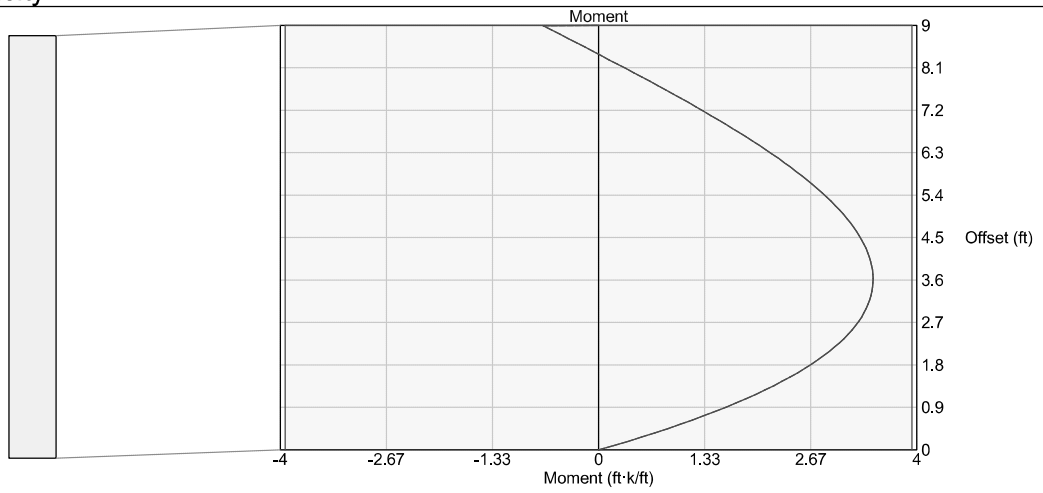
Bearing Capacity Check

Bearing pressure < allowable (2163 psf < 3000 psf) - OK
Bearing resultant eccentricity < allowable (2.28 in < 6 in) - OK

Wall Top Displacement

Not calculated because this wall has a lateral restraint.

Stem Flexural Capacity



Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Positive bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Positive bending]

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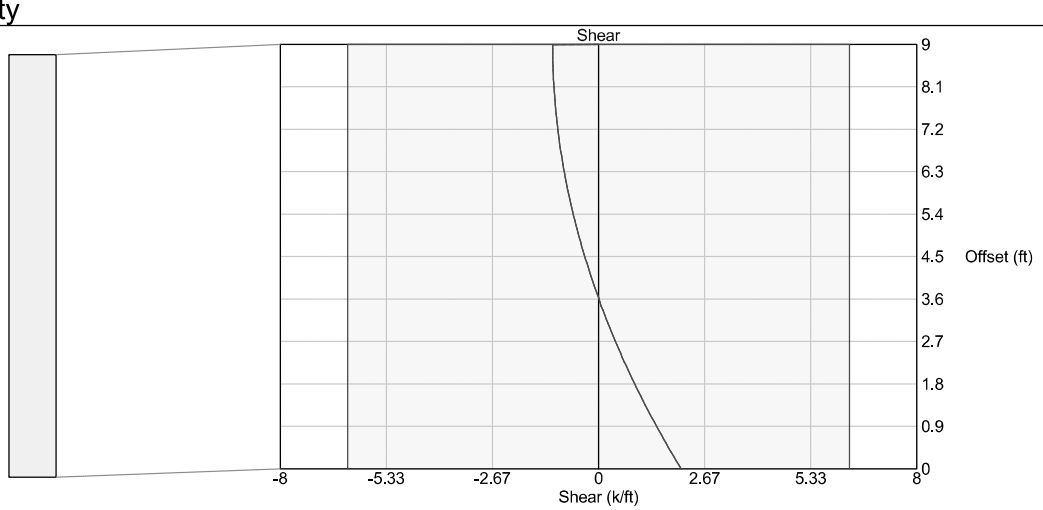
$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Stem Shear Capacity



Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Positive shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Negative shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Positive shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Negative shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Toe Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 1.21 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.69$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

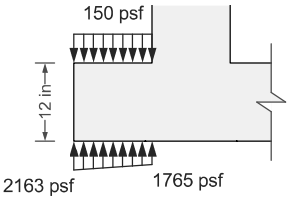
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 1.21$ ft·k / ft ✓

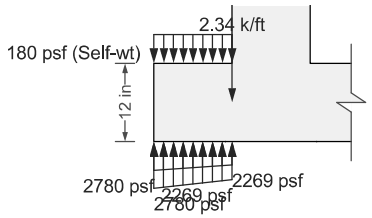
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.2D + 1.6L + 1.6H



Heel Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.63 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000 \text{ psi}}\, (10 \text{ in}) = 8.76 \text{ k / ft}$

$\phi V_n = \phi\, V_n = (0.60)(8.76 \text{ k / ft}) = 5.26 \text{ k / ft}$

$\phi V_n = 5.26 \text{ k / ft} \geq V_u = 1.26 \text{ k / ft}$ ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000 \text{ psi}}\, (200 \text{ in}^3 / \text{ft}) = 4.56 \text{ ft·k / ft}$ (as limited by tension)

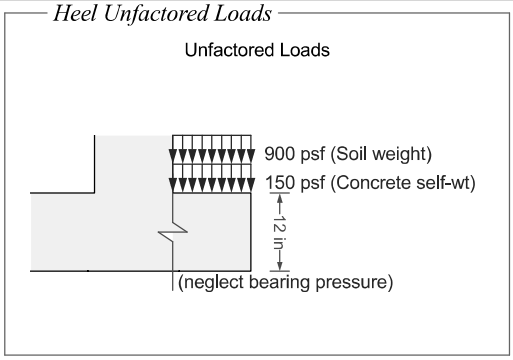
$M_n = 0.85\, F'_c\, S_m = 0.85 (3000 \text{ psi}) (200 \text{ in}^3 / \text{ft}) = 42.5 \text{ ft·k / ft}$ (as limited by compression)

Tension controls

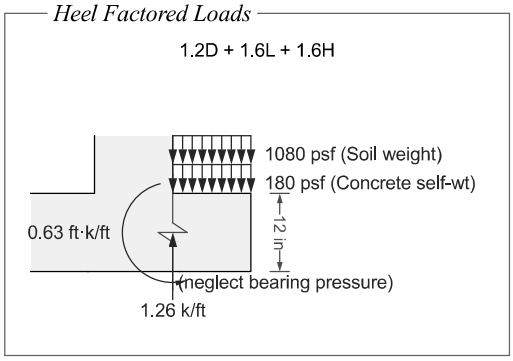
$\phi M_n = \phi\, M_n = (0.60)(4.56 \text{ ft·k / ft}) = 2.74 \text{ ft·k / ft}$

$\phi M_n = 2.74 \text{ ft·k / ft} \geq M_u = 0.63 \text{ ft·k / ft}$ ✓

Heel Unfactored Loads

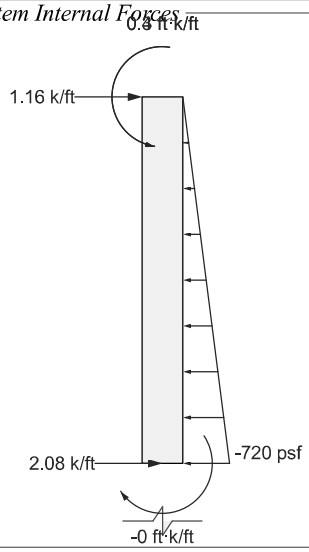


Heel Factored Loads

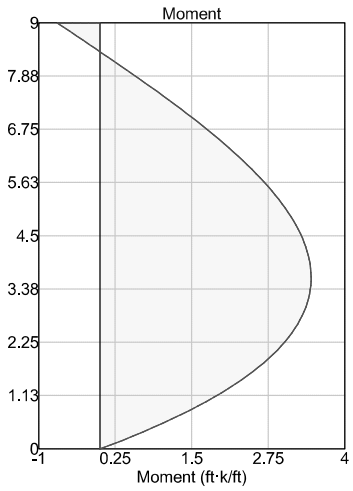


Stem Forces [1.2D + 1.6L + 1.6H]

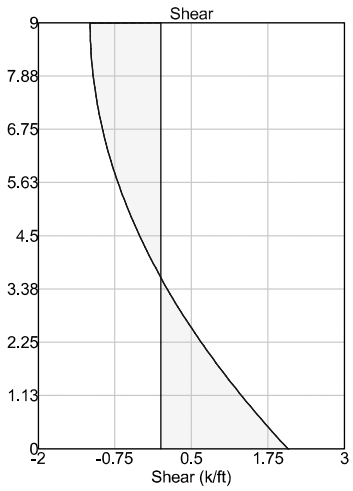
Stem Internal Forces



Stem Internal Forces



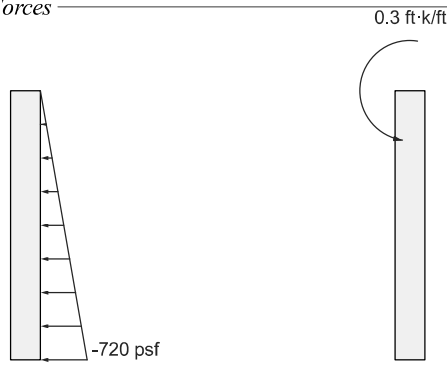
Stem Internal Forces



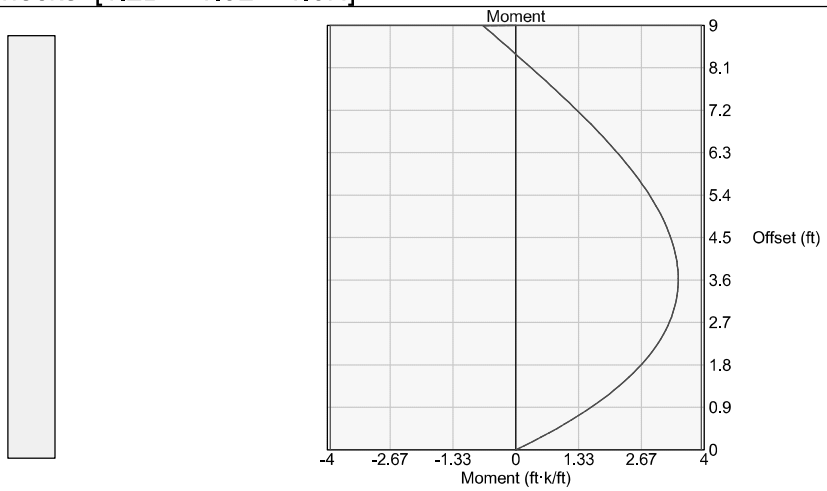
Stem Joint Force Transfer

Location	Force
@ stem base	2.08 k/ft

Stem Internal Forces



Stem Moment Checks [1.2D + 1.6L + 1.6H]



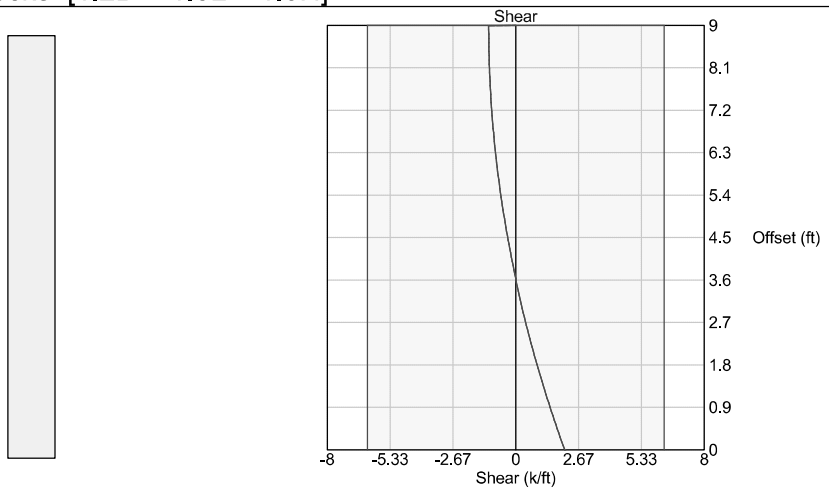
Check (ACI 318-14 11.5.5.1b) @ 3.64 ft from base [Positive bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 3.45 ft·k / ft ✓

Check (ACI 318-14 11.5.5.1b) @ 9 ft from base [Negative bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.7 ft·k / ft ✓

Stem Shear Checks [1.2D + 1.6L + 1.6H]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Positive shear]

ϕV_n = 6.31 k / ft ≥ V_u = 2.08 k / ft ✓

Shear Check (ACI 318-14 11.5.5.1c) @ 9 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 1.16 k / ft ✓

Stem Miscellaneous Checks [1.2D + 1.6L + 1.6H]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

ϕM_n = 3.94 ft·k / ft ≥ (4 / 3) M_u = [4 / 3] (0 ft·k / ft) = 0 ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

β_1 = 0.850 ($F'_c \le 4000$ psi)

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

ε_t = INF ≥ 0.004 ✓

Toe Checks [0.9D + 1.6H]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 0.65 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.37$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

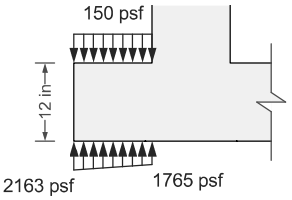
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.65$ ft·k / ft ✓

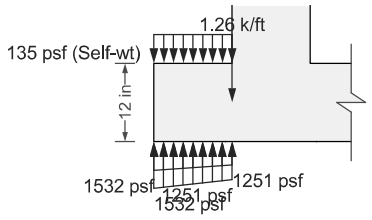
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

0.9D + 1.6H



Heel Checks [0.9D + 1.6H]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.47 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000 \text{ psi}}\, (10 \text{ in}) = 8.76 \text{ k / ft}$

$\phi V_n = \phi\, V_n = (0.60)(8.76 \text{ k / ft}) = 5.26 \text{ k / ft}$

$\phi V_n = 5.26 \text{ k / ft} \geq V_u = 0.95 \text{ k / ft}$ ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000 \text{ psi}}\, (200 \text{ in}^3 / \text{ft}) = 4.56 \text{ ft·k / ft}$ (as limited by tension)

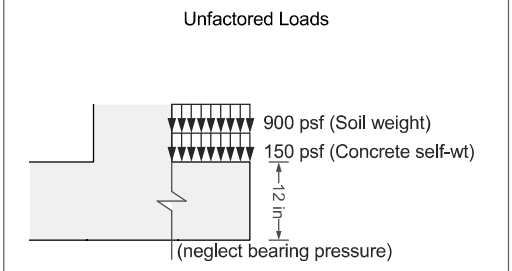
$M_n = 0.85\, F'_c\, S_m = 0.85 (3000 \text{ psi}) (200 \text{ in}^3 / \text{ft}) = 42.5 \text{ ft·k / ft}$ (as limited by compression)

Tension controls

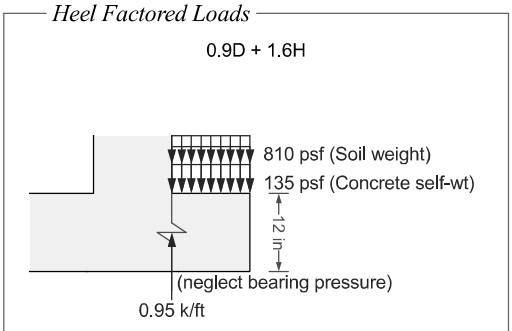
$\phi M_n = \phi\, M_n = (0.60)(4.56 \text{ ft·k / ft}) = 2.74 \text{ ft·k / ft}$

$\phi M_n = 2.74 \text{ ft·k / ft} \geq M_u = 0.47 \text{ ft·k / ft}$ ✓

Heel Unfactored Loads

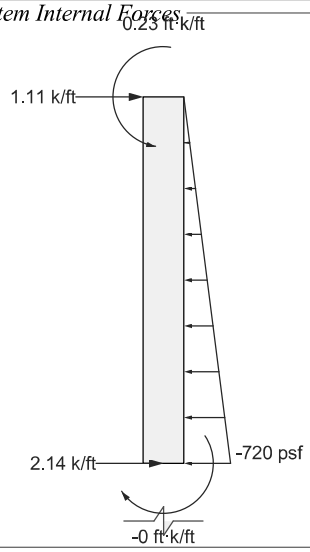


Heel Factored Loads

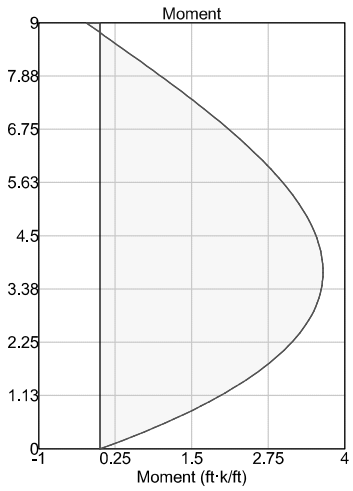


Stem Forces [0.9D + 1.6H]

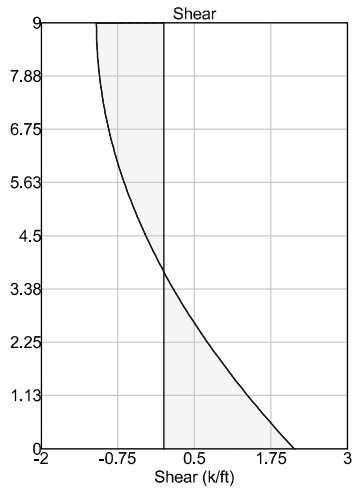
Stem Internal Forces



Stem Internal Forces



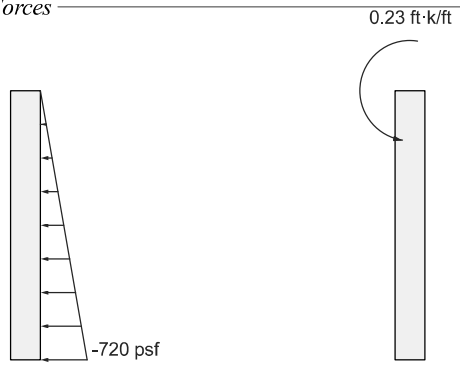
Stem Internal Forces



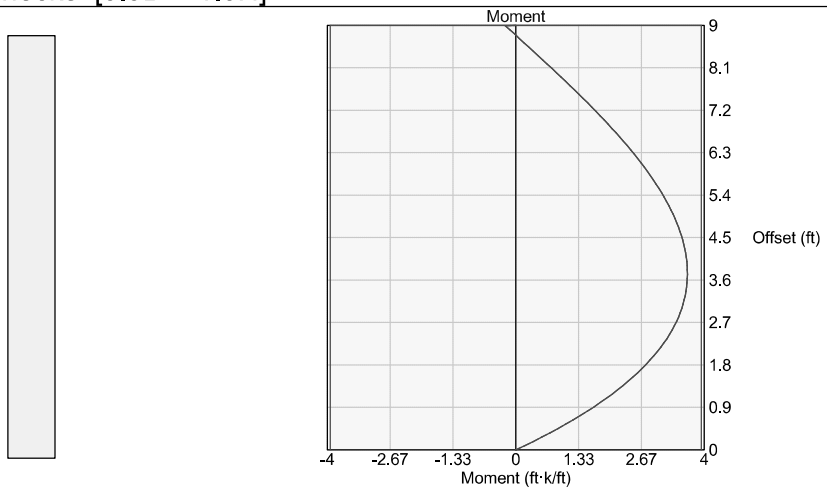
Stem Joint Force Transfer

Location	Force
@ stem base	2.14 k/ft

Stem Internal Forces



Stem Moment Checks [0.9D + 1.6H]



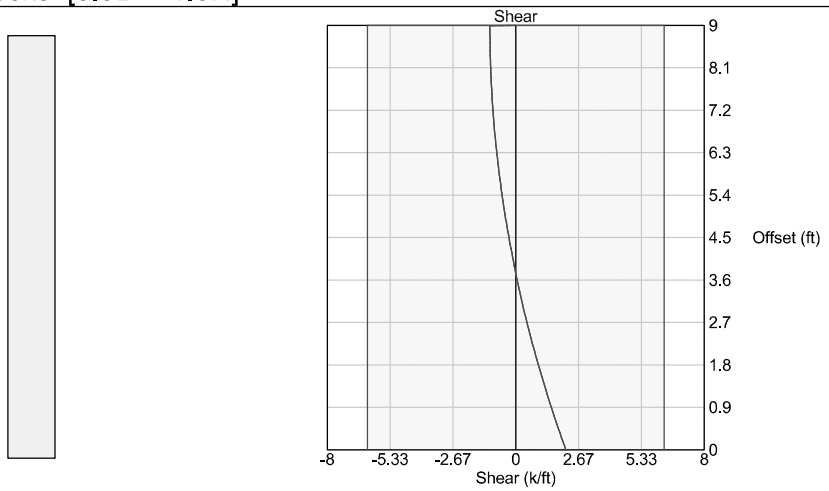
Check (ACI 318-14 11.5.5.1b) @ 3.73 ft from base [Positive bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 3.65 ft·k / ft ✓

Check (ACI 318-14 11.5.5.1b) @ 9 ft from base [Negative bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.22 ft·k / ft ✓

Stem Shear Checks [0.9D + 1.6H]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Positive shear]

ϕV_n = 6.31 k / ft ≥ V_u = 2.14 k / ft ✓

Shear Check (ACI 318-14 11.5.5.1c) @ 9 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 1.1 k / ft ✓

Stem Miscellaneous Checks [0.9D + 1.6H]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

ϕM_n = 3.94 ft·k / ft ≥ (4 / 3) M_u = [4 / 3] (0 ft·k / ft) = 0 ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

β_1 = 0.850 ($F'_c \le 4000$ psi)

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

ε_t = INF ≥ 0.004 ✓

Toe Checks [1.4D]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 1.01 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000 \text{ psi}}\, (10 \text{ in}) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76 \text{ k / ft}) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq$ $V_u = 0.58$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000 \text{ psi}}\, (200 \text{ in}^3 / \text{ft}) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000 \text{ psi}) (200 \text{ in}^3 / \text{ft}) = 42.5$ ft·k / ft (as limited by compression)

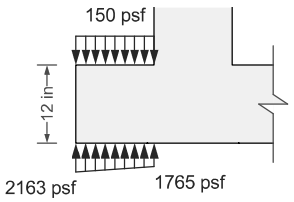
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56 \text{ ft·k / ft}) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq$ $M_u = 1.01$ ft·k / ft ✓

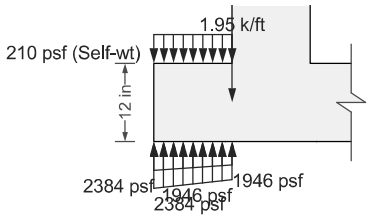
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.4D



Heel Checks [1.4D]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.74 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000\ psi}\, (10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 1.47$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000\ psi}\, (200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000\ psi) (200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

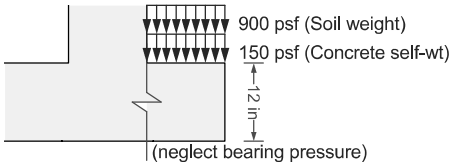
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.74$ ft·k / ft ✓

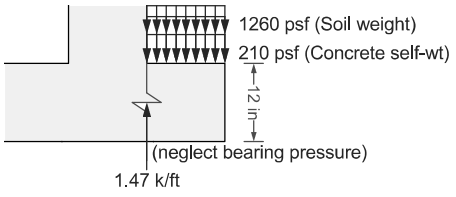
Heel Unfactored Loads

Unfactored Loads



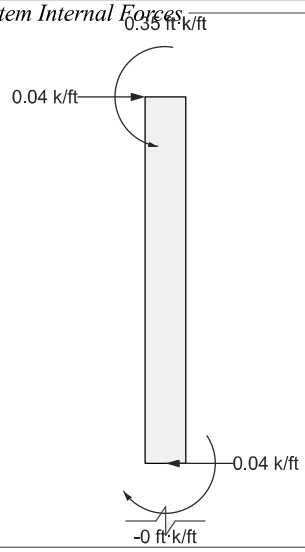
Heel Factored Loads

1.4D

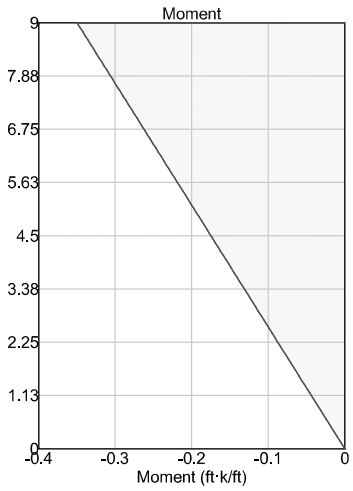


Stem Forces [1.4D]

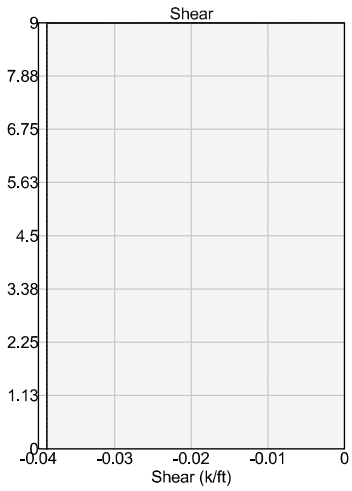
Stem Internal Forces



Stem Internal Forces



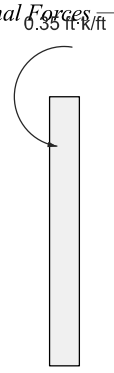
Stem Internal Forces



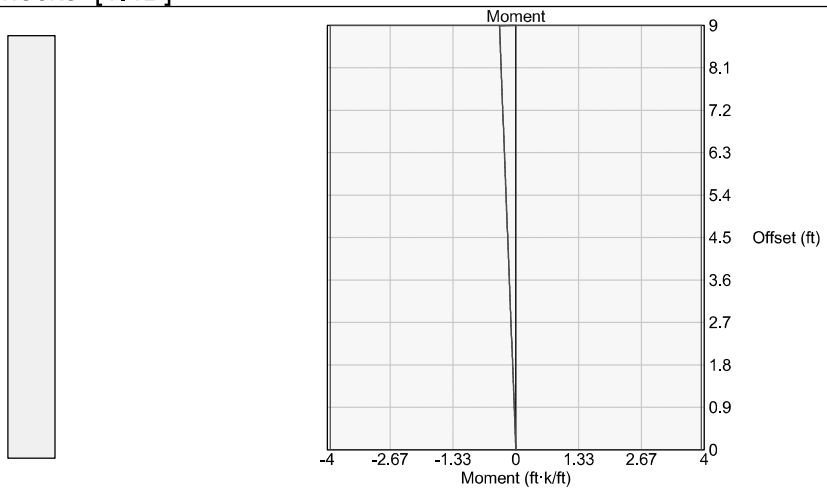
Stem Joint Force Transfer

Location	Force
@ stem base	-0.04 k/ft

Stem Internal Forces



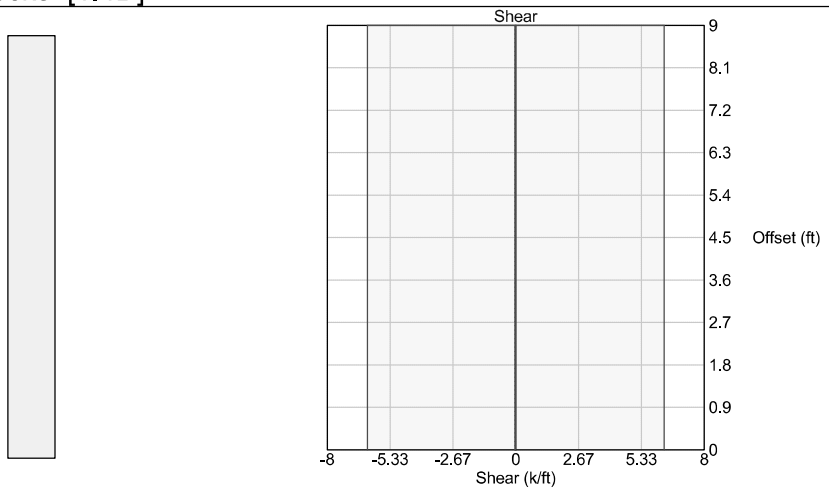
Stem Moment Checks [1.4D]



Check (ACI 318-14 11.5.5.1b) @ 9 ft from base

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.35 ft·k / ft ✓

Stem Shear Checks [1.4D]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 0.04 k / ft ✓

Stem Miscellaneous Checks [1.4D]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850$ $(F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

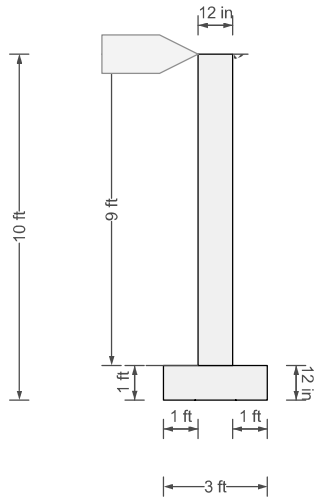
$\varepsilon_t = \text{INF} \geq 0.004$ ✓

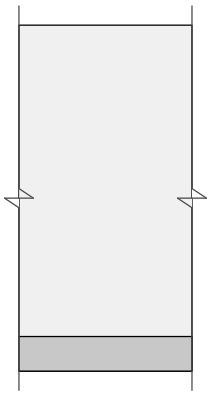
JACOB FREY
J.E. FREY LLC

Restrained Wall @ Garage Bearing

Design Detail

Concrete f'c = 3000 psi
Rebar Fy = 60000 psi
Unit Weight = 150 lb/ft³





Check Summary

Ratio	Check	Provided	Required	Combination
----- Stability Checks -----				
✓ 0.881	Bearing Pressure	3000 psf	2644 psf	1.0D + 1.0L + 1.0H
✓ 0.392	Bearing Eccentricity	2.35 in	6 in	1.0D + 1.0L + 1.0H
----- Toe Checks -----				
✓ 0.160	Shear	5.26 k/ft	0.84 k/ft	1.2D + 1.6L + 1.6H
✓ 0.542	Moment	2.74 ft·k/ft	1.48 ft·k/ft	1.2D + 1.6L + 1.6H
----- Heel Checks -----				
✓ 0.280	Shear	5.26 k/ft	1.47 k/ft	1.4D
✓ 0.268	Moment	2.74 ft·k/ft	0.74 ft·k/ft	1.4D
----- Stem Checks -----				
✓ 0.901	Moment	3.94 ft·k/ft	3.55 ft·k/ft	0.9D + 1.6H
✓ 0.334	Shear	6.31 k/ft	2.11 k/ft	0.9D + 1.6H

Criteria

Use basic criteria from common projec...	Yes
Building Code	IBC 2018
Concrete Load Combs	IBC 2018 (Strength)
Masonry Load Combs	ASCE 7-16 (ASD)
Stability Load Combs	IBC Retaining Wall St...
Apply Sds Factor to Seismic Combinat...	No
Restrained Against Sliding	Yes
Neglect Bearing At Heel	Yes
Use Vert. Comp. for OT	No
Use Vert. Comp. for Sliding	No
Use Vert. Comp. for Bearing	Yes
Use Surcharge for Sliding & OT	Yes
Use Surcharge for Bearing	Yes
Neglect Soil Over Toe	No
Neglect Backfill Wt. for Coulomb	No
Factor Soil Weight As Dead	Yes
Use Passive Force for OT	Yes
Assume Pressure To Top	Yes
Extend Backfill Pressure To Key Bottom	No
Use Toe Passive Pressure for Bearing	No
Required F.S. for OT	1.50
Required F.S. for Sliding	1.50
Has Different Safety Factors for Seismic	No
Allowable Bearing Pressure	3000 psf
Req'd Bearing Location	Middle third
Wall Friction Angle	25°
Friction Coefficent	0.35
Soil Reaction Modulus	172800 lb/ft³

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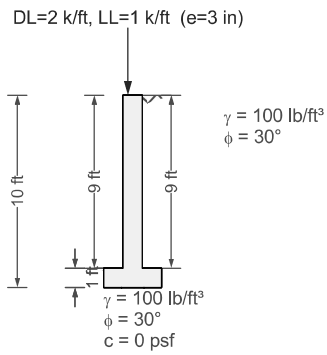
Restrained Wall @ Garage Bearing

Loads



Loading Options/Assumptions

➔ Passive pressure neglects top 0 ft of soil.

Load Combinations

IBC 2018 (Strength)

1.2D + 1.6L + 1.6H
1.2D + 1.6L + 0.9H
1.2D + 0.5L + 1.6H
1.2D + 0.5L + 0.9H
1.2D + 1.6H
1.2D + 0.9H
0.9D + 1.6H
0.9D + 0.9H
1.4D

Strength Check Results Summary

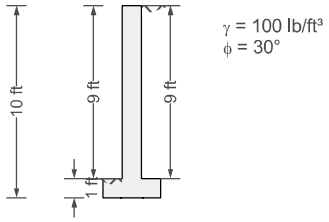
Load Combination	Stem M-applied (ft-k/ft)	Stem M-allow (ft-k/ft)	Stem V-applied (k/ft)	Stem V-allow (k/ft)	Heel M-applied (ft-k/ft)	Heel M-allow (ft-k/ft)
1.2D + 1.6L + 1.6H	3.33	3.94	2.05	6.31	0.63	2.74
1.2D + 1.6L + 0.9H	1.71	3.94	1.1	6.31	0.63	2.74
1.2D + 0.5L + 1.6H	3.44	3.94	2.08	6.31	0.63	2.74
1.2D + 0.5L + 0.9H	1.81	3.94	1.13	6.31	0.63	2.74
1.2D + 1.6H	3.49	3.94	2.09	6.31	0.63	2.74
1.2D + 0.9H	1.86	3.94	1.15	6.31	0.63	2.74
0.9D + 1.6H	3.55	3.94	2.11	6.31	0.47	2.74
0.9D + 0.9H	1.92	3.94	1.17	6.31	0.47	2.74
1.4D	0.7	3.94	0.08	6.31	0.74	2.74

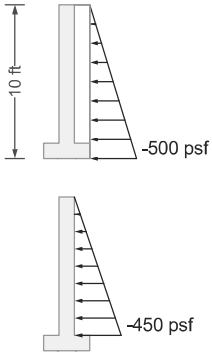
Load Combination	Heel V-applied (k/ft)	Heel V-allow (k/ft)	Toe M-applied (ft-k/ft)	Toe M-allow (ft-k/ft)	Toe V-applied (k/ft)	Toe V-allow (k/ft)
1.2D + 1.6L + 1.6H	1.26	5.26	1.48	2.74	0.84	5.26
1.2D + 1.6L + 0.9H	1.26	5.26	1.48	2.74	0.84	5.26
1.2D + 0.5L + 1.6H	1.26	5.26	1.25	2.74	0.71	5.26
1.2D + 0.5L + 0.9H	1.26	5.26	1.25	2.74	0.71	5.26
1.2D + 1.6H	1.26	5.26	1.14	2.74	0.65	5.26
1.2D + 0.9H	1.26	5.26	1.14	2.74	0.65	5.26
0.9D + 1.6H	0.95	5.26	0.85	2.74	0.48	5.26
0.9D + 0.9H	0.95	5.26	0.85	2.74	0.48	5.26
1.4D	1.47	5.26	1.33	2.74	0.75	5.26

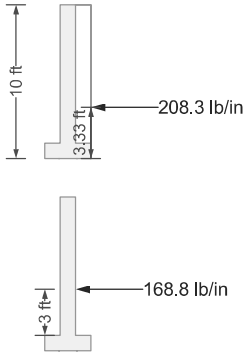
Stability Check Results Summary

Load Combination	Sliding Force (lb/in)	Resisting Force (lb/in)	Sliding F.S.	Sliding F.S. Req'd	Sliding Bearing Pressure F.S. Req'd Seis...	Bearing Pressure Actual (psf)	Bearing Pressure Allowable (psf)	Bearing Eccentricity Actual (in)	Bearing Eccentricity Allowable (in)
1.0D + 1.0L + 1.0H	208.3	241.9	1.161	1.500	1.500	2644	3000	2.35	6
1.0D + 1.0H	208.3	210.5	1.010	1.500	1.500	2181	3000	2.35	6

Backfill Pressure







Lateral Earth Pressure

At - Rest Earth Pressure Theory

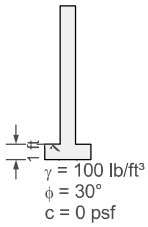
$K_o = 1 - \sin(\phi) = 1 - \sin((30°)) = 0.50$

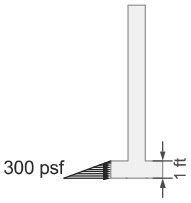
$\sigma_h = K_o \gamma H = (0.50)(100\ lb/ft^3)(10\ ft) = 500\ psf$

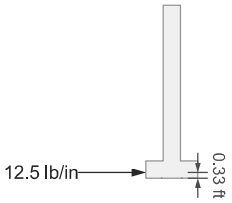
Lateral Earth Pressure (stem only)

$\sigma_h = K_o \gamma H = (0.50)(100\ lb/ft^3)(9\ ft) = 450\ psf$

Passive Pressure







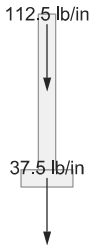
Lateral Earth Pressure

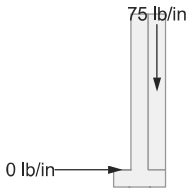
Rankine Passive Earth Pressure Theory

$$K_p = \tan^2\left(45° + \frac{\phi}{2}\right) = \tan^2\left[45° + \frac{(30°)}{2}\right] = 3.0$$

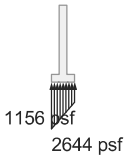
$$\sigma_p = \gamma H K_p + 2c\sqrt{K_p} = (100\ lb/ft^3)(1\ ft)(3.0) + 2(0\ psf)\sqrt{3.0} = 300\ psf$$

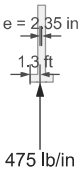
Wall/Soil Weights

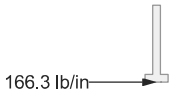




Bearing Pressure







Friction

$F = \mu R = (0.350)(475\ \text{lb / in}) = 166.3\ \text{lb / in}$

Bearing Pressure Calculation

Contributing Forces

	Vert Force	...offset	Horz Force	...offset	OT Moment
Backfill Pressure	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Axial Dead Load	-166.67 lb/in	1.25 ft	0 lb/in	-	-30000 in·lb/ft
Axial Live Load	-83.33 lb/in	1.25 ft	0 lb/in	-	-15000 in·lb/ft
Footing Weight	-37.5 lb/in	1.5 ft	0 lb/in	-	-8100 in·lb/ft
Stem Weight	-112.5 lb/in	1.5 ft	0 lb/in	-	-24300 in·lb/ft
Backfill Weight	-75 lb/in	2.5 ft	0 lb/in	-	-27000 in·lb/ft
Soil over toe Weight	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Stem Base Shear	-0 lb/in	-	-105.56 lb/in	1 ft	15200 in·lb/ft
Stem Base Moment	0 lb/in	-	0 lb/in	-	0 in·lb/ft
	-475 lb/in				-89200 in·lb/ft

$$\frac{-89200\ \text{in·lb / ft}}{-475\ \text{lb / in}} = 1.3\ \text{ft}$$

Stability Checks [1.0D + 1.0L + 1.0H]

Overturning Check

Check not performed; wall has lateral support.

Sliding Check

Check not performed; restrained against sliding.

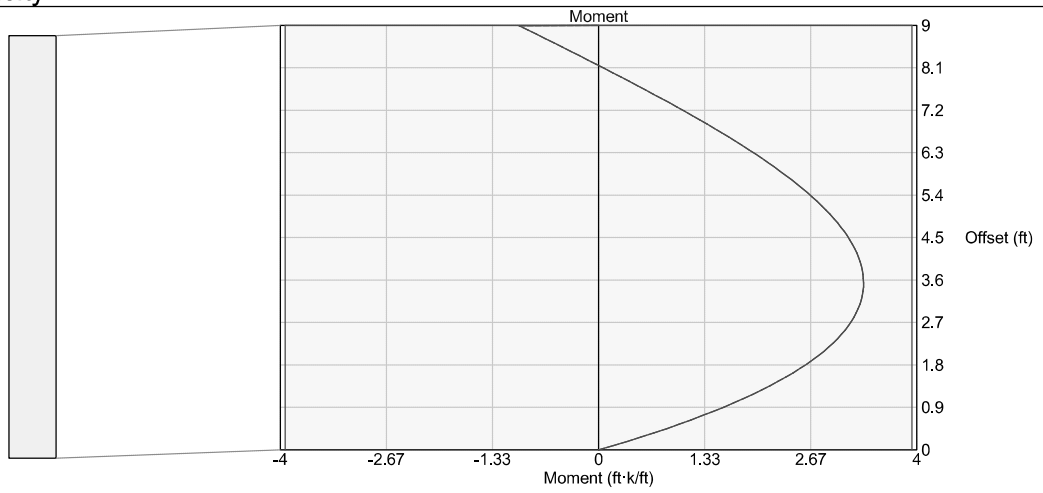
Bearing Capacity Check

Bearing pressure < allowable (2644 psf < 3000 psf) - OK
Bearing resultant eccentricity < allowable (2.35 in < 6 in) - OK

Wall Top Displacement

Not calculated because this wall has a lateral restraint.

Stem Flexural Capacity



Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5\,\lambda\,\sqrt{F'_c}\,S_m = 5\,(1.0)\,\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\,M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Positive bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5\,\lambda\,\sqrt{F'_c}\,S_m = 5\,(1.0)\,\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\,M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5\,\lambda\,\sqrt{F'_c}\,S_m = 5\,(1.0)\,\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\,M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Positive bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

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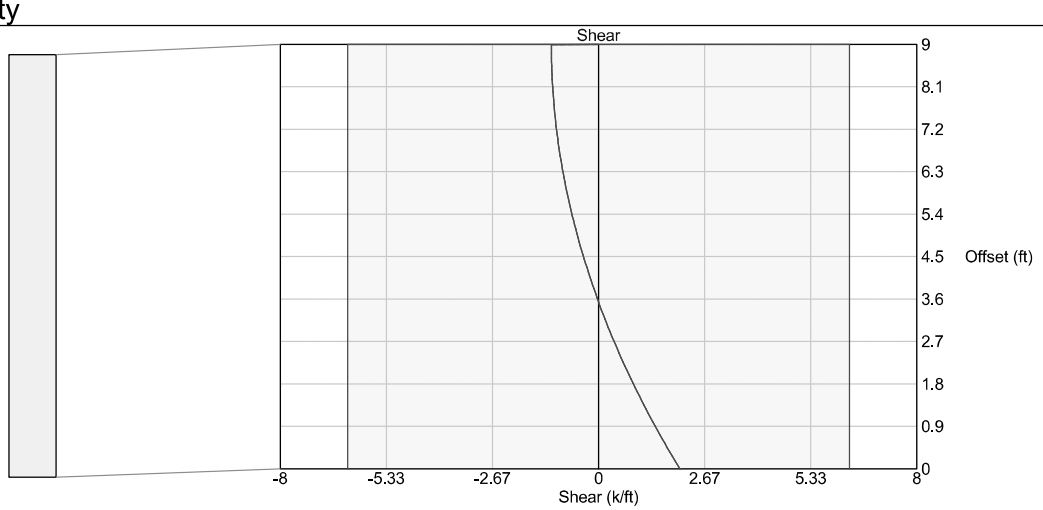
$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\,M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Stem Shear Capacity



Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Positive shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Negative shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Positive shear]

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Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Negative shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Toe Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 1.48 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.84$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

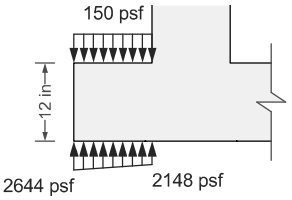
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 1.48$ ft·k / ft ✓

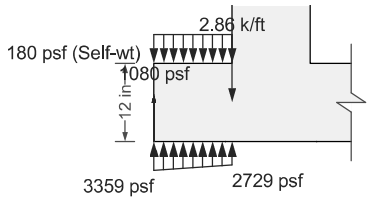
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.2D + 1.6L + 1.6H



Heel Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.63 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000 \text{ psi}}\, (10 \text{ in}) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76 \text{ k / ft}) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 1.26$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000 \text{ psi}}\, (200 \text{ in}^3 / \text{ft}) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000 \text{ psi}) (200 \text{ in}^3 / \text{ft}) = 42.5$ ft·k / ft (as limited by compression)

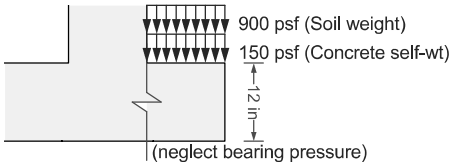
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56 \text{ ft·k / ft}) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.63$ ft·k / ft ✓

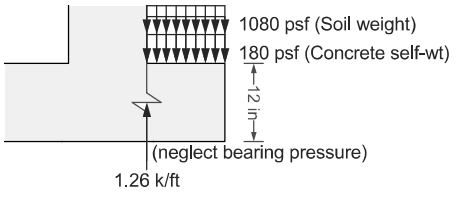
Heel Unfactored Loads

Unfactored Loads



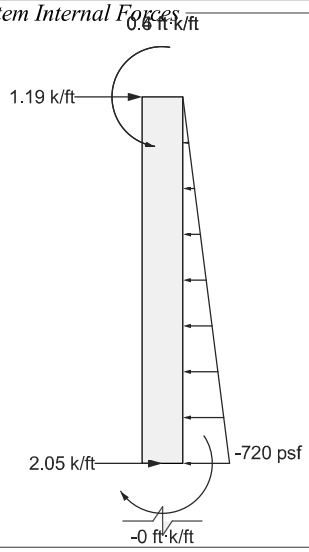
Heel Factored Loads

1.2D + 1.6L + 1.6H

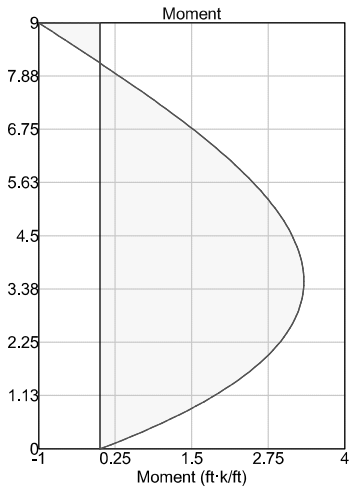


Stem Forces [1.2D + 1.6L + 1.6H]

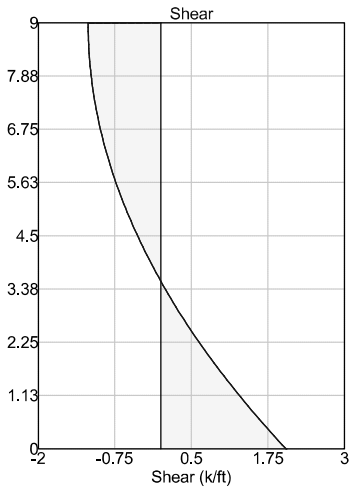
Stem Internal Forces



Stem Internal Forces



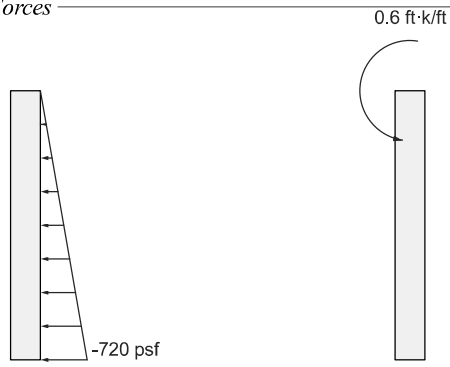
Stem Internal Forces



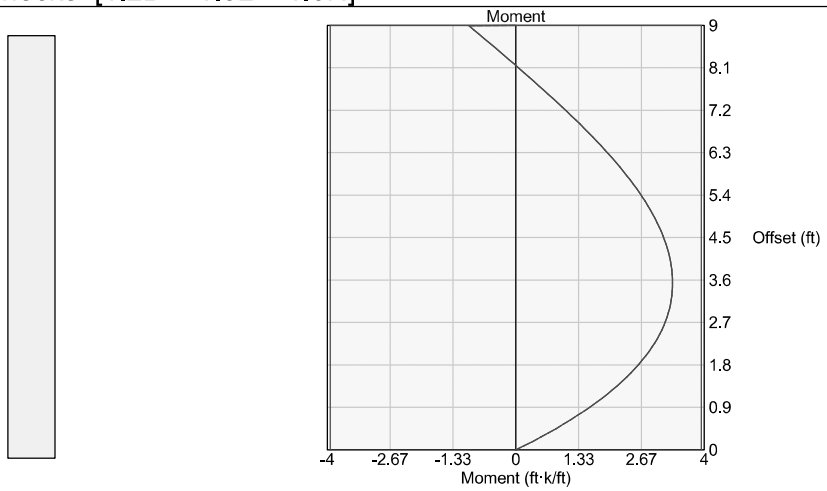
Stem Joint Force Transfer

Location	Force
@ stem base	2.05 k/ft

Stem Internal Forces



Stem Moment Checks [1.2D + 1.6L + 1.6H]



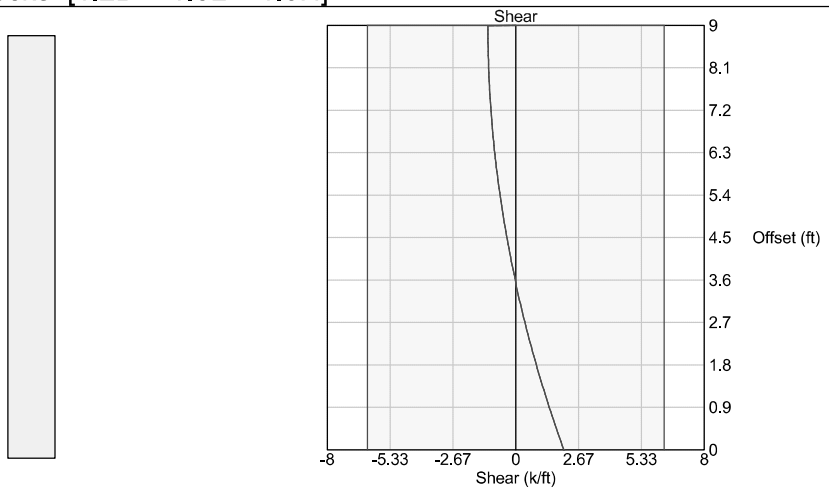
Check (ACI 318-14 11.5.5.1b) @ 3.55 ft from base [Positive bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 3.33 ft·k / ft ✓

Check (ACI 318-14 11.5.5.1b) @ 9 ft from base [Negative bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 1 ft·k / ft ✓

Stem Shear Checks [1.2D + 1.6L + 1.6H]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Positive shear]

ϕV_n = 6.31 k / ft ≥ V_u = 2.05 k / ft ✓

Shear Check (ACI 318-14 11.5.5.1c) @ 9 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 1.19 k / ft ✓

Stem Miscellaneous Checks [1.2D + 1.6L + 1.6H]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850 \quad (F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

$\varepsilon_t = \text{INF} \geq 0.004$ ✓

Toe Checks [0.9D + 1.6H]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 0.85 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.48$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

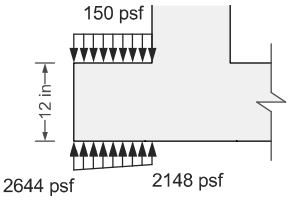
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.85$ ft·k / ft ✓

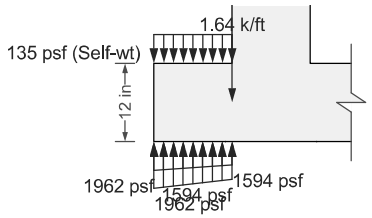
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

0.9D + 1.6H



Heel Checks [0.9D + 1.6H]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.47 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000\ psi}\, (10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.95$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000\ psi}\, (200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

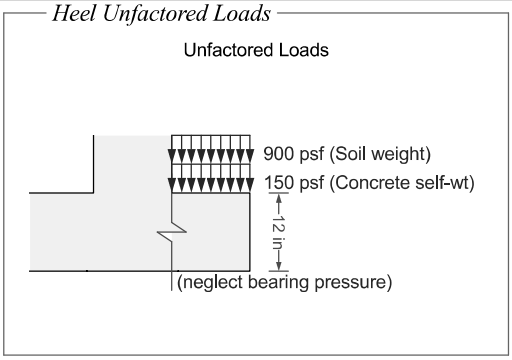
$M_n = 0.85\, F'_c\, S_m = 0.85 (3000\ psi) (200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

Tension controls

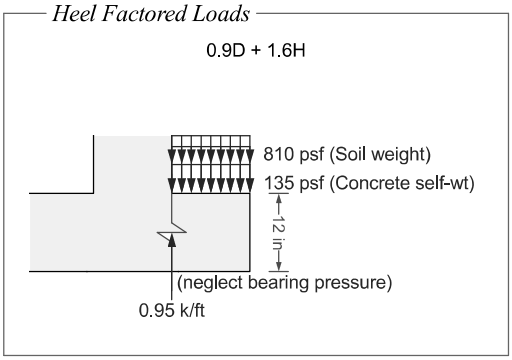
$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.47$ ft·k / ft ✓

Heel Unfactored Loads

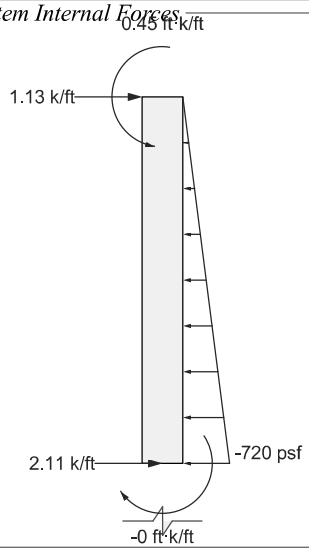


Heel Factored Loads

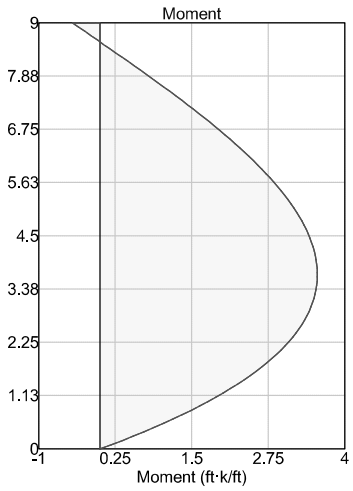


Stem Forces [0.9D + 1.6H]

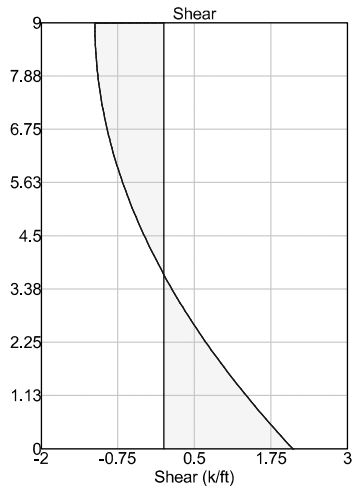
Stem Internal Forces



Stem Internal Forces



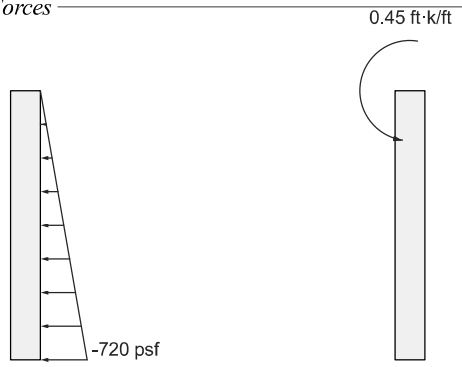
Stem Internal Forces



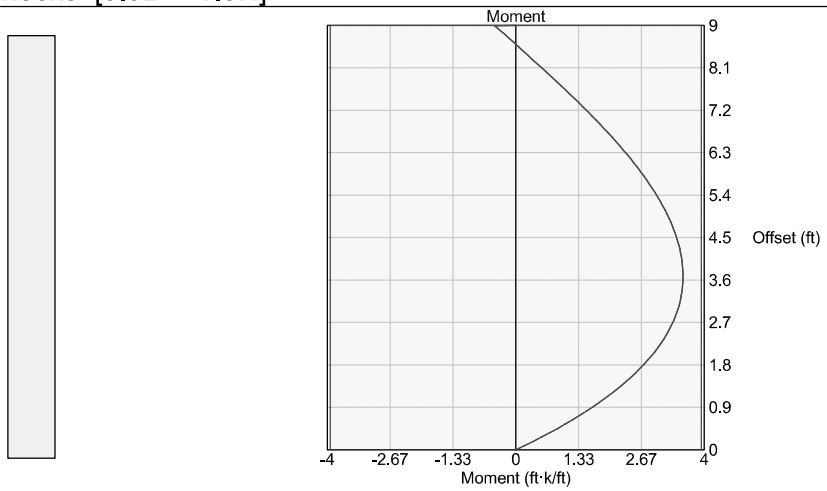
Stem Joint Force Transfer

Location	Force
@ stem base	2.11 k/ft

Stem Internal Forces



Stem Moment Checks [0.9D + 1.6H]



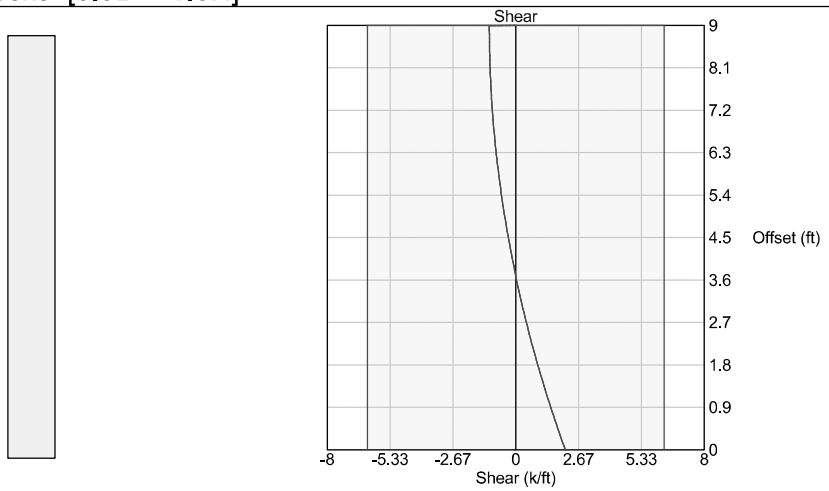
Check (ACI 318-14 11.5.5.1b) @ 3.73 ft from base [Positive bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 3.55 ft·k / ft ✓

Check (ACI 318-14 11.5.5.1b) @ 9 ft from base [Negative bending]

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.45 ft·k / ft ✓

Stem Shear Checks [0.9D + 1.6H]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Positive shear]

ϕV_n = 6.31 k / ft ≥ V_u = 2.11 k / ft ✓

Shear Check (ACI 318-14 11.5.5.1c) @ 9 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 1.13 k / ft ✓

Stem Miscellaneous Checks [0.9D + 1.6H]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850$ $(F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

$\varepsilon_t = \text{INF} \geq 0.004$ ✓

Toe Checks [1.4D]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 1.33 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.75$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

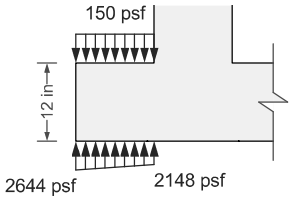
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 1.33$ ft·k / ft ✓

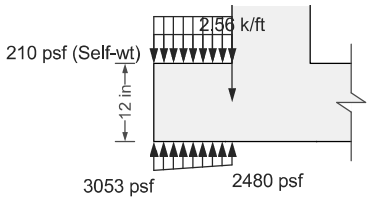
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.4D



Heel Checks [1.4D]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.74 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000\ psi}\, (10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 1.47$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\, \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000\ psi}\, (200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000\ psi) (200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

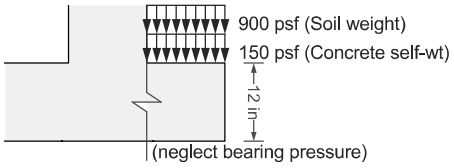
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.74$ ft·k / ft ✓

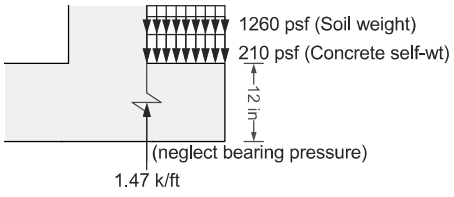
Heel Unfactored Loads

Unfactored Loads



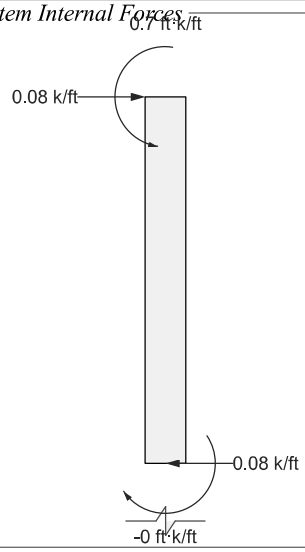
Heel Factored Loads

1.4D

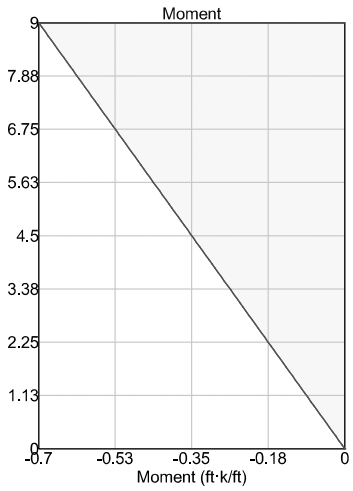


Stem Forces [1.4D]

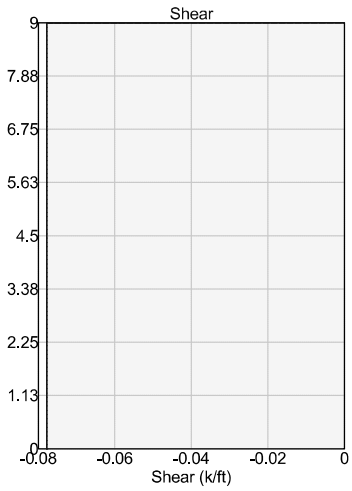
Stem Internal Forces



Stem Internal Forces



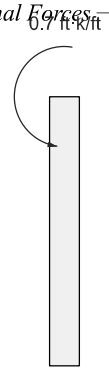
Stem Internal Forces



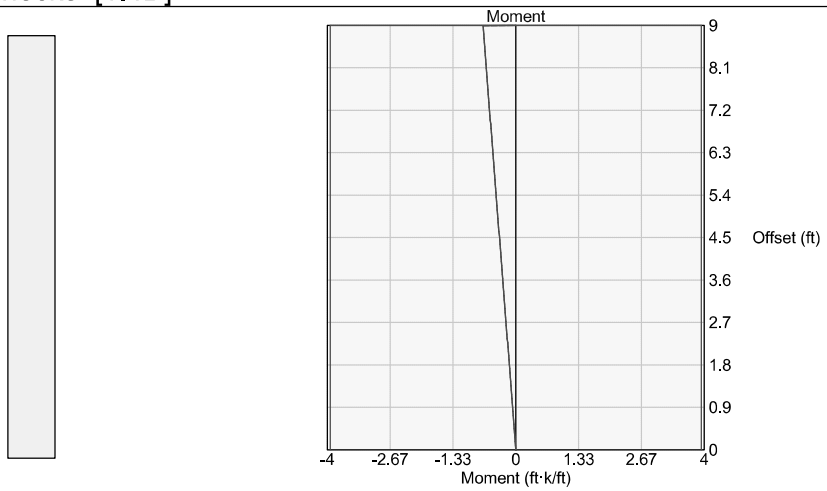
Stem Joint Force Transfer

Location	Force
@ stem base	-0.08 k/ft

Stem Internal Forces



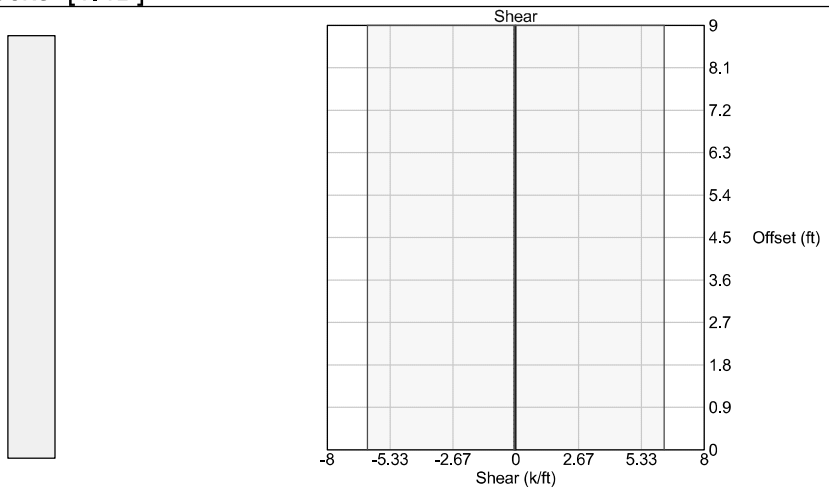
Stem Moment Checks [1.4D]



Check (ACI 318-14 11.5.5.1b) @ 9 ft from base

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.7 ft·k / ft ✓

Stem Shear Checks [1.4D]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 0.08 k / ft ✓

Stem Miscellaneous Checks [1.4D]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850$ $(F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

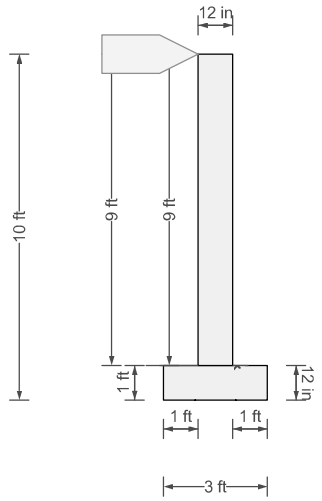
$\varepsilon_t = \text{INF} \geq 0.004$ ✓

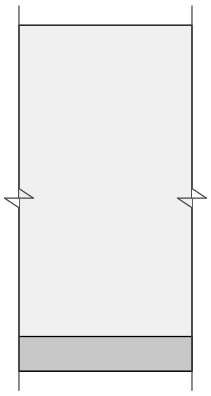
JACOB FREY
J.E. FREY LLC

Restrained Wall @ Stairwell

Design Detail

Concrete f'c = 3000 psi
Rebar Fy = 60000 psi
Unit Weight = 150 lb/ft³





Check Summary

Ratio	Check	Provided	Required	Combination
----- Stability Checks -----				
✓ 0.681	Bearing Pressure	3000 psf	2044 psf	1.0D + 1.0L + 1.0H
✓ 0.278	Bearing Eccentricity	1.67 in	6 in	1.0D + 1.0L + 1.0H
----- Toe Checks -----				
✓ 0.124	Shear	5.26 k/ft	0.65 k/ft	1.2D + 1.6L + 1.6H
✓ 0.423	Moment	2.74 ft·k/ft	1.16 ft·k/ft	1.2D + 1.6L + 1.6H
----- Heel Checks -----				
✓ 0.040	Shear	5.26 k/ft	0.21 k/ft	1.4D
✓ 0.038	Moment	2.74 ft·k/ft	0.1 ft·k/ft	1.4D
----- Stem Checks -----				
✓ 0.254	Moment	3.94 ft·k/ft	1 ft·k/ft	1.2D + 1.6L + 1.6H
✓ 0.018	Shear	6.31 k/ft	0.11 k/ft	1.2D + 1.6L + 1.6H

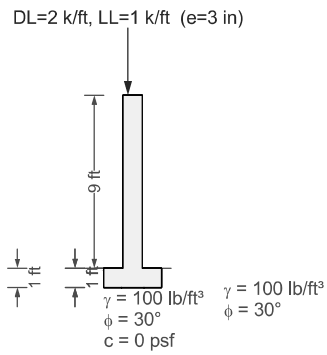
Criteria

Use basic criteria from common projec...	Yes
Building Code	IBC 2018
Concrete Load Combs	IBC 2018 (Strength)
Masonry Load Combs	ASCE 7-16 (ASD)
Stability Load Combs	IBC Retaining Wall St...
Apply Sds Factor to Seismic Combinat...	No
Restrained Against Sliding	Yes
Neglect Bearing At Heel	Yes
Use Vert. Comp. for OT	No
Use Vert. Comp. for Sliding	No
Use Vert. Comp. for Bearing	Yes
Use Surcharge for Sliding & OT	Yes
Use Surcharge for Bearing	Yes
Neglect Soil Over Toe	No
Neglect Backfill Wt. for Coulomb	No
Factor Soil Weight As Dead	Yes
Use Passive Force for OT	Yes
Assume Pressure To Top	Yes
Extend Backfill Pressure To Key Bottom	No
Use Toe Passive Pressure for Bearing	No
Required F.S. for OT	1.50
Required F.S. for Sliding	1.50
Has Different Safety Factors for Seismic	No
Allowable Bearing Pressure	3000 psf
Req'd Bearing Location	Middle third
Wall Friction Angle	25°
Friction Coefficent	0.35
Soil Reaction Modulus	172800 lb/ft³

JACOB FREY
J.E. FREY LLC

Restrained Wall @ Stairwell

Loads



Loading Options/Assumptions

➔ Passive pressure neglects top 0 ft of soil.

Load Combinations

IBC 2018 (Strength)

1.2D + 1.6L + 1.6H
1.2D + 1.6L + 0.9H
1.2D + 0.5L + 1.6H
1.2D + 0.5L + 0.9H
1.2D + 1.6H
1.2D + 0.9H
0.9D + 1.6H
0.9D + 0.9H
1.4D

Strength Check Results Summary

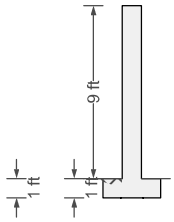
Load Combination	Stem M-applied (ft·k/ft)	Stem M-allow (ft·k/ft)	Stem V-applied (k/ft)	Stem V-allow (k/ft)	Heel M-applied (ft·k/ft)	Heel M-allow (ft·k/ft)
1.2D + 1.6L + 1.6H	1	3.94	0.11	6.31	0.09	2.74
1.2D + 1.6L + 0.9H	1	3.94	0.11	6.31	0.09	2.74
1.2D + 0.5L + 1.6H	0.72	3.94	0.08	6.31	0.09	2.74
1.2D + 0.5L + 0.9H	0.72	3.94	0.08	6.31	0.09	2.74
1.2D + 1.6H	0.6	3.94	0.07	6.31	0.09	2.74
1.2D + 0.9H	0.6	3.94	0.07	6.31	0.09	2.74
0.9D + 1.6H	0.45	3.94	0.05	6.31	0.07	2.74
0.9D + 0.9H	0.45	3.94	0.05	6.31	0.07	2.74
1.4D	0.7	3.94	0.08	6.31	0.1	2.74

Load Combination	Heel V-applied (k/ft)	Heel V-allow (k/ft)	Toe M-applied (ft·k/ft)	Toe M-allow (ft·k/ft)	Toe V-applied (k/ft)	Toe V-allow (k/ft)
1.2D + 1.6L + 1.6H	0.18	5.26	1.16	2.74	0.65	5.26
1.2D + 1.6L + 0.9H	0.18	5.26	1.16	2.74	0.65	5.26
1.2D + 0.5L + 1.6H	0.18	5.26	0.94	2.74	0.53	5.26
1.2D + 0.5L + 0.9H	0.18	5.26	0.94	2.74	0.53	5.26
1.2D + 1.6H	0.18	5.26	0.83	2.74	0.47	5.26
1.2D + 0.9H	0.18	5.26	0.83	2.74	0.47	5.26
0.9D + 1.6H	0.13	5.26	0.63	2.74	0.35	5.26
0.9D + 0.9H	0.13	5.26	0.63	2.74	0.35	5.26
1.4D	0.21	5.26	0.97	2.74	0.55	5.26

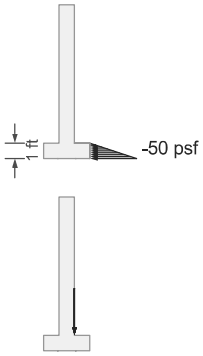
Stability Check Results Summary

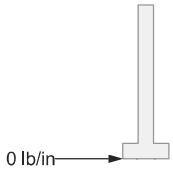
Load Combination	Sliding Force (lb/in)	Resisting Force (lb/in)	Sliding F.S.	Sliding F.S. Req'd	Sliding Bearing Pressure F.S. Req'd Seis...	Bearing Pressure Actual (psf)	Bearing Pressure Allowable (psf)	Bearing Eccentricity Actual (in)	Bearing Eccentricity Allowable (in)
1.0D + 1.0L + 1.0H	2.08	159.4	76.533	1.500	1.500	2044	3000	1.67	6
1.0D + 1.0H	2.08	128	61.422	1.500	1.500	1619	3000	1.67	6

Backfill Pressure



γ = 100 lb/ft³
ϕ = 30°





Lateral Earth Pressure

At - Rest Earth Pressure Theory

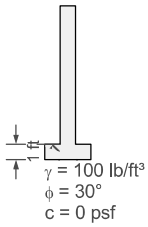
$K_o = 1 - \sin(\phi) = 1 - \sin((30°)) = 0.50$

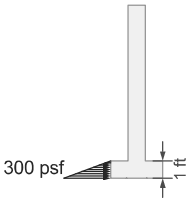
$\sigma_h = K_o \gamma H = (0.50)(100 \text{ lb / ft}^3)(1 \text{ ft}) = 50 \text{ psf}$

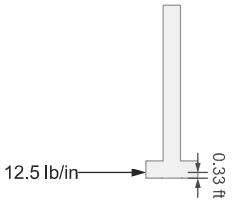
Lateral Earth Pressure (stem only)

$\sigma_h = K_o \gamma H = (0.50)(100 \text{ lb / ft}^3)(0 \text{ ft}) = 0 \text{ psf}$

Passive Pressure







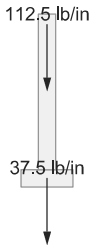
Lateral Earth Pressure

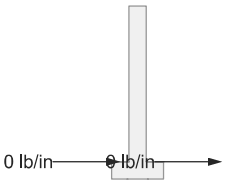
Rankine Passive Earth Pressure Theory

$$K_p = \tan^2\left(45° + \frac{\phi}{2}\right) = \tan^2\left[45° + \frac{(30°)}{2}\right] = 3.0$$

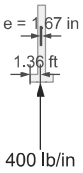
$$\sigma_p = \gamma H K_p + 2c\sqrt{K_p} = (100\ lb/ft^3)(1\ ft)(3.0) + 2(0\ psf)\sqrt{3.0} = 300\ psf$$

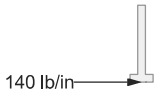
Wall/Soil Weights





Bearing Pressure





Friction

$F = \mu R = (0.350)(400\ \text{lb / in}) = 140\ \text{lb / in}$

Bearing Pressure Calculation

Contributing Forces

	Vert Force	...offset	Horz Force	...offset	OT Moment
Backfill Pressure	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Axial Dead Load	-166.67 lb/in	1.25 ft	0 lb/in	-	-30000 in·lb/ft
Axial Live Load	-83.33 lb/in	1.25 ft	0 lb/in	-	-15000 in·lb/ft
Footing Weight	-37.5 lb/in	1.5 ft	0 lb/in	-	-8100 in·lb/ft
Stem Weight	-112.5 lb/in	1.5 ft	0 lb/in	-	-24300 in·lb/ft
Backfill Weight	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Soil over toe Weight	-0 lb/in	-	0 lb/in	-	-0 in·lb/ft
Stem Base Shear	-0 lb/in	-	6.94 lb/in	1 ft	-1000 in·lb/ft
Stem Base Moment	0 lb/in	-	0 lb/in	-	0 in·lb/ft
	-400 lb/in				-78400 in·lb/ft

$$\frac{-78400\ \text{in·lb / ft}}{-400\ \text{lb / in}} = 1.36\ \text{ft}$$

Stability Checks [1.0D + 1.0L + 1.0H]

Overturning Check

Check not performed; wall has lateral support.

Sliding Check

Check not performed; restrained against sliding.

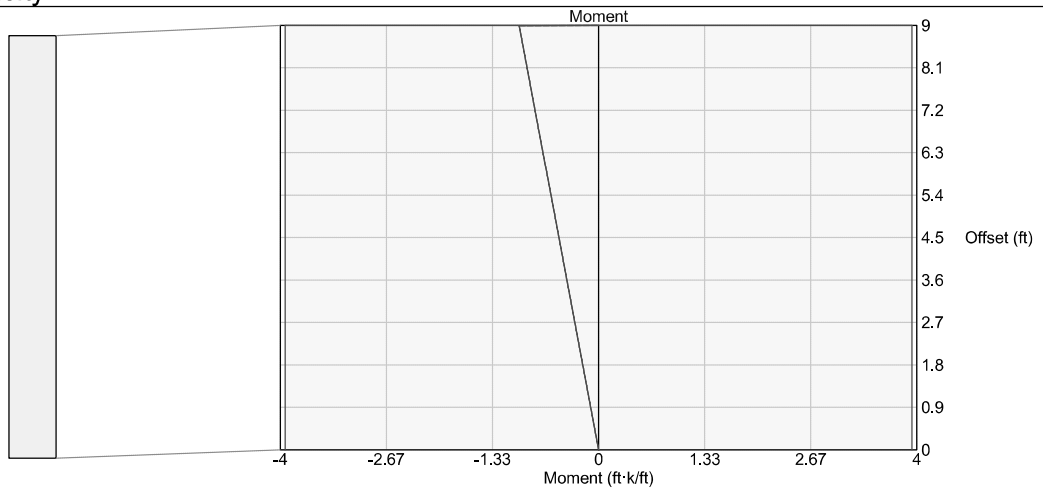
Bearing Capacity Check

Bearing pressure < allowable (2044 psf < 3000 psf) - OK
Bearing resultant eccentricity < allowable (1.67 in < 6 in) - OK

Wall Top Displacement

Not calculated because this wall has a lateral restraint.

Stem Flexural Capacity



Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 0 ft from base [Positive bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Negative bending]

Unreinforced, use plain concrete provisions: ACI 14.5.2

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5\,(1.0)\sqrt{3000\ psi}\,(288\ in^3 / ft) = 6.57\ ft{\cdot}k / ft$ (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85\,(3000\ psi)\,(288\ in^3 / ft) = 61.2\ ft{\cdot}k / ft$ (as limited by compression)

Tension controls

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Capacity (ACI 318-14 11.5.2.2, »22.3, »22.2) @ 9 ft from base [Positive bending]

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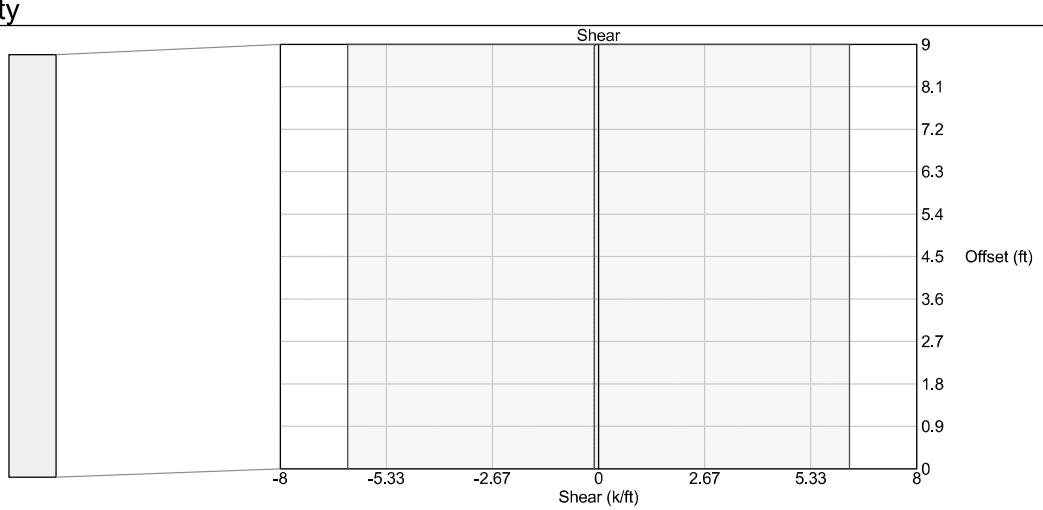
Tension controls

$\phi M_n = \phi\, M_n = (0.60)\,(6.57\ ft{\cdot}k / ft) = 3.94\ ft{\cdot}k / ft$

Stem Shear Capacity



Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Positive shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 0 ft from base [Negative shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Positive shear]

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

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Shear Capacity (ACI 318-14 11.5.5.1, 22.5.1.1, 22.5.5.1) @ 9 ft from base [Negative shear]

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$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(12\ in) = 10.52\ k/ft$

$\phi V_n = \phi\, V_n = (0.60)(10.52\ k/ft) = 6.31\ k/ft$

Toe Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 1.16 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.65$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5\,(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85\,(3000\ psi)\,(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

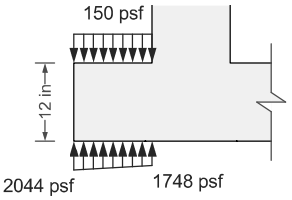
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 1.16$ ft·k / ft ✓

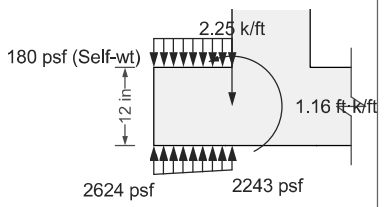
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.2D + 1.6L + 1.6H



Heel Checks [1.2D + 1.6L + 1.6H]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.09 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000 \text{ psi}}\, (10 \text{ in}) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76 \text{ k / ft}) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.18$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5 \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000 \text{ psi}}\, (200 \text{ in}^3 / \text{ft}) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000 \text{ psi}) (200 \text{ in}^3 / \text{ft}) = 42.5$ ft·k / ft (as limited by compression)

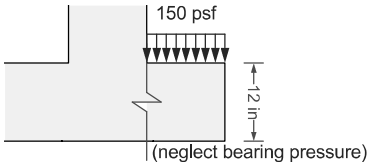
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56 \text{ ft·k / ft}) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.09$ ft·k / ft ✓

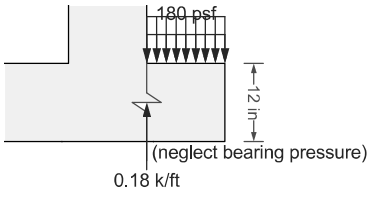
Heel Unfactored Loads

Unfactored Loads



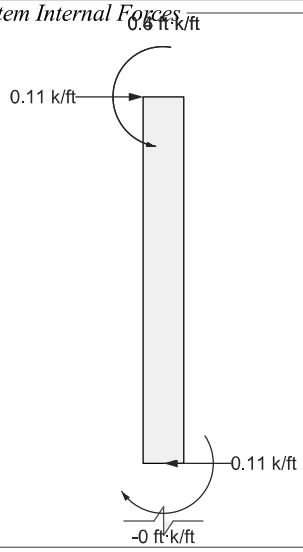
Heel Factored Loads

1.2D + 1.6L + 1.6H

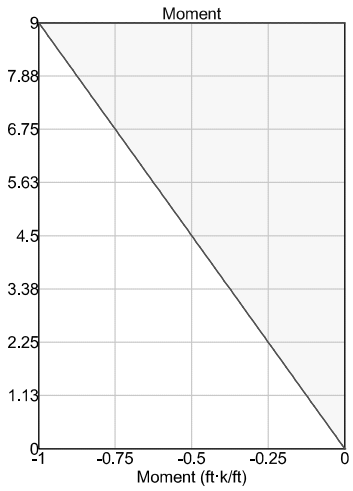


Stem Forces [1.2D + 1.6L + 1.6H]

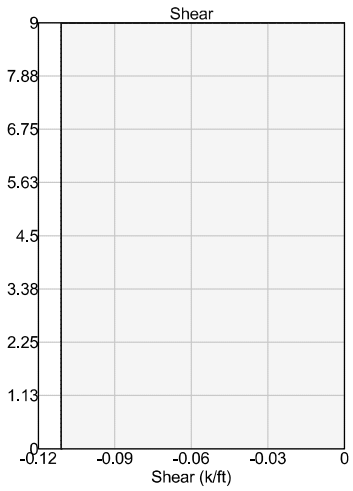
Stem Internal Forces



Stem Internal Forces



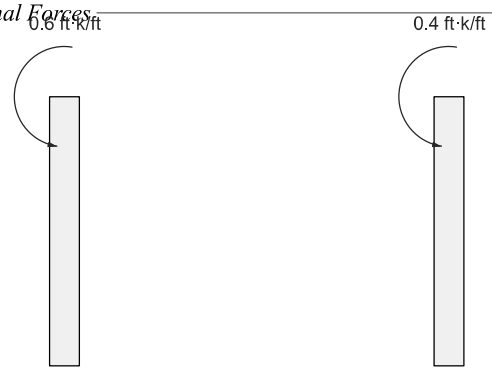
Stem Internal Forces



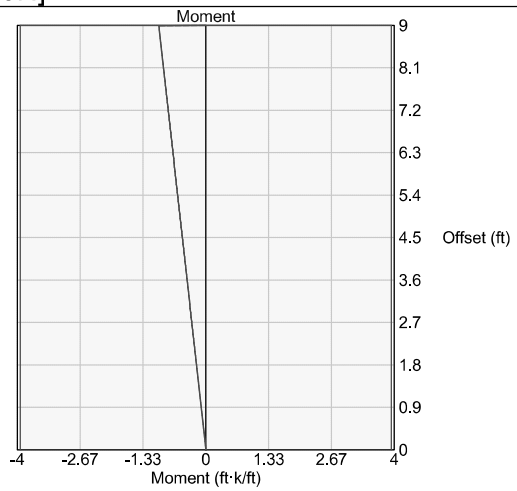
Stem Joint Force Transfer

Location	Force
@ stem base	-0.11 k/ft

Stem Internal Forces



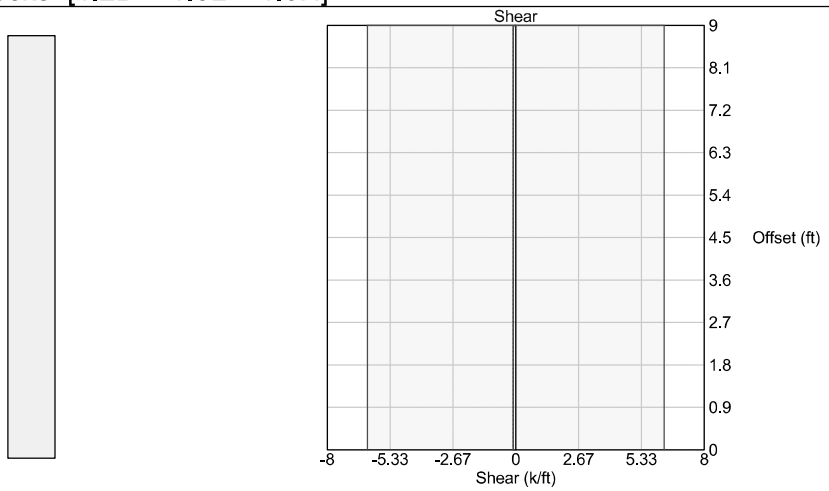
Stem Moment Checks [1.2D + 1.6L + 1.6H]



Check (ACI 318-14 11.5.5.1b) @ 9 ft from base

ϕM_n = 3.94 ft·k / ft ≥ M_u = 1 ft·k / ft ✓

Stem Shear Checks [1.2D + 1.6L + 1.6H]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 0.11 k / ft ✓

Stem Miscellaneous Checks [1.2D + 1.6L + 1.6H]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850$ $(F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

$\varepsilon_t = \text{INF} \geq 0.004$ ✓

Toe Checks [1.4D]

Controlling Moment

Note: Design toe moment is not limited to stem moment because stem base is pinned

M_{toe} = 0.97 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3}\lambda\sqrt{F'_c}\,h = \frac{4}{3}(1.0)\sqrt{3000\ psi}\,(10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.55$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\,\lambda\sqrt{F'_c}\,S_m = 5(1.0)\sqrt{3000\ psi}\,(200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\,F'_c\,S_m = 0.85(3000\ psi)(200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

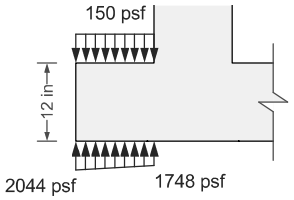
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.97$ ft·k / ft ✓

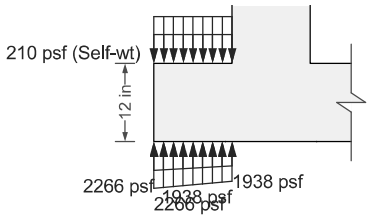
Toe Unfactored Loads

Unfactored Loads



Toe Factored Loads

1.4D



Heel Checks [1.4D]

Controlling Moment

Note: Design heel moment is not limited to stem moment because stem base is pinned

M_{heel} = 0.1 ft·k / ft

Shear Check (ACI 318-14 13.3.2.1, 7.5.3.1, »22.5.1, »22.5.5, 7.5.1.1b)

λ = 1.0 (normal weight concrete)

Unreinforced, use plain concrete provisions: ACI 14.5.5

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$V_n = \frac{4}{3} \lambda \sqrt{F'_c}\, h = \frac{4}{3} (1.0) \sqrt{3000\ psi}\, (10\ in) = 8.76$ k / ft

$\phi V_n = \phi\, V_n = (0.60)(8.76$ k / ft$) = 5.26$ k / ft

$\phi V_n = 5.26$ k / ft $\geq V_u = 0.21$ k / ft ✓

Flexure Check (ACI 318-14 13.3.2.1, 7.5.2.1, »22.3, »22.2, 7.5.1.1a)

Unreinforced, use plain concrete provisions: ACI 14.5.2

Note: Effective thickness reduced by 2 inches for concrete cast on soil (ACI 22.4.8)

$M_n = 5\, \lambda \sqrt{F'_c}\, S_m = 5 (1.0) \sqrt{3000\ psi}\, (200\ in^3 / ft) = 4.56$ ft·k / ft (as limited by tension)

$M_n = 0.85\, F'_c\, S_m = 0.85 (3000\ psi) (200\ in^3 / ft) = 42.5$ ft·k / ft (as limited by compression)

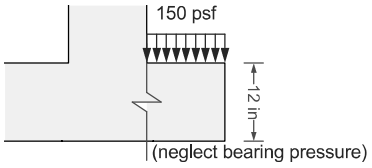
Tension controls

$\phi M_n = \phi\, M_n = (0.60)(4.56$ ft·k / ft$) = 2.74$ ft·k / ft

$\phi M_n = 2.74$ ft·k / ft $\geq M_u = 0.1$ ft·k / ft ✓

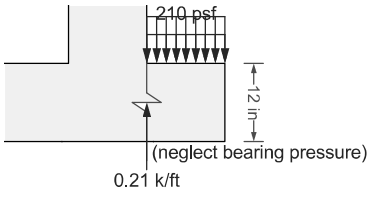
Heel Unfactored Loads

Unfactored Loads



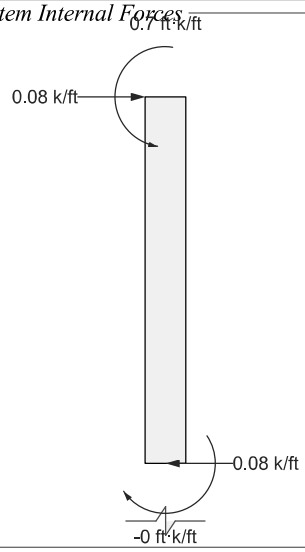
Heel Factored Loads

1.4D

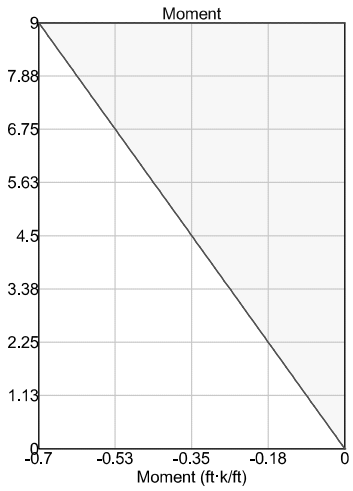


Stem Forces [1.4D]

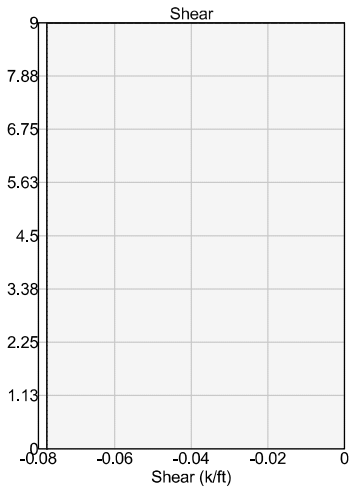
Stem Internal Forces



Stem Internal Forces



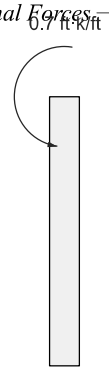
Stem Internal Forces



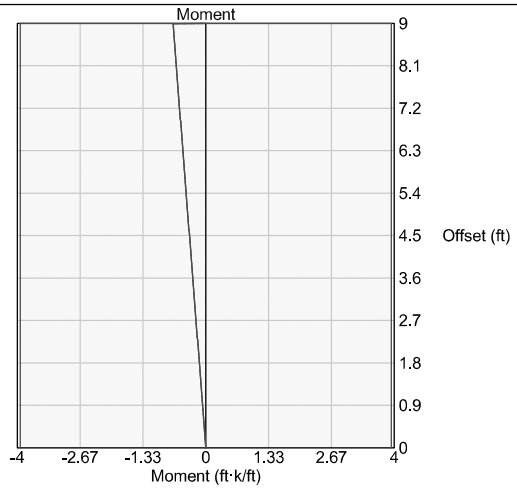
Stem Joint Force Transfer

Location	Force
@ stem base	-0.08 k/ft

Stem Internal Forces



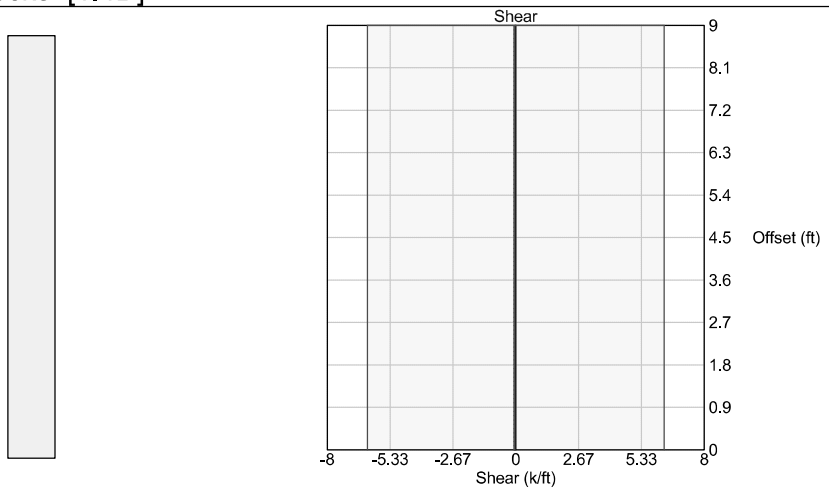
Stem Moment Checks [1.4D]



Check (ACI 318-14 11.5.5.1b) @ 9 ft from base

ϕM_n = 3.94 ft·k / ft ≥ M_u = 0.7 ft·k / ft ✓

Stem Shear Checks [1.4D]



Shear Check (ACI 318-14 11.5.5.1c) @ 0 ft from base [Negative shear]

ϕV_n = 6.31 k / ft ≥ V_u = 0.08 k / ft ✓

Stem Miscellaneous Checks [1.4D]

Minimum Steel Check (ACI 318-14 9.6.1) @ 0 ft from base [Stem in negative flexure]

$\phi M_n = 3.94$ ft·k / ft $\geq (4 / 3) M_u = [4 / 3](0$ ft·k / ft$) = 0$ ft·k / ft

Check is waived per ACI 9.6.1.3 ✓

Maximum Steel Check (ACI 318-14 9.3.3.1) @ 0 ft from base [Stem in negative flexure]

$\beta_1 = 0.850$ $(F'_c \leq 4000$ psi$)$

$$a = \frac{A_s f_y}{0.85 F'_c} = \frac{(0 \text{ in}^2 / \text{in})(60000 \text{ psi})}{0.85 (3000 \text{ psi})} = 0 \text{ in}$$

$$\varepsilon_t = 0.003 \left(\frac{d}{a / \beta_1} - 1 \right) = 0.003 \left[\frac{(12 \text{ in})}{(0 \text{ in}) / (0.850)} - 1 \right] = \text{INF}$$

$\varepsilon_t = \text{INF} \geq 0.004$ ✓

LAUREN STRASSER
339 PROSPECT AVE
HARTLAND, WI 53029-2022

FEISTHAMMEL FAMILY TRUST
PO BOX 242
HARTLAND, WI 53029-0242

DAVID & JEAN CATANIA
328 PROSPECT AVE
HARTLAND, WI 53029-2023

VAGA PROPERTIES LLC
2960 HUNTINGTON CIR
BROOKFIELD, WI 53005-1927

MICHELE H ANDRAE
256 W CAPITOL DR
HARTLAND, WI 53029

PARK IT REAL ESTATE INVESTING LLC
N78W29196 FLYNN RD
HARTLAND, WI 53029-9551

CHRISTOPHER VIESSELMANN &
ERIN FLANAGAN
247 W PARK AVE
HARTLAND, WI 53029-2020

MICHAEL J HORVATH
205 W PARK AVE
HARTLAND, WI 53029

HARTLAND MEADOWS RETIREMENT
APARTMENTS LLC
W320N1161 BUTTERNUT RIDGE CT
DELAFIELD, WI 53018-2257

EDWIN & ANNETTE MILLER TRUST
354 PROSPECT AVE
HARTLAND, WI 53029

DAVID & SUSAN JAMBRETZ
338 PROSPECT AVE
HARTLAND, WI 53029

MAC HOLDINGS LLC
PO BOX 102
DOUSMAN, WI 53118-0102

CYNTHIA M BROWN
243 W CAPITOL DR
HARTLAND, WI 53029

DANIEL & SALLY ANDERSON
315 W CAPITOL DR
HARTLAND, WI 53029

FREDERICK F AND MARY J OTT 2011
LIVING TRUST
229 W PARK AVE
HARTLAND, WI 53029-2020

PAMELA FILO
344 PROSPECT AVE
HARTLAND, WI 53029

NICHOLAS & KATELYN GOMEZ
221 W PARK AVE
HARTLAND, WI 53029-2020

MAC HOLDINGS LLC
PO BOX 102
DOUSMAN, WI 53118-0102

THOMAS H BEAUMONT
310 ZION ST
HARTLAND, WI 53029

492 PARTNERS LLC
492 RIVERSIDE DR
PRINCETON, NJ 08540-5421

DAVID P& ERICA PEERS
345 PROSPECT AVE
HARTLAND, WI 53029-2022

MARGARET M CONDON
248 W CAPITOL DR
HARTLAND, WI 53029

ROBERT J & SUSAN L KOSANKE
2007 LIVING TRUST
237 W PARK AVE
HARTLAND, WI 53029

HARMANN RENTALS LLC
W320N9189 HIGHWAY 83
HARTLAND, WI 53029-9737

STEPHEN SECOSH
213 W PARK AVE
HARTLAND, WI 53029

SHAWN M HOPPE
320 PROSPECT AVE
HARTLAND, WI 53029-2023

TIMOTHY E MUELLER
330 PROSPECT AVE
HARTLAND, WI 53029-2023

Village of Hartland

DEPARTMENT OF BUILDING INSPECTION
APPLICATION FOR ARCHITECTURAL BOARD

Job Address	375 Cottonwood Ave				
Lot	Block	Subdivision		Key No. HAV	
Owner	375 Cottonwood LLC	EMAIL	eisenstein64@yahoo.com	Phone	(262) 719-6650
Address	201 North Ave	City	Hartland	State WI	Zip 53029
Contractor	Self	Phone	FAX	EMAIL	
Address		City		State	Zip

The Architectural Board meets on the THIRD MONDAY of the Month at 6:30 p.m. in the Board Room of the Hartland Municipal Building located at 210 Cottonwood Avenue in the Village of Hartland.

The DEADLINE for filing is FIFTEEN WORKING DAYS PRIOR TO THE MEETING DATE at 4:30 p.m. All of the following information must be received prior to the deadline in order to be placed on the agenda.

All applications for consideration by the Architectural Board are subject to the policies described in this document.

Commercial/Industrial/Multifamily:

- ☐ One (1) bound set of plans and application material and one (1) electronic copy of all submittals.
- ☐ Elevations must show all sides of the structure and state the building materials and colors. Additions must be shown with the existing building.

Signs:

- ☐ One (1) color rendering of the requested sign(s) and one (1) electronic copy of all submittals. Include colors and material type. Renderings are to be dimensioned and must show placement on building and height.
- ☐ Details (color picture) of all existing wall signs on the same building elevation. A photograph of the building with sign location shown is recommended.
- ☐ One (1) site plan with dimensions. Not required for wall signs or other signs attached to the building. One (1) set of lighting details. Include type, location, number and photometric plan.
- ☐ Submit Sign Permit Application

NOTE: Approval by the Architectural Board is not permission to begin construction; a building permit must first be obtained.

Date Applied: 2-27-26 Date of Meeting: 3-16-26 Item No. _____


GRISTMILL

Village of Hartland

DEPARTMENT OF BUILDING INSPECTION
APPLICATION FOR ARCHITECTURAL BOARD

Job Address 418 Merton Ave Hartland, WI 53029					
Lot	Block	Subdivision		Key No. HAV0428982	
Owner Ryan Jacobs		EMAIL jacobsgang4@gmail.com		Phone 262-510-9048	
Address 1492 Bluebird Dr		City oconomowoc		State WI	Zip 53066
Contractor Signarama	Phone 414-273-7446	FAX		EMAIL	
Address 5061 W State St		City Milwaukee		State WI	Zip 53208

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Signs:

- ☐ One (1) color rendering of the requested sign(s) and one (1) electronic copy of all submittals. Include colors and material type. Renderings are to be dimensioned and must show placement on building and height.
- ☐ Details (color picture) of all existing wall signs on the same building elevation. A photograph of the building with sign location shown is recommended.
- ☐ One (1) site plan with dimensions. Not required for wall signs or other signs attached to the building. One (1) set of lighting details. Include type, location, number and photometric plan.
- ☐ Submit Sign Permit Application

NOTE: Approval by the Architectural Board is not permission to begin construction; a building permit must first be obtained.

Date Applied: 2-26-26 Date of Meeting: 3-16-26 Item No. _____

DEPARTMENT OF BUILDING INSPECTION
APPLICATION FOR SIGN PERMIT

PERMIT #_____

JOB LOCATION 418 Meton Ave TAX KEY # _____
OWNER Ryan & Jessica Jacobs PHONE 262-510-9048
ADDRESS 1492 Blue Bird Dr CITY Oconomow STATE WI ZIP 53066
CONTRACTOR Signarama PHONE 414-273-7446
ADDRESS 5061 W State St CITY Milwaukee STATE WI ZIP 53208

SIGN TYPE: ☒ WALL ☐ PROJECTING ☐ AWNING, CANOPY ☐ GROUND

☐ PORTABLE/TRAINING ☐ REAL ESTATE PERM. ☐ REAL ESTATE TEMP.

WORDS AS THEY WILL APPEAR ON THE SIGN:
Tropitana Tanning

(We will be replacing the current sign that is on the building and marquee sign)

OVERALL DIMENSIONS OF SIGN 42" x 96" COLOR OF BACKGROUND Black

SIZE OF LETTERS IN INCHES 10"+ COLOR OF LETTERS white

CONSTRUCTION MATERIALS OF SIGN BACKGROUND (i.e. WOOD, ALUM, ETC.)

ILLUMINATED? ☑ YES ☐ NO ☐ INTERNALLY ☐ EXTERNALLY

SIGN PLANS MUST BE APPROVED BY ARCHITECTURAL BOARD PRIOR TO PERMIT BEING APPROVED (SEE ARCHITECTURAL BOARD APPLICATION)

ESTIMATED COST OF ABOVE SIGN $ $3000.00

TO THE BUILDING INSPECTOR: THE UNDERSIGNED HEREBY APPLIES FOR A PERMIT TO DO WORK HEREIN DESCRIBED ACCORDING TO THE PLANS AND SPECIFICATIONS FILED HEREWITH AND LOCATED AS SHOWN ON THIS APPLICATION. THE UNDERSIGNED AGREES THAT SUCH WORK WILL BE DONE IN ACCORDANCE WITH THE SAID DESCRIPTION, PLANS AND SPECIFICATIONS AND IN COMPLIANCE WITH ZONING ORDINANCE AND ALL OTHER ORDINANCES OF THE VILLAGE OF HARTLAND AND WITH ALL THE LAWS AND ORDERS OF THE STATE OF WISCONSIN APPLICABLE TO SAID PREMISES.

APPLICANT _____ DATE 2/26/26

PLANS APPROVED: ARCHITECTURAL BOARD _____

APPLICATION APPROVED: BUILDING INSPECTOR _____ DATE _____

Tropitana Sign replacement at 418 Merton Ave

Marquee sign to be replaced using the same frame. Black in color with white lettering will say (TANNING)

current

Building sign to be replaced using the same frame with Tropitana Image

current

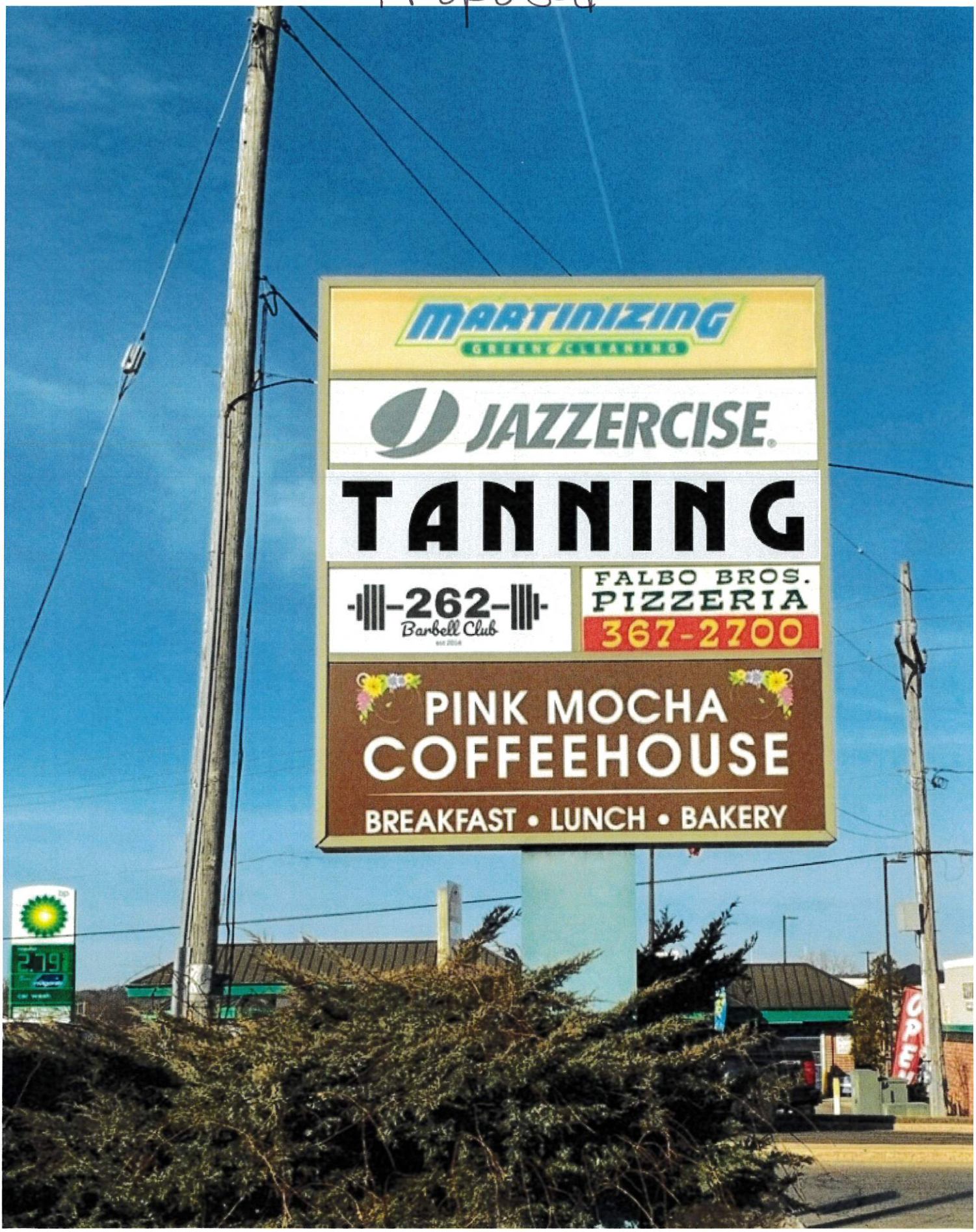
This is the Tropitana Logo which would be put on the front door and sign on the building.

Proposed

Proposed


JAZZERCISE
TANNING
262
Barbell Club
FALBO BROS.
PIZZERIA
367-2700
PINK MOCHA
COFFEEHOUSE
BREAKFAST • LUNCH • BAKERY
PINK MOCHA
COFFEEHOUSE
BREAKFAST • LUNCH • BAKERY

Proposed


MARTINIZING
GREEN CLEANING
JAZZERCISE
TANNING
262
Barbell Club
FALBO BROS.
PIZZERIA
367-2700
PINK MOCHA
COFFEEHOUSE
BREAKFAST • LUNCH • BAKERY

Signarama Milwaukee
5061 W. State Street
Milwaukee, WI 53208
(414) 273-7446

5061 W State St, Milwaukee, WI 53208
www.milwaukee-signs.com

ESTIMATE
EST-67764

Payment Terms: Deposit Required

Created Date: 2/27/2026

DESCRIPTION: Hartland Location Signage

Bill To: Tropitana
1492 Bluebird Dr
Oconomowoc, WI 53066
US

Installed: Tropitana
418 N Merton Ave
Hartland, WI 53209
US

Requested By: Jessica Jacobs
Email: 101tropitana@gmail.com
Cell Phone: (262) 501-9841

Salesperson: Vanessa Shumway
Email: vanessa@milwaukee-signs.com

NO.	Product Summary	QTY	UNIT PRICE	AMOUNT
1	**Face Replacement**	1	$686.00	$686.00
1.1	**.150 White Polycarbonate -** **Part Qty:** 1 **Width:** 95.00" **Height:** 41.00" **Text:** 95" x 41" Poly face with translucent vinyl and laminate Rectangle cut Single-sided Qty 1			
2	**Pylon Replacement**	2	$407.09	$814.18
2.1	**.150 White Polycarbonate with Translucent Vinyl and Laminate Print -** **Part Qty:** 1 **Width:** 107.00" **Height:** 19.50" **Text:** 107" x 19.5" Poly face with translucent vinyl and laminate Rectangle cut Qty 2			
3	**Door Graphics**	1	$40.33	$40.33

3.1	**Standard Adhesive Vinyl -** **Part Qty:** 1 **Width:** 30.00" **Height:** 20.00" **Text:** 30" x 20" Standard adhesive vinyl with laminate Logo - Hours - Phone number Print to cut Qty 1			
3.2	**PSA Standard Matte Laminate -** **Part Qty:** 1 **Width:** 30.00" **Height:** 20.00"			
4	**Installation**	1	$875.00	$875.00
4.1	**1 Person Lift Truck Installation - Removal - Service -** - # of Hours: 4 **Text:** Installation of 2 poly panels on a pylon (slide), 1 poly panel in cabinet (slide), and vinyl graphics on front door Location 418 N Merton Ave, Hartland, WI ***Signarama is not responsible for permitting. Customer's responsibility to procure permit if they choose to do so. Signarama can procure permit for an additional cost***			
5	**Artwork**	1	$80.00	$80.00
5.1	**Custom Artwork - Logo Creation - Layout and Design -** - # of Hours: 1			
6	**Order Setup**	1	$25.00	$25.00
6.1	**Order Set Up - Artwork and Production File Set Up -** **Part Qty:** 1			

A 3% surcharge will be automatically applied to the transaction amount when using credit, debit, prepaid or virtual cards.

To avoid this surcharge, you can pay with a check, ACH, or cash.

Estimate is valid for 30 days. This estimate is based on information from the client about the project requirements. Changes by the client after estimate and proof approval may result in a change to the price of the produced signs.

Subtotal:	$2,520.51
Taxes:	$126.03
Grand Total:	$2,646.54
Credit Card Surcharge:	*3.00%*
Total with Surcharge:	*$2,725.94*

This is for estimation purposes and is not a guarantee of cost for signs, service and/or installation beyond current information from the client about the project. Actual cost may change once the project details are finalized. Signarama Milwaukee is not responsible for correcting grammar or spelling mistakes on approved artwork or customer provided files. Final printed colors may vary from the electronic proof. If Pantone or other color matches are required, the customer must provide the color matching instructions prior to approval. Signarama Milwaukee is not responsible for permitting unless stated in a line item. 1 year warranty on material and workmanship. No material and workmanship warranty on temporary signs or signs installed by customer. No warranty on customer's own material, graphics, or design. Signarama Milwaukee is not responsible for vandalism or damage to products after pick up, delivery, or installation.

Signature: _____ **Date:** _____

Village of Hartland

APPLICATION FOR PLAN COMMISSION

$300 REVIEW FEE DUE AT TIME OF APPLICATION

Project Description and Narrative: (attach additional sheet if necessary)

Fence adds additional safety and security to the play area, and will limit access to the Nature Classroom area for Hartland North. It will prevent anyone from entering the areas from the woods and detour possible vandalism.

Proposed Use Additional safety and security			
Project Location West property line from south to north up to Hyw 16.			
Project Name St. Charles Fencing Project			
Owner St Charles	Phone 262-367-0800		
Address 313 Circle Dr.	City Hartland	State WI	Zip 53029
Engineer/Architect n/a	Phone	FAX	
Address	City	State	Zip
Contact Person Mike Cattani	Phone 262-367-0800	FAX n/a	E-mail mcattani@stcharleshartland.org

The Plan Commission meets on the third Monday of the Month at 6:30 PM in the Village Board Room of the Hartland Municipal Building located at 210 Cottonwood Avenue, Hartland.

The deadline for filing is a minimum of fifteen (15) working days before the meeting.

All of the requested information must be received prior to the deadline in order to be placed on the agenda. Village Plan Review Staff has been directed to delay placement on the Plan Commission Agenda based on incomplete submittals.

One (1) set of bound application materials and one (1) electronic copy of all materials must be submitted.

Applications that include site plans must depict the following existing and proposed information:

- Complete dimensions (lot, building, setbacks, parking, drives, etc.)
- Scale and north arrow
- All structures (include building elevations and height)
- Drainage and grades (include design calculations for drainage)
- Storm Water Management Plan
- Utilities and easements (sewer, water, storm etc.)
- Calculation of lot coverage
- Parking stalls (stalls to be minimum 180 s.f., driving lanes minimum 24 ft. wide and 30 ft. maximum at street right-of-way, asphalt to be minimum 3 ft. from lot lines)
- Grading and erosion control
- Landscaping, including a Tree Protection Plan
- Exterior lighting details
- Exterior HVAC equipment location
- Dumpster location (screening required)
- Street right-of-way
- Miscellaneous, 100 year floodplain, wetland boundary, environmental corridor

Additional information may be requested by the Plan Commission or Staff.

All applications for consideration by the Plan Commission are subject to the policies described in this document.

— VILLAGE OF —
HARTLAND
WISCONSIN
EST 1892

Department of
Building Inspection

PERMIT #_____

APPLICATION FOR
BUILDING PERMIT

210 Cottonwood Avenue • Hartland, WI 53029 • Phone (262) 367-4744 • Fax (262) 367-2430

JOB LOCATION St Charles School

OWNER St Charles Parish PHONE 262-367-0800 FAX n/a

ADDRESS 313 Circle Dr CITY, STATE, ZIP Hartland,WI. 53029

CONTRACTOR Centry Fence PHONE 262-956-6429

ADDRESS 1300 Hickory St. CITY, STATE, ZIP pewaukee, WI. 53072

DWELLING CONTRACTOR # 34905 EMAIL tfoster@centryfence.com

When permit is ready notify: Contractor Owner By: Mail Phone Email

Project Description: fence will add additional safety and security to the play area and limit access to the Hartland North Nature Classroom area.

It prevents anyone from entering the play area from the woods and prevents possible vandalism to both areas.

Estimated cost of above job(s) $_____

Current principal use of property School play area

Proposed principal use of property School play area

TO THE BUILDING INSPECTOR: The undersigned hereby applies for a permit to do work herein described according to the plans and specifications filed herewith and located as shown on this application. The undersigned agrees that such work will be done in accordance with the said description, plans and specifications and in compliance with the Uniform Dwelling Code of Wisconsin Administrative Code, Zoning Ordinance, all other ordinances of the Village of Hartland and with all the laws and orders of the State of Wisconsin applicable to said premises.

Signature of Applicant_____ Date _____

CONDITIONS OF APPROVAL: This permit is issued pursuant to the following conditions. Failure to comply may result in suspension or revocation of this permit or other penalty.

1. See plans for possible conditions/recommendations
2.

_____ **TOTAL FEES**

_____ Date Paid

_____ Receipt

Meeting dates plans were approved for building permit:

Plan Commission_____ Village Board _____ Arch Board _____

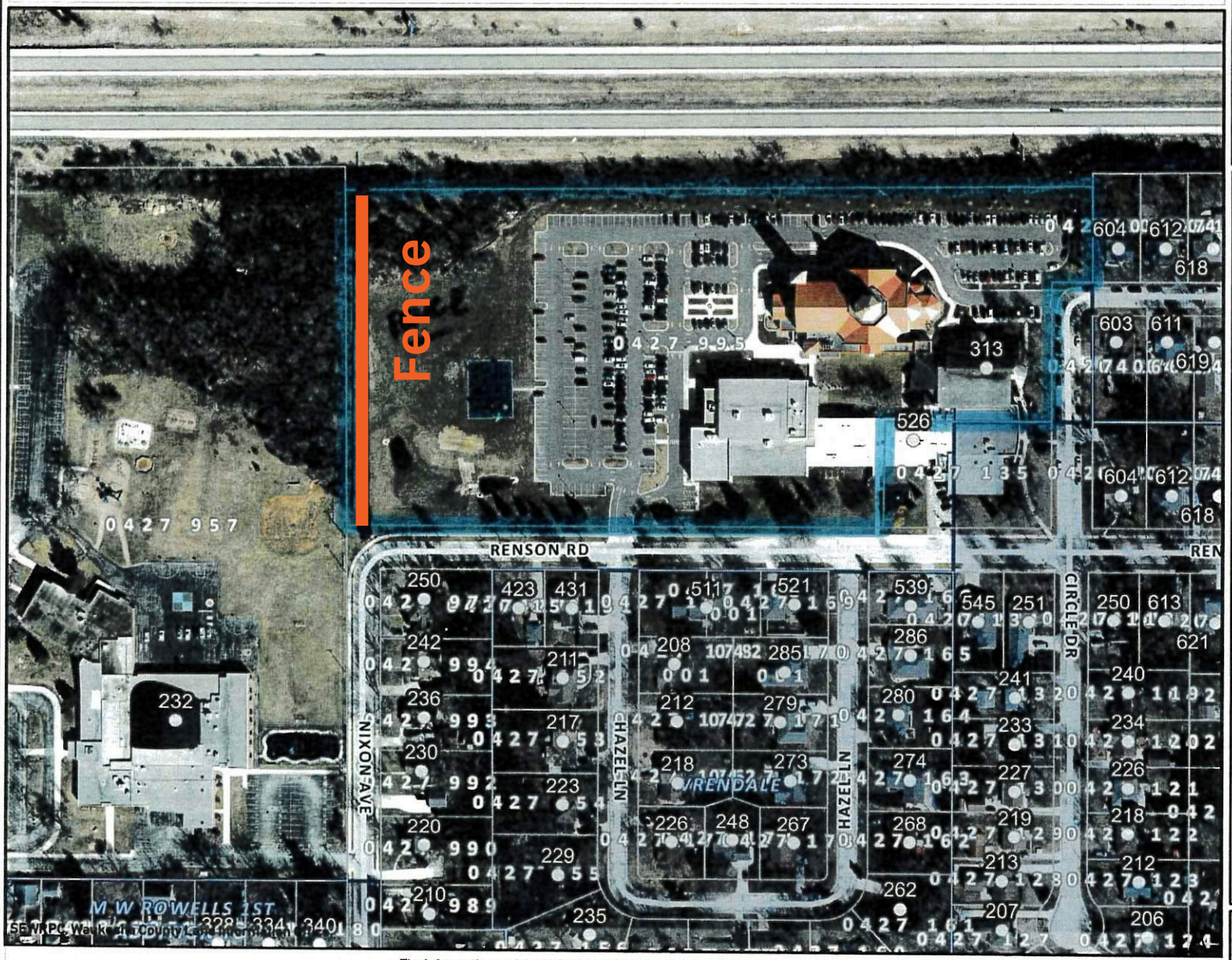
APPLICATION APPROVED ON:_____ **BY:**_____

DATE BUILDING INSPECTOR

REV 1/09

WAUKESHA COUNTY
Land Information System

Map Title



Legend

- Site Address
- Tax Parcels
- Assessor Plat — Assessor
- CSM — CSM
- Condominium — Condomi
- Subdivision — Subdivisi
- Points of Interest

RGB

- Red: Band_1
- Green: Band_2
- Blue: Band_3
- Override 1

Notes

Printed Date: 3/9/2026 9:15 AM

0 125 250 375 500 ft