



## Historic Brewery Tower

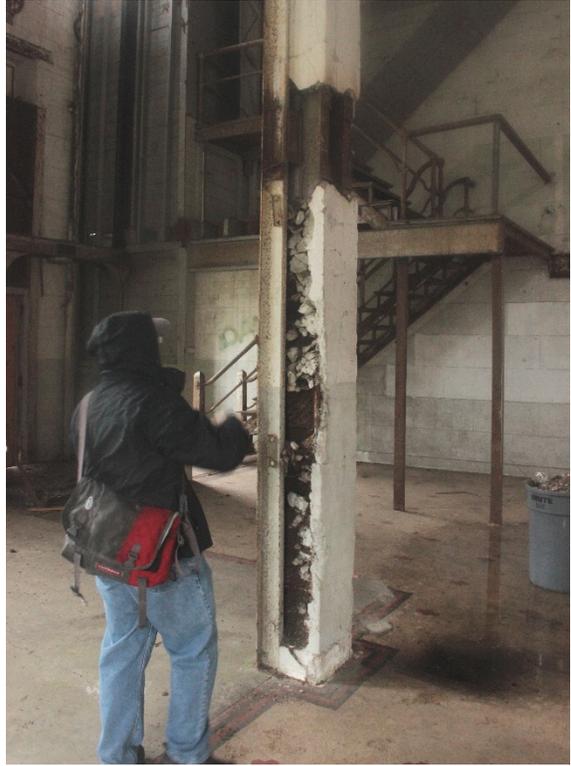
5 April 2016

  
**CARDINAL**  
ARCHITECTURE PC  
1326 5th Avenue #440  
Seattle WA 98101  
206 624-2365





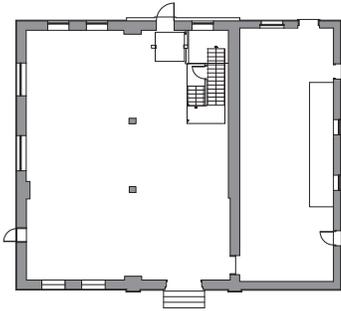




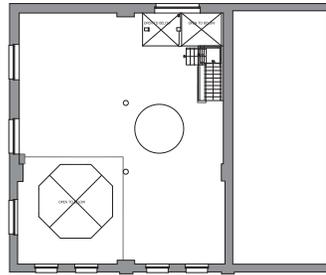
The potential project construction scope would include:

1. Temporary roof structure and new single membrane roofing. This would include new wood framing for the roof structure, new plywood sheathing, new coverboard, & new membrane.
2. Repair or replace existing copper roofing on top of tower.
3. Temporary window & door panels constructed of painted marine-grade plywood panels. These would be installed behind existing window & door frames and painted dark gray.

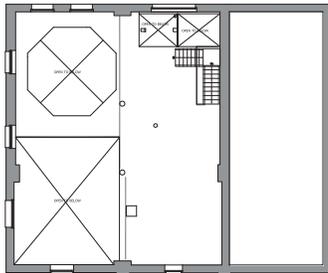
BASE SCOPE PLANS:



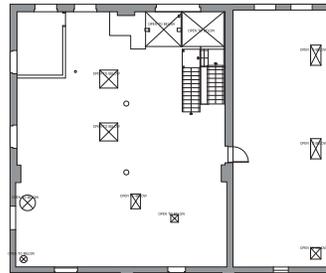
1ST FLOOR PLAN: Approx. 715 ft<sup>2</sup> open



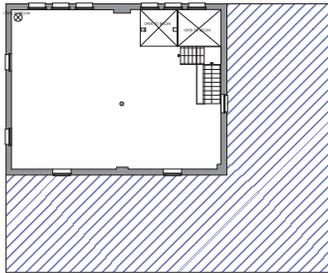
2ND FLOOR PLAN Approx. 400 ft<sup>2</sup> open



3RD FLOOR PLAN: Approx. 225 ft<sup>2</sup> open

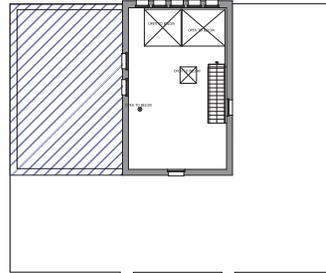


4TH FLOOR PLAN Approx. 535 ft<sup>2</sup> open



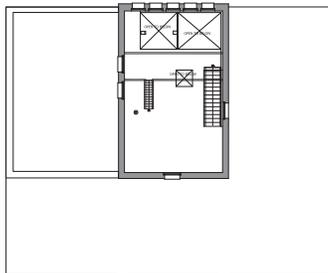
Roof Area: 1,925 ft<sup>2</sup>

5TH FLOOR PLAN: Approx. 455 ft<sup>2</sup> open

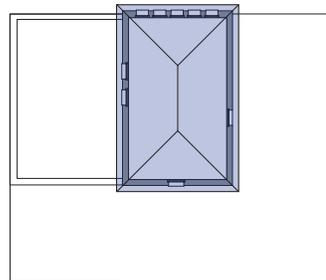


Roof Area: 760 ft<sup>2</sup>

6TH FLOOR PLAN Approx. 155 ft<sup>2</sup> open



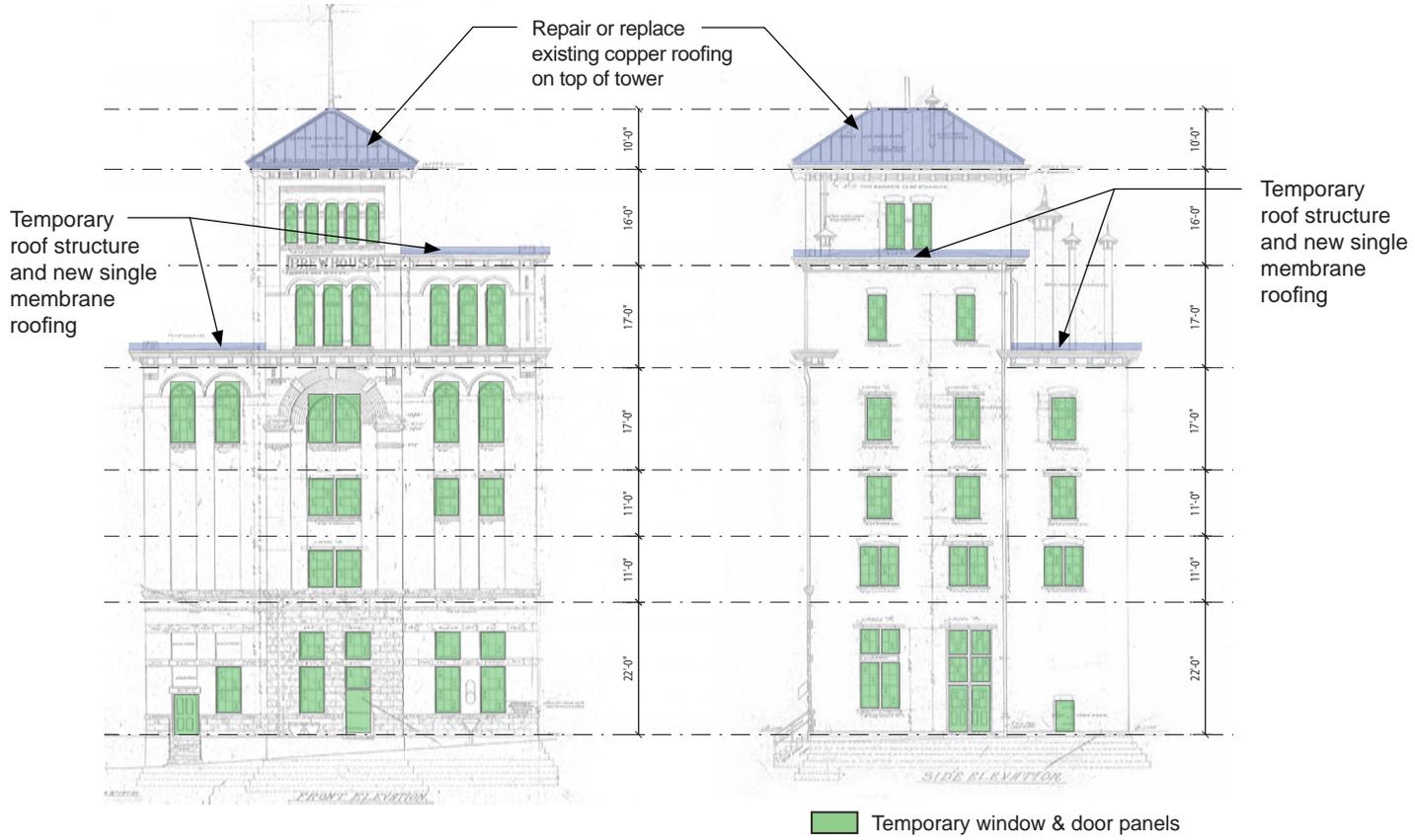
6TH MEZZANINE PLAN



Roof Area: 560 ft<sup>2</sup>

ROOF PLAN

BASE SCOPE ELEVATIONS:



BASE SCOPE COST:

Task	Quantity	Unit	Rate	Cost
1. Temporary roof structure and new single membrane roofing	2,300	SF	42.50	97,750
2. Repair or replace existing copper roofing on top of tower	560	SF	280.00	156,800
3. Temporary window & door panels constructed of painted marine-grade plywood panels	2,500	SF	8.50	21,250

Subtotal 275,800  
 20% Contingency 55,160  
 330,960

Field Requirements, Office Overhead & Profit, Bonds & Insurance, Mobilization at 28.5% 94,324

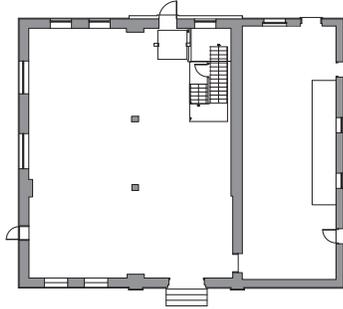
Total Recommended Base Budget 425,284

\*Construction costs based on DCW Cost Management's *Tumwater Brewery Comprehensive Study, December 22, 2014*

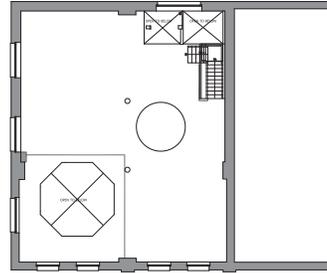
Additional potential project construction scope could include:

1. Exterior brick repair & replacement following historic preservation process and review.
2. Permanent roof structure following historic preservation process and review.
3. Permanent modified bitumen torch-down roofing following historic preservation process and review.
4. Minimal building ventilation including roof-mounted powered attic fans and low air intake (if necessary), to mitigate mold, mildew & rust.
5. Building cleanup & removal of hazardous elements.

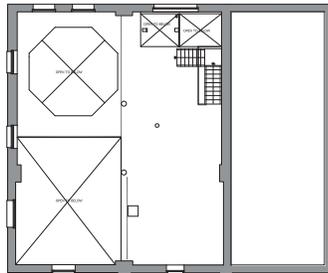
ADDITIVE SCOPE PLANS:



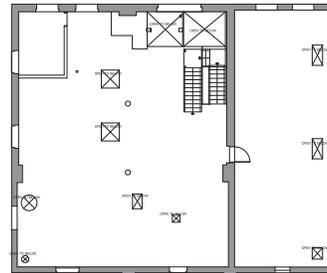
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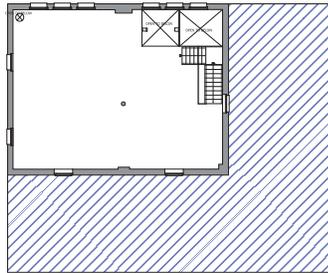
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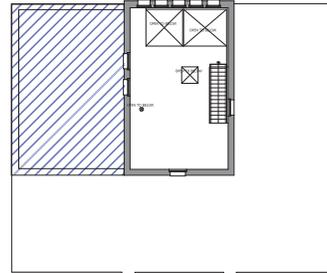


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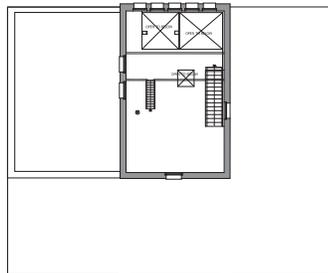
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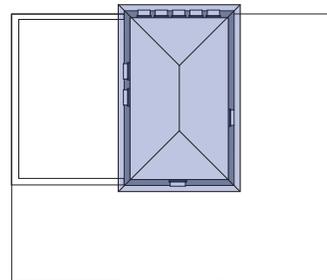


Roof Area: 760 ft<sup>2</sup>

6TH FLOOR PLAN Approx. 155 ft<sup>2</sup> open



6TH MEZZANINE PLAN



Roof Area: 560 ft<sup>2</sup>

ROOF PLAN

ADDITIVE SCOPE ELEVATIONS:



ADDITIVE SCOPE COST:

Task	Quantity	Unit	Rate	Cost	20% Contingency	28.5% Field Reqs, Office Overhead & Profit, Bonds & Insurance, Mobilization	Total
4. Exterior brick repair & replacement following historic preservation process and review	21,536	SF	22.00	473,792	94,758	162,037	730,587
5. Permanent roof structure and modified bitumen torch-down roofing following historic preservation process and review**	2,300	SF	51.00	117,300	23,460	40,117	180,877
6. Minimal building ventilation including a roof-mounted attic fans and low air intake (if necessary), to slow mold, mildew & rust	6	EA	500.00	3,000	600	1,026	4,626
7. Building cleanup & removal of hazardous elements	98,190	SF	2.50	245,475	49,095	83,952	378,522

Total Recommended Additive Budget 1,294,612.31  
 Total Recommended Base Budget 425,283.60  
 (-Task 1) 97,750.00

**Total Recommended Budget 1,622,145.91**

\*Construction costs based on DCW Cost Management's *Tumwater Brewery Comprehensive Study, December 22, 2014*

\*\*Task 5 would be used as an alternative to Task 1. Some seismic wall bracing might be required to provide minimal structural wall support.

The wall height vs. out-of-plane thickness ratio helps determine if the wall will be stable under seismic out-of-plane wall forces. Walls with high height-to-thickness ratios are more unstable and are prone to out-of-plane failure during earthquake ground motions. Out of plane wall failure can result in loss of support for floor and roof structure.

#### Summary of Findings and Building Retrofit Recommendations

Following is a summary of findings and retrofit recommendations based on our ASCE 41-13 evaluation of the Brewhouse building. Please see the schematic seismic retrofit plan and building elevations at the end of this report for a more detailed description of the recommended retrofit measures. Implied but not explicitly described or detailed is the need for restoration of the existing masonry walls including replacement of damaged or missing brick and repair and repointing of the masonry mortar joints. This work should be completed in conjunction with the recommended work outlined below.

- Portions of the building masonry wall structure have adequate strength to resist earthquake in-plane lateral load while other portions will require strengthening to resist lateral loads. Strengthening of existing walls can take the form of installation of steel braced frames or through the installation of a reinforced concrete facing to the wall. Steel braced frames would be installed on the interior of the building adjacent to the wall and portions of the steel framing would be bolted to the existing wall to deliver the wall lateral loads to the braced frames. For walls requiring a concrete facing, the concrete would be placed directly over the existing masonry at the interior of the wall. Steel reinforcing bar dowels would be drilled and epoxied into the masonry to anchor the wall to the reinforced concrete facing.
- Missing or damaged roof and floor diaphragms must be repaired in order for the existing masonry walls to have adequate wall out-of-plane bracing in these areas. In some areas of the building, we recommend infilling openings in existing floor diaphragms or adding floor diaphragm structure to limit the height of unsupported walls and reduce the potential for wall out-of-plane failure.
- Connections of existing framing to supporting masonry walls should be investigated further and existing connections strengthened where required. We observed that steel floor beams are pocketed into the supporting masonry walls but it is unclear how the members are anchored to the wall. Similarly, we observed wood roof beams pocketed into existing masonry walls. Some wood beams have steel strap ties with simple nail attachment to the wood beam and unknown attachment to the masonry. Under wall out-of-plane movement, beams that are not adequately anchored to the wall could pull free of the wall resulting in partial or total roof or floor collapse. Retrofit measures to strengthen beam anchorage could take the form of steel straps or angles that are bolted or welded to existing wood or steel members and epoxy-bolted to the masonry wall.

- The Brewhouse building is constructed on wood piles due to the presence of compressible or liquefiable soils beneath the building. Liquefiable soils are soils that are fully or partially saturated and that can lose strength under applied stress such as earthquake ground shaking. We believe that the soils under the building offer inadequate strength to transfer the building horizontal seismic forces at the foundation level. Further, we believe that the existing wood piles do not have adequate strength to resist both the vertical and horizontal foundation seismic forces. We recommend installing drilled micropiles at the foundation perimeter to mitigate the foundation deficiencies. Micropiles are small diameter drilled shafts with a central high strength reinforcing bar. The micropiles would be drilled to a depth sufficient to engage competent soils that are neither compressible nor liquefiable. A combination of straight and batter piles would be installed to resist the vertical and lateral seismic forces.
- Existing cast iron and steel framing, including beams and columns, shows signs of significant rust and deterioration. We recommend that the framing be thoroughly cleaned so that an evaluation of the extent of deterioration can be made. Existing members that have significant deterioration and loss of section may need to be strengthened or replaced. Other members with less deterioration should be thoroughly cleaned and treated with a rust converting coating to halt further deterioration.

### Limitations

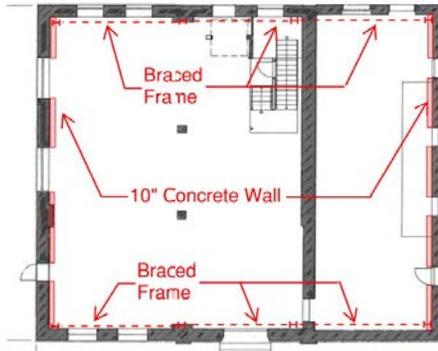
This study represents our opinions based on our site observations and a limited seismic evaluations using ASCE 41-13. Material properties have been assumed based on the original construction documents, our observations, and our experience with similar buildings. No testing of existing material has been performed. Our scope of work was limited to a seismic evaluation of the primary lateral force resisting system. No investigation of the vertical (gravity) load carrying capability of existing structure was undertaken other than to make visual observations of the condition of those elements.

We evaluated the building for the Life-Safety Performance Objective as defined by the *Seismic Evaluation and Retrofit of Existing Buildings* (ASCE 41-13). The Life-Safety level of performance is the standard performance objective for seismic retrofit of occupied, non-essential, buildings. It is also an appropriated level of performance for buildings that may not be occupied full time but will have visitors or occupants periodically. It is important to note that even when a building meets this objective, a design level earthquake may still cause injuries, and may still cause severe damaged to some or all of a building's structural elements. It is possible that the damage may be economically impractical to repair.

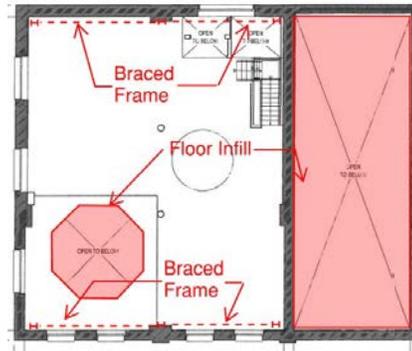
This report is intended for the sole use of Cardinal Architecture, PC and their Clients and consultants. The scope of services performed in the execution on this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or the findings and recommendations presented herein is at the sole risk of the said user.

# Tumwater Brewery Seismic Retrofit Plan

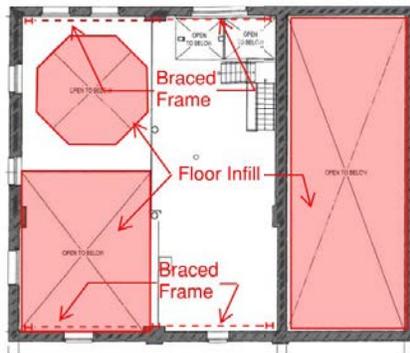
11/14/2014



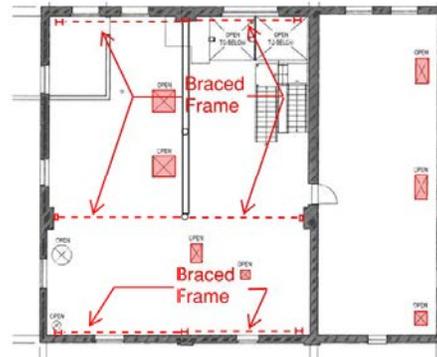
1st Floor



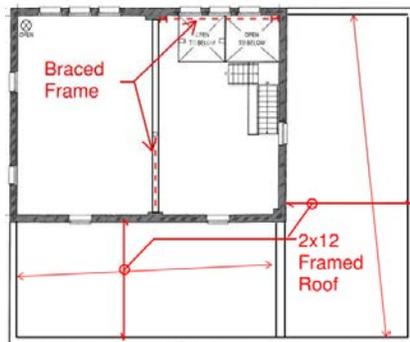
2nd Floor



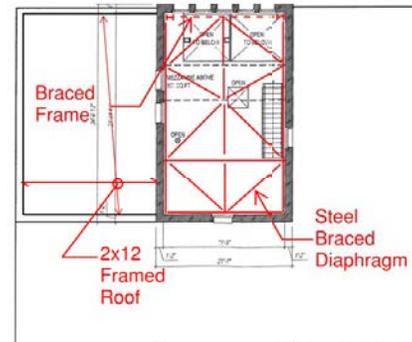
3rd Floor



4th Floor



5th Floor



6th Floor

# Tumwater Brewery Brew House Renovation North Elevation

South  
Elevation  
Similar

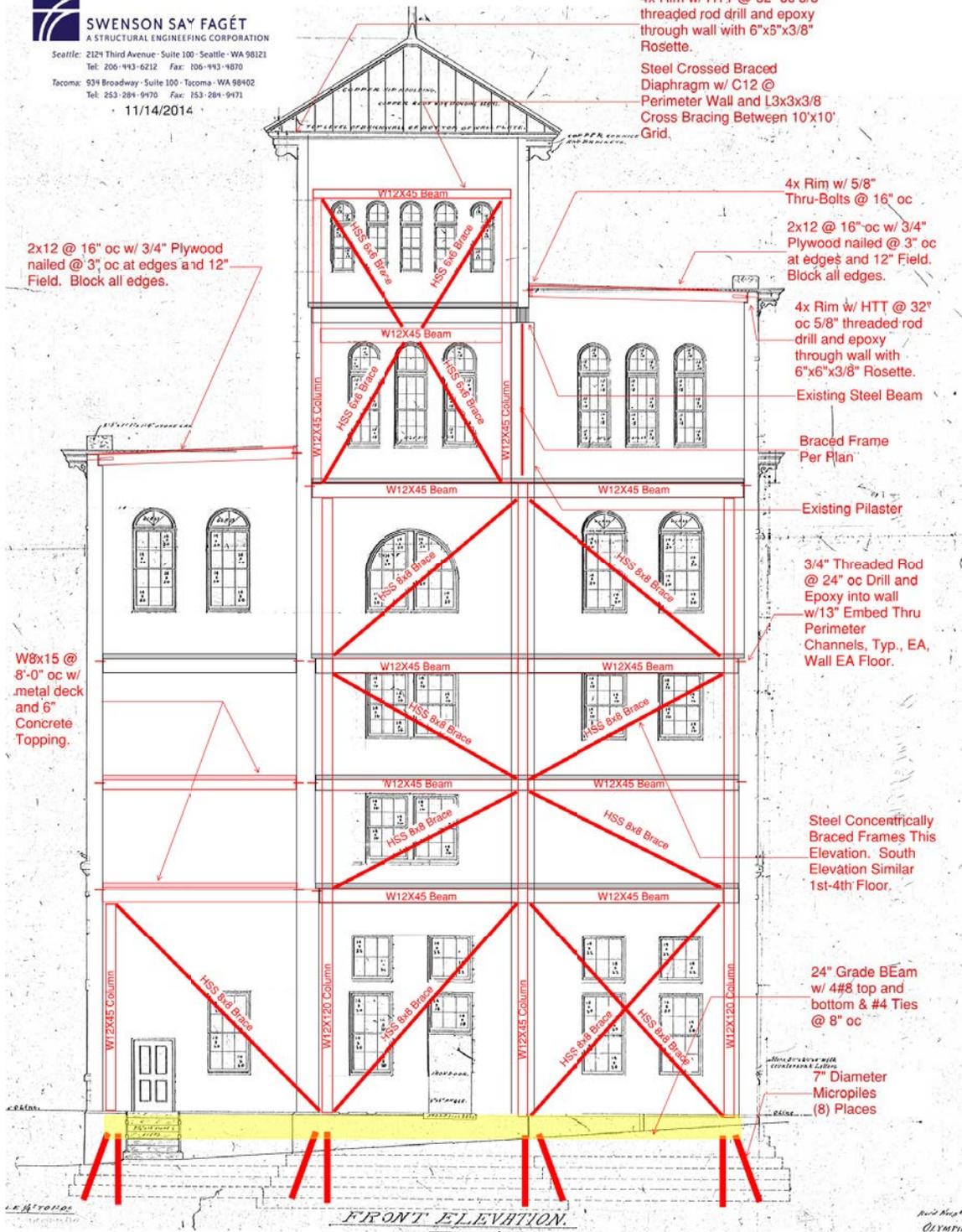


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Tacoma: 934 Broadway - Suite 100 - Tacoma - WA 98402  
Tel: 253-284-9470 Fax: 253-284-9471

11/14/2014



2x12 @ 16" oc w/ 3/4" Plywood  
nailed @ 3" oc at edges and 12"  
Field. Block all edges.

W8x15 @  
8'-0" oc w/  
metal deck  
and 6"  
Concrete  
Topping.

4x Rim w/ HTT @ 32" oc 5/8"  
threaded rod drill and epoxy  
through wall with 6"x5"x3/8"  
Rosette.

Steel Cross Braced  
Diaphragm w/ C12 @  
Perimeter Wall and L3x3x3/8  
Cross Bracing Between 10'x10'  
Grid.

4x Rim w/ 5/8"  
Thru-Bolts @ 16" oc

2x12 @ 16" oc w/ 3/4"  
Plywood nailed @ 3" oc  
at edges and 12" Field.  
Block all edges.

4x Rim w/ HTT @ 32"  
oc 5/8" threaded rod  
drill and epoxy  
through wall with  
6"x6"x3/8" Rosette.

Existing Steel Beam

Braced Frame  
Per Plan

Existing Pilaster

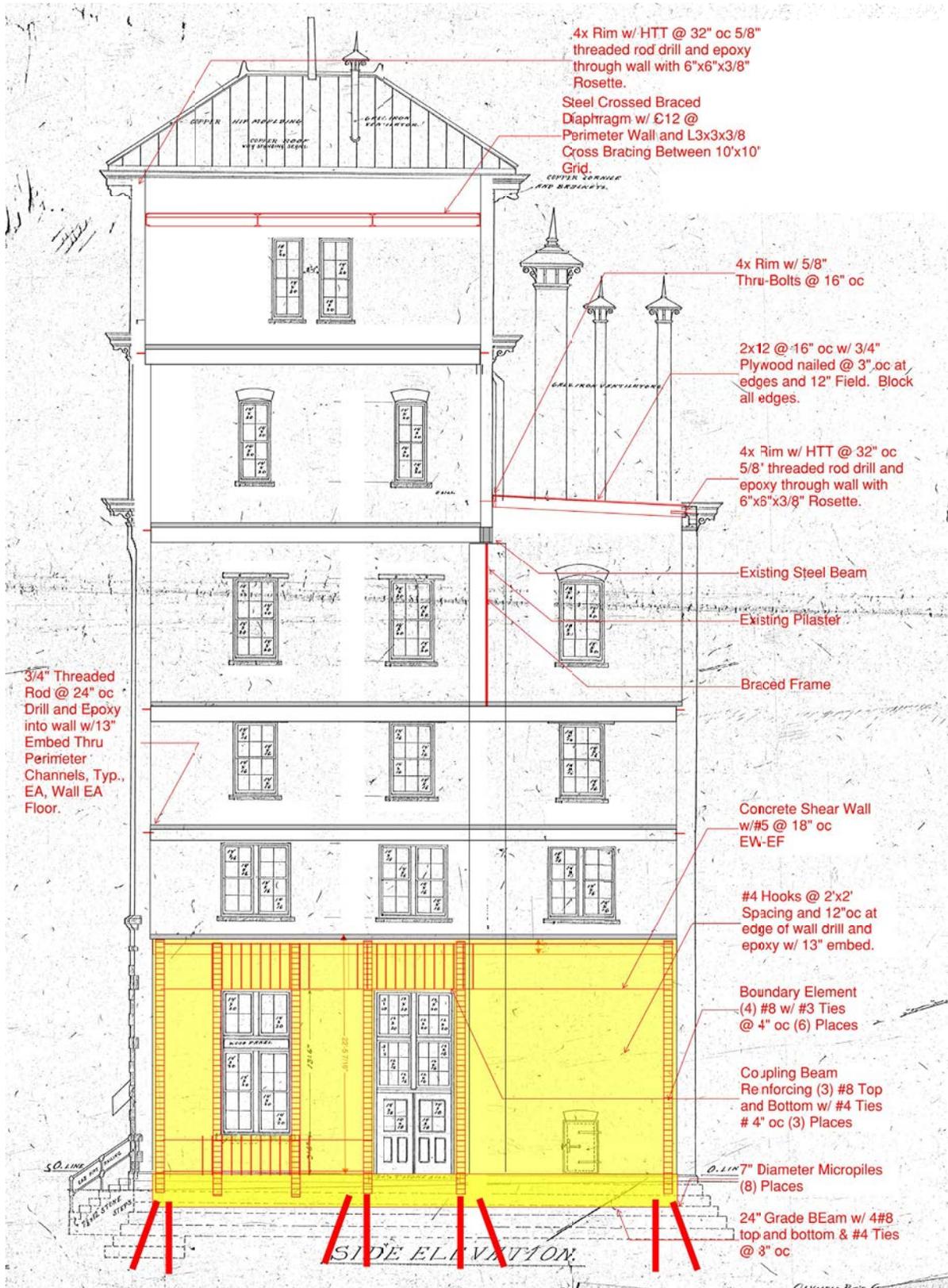
3/4" Threaded Rod  
@ 24" oc Drill and  
Epoxy into wall  
w/13" Embed Thru  
Perimeter  
Channels, Typ., EA,  
Wall EA Floor.

Steel Concentrically  
Braced Frames This  
Elevation. South  
Elevation Similar  
1st-4th Floor.

24" Grade BEam  
w/ 4#8 top and  
bottom & #4 Ties  
@ 8" oc

7" Diameter  
Micropiles  
(8) Places

FRONT ELEVATION.



# Tumwater Brewery Comprehensive Study

## Historic Brew House- Renovation Summary

		%	\$/SF	TOTAL	
		Gross Area:	9,819 SF		
A10	Foundations	1%	5.18	50,831	
A20	Basement Construction	0%	0.00	0	
<b>A</b>	<b>Substructure</b>	<b>1%</b>	<b>5.18</b>	<b>50,831</b>	
B10	Superstructure	3%	19.39	190,391	
B20	Exterior Enclosure	25%	146.60	1,439,469	
B30	Roofing	4%	22.06	216,600	
<b>B</b>	<b>Shell</b>	<b>32%</b>	<b>188.05</b>	<b>1,846,460</b>	
C10	Interior Construction	6%	32.57	319,837	
C20	Stairways	8%	47.36	465,000	
C30	Interior Finishes	5%	28.36	278,500	
<b>C</b>	<b>Interiors</b>	<b>19%</b>	<b>108.29</b>	<b>1,063,337</b>	
D10	Conveying Systems	0%	0.87	8,500	
D20	Plumbing Systems	0%	0.00	0	
D30	Heating, Ventilation & Air Conditioning	0%	0.00	0	
D40	Fire Protection	0%	0.00	0	
D50	Electrical Lighting, Power & Communications	6%	35.00	343,665	
<b>D</b>	<b>Services</b>	<b>6%</b>	<b>35.87</b>	<b>352,165</b>	
E10	Equipment	0%	0.00	0	
E20	Furnishings	0%	0.45	4,419	
<b>E</b>	<b>Equipment &amp; Furnishings</b>	<b>0%</b>	<b>0.45</b>	<b>4,419</b>	
F10	Special Construction	0%	0.00	0	
F20	Selective Demolition	4%	25.00	245,475	
<b>F</b>	<b>Special Construction &amp; Demolition</b>	<b>4%</b>	<b>25.00</b>	<b>245,475</b>	
<b>BUILDING ELEMENTAL COST BEFORE CONTINGENCIES</b>		<b>63%</b>	<b>362.84</b>	<b>3,562,686</b>	
Z10	Contingency	20.00%	13%	72.57	712,537
<b>BUILDING ELEMENTAL COST INCLUDING CONTINGENCIES</b>		<b>75%</b>	<b>435.40</b>	<b>4,275,224</b>	
Z21	Field Requirements	9.00%	7%	39.19	384,770
Z22	Office Overhead & Profit	6.00%	5%	28.48	279,600
Z23	Bonds and Insurance	2.00%	2%	10.06	98,792
Z24	Mobilization	9.00%	8%	46.18	453,455
<b>BUILDING CONSTRUCTION COST BEFORE ESCALATION</b>		<b>97%</b>	<b>559.31</b>	<b>5,491,840</b>	
Z30	Escalation to Start Date (Jun 2015)	3.50%	3%	19.58	192,214
<b>RECOMMENDED BUDGET</b>		<b>100%</b>	<b>578.88</b>	<b>5,684,054</b>	





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5 April 2016

  
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