PORT OF SILVERDALE

2019 COMPREHENSIVE PLAN

APPENDIX F: OLD TOWN PUB STRUCTURAL ANALYSIS

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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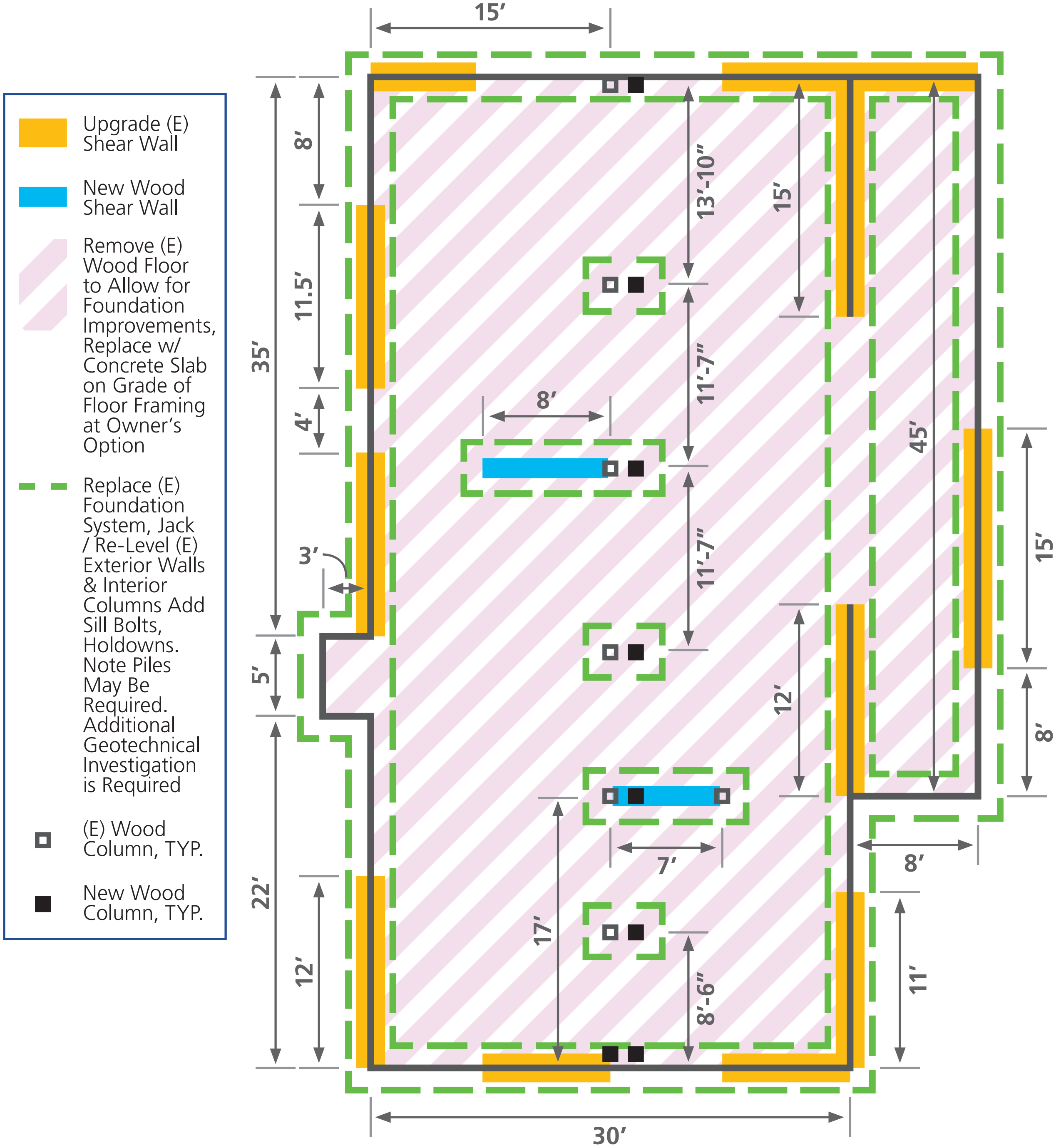


NOTES

Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 1 - First Floor

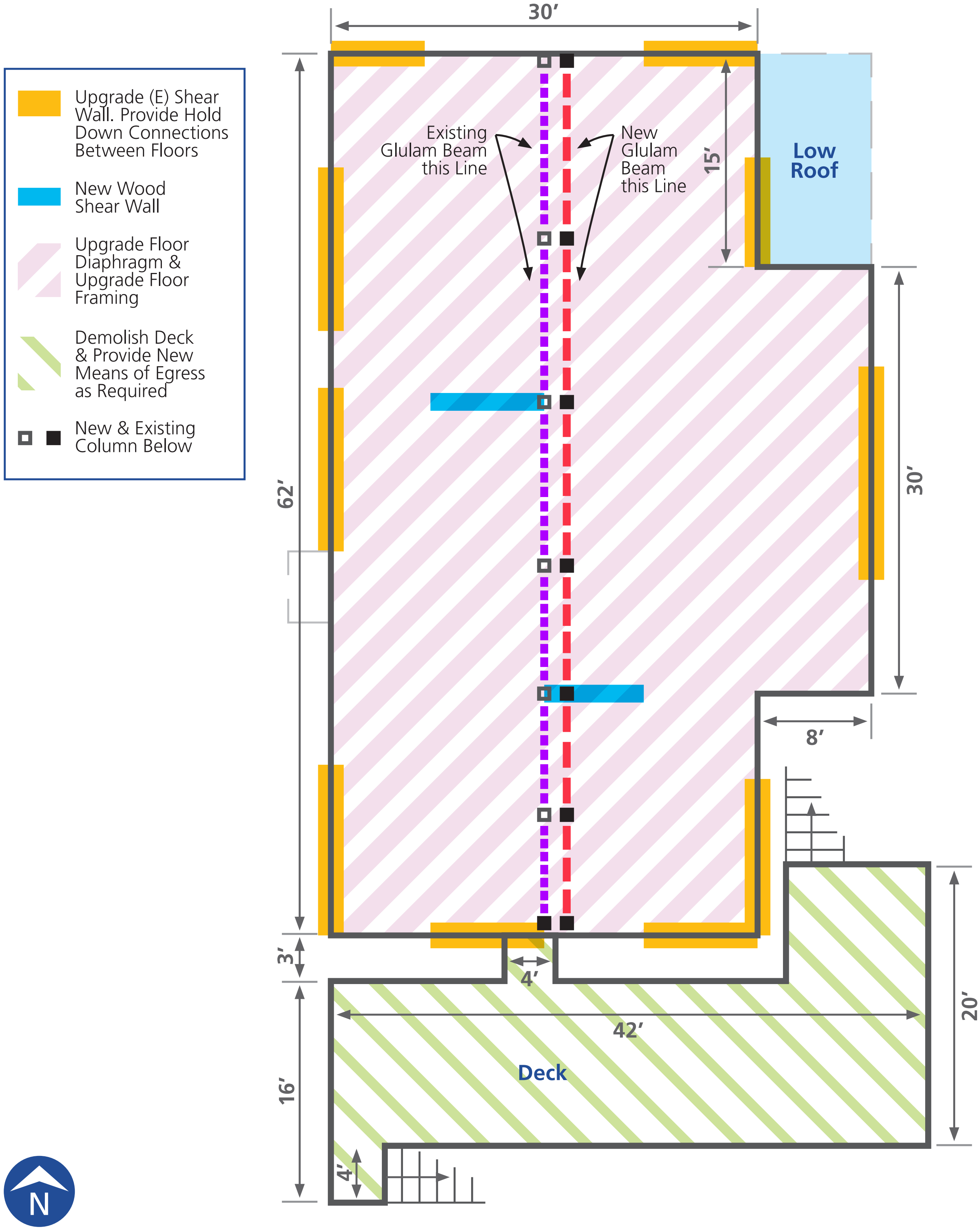
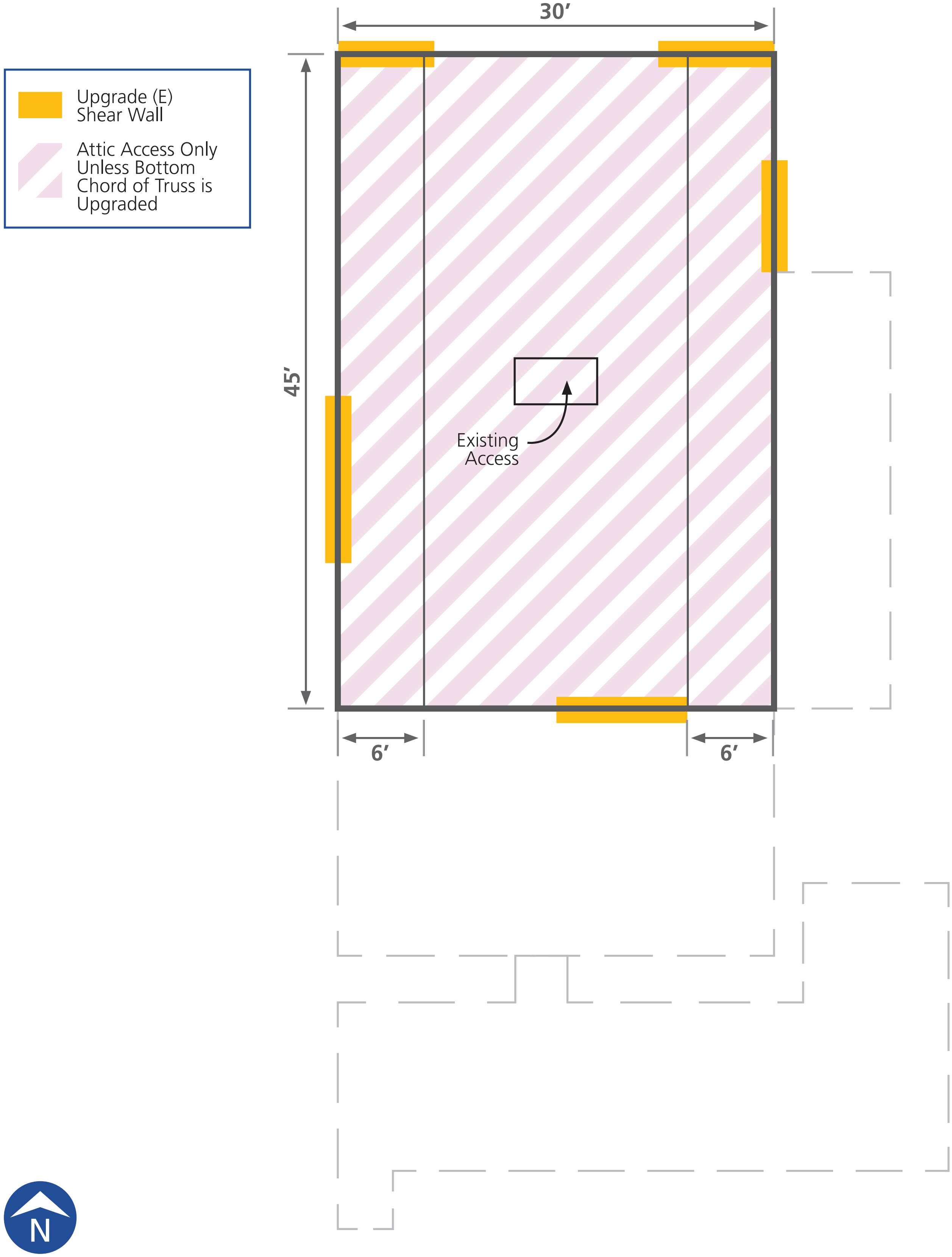


Figure 2 - Second Floor



Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.

Photograph 7: Typical exterior shiplap.

Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).


Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.

Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

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There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E. Principal Structural Engineer	Katherine R, Brawner, P.E. Project Engineer

Attachments

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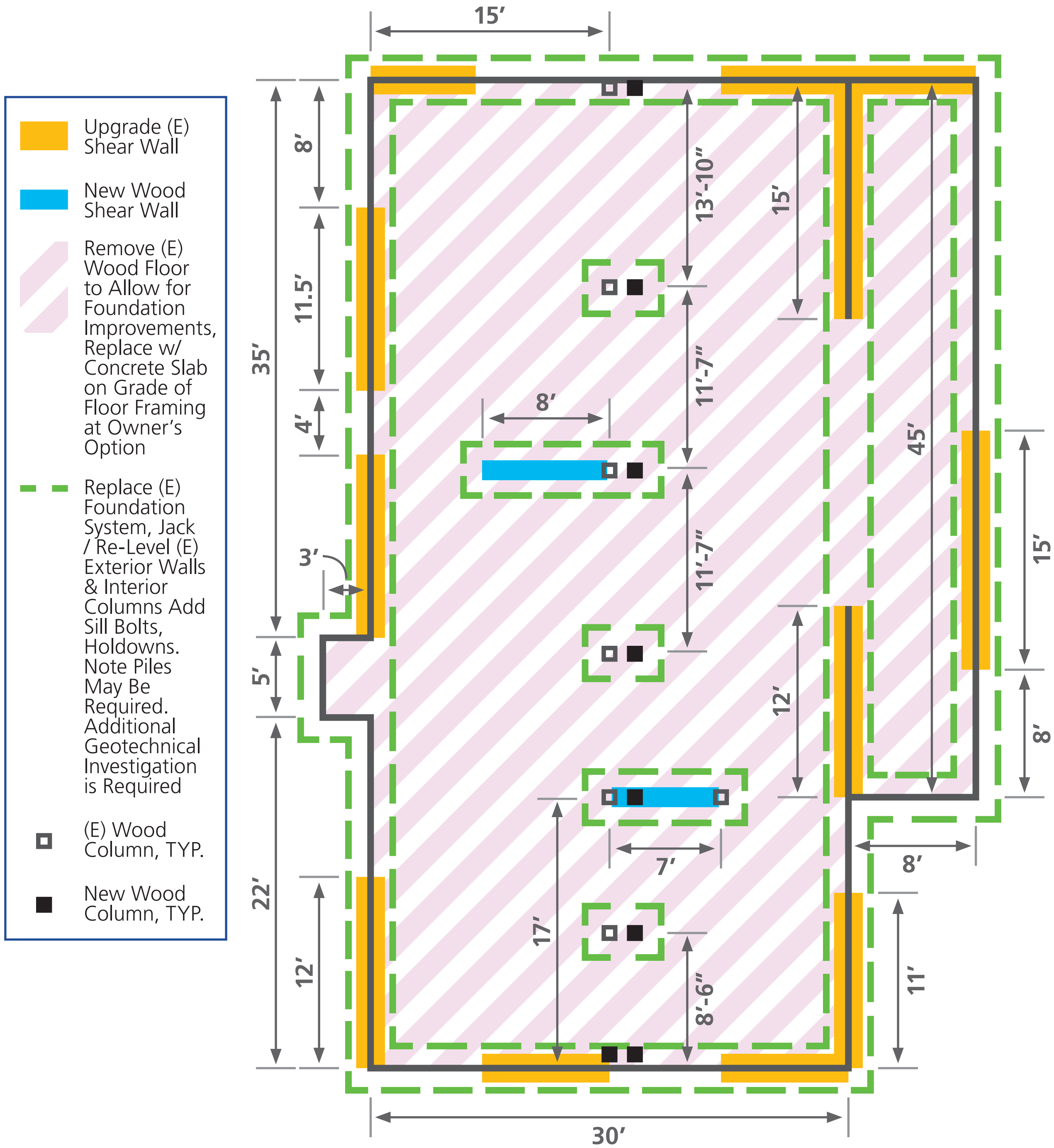


NOTES

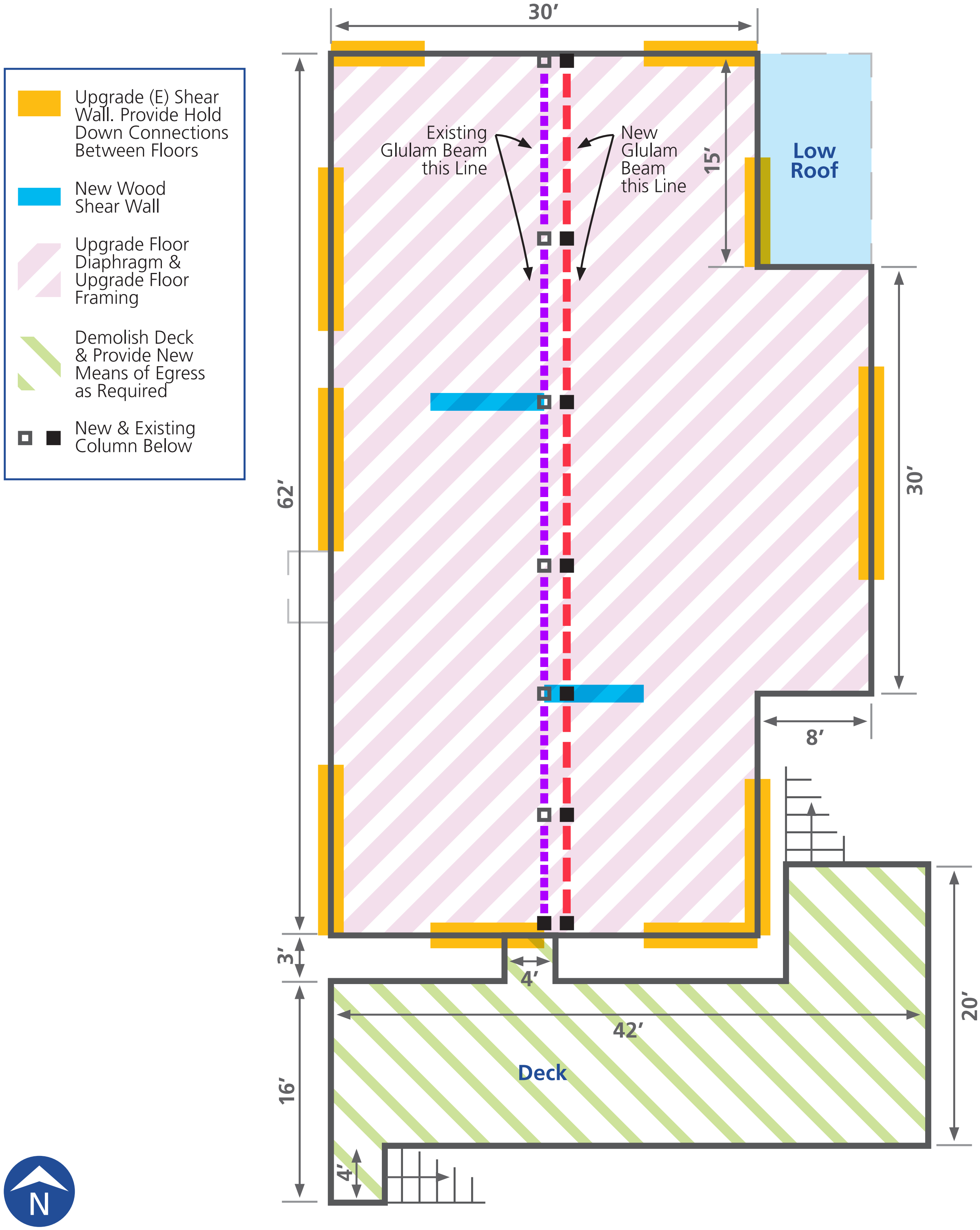
Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

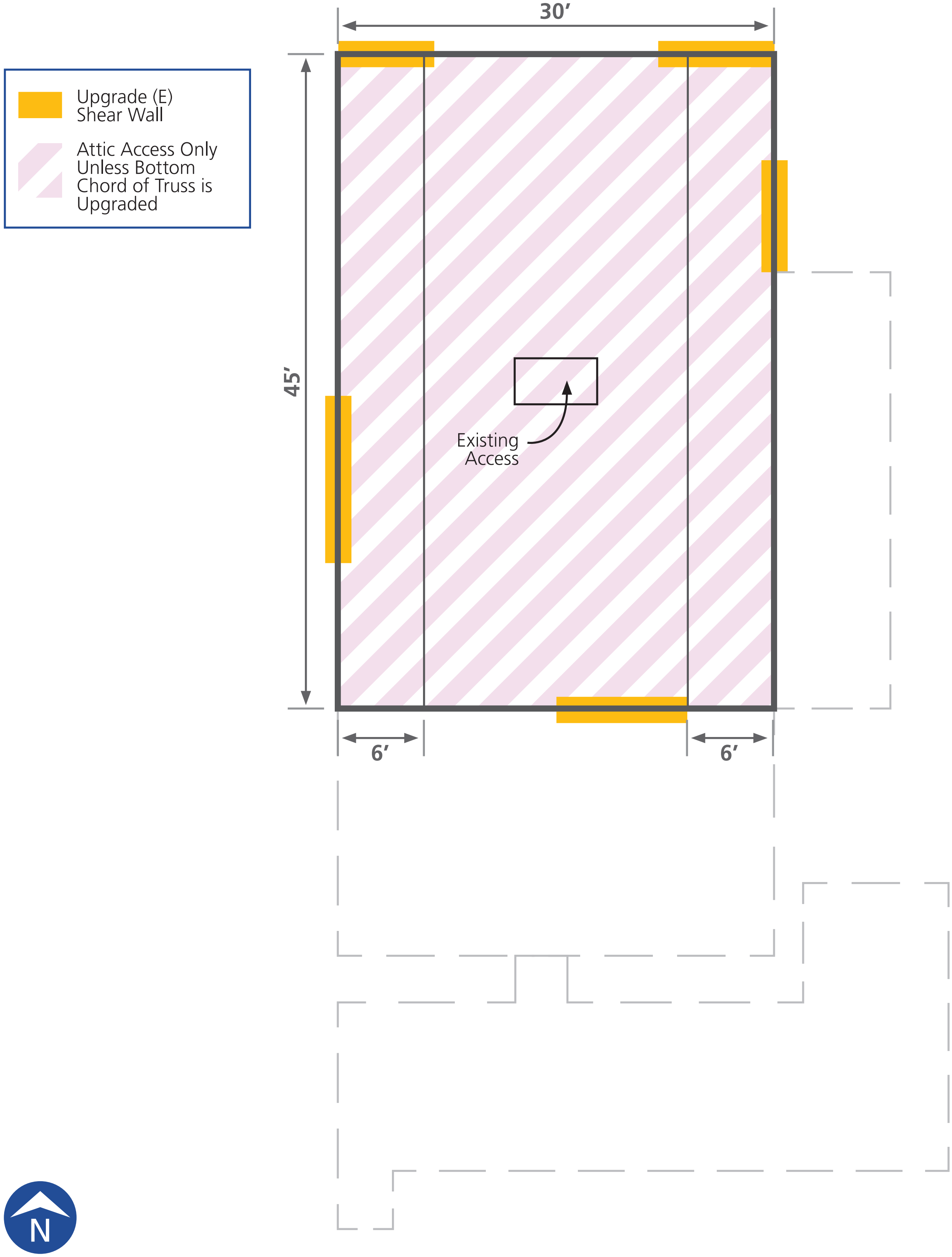
Port of Silverdale - September 2018

Figure 1 - First Floor



Old Town Pub
Port of Silverdale - September 2018

Figure 2 - Second Floor



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Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.


Photograph 3: Southwestern exterior corner of building.


Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.


Photograph 7: Typical exterior shiplap.


Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).


Photograph 13: Typical floor and walls (third floor shown).


Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.


Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: **Complete the Following Items in Addition to the Items for Low Seismicity.**

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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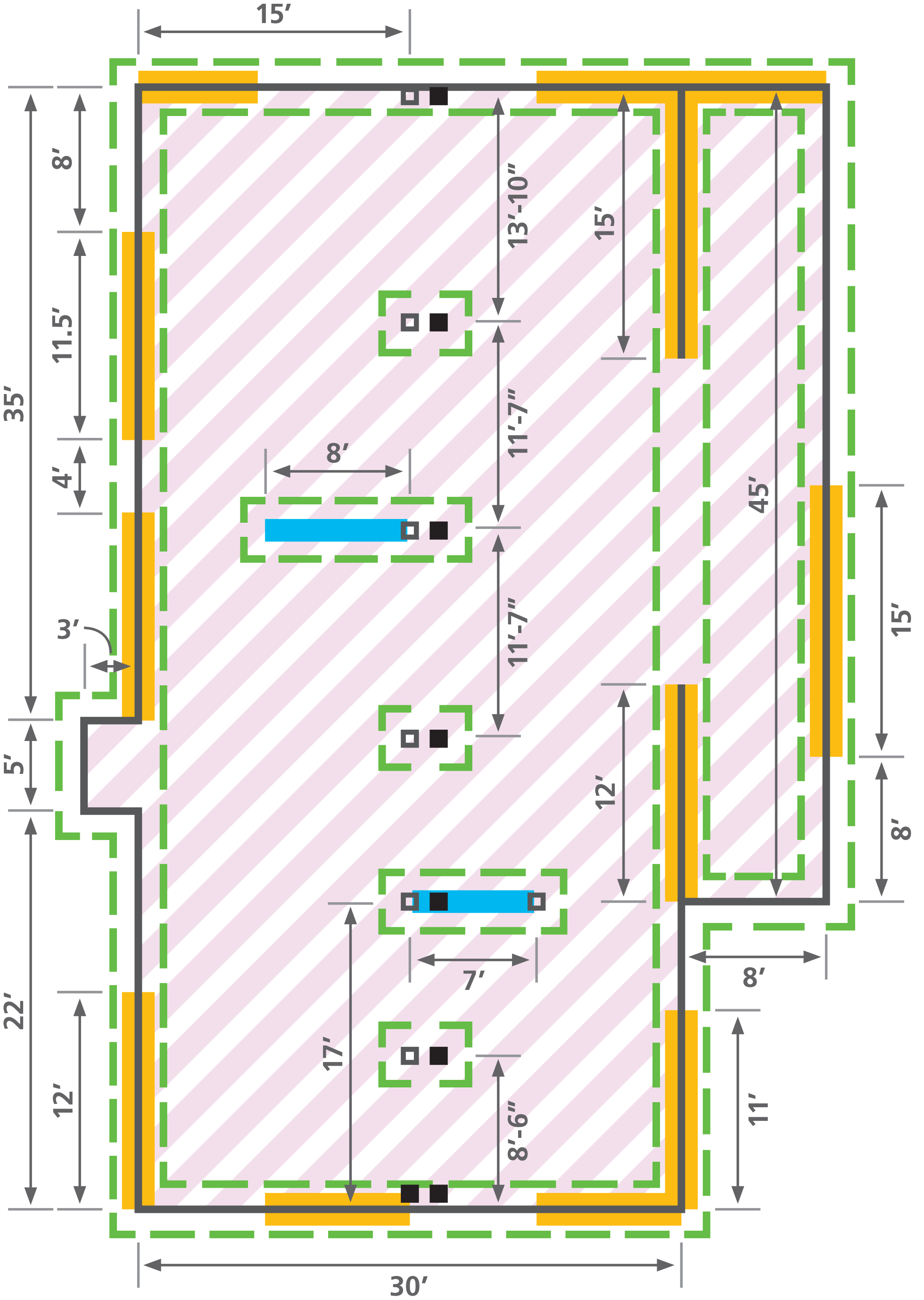


Upgrade (E) Shear Wall

New Wood Shear Wall

Remove (E) Wood Floor to Allow for Foundation Improvements, Replace w/ Concrete Slab on Grade of Floor Framing at Owner's Option

Replace (E) Foundation System, Jack / Re-Level (E) Exterior Walls & Interior Columns Add Sill Bolts, Holdowns. Note Piles May Be Required. Additional Geotechnical Investigation is Required

(E) Wood Column, TYP.

New Wood Column, TYP.

N

NOTES

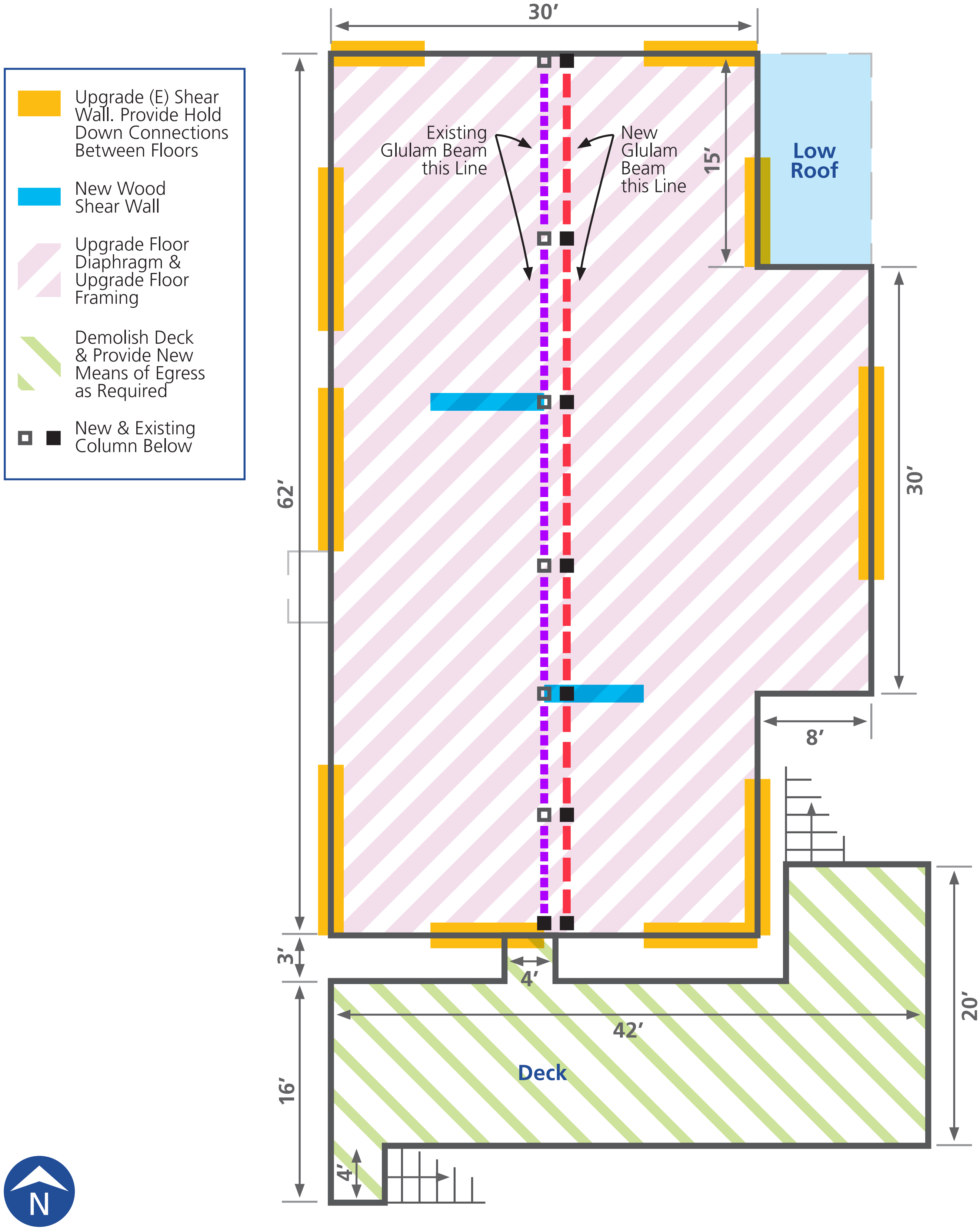
Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

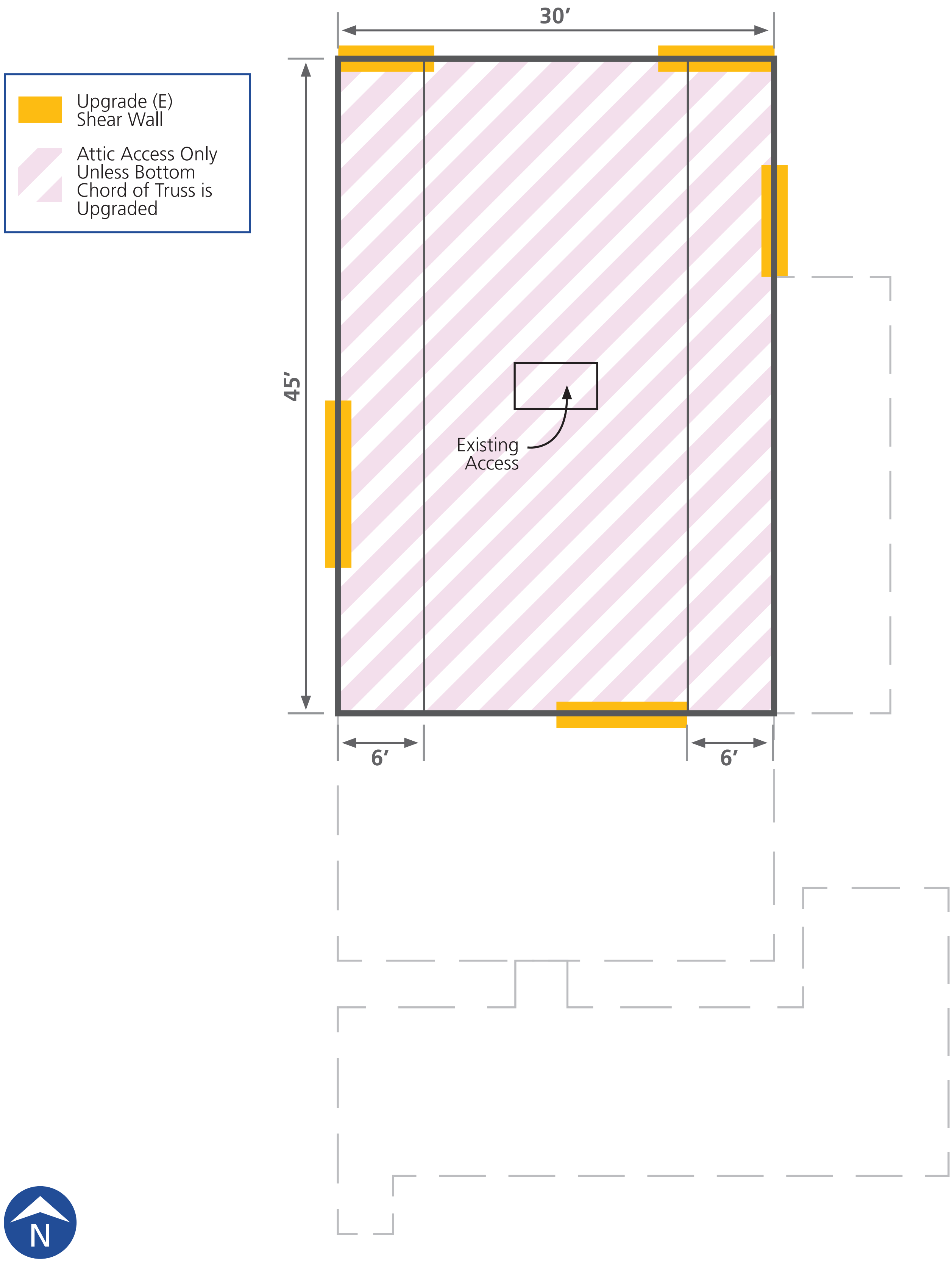
Figure 1 - First Floor



ReidMiddleton RICEfergusMILLER

Old Town Pub
Port of Silverdale - September 2018

Figure 2 - Second Floor



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Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.


Photograph 3: Southwestern exterior corner of building.


Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.


Photograph 7: Typical exterior shiplap.


Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).


Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.


Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

Reid Middleton

CIVIL ENGINEERING
STRUCTURAL ENGINEERING
PLANNING
SURVEYING

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

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Everett, WA 98204
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ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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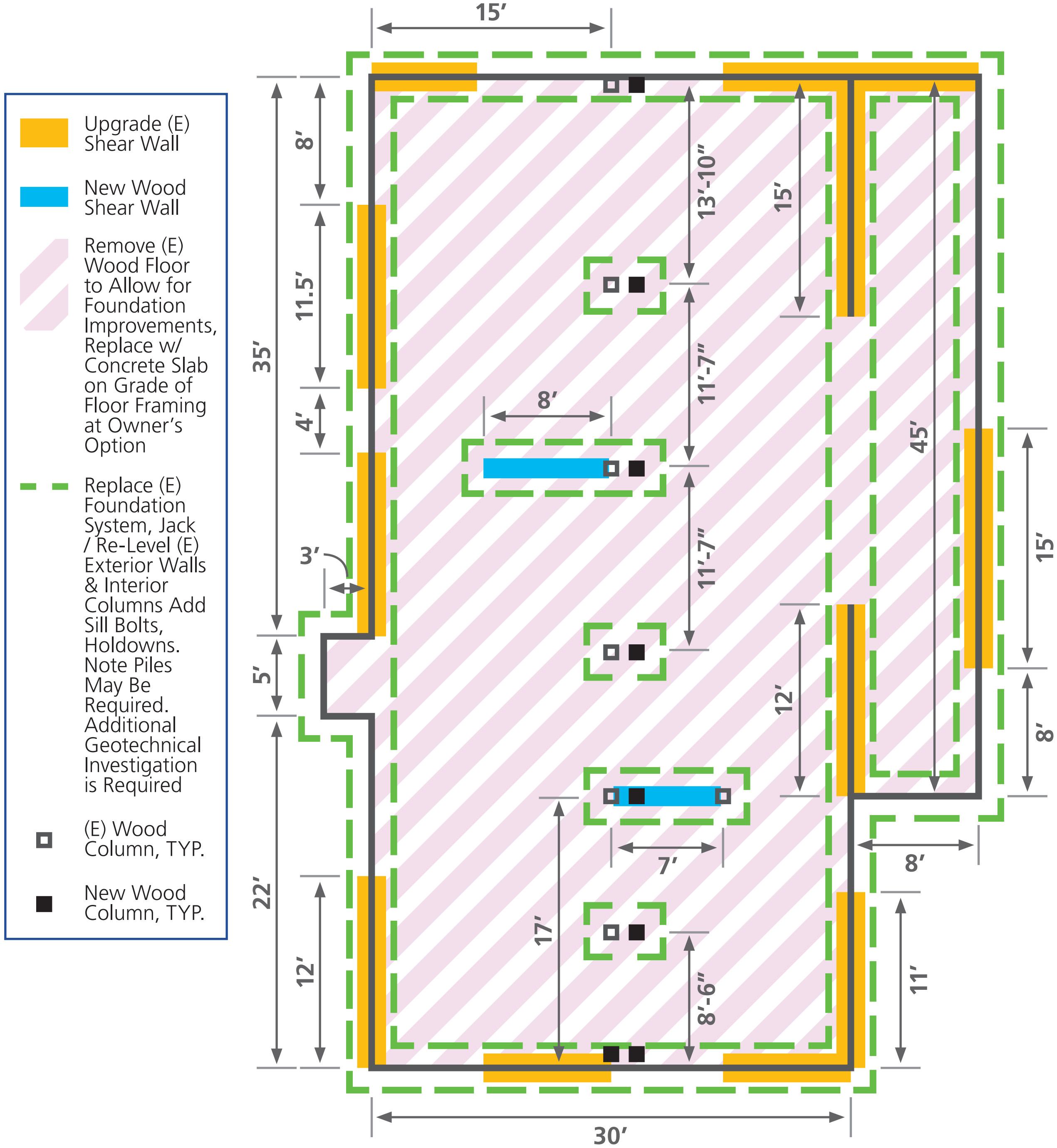


NOTES

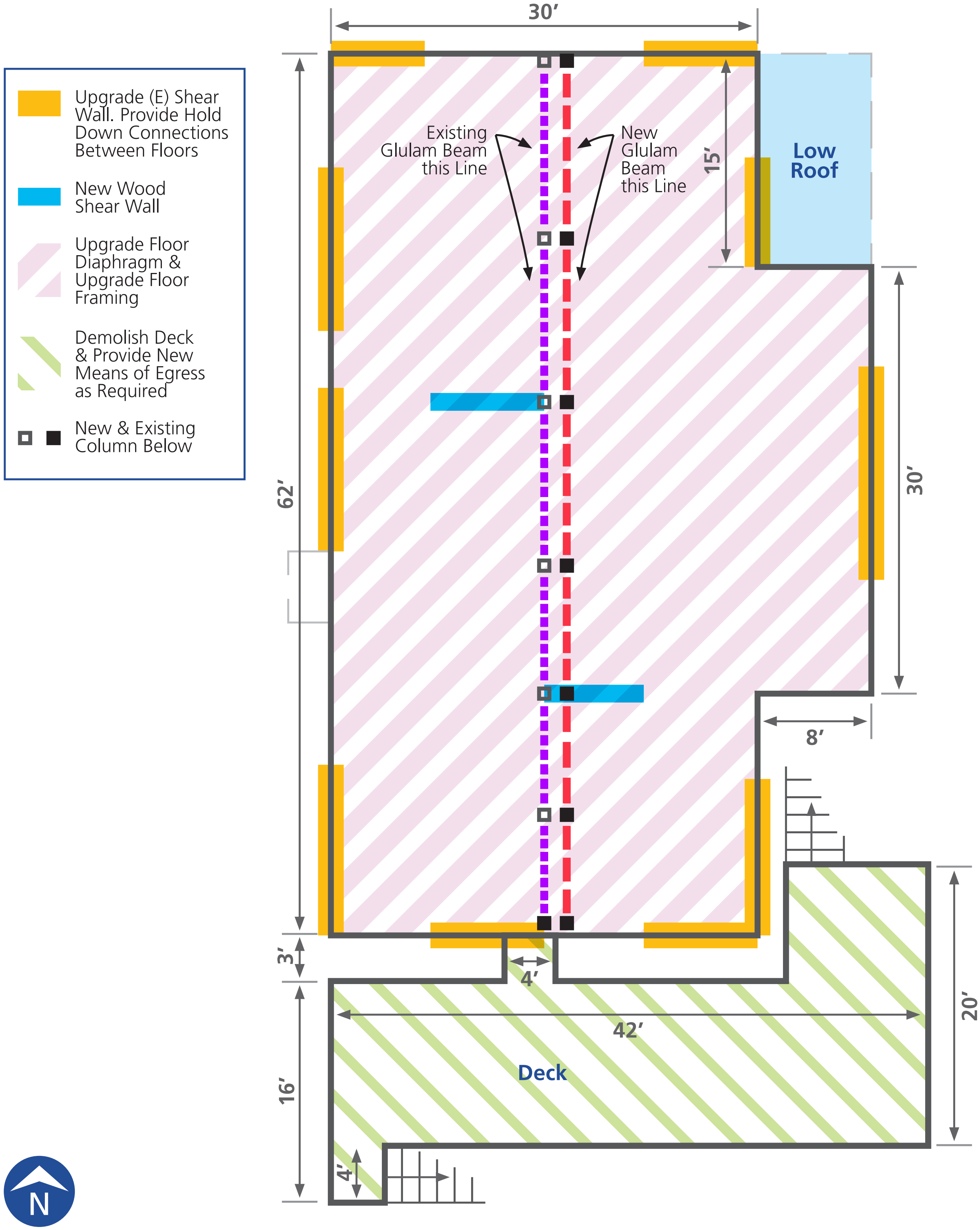
Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

Reid Middleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

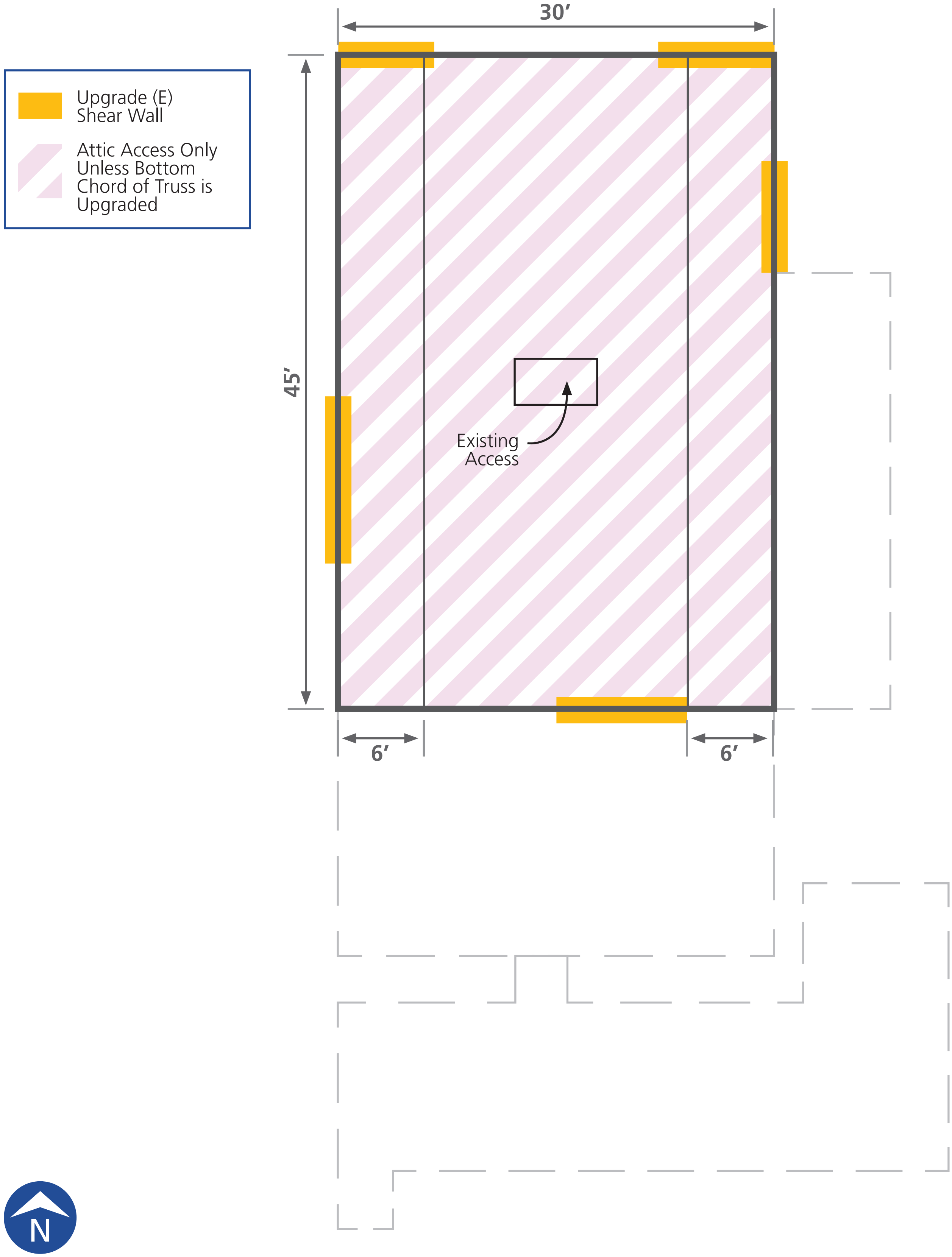
Figure 1 - First Floor



Old Town Pub

Port of Silverdale - September 2018

Figure 2 - Second Floor



ReidMiddleton RICEfergusMILLER

Old Town Pub
Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

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Photograph 7: Typical exterior shiplap.


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Photograph 9: Interior line of columns at first floor.

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Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).


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Photograph 14: Western interior with exposed truss top and bottom chords.


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Photograph 16: Typical foundation system and underside of first floor.

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Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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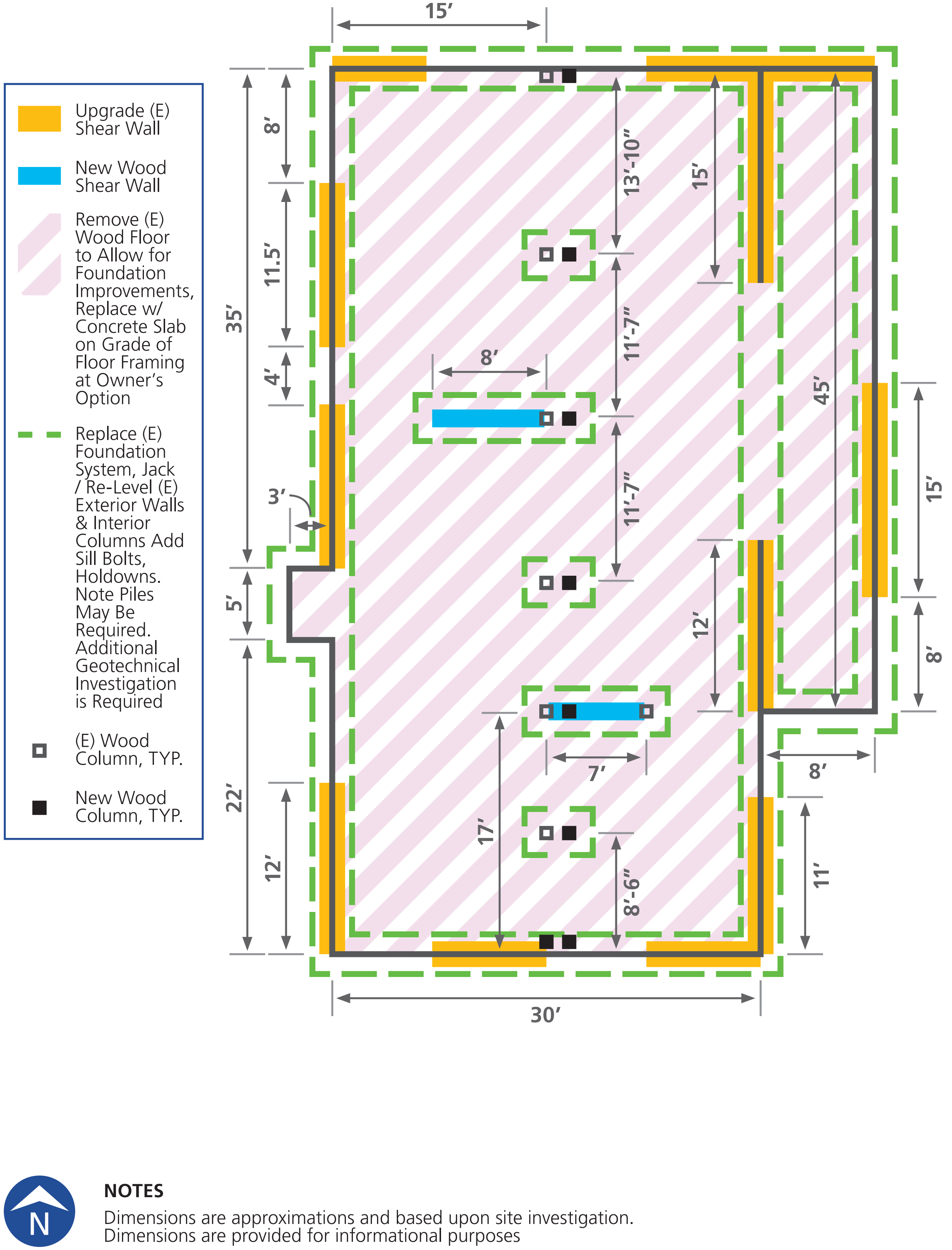


NOTES

Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 1 - First Floor

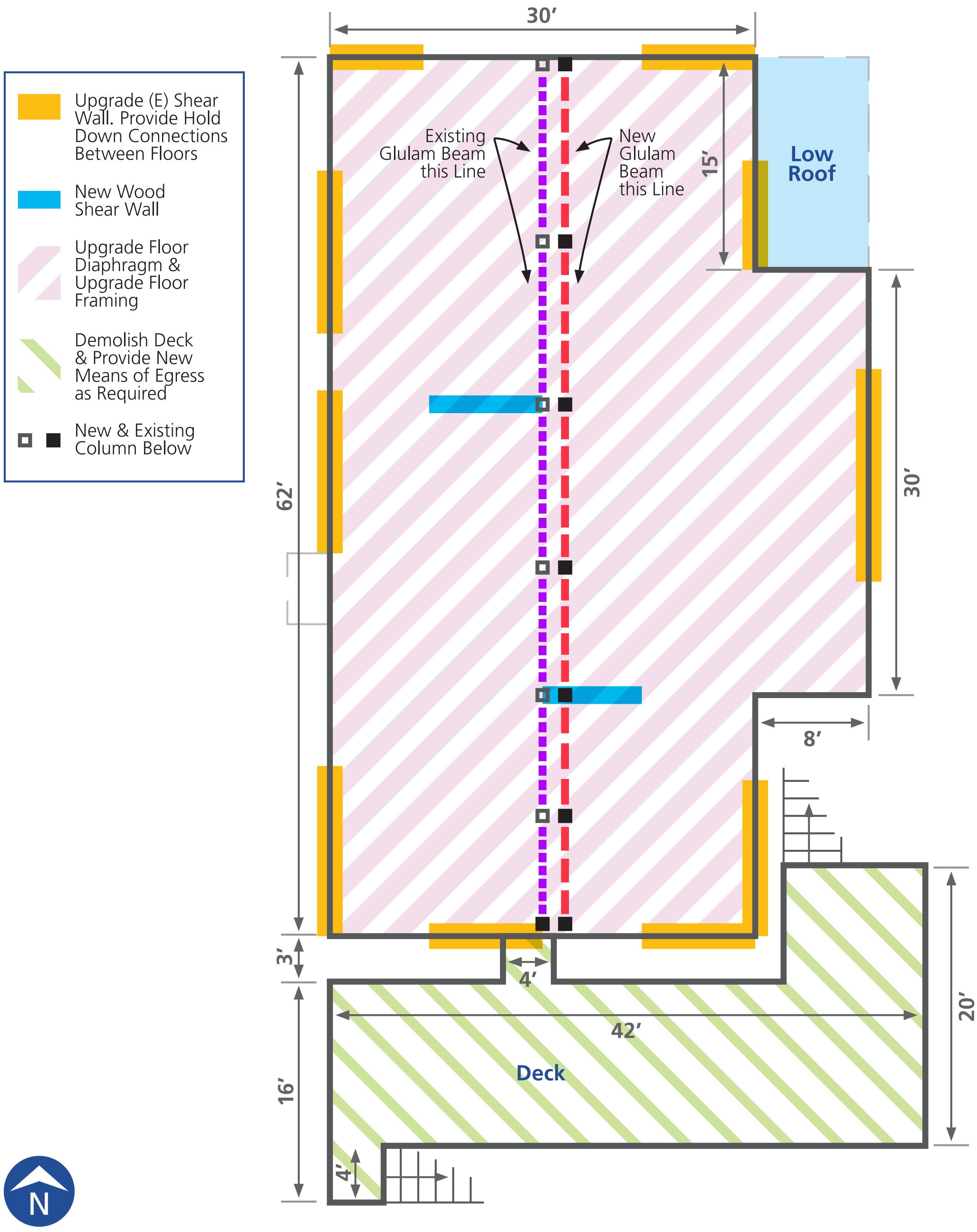
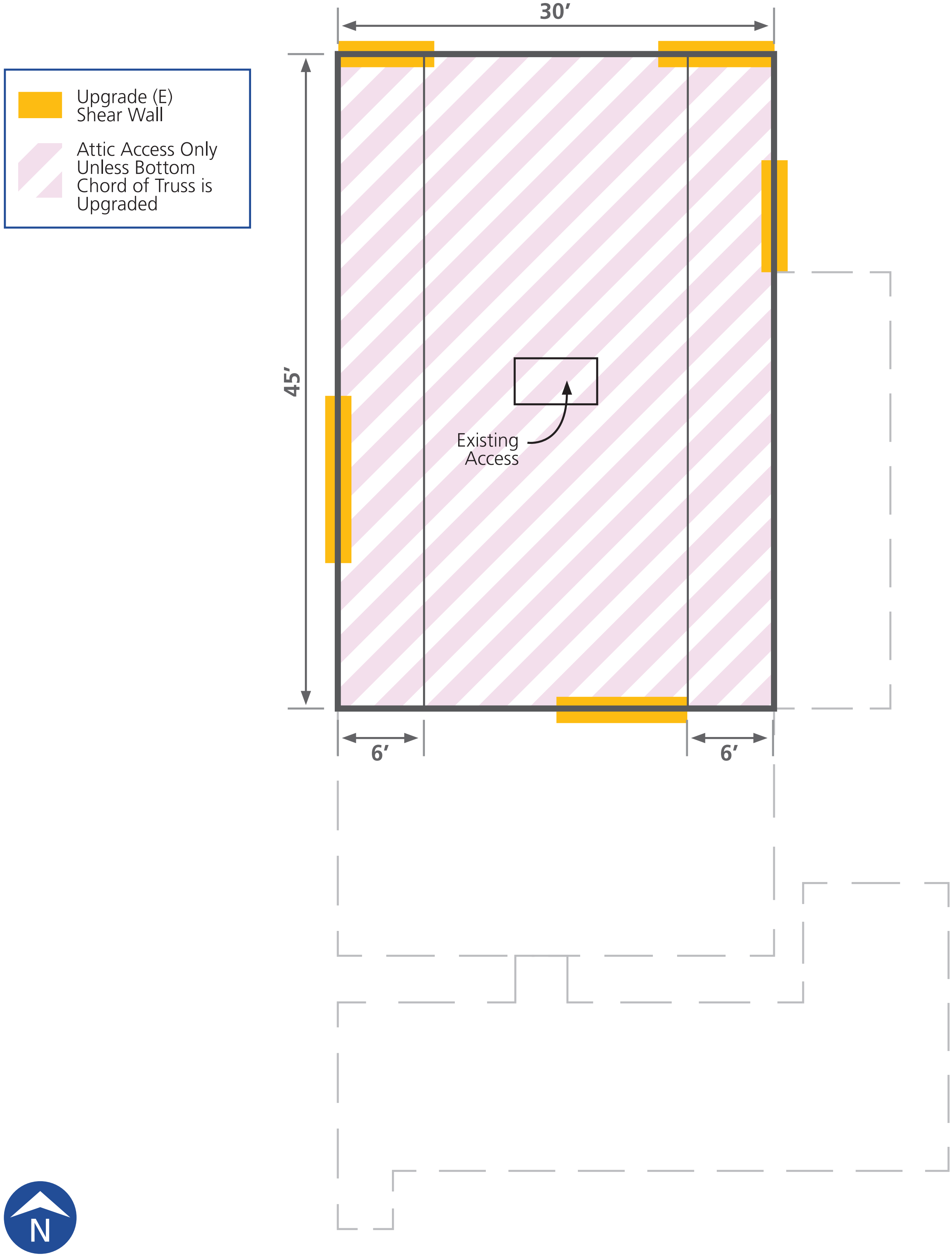


Figure 2 - Second Floor



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Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.

Photograph 7: Typical exterior shiplap.

Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).


Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.

Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building’s age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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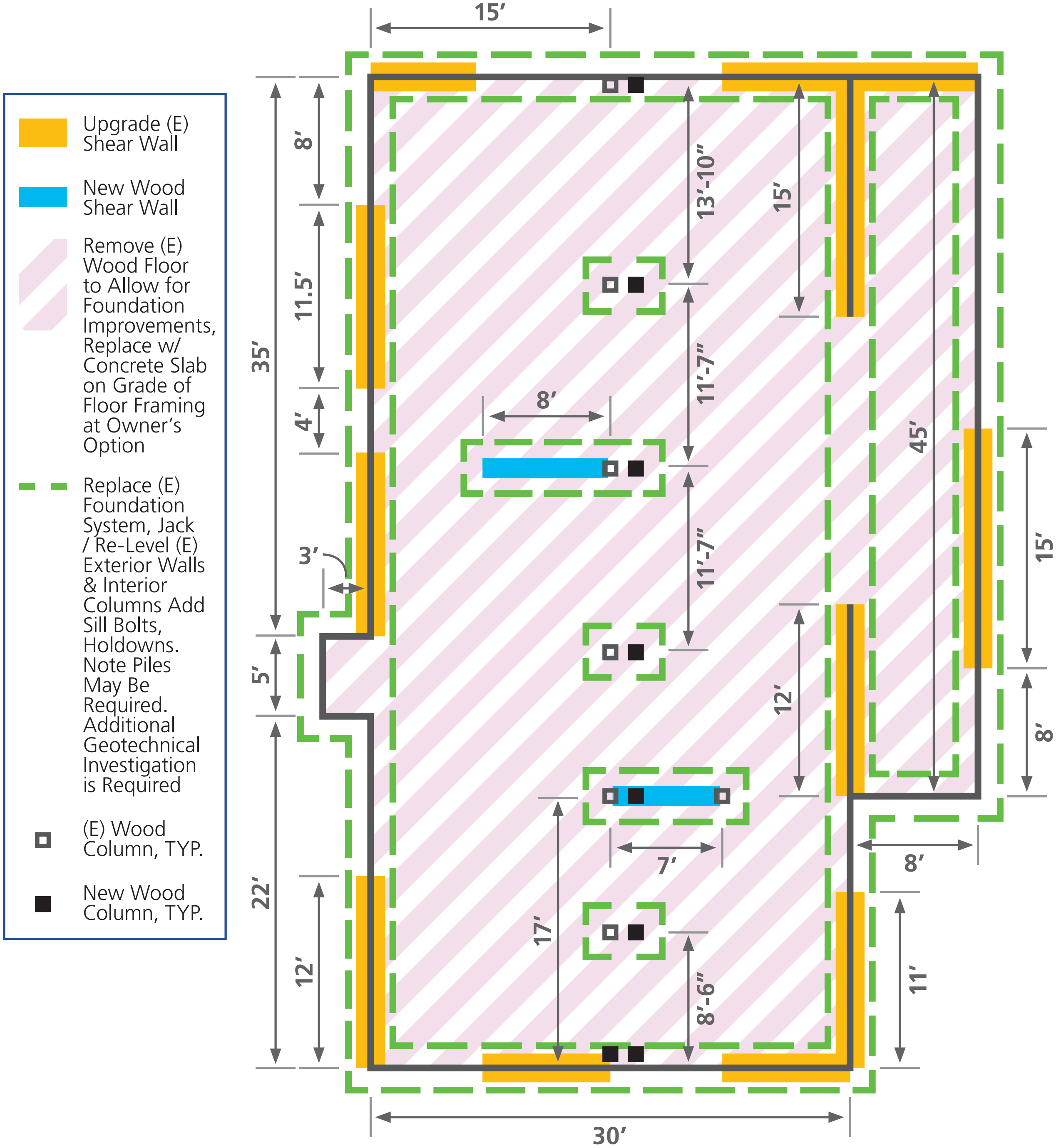


NOTES

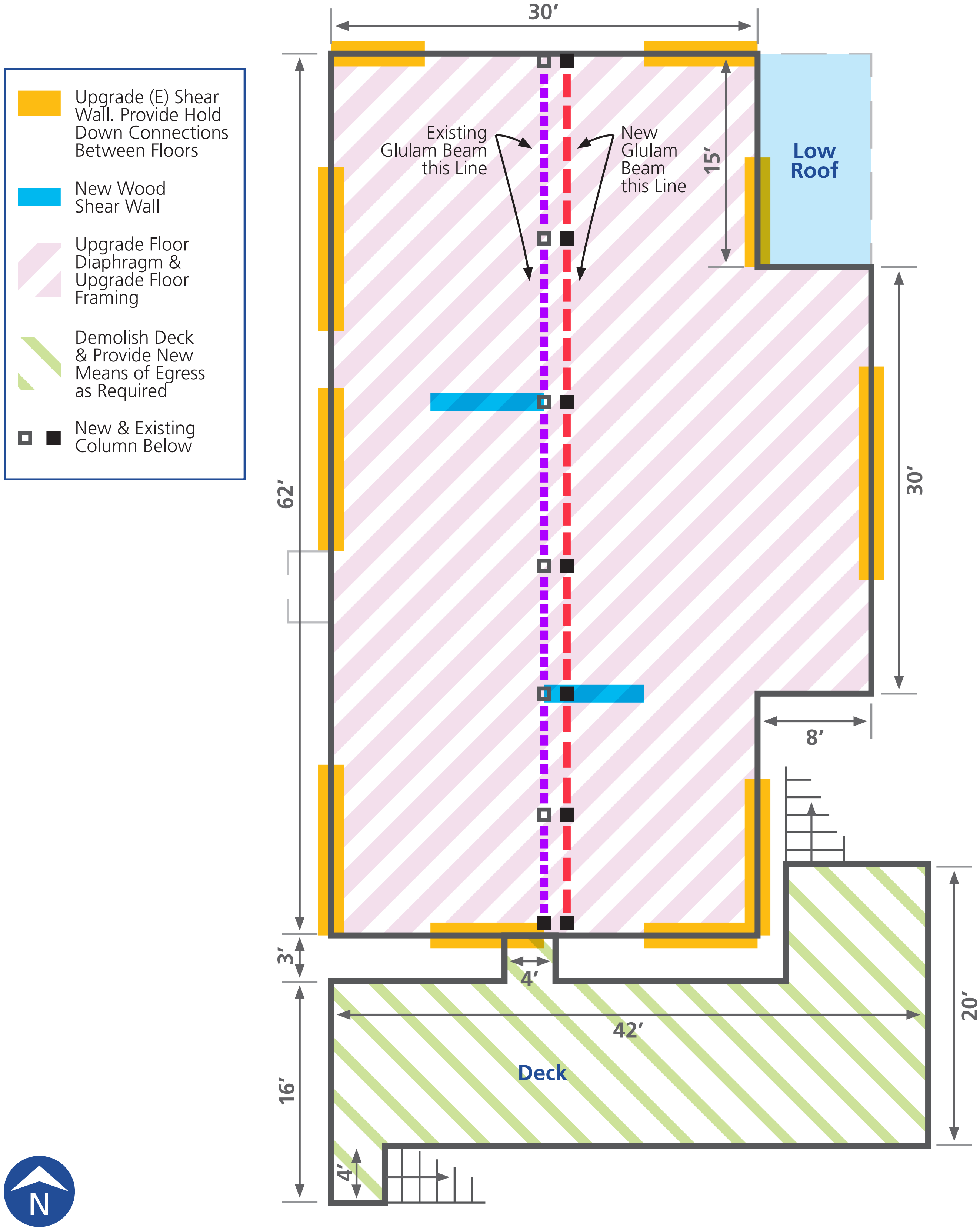
Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 1 - First Floor



ReidMiddleton RICEfergusMILLER

Old Town Pub
Port of Silverdale - September 2018

Figure 2 - Second Floor

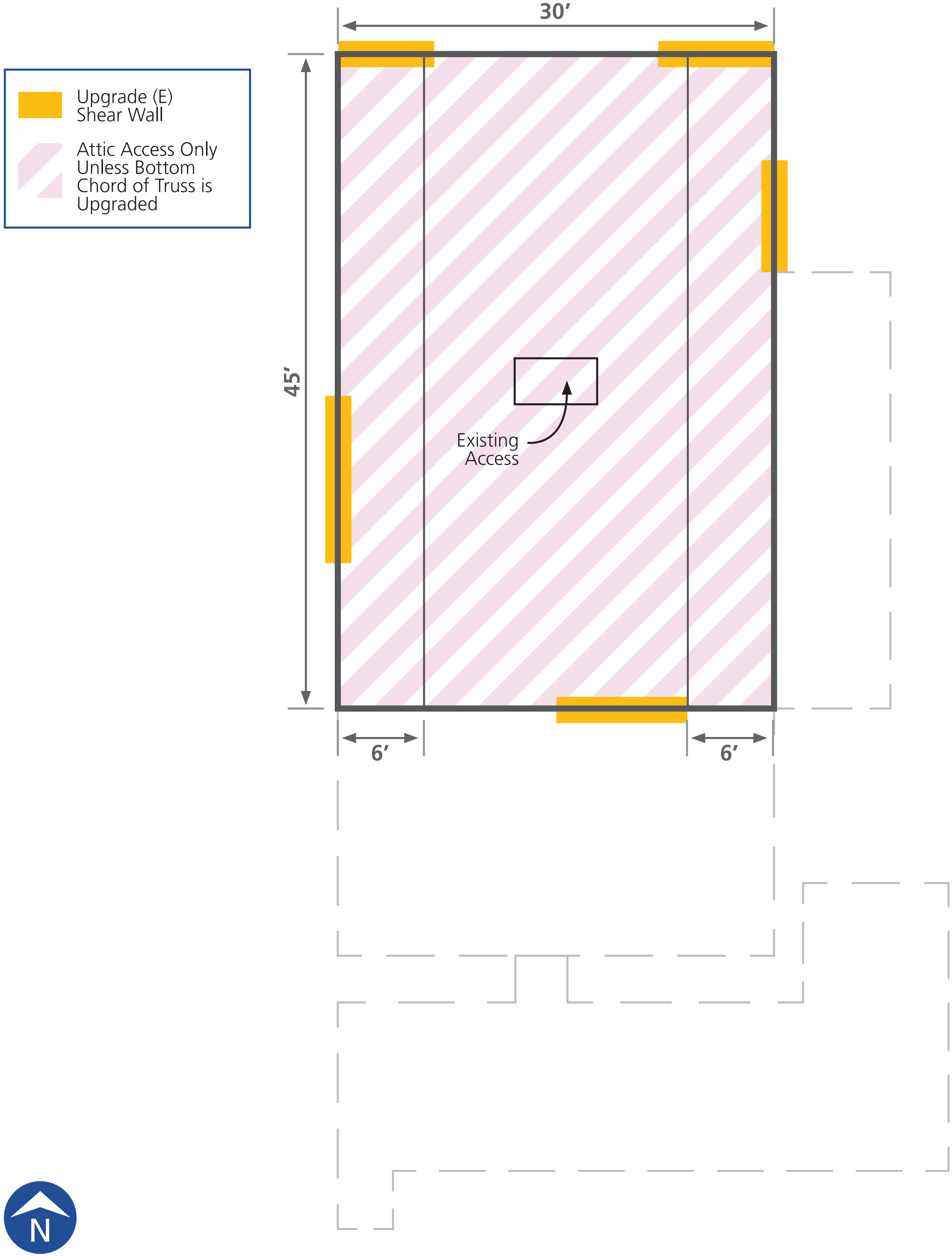


Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.

Photograph 7: Typical exterior shiplap.

Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).

Photograph 14: Western interior with exposed truss top and bottom chords.

Photograph 15: Underside of first floor.

Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

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As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

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Everett, WA 98204
425 741-3800

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ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

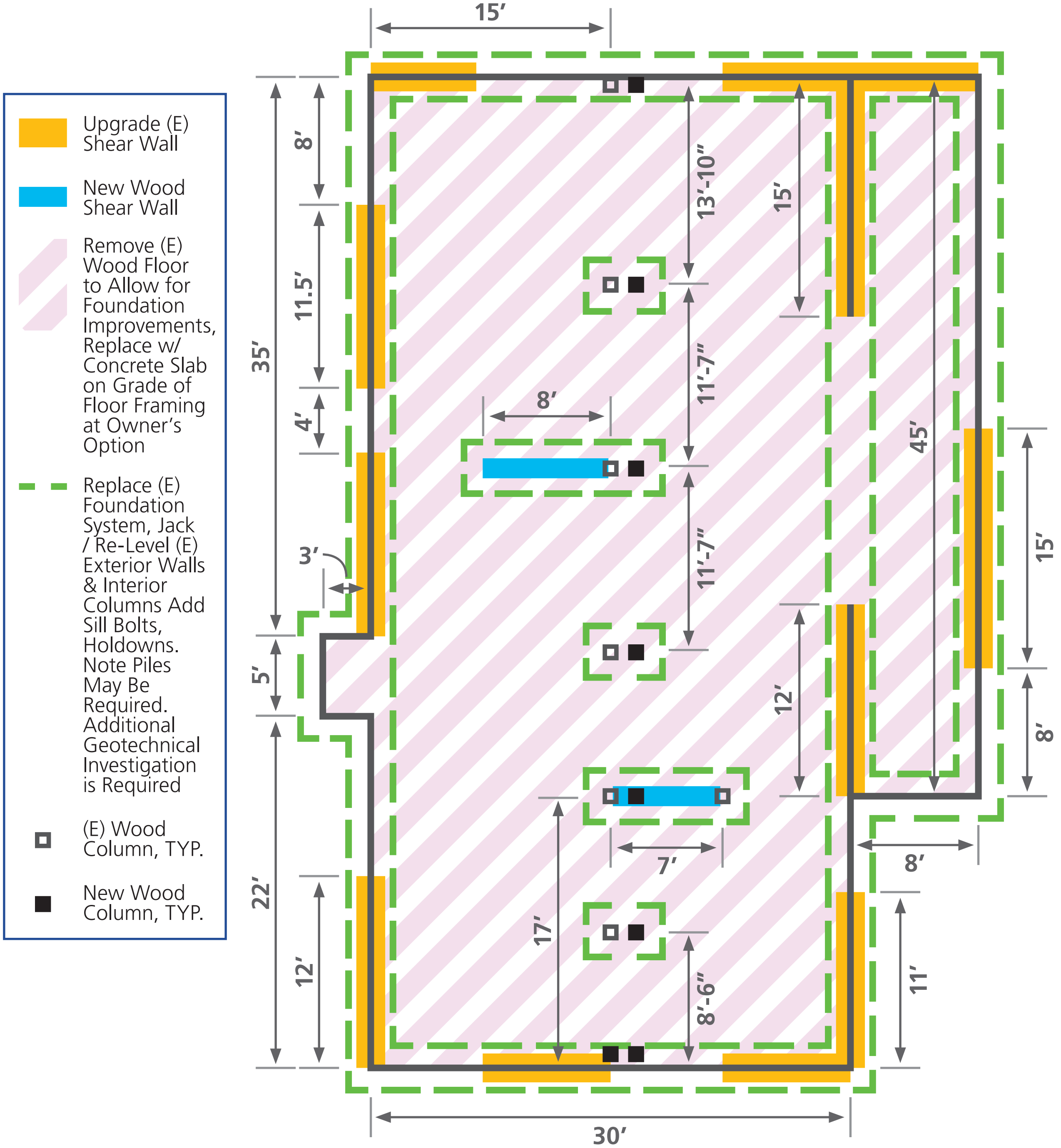
Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E. Principal Structural Engineer	Katherine R, Brawner, P.E. Project Engineer

Attachments

sah\26\18\077 pos old town pub structural evaluation\reports\180910 old town pub_letter report.docx\krb



NOTES

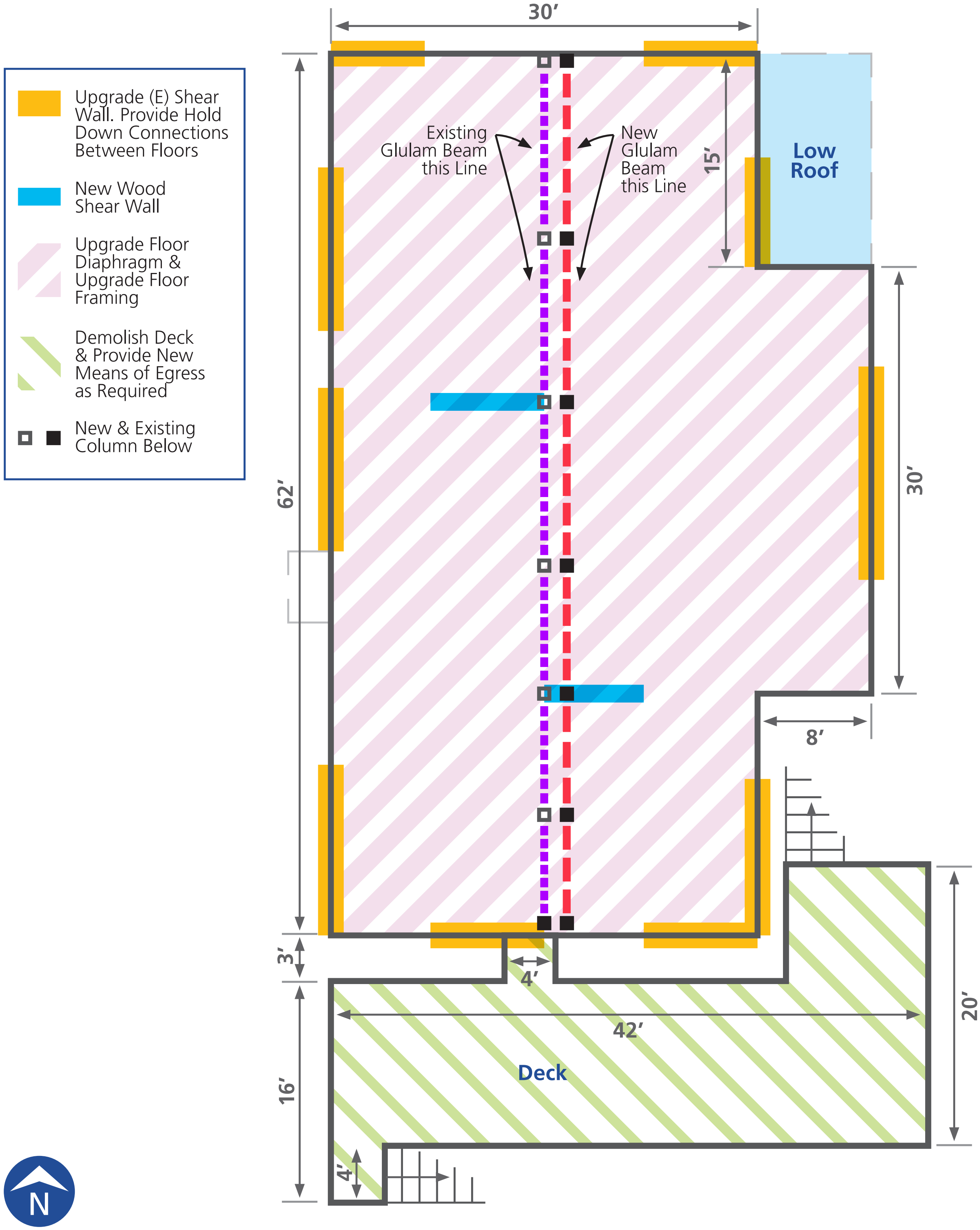
Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

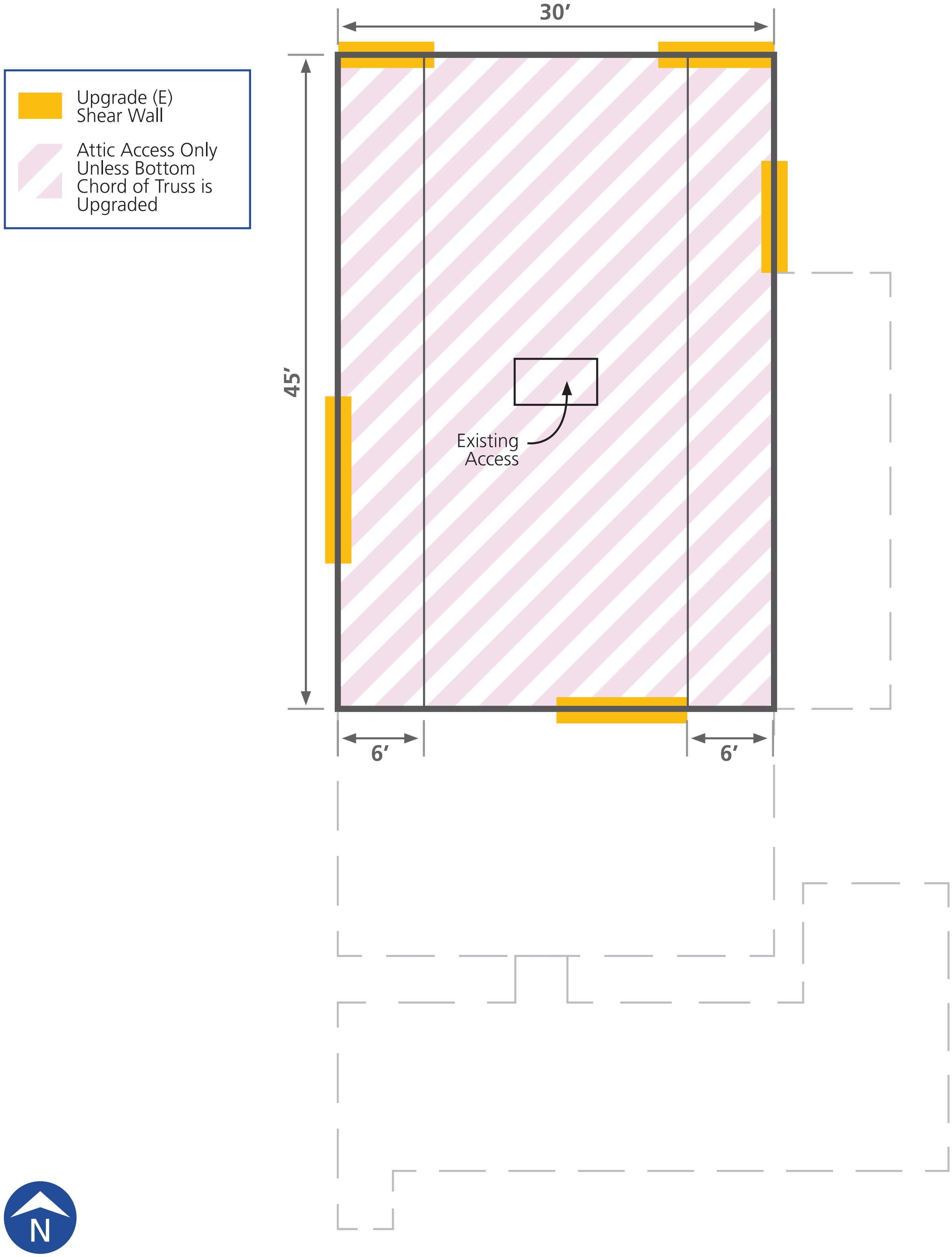
Figure 1 - First Floor



Old Town Pub

Port of Silverdale - September 2018

Figure 2 - Second Floor



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Old Town Pub
Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.

Photograph 7: Typical exterior shiplap.

Photograph 8: Underside of deck at southern side of building.


Photograph 9: Interior line of columns at first floor.


Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).


Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.


Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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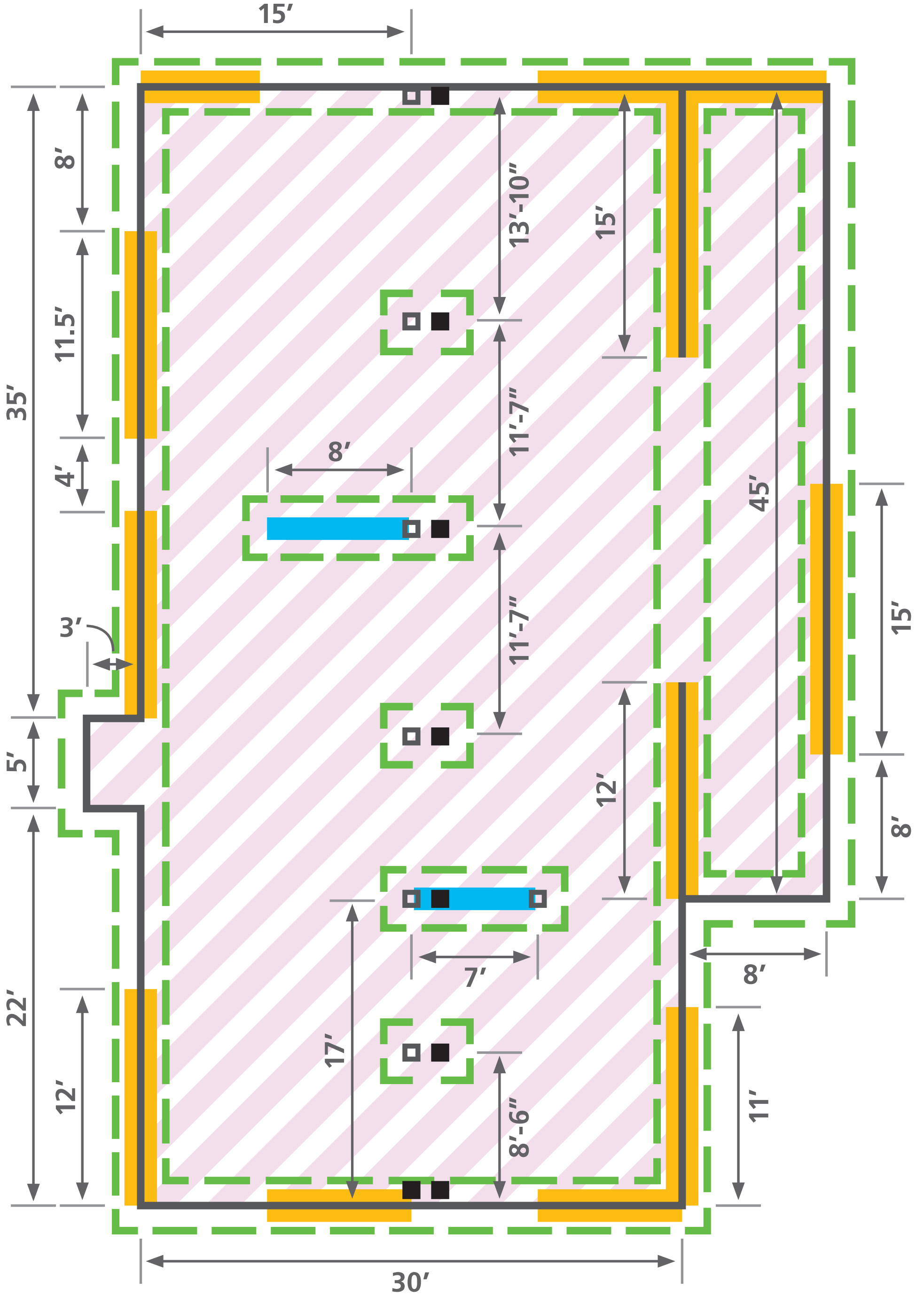

Upgrade (E) Shear Wall

New Wood Shear Wall

Remove (E) Wood Floor to Allow for Foundation Improvements, Replace w/ Concrete Slab on Grade of Floor Framing at Owner's Option

Replace (E) Foundation System, Jack / Re-Level (E) Exterior Walls & Interior Columns Add Sill Bolts, Holdowns. Note Piles May Be Required. Additional Geotechnical Investigation is Required

(E) Wood Column, TYP.

New Wood Column, TYP.

N

NOTES

Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

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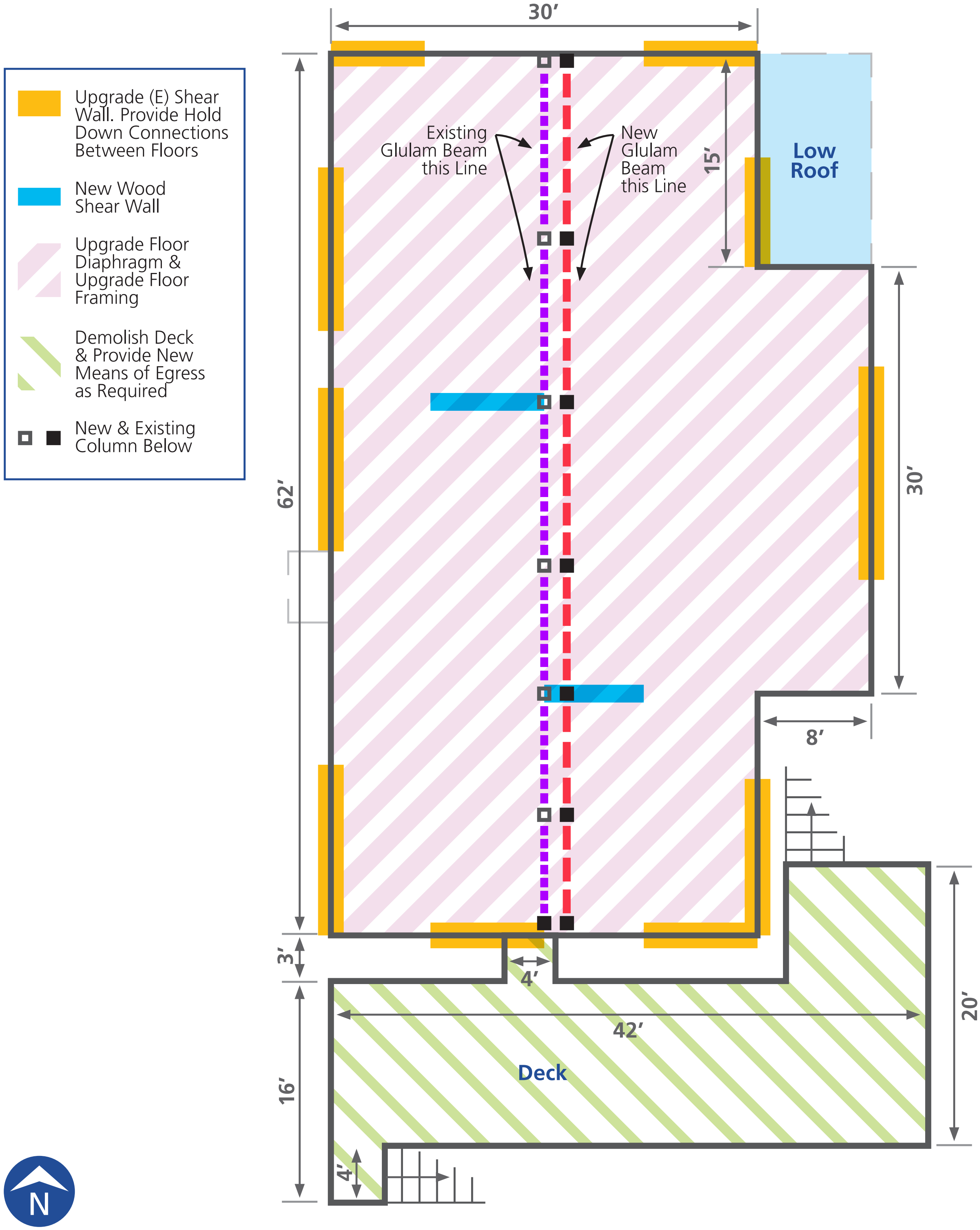
Old Town Pub

Port of Silverdale - September 2018

Figure 1 - First Floor



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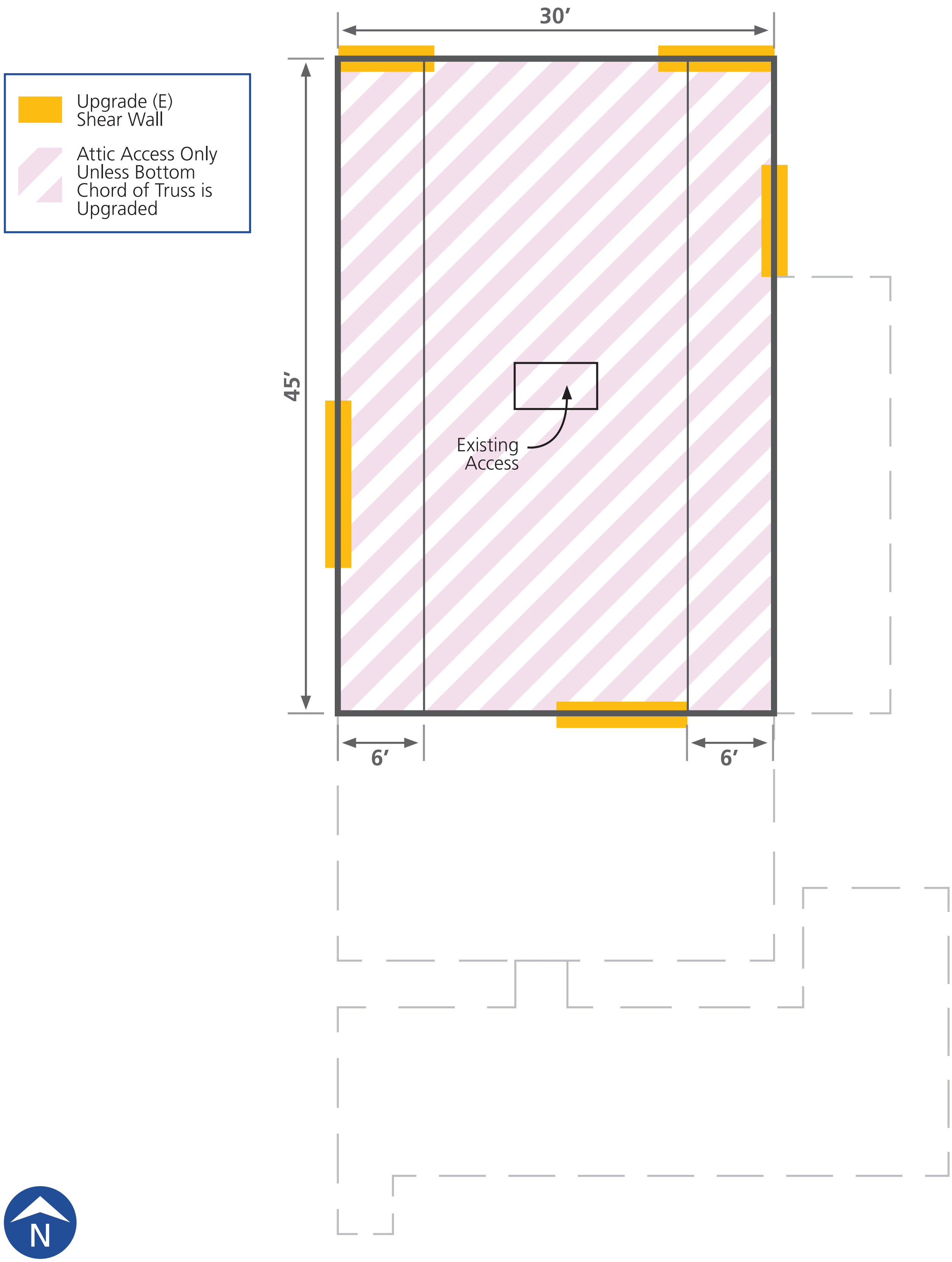
Old Town Pub
Port of Silverdale - September 2018

Figure 2 - Second Floor



Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

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Photograph 14: Western interior with exposed truss top and bottom chords.


Photograph 15: Underside of first floor.


Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than 0.6S_a. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E. Principal Structural Engineer	Katherine R, Brawner, P.E. Project Engineer

Attachments

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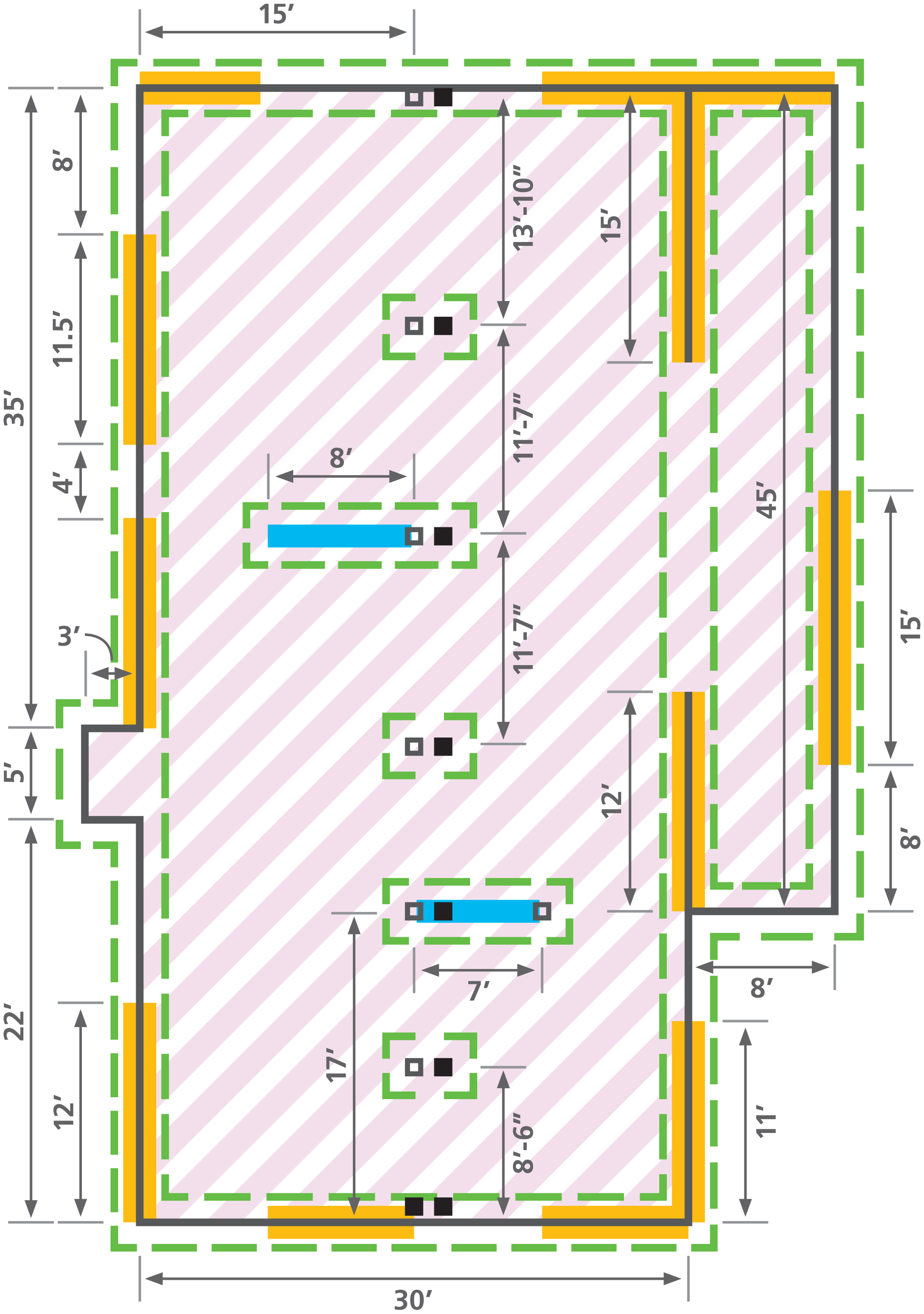

Upgrade (E) Shear Wall

New Wood Shear Wall

Remove (E) Wood Floor to Allow for Foundation Improvements, Replace w/ Concrete Slab on Grade of Floor Framing at Owner's Option

Replace (E) Foundation System, Jack / Re-Level (E) Exterior Walls & Interior Columns Add Sill Bolts, Holdowns. Note Piles May Be Required. Additional Geotechnical Investigation is Required

(E) Wood Column, TYP.

New Wood Column, TYP.

N

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ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

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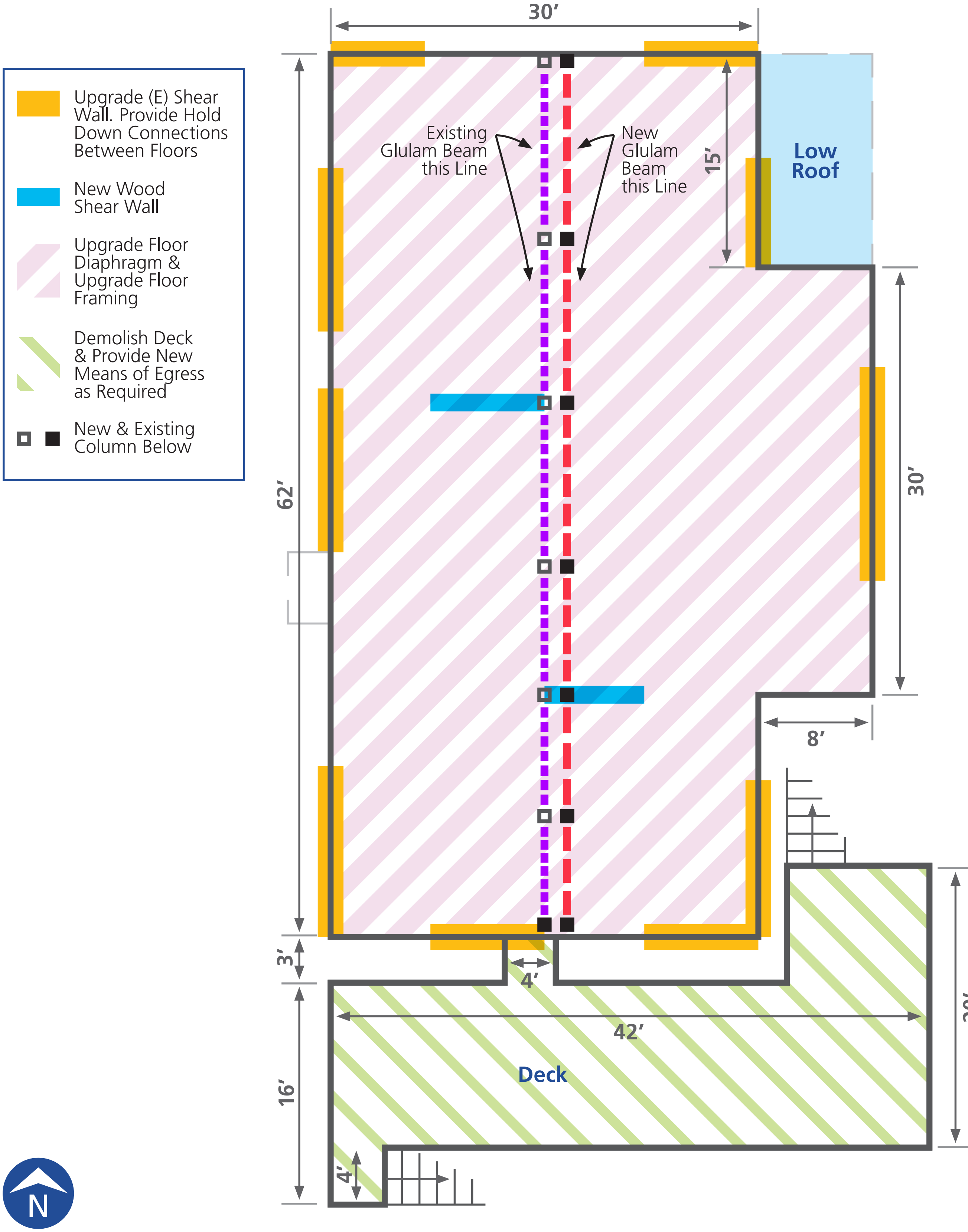
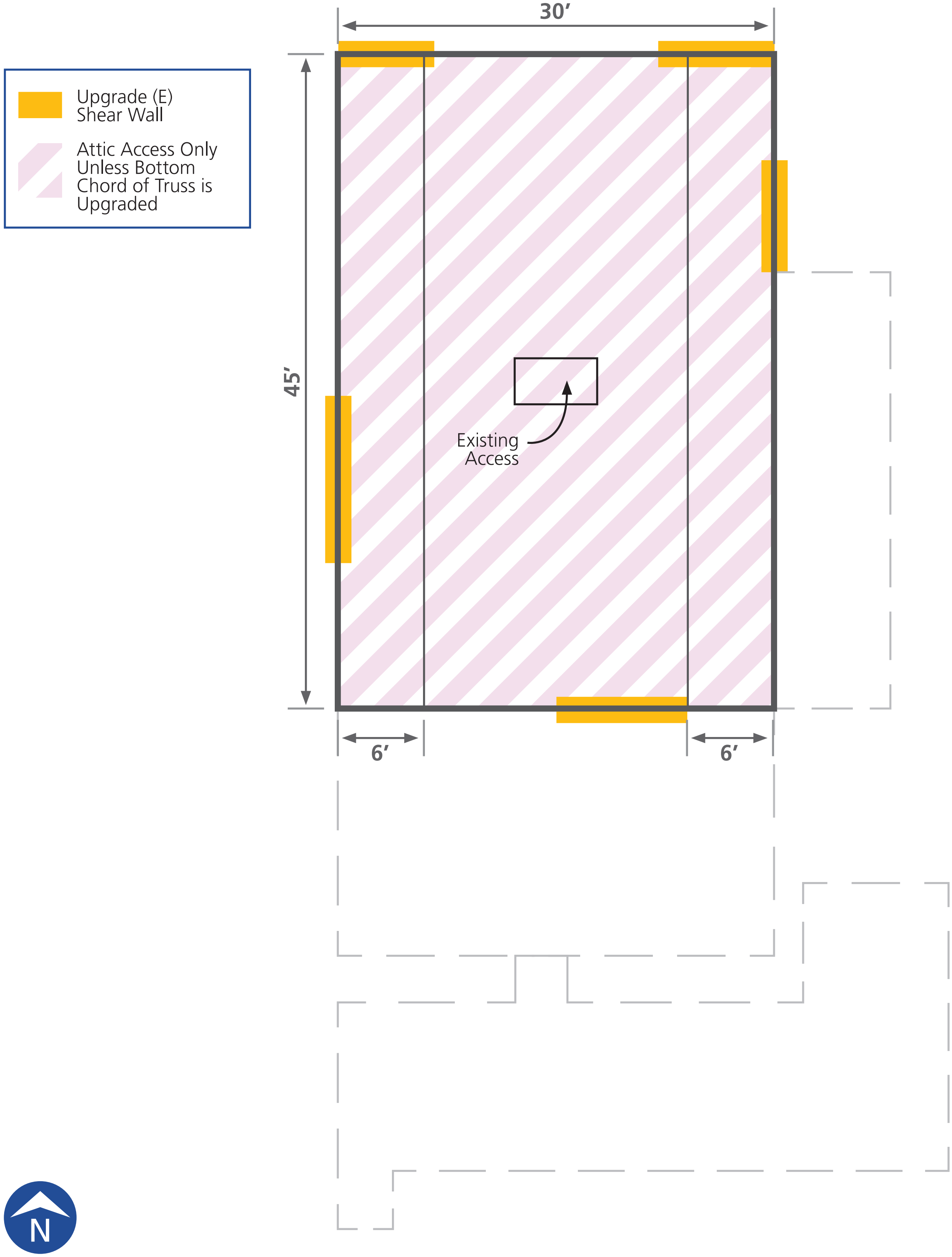


ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 2 - Second Floor



ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.


Photograph 3: Southwestern exterior corner of building.


Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

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Photograph 7: Typical exterior shiplap.

Photograph 8: Underside of deck at southern side of building.

Photograph 9: Interior line of columns at first floor.

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16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.

September 10, 2018
File No. 262018.077

Mr. Ron Easterday
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA 98337

Subject: Port of Silverdale Old Town Pub
Structural Evaluation

Dear Mr. Easterday:

We understand that the Port of Silverdale owns a building, known as the Old Town Pub, located near the City of Silverdale waterfront. The Port of Silverdale is considering renovating the Old Town Pub to return it to an occupiable condition. A limited gravity evaluation and a seismic evaluation of the existing building was performed in accordance with the ASCE 41-13 Tier 1 procedure to identify potential seismic deficiencies in the building and recommend concept-level seismic upgrades to mitigate the deficiencies.

Background

The Old Town Pub is an approximately 5,600-square-foot, three-story building located near the City of Silverdale waterfront. The building, originally constructed in the early 1900s as a Stable and Hall, has been modified several times over the life of the structure, including additions and revised layouts. Most recently, the first floor was occupied as a pub, while the second and third floors had an apartment space. The building is currently unoccupied.

As-built drawings for the building are not available. Information pertaining to the construction of the building and foundation system was obtained through on-site investigation. The wood-framed rectangular building is approximately 30 feet by 60 feet in plan, with story heights of approximately 9 feet and the roof peak creating a floor to roof height at the third level of approximately 12 feet. The exterior perimeter walls of the building are wood studs with 1x shiplap members. These compose most of the vertical- and lateral-force-resisting systems of the building.

Roof framing is composed of wood trusses that span the width of the building and a shiplap diaphragm. The bottom chords of the wood trusses compose the framing that supports the third floor. The second-floor diaphragm is composed of shiplap decking and is supported by wood exterior walls and a line of wood beams and columns at the interior. The floor is constructed of plywood over tongue-and-groove decking, supported by wood framing bearing on asphalt and dirt.

ASCE 41-13 Seismic Evaluation Criteria

The current standard for seismic evaluation and retrofit of existing buildings is the ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings. ASCE 41-13 provides screening and evaluation procedures used to identify potential seismic deficiencies that may require further investigation or hazard mitigation. It presents a three-tiered review process implemented by following a series of predefined checklists and "quick check" structural calculations. Each successive tier is designed to perform an increasingly refined evaluation procedure for seismic deficiencies identified in previous tiers in the process.

The Tier 1 checklists in ASCE 41-13 are specific to each common building type and contain seismic evaluation statements based on observed structural damage in past earthquakes. These checklists screen for potential seismic deficiencies by examining the lateral-force-resisting systems and details of construction that have historically caused poor seismic performance in similar buildings. Tier 1 screenings include basic "Quick Check" analyses for primary components of the lateral system: in this building's case, the shear walls and wall anchorage. They also include prescriptive checks for proper seismic detailing of connections, diaphragm spans and continuity, and overall system configuration. Use of ASCE 41-13 for seismic evaluation requires buildings be classified from a group of common building types. The Old Town Pub is classified as a Wood Frame, Commercial and Industrial Building (W2), and was checked for Life Safety criteria. The ASCE 41-13 Tier 1 Preliminary Seismic Evaluation structural checklist was completed and is included for reference.

Findings

The findings of the structural seismic evaluation and limited gravity framing check indicate that The Old Town Pub has multiple deficiencies, including overstressed shear walls, irregularities and redundancy issues with the lateral-force-resisting system, and inadequate connections. In addition, the building has extensive settlement and insufficient support for gravity loads.

Multiple deficiencies associated with the general building system and configuration include an incomplete load path, weak story, vertical irregularities, and ratios causing overturning. Vertical irregularities and an incomplete lateral load path increase the forces in the supporting elements and require the supporting element to transfer lateral forces to surrounding systems. These deficiencies primarily occur at the northern face of the building.

A weak story is created between the first and second floors where the length of the walls of the seismic system decrease: the shear walls going east-west at the first floor have approximately 50 percent less capacity than those at the second floor. A weak story may result in partial collapse of the structure. In addition, the deck on the southern side of the

building does not have an approved lateral system, adequate detailing, and had limited connections at gravity system.

The wood walls that compose both the gravity system and lateral–force-resisting system have multiple seismic deficiencies, including redundancy, shear stress, and narrow walls. There should be a minimum of two shear walls in each direction. However, the walls at the northern side of the first floor do not meet the length-to-height ratios to be considered shear walls; therefore, a line of walls is not present at the northern face of the building at the first floor. Redundancy is typically desired for seismic performance to provide additional support in case another element of the lateral system fails. In addition, multiple walls on the northern face of the building are narrow, meaning they have an aspect ratio greater than 2-to-1. Narrow wood shear walls have high stresses, which impact the ability to provide adequate seismic support. A majority of the wood walls do not meet the shear stress check, which means that the overall strength of the building to resist seismic forces may be compromised.

There are inadequate connections throughout the building, including the connection of walls through floors, wood sills and sill bolts, girder and column connections, connections at wood posts, and ties between foundation elements. With the exception of toe nailing, no connections were observed. The connection between the walls of the first and second floors could not be observed. Based on the building's age, it is anticipated that straps and hold-downs are not present to allow for a complete load path. Connections were not observed at the woods sills of the shear walls; sill bolts are required to transfer lateral loads to foundation elements.

The span of all the floor diaphragms exceeds the 24-foot recommended span due to the open floor space with no interior shear walls. The diaphragms at the roof and all of the floors of the three-story building are composed of decking and appear to be unblocked. Unblocked diaphragms and diaphragms composed of decking have limited capacities. Diaphragms with sheathing and those that are blocked at panel edges have more strength to transfer lateral forces than those that are composed of decking and are unblocked at panel edges.

Extensive settling of the building was observed through visual observation and the measurement of sloping floors. Most settling appears to be occurring at the exterior sides. At both the first and second floors, the floor sloped away from the center of the building to all four exterior walls. The maximum slope measurement taken on site was approximately 1/2-inch per foot. This occurred at both the first and second floor in the northwest portion of the building. The settling appears to be due to an inadequate foundation system. The building does not appear to have an adequate concrete foundation system, and it is anticipated that the building does not sit on piling, as is typical near most waterfront areas in the Pacific Northwest.

Limited gravity framing calculations were performed on the roof trusses, floor framing, and first floor interior columns and beams that run down the center of the building.

Calculations for these gravity framing elements indicate that they do not have sufficient capacity for current code-prescribed loads (2015 International Building Code). With current snow load requirements, the existing roof trusses can support a third-floor live load on the bottom chord ranging from 10 to 20 pounds-per-square foot (psf), depending on the grade of the wood. The capacity of the bottom chord controls the truss capacity. As a reference, a 40 psf live load is typical for residential dwellings. The floor framing also has limited capacity, with a similar capacity as the existing roof trusses. While the first floor columns have adequate capacity, the glulam beams running down the center of the first floor do not meet deflection requirements by five percent, assuming a live load of 40 psf.

The Old Town Pub does not meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, extensive damage of the lateral-force-resisting elements may occur. It is recommended that the building be upgraded to meet the Life Safety performance objective.

Conclusions and Recommendations

The attached figures display concept-level upgrade concepts to improve the gravity and lateral systems to meet the Life Safety performance objective. The upgrade concepts involve adding lateral strength to the building, strengthening the roof and floor diaphragms and connections, upgrading the foundation system, upgrading gravity framing, and limiting live loads and uses at portions of the building.

Specified exterior walls should be resheathed with structural sheathing, which will strengthen the existing shear walls and increase shear capacity of the LFRS. Interior wood shear walls with structural sheathings should be added to decrease the diaphragm span. Hold-downs should be added to all walls and between walls at floor levels to strengthen and stiffen the building. By stacking shear walls, multiple deficiencies noted for the general building system and configuration will be alleviated.

The live load capacity of the third floor should be limited unless the trusses are upgraded. A second line of column and beams should be added at the first floor to decrease the load on the existing beams. The load on the second floor should be limited until the floor system is upgraded. Upgrades include adding additional floor framing members and adding additional columns and glulam beams down the center. As an alternate option to additional glulam beams and columns, the framing could be replaced with steel, which would allow for longer beam spans and thus fewer interior columns. The deck at the southern side of the building should be demolished. A new means of egress, or a deck with an adequate lateral system, should be provided.

The floor systems should be resheathed with structural sheathing and nailing, and blocking should be added to increase the diaphragms' capacity and strength. The connection between the diaphragms and shear walls should be improved using wall ties to ensure that forces are transferred to the shear walls. Connections should be added at a

new foundation system. A concrete foundation system, consisting of spread footings under all gravity and lateral systems and a concrete slab, should be installed. It is also anticipated that pile foundations may be required. Prior to installation of a foundation system, the existing gravity and lateral systems should be leveled.

With both seismic and lateral upgrades, the Old Town Pub may be upgraded to meet the Life Safety performance level as determined by the ASCE 41-13 Tier 1 evaluation. During a design-level earthquake, upgrades would limit the damage of the lateral-force-resisting elements and gravity system.

Thank you for allowing us the opportunity to assist you with this project. If you need any clarification or additional information, please call.

Sincerely,

Reid Middleton, Inc.

Corbin M. Hammer, P.E., S.E.
Principal Structural Engineer

Katherine R, Brawner, P.E.
Project Engineer

Attachments

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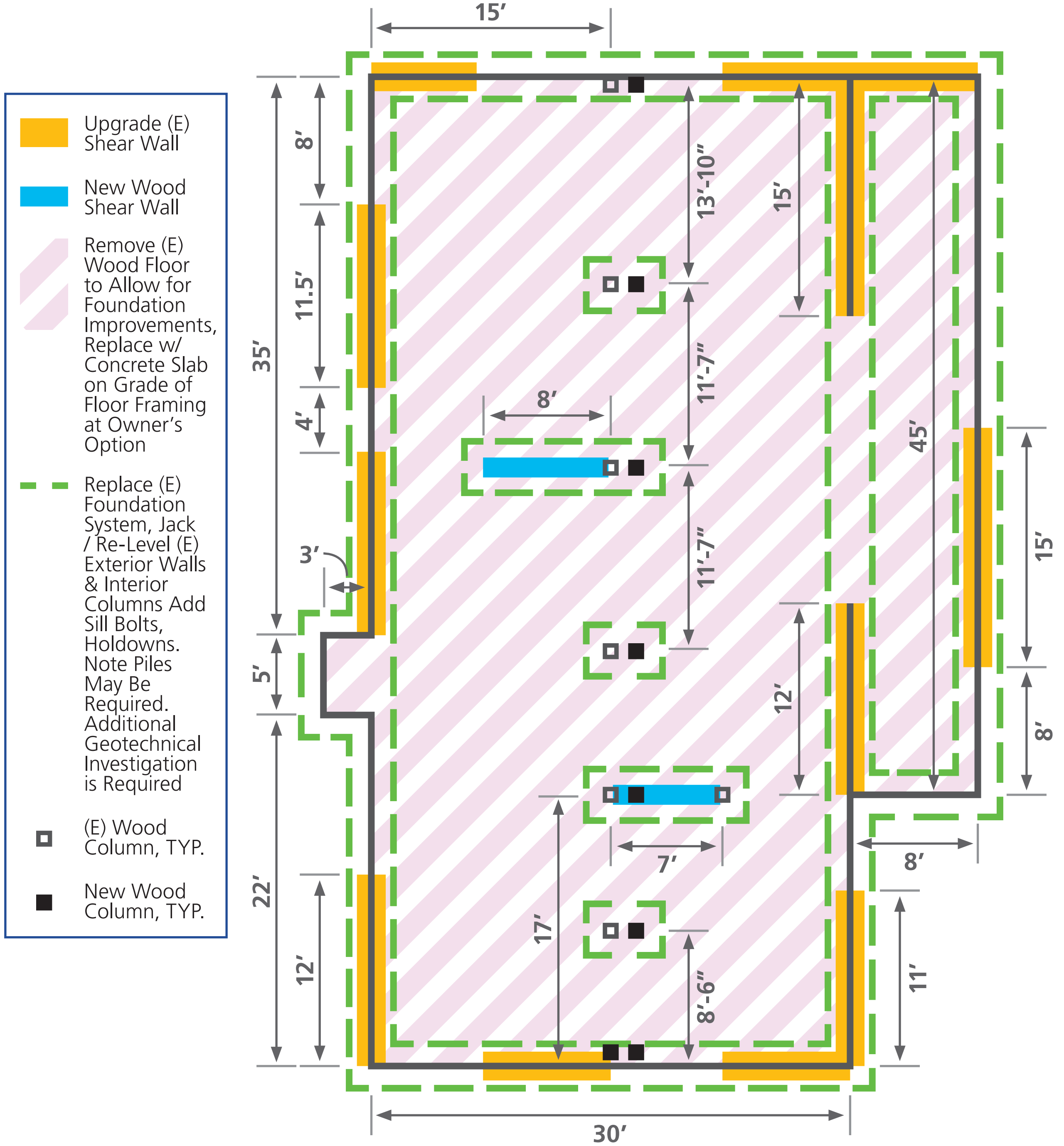
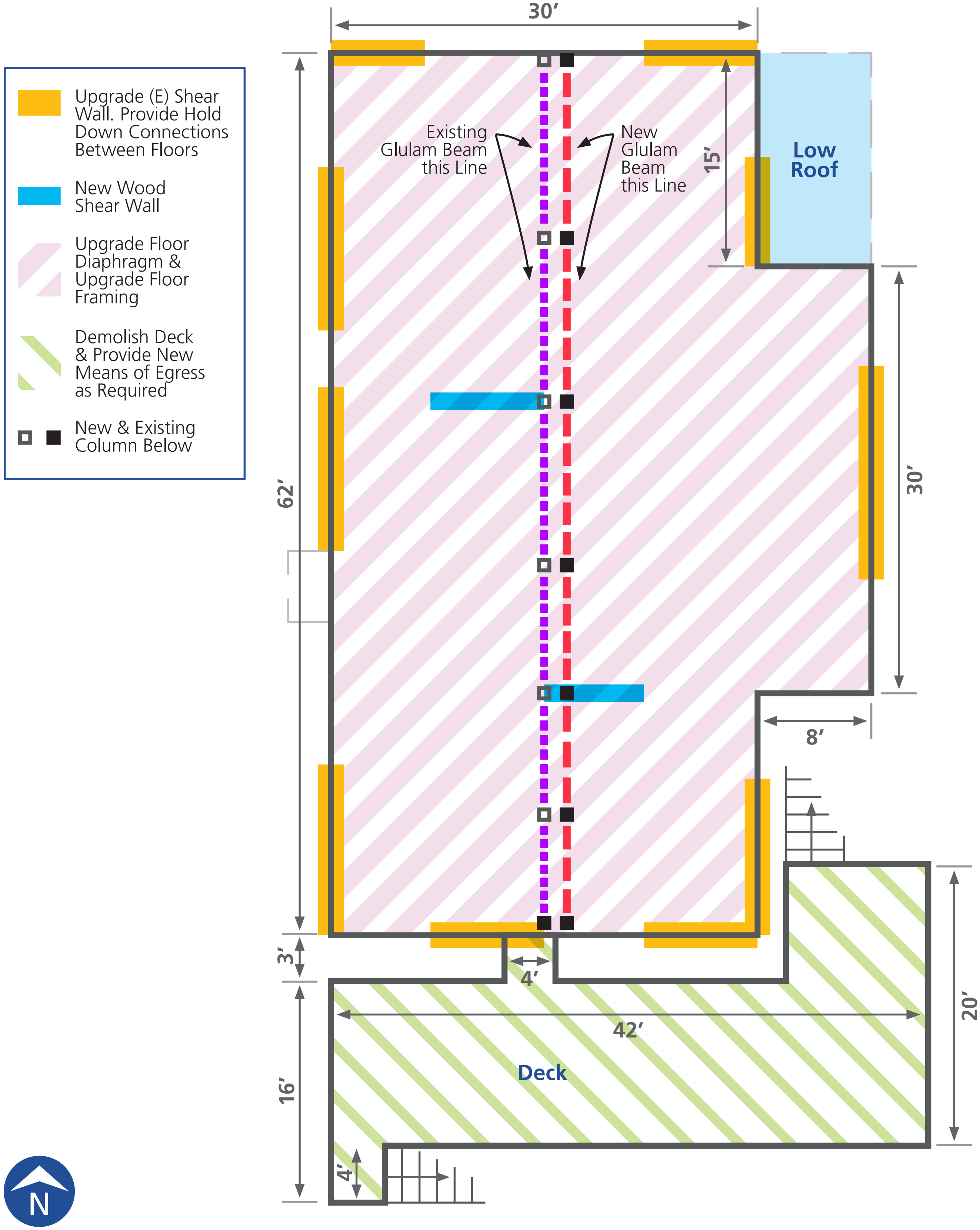


NOTES

Dimensions are approximations and based upon site investigation.
Dimensions are provided for informational purposes

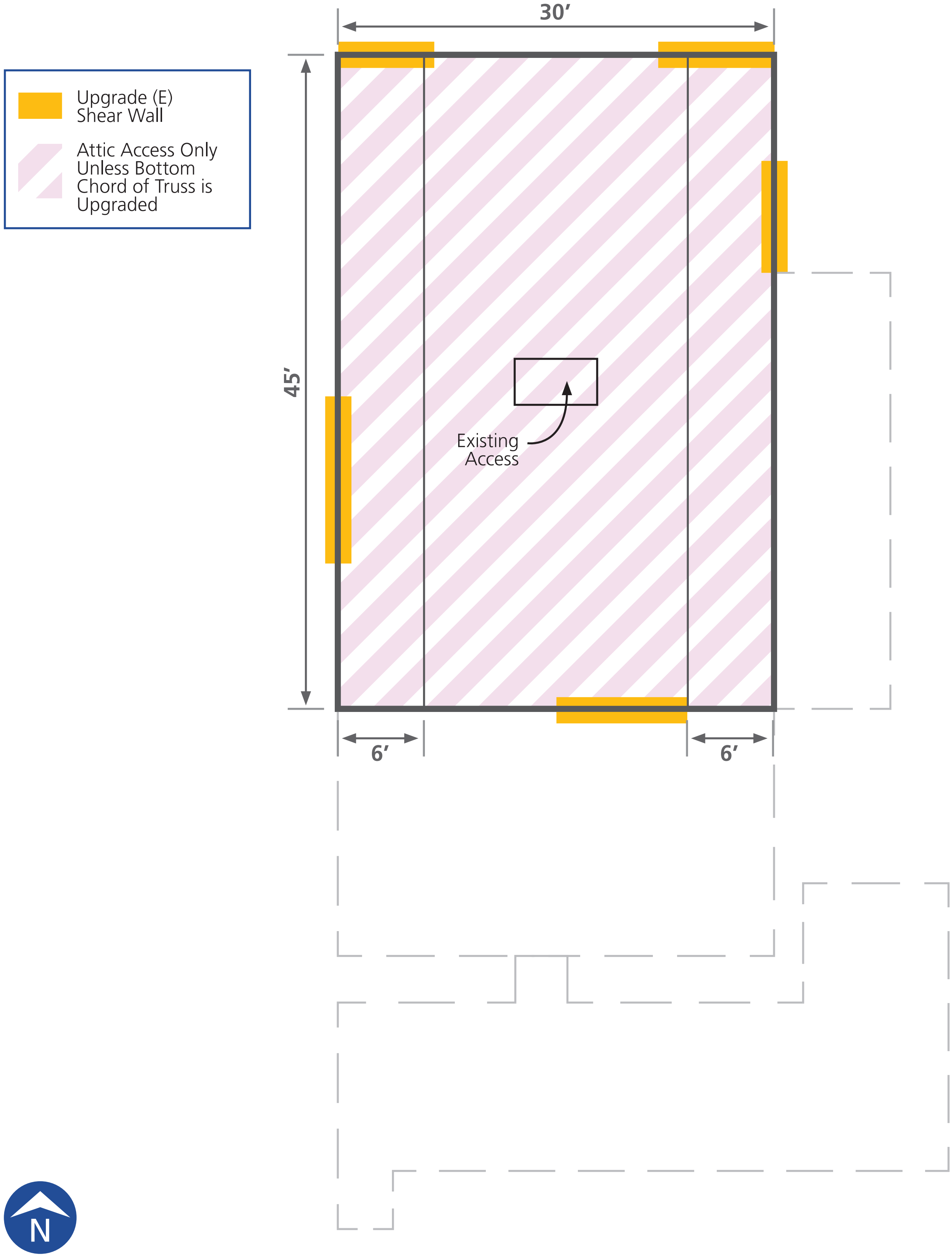
Figure 1 - First Floor



Old Town Pub

Port of Silverdale - September 2018

Figure 2 - Second Floor



ReidMiddleton RICEfergusMILLER

Old Town Pub

Port of Silverdale - September 2018

Figure 3 - Third Floor

Photographs

Photograph 1: Northern exterior of building.

Photograph 2: Northwestern exterior corner of building.

Photograph 3: Southwestern exterior corner of building.

Photograph 4: Deck at southern exterior of building.

Photograph 5: Deck at southeastern exterior corner of building.

Photograph 6: Northeastern exterior corner of building.


Photograph 7: Typical exterior shiplap.


Photograph 8: Underside of deck at southern side of building.


Photograph 9: Interior line of columns at first floor.


Photograph 10: Hole cut at column base at first floor.

Photograph 11: Underside of second floor with slope toward exterior of 12-inch per 1-foot.

Photograph 11: Typical floor and walls (second floor shown).

Photograph 12: Second floor at building center with high point (slope east and west).

Photograph 13: Typical floor and walls (third floor shown).

Photograph 14: Western interior with exposed truss top and bottom chords.

Photograph 15: Underside of first floor.

Photograph 16: Typical foundation system and underside of first floor.

16.1.2LS Life Safety Basic Configuration Checklist

The evaluation statements represent general configuration issues applicable for most buildings based on observed earthquake structural damage during actual earthquakes. This checklist should be completed for all buildings in Very Low, Low, Moderate, and High Seismicity for Life Safety Performance Levels.

Each of the evaluation statements in this checklist shall be marked Compliant (C), Noncompliant (NC), Unknown (U), or Not Applicable (N/A) for a Tier 1 screening. Compliant statements identify issues that are acceptable according to the criteria of this standard, whereas noncompliant and unknown statements identify issues that require further investigation. Certain statements may not apply to the building being evaluated. For noncompliant and unknown evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 evaluation procedure; corresponding section numbers are in parentheses after each evaluation statement.

Very Low Seismicity

Building System

General

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			LOAD PATH: The structure shall contain a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1)	
X				ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 4% of the height of the shorter building. This statement need not apply for the following building types: W1, W1a, and W2. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2)	
		X		MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3)	

Building Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction shall not be less than 80% of the strength in the adjacent story above. (Commentary: Sec. A.2.2.2. Tier 2: Sec. 5.4.2.1)	The shear walls going east-west at the first floor have approximately 50% less capacity than those at the second floor.
X				SOFT STORY: The stiffness of the seismic-force-resisting system in any story shall not be less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2)	
	X			VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3)	

16.1.2LS Life Safety Basic Configuration Checklist

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4)	
X				MASS: There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5)	
X				TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6)	

Low Seismicity: Complete the Following Items in Addition to the Items for Very Low Seismicity.

Geologic Site Hazards

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
			X	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 ft under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1)	
X				SLOPE FAILURE: The building site is sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1)	
			X	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1)	

16.1.2LS Life Safety Basic Configuration Checklist

Moderate and High Seismicity: Complete the Following Items in Addition to the Items for Low Seismicity.

Foundation Configuration

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3)	
	X			TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4)	No connections observed at the foundation.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

Low and Moderate Seismicity

Lateral Seismic-Force-Resisting System

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1)	Walls at the northern side of the first floor do not meet length/height ratios to be considered shear walls therefore not having a line of walls.
	X			SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.5.3.3, is less than the following values (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1): Structural panel sheathing 1,000 lb/ft Diagonal sheathing 700 lb/ft Straight sheathing 100 lb/ft All other conditions 100 lb/ft	
		X		STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1)	
		X		GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used as shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1)	Interior walls are not part of the lateral system
	X			NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1)	
	X			WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2)	No connection observed on site.
		X		HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-2. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3)	
		X		CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4)	

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
		X		OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3)	No connection observed on site.
	X			WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.
	X			GIRDER/COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1)	No connections beyond toe nailing observed on site.

16.3LS LIFE SAFETY STRUCTURAL CHECKLIST FOR BUILDING TYPE W2: WOOD FRAMES, COMMERCIAL AND INDUSTRIAL

High Seismicity: Complete the Following Items in Addition to the Items for Low and Moderate Seismicity.

Diaphragms

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
X				DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1)	
X				ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1)	
		X		DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension. (Commentary: Sec. A.4.1.8. Tier 2: Sec. 5.6.1.5)	No diaphragm openings larger than 50% of width.
		X		STRAIGHT SHEATHING: All straight sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2)	Diaphragms do not have sheathing.
	X			SPANS: All wood diaphragms with spans greater than 24 ft consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2)	Span exceeds 24 feet in both directions.
		X		DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2)	Diaphragms are not composed of sheathing of structural panels.
X				OTHER DIAPHRAGMS: The diaphragm does not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5)	

Connections

C	NC	N/A	U	EVALUATION STATEMENT	COMMENT
	X			WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less, with proper edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3)	No sill bolts observed on site.