CREtelligent
Commercial Real Estate Due Diligence. Simplified.

Seismic Risk Assessment

Subject Property:

City Place Apartments

[redacted], Seattle, WA 12345

Engaged By:

Client Name:	**Mr Banker**
Client Company:	[redacted]
Client Address:	**Bank St, Washington, DC, 67890**
Order Number:	**25A12-12345-001**
Date of Engagement:	**January 1, 2025**
Report Date:	**January 2025**

[redacted]
Mr Banker
Bank St,DC 67890

Re: Seismic Risk Assessment (SRA) – Probable Maximum Loss (PML)
City Place Apartments
[redacted], Seattle, WA

CREtelligent (CRE) has completed a Seismic Risk Assessment (SRA) – Probable Maximum Loss (PML) report of the above referenced Property. The assessment was completed in accordance with ASTM International (ASTM) E2026-16a *Standard Guide for Seismic Risk Assessment of Buildings* and generally accepted industry standards.

We appreciate the opportunity to be of service on this important project. Please do not hesitate to contact the undersigned with any questions or comments.

Sincerely,

CREtelligent

for

William Structure, PE
Senior Assessor

Fraser K Hamilton
Technical Director, Assessment Services

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Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Subject Property Description

Subject Property Name:	City Place Apartments
Subject Property Address:	[redacted]
City, State Zip Code:	Seattle, WA 12345

Provide a paragraph describing the Property following the example below.

The Property consists of a rectangular parcel of land totaling approximately 0.4 acres improved with one two-story apartment buildings containing 35 living units totaling 30,000 square feet (SF). The building, which was constructed in 2020, is/are of wood-frame construction with cementatious hardboard siding and a flat roof covered with single ply TPO membrane. The building is constructed on a reinforced concrete slab-on-grade foundation system and does not contain sub-grade areas that could be occupied. Additional improvements include concrete-paved driveways and parking areas, concrete sidewalks and landscaping. At the time of the assessment, the Property operated as an apartment complex.

A Property Location Map and a Property Diagram are included in Appendix 1. Photographs of the Property are provided in Appendix 2.

1.2 Opinion of Probable Maximum Loss

For this assessment, the PML is defined as the Scenario Expected Loss in the Design Basis Earthquake (SEL_{DBE}). The Design Basis Earthquake (DBE) is defined as the site ground motion with a 10% probability of exceedance in 50 years, which equates to a return period of 475 years. This is sometimes referred to as the 475-year PML.

Based on CREtelligent's field observation on December 10, 2024 and using the damage prediction method developed by Thiel and Zsutty, ground fault and acceleration data from the EQFAULT and USGS and CGS websites; it is our professional judgment that the SEL_{DBE}, also referred to as the PML, for the Subject Property is 8%. The Scenario Upper Loss (SUL) for the Property is 12%.

2.0 USER RELIANCE

This assessment was conducted on behalf of and for the exclusive use of [redacted] (Client). This report, and the findings contained herein, shall not, in whole or in part, be disseminated or conveyed to or used by any other party without the prior written consent of CREtelligent. Any unauthorized party using or relying upon this Report shall be liable to CREtelligent for equitable compensation and appropriate punitive damages, and shall be responsible to reimburse CREtelligent for and indemnify, defend, and hold CREtelligent harmless from and against any and all costs, claims, liabilities, expenses, lost profits, and damages arising as a direct or indirect result of such unauthorized use or reliance.

3.0 INTRODUCTION

3.1 Purpose

CREtelligent was retained to conduct this seismic risk assessment to assist in the underwriting of a proposed mortgage loan.

3.2 Scope of Work

This SRA was conducted in accordance with ASTM E2026-16a *Standard Guide for Seismic Risk Assessment of Buildings* (Standard) Level of Investigation Level 1. CREtelligent evaluated information collected during completion of the Subject Property reconnaissance to develop a statistical estimate of the cost to repair damage to buildings at the Subject Property that might occur as a result of the 475-year return period event. The calculation was based on the damage prediction method developed by Thiel and Zsutty and ground acceleration data from the FRISKSP software.

The Standard defines the DBE as the site ground motion with a 10% probability of exceedance in 50 years, equivalent to a 475-year return period for exceedance, or a 0.2105% annual probability of occurrence. This earthquake has an equal chance of occurrence in any year. This is a standardized hazard level, often used by lenders, and the 475-year return period will be the ground motion basis for the damage estimate for the Subject Property unless CREtelligent is specifically instructed to use a different return period by Client.

Damageability will be expressed as a percentage of building construction costs and does not take into account the value of equipment, inventory or monetary loss from business interruption. Consistent with Section 6.5.1.4 of ASTM E2557-16a *Standard Practice for Probable Maximum Loss (PML) Evaluations for Earthquake Due-Diligence Assessments*, both the scenario expected loss (SEL) and the scenario upper-bound loss (SUL) for the Property will be reported. Because the term PML has had a number of very different explicit and implicit definitions, the Standard recommends the term PML be defined in terms of scenario loss or probable loss. Unless otherwise instructed by Client, CREtelligent will define the PML as the SEL_{DBE}.

3.3 Deviations from the ASTM Guide

There were no significant deviations from the ASTM Guide.

3.4 Significant Assumptions

- CREtelligent assumes the Subject Property has been correctly identified by the User, designated representative of the User, Subject Property owner or operator, and/or the designated representative of the Subject Property owner or operator.
- CREtelligent assumes that the User, designated representative of the User, property owner or operator, and/or the designated representative of the property owner or operator used good faith in answering questions about and providing information for the Subject Property.

- In the absence of information to the contrary, buildings present at the Subject Property are assumed to have been constructed in accordance with building codes in common use at the time of construction or, when applicable, subsequent significant modifications.

3.5 Limiting Conditions

- The scope of work completed was designed solely to meet the needs of [redacted]. CREtelligent shall not be liable for any unintended usage of this report by another party.
- The PML is solely an estimate of the amount of damage that can be expected during an earthquake. No estimate can wholly eliminate uncertainty regarding damage resulting from actual earthquakes. This estimate is not intended to serve as a guarantee of how the Subject Property will perform in a seismic occurrence. Rather, it is a statistical review that is intended to suggest how the Subject Property will be affected by a probable seismic event.
- Except as specifically identified in the report, this assessment does not include a review of plans, structural calculations, review of geotechnical investigations, or collection or analysis of soil samples. As a result, conclusions of this assessment are subject to a high degree of uncertainty.
- Consistent with the industry practice, the earthquake loss estimates reported here do not include possible earthquake triggered losses from fire, water damage, or related business interruption or losses to the contents of the building.
- Information in this report concerning geological conditions, location of faults, past seismic performance, the presence of any seismic retrofit, and condition of spaces not observed or viewable, is from sources deemed to be reliable, including, but not limited to maps and data published by universities, governmental agencies, and other repositories, and interviews with Subject Property owners, operators, tenants, and municipal agencies; however, no representation or warranty is made as to the accuracy thereof.
- CREtelligent will have no ongoing obligation to obtain and include information that was not reasonably ascertainable, practically reviewable or provided to CREtelligent in a reasonable timeframe to formulate an opinion and complete the assessment by the agreed upon due date.

3.6 Subject Property Access and Access Disclosure

Field Assessor:	William Structure, PE
Senior Assessor:	William Structure, PE
	The Assessors' qualifications are included in Appendix 6.
Date of Reconnaissance:	December 10, 2024
Weather Conditions:	Partly cloudy with temperatures around 50 degrees Fahrenheit
Site Escort:	Benjamin Tell, Owner, City Place Apartments

Areas Accessed: CREtelligent was provided access to four apartments, which represents approximately 10% of the available units, mechanical areas, equipment areas, common areas and storage areas. Access was provided by the site escort and is assumed to be representative of conditions at the Property. Specific units observed are listed in the following table:

Apt 106	Apt 110	Apt 115
Apt 100		

Inaccessible Areas: No areas were inaccessible during the assessment.

Other Limitations: No significant limitations or physical obstructions were encountered during the property reconnaissance.

4.0 SUBJECT PROPERTY DESCRIPTION

4.1 General

The Subject Property consists of a regular-shaped parcel of land totaling 0.4. The Subject Property is improved with one six story building. The building is of wood-construction with fiber cement sided exterior walls and a flat roof with a single ply TPO membrane. The building is constructed on a reinforced concrete slab-on-grade foundation system and does not contain any sub-grade areas that could be occupied. The building was constructed in 2020. Other improvements include concrete driveways and parking, concrete sidewalks and landscaping. At the time of the assessment, the Property operated as a multi-tenant retail facility, single-tenant office building, an apartment complex, etc.

Per the 1997 Uniform Building Code, the Property is in a Seismic Zone 3, defined as an area geographical area that is considered to have a moderate risk of experiencing earthquakes.

4.2 Building Characteristics

Structures can be grouped into various building classes. Different buildings within the same class can be expected to perform similarly during earthquake shaking. To account for the differences between buildings with the same class, additional information is utilized. For example, the year built provides an insight into the level of design code used. Generally, the more information that is available about a building, the more reliably potential damage can be estimated. It appears that, for this seismic area, the basic elements of a lateral-force resisting system have been in accordance with the building code in effect at the time of construction.

BUILDING CHARACTERISTICS

Year of Construction:	2020
Occupancy Type:	Apartments
Foundation:	The building is supported on a conventional shallow concrete foundation system with isolated spread footings set below concrete columns and continuous footings set below concrete bearing/shear walls. The continuous and isolated spread footings are to be supported over a 12-inch-thick compacted aggregate load transfer platform constructed over native soils improved with rigid inclusion geopiers. The geopier and load transfer platform system is a design-build system that is to produce a 4,000-psdesign soil bearing pressure. The 1st Floor level is a four-inch-thick concrete slab-on grade reinforced with welded wire mesh.
Building Frame:	Conventional wood-frame platform construction
Number of Stories:	Six

BUILDING CHARACTERISTICS

Lateral Load Resisting System:	Lateral wind and earthquake forces acting on the wood framed levels are resisted by the plywood or OSB sheathed roof and floor diaphragms spanning between perimeter and interior wood stud shear walls. The wood stud shear walls, sheathed with 7/16-inch thick OSB, transfer the lateral forces to the 2nd Floor concrete podium slab via embedded sill plate anchor bolts. Simpson holdown anchors (or similar) are used at the ends of the wood stud shear walls to transfer lateral overturning forces from the walls into the concrete podium slab. Lateral forces transferred from the wood stud shear walls and holdown devices, and lateral inertial forces acting on the concrete podium level, are resisted by the reinforced concrete slab diaphragm that spans between interior and perimeter reinforced concrete shear walls. The shear walls are reinforced with reinforced with face curtains of mild steel reinforcing bars. Vertical boundary reinforcing with closely space horizontal ties are located at the ends of the walls. The concrete shear walls transfer the lateral forces to the concrete foundations.
Shape Configuration:	Generally regular shaped in each module
Vertical Irregularities:	Low
Redundancy:	Standard
Torsion:	Low
Building Exterior:	Cement fiber lap siding
Seismic Details:	Assumed standard for the year of reported construction.
Structural Upgrades:	None
Construction Quality:	Appears to be good.
Hazardous Exposure:	None

4.3 Building Stability Assessment

In accordance with the ASTM Standard Guide E2026-16a and Standard Practice E2557-16a, a building stability assessment was performed. The stability assessment utilizes ASCE 41-13 “Seismic Evaluation and Retrofit of Existing Buildings”, Tier 1 evaluation procedures. Based on our assessment, the Subject Property appears to meet the building stability requirements and is expected to remain stable (partially and/or completely) when subjected to the DBE.

4.4 Soil Characteristics

The soil conditions at a site can influence the damageability of a structure in two general ways:

1. Soft soils tend to amplify ground motion.
2. Collateral hazards such as soil liquefaction, sliding or rupturing can potentially result in considerable damage to a structure.

Site specific geotechnical data classify the soil as Site Class E.

SOIL DATA

Soil Type	Gravelly sandy loam to very gravelly sandy loam
Liquefaction Potential	Low
Landslide Potential	Low
Fault Rupture Potential	Low
Tsunami Inundation Zone	Low

4.5 Site Stability Assessment

In accordance with the ASTM Standard Guide E2026-16 and Standard Practice E2557-16, a Level 1 Site Stability Assessment was performed by review of publicly available records. Based on our assessment and review of generalized mapping, the potential for liquefaction at the site appears to be low during a DBE event. Therefore, the Subject Property appears to meet the site stability requirements.

5.0 SEISMIC REVIEW

5.1 Site Seismicity

The Richter Magnitude Scale gives an indication of the absolute energy released in an earthquake; however, generally, the farther a building is from the epicenter, the less shaking it will experience. As such, just considering the magnitude of an earthquake does not give an adequate picture of the building's risk, since the distances from potential earthquake sources to the subject site must also be considered.

The Modified Mercalli Intensity (MMI) Scale considers the reduction, or attenuation, of ground motion as the distance between source and building being evaluated increases. The scale used Roman numerals from I (imperceptible other than to instruments) to XII (damage is total, waves seen on ground surfaces). For example, in a large earthquake, a site next to the fault may experience intensity IX shaking, while a site many miles away may experience only intensity VI shaking.

Earthquakes of moderate-to-large magnitude have occurred in southern California in recent history. The following table lists historical earthquakes with magnitude greater than 5.5 (Richter) and their corresponding effect (MMI) at the Subject Property; these earthquakes are within a 100-mile radius of the Property as recorded since 1900:

HISTORICAL EARTHQUAKES

Name	Date	Richter Magnitude	Peak Horizontal Site Acceleration (g)	Site MMI	Approx. Distance to Site in miles
Seattle-Tacoma	1965	6.9	<0.30	VIII	12
Robinson Point	1995	5	<0.15	VII	8
Olympia	1949	7.1	<0.15	VII	37
Duvall	1996	6.3	<0.15	VII	23
Seattle	1997	3.5	<0.15	VII	1
Nisqually	2001	3.5	<0.10	VII	35
Puget Sound	1939	5.75	<0.10	VII	18

Notes:

1. Data source: EQSearch software by Thomas Blake.
2. g = gravity (the peak horizontal ground motion is expressed as a percentage of gravity).
3. MMI definitions are provided in Appendix 3.

5.2 Regional Seismicity

Strong ground shaking may affect the site as the result if earthquakes likely to occur on the following regional faults:

Fault or Fault Zone	Distance in miles	Maximum Magnitude
Seattle fault zone middle	<1.0	7.2
Seattle fault zone northern	1	7.2
Seattle fault zone southern	2	7.2
Southern Whidbey Island fault southern	14	7.5
Tacoma fault zone	16	6.9
Southern Whidbey Island fault middle	16	7.5
Southern Whidbey Island fault northern	19	7.5

5.3 Damageability

A light to moderate level of overall damage is expected during a 475-year earthquake. Earthquake damage is expected to include tearing of the plywood/OSB roof and floor diaphragms, wood stud shear wall damage, cracking of the concrete slab diaphragms and shear walls, and distress to nonstructural elements (interior and exterior finishes, glazing, ceilings, partitions, equipment, and piping).
The following Probable Maximum Loss (PML) damage estimates are reported consistent with ASTM E2026 terminology for Scenario Expected Loss (SEL) and Scenario Upper Loss (SUL). The SEL and the SUL result from earthquake ground motions with a 10 percent probability of being exceeded in a 50-year period (475-year average return period). Where provided, the
aggregate loss value for the SUL considers the portfolio effect of multiple buildings on the same site with common site soil conditions and earthquake ground motion:

Building	SEL	SUL
City Place Apartments	8%	12%

The above stated earthquake loss estimates were developed for a moderate level of uncertainty consistent with a Level 1 BD assessment.

5.4 Evaluation Criteria

In accordance with the Standards governing this work, PML is a user-defined term. There is no one method of calculating PML and no universally accepted value for certain variables. The intensity of ground shaking and resulting damage to the structures are determined statistically.

Using commonly available software, we have identified a scenario which will result in an intensity of ground shaking consistent with a Design Basis Earthquake (DBE) - ground motion with a 10 % probability of exceedance in 50 years - equivalent to a 475-year return period. Based upon this estimate of ground shaking, the damage to buildings at the Subject Property is evaluated using either the SEL or SUL criteria.

Scenario Expected Loss (SEL)

SEL represents an estimate of damage at the mean value of a normal distribution curve describing damage to a large population of buildings similar to that being assessed. In a portfolio of similar buildings, approximately 50% are likely to experience less than the estimated damage, while the balance are likely to experience more than the estimated damage.

Scenario Upper Loss (SUL)

SUL represents an estimate of damage that has a 10% percent probability of exceedance due to the specified ground motion of the scenario considered. In a portfolio of similar buildings, nine out of ten buildings are likely to experience less than the estimated damage, while one building is likely to experience more damage.

Design Basis Earthquake

The design basis earthquake ground motions are associated with any earthquake that has the specified site ground motion value; often there are several earthquakes with different magnitudes and causative faults that yield equivalent site peak ground motions.

Replacement costs for the SEL and SUL results do not include the value of the land, value of equipment, value of inventory, or the monetary loss from business interruption nor do they refer to the market value of the property.

6.0 LIMITATIONS

Some of the information provided in this report is based upon personal interviews, and research of available documents, records, and maps held by the appropriate government and private agencies. This report is therefore subject to the limitations of historical documentation, availability, and accuracy of pertinent records, and the personal recollections of those interviewed.

Applicable limitations may include any of the following:

- The scope of work completed was designed solely to meet the needs of [redacted]. CREtelligent's analysis and conclusions are based on conditions observed during the walk-through performed, documentation reviewed and interviews conducted. Conditions at at the Subject Property and the costs to remedy them can change significantly over a relatively short period of time due to levels of maintenance, acts of nature and other factors. CREtelligent shall not be liable for any unintended usage of this report by another party.
- The walk-through site visit (if performed) was limited to a visual observation of structural elements in representative and readily accessible interior and exterior areas only. Ceilings, roofing, insulation, or other architectural finishes were not removed to facilitate the visual observations, and sampling or testing of structural materials was not completed. Structural damage or distress which would affect future earthquake performance was noted where observed; however, a detailed assessment of structural conditions was not completed. It is possible that areas containing deficiencies, physical inadequacies, or code and other regulatory violations may be present but were not observed.
- CREtelligent shall have no on-going obligation to obtain and include information that was not reasonably ascertainable, practically reviewable, or provided to CREtelligent in a reasonable timeframe to formulate an opinion and complete the assessment by the agreed upon due date.

Figures

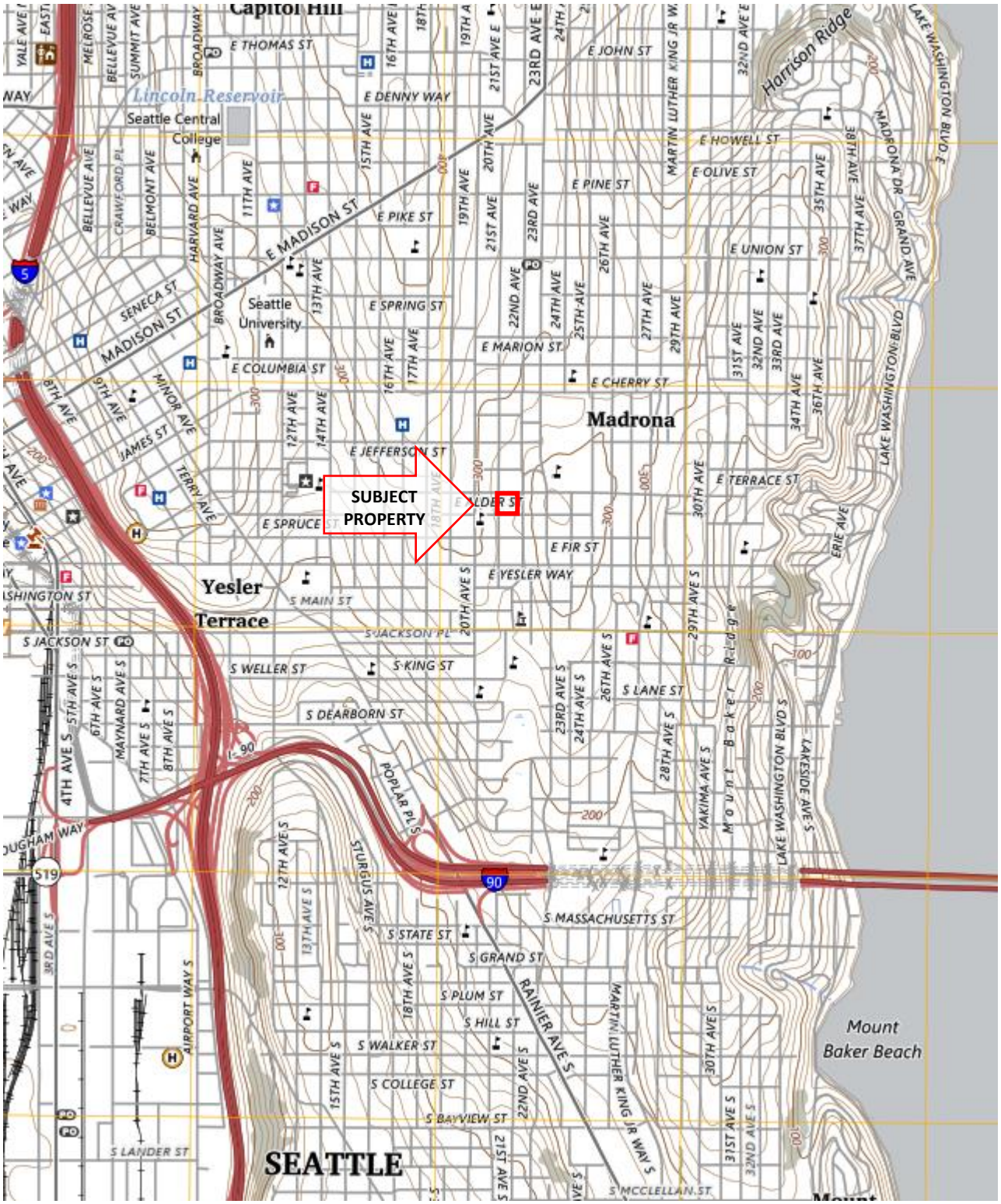

FIGURE 1	
SAMPLING LOCATIONS	
SEISMIC RISK ASSESSMENT **CITY PLACE APARTMENTS** **SEATTLE WASHINGTON**	**SOURCE:** USGS Seattle South, 2023 **DATE:** JANUARY 2025

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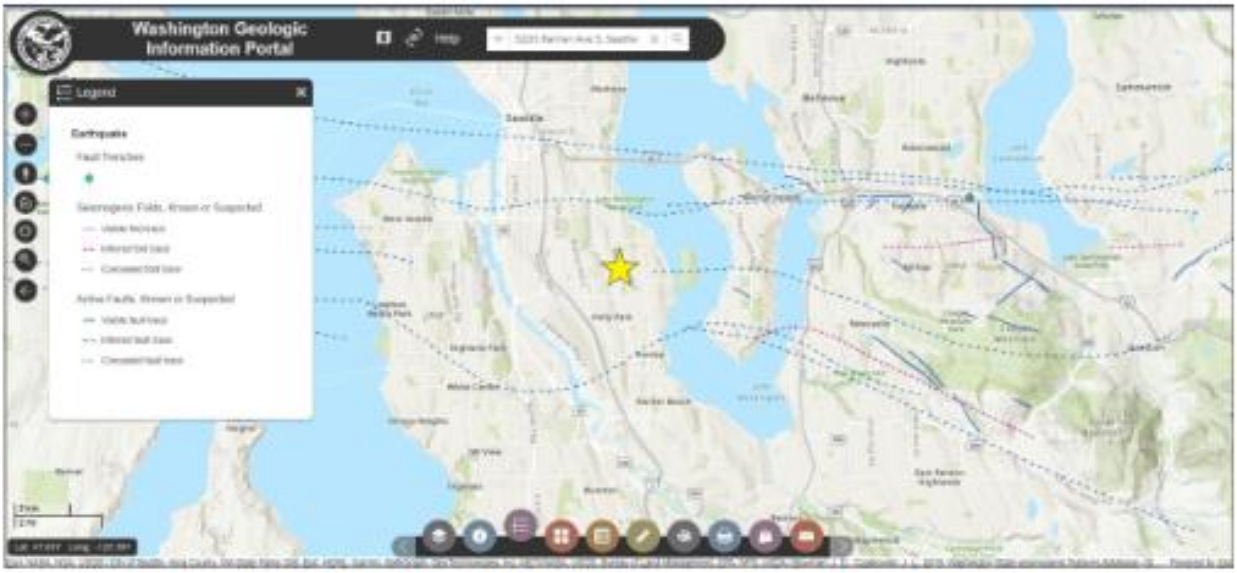

Figure : Fault Map maintained by the Washington State Department of Natural Resources

https://geologyportal.dnr.wa.gov/

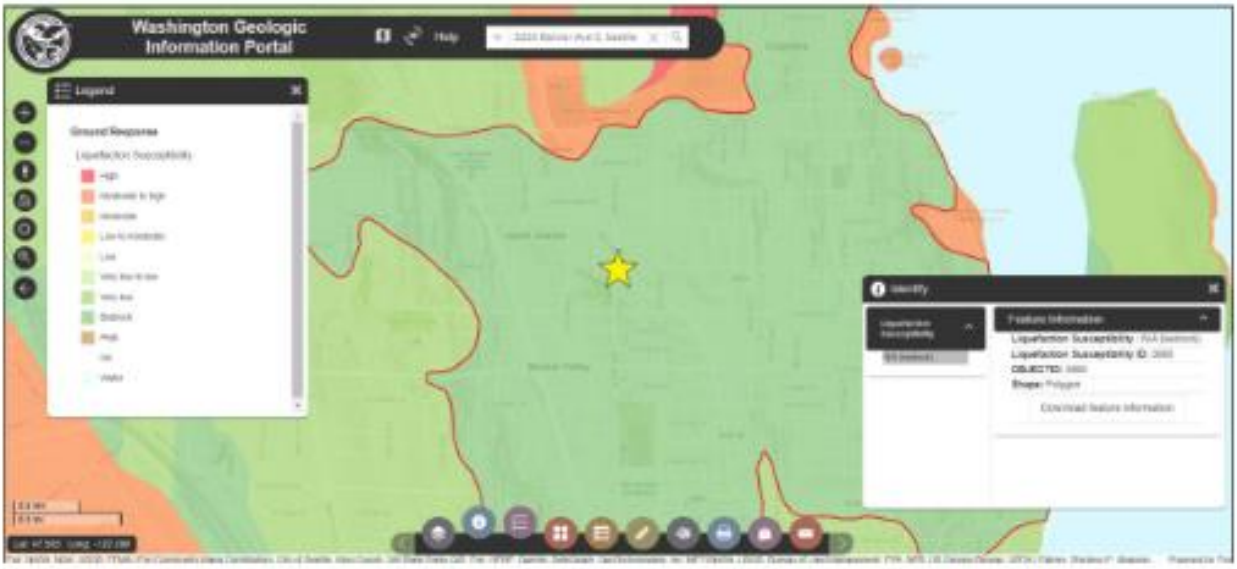

Figure : Liquefaction Map maintained by the Washington State Department of Natural Resources

https://geologyportal.dnr.wa.gov/

FIGURE 2	
FAULT AND LIQUEFACTION MAPS	
SEISMIC RISK ASSESSMENT **CITY PLACE APARTMENTS** **SEATTLE WASHINGTON**	**SOURCE:** As shown **DATE:** JANUARY 2025

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Qualifications

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William Structure, PE

Senior Engineer

Education

B.S. Civil Engineering with Structural Emphasis, 1985, Cum Laude

California State University, Long Beach, California

Summary of Experience

Responsible for structural evaluations, design, and seismic rehabilitation of significant projects and buildings. Completed over 1,000 structural building evaluations and PML assessments, for buildings ranging from industrial tilt-up, retail, multi-family, and high-rise retail.

Experience in analysis and design, project management, and construction support for a variety of new construction and seismic retrofit projects.

Design / Retrofit Experience

40+ years project management experience for design and retrofit projects of varying construction types throughout the United States.

Seismic Risk Assessment Experience

40+ years Seismic Risk Assessment experience as Senior and Field Assessor completing site visits, preparing reports, and reviewing reports for projects of varying construction types throughout the United States, Canada, Mexico, and the United Kingdom.

Post-Earthquake Damage Assessments

Conducted damage assessments following the 1994 Northridge, 2001 Nisqually, 2008 Chino Hills, 2010 Baja, and 2014 South Napa earthquakes.

Industry Tenure – 40 years

Regional Location -
Sacramento

Professional Registration / Licensing

Licensed Structural Engineer – State of California, CA SXXXX, expiration 06/30/2025

Licensed Civil Engineer – State of California, PE #XXXXX, expiration 06/30/2025