Exhibit A

kpff
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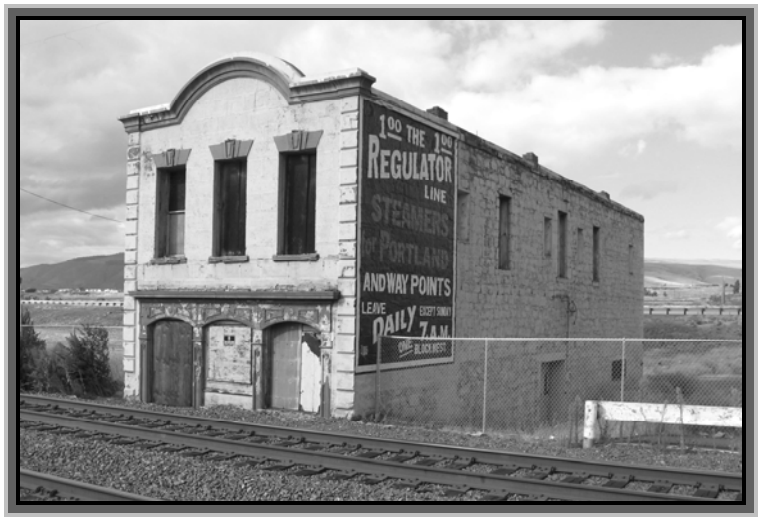
Waldron Drug Store Building
The Dalles, Oregon

ASCE-31 Structrual Evaluation



Submitted to:

City of The Dalles
313 Court Street
The Dalles, Oregon 97058

Submitted by:

KPFF Consulting Engineers
111 SW Fifth Avenue Suite 2500
Portland, Oregon 97204

KPFF PROJECT NO. 207704.10
April 2009

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kpff
Consulting Engineers

Waldron Drug Store Building
The Dalles, Oregon

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INTRODUCTION

The Waldron Drug Store building is located on the north side of the Union Pacific Railroad tracks near the intersection of East First Street and Washington Street in The Dalles, Oregon. KPFF Consulting Engineers was retained to perform a seismic screening evaluation along with a general gravity load capacity and condition assessment of the building.

The building was constructed in 1867. It originally housed a drug store and newspaper, and has since had various tenants, but has been unoccupied for a number of years. The structure is built with stone exterior walls, sandstone above grade and a stone similar to basalt (diabase) below grade. Interior framing consists of wood posts, girders, joists and deck. It measures approximately 23 feet by 80 feet at the exterior. It appears that the original building had two levels above grade and a basement, with a level added that split the first story. In the 1880s, East First Street was raised, to address flooding problems in the area and the building of new railroad tracks. Presumably at that time the additional level inside was added to provide an entrance at street level (as seen in Photo 1).

EXECUTIVE SUMMARY

An American Society of Civil Engineers (ASCE) 31-03, *Seismic Evaluation of Existing Buildings*, Life Safety Performance Level, Tier 1 Screening Phase, evaluation of the building was performed. ASCE 31 classifies buildings based on their construction type and provides investigative requirements applicable to each classification. The Waldron Drug Store Building falls under Building Type URM (Unreinforced Masonry Bearing Walls with Flexible Diaphragms). Additionally, based on the National Earthquake Hazards Reduction Program (NEHRP) seismic mapping, the site is classified as a Moderate Level of Seismicity. These criteria dictate the required ASCE 31 Tier 1 Checklists, which are included later in the report. The building is not considered within a flood zone based on the Flood Insurance Rate Map for the locale (map attached at the end of the General Summary and Recommendations).

The evaluation is based on one site visit – there are no existing drawings for the building. The ASCE 31 evaluation indicates that there are several deficiencies in the building lateral system. The exterior walls are massive, unreinforced stone, with no connection to the floor diaphragms. The north and south ends have a high percentage of openings, which leads to overstress in the walls if they are relied upon to resist in-plane seismic forces. With no reinforcing, this could result in a failure with no ductility. The diaphragms are straight sheathing, with insufficient capacity to resist the seismic forces induced by the mass of the stone walls. Two new shear walls are recommended, as well as reinforcement of the diaphragms and anchorage of the walls to the diaphragms. Current Oregon building codes may not require seismic upgrading of a historic structure. Further discussion of these options is contained in the General Summary and Recommendations section of this report.

There is also significant deterioration of the gravity load-supporting capability of the exterior walls. While the walls have considerable thickness, the stone has deteriorated, substantially in some areas, and the mortar is in generally poor condition. There are areas of the wood framing where water infiltration has led to deterioration, including the base of all of the columns, and there is a portion of the Second Floor that suffered fire damage that was not completely repaired. Repairs to the deteriorated and fire-damaged framing will be required as part of the building rehabilitation.

During the site visit Peter Meijer Architects evaluated the condition of the exterior stone walls, windows and metal features of the building. The evaluation included removing samples of mortar along with two stone samples that were sent away for laboratory testing. Details of those evaluations are contained in Attachment A. The above-grade stone was found to be a poorly cemented sandstone susceptible to decay from exposure to wetting, currently in fair to poor condition. The above-grade mortar is generally in poor condition, typically in a powdery condition for at least several inches in depth. Local repairs to the stone and applying a penetrating epoxy-based coating, as well as remortaring the joints, is recommended.

There was limited access to the exterior windows, having been boarded up on the inside. They do not appear to be original. Further survey is recommended to verify the degree of deterioration if restoration is desired.

The decorative cast iron at the south façade appears to be in relatively good condition, except for the decorative transom, which has suffered significant deterioration. The parapet coping is corroded and dislodged in places and should be replaced.

The south face of the building is approximately 12 feet from the centerline of the north Union Pacific Railroad (UPRR) track. The standard distance from centerline track to a structure required by the railroad is 25 feet without providing a crash wall. If this clearance is to be maintained relative to occupied building space, an alternative to address this would be to provide a new interior shear wall at the 25-foot location (approximately 13 feet north of the exterior face of the south wall), and leave that southern portion of the building unoccupied, but with the historic façade refinished and intact. Detailing around the new shear wall would need to provide for losing the southern portion of the building without allowing collapse of any portion north of the new wall. This scheme could also be used if the clearance requirement must be met and only gravity repairs are pursued.

The level referred to as the Mezzanine is not original, but was added to address the raised East First Street. The clear height from floor to ceiling in this level is only 6'-0", making it impractical for future use. The proposals in this report are based on the assumption that this level will be removed.

Summary of Recommended Strengthening Measures

Refer also to the drawings attached to this report for layout of these recommended strengthening measures.

Seismic strengthening required to meet Life Safety performance level:

- Add an interior concrete shear wall at the north end, including rock anchors.
- Add light gage sheet metal to the Second Floor and Roof to reinforce those diaphragms. Cover with ½" plywood.
- Add tension ties between the exterior stone wall and the wood joists and/or diaphragm at each level. Ties at approximately 32" on center.
- Add continuous steel angle chord ties along west and east walls at the Second Floor and Roof levels.
- Add bracing for the south parapet extension above the roof line.

Repairs required for occupancy:

- Add an interior concrete shear wall approximately 13 feet north of the south end of the building, including rock anchors. Note that this will require reconfiguring the exit stair to the Second Floor. This wall would also serve to provide 25-foot separation to the railroad tracks.

- Remortar all deteriorated stone wall joints. Remortaring should extend a minimum of 6 inches into the wall or to sound mortar, both faces of the wall.
- Replace or repair areas of extensively decayed stone.
- Apply a penetrating epoxy to the outside surfaces of the above grade stone walls. Note that this will require removing the existing murals.
- Epoxy grout cracks in the stone walls.
- Repair bases of the timber columns in the basement, included providing code-required standoff to concrete.
- Repair first floor joist end bearings along the east wall in the vicinity of the east entry.
- Repair joist end bearings along portions of the west wall and northwest corner at each level.
- Repair fire damaged joists and decking.
- At the south end of the building, apply waterproofing to the exterior face of the below-grade portions of the east and west sandstone walls.
- Add a concrete retaining wall at the south end from the First Floor to existing exterior grade.
- Replace windows, as required, and parapet coping.

A cost estimate for the work outlined above is attached at the end of this report. The estimate for performing all work is $780,000, including professional design services and additional material testing. The portion of this cost associated with the seismic upgrade work is $116,000.

SCOPE

The City of The Dalles, Oregon, retained KPFF Consulting Engineers, Inc., to conduct an ASCE 31-03, *Seismic Evaluation of Existing Buildings*, Tier 1 seismic evaluation of the Waldron Drug Store Building. KPFF retained a specialty consultant, Peter Meijer Architects, LLC (PMA), to assist in evaluating the exterior stone walls, windows, and metal features.

This evaluation included a one-day visual reconnaissance of the building including limited material testing by sounding and prodding. PMA performed a similar review of the stone walls and removed two stone samples for laboratory testing to determine their physical properties and the possible existence of lithotrophic (stone) bacteria. There are no existing construction drawings for the building. Existing mechanical and electrical utilities inside the building were not reviewed in detail considering that there is no remaining equipment and the existing systems will likely need to be replaced for future use of the building. Utility services into and out of the building also were not investigated (none are currently active).

Based on the evaluation, recommendations have been made for reinforcing the seismic force resisting system, as well as repairs to the gravity load resisting elements, including the exterior walls. Recommendations are also made regarding the existing windows and metal work.

Observations, analyses, conclusions and recommendations contained in this report reflect our best engineering judgment. Concealed problems with the construction of the building may exist that cannot be revealed through our review. KPFF, therefore, can in no way warrant or guarantee the condition of the existing construction of the buildings, the building site, and future building performance.

OBSERVATIONS

Document Review

There are no existing building drawings. Limited information has been found regarding the history of the structure. Additional information on the history of this area along First Street can be found in the report by Archaeological Investigations Northwest, Inc. for the Riverfront Connection Project, titled *The Dalles Riverfront Connection Archaeological and Historic Resource Surveys, Wasco County, Oregon*.

General Structural Observations

The Waldron Drug Store Building is approximately 80'-4" north-south by 23'-6' east-west, exterior plan dimensions, with approximately 1550 square feet interior floor space on each level. The construction is exterior, unreinforced stone bearing walls with interior timber framing and straight-sheathed floor diaphragms. The exterior stone is approximately 2'-4" thick below grade and approximately 1'-8" thick above grade. There is one below-grade basement level with three current levels above grade. The level referred to in this report as the Mezzanine Level appears to have been added after the original building was constructed.

Site Reconnaissance

A site visit was conducted on December 29, 2008. Three KPFF representatives reviewed the overall condition of the building and, in particular, the gravity and seismic components. PMA reviewed the exterior stone walls, windows, and metal work. PMA's findings are described in their report included as Attachment A. City workers assisted with the lift on a utility truck to provide access to the roof and upper exterior wall, and by excavating to the exterior foundation with a backhoe. The scope of this visit was to evaluate the structure exposed to view and note signs of deterioration or other distress, as well as the general dimensions and construction of the building. No attempts were made to perform material testing or exploratory demolition other than as noted in this report and PMA's report in Attachment A.

The exterior stone walls are addressed in detail in PMA's report in Attachment A. The sandstone shows significant deterioration in general and in some locations large pieces are spalling off (Photo 5). The diabase stone comprising the basement walls appears to be in much better condition, as would be expected. The mortar is in poor condition and can readily be scraped out to substantial depth. In many areas, a small berm of fallen mortar can be seen along the base of the wall. There are a few significant cracks in the stone wall (Photo 6) as described in further detail in Attachment A. These cracks appear to be from minor movement or swelling and contraction, commonly seen to some degree in masonry or stone structures, and do not appear to be a serious concern if repaired and other precautions, e.g. sealing the stone against moisture, are taken. The original grade was level around the entire building, but the grade around the south end of the building was raised (circa 1882) to approximately 7 feet higher than the First Floor. The bottom of the windows and doors at the south end, below this revised grade, were infilled with concrete.

The backhoe appeared to reach hard rock at the elevation of the bottom of the wall, so it is assumed that the building is supported on bedrock. The soil was saturated and unstable, and would have required an extensive excavation to investigate further. This will need to be verified by a geotechnical investigation prior to design of any seismic upgrades.

The basement has a clear height of approximately 7'-0" to the underside of the floor joists. A line of timber columns, varying from 4'-0" to 10'-3" on center, run near the center of the space, supporting a nominal 8"x 8" beam line (Photo 7). The floor joists of the first floor at the south end are 3" x 12" (actual dimensions unless noted otherwise) whereas the joists at the north end are 2½"x 13½", all at 16" on center. The deck is straight shiplap sheathing. The columns sit on the basement slab with no standoff, which has resulted in deterioration of the bottoms (Photo 8). Several joist end bearings have been subjected to moisture, particularly near the east entrance and the northwest corner, resulting in deterioration, and associated settling, in these areas (Photo 9). Elsewhere, the wood appears to be in good condition. Construction is typical of the era, with no supplemental connectors, including no attachment of the joists or diaphragm to the exterior walls. The south wall has a hole roughly 2 foot square of unknown origin.

The First Floor has a clear height of approximately 7'-4" to the existing ceiling (less under the existing north-south beam). The current ceiling is the underside of an interstitial floor, referred to as the Mezzanine Level in this report, that was probably added when East First Street was raised and the new street entry at the south entry became half-way between existing floors. Columns ranging from 8 feet to 10 feet on center support the Mezzanine above (Photo 10), except at the south end where the Mezzanine is lower, columns are located at several feet on center each way. The Mezzanine deck is 3x members laid flat, spanning from 3x posts and beams tight against the exterior walls to the central beam line. There is no tie between the diaphragm and the exterior walls. The ten foot span in line with the east door is headed with upturned steel to maintain a higher head height. There is an area at the northwest corner and along the west wall that appears to have significant deterioration at all levels (Photo 11). The roof drains toward this corner of the building and a portion of the parapet coping has come off along this wall, allowing water leakage into the building. Most of the ceiling and walls are covered with finishes; however, except for the areas noted, there are no obvious signs of significant deterioration of the framing.

The existing Mezzanine Level is split between two levels. The southern approximately 13 feet is 1'-8" lower than the remainder, and the small landing to the exterior southwest door is another 10 inches lower. The level is accessed from the First Floor by a stair with very narrow, approximately 7 inches wide, treads. At the east side of this lower Mezzanine Level, there is a ramp up to the main level. The Second Floor structure above consists of 1¾" x 11½" joists at 16" on center with straight shiplap sheathing. There is no tie between the diaphragm and the exterior walls. The joists span across a central beam that is supported on columns aligning with those below. This level has suffered fire damage over a substantial portion of the north end. There are small areas that have received some repair; however there remains numerous joists and flooring with significant section loss. The main girder has fire damage, although not as severe as many of the joists (appeared to be limited to <1/8" deep). Again, the northwest corner and a length of the west wall has suffered deterioration from water (Photo 12).

The Second Floor has a clear height of approximately 10'-0" to the existing ceiling. The floor is partitioned off into several rooms – apparently living quarters along with bath and cooking facilities. A corridor runs along the west wall from the stairway at the southwest corner. The entire space has a lath and plaster ceiling, so the access to view the roof framing was limited to one access panel above the bathroom and one area of local demolition. The ceiling joists span between exterior walls and are 2" x 10" at 16" on center. These in turn support the roof joists, which are 2" x 5¾" at 32" on center, and form a roof that drains from the southeast to the northwest (Photo 13). The roof joists are supported by the ceiling joists at approximate ¼-points, including the ends (the roof joists do not bear on the exterior stone walls), with a space between that varies, but is roughly one foot high (Photo 14). The roof is again straight shiplap sheathing. There is no tie between the diaphragm and the exterior walls. Access to the northwest corner was not available; however, it has been exposed to

water as at the other levels and would be expected to have significant deterioration. The plaster ceiling along much of the west wall has deteriorated and fallen off due to this water (Photo 15).

The parapet is typically quite low, except for the south façade where the unreinforced stone extends approximately 5 feet above the roof line (Photo 16).

Refer to the included report *Exterior Building Assessment*, by Peter Meijer Architects, LLC, for additional information on the stone, windows, and metal work.

STRUCTURAL EVALUATIONS

The Waldron Drug Store Building was evaluated for an ASCE 31-03, *Seismic Evaluation of Buildings,* Tier 1 screening, Life Safety Performance Level. The three Tiers addressed in ASCE 31-03 are as follows:

> *Tier 1- Screening Phase*: This level includes completing checklists for the structure, foundations, and non-structural items. During this phase, a review is performed utilizing any available construction documents. In addition to the construction plans, a site visit is made to assess the condition for the existing structure for deterioration of the structure and finishes, and compare the existing structure to the information provided in the construction documents (if available). The Tier 1 checklists are attached to this report.
>
> *Tier 2- Evaluation Phase*: This level includes linear static, linear dynamic, and special analysis procedures. For buildings types not requiring a full Tier 2 evaluation, this phase analyses non-compliant elements from Tier 1 utilizing a simplified static analysis approach. A full Tier 2 evaluation is not required for URM building evaluated for Life Safety Performance Level.
>
> *Tier 3- Detailed Evaluation Phase*: This level provides more detailed methods and available codes for evaluating the structure and components. This Tier is not used for a Tier 1 evaluation.

The two design performance levels are defined as:

> Life Safety Performance Level: This level evaluates both structural and non-structural building components during a design earthquake such that:
>
> (a) partial or total structural collapse does not occur, and
> (b) damage to nonstructural components is non-life-threatening.
>
> Immediate Occupancy Performance Level: This level evaluates both structural and non-structural building components during a design earthquake such that:
>
> (a) the damage is not life-threatening, so as to permit immediate occupancy of the building after a design earthquake, and
> (b) the damage is repairable while the building is occupied.

When analyzing a building, the total seismic force, also known as the base shear, of the building is calculated using a static analysis. This calculation is based on a formula that utilizes geographic seismicity, mass of the building, stiffness, and structural building type. The base shear is then distributed to each level of the structure based on a weighted proportion of each level's mass and height above the ground. These forces are then used to evaluate the structural elements in the building. The proposed option of reinforcing the diaphragm with sheet

metal appears to be a practical alternative for this situation and would be calculated to give the desired performance; however, it is not a codified method. This method would be utilizing the clause for historic buildings that repairs "may be made without conformance to all the requirements of this code" as explained further in the General Summary and Recommendations section of this report.

Gravity load design of the timber framing is based on the 2005 National Design Specification for Wood Construction. Wood in historic structures is generally of high quality, and this evaluation considered the existing wood as Select Structural quality.

GENERAL SUMMARY AND RECOMMENDATIONS

As noted above, the Waldron Drug Store Building presently has deficiencies that could result in localized hazard, or partial or total collapse of the structure in a major seismic event. The gravity system has suffered deterioration from exposure to the elements and will require repairs, as noted, prior to future occupancy. Following is a summary of the recommended remediations. Refer also to the attached plans for a layout of the recommended strengthening measures. Refer also to PMA's report in Attachment A for further details of the stone, including additional testing needed to verify the long-term effect of the current saturated condition of the stone, windows and metal work.

Seismic strengthening required to meet Life Safety performance level:

- Add an interior concrete shear wall at the north end, including rock anchors.
    - Add a 12-inch thick reinforced concrete shear wall extending between the window and door opening (or full width). The wall would extend full width at the basement level and be anchored into the basalt bedrock with two rock anchors at each end. From First Floor to Roof, the wall would extend between the existing window openings; alternatively, could extend full width. Note that with the four-inch offset in the stone wall from below grade to above grade, the concrete wall above will be four inches thicker. This space could be either thickened wall or filled with insulation.
- Add light gage sheet metal to the Second Floor and Roof to reinforce those diaphragms. Cover with ½" plywood.
    - The second Floor and Roof diaphragms would be reinforced with 18-gage sheet metal screwed to the existing framing. The sheet metal would be covered with plywood. This work would require removal of the interior partitions at the second floor. An alternative at the Second Floor would be a concrete diaphragm approximately four inches thick. This would require additional columns or reinforcing the north-south girder for the additional weight.
- Add tension ties between the exterior stone wall and the wood joists and/or diaphragm at each level. Ties at approximately 32" on center.
    - Rods, epoxy anchored into the stone and connected to the timber joists. To resist out-of-plane seismic loads of the walls.
- Add continuous steel angle chord ties along west and east walls at the Second Floor and Roof levels.
    - Approximately 8 plf steel angle. Nominal epoxy rod anchorage to the stone walls. Attached to the diaphragm reinforcing to develop the diaphragm shear capacity.
- Add bracing for the south parapet extension above the roof line.
    - Add diagonal braces from near the top of the high parapet to the roof framing to resist out-of-plane seismic forces.

Repairs required for occupancy:

- Add an interior concrete shear wall approximately 13 feet north of the south end of the building, including rock anchors. Note that this will require reconfiguring the exit stair to the Second Floor.
    - Add a 12-inch thick reinforced concrete shear wall extending full width and full height of the building. The wall would be anchored into the basalt bedrock with two rock anchors at each end. This wall would also serve to provide 25-foot clearance from the centerline of the railroad tracks to occupied building space.
- Remortar all deteriorated stone wall joints.
    - Remortaring should extend a minimum of 6 inches into the wall or to sound mortar, both faces of the wall. This will require removing interior finishes from the walls.
- Replace or repair areas of extensively decayed stone.
    - Repair by replacing stone or with patching mortar to match the existing stone. Refer to Attachment A for additional information.
- Apply a penetrating epoxy to the outside surfaces of the above grade stone walls.
    - To prevent further deterioration and strengthen the currently deteriorating surfaces. Refer to Attachment A for additional information. Note that this will require removing the existing murals.
- Epoxy grout cracks in the stone walls.
    - Clean cracks as required to allow proper bonding. Seal and pressure inject cracks to reinforce and prevent water infiltration.
- Repair bases of the timber columns in the basement, included providing code-required standoff to concrete.
    - Shore, cut off base of column, attach metal post base with standoff, fill space between post base and floor with concrete plinth (approximately 4” to 6” high).
- Repair of first floor joist end bearings along the east wall in the vicinity of the east entry.
    - Jack floor where settled, replace deteriorated 2x4 bearing plate with preservative treated 2x4 plate, cut off deteriorated portion of joists, add strongback joist, nominal 3x12, spanning from wall to center girder bearing.
- Repair joist end bearings along portions along the west wall and northwest corner at each level.
    - Similar to repair along east wall noted above.
- Repair fire damaged joists and decking.
    - Replace decking where significant damage exists with new straight decking or plywood of the same thickness. Replace or strongback joists where more than 1/4" thickness has been lost on any side.
- Apply waterproofing to the exterior face of the buried sandstone at the south end of the building.
    - Provide temporary shoring parallel to the tracks to allow excavation down to the First Floor level along the east and west walls at the south end. Apply waterproofing to the exterior sandstone face to prevent continued water infiltration and deterioration.
- Add concrete retaining wall at the First Floor, south wall.
    - New retaining wall from floor level up to approximately 7 feet to provide support if the south wall retaining structure deteriorates further, as it is not readily accessible to waterproof or reinforce on the south face due to the close railroad tracks.
- Replace windows, as required, and parapet coping.

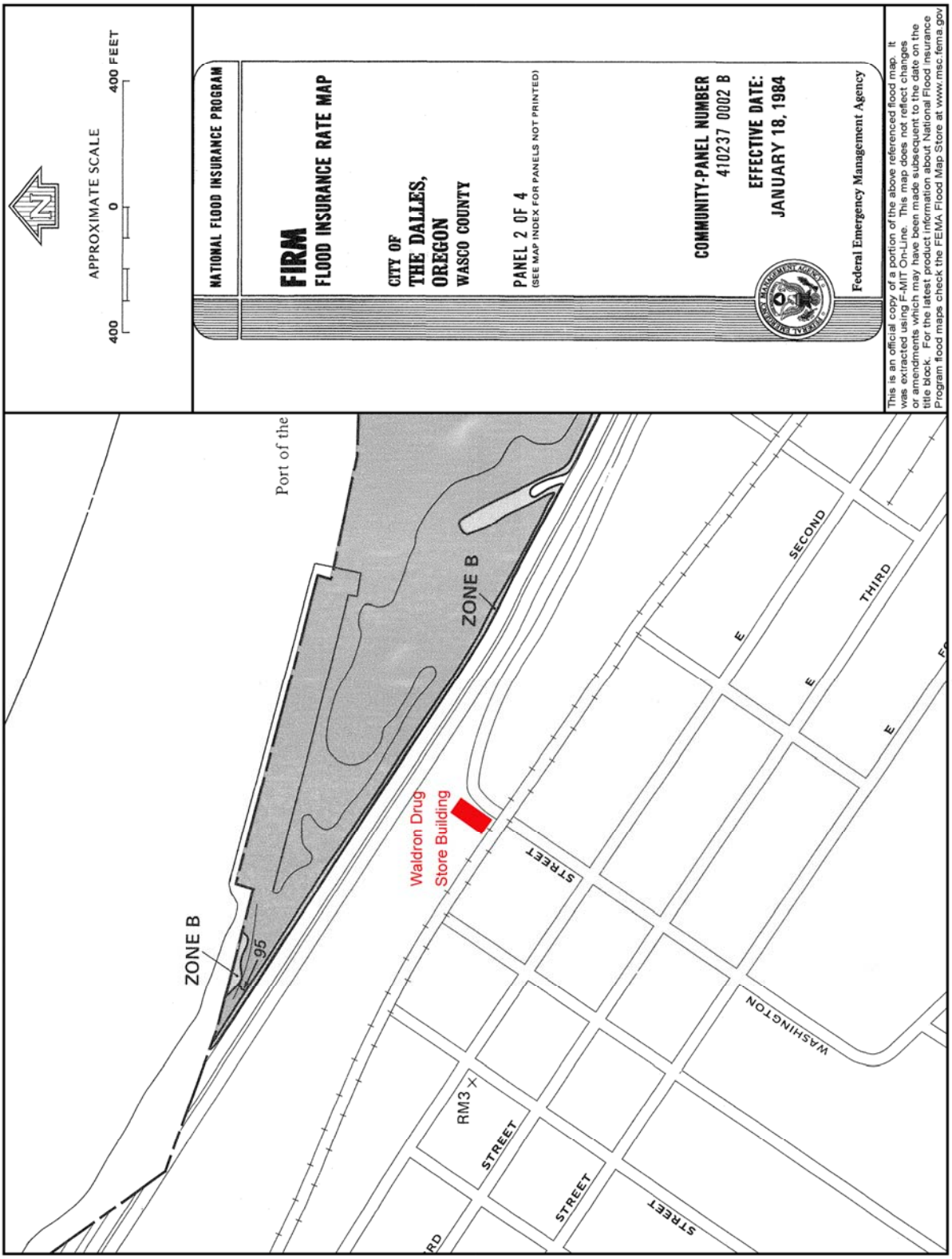
- Depending on the Code-required design load for the final use of the Second Floor, the fire damaged girder may require reinforcing

Attached to this report is a cost estimate for the measures above, including professional design services and additional material testing fees.

ASCE 31, Tier 1 Evaluation, is a screening tool to quickly identify the general seismic performance of an existing building. The current governing structural building code in the state of Oregon is the 2007 Oregon Structural Specialty Code (OSSC), based on the 2006 International Building Code (IBC). The OSSC, Section 3407 – *Historic Buildings*, states (with comments added in italics):

> 3407.1 Historic buildings. Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of a building or structure may be made without conformance to all the requirements of this code when authorized by the building official, provided:
>
> 1. The building or structure has been designated by official action of the legally constituted authority or this jurisdiction as having special historical or architectural significance. *(We understand the building is designated "Historical").*
> 2. Any unsafe conditions as described in this code are corrected. *(This would include correcting deficiencies and deterioration of gravity load supporting elements. See "Gravity strengthening required for occupancy" under the Executive Summary above).*
> 3. The restored building or structure will be no more hazardous based on life safety, fire safety and sanitation than the existing building. *(No structural weakening is anticipated. This also includes exiting, which will require design and approval for revising the exiting from the Second Floor if the recommended interior south shear wall location is used).*
> 4. The building official seeks the advice of the State of Oregon historic preservation officer. *(Required action by the City of The Dalles).*

The above information is to present the alternatives that the City of The Dalles may have at their disposal. KPFF's scope is to present objective engineering information and is not to take positions on social, political or economic decisions relating to the potential hazards and remedies for this building.


APPROXIMATE SCALE
400
0
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NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CITY OF
THE DALLES,
OREGON
WASCO COUNTY
PANEL 2 OF 4
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
410237 0002 B
EFFECTIVE DATE:
JANUARY 18, 1984
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov
Port of the
ZONE B
95
ZONE B
Waldron Drug
Store Building
STREET
RM3
STREET
STREET
STREET
WASHINGTON
SECOND
THIRD

Summary Data Sheet

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DATA SUMMARY SHEET

BUILDING DATA

Building Name:	Waldron Drug Store Buillding			Date:	February 2009
Building Address:	East First Street and Washington Street				
Latitude:	45°36'8.2"N	Longitude:	121°10'52.2"W	By:	PRW
Year Built:	1867	Year(s) Remodeled:	1880s, other ?	Original Design Code:	None
Area (sf):	1840 /floor	Length (ft):	80'	Width (ft):	23'
No. Stories	2*	Story Height:	~ 8'/15'/12.5'	Total Height:	30' (w/par.)

Use ☐ Industrial ☐ Office ☐ Warehouse ☐ Hospital ☐ Residential ☐ Educational ☒ Other: Unoccupied

CONSTRUCTION DATA

Gravity Load Structural System:	Wood framed with exterior stone walls		
Exterior Transverse Walls:	Stone (basaltic sandstone)	Openings:	
Exterior Longitudinal Walls:	Stone (basaltic sandstone)	Openings:	
Roof Materials/Framing:	Wood (assumed select structural)		
Intermediate Floors/Framing:	Wood (assumed select structural)		
Ground Floor:	Wood (assumed select structural)		
Columns:	Wood (assumed select structural)	Foundation:	Appears to bear on basalt bedrock
General Condition of Structure:	Fair to poor		
Levels Below Grade:	1 (with diabase stone perimeter walls)		
Special Features and Comments:	*Mezzanine Floor (~6'-0" clear) added, probably when 1st street was raised (circa 1882). Presently has basement, 1st, Mezzanine, 2nd and Roof.		

LATERAL-FORCE-RESISTING SYSTEM

	Longitudinal	Transverse
System:	Shear walls	Shear walls
Vertical Elements:	Stone exterior walls	Stone exterior walls
Diaphragms:	Wood straight sheathing	Wood straight sheathing
Connections:	Diaphragm nails, none to shear walls	Diaphragm nails, none to shear walls

EVALUATION DATA

Spectral Response Accelerations:	S_S =	0.474	S_1 =	0.173		
Soil Factors:	Class =	B	F_a =	1.0	F_v =	1.0
Design Spectral Response Accelerations:	S_{DS} =	0.316	S_{D1} =	0.115		
Level of Seismicity:		Moderate	Performance Level:	Life safety		
Building Period:	T =	0.3				
Spectral Acceleration:	S_a =	0.32				
Modification Factor:	C =	1.0	Building Weight: W =	1900 kips		
Pseudo Lateral Force:	$V = CS_aW$=	600 kips				

BUILDING CLASSIFICATION: URM (unreinforced masonry bearing walls with flexible diaphragms)

REQUIRED TIER 1 CHECKLISTS

	YES	NO
Basic Structural Checklist	☒	☐
Supplemental Structural Checklist	☐	☒
Geologic Site Hazards and Foundations Checklist	☒	☐
Basic Nonstructural Checklist	☒	☐
Supplemental Nonstructural Checklist	☐	☒

FURTHER EVALUATION REQUIREMENT: _____

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ASCE -31 Checklists

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SEISMIC EVALUATION (Per ASCE-31)
BASIC STRUCTURAL
BUILDING TYPE URM: UNREINFORCED MASONRY BEARING WALLS WITH FLEXIBLE DIAPHRAGMS

BUILDING NAME: Waldron Drug Store Building

BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
BUILDING SYSTEM	
LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1) *No south wall at Level 1. Addressed by adding shear wall.*	NC
ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2)	C
MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)	NA
WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1) *No south wall at Level 1. Addressed by adding shear wall.*	NC
SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70% of the lateral-force-resisting system stiffness in an adjacent story, above or below, or less than 80% of the average lateral-force-resisting system stiffness of the three stories, above or below, for Life-Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2) *No south wall at Level 1. Addressed by adding shear wall.*	NC
GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30% in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)	C
VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)	C

SEISMIC EVALUATION (Per ASCE-31)
BASIC STRUCTURAL
BUILDING TYPE URM: UNREINFORCED MASONRY BEARING WALLS WITH FLEXIBLE DIAPHRAGMS

BUILDING NAME: Waldron Drug Store Building

BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
MASS: There shall be no change in effective mass more than 50% from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)	C
DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members and none of the metal connection hardware shall be deteriorated, broken, or loose. (Tier 2: Sec. 4.3.3.1) *See also analyses and repairs for gravity load system*	NA
MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)	NA
MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8) *Addressed by remortaring joints.*	NC
UNREINFORCED MASONRY WALL CRACKS: There shall be no existing diagonal cracks in wall elements greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy or out-of-plane offsets in the bed joint greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.11) *Addressed by epoxy grouting joints, waterproofing the stone, and floor ties.*	NC
LATERAL FORCE RESISTING SYSTEM	
REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1) *South wall lacking. Addressed by adding shear wall.*	NC

SEISMIC EVALUATION (Per ASCE-31)
BASIC STRUCTURAL
BUILDING TYPE URM: UNREINFORCED MASONRY BEARING WALLS WITH FLEXIBLE DIAPHRAGMS

BUILDING NAME: Waldron Drug Store Building

BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units and 70 psi for concrete units for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.5.1) *Addressed by adding shear walls at north and south ends.*	NC (E/W) C (N/S)
CONNECTIONS	
WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections shall have adequate strength to resist the connection force calculated in the Quick Check Procedure of Section 3.5.3.7. (Tier 2: Sec. 4.6.1.1) *Addressed by adding wall anchors.*	NC
WOOD LEDGERS: The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 4.6.1.2)	N/A
TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1) *Addressed by adding ties.*	NC
GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)	U

FOOTNOTES:

(1) C = Compliant; NC = Non-compliant; N/A = Not Applicable; U = Unable to Determine or Not Investigated

(2) Quick Check refers to ASCE-31 Procedures

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SEISMIC EVALUATION (Per ASCE-31)
BASIC NONSTRUCTURAL COMPONENT

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
PARTITIONS	
UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low and moderate seismicity and 6 feet in levels of high seismicity. (Tier 2: Sec. 4.8.1.1)	NA
CEILING SYSTEMS	
INTEGRATED CEILINGS: Integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.2.1)	NA
LIGHT FIXTURES	
EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)	NA
CLADDING AND GLAZING	
CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.1)	NA
DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)	NA

SEISMIC EVALUATION (Per ASCE-31)
BASIC NONSTRUCTURAL COMPONENT

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.3)	NA
MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.4)	NA
BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)	NA
INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)	NA
PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of four connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)	NA

SEISMIC EVALUATION (Per ASCE-31)
BASIC NONSTRUCTURAL COMPONENT

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
MASONRY VENEER	
SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety, and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)	NA
TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every $2^2/_3$ square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)	NA
WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)	NA
DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)	NA
PARAPETS, CORNICES, ORNAMENTATION AND APPENDAGES	
URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1) *Addressed by adding braces.*	NC
CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)	NA
MASONRY CHIMNEYS	

SEISMIC EVALUATION (Per ASCE-31)
BASIC NONSTRUCTURAL COMPONENT

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)	C
STAIRS	
URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1) *Southwest stair. This stair will require reconfiguration if seismic upgrades are employed.*	NC
STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check Procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)	NA
BUILDING CONTENTS AND FURNISHING	
TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)	NA
MECHANICAL AND ELECTRICAL EQUIPMENT	
EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)	NA

SEISMIC EVALUATION (Per ASCE-31)
BASIC NONSTRUCTURAL COMPONENT

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)	NA
DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)	NA
ATTACHED EQUIPMENT: Equipment weighing over 20 pounds that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)	NA
PIPING	
FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2. Sec. 4.8.13.1)	NA
FLEXIBLE COUPLINGS: Fluid, gas and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)	NA
HAZARDOUS MATERIAL STORAGE AND DISTRIBUTION	
TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)	NA

FOOTNOTES:
(1) C = Compliant; NC = Non-compliant; N/A = Not Applicable; U = Unable to Determine or Not Investigated
(2) Quick Check refers to ASCE-31 Procedures

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SEISMIC EVALUATION (PER FEMA 310)
GEOLOGIC SITE HAZARDS AND FOUNDATIONS

BUILDING NAME: Waldron Drug Store Building
BUILDING LOCATION: The Dalles, Oregon

Evaluation Statement	Evaluation (1)
GEOLOGIC SITE HAZARDS	
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 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)	C
SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: 4.7.1.2)	C
SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)	C
CONDITION OF FOUNDATIONS	
FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1).	C
DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)	C
CAPACITY OF FOUNDATIONS	
POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)	NA

SEISMIC EVALUATION (PER FEMA 310)
GEOLOGIC SITE HAZARDS AND FOUNDATIONS

BUILDING NAME: **Waldron Drug Store Building**
BUILDING LOCATION: **The Dalles, Oregon**

Evaluation Statement	Evaluation (1)
OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2) *23'/36'=0.64 > 0.6*0.32=0.19*	C
TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)	NA
DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)	NA
SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)	C

FOOTNOTES:
(1) C = Compliant; NC = Non-compliant; N/A = Not Applicable; U = Unable to Determine or Not Investigated
(2) Quick Check refers to ASCE-31 Procedures

Drawings

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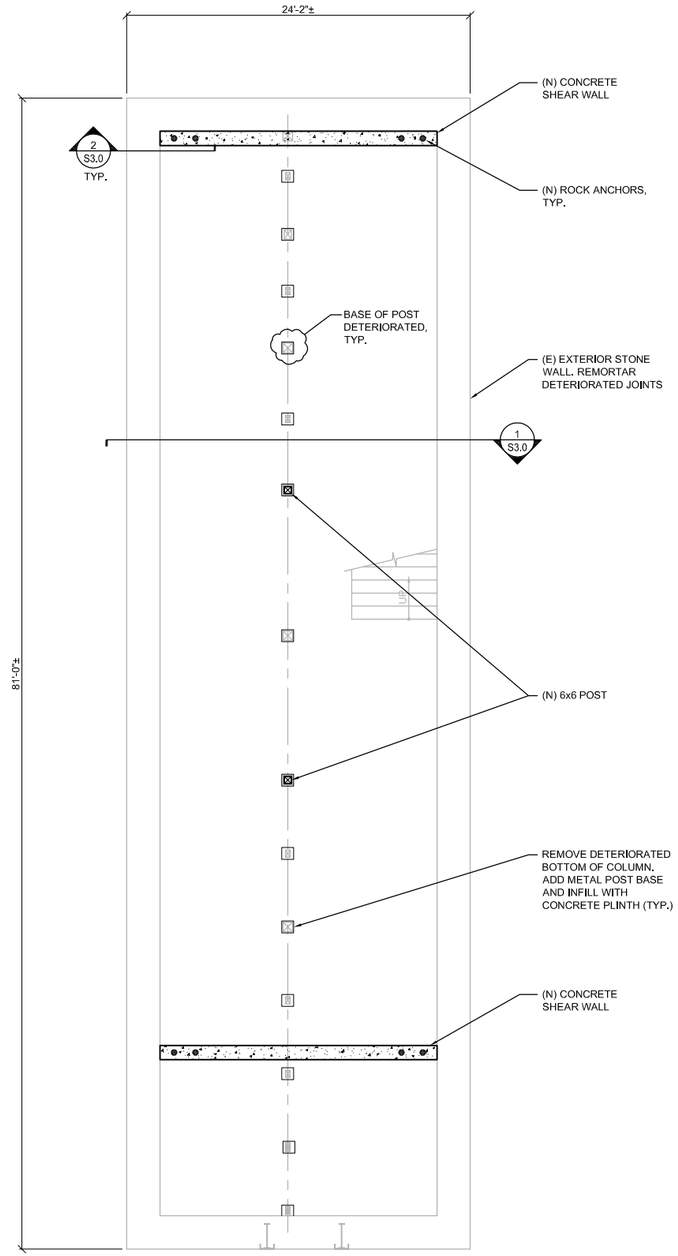
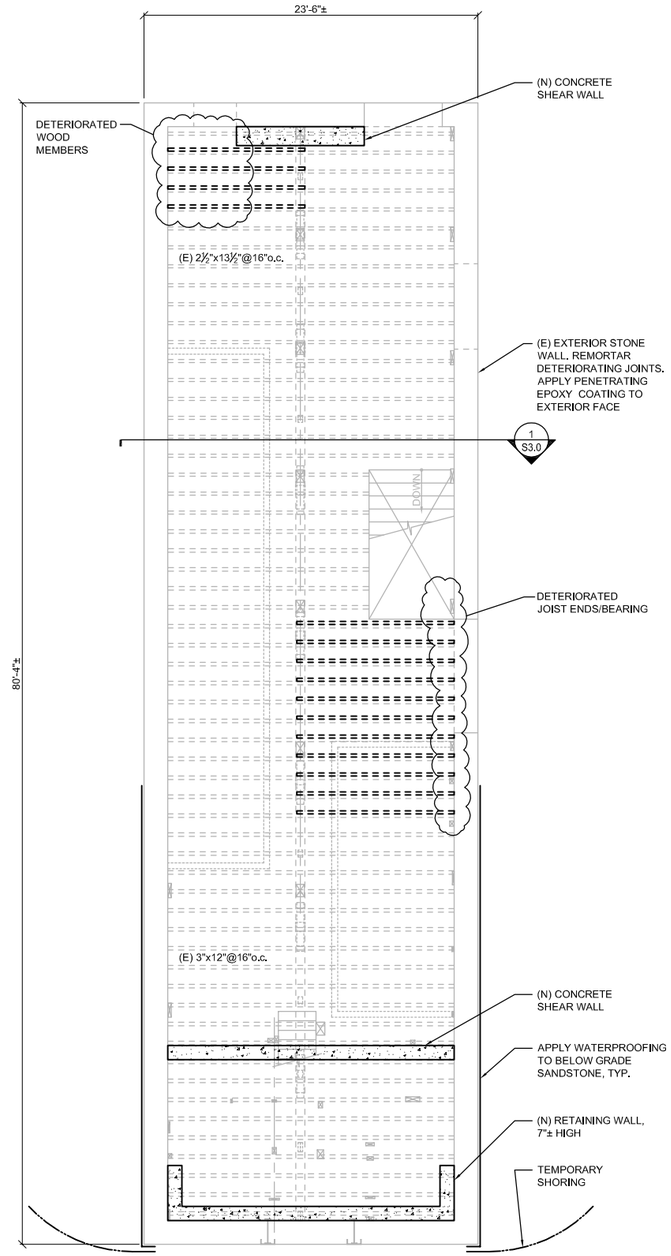


1 BASEMENT PLAN

3/16"=1'-0"



2 1st FLOOR FRAMING PLAN

3/16"=1'-0"

NOT FOR CONSTRUCTION
CONCEPT PLAN 02-2009

NO.	DATE	REVISIONS

CITY OF THE DALLES
PUBLIC WORKS DEPARTMENT
1215 West First Street
The Dalles, Oregon 97058
(541) 296-5401

A DRAWING SHEET FOR:
CONCEPTUAL PLAN
WALDRON DRUG STORE BUILDING
THE DALLES, OREGON

NAME	XXX
DATE	xx-xx-xx
SCALE	AS NOTED
CHECKED	
SHEET	S2.0
OF	SHEETS
JOB NO.	207704.10

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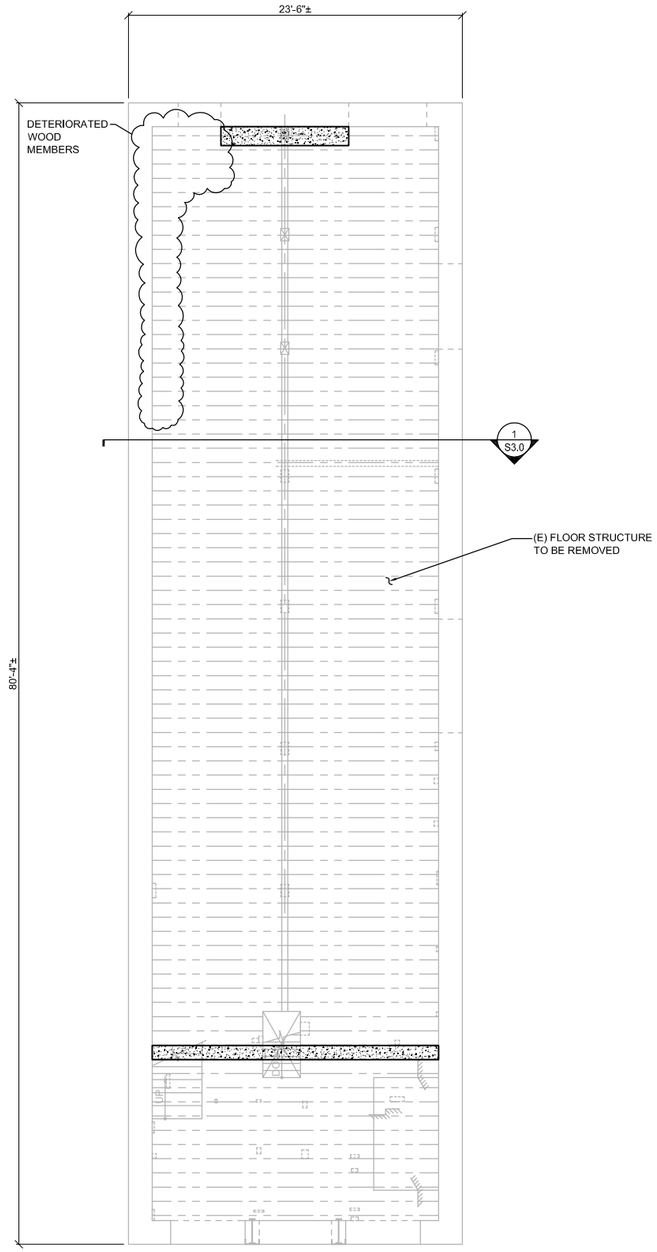
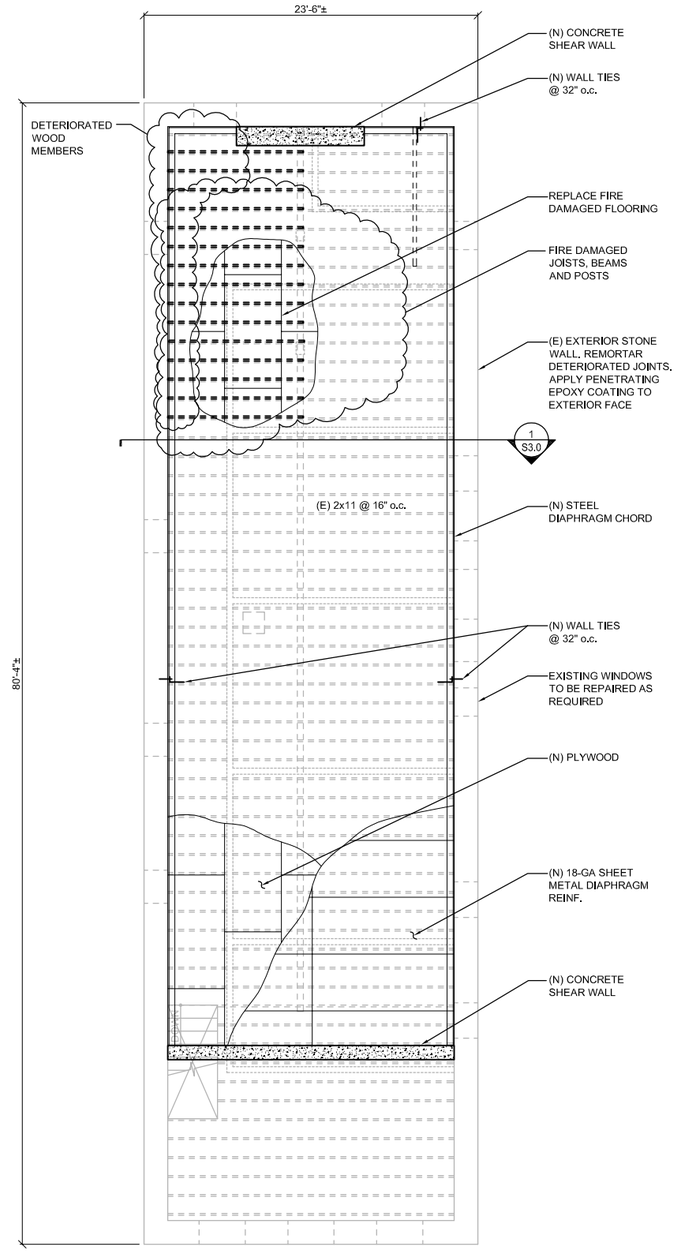


1 MEZZANINE FRAMING PLAN
3/16"=1'-0"



2 2nd FLOOR FRAMING PLAN
3/16"=1'-0"

NOT FOR CONSTRUCTION
CONCEPT PLAN 02-2009

NO.	DATE	REVISIONS

CITY OF THE DALLES
PUBLIC WORKS DEPARTMENT
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The Dalles, Oregon 97058
(541) 296-5401

A DRAWING SHEET FOR:
CONCEPTUAL PLAN
WALDRON DRUG STORE BUILDING
THE DALLES, OREGON

NAME	XXX
DATE	xx-xx-xx
SCALE	AS NOTED
CHECKED	
SHEET	S2.1
OF	SHEETS
JOB NO.	207704.10

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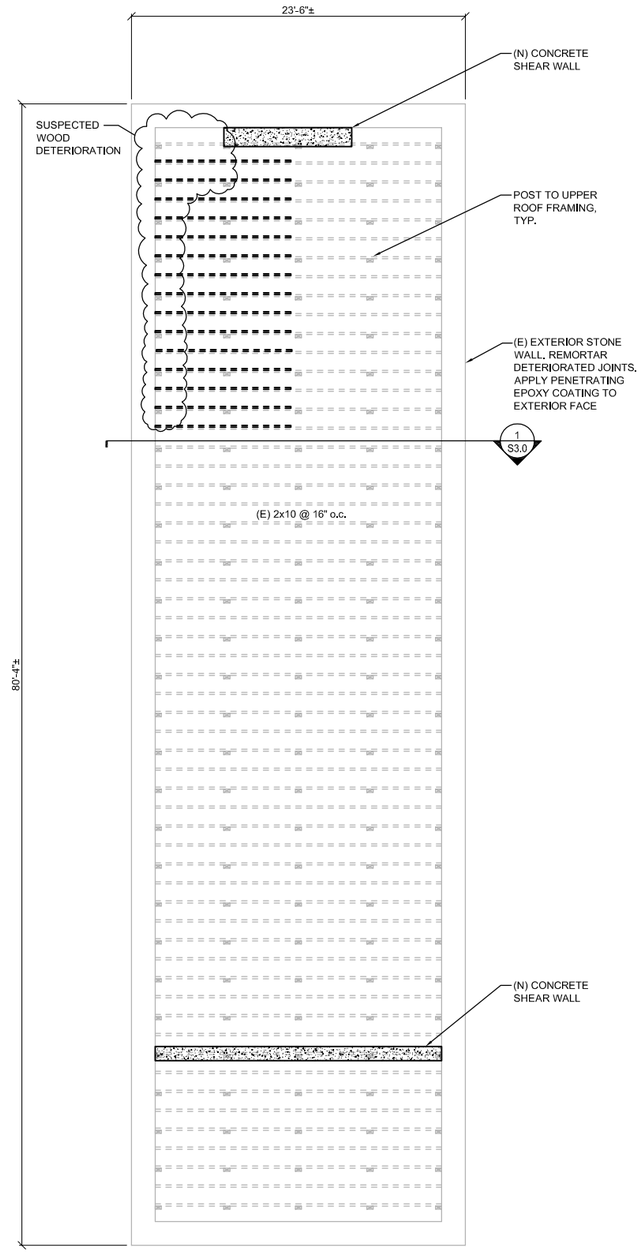
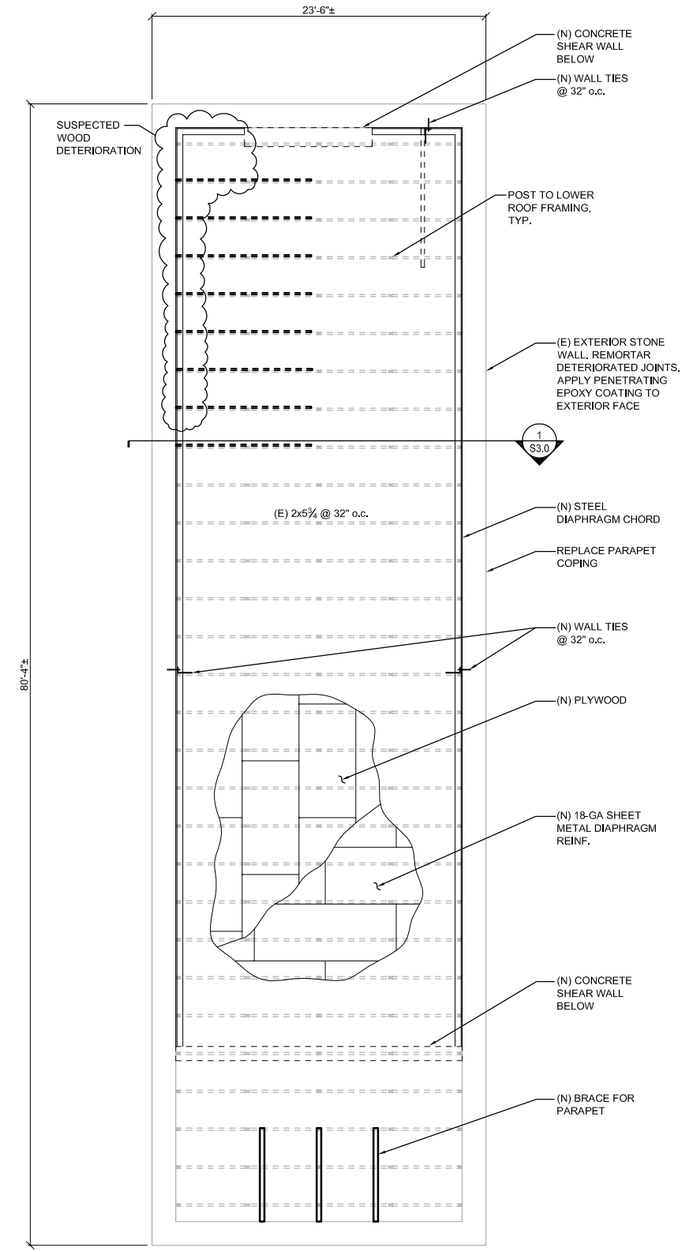


1 ROOF-LOWER FRAMING PLAN

3/16"=1'-0"



2 ROOF-UPPER FRAMING PLAN

3/16"=1'-0"

NOT FOR CONSTRUCTION
CONCEPT PLAN 02-2009

NO.	DATE	REVISIONS

CITY OF THE DALLES
PUBLIC WORKS DEPARTMENT
1215 West First Street
The Dalles, Oregon 97058
(541) 296-5401

A DRAWING SHEET FOR:
CONCEPTUAL PLAN
WALDRON DRUG STORE BUILDING
THE DALLES, OREGON

NAME	XXX
DATE	xx-xx-xx
SCALE	AS NOTED
CHECKED	
SHEET	S2.2
OF	SHEETS
JOB NO.	207704.10

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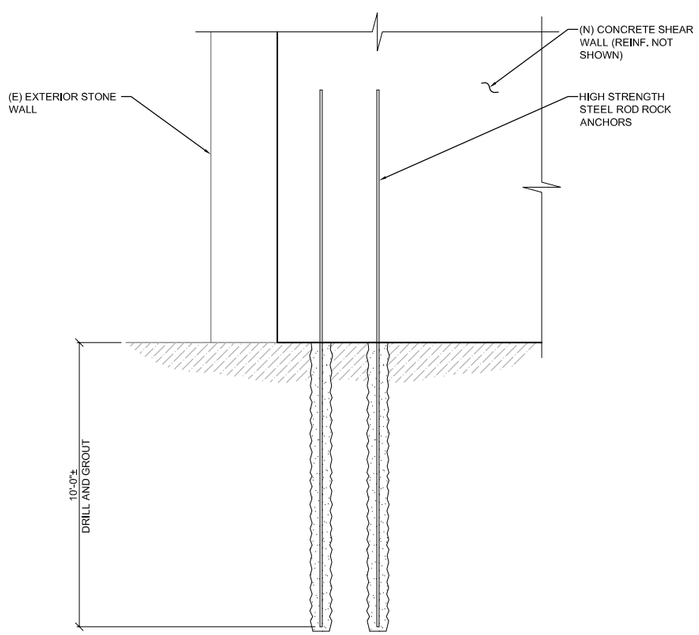
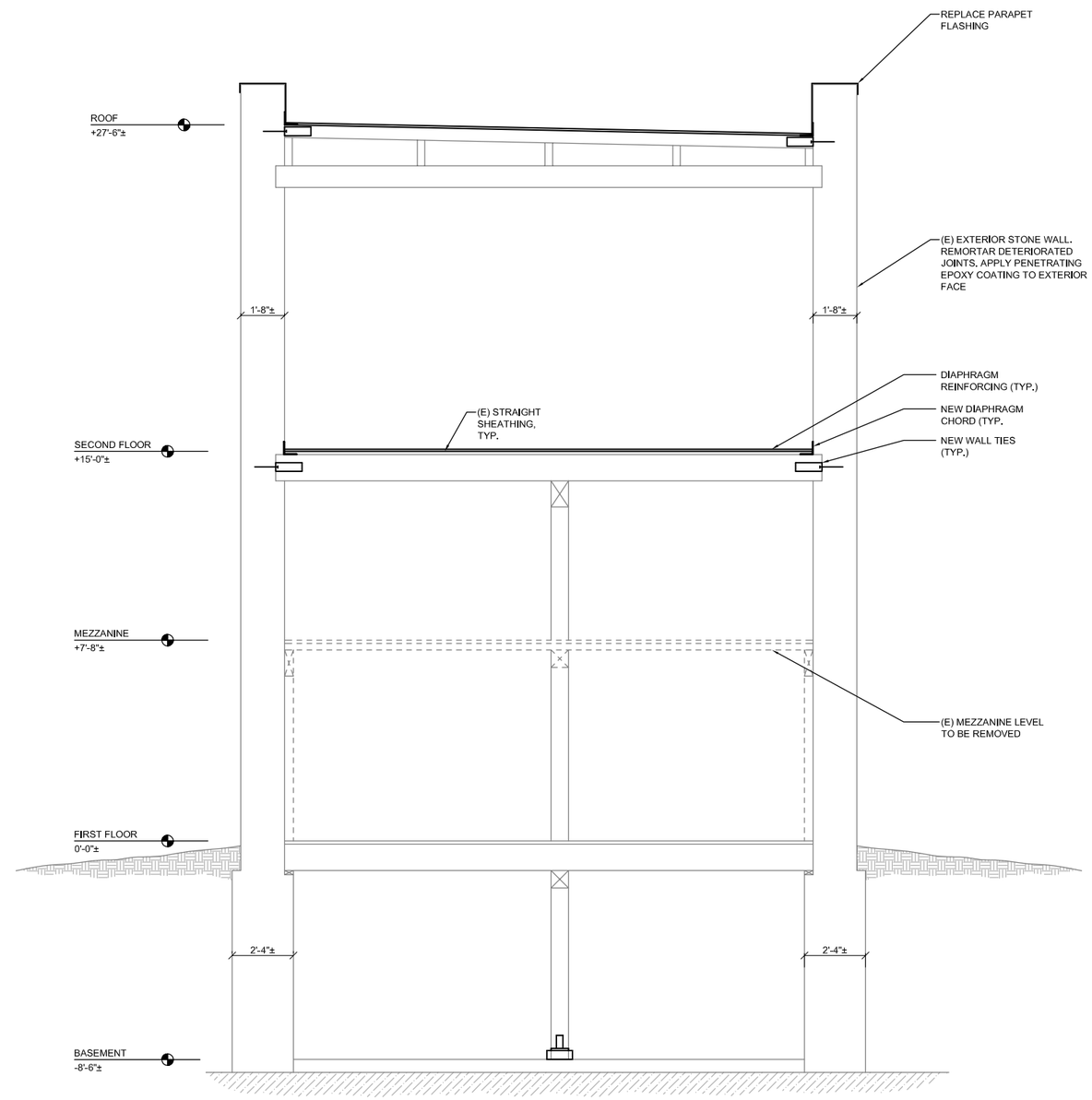


2 ROCK ANCHORS AT SHEAR WALLS

3/8"=1'-0"



NOTES:
1. EXISTING INTERIOR WALLS NOT SHOWN.
2. REFER TO PETER MEIJER ARCHITECT, LLC, REPORT EXTERIOR BUILDING ASSESSMENT FOR NOTED AREAS OF DETERIORATED STONE TO BE REPLACED AND EXTERIOR CRACKS TO BE INJECTION GROUTED.

1 BUILDING CROSS SECTION

3/8"=1'-0"

NOT FOR CONSTRUCTION
CONCEPT PLAN 02-2009

NO.	DATE	REVISIONS

CITY OF THE DALLES
PUBLIC WORKS DEPARTMENT
1215 West First Street
The Dalles, Oregon 97058
(541) 296-5401

A DRAWING SHEET FOR:
CONCEPTUAL PLAN
WALDRON DRUG STORE BUILDING
THE DALLES, OREGON

NAME	XXX
DATE	xx-xx-xx
SCALE	AS NOTED
CHECKED	
SHEET	S3.0
OF	SHEETS
JOB NO.	207704.10

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Photographs

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Photo 1 - Circa 1939 from Southwest (Image courtesy of the Oregon State Library)

Photo 2 - 2008 from Southwest

Photo 3 - Building from Southwest

Photo 4 - Building from Northeast

Photo 5 - Spalling Stone at First Floor

Photo 6 - Crack in Stone Wall at Second Floor

Photo 7 - Basement Looking Southeast

Photo 8 - Deteriorated Column Base at Basement

Photo 9 - Deteriorated First Floor Joist End/Bearing

Photo 10 - First Floor Looking South

Photo 11 – Water Damage at Northwest Corner First Floor

Photo 12 - Water Damage at Northwest Corner Mezzanine Level

Photo 13 - Roof Looking North

Photo 14 - Roof Framing

Photo 15 - Second Floor West Hallway

Photo 16 - Roof Looking South (High Parapet)

Calculations

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kpff Consulting Engineers, Portland, Oregon	Project: WALDRON DRUG STORE	By: PM	Sheet No. 1
	Location	Date: 3/09	
	Client	Revised	Job No. 207704.1
	ASCE 31 LATERAL	Date	

BLDG PERIOD T:
(3.5.2.4)

$$T = C_t h_n^{\beta}$$

$C_t = 0.02$
$h_n = 38'$ (TO FDN)
$\beta = 0.75$

$T = 0.3$ sec

ACCELERATION:

$S_{DS} = 0.316$*
$S_{D1} = 0.115$*
SITE CLASS B (SEE ATTACHED)

$S_a = S_{D1}/T = 0.115/0.3 = 0.38$

$\leq S_{DS} = 0.32$ ⇐ CONTROLS

MODIFICATION FACTOR C:
(TABLE 3.4)

3 STORIES (INCL. BASEMENT)
URM

$C = 1.0$

PSEUDO LATERAL FORCE:
(3.5.2.1)

$V = C S_a W$
$= 1.0(0.32)W$
$= 0.32W$

* PER TABLE 2.1: $0.167 \leq S_{DS} < 0.500$
$0.067 \leq S_{D1} < 0.200$
∴ MODERATE LEVEL OF SEISMICITY

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 45.6
Longitude = -121.18
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.05 deg grid spacing

Period (sec)	Sa (g)	
0.2	0.474	(Ss, Site Class B)
1.0	0.173	(S1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 45.6
Longitude = -121.18
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class B - Fa = 1.0 ,Fv = 1.0

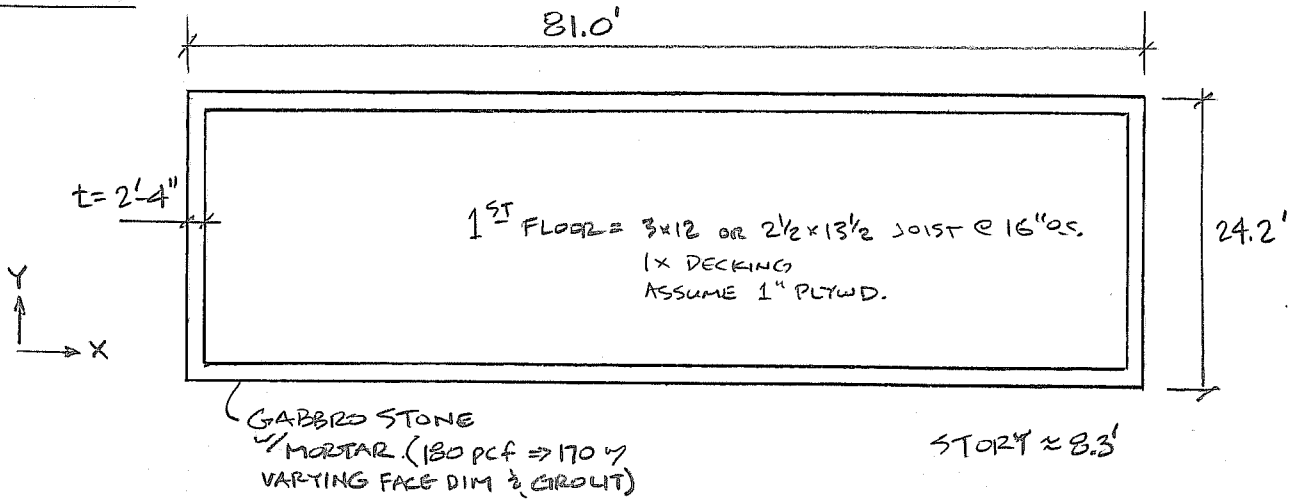
Period (sec)	Sa (g)	
0.2	0.474	(SMs, Site Class B)
1.0	0.173	(SM1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 45.6
Longitude = -121.18
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	
0.2	0.316	(SDs, Site Class B)
1.0	0.115	(SD1, Site Class B)

kpff Consulting Engineers, Portland, Oregon	Project: WALDRON DRUG STORE	By	Sheet No. 3
	Location	Date	
	Client	Revised	Job No.
	ASCE 31 LATERAL	Date	

BASEMENT



X-WALLS: WT = (81-2.3)(2)(2.33)(8.3)(170) = 520,000# (BASE TO 1ST FLOOR)

Y-WALLS: WT = (24.2-2.3)(2)(2.33)(8.3)(170) = 140,000#

1ST FLOOR:

JOISTS @ 35 pcf	= 7 psf
DECKING	= 2.6
PLYWOOD	= 3
PARTITIONS	= 10
	23 psf

WT = (81 - 4.7)(24.2-4.7)(23) = 35,000#

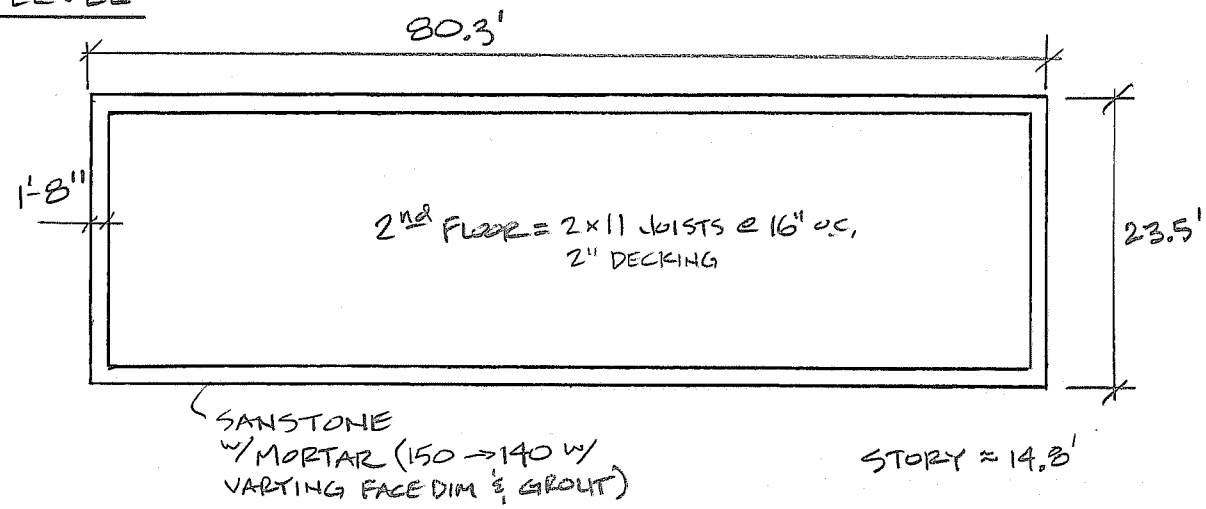
WALL WTS TO 1st FLOOR DIAPHRAGM:

X-WALLS = (81-2.3)(2)[(2.33)(8.3/2)(170) + (14.8/2)(1.67)(140)] = 530,000#

Y-WALLS = (24.2-2.3)(2)[2.33(8.3/2)(170) + (14.8/2)(1.67)(140)] = 150,000#

kpff Consulting Engineers, Portland, Oregon	Project: WALDRON DRUG STORE	By	Sheet No. 4
	Location	Date	
	Client	Revised	Job No.
	ASCE 31 LATERAL	Date	

FIRST LEVEL



X-WALLS: $WT = (80.3-1.7)(2)(1.67)(14.8)(140) = 540{,}000^{\#}$ (1ST TO 2ND FLOOR)

Y-WALLS: $WT = (23.5-1.7)(2)(1.67)(14.8)(140) = 150{,}000^{\#}$

2nd FLOOR:

JOISTS @ 35 pcf	= 4	psf
DECK	= 6	psf
CEILING	= 5	psf
PARTITIONS	= 10	psf
	25	psf

$WT = (80.3-3.3)(23.5-3.3)(25) = 40{,}000^{\#}$

WALL WTS TO 2ND FLOOR DIAPHRAGM:

X-WALLS $= (80.3-1.7)(2)\left[\left(\frac{12.5}{2}+\frac{14.8}{2}\right)(1.67)(140)\right] = 500{,}000^{\#}$

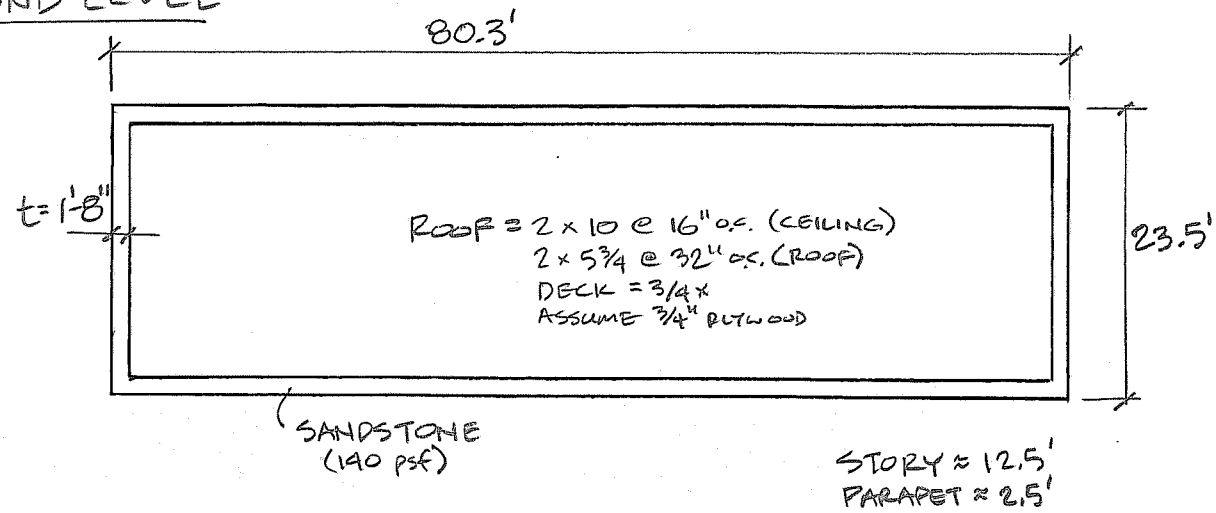
Y-WALLS $= (23.5-1.7)(2)\left(\frac{12.5}{2}+\frac{14.8}{2}\right)(1.67)(140) = 140{,}000^{\#}$

$-\left(\frac{12.5}{2}(140)\left(\frac{1}{4}\right)+\frac{14.8}{2}(120)\right)(1.67)(21.8') = 40{,}000^{\#}$ (SOLID WALL)

~25% open; assume 20 psf wall

$100{,}000^{\#}$

SECOND LEVEL



X-WALLS: WT. = (80.3-1.7)(2)(1.67)(15)(140) = 550,000 # (2ND FLOOR TO ROOF)

Y-WALLS: WT = (23.5-1.7)(2)(1.67)(15)(140) = 150,000 #

ROOF: JOISTS @ 35 pcf = 4 psf

	1
DECK =	2.3
PLYWOOD =	2.3
CEILING =	5
ROOFING =	3
	18 psf

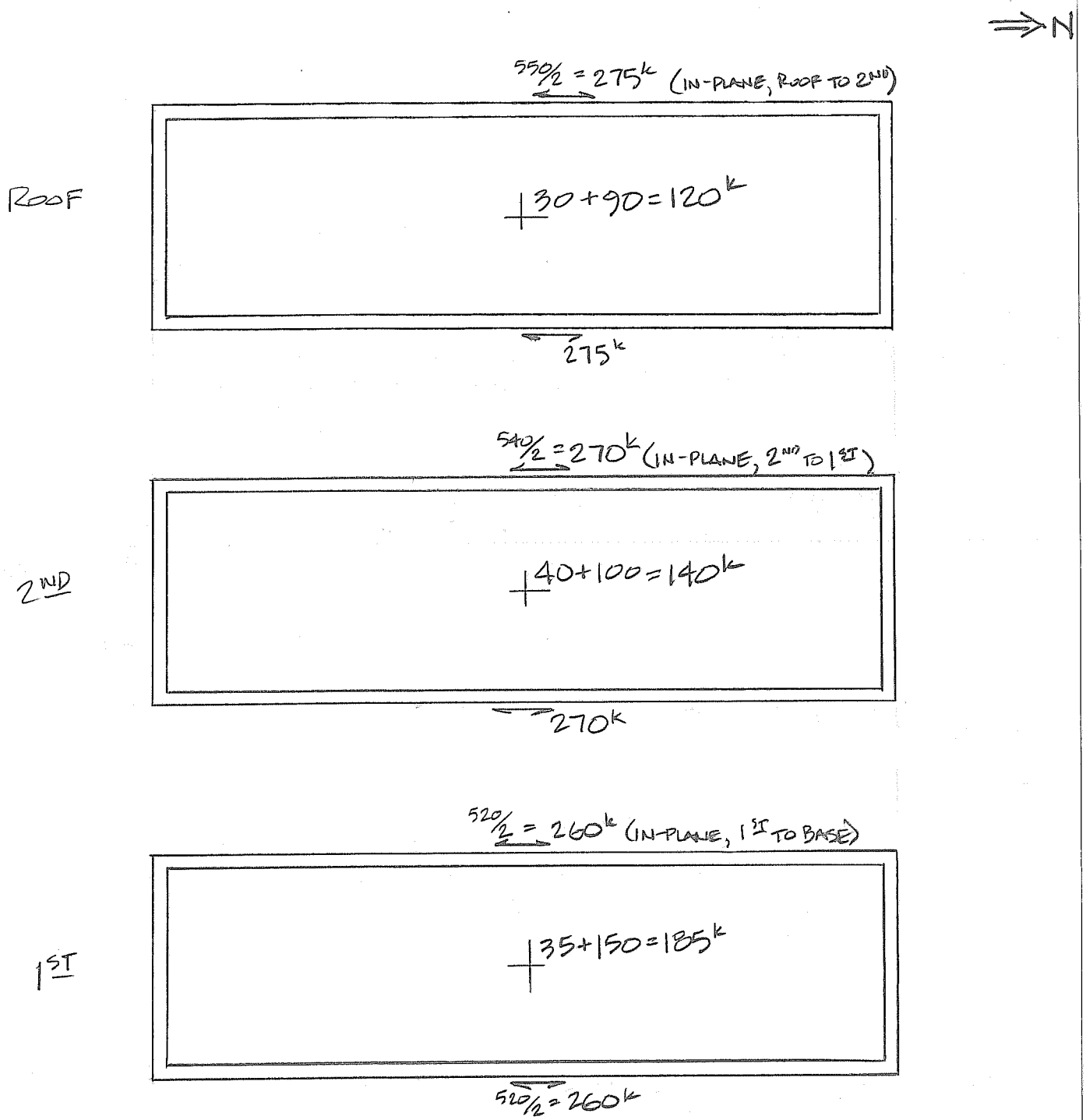
WT = (80.3-3.3)(23.5-3.3)(18) = 30,000 #

WALL WTS TO ROOF DIAPHRAGM:

X-WALLS = (80.3-1.7)(2)(12.5/2 + 2.5)(1.67)(140) = 320,000 #

Y-WALLS = (23.5-1.7)(2)(12.5/2 + 2.5)(1.67)(140) = 90,000 #

kpff Consulting Engineers, Portland, Oregon	Project: WALDRON DRUG STORE	By	Sheet No. 6
	Location	Date	
	Client	Revised	Job No.
	ASCE 31 LATERAL: N/S	Date	



$W = 120 + 140 + 185 = 445^k$ $\quad W_{WALL,\,IN\text{-}PLANE} = 275 + 270 + 260 = 805^k$

N/S BASE SHEAR, $V = 0.32(445) = 140^k$

$V_{WALL,\,IN\text{-}PLANE} = 0.32(805) = 250^k$ (EA. WALL)

STORY SHEAR

LEVEL	h	W	Wh	$V = 0.32\left[(Wh)_x / \Sigma Wh\,(W)\right]$
R	35.6'	120	4270	67k
2	23.1'	140	3230	51k
1	8.3'	185	1540	24k
		$\Sigma Wh =$	9040	142k (≈140k)

$$f_{v_{BASE}} = \frac{142/2 + 250}{81(2.33)(12)^2}(1000)\left(\frac{1}{1.5}\right) = 8 \text{ psi}$$ (m = 1.5, TABLE 3.7)

$$f_{v_1} = \frac{118/2 + 250(545/305)}{\sim 66'(1.67)(12)^2}(1000)\left(\frac{1}{1.5}\right) = 10 \text{ psi}$$

DIAPHRAGM CONNECTION

NOTE, NO CONNECTION EXISTS CURRENTLY

$$T_c = a S_{DS} W_p A_p$$

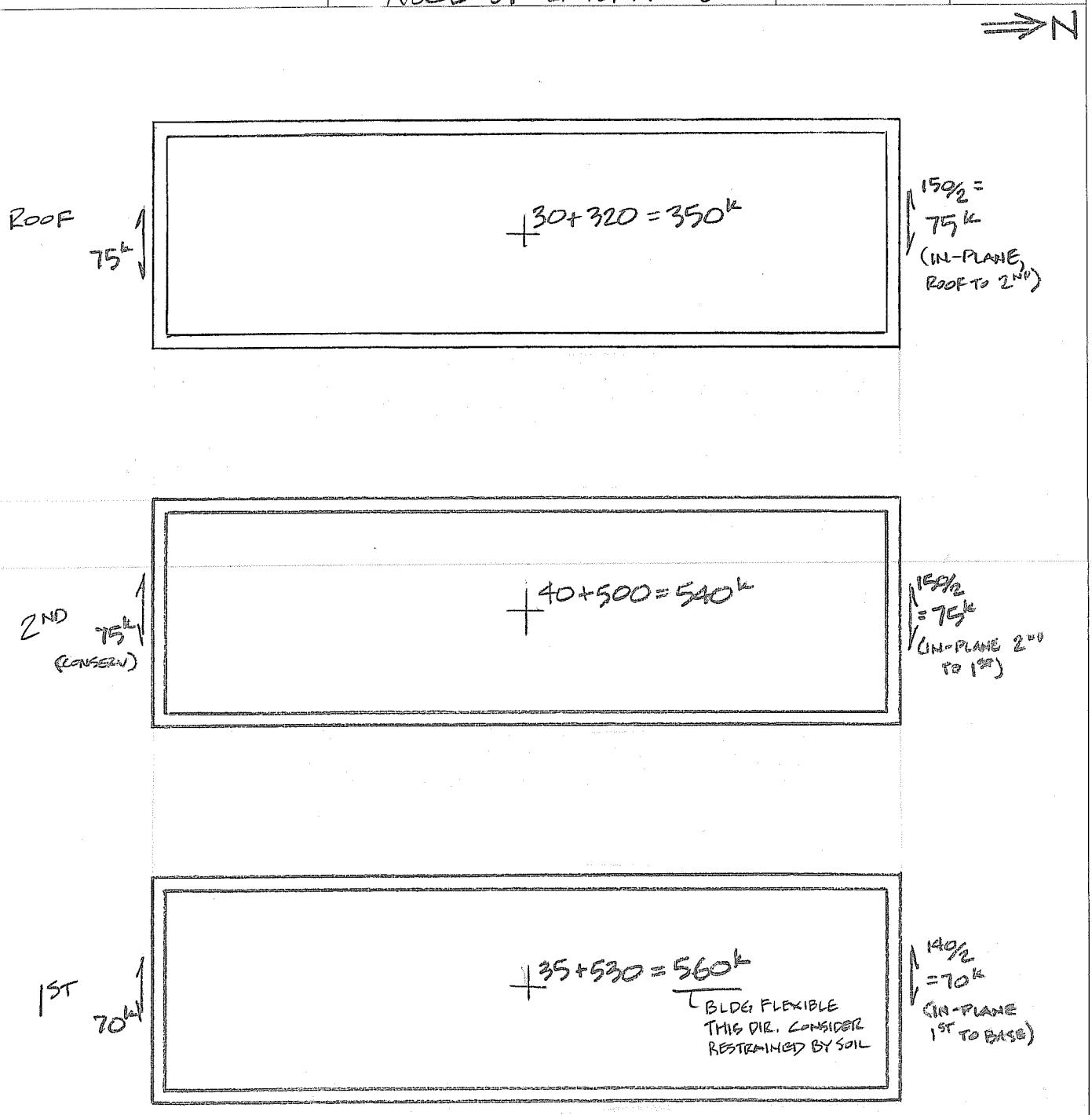
$a = 0.9$
$S_{DS} = 0.32$

$$T_{c_R} = 0.9(0.32)\left(\frac{90}{2(23)}\right)(1000) = 560 \text{ plf}$$

$$T_{c_2} = 0.9(0.32)\left(\frac{100}{2(23)}\right)(1000) = 630 \text{ plf}$$

$$T_{c_1} = 0.9(0.32)\left(\frac{150}{2(24)}\right)(1000) = 900 \text{ plf}$$

kpff Consulting Engineers, Portland, Oregon	Project: WALDRON DRUG STORE	By	Sheet No. 8
	Location	Date	
	Client	Revised	Job No.
	ASCE 31 LATERAL: E-W	Date	



$W = 350 + 540 = 900^k$

$V_{WALL,\ IN\text{-}PLANE} = 75 + 75 + 70 = 220^k$

E-W BASE SHEAR, $V = 0.32(900) = 300^k$

$V_{WALL,\ IN\text{-}PLANE} = 0.32(220) = 70^k$ (EA. WALL)

STORY SHEAR

LEVEL	h	w	wh	$V = 0.32\left[(wh)_x / \Sigma wh\right](w)$
R	35.6'	350	12,460	150k
2	23.1'	540	12,470	150k
1	8.3'	0	0	0
			$\Sigma wh = 24,910$	300k

$$f_{v_{BASE}} = \frac{300/2 + 70}{24(12)^2(2.33)}(1000)\left(\frac{1}{1.5}\right) = 18 \text{ psi}$$ (m=1.5, TABLE 3-7)

$$f_{v_1} = \frac{300/2 + 70(150/220)}{(.9)(1.67)(12)^2}(1000)\left(\frac{1}{1.5}\right) = 60 \text{ psi}$$

DIAPHRAGM CONNECTION

NOTE, NO CONNECTION EXISTS CURRENTLY

$$T_c = a S_{DS} W_p A_p$$

$a = 0.9$
$S_{DS} = 0.32$

$$T_{c_R} = 0.9(0.32)\left(\frac{320}{2(80)}\right)(1000) = 580 \text{ plf}$$

$$T_{c_2} = 0.9(0.32)\left(\frac{540}{2(80)}\right)(1000) = 970 \text{ plf}$$

kpff Consulting Engineers Portland, Oregon	Project WALDRON DRUG STORE	By	Sheet No. 10
	Location	Date	
	Client	Revised	Job No.
	ASCE 31 - GEOLOGIC CHECKLIST	Date	

OVERTURNING:

$0.6S_a = 0.6(0.32) = 0.19$

$BASE_{MIN} = 23'$

$HEIGHT = 36'$

$23/36 = 0.64 > 0.19$

kpff Consulting Engineers Portland, Oregon	Project WALDRON DRUG STORE	By	Sheet No. 11
	Location	Date	
	Client	Revised	Job No.
	ASCE 41 LATERAL	Date	

$V = C_1 C_2 C_m S_a W$ (EQ 3-9)

$C_1 = 1.0$ (ASSUMED)
$C_2 = 1.0$ (FOR NEW CONSTRUCTION)
$C_m = 0.8$ (CONCRETE SHEAR WALL)
$= 1.0$ (OTHER) ← USE FOR PRELIM. ANALYSES
$S_a = 0.32$

$V = 0.32W$ (SAME AS ASCE 31)

VERTICAL DISTRIBUTION SAME AS ASCE 31

GEOLOGIC SITE HAZARDS/FDNS:

- NONE

BASIC STRUCTURAL:

- LOAD PATH: NO EVAL.
- WEAK STORY/SOFT STORY: ADDRESSED BY NEW SHEAR WALL.
- MASONRY JOINTS: REPAIR.
  FOR N/S $f_v < 30$ psi REQ'D
  CALC'D $f_{v_1} = 10$ psi $\Rightarrow$ 33% JOINT EFFECT.
  $= 0.33(20") = 7"$
  GRAVITY $\approx 30'(140) \div 144 = 30$ psi
  @ 33% $\Rightarrow$ 100 psi – STILL SMALL
  $\Rightarrow$ 6" MIN $(2(6") > 7")$
- URM CRACKS: EXCESSIVE BLDG OR FDN MOVEMENT NOT NOTED. JOINTS WILL BE GROUTED.
- REDUNDANCY: ADDRESSED BY NEW SHEAR WALL
- SHEAR STRESS CHECK: E/W ADDRESSED BY NEW SHEAR WALL
- WALL ANCHORAGE: ADDRESSED BY ADDING TIES
- TRANSFER TO SHEAR WALLS: ADDRESSED BY ADDING TIES
- GIRDER/COLUMN CONN: ADD CONNECTORS AS REQ'D

BASIC NON-STRUCTURAL COMPONENT:

- URM PARAPETS: ADD BRACING AT SOUTH PARAPET
- URM WALLS: STAIR ELIMINATED BY PROPOSED SEISMIC UPGRADES

kpff Consulting Engineers Portland, Oregon	Project WALDRON DRUG STORE	By	Sheet No. 13
	Location	Date	
	Client	Revised	Job No.
	ASCE 41: SHEAR WALL	Date	

$R = 150^k$

$2 = 150^k$

300^k

$300/80 = 3.8'$, $70/2 = 35^k$

12 ↑ 68 ↑

$R_N = 34(3.8) + 35 = 170^k$

$R_S = \left(34 + \frac{12^2}{2(68)}\right)(3.8) = 140^k$

$M \geq 2$

$170^k/2 = 85^k$

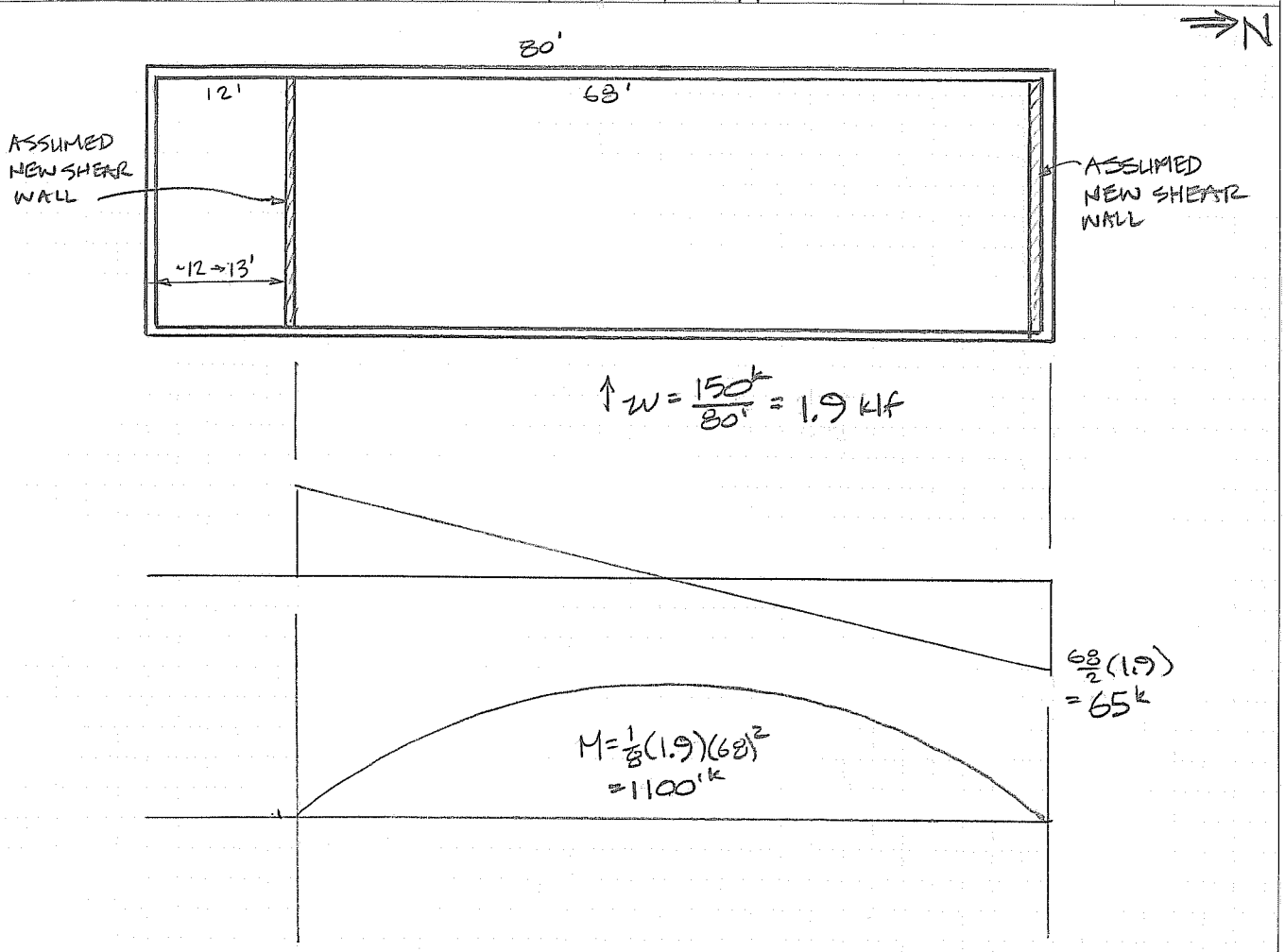
$\ell = 9'$

$f_v = 85/9' = 10\ klf$

FOR $\leq 6\sqrt{f'_c} \Rightarrow t_r = \frac{10000}{6\sqrt{4000}(12)} = 3''$

AT BASE $\Rightarrow$ 12" MINIMUM

kpff Consulting Engineers, Portland, Oregon	Project WALDRON DRUG STORE	By	Sheet No. 14
	Location	Date	
	Client	Revised	Job No.
	ASCE 41: DIAPHRAGM	Date	



$f_v = \frac{65{,}000}{20'} = 3.3$ klf

$f_v/m = 3300/2.3 = 1500$ plf

STRAIGHT SHEATHING NOT CLOSE

$\ell/b = 3.4$ (PANEL OVERLAY ON SAT'G, CHORDED)

TO HIGH FOR REGULAR WOOD DIAPHRAGM (FRAMING MEMBERS ONLY 2x)

TRY SHEET METAL SHEATHING. FINISH SHEATHING OVER, AND EXISTING SHEATHING UNDER WILL PREVENT BUCKLING.

FOR $F_v = 502(.4)(33\ \text{k/in}) = 6.6$ klf

$t = \frac{1500}{6600(12)} = 0.02''$ ⇒ 18 ga MIN.

SCREWS $\frac{3300}{1.8} = 1800$ plf

CHORD $\doteq \frac{1100}{20'(6)} = 10^k$ (ℓ_m)

$A_r \approx 10/36 = 0.3\ \text{in}^2$ ⇒ ~L4x4x1/4 = 2 in² MIN

DEAD LOAD = EXISTING STRUCTURE
LIVE LOAD = 100 psf
WOOD ASSUMED DF-L SELECT STRUCTURAL

LEVEL 1: JOISTS = 3×12 AND 2½×13½ @ 16" o.c.

$S_{3\times12} = \frac{1}{6}(3)(12)^2 = 72 \text{ in}^3$ ⇐

$S_{2\frac{1}{2}\times13\frac{1}{2}} = \frac{1}{6}(2\frac{1}{2})(13\frac{1}{2})^2 = 76 \text{ in}^3$

DL = 23 + 10(PART) = 33 psf (SEE ASCE 31 LATERAL)

SPAN ≤ 11'

$f_b = \frac{\frac{1}{8}(33+100)(1.33)(11)^2(12)}{72} = 450 \text{ psi}$

$f_v = \frac{1.5(11/2)(33+100)(1.33)}{2\frac{1}{2}(12)} = 49 \text{ psi}$

GIRDER $w = (135 \text{ psf})(20/2) = 1.35 \text{ klf}$ SPAN ≈ 10'

$f_b = \frac{\frac{1}{8}(1350)(10)^2(12)(6)}{(7\frac{3}{4})^3} = 2600 \text{ psi}$ — ADD POSTS WHERE MISSING TO CUT SPAN IN HALF ⇒ $M' = \frac{1}{4}M$

$f_v = \frac{1.5(1350)(10/2)(1/2)}{(7.75)^2} = 84 \text{ psi}$ ok

LEVEL 2: JOISTS = 2×11 @ 16" o.c.

$S = \frac{1}{6}(2)(11)^2 = 40 \text{ in}^3$

DL = 25 + 10(PART) = 35 psf

SPAN ≤ 11'

$f_b = \frac{\frac{1}{8}(35+100)(1.33)(11)^2(12)}{40} = 810 \text{ psi}$

$f_v = \frac{1.5(11/2)(35+100)(1.33)}{2(11)} = 67 \text{ psi}$

$F_b = 1500(1.15)(1.0) = 1700 \text{ psi}$
$F_v = 180 \text{ psi}$

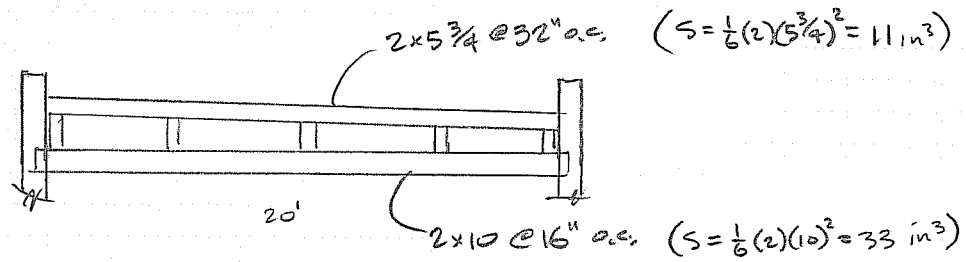
GIRDER 11×5¼ $w \approx 137 \text{ psf}(20/2) = 1370 \text{ plf}$ SPAN ≈ 10'

$f_b = \frac{\frac{1}{8}(1370)(10)^2(12)(6)}{5\frac{1}{4}(11)^2} = 1940 \text{ psi}$ F_b FOR SELECT STRUCT = 1600 psi ok FOR ≈ 75 psf LL

$f_v = \frac{1.5(1370)(10/2)}{5\frac{1}{4}(11)} = 180 \text{ psi}$

$F_v = 170 \text{ psi}$ — ok AT LL = 75 psf

ROOF: JOISTS –



$DL_{TOP} \approx$ 1 JOIST
+ 2.3 DECK
2.3 PLY (FUTURE)
3 ROOFING
1.4 MISC
10 psf

DL_{BOT} = 10 psf
+ 5 CEILING
15 psf

SNOW = 20 psf

TOP:

$$f_b = \frac{\frac{1}{2}(10+20)(2.67)(20/4)^2(12)}{11} = 270 \text{ psi}$$

$$f_v = \frac{1.5(10+20)(20/4(2))(2.67)}{2(5\frac{3}{4})} = 26 \text{ psi}$$

BOTTOM:

$$f_b = \frac{\frac{1}{2}(15+20)(1.33)(20)^2(12)}{33} = 850 \text{ psi}$$

$$f_v = \frac{1.5(15+20)(20/2)(1.33)}{2(10)} = 35 \text{ psi}$$

$F_b = 1500(1.15)(1.1) = 1900$ psi (FOR BOT., ÷1.15 FOR TOP)

$F_v = 180$ psi

COLUMNS

ROOF SPANS TO EXTERIOR WALLS

2ND FLOOR: $A_{TRIB} \approx 10'(20')(5/8)$ (IF CONT JOIST) $= 125$ sf

1ST FLOOR: $A_{TRIB} \approx 10'(20)(5/8) = 125$ sf

LEVEL 2: $P = (135 \text{ psf})(125) = 17{,}000^{\#}$

$f_a = \frac{17000}{8(8)} = 265$ psi < 625 psi $F_\perp$

$l \approx 14'$

SELECT STRUCT 8x8 (AFPA MANU. TABLE M4.5-2a)

$P_a = 40{,}000^{\#}$

LEVEL 1: $P = 17{,}000 + (133 \text{ psf})(125 \text{ sf}) = 34{,}000^{\#}$

$f_a = \frac{34000}{8(8)} = 530$ psi < 625 psi $F_\perp$

$l \approx 7'$

SELECT STRUCT 8x8

$P_a \approx 60{,}000^{\#}$ ($F_a = 1070$ psi)

kpff Consulting Engineers, Portland, Oregon	Project WALDRON DRUG STORE	By	Sheet No. 18
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	GRAVITY - FIRE DAMAGE	Date	

CONSIDER EXTENT OF JOIST/GIRDER DAMAGE (REFERENCE PREVIOUS "UNDAMAGED" CALCS)

IF JOISTS LOSE 1/4" SIDES, 1/2" BOTTOM

$$S' = \frac{1}{6}(1\tfrac{1}{2})(10\tfrac{1}{2})^2 = 27 \text{ in}^3$$

$$f_b = 810\left(\tfrac{40}{27}\right) = 1200 \text{ psi}$$

$$f_v = 67\left(\tfrac{2(11)}{1\tfrac{1}{2}(10\tfrac{1}{2})}\right) = 94 \text{ psi}$$

GIRDER GOOD FOR 75 psf LL, IF LOSE 1/8" SIDES, 1/4" BOTTOM

$$S = \frac{1}{6}(5\tfrac{1}{4})(11)^2 = 106 \text{ in}^3$$

$$S' = \frac{1}{6}(5)(10\tfrac{3}{4})^2 = 96 \text{ in}^3$$

$$f_b = 1940\left(\frac{112 \text{ psf}}{137 \text{ psf}}\right)\left(\frac{106}{96}\right) = 1750 \text{ psi}$$

MAY BE ADEQUATE IF OFFICE LOAD (50 psf) OR w/ FURTHER GRADING — OTHERWISE, REINFORCING REQ'D

Attachment A:

Exterior Building Assessment (Peter Meijer Architect, LLC)

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Exterior Building Assessment

Revised April 27, 2009

100% Submittal

Waldron Bros.
Drug Store Building
The Dalles, Oregon

Produced for:
KPFF Consulting Engineers
111 SW 5th Avenue, Suite 2500
Portland, Or 97204

PETER MEIJER ARCHITECT, PC

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INTRODUCTION 01

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Introduction

Peter Meijer Architect, PC was retained to conduct a "from the ground" preliminary limited exterior assessment of the Waldron Bros. Drug Store Building in the City of The Dalles, Oregon. The purpose of the assessment was to provide KPFF Consulting Engineers and the City of The Dalles with an understanding of general conditions, noted deficiencies, and potential sources of the deficiencies of the exterior building materials, primarily the original building stone. It is our understanding that the results of the assessment will contribute to a broader understanding of the potential re-use options, if any, in future redevelopment of the City of The Dalles Waterfront development plan. As part of the condition assessment, Peter Meijer Architect, PC annotated AutoCad format drawings of the existing elevations with our observations.

The limited, from the ground, assessment was conducted on December 29, 2008. Observations included the exterior stone both above and below grade, the roof parapet, the cast iron storefront system, and miscellaneous elements when visible. Roof areas and site work were excluded from the scope of work. Temperature and weather conditions during the assessment were spotty rain with sunshine and 38 degrees Fahrenheit.

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GENERAL BUILDING INFORMATION 05

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General History

(The following paragraphs are excerpted from The Dalles Riverfront Connection Archaeological and Historic Resource Surveys prepared by Archaeological Investigations Northwest, Inc.)

In 1867, Henry J. and George W. Waldron built the Waldron Bros. Drug Store building in The Dalles, Oregon, located at East 1st and Washington Streets. The building was most recently used as a residential building, but prior to that it held a variety of businesses, including the Mountaineer newspaper, a feed warehouse, and The Dalles Portland and Astoria Navigation company. The building survived numerous floods and fires over the years, but remains vacant and in fair to poor condition today.

The only significant change to the building, happened in 1882, when East 1st Street was buried to accommodate the OR&N Main Line. At this time, the first floor of the Waldron Bros. Drug Store was partially buried below grade at the south end.

Aerial view, circa 1950

The South façade represents the style that once lined 1st Avenue, with its decorative cast iron. The unique aspect of the east and west facades is a painting on each side. The west façade has a painted advertisement for Owl Storage which is deteriorating as the stone continues to age. The east façade has a painted advertisement for daily steamships running to Portland, which was originally painted when a steamship office occupied the building. The advertisement was recreated at a later date to replicate the original.

General Building Summary

The Waldron Bros. Drug Store Building (circa 1867), is a two story with mezzanine floor and partial basement rectangular stone building located on the south bank of the Columbia River in section 3 of Township 1 North, Range 13 East, Willamette Meridian. The building is about 80′-0″ by 23′-6″ in plan and faces south towards the historic downtown of the City of The Dalles. The grade slopes on the site from high on the south to low on the north. The south elevation, which is the principle façade, features a cast iron storefront supporting an upper level of cut stone in an ashlar block pattern detailed with rusticated quoins at the corners and capped by a sheet metal entablature.

South Elevation

The east and west facades are similar to each other except for an entry door on the east and the layout of upper story windows. These facades are built with a random ashlar pattern of rock face stone with rusticated corner blocks.

The exterior appearance of the structure has remained largely the same since its construction one hundred and forty years ago. The principal alteration resulted from raising the grade and partially burying the south end with in-fill soil. Primary among the exterior modifications were the revisions made to the facades to accommodate the new grade: concrete in-fill of the lower portion of the cast iron façade; insertion of doors on the north and east; and modification of the surrounding grade.

A cursory review of the interior revealed no historic fabric on the lower level, grade level, and mezzanine level. However, the upper level still retains elements of historic

periods including wood wainscot, wood trim, original plaster ceilings, and some wood windows.

Upper Level, Interior

Peter Meijer Architect, PC's observations from the ground showed the exterior building envelope to be in fair to poor overall condition. Because of the long period of no occupancy, the building envelope and materials appear to lack periodic maintenance although the ground and roof drainage systems are kept open. The deficiencies noted comprise a large percentage of the entire building envelope. Of the conditions noted, a pattern of stone failure was noted along the east and west facades corresponding to the roof joist/flashing interface. Additional stone spalling is present on all

Roof Joist/Flashing Interface East Elevation

facades with the exception of the south. Other general deficiencies include: 1) vertical cracking of the stone due to the lack of adequate connections between the wood floor framing and the exterior wall, and also potentially due to the swelling and contraction of the exterior stone during seasonal temperature fluctuations; 2) deterioration of the sheet metal cornice and lack of routine maintenance (access was restricted because of the railroad tracks and railroad right-of-way); 3) missing mortar within the stone joints as a result of moisture migration through the wall; and 4) visible deterioration of wood components comprising the windows.

During this limited assessment, PMA removed stone from the below grade level and from the west façade approximately five feet above grade (See annotated elevations for "sample" locations), and mortar from both locations. Laboratory analysis of the mortar was conducted in Dorchester, England to determine if the mortar was lime based or used cement as the binder. As a result of the visible deterioration of the exterior stone, petrographic lab analysis of the stone was conducted in Oregon to assist in the evaluation of the cause of deterioration. (See Appendix for full laboratory results)

Peter Meijer Architect was asked to conduct testing for the presence of stone bacteria. Microbial life typically invades carbonate rock surfaces (limestone, dolomite, marble, etc.) in warm humid climates. The proliferation of lichen, algae, moss, and other biological growth on stone surfaces in the northwest, can result in complex micro-chemical reactions on the stone surface. However, the rate of decay induced by biological growth is comparatively small to other sources and causes of stone decay. As a result, microbial life was not evaluated as a cause of the stone deterioration on the Waldron Bros. Drug Store building.

STONE 09

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Stone

Investigation

The National Register nomination alludes to the source of stone for the Waldron Bros. Drug Store Building quarried from a site near the early Pioneer Cementary in The Dalles. The Waldron Building uses three primary stone types: 1) volcanic rock at the below grade level; 2) a non-local quarried stone laid in a random ashlar rock face; and 3) the same quarried stone cut in blocks with a smooth finished face and laid in a running bond and decorative corner quoins.

Lower Level Basalt below grade at East Elevation

Secondary uses of this same quarried stone include flat jack arches above some windows, flat stone lintels above some windows, and some stone window sills.
All stone appears to be set in multiple wythes to create the thickness of the exterior wall. With the exception of the south façade, the typical stone units vary in length and height on each elevation. The south façade blocks are approximately 15″ high x 30″ long with 3/8″ mortar joints. The corner quoin stones are rusticated to accentuate the joints and create shadow lines.

The lower level volcanic rock is limited in use from the foundation to grade level. Partial excavation of the north end of the east façade indicated the wall to be set directly on a stone footing with no visible deficiencies below grade. At grade level, remnants of a wood plate were excavated. It is uncertain what the

Waldron Bros. Drug Store, 1960's

function of the wood plate was but it appears to run parallel with the building façade along the length and tight against the exterior wall. Historic photos indicate a sidewalk parallel with the street and the wood plate may have been used during construction of the sidewalk. Transition to the non-local quarried stone occurs at the first floor framing level. Petrographic analysis revealed this stone to be from locations away from the Columbia River and highly susceptible to deterioration.

The petrographic report summarizes the quality and characteristics of the stone as "The exterior above grade [stone] consists of poorly sorted, highly porous, coarse-grained basaltic sandstone that was laid down in a river environment and weakly cemented by shallow burial. Sands of this character probably originate as sediments washed down streams from the Cascades. A Columbia River source is not possible, since Columbia River sands contain granitic rock fragments and moderately abundant quartz grains that were not identified in the exterior building stone sample." The petrographic report goes on to state "the presence of swelling clay cement and the general absence of strong pore-filling

North end of East Elevation

natural cement, results in a stone with poor construction quality, sensitive to crumbling upon repeated wetting and drying, and highly transmissive to moisture"
The ground level survey appears to support the stone analysis. PMA noted existing conditions with large portions of stone and/or entire faces of stone spalled more than 50% of the cross section. The highest degree of stone deterioration corresponds to the level of roof flashing along the east façade and north façade. However, other stones have similarly spalled conditions at random places along the facades regardless of proximity to water migration. PMA used a mason chisel and hammer to remove stone samples for testing. While in the process of removing whole samples, the stone would break with relative ease. As these stone pieces have been drying in PMA's studio, the surface texture of the stone has become very grainy.

Cracks in stone at north end of west elevation

The south façade does not appear to be suffering from similar stone erosion as the other facades. The cut blocks comprising the south façade are approximately 8" deep and of uniform texture and finish. No samples of the south façade stone were removed for laboratory analysis.

The north, east, and west façades contain structural cracks that appear to be unrelated to each other. The west facade is cracked in two locations extending from grade to the second floor windows. The east façade has numerous vertical cracks extending from grade to parapet level and often correspond to the stress planes above and below the window openings. The cracks further promulgate along the joint lines or thru stone units necessitating re-pointing and/or replacement in these locations.

Test results on the mortar resulted in a determination that the mortar contains a predominant percentage of lime and no cement as binder. Given the era of construction, this is an expected result.

The current mortar is very powdery to a depth varying from 3 inches to 6 inches. The failure of the mortar may be a direct result of increased moisture migration from the stone decay.

The current existing field conditions combined with the petrographic analysis result in some concern regarding the longevity of the existing stone. The cyclical wetting and drying during seasonal weather changes in The Dalles likely increases the rate of decay given the susceptibility of the stone to moisture migration. Although the building has stood for over one hundred and forty years, the same stone under modern analysis and evaluation would likely determine the stone to be unsuitable for modern building requirements.
[See Appendix for complete Petrographic analysis]

Probable Causes of Deficiency

Whereas deficiencies were observed throughout the stone, the probable cause of failure is moisture uptake and migration through the stone. A rapid increase in stone failure has occurred since the building has been unoccupied. Older buildings typically lack insulation and the interior heat loss passes through the exterior walls driving the moisture to the outside while simultaneously drying the exterior walls. When the heat is removed, the walls are colder and thus remain wet longer. The lack of adequate flashing maintenance at the roof and other openings, increases the amount of water migration into the building stone. The increase migration accelerates the decay of the adjacent stone.

Rock face stone have greater surface area than smooth face stone and this may be one

reason the south facade appears to be in better condition than the other facades. The regular joint profiles also contribute to increased water shedding at the joints.

Repair Methodologies

"From the ground" assessments are limited in their observations to the most visible deficiencies. Whereas deficiencies were observed throughout the stone, and the petrographic analysis characterized the existing stone as susceptible to moisture, further evaluation of the stone needs to be conducted in order to confirm the long term affects of the current deficiencies and to determine the probability of successful repair of the existing stone.

Additional structural tests are needed to determine if degradation of the strength of the stone has occurred with moisture migration and what the long-term affect of prolonged wetting and drying cycles have had on the strength of the stone.

Further laboratory testing should be conducted to confirm the compatibility of the existing stone to respond to the suggested repair techniques. The underlying causes of structural movement should be mitigated prior to any attempted repair of cracked stone.

Based on Peter Meijer Architect, PC's previous project experience and knowledge of historic construction means and methods, the following potential types of repair may be anticipated for the specific problem, while preserving the historic aesthetics.

1. Eliminate the Sources of Water Migration- It is recommended that the roof system, including the sheet metal flashing and parapet sheet metal be replaced.

2. Provide Interior Conditioned Space - In specific, heat must be provided during the winter months for its drying affect on the exterior stone.

3. Mitigate Moisture Migration at the exterior Stone Joints - The exterior stone requires both repointing and rebedding with lime based mortar varying in depth from three inches to six inches over 100% of the exterior surfaces. The strength of the stone should be known (as stated earlier) in order to evaluate the proper mortar to prevent a strong mortar from exerting pressure on a weak stone resulting in stone spalls.

4. Slow the Erosion of Stone – Impregnating the stone with epoxy-based consolidation materials formulated to fill the micropores within the stone and thus bond the corresponding stone granules can slow the erosion of some stones.

The potential efficacy of such treatment requires pre-testing in a laboratory of the consolidant applied to the stone. The test determines how deep the consolidation material is absorbed and much product would be required.

Such treatment would require the removal of all existing historic murals and other painted surfaces. Paint removal is typically a chemical process involving warm water rinses to neutralize the acidic product. The water rinse is applied at pressure.The weak surface strength and absorptive quality of the existing stone may preclude pressure rinsing. Field mock-up and trial during design stages is recommended.

5. Dutchman Repair – provide more durable sandstone with similar aesthetic values to replace missing stone faces.

6. Plastic Repair - Colored patching mortar based on the petrographic analysis and additional laboratory color analysis is used to properly match the existing stone with surface repairs.

7. Epoxy Repair – Provide low pressure injection of epoxy to repair the structural cracks.

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WOOD WINDOWS 15

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Wood Windows

Investigation

The Waldron Bros. Drug Store Building has multi-pane wood windows consisting of 4 different rough opening sizes. The four different types consist of, 1) vertical window at the upper level of the east and west elevation roughly 2′-8″ x 4′-0″; 2) larger vertical windows at the upper level of the east elevation roughly 2′-6″ x 7′-0″ with steel lintels; 3) vertical windows on the south, east, and north elevations roughly 3′-0″x7′-3″ with flat jack arches at the head; 4) horizontal window on east elevation which is roughly 6′-0″ x 2′-6″. Many of the windows have broken glass panes and are boarded up or inaccessible. Given the variances in lintel types, rough opening sizes, insertion of secondary support members, inconsistency in window sills, PMA believes the wood window frames and sashes have been replaced over the life of the structure.

PMA observed deficiencies consisting of broken sash chains, broken glazing, wood sill and jamb weathering, as well as miscellaneous items fastened to the wood sash components. Nearly all the glazing is broken in the windows, and many have been boarded up or altered in some way. One centrally located 4 over 4 window on the east elevation has a wood post placed into the opening, possibly added for additional support.

Recommendations

Because wood windows fail at the sash joints, and at areas exposed to a higher concentration of water, visual observation from the ground alone is not sufficient to determine a window's condition. The physical properties of wood require field testing for wood decay, glazing putty failure, and degradation of joints. Therefore, PMA recommends conducting a detailed window survey. It is known that the observed deficiencies will require replacing cracked glazing and repairing any damaged or weathered wood elements.

Window Type 1, West Elevation

Window Type 2, East Elevation

Window Type 3, East Elevation

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Metal

Investigation

Metal elements on the elevations include the cast iron façade and the sheet metal cornice. The parapet along the east and west facades is capped and covered by galvanized sheet metal. Because of the restricted access, the cast iron façade was observed from a distance across the railroad tracks and from an obtuse angle from a high lift. Observation of a portion of the cast iron channels was visible from the interior.

Sheet Metal Flashing along East Elevation

The cast iron appears to be in good condition retaining its structural capacity and not showing corrosion resulting in cross section loss of material. Surface corrosion is occurring as a result of the failure of the paint coating. The decorative transom combination gutter, as a result of greater exposure to the elements, has greater deterioration of the metal. Sheet metal along the east and west parapet is missing in sections, and is corroded along the length with open seams. It no longer is an effective flashing system. The lack of access prevented an assessment of the decorative south façade sheet metal cornice. However, from the ground review and review of the backside of the south "false building front" did not indicate large failures.

Decorative transom combination gutter, South Elevation

Recommendations

"From the ground" assessments are limited in their observations to the most visible deficiencies. Whereas large deficiencies were not observed in the metal, further up close visual investigation is recommended. Given the exposure of bare metal and the structural capacity of the cast iron elements, it is recommended that a protective paint coating be applied, even if such coating is applied without cleaning down to bare iron, on the exposed cast iron to reduce further corrosion. Such coating can be viewed as temporary and sacrificial in nature. In concert with a structural engineer, PMA would like to further investigate the attachment of the cast iron elements to the foundation and the attachment to the east and west bearing walls.

Short term protection of the stone walls requires replacement of the existing sheet metal coping. Additionally, the roof membrane should be replaced with a similar membrane to restore the integrity of the main water intrusion protection system. Such roof system should be considered a low cost protective measure for a ten year period. Continued periodic inspection by the City of The Dalles is also recommended.

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CONCLUSION 23

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Conclusion

The Waldron Bros. Drug Store building circa 1867, is in fair to poor condition. Structural cracks in the stone are numerous and are likely caused by both structural movement and by material deficiencies.

The east and west elevations have historically been painted to advertise various services and/or commodities. The ghost of wall paintings is clearly visible on the west facade. One advertisement has been recreated on the east facade. Given the nature of the stone decay, these paintings may have both simultaneously protected the stone surface from water saturation and prevented any absorbed moisture from migrating to the exterior. The existing paintings do cover numerous previous spalls and breaks in the stone. Some repair techniques will require the stone murals to be removed from the surfaces

Petrographic analysis of two samples of stone indicate very different compositions. Whereas the lowest level stone is a hard basalt material, the above grade level stone is characterized as volcanic rock with high absorptive qualities. The stone undergoes rapid decay when subject to repetitive wet/dry cycles. As long as the Waldron Bros. Drug Store building was occupied, the heated interior helped dry the stone during the wet winter months and prevented rapid decay. It is likely that the current deficiencies of the building have increased exponentially since the structure became unoccupied.

Absent replacement of the surface stone with a veneer of new, more stable, stone, the decay of the existing stone may be slowed through a combination of 1) saturation of the exterior with epoxy-based consolidants; and 2) mechanical heating and drying of the interior spaces.

There remains some concern that the current saturation level of the stone may have a permanent adverse effect on the structural stability of the stone. Such a long-term affect must be tested by repairing all known water penetration areas; providing a source of interior heat; replacing those stone units with 50% cross section loss; and establishing a period of time by which to monitor the drying effects on the exterior stone.

Once it has been determined that the stone has stabilized under the above listed protective treatments, further protection of the stone can be implemented as suggested in the Recommendation section of this report.

Limitations

The building envelope for the purposes of our limited visual assessment consists of the exterior stone walls; windows and doors; and other miscellaneous cladding assemblies when present. Peter Meijer Architect, PC's review is limited to building envelope and its performance issues in relation to the integrity of individual material units/elements.

This assessment is based on a "from the ground" limited visual assessment (No available building description documents were located at the time of assessment). PMA assumes that any correspondence, material, data, evaluations and reports furnished by others are free of latent deficiencies or inaccuracies except for apparent variances discovered during the completion of this report.

This report documents the current condition of elements of the building envelope and may identify factors or mechanisms that lead to the current condition. Any comments or conclusions within this report represent Peter Meijer Architect PC's opinion, which is based upon the documents provided to us, our limited field review of physical conditions, specifically identified testing, and our past experience.

In issuing this report, PMA does not assume any of the duties or liabilities of the designers, builders or owners of the subject property. Owners, prospective purchasers, tenants or others who use or rely on the contents of this report do so with an understanding as to the limitations of the documents reviewed, the general visual review undertaken and understand that PMA cannot be held liable for damages which may be suffered with respect to the purchase, ownership, or use of the subject property.

If a decision is made to correct any existing problems or deficiencies, it is recommended that PMA be provided the opportunity to review the repair or replacement strategy in order that the work be properly implemented.

End of Report

APPENDIX A: PRELIMINARY LIMITED AS-IS CONDITION DRAWINGS

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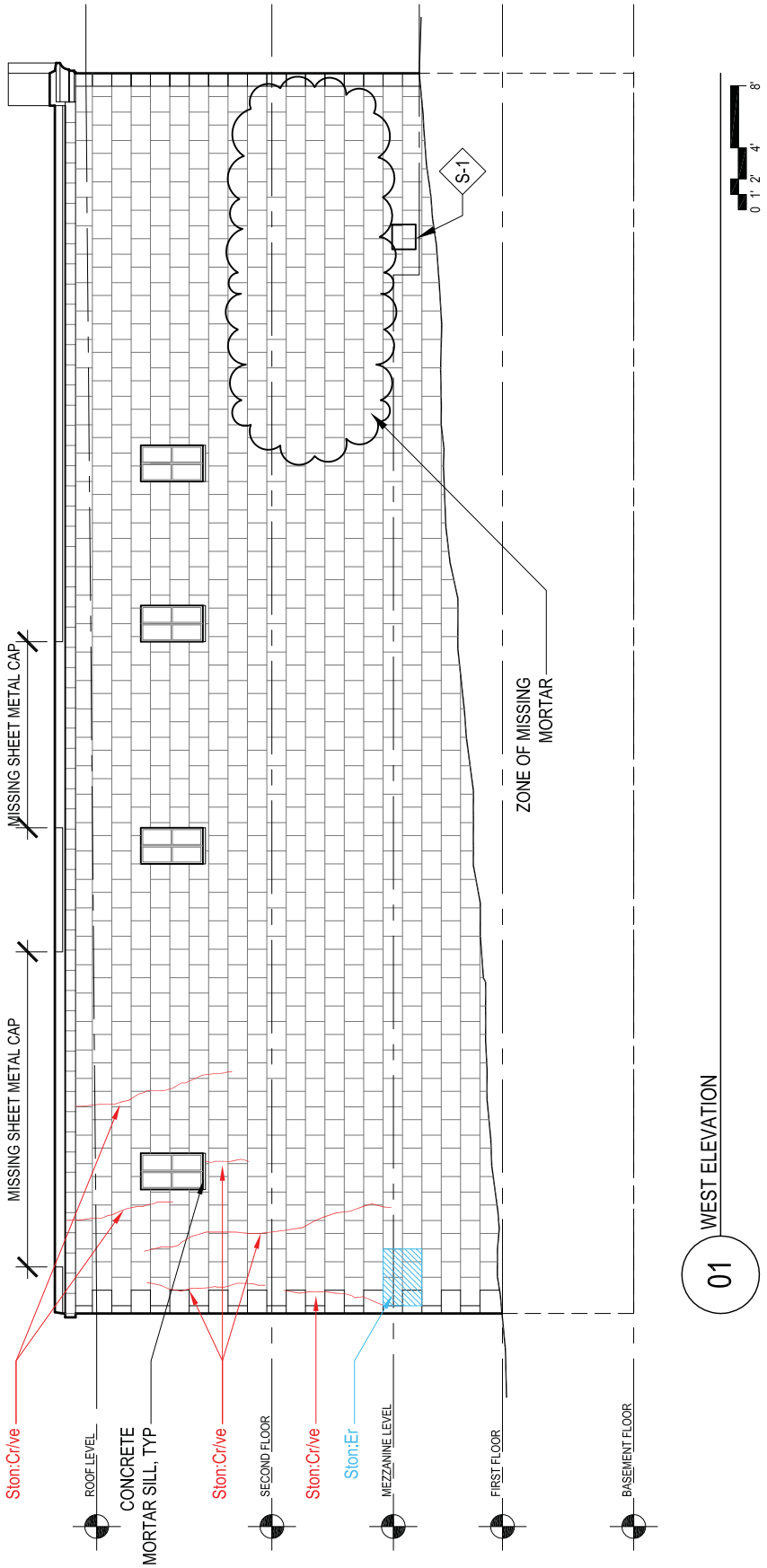
Assessment Annotation:	Material Abbrs. (color follows Deficiency):	Deficiency Abbrs.:	Direction Abbrs. (color follows Deficiency):
deficiency, material, direction → Ston:Cr/ho	Ston = Stone	Cr = Crack Er = Erosion (Severe)	ho = horizontal ve = vertical di = diagonal

Legend:

S-1 Stone Sample

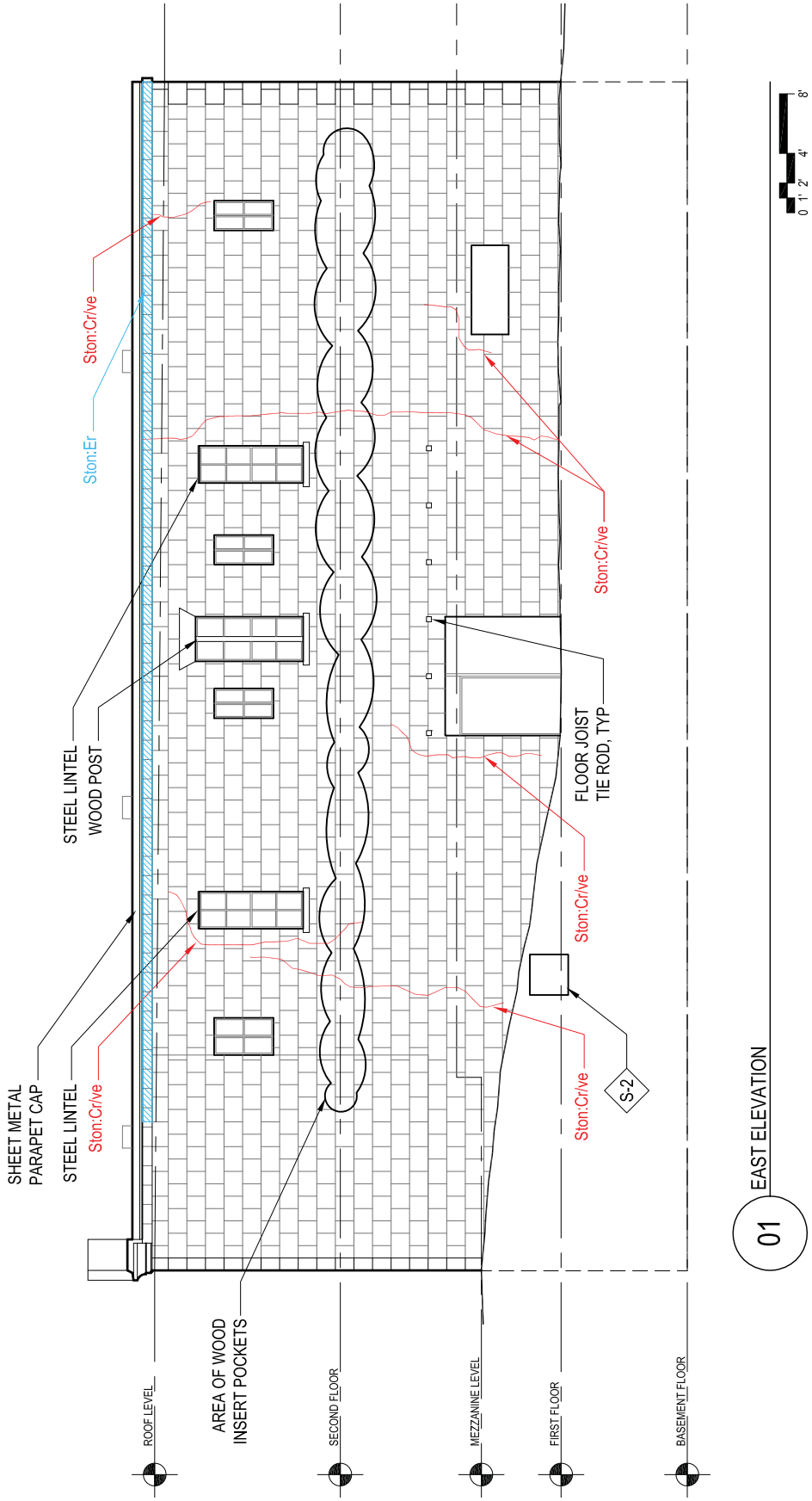


01 WEST ELEVATION

Assessment Annotation:	Material Abbrs. (color follows Deficiency):	Deficiency Abbrs.:	Direction Abbrs. (color follows Deficiency):
material → Ston:Cr/ho ← deficiency, direction	Ston = Stone	Cr = Crack Er = Erosion (Severe)	ho = horizontal ve = vertical di = diagonal

Legend:

S-1 Stone Sample

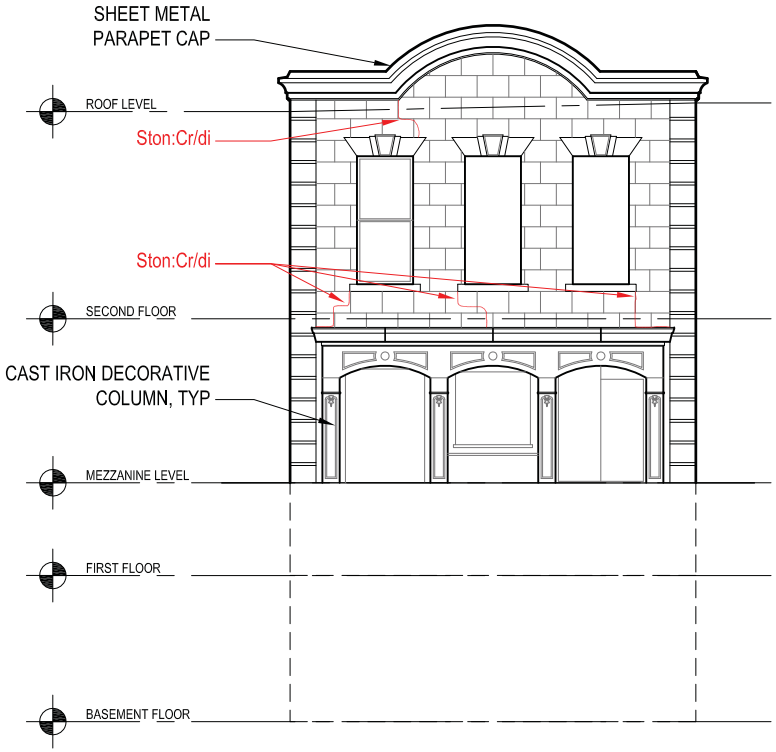


01 EAST ELEVATION

Assessment Annotation:	Material Abbrs. (color follows Deficiency):	Deficiency Abbrs.:	Direction Abbrs. (color follows Deficiency):
deficiency — direction material Ston:Cr/ho	Ston = Stone	Cr = Crack Er = Erosion (Severe)	ho = horizontal ve = vertical di = diagonal

Legend:

S-1 Stone Sample



02 SOUTH ELEVATION

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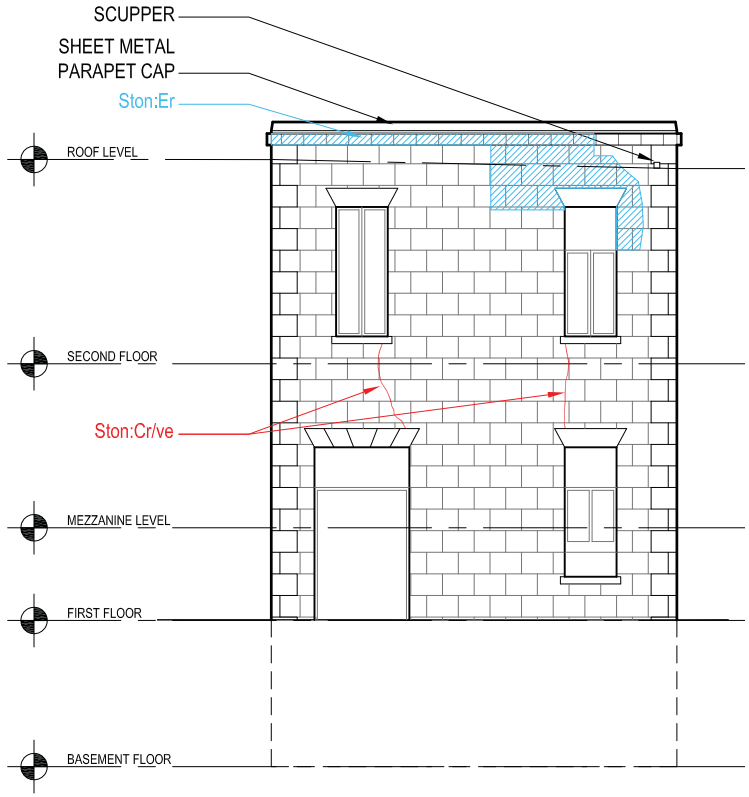

01 NORTH ELEVATION

0 1' 2' 4' 8'

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APPENDIX B: PETROGRAPHIC ANALYSIS

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WILLAMETTE GEOLOGICAL SERVICE

Dr. J. Reed Glasmann
31191 Peterson Rd.
Philomath, OR 97370
(541) 929-3607 PH/FAX

PETROLEUM EXPLORATION CONSULTING CLAY MINERALOGY SEDIMENTARY PETROLOGY

February 6, 2009

To: Peter Meijer, Architect

From: J.Reed Glasmann

RE: Petrographic Characterization Building Stone from the Waldron Drug Store Building, The Dalles, Oregon

Summary

Two stone samples from the Waldron Drug Store Building, a circa 1860's structure located in The Dalles, Oregon, were examined to determine the nature and condition of building stone used during construction of the building. Sample No. 1 consists of highly porous, poorly cemented, poorly sorted, coarse-grained volcaniclastic sandstone obtained from the building exterior. The sand grains that make up the stone are composed dominantly of basalt and andesite, with discrete grains of plagioclase feldspar, pyroxene, and occasionally quartz. The rock is poorly cemented, with scattered pore-lining calcite and widespread, very thin grain-rimming Fe-rich smectite. The presence of this swelling clay cement and the general absence of strong pore-filling natural cement, results in a stone with poor construction quality, sensitive to crumbling upon repeated wetting and drying, and highly transmissive to moisture. Stone sample No. 2, obtained from an interior location (lower level) consists of coarse-grained intrusive diabase with interpenetrating, weakly flow-oriented plagioclase laths and interstitial pyroxene and iron oxide. The sample probably represents an intrusion which cooled slowly, allowing the growth of large phenocrysts of pyroxene and plagioclase. The interlocking crystal fabric of this dark volcanic rock results in a stone with considerable strength that will be resistant to moisture and surface degradation. This stone would probably accept polishing to reveal its attractive internal structure. The diabase has minor amounts of isolated porosity that frequently shows lining by Fe-rich smectite clay. These clays probably developed during surface weathering of the rock at the quarry site. The coarse-grained nature of this diabase distinguishes it from the locally abundant basalt of the Columbia River Group, which tends to be very glassy and generally shows very small feldspar phenocrysts.

Methods

A thin slice of each stone sample was cut with a diamond-bladed rock saw and sent to Idaho Petrographics for preparation of standard thin sections. Each of the samples was impregnated with blue-dyed epoxy in order to facilitate polishing of the friable sandstone and accentuate intergranular porosity. Each thin section was photographed to document grain-size, mineralogical composition, and pore types. Sandstone grain-size was determined by measuring the long axis of 100 grains. The sorting measure used represents the phi standard deviation, where phi is the grain size expressed as –log(grain-size in mm, base 2). This is a standard convention among sedimentary petrologists.

X-ray diffraction (XRD) analysis was carried out on the <15-2- and <2-μm fraction of the sandstone sample. Owing to the very minor amount of clay observed in the diabase sample, I

did not feel compelled to try to grind up this very durable rock to obtain the amount of clay needed for XRD analysis. My identification of the clay mineralogy of this sample is based upon the optical properties of the pore-lining clays and past experience in dealing with weakly altered basaltic rocks. The clays from the sandstone sample were obtained by washing the crushed sand in distilled water and subjecting the slurry to mild ultrasonic treatment. The suspended sediment was allowed to settle for 15 minutes, after which the suspended fluid was decanted and centrifuged to obtain the <2-μm fraction. The separation process was repeater 3 times, until most of the clay was removed from the sand. The <2-μm fraction was saturated with Mg by rinsing several times with 0.5M $MgCl_2$, followed by the removal of excess salt by several rinses with distilled water. Slides for XRD analysis were prepared using a smear method and the mineralogic composition was determined using a long fine focus X-ray generator (Cu Kα radiation), with a quartz reference intensity of ca 30,000 counts per second. The slides were scanned from 2 – 40 degrees 2-Theta, using glycol solvation to test for the presence of expandable clays. Copies of the XRD patterns are included with this report.

Results

Exterior Stone (Sample No. 1)

Thin section petrographic analysis of the exterior stone from the Waldron Drug Store Building shows that the stone consists of poorly sorted, coarse-grained, basaltic sandstone with poorly-developed grain-rimming Fe-rich smectite cement and scattered grain-rimming calcite cement (Figures 1 – 4). The smectite cement may be an infiltrate that formed during river deposition of the sand prior to solidification (Figures 5 & 6). The calcite cement is probably a caliche or ground-water derived cement that formed after the river sands were subjected to shallow burial. The sandstone has an average grain size of 0.77-mm, and ranges in grain size from <0.063-mm (the very fine-grained sand/silt cutoff) to in excess of 2-mm (the very coarse sand/granule cutoff). Thus, the sand is poorly sorted, as indicated by a phi standard deviation value of 1.22. (Samples whose phi standard deviation ranges between 1-2 are considered poorly sorted.) Evidently, the river system that deposited the sand was sufficiently energetic that most of the silt and clay remained in suspension while the coarse sand accumulated in migrating channel sand bars. The basaltic sand grains are generally rounded, whereas discrete plagioclase and pyroxene grains are angular to subangular in shape. The absence of severe compaction and cementation indicates that the sediment was never very deeply buried. The lack of geologically-produced cement and abundance of altered and microporous rock fragments in the exterior stone sample render the stone unsuitable for prolonged exposure to the elements. Repeated wetting and drying of the stone will accelerate physical degradation of the stone as clay swelling and leaching of internal carbonate cement contributes to loosening of the rock fabric. Much of the rock's strength is due to the poor sorting and the weak clay cementation of the sandstone. Compaction of this poorly sorted sand has produced a clay-deficient "adobe", which will hold together as long as it is kept dry, but probably has a short life in critical weight bearing building applications when exposed to repeated wetting and drying.

Interior Stone

The stone sample taken from the interior of the Waldron Drug Store Building is fundamentally different from the porous crumbly sandstone used for the building exterior. The interior stone consists of coarse-grained diabase, an intrusive igneous rock with the same chemical composition as basalt, but generally much coarser grained (Figures 7 & 8). The coarsening of the crystalline components of diabase results from slow cooling deep within the earth, which allows much

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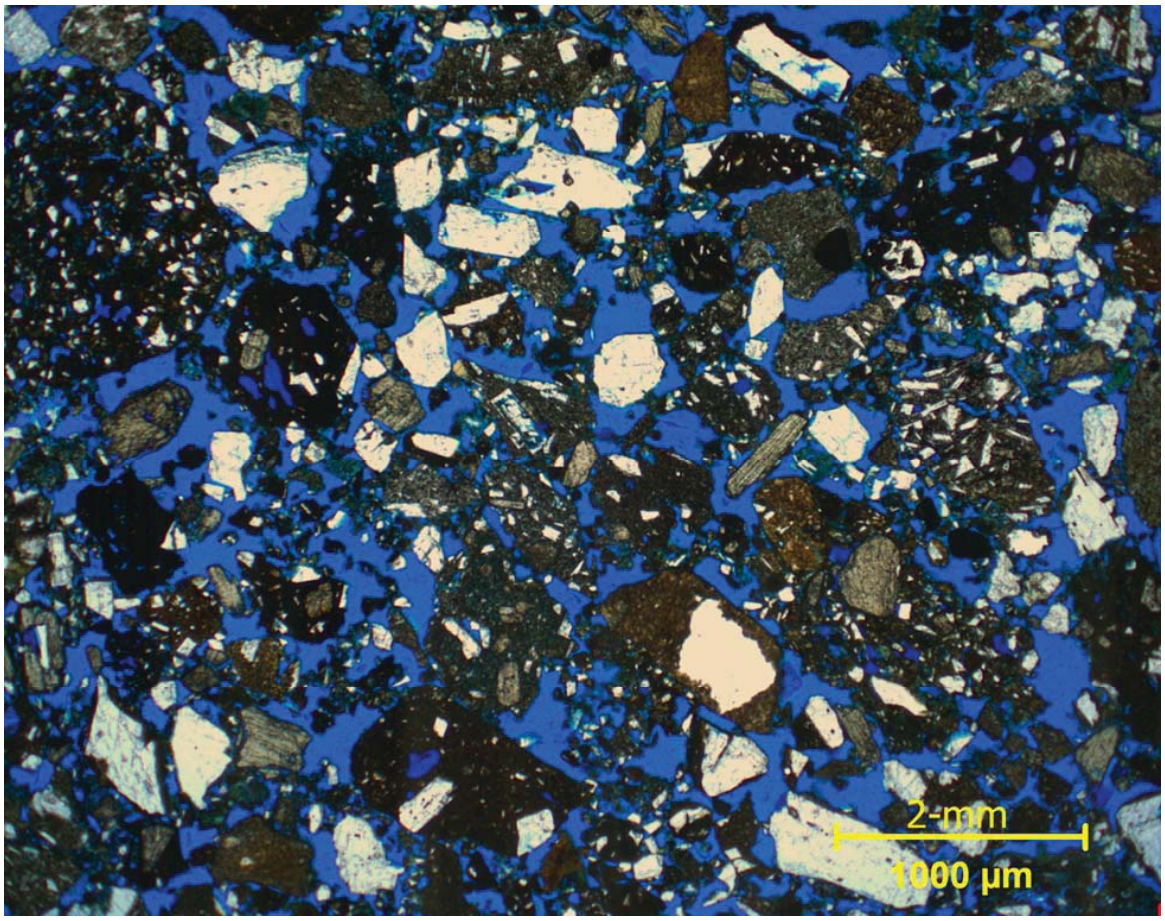

Figure 1. This plane light photo was taken of stone sample No. 1 with a 1.25X objective and illustrates the strongly lithic character of the sand, which is composed predominantly of basaltic rock fragments and discrete grains of plagioclase and pyroxene. The dominance of dark volcanic rock fragments gives the stone a dark grey to black color in hand specimen. The sandstone shows large amounts of intergranular porosity, as well as microporosity developed within some individual rock fragments. This intragranular porosity may reflect the occurrence of gas bubbles in the original volcanic rock, or could also have formed as a result of leaching of unstable mineral grains during weathering and transport of the sand. The open, porous state of the sandstone suggests that the rock was never very deeply buried, nor strongly cemented by clays or other intergranular cements. This rock will not have high compressive strength and will be very prone to crumbling in surface exposures due to interaction with swelling clay cements. The 2-mm scale is correct. Please ignore the 1000-µm label.

longer time for crystal growth. In the interior stone, the dominant crystal building blocks of the rock are lath-shaped crystals of plagioclase and granular crystals of pyroxene. The plagioclase laths from a complex interlocking fabric with pyroxene filling the interstitial space between plagioclase laths, or occasionally forming large crystal agglomerations. Other minerals in the diabase include magnetite and minor amounts of smectitic clay. The clay minerals are

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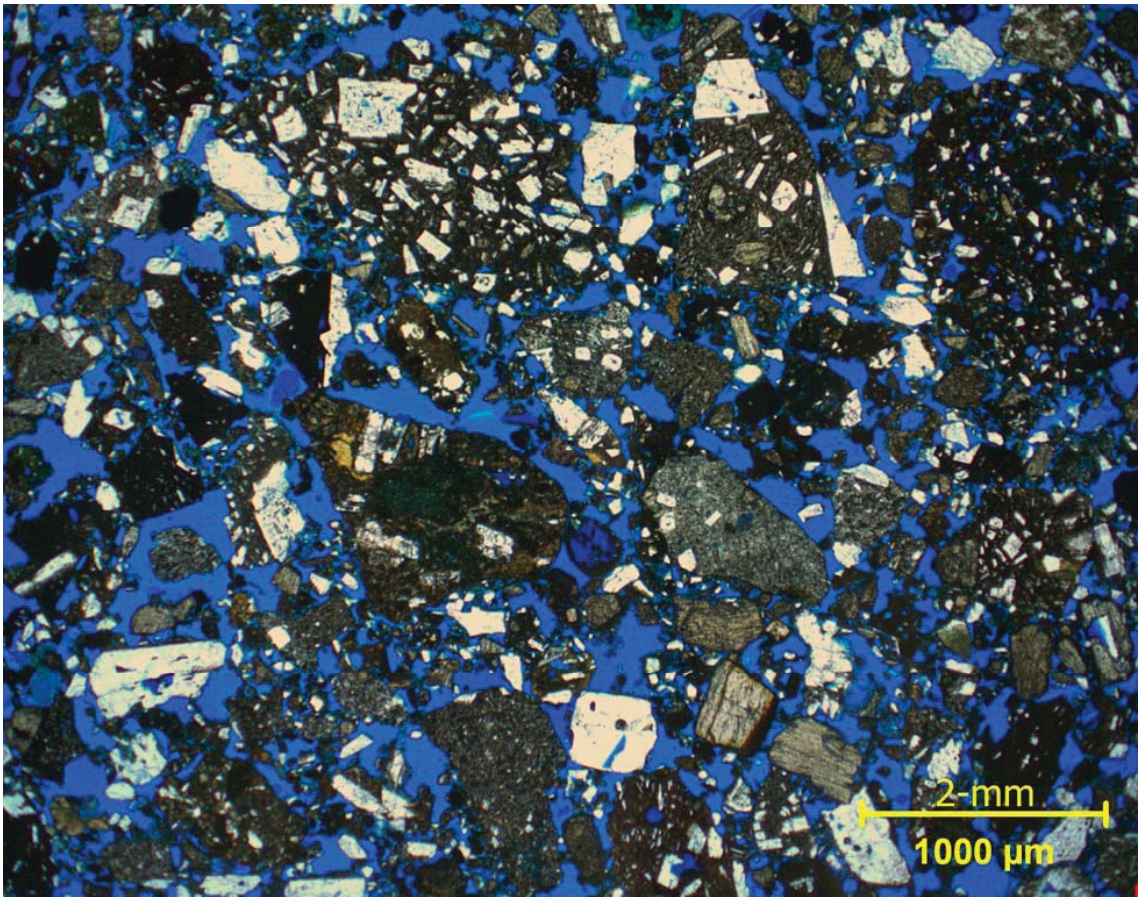

Figure 2. This photo shows another view of the exterior building stone from the Waldron Drug Store Building, illustrating the presence of very coarse-grained, often granule-size grains of basaltic rock that make up the dominant component of the sandstone. The rock fragments usually consist of porphrytic basalt, with fine- to medium-grained crystals of plagioclase or augite, surrounded by a much finer-grained, often glassy groundmass. Some rock fragments show moderate alteration to clay (larger central grain with yellowish clay alteration). The blue background to the photo represents intergranular porosity of the rock that was impregnated with blue-dyed epoxy in order to facilitate grinding of the thin section. This stone crumbled during cutting with a rock saw and was very sensitive to surface wetting and drying. Exposure of this water-sensitive stone to repeated wetting and drying, such as might occur on the exterior of a building, would certainly hasten its degradation and failure. The 2-mm scale is correct. Please ignore the 1000-µm scale.

concentrated in thin bands around the walls of small gas bubbles in the diabase, indicating precipitation from water that percolated through the diabase as it was exposed near the ground surface prior to quarrying of the rock. The interlocking fabric of the framework crystals in the diabase produces a rock with considerable compressive strength. In contrast to the weak, porous, non-cemented sandstone of the exterior building stone, the interior diabase stone probably has excellent durability, fairly low permeability to moisture, and will be fairly insensitive to weathering.

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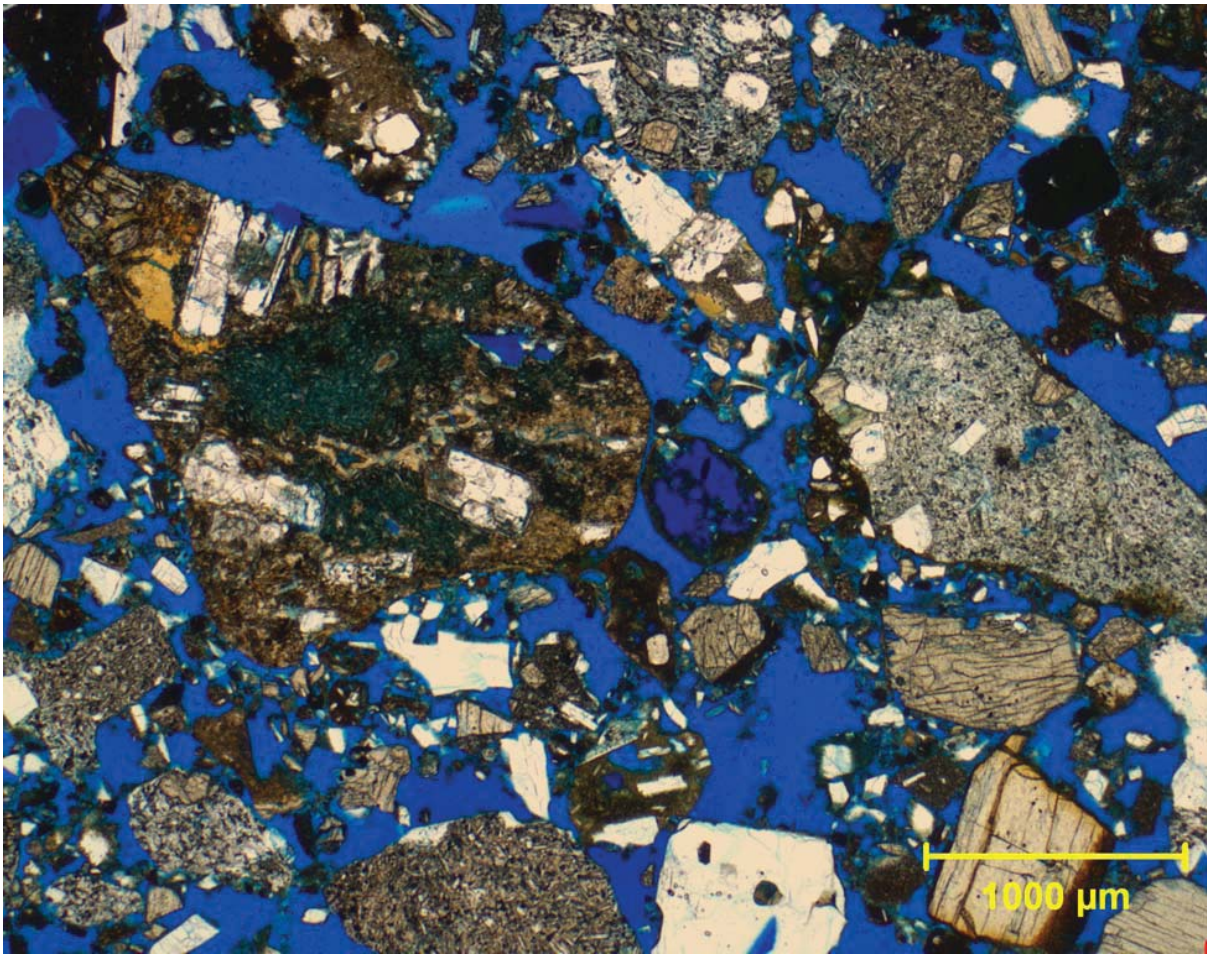

Figure 3. This photo shows a more magnified view of the central portion of the prior photo (Figure 2), representing the exterior stone from the Waldron Drug Store Building. The volcanic rock fragments show a complex heterogeneous assemblage of rock textures, some showing very tiny plagioclase micro-crystals surrounding larger plagioclase phenocrysts (center right side of photo). The mixture of volcanic rock types indicates that the sandstone formed in a river environment, where streams mixed sediment from a variety of volcanic rock types, lava flows, intrusive dikes, welded ash flow tuffs, and volcanic ash. Notice the poor sorting of the sediment, with some grains as small as fine silt, extending to grains as large as 1 – 2- mm. The amount of grain-bonding cement in this sample is very minor. The rock probably holds together primarily due to compaction of the poorly sorted grains. Without rigid grain-bonding cements, such as calcite or zeolite, this rock will be highly sensitive to surface flaking, granular failure (sugaring), and compressive failure. If there is no choice but to try to preserve this stone, it must be impregnated with an intergranular cement that will stabilize the rock fabric and protect against shrink/swell damage from wetting and drying.

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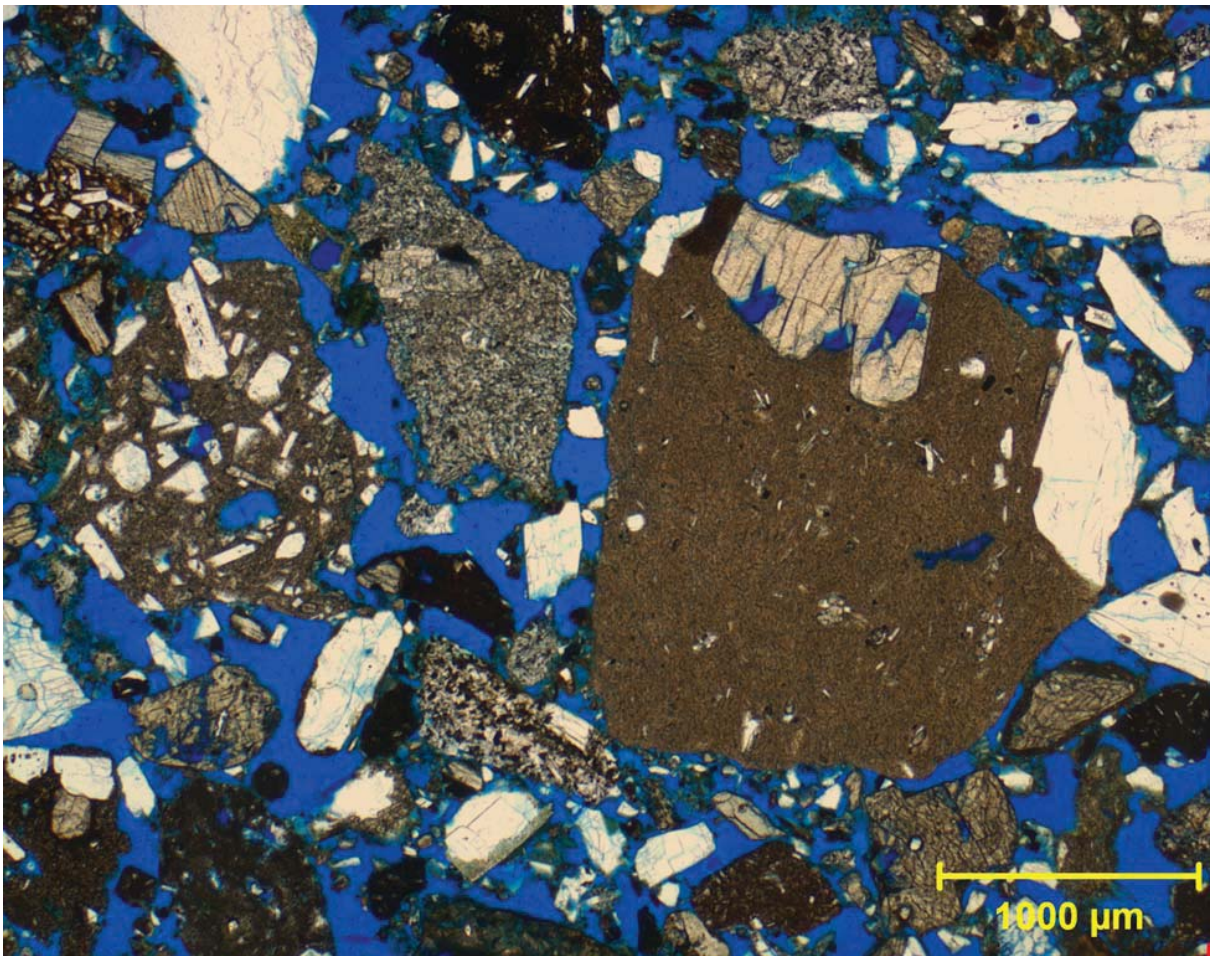

Figure 4. This photo shows another view of the basaltic sandstone used for the exterior building stone of the Waldron Drug Store Building. The very coarse-grained rock fragment at the right side of the photo shows a large pyroxene crystal floating in a matrix of altered volcanic glass. A broken plagioclase crystal occurs at the right edge of the grain. Note that most of the basaltic rock fragments exhibit rounded to sub-rounded grain shape, whereas most of the discrete plagioclase or pyroxene sand grains exhibit angular grain shape. The very fine-grained sand and silt particles are typically angular. Intergranular cement is typically absent and the rock is very weakly cemented.

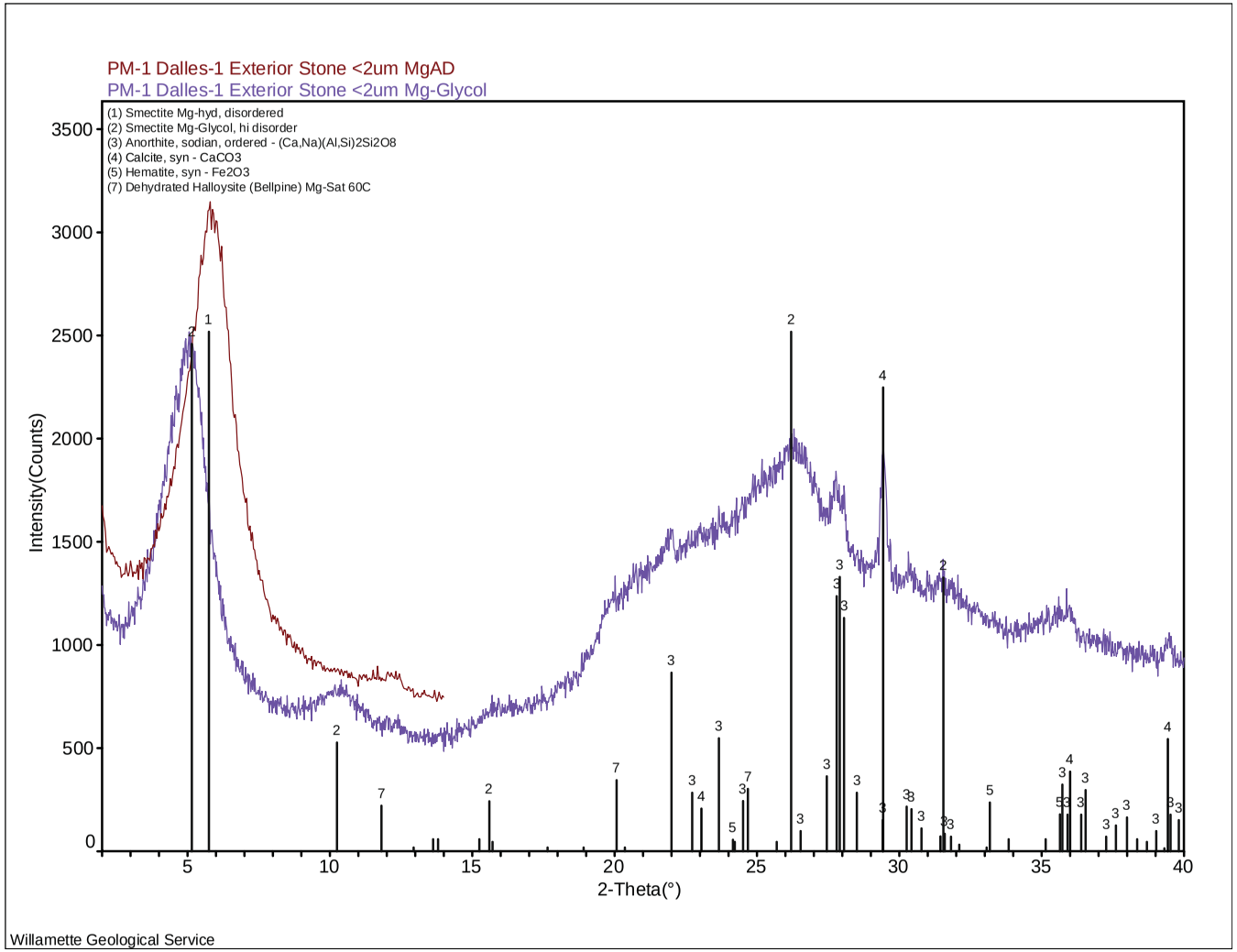

Figure 5. XRD pattern of the <2-μm clay fraction of the basaltic sandstone used for the exterior of the Waldron Drug Store Building, The Dalles, Oregon. The clay mineral assemblage is dominated by Fe-rich highly expandable smectitic clay, with minor amounts of non-clay minerals that include plagioclase, augite, hematite, calcite, and amorphous material (glass or allophone). This clay assemblage is extremely water-sensitive.

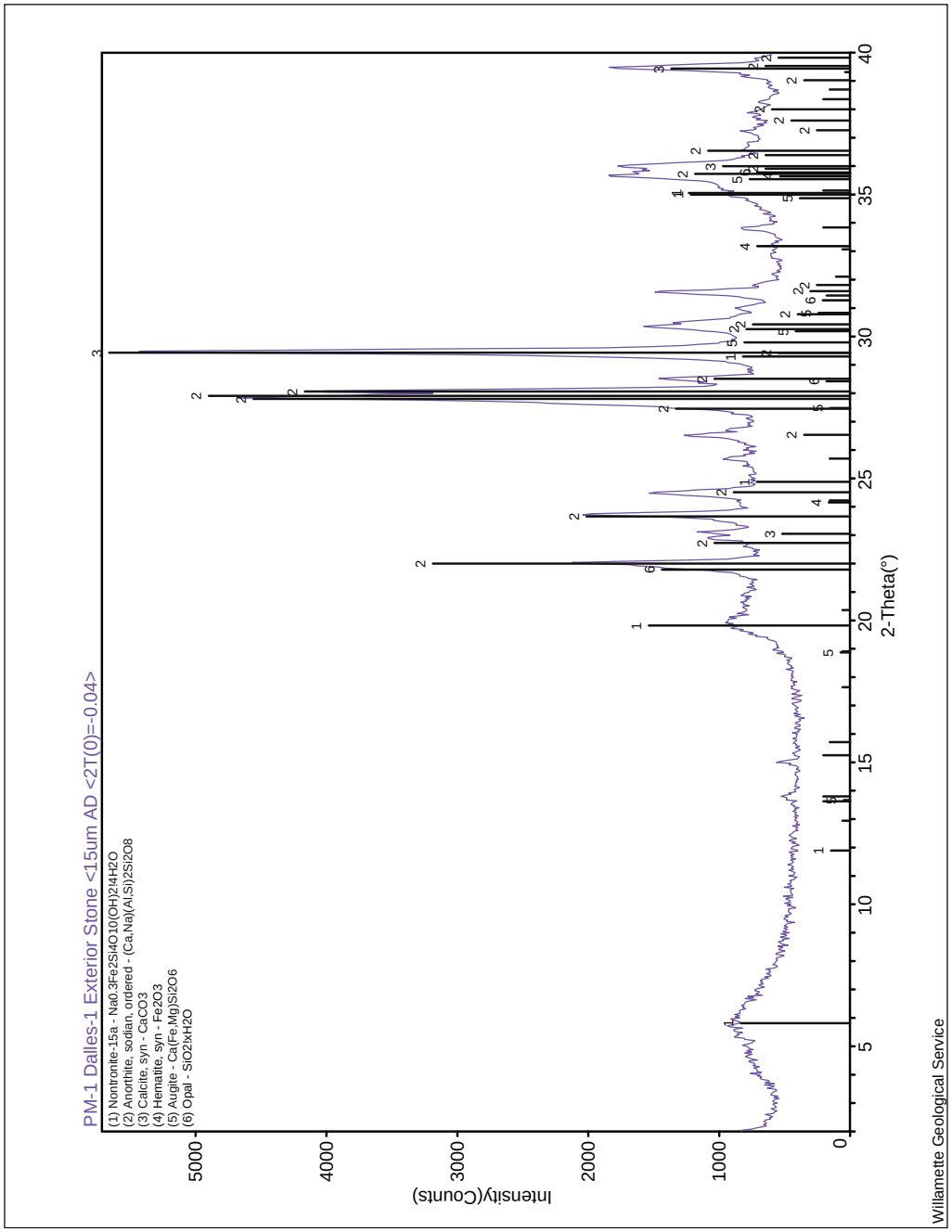

Figure 6. XRD pattern of the 2-15-µm fraction of material separated from the basaltic sandstone exterior building stone of the Waldron Drug Store Building, The Dalles, Oregon. The fine silt size fraction is enriched in plagioclase and calcite relative to the <2-mm fraction (Figure 5). The calcite component probably occurs as a grain-rimming cement associated with thin clay coatings. Such carbonate coatings develop in arid soil environments and can show local variation in intensity. These "caliche" cements are not well-developed in the stone.

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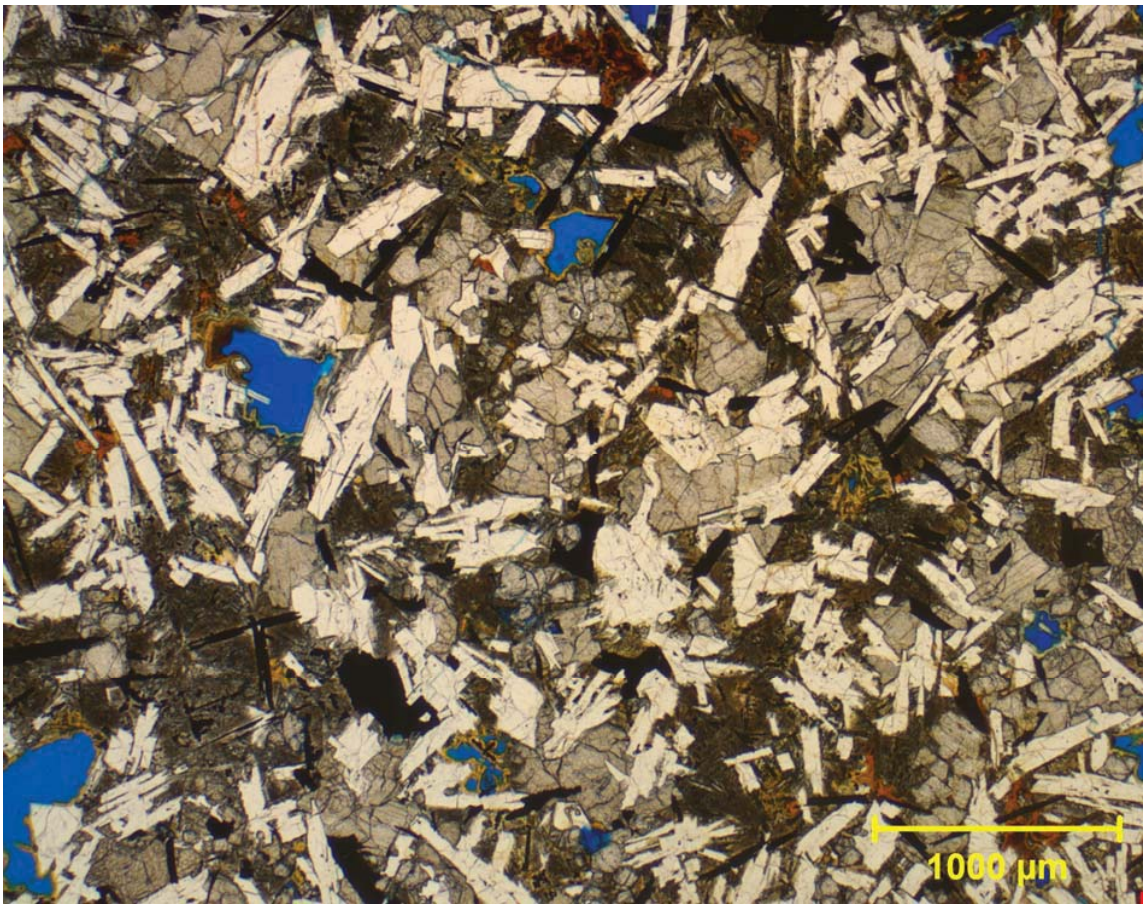

Figure 7. This photo shows a low magnification view of a thin section made from the interior building stone obtained from the lower level of the Waldron Drug Store Building, The Dalles, Oregon. In contrast to the poorly sorted, highly porous basaltic sandstone used for the building's exterior, this stone consists of a dark, dense, intrusive diabase, with coarse-grained laths of plagioclase feldspar enclosing, or enclosed by, equant patches of dark pyroxene and altered basaltic glass. Basalt and diabase have similar chemical composition, but differ in the texture of the rock, with diabase developing a coarse, interpenetrating crystal fabric that reflects slow cooling and a long period of crystallization. Scattered blue-filled pores are generally rimmed with smectitic clay. In some cases, these pores may represent gas bubbles, but more likely represent voids left by the dissolution of unstable minerals. This stone has suffered minor amounts of alteration due to surface exposure and weathering. Portions of the rock along the top of the photo and lower right corner show oxidative weathering and development of minor amounts of clay from the altered glassy matrix. In spite of this weathering, this rock should show high durability and is representative of a fairly high quality building stone, assuming other factors (fracture density, compressive strength, etc) are favorable.

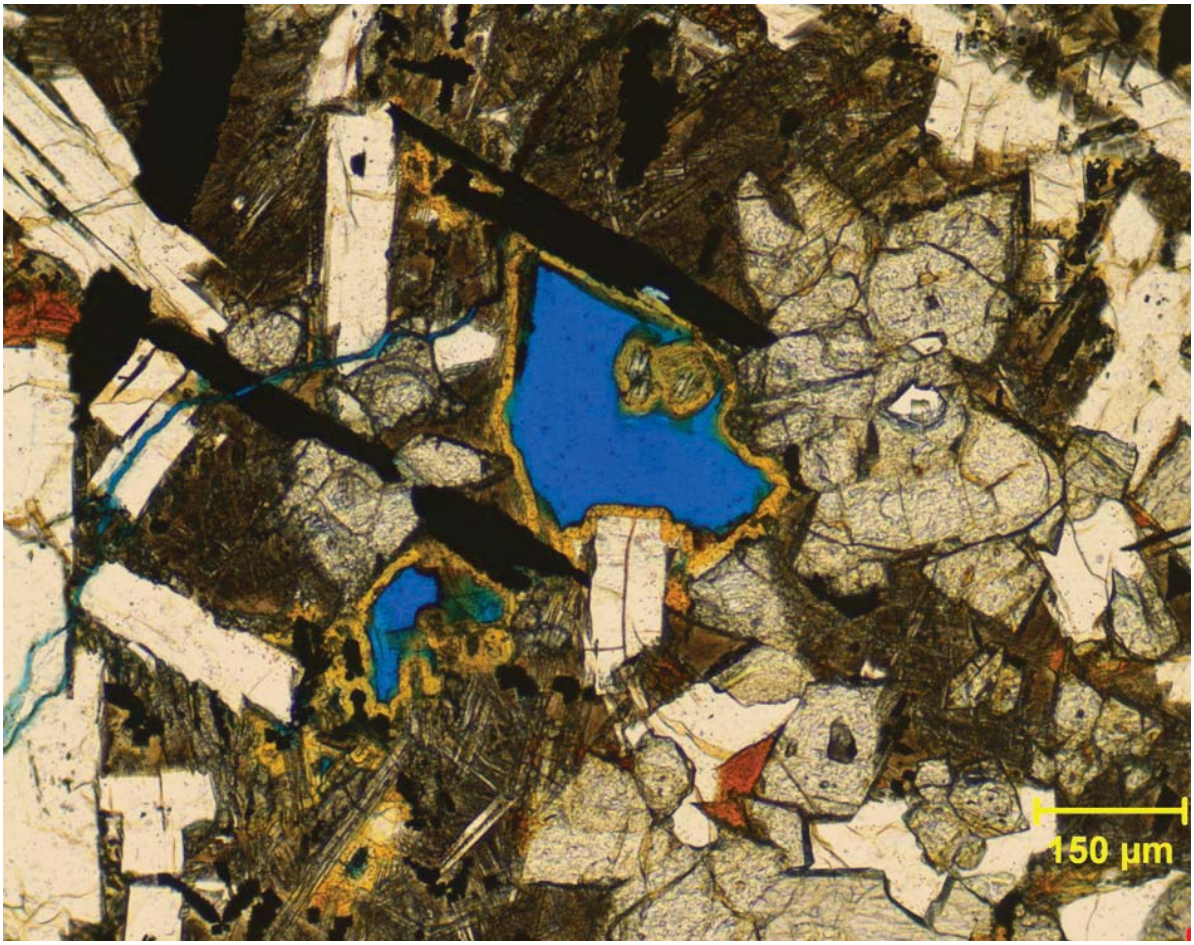

Figure 8. This photo shows a more highly magnified view of the diabasic building stone from the interior location in the Waldron Drug Store Building. The center of the photo shows a pore filled with blue epoxy. The walls of the pore are lined with gold-colored smectitic clay that shows a secondary rim with greenish clay. Elsewhere, clay-altered matrix has taken on a reddish-orange color from mixing of clay and very fine-grained hematite. Plagioclase crystals show up as larger white laths and tiny elongated crystals in the altered glassy matrix of the rock. Augite crystals have a grayish color and appear granular in character. A few elongated opaque iron oxide crystals trend diagonally across the photo. This area of the rock shows moderate alteration, but many of the framework minerals survive intact and preserve the interlocking crystalline fabric of the rock. It is this "welded", interlocking crystalline fabric that gives this stone its strength and durability, although the durability of the stone may show local variation due to local differences in the extend of alteration of the stone by weathering.

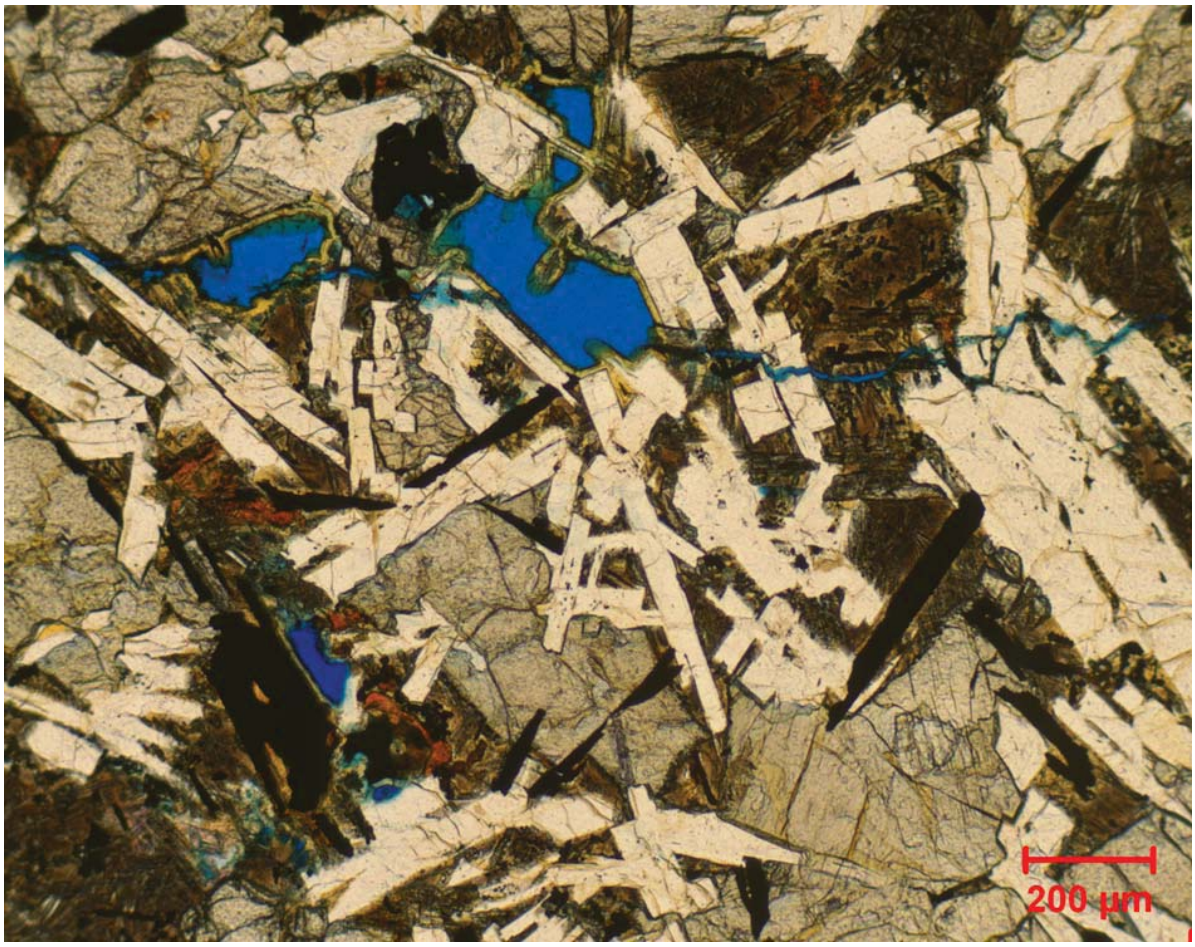

Figure 9. This photo shows another view of the interior building stone from the Waldron Drug Store Building, illustrating the random orientation of the white coarse-grained plagioclase laths with coarse interstitial pyroxene. The interstitial material in the upper right corner of the photo consists of altered basaltic glass and is composed of a mixture of smectitic clay, hematite, and tiny plagioclase crystals. More of the golden-colored pore-lining smectitic clay is seen on the walls of epoxy-filled vesicles in the upper part of the photo. While this stone is certainly coarse-grained enough to fall into the diabase classification, the presence of open gas bubbles and remnants of altered glassy matrix suggest that this sample could also be a basaltic lava, perhaps from a vent plug that experienced much slower cooling than other areas of the flow. The altered character of the stone further suggests that it was exposed to surface weathering and interaction with oxidizing ground water, resulting in the formation of secondary clays and iron oxide minerals.

Conclusions

Two stone samples were examined from the Waldron Drug Store Building, an historic structure built in the 1860's in The Dalles, Oregon. Locally-derived rock material appears to have been used in building construction. The exterior stone (Sample No. 1) consists of poorly sorted, highly porous, coarse-grained basaltic sandstone that was laid down in a river environment and weakly cemented by shallow burial. Sands of this character probably originate as sediments washed down streams from the Cascades. A Columbia River source is not possible, since Columbia River sands contain granitic rock fragments and moderately abundant quartz – grains that were not identified in the exterior building stone sample. This stone is a low quality rock, exhibiting weak cementation and sensitivity to rock failure upon repeated wetting and drying due to the presence of expandable clay cements. Portions of the rock are cemented by very fine-grained calcite. These areas will be less sensitive to crumbling and spalling failure due to shrink/swell damage from expandable clays. Overall, however, the stone has poor quality for use in exposed exterior building applications. If the stone can not be replaced with something more durable, I would recommend trying to find a source for more strongly calcite-cemented basaltic sandstone to use as a substitute stone with better engineering qualities. If this is not possible, the existing stone will need to be impregnated with a penetrating epoxy to provide grain-to-grain bonding.

The second stone sample from the interior of the Waldron Drug Store Building consists of a coarse-grained basaltic intrusive igneous rock that shows diabasic texture. The internal rock fabric shows a highly rigid framework of randomly oriented coarse-grained plagioclase laths surrounded by coarse interstitial pyroxene or dark basaltic glass. The rock has low amounts of porosity, with pores primarily represented by isolated clay-rimmed gas bubbles. The rock shows local variation in the intensity of alteration, with some areas that are dominated by interstitial basaltic glass showing oxidation and smectitic clay formation. These altered zones appear randomly distributed and do not contribute to major zones of weakness that might influence failure of the stone. The occurrence of this weathering may be highly variable in the quarry location and could be minimized by careful selection of stone cutting sites. Overall, the interior stone is a good quality rock for most structural applications, to be highly preferred over the porous, weakly-cemented, basaltic sandstone that was used for the building's exterior.

If I can be of further help with this project, feel free to contact me.

Respectfully submitted,

Dr. J. Reed Glasmann, Willamette Geological Service

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APPENDIX C

Terminology and Glossary

A number of terms used in this report have a specific meaning in the context of this report and are therefore defined below. All of the terms and abbreviations used are standard in the industry. This glossary may be of some aid for those not familiar with constructions terms.

Air Leakage: refers to airflow into or out of a space through the wall assembly. The outward leakage of air is known as exfiltration and the inward leakage is known as infiltration.

Andesite: a volcanic rock.

Arch: a mechanical arrangement of blocks of any hard material disposed in the line of same curve, and supporting one another by their mutual pressure; the arch itself is formed of arch stones.

Architectural Stone: non-load bearing cut panels (3/4″ – 5″ thick) used as a curtain wall or veneer in building construction; commonly referred to as cladding in the industry.

Architrave: the lowest of the three main parts of an entablature.

Artificial Stone: stone chips and matrix formed to look like stone.

Ashlar: wrought stone of uniform shape and height, as opposed to rubble work.

Atrium: a tall internal courtyard with a glazed roof that lets in daylight.

Awning: an external blind of fabric, such as canvas, that can be put up for protection against sun or rain.

Bay: one of several uniform divisions of a building.

Beds: the lower surface upon which a block of stone rests, and the upper surface which supports the stone above.

Building Paper: refers to a breather-type asphalt sheathing paper which is rated in minutes (15, 30 or 60), based on preventing water flow through it for number of minutes in accordance with a standard test. Usually used as a moisture barrier.

Capital: the head or crowning feature of a column.

Column: an upright member, circular or rectangular in plan; in classical architecture consists of a pedestal, shaft and capital. It is designed to carry the entablature or other load, but is also use ornamentally in isolation.

Coping: a capping or covering to a wall, either flat or sloping to throw off water.

Corbel: a projecting block, usually stone or brick, supporting a beam or other horizontal member. A series, each one projecting beyond the one below can be used in constructing a vault or arch.

Cornice: typically the projecting molded course which crowns the part of the wall to which it is affixed.

Course: a horizontal layer of stone or brick.

Curtain Wall: a non-load-bearing wall which can be applied in front of a framed structure to keep out the weather. There are many types, manufactured from a variety of materials such as aluminum, steel, and glass.

Dentils: are small square block features used in series as part of particularly styled cornices.

DORMER: a small window with a gable or arched top, projecting from a sloping roof.

DRIP EDGE: a projecting member of a cornice etc., from which rainwater drips and is thus prevented from running down the face of the wall.

DUTCHMAN: a stone repair where the broken stone is cut uniform to receive the fitting of a newly matched stone which has been cut to fit; usually fastened with a epoxy and/or pin.

EFFLORESCENCE: occurs when salts from the masonry and mortar are dissolved by water and carried by solution to the surface. Once the water is evaporated, the salts are deposited on the surface of the masonry.

ENTABLATURE: the upper part of an order consisting of architrave, frieze and cornice.

EPDM: (Ethylene Propylene Diene Monomer) refers to a waterproofing sheet membrane made of vulcanized rubber. These membranes, usually single-ply applications, may be installed fully bonded to the substrate with an adhesive, or may be "loose-laid" with only the laps and terminations of the membranes adhered.

EXFOLIATION: the process where the surface of brick or stone masonry comes off in layers.

FLASHING: refers to sheet metal or other material used in roof or wall construction and designed to shed water (typically sloped outwards, with a drip edge to shed water). Used in conjunction with:

- Cap or Parapet flashing: top of wall, pier, column or chimney.
- Saddle flashing: an upturn, sloping transition piece between a horizontal and vertical plane, e.g., balcony cap and wall intersection.
- Head/sill flashing: at head or sill of window opening or other penetration.
- Base flashing: at bottom edge of wall surface.
- Cross-cavity or Through-wall flashing: a flashing which sheds water from the moisture barrier plane to the exterior, through the cladding.

FRIEZE: the middle division of an entablature, between the architrave and the cornice, usually decorated but may be plain.

GABLE: triangular section of wall beneath the ridge of the roof.

GRANITE: refers to rocks of various origins, range including felsic igneous and metamorphic rocks that vary considerably in mineral composition. These rocks are usually dense and have a wide range of grain sizes.

GUM LIP: refers to a method of sealing flashing to a wall surface whereby the top edge of the flashing is bent outwards to form a caulk-filled cavity (typically at the termination of a waterproofing membrane).

JULIET BALCONY: a narrow balcony in front of a door.

KEYSTONE: the central stone of an arch or a window head.

LIMY MORTAR: refers to a lime based mortar composition as opposed to cement. This type of mortar is much softer compared to cementitious types and is better suited for soft masonry such as brick.

LINTEL: a horizontal beam or stone bridging an opening.

MANSARD ROOF: a roof with a lower section that steeply slopes to form a wall.

MASONRY: an assemblage of masonry units properly bonded together with mortar.

MULLION: the vertical post or other upright dividing a window or other opening into two or more lights, usually structural.

MUNTIN: secondary strips (not structural) used to divide a window into multiple lights.

ORDER: in classical architecture, a column with pedestal, shaft, capital and entablature.

OXIDE JACKING: the process where the expansion of a corroded structural or supporting steel members causing displacement or spalling of the masonry by internal pressure.

PEDESTAL: makes up the base of a column, supporting the shaft.

PILLAR: a vertical structure of stone, slender in proportion to height used as support or ornament.

PLASTIC REPAIRS: repairs where damaged stone or masonry is replaced by mortar.

QUOINS: the dressed stones at the corners of buildings, usually laid so that their faces are alternately large and small.

SANDSTONE: comprised of individual grains supported by a natural cementitious materials; often shows bedding planes.

SBS MEMBRANE: a manufactured sheet membrane applied by heating the substrate and membrane. Typically installed in two plies.

SCALING: the removal of loose, delaminated or spalled masonry.

SHAFT: the trunk of a column, between the pedestal and the capital.

SILL-BLOCK: the segment(s) of masonry that make up the sill portion of a window.

SPALL: refers to a fragment of material, such as concrete or masonry, detached from a larger mass by a physical blow, weather action, internal pressure or efflorescence within the mass (sub-fluorescence).

SPLIT FACE: the resulting surface texture, which arises from splitting a stone.

SUGARING: a process where the crystal bonds of granite are eroded by salt crystallization.

SUPERSTRUCTURE: a structure above or on something else, anything erected on a foundation.

TIDE LINES: are formed when dissolved salts in water are wicked up the porous masonry then are deposited on the surface when the water evaporates.

TIEBACK BRICK: bricks used in such a fashion as to support one wythe to another.

WEEPHOLES: refers to an opening placed in a wall or window assembly to permit the escape of liquid water from within the assembly. Weepholes can also act as vents.

WYTHE: a continuous vertical section of a masonry wall having a thickness of one masonry unit.

Specifications, and the review of contractor

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Attachment B:

Cost Estimate

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COST ESTIMATE

Item	Quantity	Units	Cost per Unit	Total
General Repairs				
Add shear/railroad separation wall (south end)	700	SF	$40	$28,000
Install rock anchors at shear walls	4	EA	$7,000	$28,000
Remortar stone wall joints	11000	SF	$20	$220,000
Repair deteriorated stone	1	LS	$50,000	$50,000
Penetrating epoxy coating on stone wall	5200	SF	$10	$52,000
Epoxy grout wall cracks	200	LF	$20	$4,000
Repair column bases	14	EA	$800	$11,000
Repair deteriorated and fire-damaged wood	1	LS	$20,000	$20,000
Apply waterproofing, ext. walls, south end	250	SF	$5	$2,000
-Shoring	140	SF	$70	$1,000
-Excavation/backfill	50	CY	$60	$3,000
Add retaining wall at First Floor, south end	200	SF	$40	$8,000
New roof membrane	1600	SF	$15	$24,000
Replace typical windows	15	EA	$1,000	$15,000
Replace south windows	6	EA	$2,500	$15,000
Replace parapet coping	180	LF	$20	$4,000
Heating, electrical, and plumbing	1	LS	$35,000	$35,000
Demo (including Mezzanine Level)	1	LS	$20,000	$20,000
Subtotal				$540,000
Seismic Upgrades				
Add shear wall (north end)	700	SF	$40	$28,000
Install rock anchors at shear walls	4	EA	$5,000	$20,000
Reconfigure Second Floor exit stair	1	LS	$10,000	$10,000
Diaphragm reinf. - Second Floor and Roof	3100	SF	$8	$25,000
Add tension ties of walls to diaphragms (2nd + R)	150	EA	$100	$15,000
Add diaphragm chords - Second Floor and Roof	140	LF	$30	$5,000
Brace south parapet	1	LS	$3,000	$3,000
Demo	1	LS	$10,000	$10,000
Subtotal				$116,000
Design Fees				
Structural	1	LS	$60,000	$60,000
Architectural	1	LS	$46,000	$46,000
Geotechnical	1	LS	$8,000	$8,000
Mechanical/Electrical/Plumbing	1	LS	$10,000	$10,000
Subtotal				$124,000
Total				$780,000

Notes:

1. This cost estimate covers repairs required for future occupancy (General Repairs) and upgrades for seismic strengthening (Seismic Upgrades). It is based on providing a core and shell building with heat to temper the space and safety lighting, but no tenant improvements.
2. The following are not included in this cost estimate:
   a. Replacing the existing murals on the exterior walls.
   b. Abatement of hazardous materials.
   c. Flagging, permits, work interruption, and other limitations imposed by UPRR.
   d. Utility service up to the building and underground plumbing.

3. Design fees include construction documents for core and shell (tenant improvement work is not included), providing minimum heating for the enclosed shell along with safety lighting. Preconstruction material analysis testing is included in design fees.

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