**Alistair Lizaranzu, P.E.**
Sole Proprietor

**North Bay Seismic Design**
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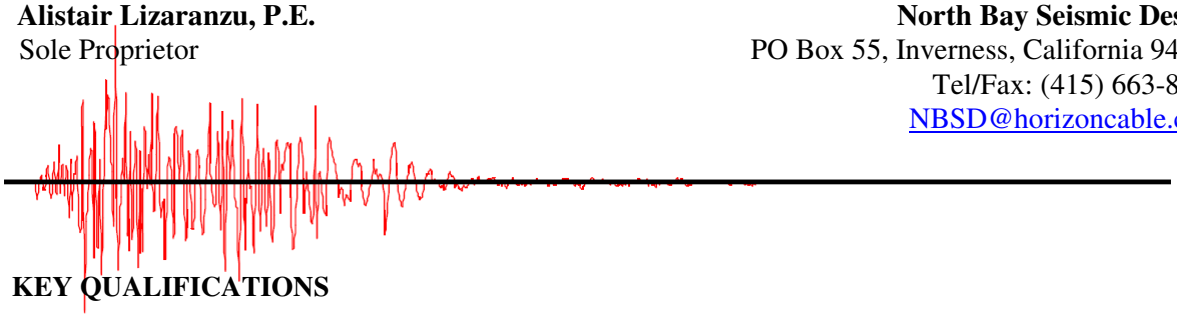

## KEY QUALIFICATIONS

Mr. Alistair Lizaranzu has nearly 30 years of experience in structural engineering analysis and design work, both in the public and private sector. This experience covers a wide array of types of structures (bridges, buildings, earth retaining structures, etc) and structural materials (steel, concrete, timber, masonry), as well as structural loading (earthquake, wind, etc). His analysis/design experience is varied and extensive, is familiar with most commercially available analysis-design programs, and has developed an extensive library of transparent parametric analysis/design spreadsheet tools for building (available for viewing and purchase at NBSD-Software.com) and bridge design (available for internal use only).

Mr. Lizaranzu has first hand experience in the aftermath of destructive earthquakes in urban centers (1985 Mexico City, 1989 Loma Prieta, 1994 Northridge), and is dedicated to the safety of people living in highly seismic regions by ensuring structural ductily and resiliency of civilian structures as intended by current codes (Capacity Based Design, etc). His primary professional interest is understanding the behavior of dynamic loading and its effects on different types of structures, in order to design structures which perform well and exceed expectations before, during, and after nature strikes.

## RELEVANT EXPERIENCE

NORTH BAY SEISMIC DESIGN, MARIN COUNTY, CALIFORNIA (12/07 - Present): Work on the analysis, design, detailing, and retrofit of building or bridge structures, or the development of software tools for these structures.

BIGGS CARDOSSA, SAN FRANCISCO, CALIFORNIA (4/05 – 12/07) : Project engineer, working in the evaluation/analysis/retrofit/design of various building and bridge structures. Emphasis on earthquake design and seismic structural response.

CIPA, SAN JUAN, PUERTO RICO (3/04 – 4/05) : Performed hazard loss estimation (earthquake, hurricane, flooding, etc) studies for various jurisdictions in Puerto Rico and the Caribbean according to FEMA standards. Determined the extent of communities affected and the impact on critical facilities for each predominant hazard at the municipal or estate level.

SOHA ENGINEERS, SAN FRANCISCO, CALIFORNIA (10/95 – 11/03) : Worked in the retrofit and new design of various building and bridge structures, in addition to the design of earth retaining structures. Duties included the supervision and mentoring of junior engineers, successful completion of projects on time and within budget, use of linear and non-linear analytical software for structural analysis and design, design of software tools, and use of applicable codes for the design of timber, steel, and concrete structures. Emphasis on earthquake design and seismic structural response.

RISK MANAGEMENT SOLUTIONS, MENLO PARK, CALIFORNIA (6/94 - 10/95) : Worked in the creation of wind turbulence risk models for use by the insurance industry. Duties included the modeling, testing, and calibration of hazard and vulnerability methodologies to the company software.

## EDUCATION :

- **M.S. Structural Engineering**, Stanford University, Palo Alto, California, 1994
- **B.S. Ocean Engineering**, Florida Institute of Technology, Melbourne, Florida, 1992

## PROFESSIONAL REGISTRATIONS:

- Licensed Civil Engineer in California (#58550) and Puerto Rico (#20194).

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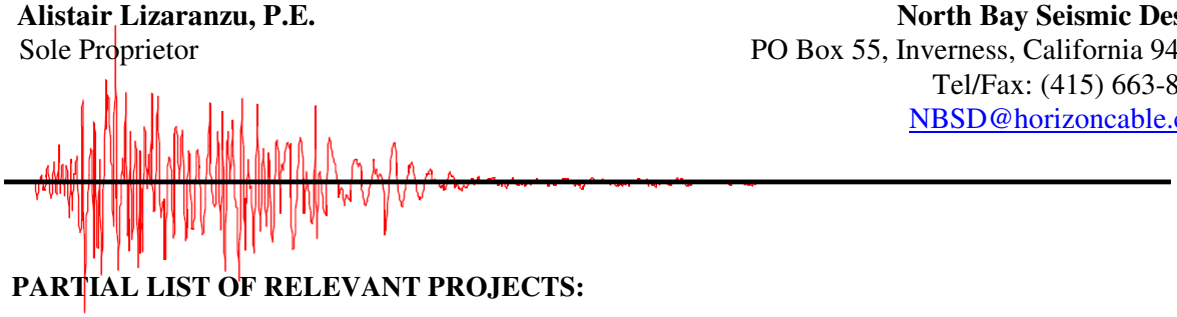

**PARTIAL LIST OF RELEVANT PROJECTS:**

***Bridges/Infrastrucure:***

- *Doyle Drive Replacement*: Worked on the Independent Check of 1,200' of retaining walls of various heights, supported by closely spaced CIDH piles and various tieback arrangements, immediately adjacent to US 101 between the proposed two tunnel segments leading to the Golden Gate Bridge.
- *Berryessa BART Station:* Project engineer for the design of a new 800' long elevated concrete BART Guideway (runway) supported on bentcaps w/ two-column bents on piled and spread footings, which provides 2 separate BART lines access to the Station platform above ground with stairways down to street level. Performed analysis and design of the bridge and platform concrete elements, and helped put together the construction drawings for this project.
- *Alameda Creek Bridge*: Project engineer for the EQ Retrofit Strategy and PS&E phase of this 990' long curved bridge built in 1947. The RC box girder structure varies from shallow 3 cell box girder to deep single spine girder with large overhangs. 14 spans are supported by single or double column bents of varying height and geometry. Project constraints included substandard clearance for a railroad crossing beneath the bridge, and pier and footing retrofit in the environmentally sensitive creek.
- *San Gabriel River Bridge*: Project engineer for the EQ Retrofit Strategy and PS&E Phase of a 2 lane, 14 span, 1000' long structure built in 1922 and widened in 1939 to 4 lanes. Positive connection was not provided between both structures (original and widening), abutments were unconventional and dissimilar in strength and stiffness, and pierwalls did not contain any reinforcement. Bridge retrofit consisted of full height cored holes with spiral reinforcement in order to avoid work in the environmentally sensitive creek.
- *Colton Interchange*: Performed EQ analysis and design for four adjacent bridges approximately 700' long in Southern California, located on an expected 16' fault rupture discovered after the bridge was retrofitted. New retrofit consists of box culverts located beneath spans in order to support the superstructure once vertical support is lost.
- *Bayshore Freeway*: Designed nearly 1000' of retaining walls of various heights and configurations, some subjected to significant vehicular surcharge.
- ***San Francisco Oakland Bay Bridge*** *(Replacement Structure – Phase II):* Performed lateral and vertical elastic response spectrum analysis for the 2800-meter long Skyway replacement structures, which consisted of multi-span PS box girders supported on individual precast concrete columns and pilecaps on battered piles embedded in the Bay mud. Results obtained where compared with non-linear time history analysis being run in parallel, guiding the design process. Looked into software modeling issues regarding push-over analysis.
- ***San Francisco Oakland Bay Bridge*** *(Replacement Structure – Phase I):* Worked on various alternatives for the replacement structure of the existing Bay Bridge East crossing (30% submittal). Performed segmental and time dependent analysis of the constant depth prestressed box girder option. Designed steel frame cantilever option for the bicycle-pedestrian walkway. Designed hinged cantilever for constant depth prestressed box girder option.
- *Sacramento River Bridge at Rio Vista*: Worked on the EQ retrofit analysis and design of a 2950' long bridge built in 1960, consisting of a steel truss superstructure resting on two-pier concrete bents driven into the river mud substrate. Two lift span towers with counterweights raise a 300' long lift span up to 170' vertically to allow river vessel traffic underneath. Performed capacity evaluation of all steel members. The bridge was retrofitted with base isolation and viscous dampers.

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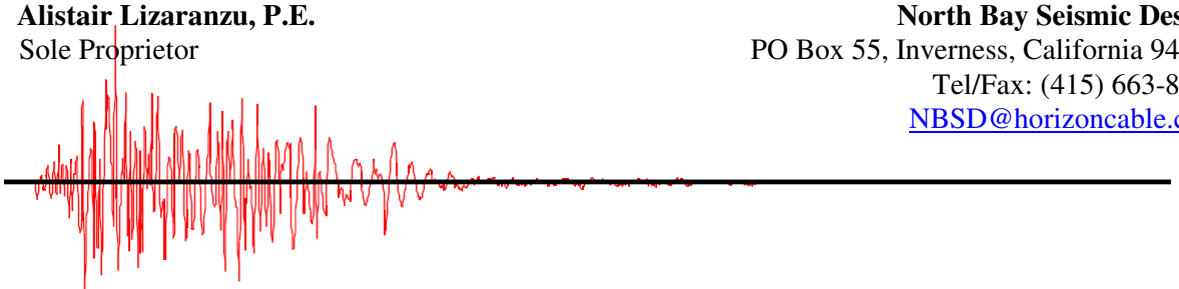

- *Damon Slough Bridge*: Performed elastic analysis of 4-lane skewed RC box girder bridge providing access to the Oakland Coliseum. The deck is supported by seat type abutments and bentcaps, themselves supported by brittle pre-stressed driven piles driven into the soft soil medium of the slough. Performed capacity evaluation of existing piles, which were found to be deficient; helped in the parametric studies needed to select suitable retrofit CISS pile size and layouts.
- *North "P" Street Underpass:* The structure is a 4 span simple supported, precast, prestressed box girder railroad bridge supported on seat abutments and CIDH pile bents encased in pier walls, built in 1976. This bridge was evaluated and found to meet Caltrans "No Collapse" criteria.
- *5th & 6th Street Viaduct*: Performed independent check for a 2820' long bridge connecting Route 880 to Route 980 in Oakland. This RC bridge structure is connected to 3 entrance ramps and two exit ramps. Bridge was retrofitted by conventional means.
- *5th & 6th Street Viaduct - Market Street Ramp:* Performed EQ retrofit analysis and design for a 806' long section of Route 880 in Oakland, and one exit ramp. This bridge connects directly to the new Cypress Structure. Bridge was retrofit by conventional means.

***Residential Buildings:***

- *Misc Soft Story Retrofits:* Performed misc analysis and design work on a consultant basis for nearly 100 3-4 story buildings (Tiers 1,2, 3) with ground level soft stories in San Francisco. These buildings were identified and required to satisfy retrofit requirements of SFBC Section 3406B. List of buildings with relevant information provided upon request (Case Studies for 3-6 Story buildings available at NBSD-Software.com/building-design-timber-software, or provided upon request).
- *33 Ocean Avenue, Bolinas:* Retrofitted the foundation and timber framing of an existing 3-story wood-frame house on a steep grade built in 1928. The existing deficient pre-code perimeter stem wall was encased in reinforced walls connected to a drilled pier and grade beam frame. Walls and diaphragms were strengthened and tied together per ASCE 7-05 requirements. Performed construction inspection of project.
- *89 Wharf Road, Bolinas:* Performed retrofit design of a single story wood-frame pre-code dwelling on pilings of unknown embedment into the Bolinas Bay lagoon. The retrofit project was reviewed and approved by the California Coastal Commission, in addition to the local building department.
- *9 Vallejo, Inverness:* Performed the design of a new 3 level, 2-story conventional wood-frame dwelling on 35% grade with a retaining wall on drilled pier and grade beam foundation. Performed construction inspection of project.
- *115 Forres, Inverness:* Retrofitted a 100 year-old two story residential wood-frame dwelling located within yards of the San Andreas Fault. Deficiencies were identified and conventional wood-frame construction strengthening and detailing were used to ensure proper load transfer from roof to foundation.
- *66 Laurel Drive, Inverness:* Retrofitted a highly irregular 2 story wood-frame structure located within yards of the San Andreas Fault.
- *Freestone Ranch House, Napa:* Retrofitted a large 100 year-old 3-story wood-frame structure whose entire lateral load resisting system had to be replaced or strengthened.

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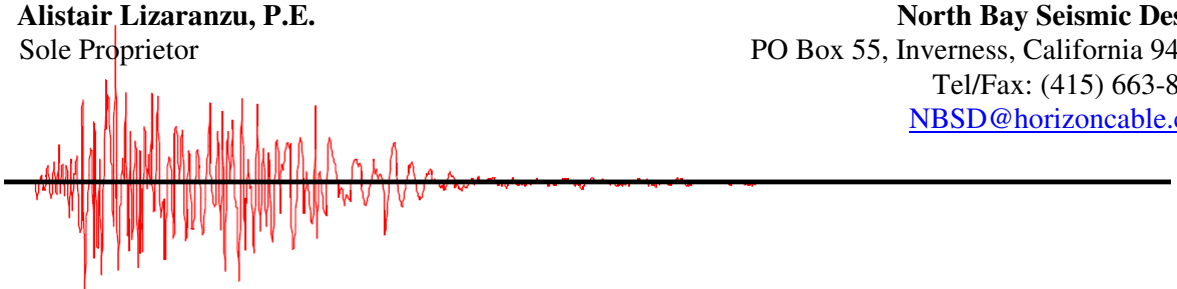

***Commercial/ Institutional Buildings:***

- 1914 Labor Council Union Hall, 2940 16th Street, San Francisco (Redstone Building): Performed retrofit (analysis, design, detailing) of exterior URM brick walls in existing 4-5 story steel frame building. A perforated ductile RC shear wall was used with shotcrete walls forming a Pier and Coupling beam LFRS around numerous window openings, connected to (E) brick walls with drill and bond dowels. Project Calculations provided upon request.
- Longs Drugs, Marketplace at Birdcage, Citrus Heights: Performed retrofit of single-story CMU building, tying the roof diaphragm to the walls. Performed construction inspection of project.
- *Berryessa BART Station:* Project engineer for the design of a two-story steel frame building isolated from the elevated concrete Guideway (runway) structure. Developed elastic analysis finite element model and performed lateral load analysis and preliminary member sizing; assembled construction drawings for this project.
- *Bank of America Bulding, San Jose, CA:* Developed an elastic response spectrum analysis model of this historic 14 story building built in 1926, for use in the determination of retrofit schemes for the building and proposed underground BART Station entrance through the building lobby.
- *Seismic Evaluation of Buildings in Bay Area:* Performed building site inspection and evaluations per FEMA 310 requirements for use by insurance purposes, and wrote evaluation reports. Buildings evaluated ranged from large shopping centers to high tech commercial buildings, to the peer review of new 50 story residential towers under construction.
- *MUNI Central Subway:* Worked on the determination of expected damage to nearly 200 buildings from expected ground settlement due to tunnel excavation along a proposed extension of the MUNI line. Buildings were located along the historic San Francisco Union Square and Chinatown, and consisted of a multitude of structural systems, building size and shapes, construction types, and existing conditions. Performed site evaluations for all buildings, and created evaluation tool and methodology to determine approximate expected structural and non-structural damage to buildings due to expected settlement.
- *Fisherman's Wharf:* Performed evaluation and proposed repair of the substructure at Wharfs J-1 and J-3 for the Port of San Francisco. Gathered information with kayak underneath wharf to obtain accurate working drawings, and determined extent of substructure and piling damage due to pest infestation and marine corrosion; proposed repairs to address immediate life safety concerns for this historic San Francisco landmark.
- *Berkeley Public Safety Building:* Performed UBC static analysis for this 5-Story base isolated reinforced concrete essential facility, and was involved in the Non-linear Time History analysis for Maximum Credible and Design Basis Earthquake loads. Ran analysis for each of the five different slabs systems in the building, and came up with load values for slab design. Designed RC columns and footings, and designed misc steel frames in the building.
- *UC Berkeley Art Museum:* Engineer for this highly irregular RC building, located within yards of the Hayward Fault in Berkeley. Performed elastic Response Spectrum analysis of structure, as well as capacity evaluation of critical elements in the building. This structure was found to be vulnerable to collapse in the event of a moderate earthquake, and worked in the selection of retrofit alternatives.