REFERENCE STANDARD RS 9 LOADS
* LIST OF REFERENCED NATIONAL STANDARDS

**AASHTO HB-13	Standard Specifications for Highway Bridges, Thirteenth Edition and 1984, 1985 and 1986 Interim Specifications	1983
AREA	Specifications for Steel Railway Bridges, Chapter 15, Steel Structures, Manual for Railway Engineering	1987
*UBC SECTION 2312	Earthquake Regulations With Accumulative Supplement	1990

135-88BCR
****** Local Law 17-1995.***

REFERENCE STANDARD RS 9-1
MINIMUM UNIT DESIGN DEAD LOADS FOR STRUCTURAL DESIGN PURPOSES

	Weight (psf)
WALLS AND PARTITIONS (unplastered).—	
Clay brick—	
High absorption (per 4 in. wythe)	33
Low absorption (per 4 in. wythe)	45
Concrete brick—	
4 in	46
4 in. lightweight aggregate	33
8 in	89
8 in. lightweight aggregate	68
12 in	130
12 in. lightweight aggregate	98
Sand-lime brick—	
per 4 in. wythe	38
Solid concrete block—	
4 in	40
4 in. lightweight aggregate	27
8 in	67
8 in. lightweight aggregate	48
12 in	108
12 in. lightweight aggregate	72
Hollow concrete block—	
4 in	30
4 in. lightweight aggregate	20
8 in	53
8 in. lightweight aggregate	38
12 in	85
12 in. lightweight aggregate	55
Solid gypsum block—	
(per in. thickness)	6
Hollow gypsum block—	
2 in	9.5
4 in	12.5
6 in	18.5
Clay, tile, load bearing—	
4 in	24
8 in	42
12 in	58
Clay tile, non-load bearing—	
2 in	11
4 in	18
8 in	34
12 in	46
Facing tile—	
2 in	16
6 in	29
8 in	41
Split terra cotta furring tile—	
1 1/2 in	8
2 in	10
3 in	12
Glass block—	
4 in	20
PLASTER PARTITIONS—	
2 in. thick, solid cement plaster on metal lath	25
2 in. thick, solid gypsum plaster on metal lath	18
Metal studs, any lath, and 3/4 in. gypsum plaster, both sides	18
Wood studs, any lath, and 3/4 in. gypsum plaster, both sides	19

EQUIVALENT UNIFORM PARTITION LOADS

Partition Weight (plf)	Equivalent Uniform Load (psf) (To be added to floor dead and live loads)
50 or less……	0
51 to 100……	6
101 to 200……..	12
201 to 350……..	20
Greater than 350……	20 plus a concentrated live load of the weight in excess of 350 plf..

	Weight (psf)
PLASTER ON MASONRY SURFACES.—	
Gypsum, with sand aggregate, per in…….	8.5
Gypsum, with lightweight aggregate, per in……..	4
Gypsum, with wood fibers, per in……..	6.5
Cement, with sand aggregate, per in……..	10
Cement, with lightweight aggregate, per in……...	5
FLOOR FINISHES (Excluding fill or base).—	
Resilient flooring (asphalt tile, linoleum, etc.)……..	2
Asphalt block, 2 in…….	24
Wood block, 3 in……	10
Hardwood flooring, 7/8 in…….	4
Softwood sub-flooring, per in……	3
Plywood sub-flooring, 1/2 in……..……	1.5
Ceramic or quarry tile, 1 in……	12
Terrazzo, 1 in…….	12
Slate, 1 in……	15
Cement, 1 in……...	12
FLOOR FILL—	
Cinders, no cement, per in……..	5
Cinders, with cement, per in……...	9
Sand, per in. ……...	8

FLOORS — WOOD JOIST CONSTRUCTION
(With double layer wood flooring - no ceiling)

	Total Weight (psf)	
**Joint Sizes (in.)	12 in. Joist Spacing	16 in. Joist Spacing
2 x 6	6	5
2 x 8	6	6
2 x 10	7	6
2 x 12	8	7
3 x 6	7	6
3 x 8	8	7
3 x 10	9	8
3 x 12	11	9
3 x 14	12	10

***** As enacted but "joist" probably intended.***

	Weight (psf)
CEILINGS: (including suspension system).—	
Plaster on tile or concrete—see "Plaster on Masonry Surfaces"	
Suspended metal lath and gypsum plaster, 3/4 in. ……..	9
Suspended metal lath and cement plaster, 3/4 in..……	11
Suspended acoustical tile…….	2
ROOF AND WALL COVERINGS—	
Clay roofing tiles……..	14
Built-up roofing:	
3-ply……..	1.5
5-ply……..	2.5
Gravel, 1/4 to 5/8 in……..	4
Slag, 1/4 to 5/8 in……..	3
Crushed rock, 1/4 to 5/8 in……...	4.5
Aluminum sheet:	
0.050 in. thick, flat……	0.72
0.032 in. thick, corrugated……	0.55
0.032 in. thick, V-Beam……	0.58
Steel, 20 gauge, protected V-Beam……..	2.3
Tin sheet, 28 gauge……..	1

Asbestos-cement, corrugated roofing, 3/8 in	4
Fiberboard, 1/2 in	0.8
Gypsum sheathing, ½ in	2
Wood sheathing, per in	3
Wood shingles, in place	3
Asphalt shingles, in place	6
Asbestos-cement shingles, in place	4
Cement tile, 3/8 in. in place	16
Stucco (cement), per in	10
Slate, 3/16 in. in place	7
Slate, 1/4 in. in place	10
Skylight, metal frame, 3/8 in. wire glass	10
MISCELLANEOUS MATERIALS—	
Glass—	
singlestrength	1.2
double strength	1.6
plate, wired or structured, 1/8 in	1.6
insulating, double 1/8 in. plates w/air space	3.5
insulating, double 1/4 in. plates w/air space	7.1
Insulation—	
fiber glass, per in	1.5
foam glass, per in	0.8
Urethane, 1 in	1.0
2 in	1.2
cork, per in	1.0
vegetable fiber boards, per in	1.5
bats and blankets, per in	0.5
vermiculite, loose fill—0.6 pcf	
expanded polystyrene—1.0 pcf	
Marble, interior, per in	14
Plastic, acrylic, 1/4 in	1.5
Slate, per in	15
Asphaltic concrete	144
Cast-stone masonry (cement, stone, sand)	144
Cinder fill	57
Concrete, plain (other than expanded aggregates)—	
cinder	108
slag	132
stone (including gravel)	144
Reinforced concrete—	
Add 6 pcf to unit weights shown for plain concrete	
Cork, compressed	14
Earth	100
Masonry, ashlar—	
granite	165
limestone (crystalline)	165
limestone (oolitic)	135
marble	173
sandstone (bluestone)	144
Masonry, rubble w/ mortar—	
granite	153
limestone (crystalline)	147
limestone (oolitic)	138
marble	156
sandstone (bluestone)	137
Masonry, dry rubble—	
Granite	130
limestone (oolitic)	125
marble	130
Sandstone (bluestone)	110
Terra cotta, architectural—	
voids filled	120
voids empty	72
Timber, seasoned—	
pine, Douglas fir, and similar species	35
oak, elm, and similar species	45

*As enacted but "gage" probably intended.

REFERENCE STANDARD RS 9-2
MINIMUM REQUIREMENTS FOR UNIFORMLY DISTRIBUTED AND CONCENTRATED LIVE LOADS UNIFORMLY DISTRIBUTED LIVE LOADS

Occupancy or Use of Spaces	Live load (psf)
Assembly spaces	
Drill rooms……..	150
Assembly spaces having fixed seats, including auditorium areas in churches, schools, theaters, courthouses, lodges, lecture halls, and similar buildings……	60[a]
Dance floors, restaurant serving and dining areas, mess halls, museums, gymnasiums, skating rinks, promenades, and roof gardens…….	100
Private assembly spaces, including conference rooms and card rooms……..	50
Stadium, grandstand, and reviewing stand seating areas……	100
Other assembly spaces……	See note [d]
Balconies	
Exterior……	See note [b]
Interior (as required for occupancy or use)	
Mezzanines (as required for occupancy or use)	
Catwalks	30
Corridors	
(1) Corridors in schools…….	100
(2) Corridors, elevators, and stairs in office buildings (other than first floor lobbies)……...	75
(3) Corridors serving first floor elevator lobbies, auditoriums, and similar areas of public assembly…...	100
(4) Other (same as that required for the occupancy of the area being served)……	100
Elevator machine rooms (see Reference Standard RS 18)	
Equipment rooms, including pump rooms, generator rooms, transformer vaults, and areas for switch gear, ventilating, air conditioning, and similar electrical and mechanical equipment……	75
Fire escapes	
Multiple dwellings……..	40
Others……..	100
Hospitals	
Operating rooms, laboratories, and service areas……	60
Rooms and wards……	40
Personnel areas……	40
Other (as required for occupancy or use of the area)	
Libraries	
Reading and study room areas……...	60
Stack areas (see Storage)	
Other (as required for occupancy or use of the area)	
Lobbies and similar areas…….	100
Manufacturing and repair areas……	100
Marquees……..	60
Office areas (not including record storage areas)…….	50
Parking areas	
For passenger cars, provided that the clear headroom at the entrance does not exceed 8 ft……...	50
Penal institutions	
Cell blocks……..	40
Other (as required for occupancy or use of the area)	
Plaza areas (open) accessible to the public (including landscaped portions)	100
Recreational areas	
Bowling alleys (alleys only)……	40
Poolrooms……...	75
Other (see assembly areas)	
Residential areas	
Dormitories	
Non-partitioned……..	60
Partitioned……..	40
Dwellings	
Multi-family units	
Apartments ……..	40
Public rooms (as required for occupancy or use)	
One- and two-family units	
First floor……..	40

Upper floors and habitable attics……..	30
Uninhabitable attics……..	20[c]
Hotels	
Guest rooms……..	40
Public rooms (as required for occupancy or use)	
Schools	
Classrooms……..	40
Shops (automotive and press shops)…….	100
Shops (others)…….	60
Other (as required for occupancy or use of the area)	
Stairs and exit passages (same as Fire escapes)	
Storage	
Light……	100
Warehouse……..	150
Stores	
Wholesale sales……..	100
Retail sales	
Basement and first floor……	100
Upper floors……..	75
Telephone equipment rooms……	80
Theaters	
Dressing rooms……	40
Projection room……...	100
Stage floor……...	150
Toilet areas……...	40

*** Notes:**

[a] Uniform load shall be applied to the gross floor area.

[b] 150 per cent of live load on adjoining occupied area, but not more than 100 psf.

[c] Live load need be applied to joists or to bottom chords of trusses or trussed rafters only in those portions of attic space having a clear height of 42 in. or more between joist and rafter in conventional rafter construction; and between bottom chord and any other member in trussed or trussed rafter construction. However, joists or the bottom chords of trusses or trussed rafters shall be designed to sustain the imposed dead load or 10 psf, whichever is greater, uniformly distributed over the entire span.

[d] Live loads for assembly spaces other than those described in this reference standard shall be determined from the occupant load requirements as established by section C26-601.2 using the formula 100/net floor area per occupant but shall not be less than 50 psf nor more than 100 psf.

****Local Law 39-1972***

CONCENTRATED LIVE LOADS

Use or Location	Load (lbs.)[a]	Remarks
Elevator machine room floor		See Reference Standard RS 18
Gratings, checkered plates and similar metal decks	200 (on area of 1.0 sq. in.)	Nonconcurrent with uniform live load.
Floor registers and similar floor insets	250 (on area of 2 ft. x 2 ft.)	Nonconcurrent with uniform live load.
Parking areas—passenger vehicles accommodating nine passengers, or less	2,500 (on area of 20 sq. in.) For slab or deck design	The concentrated load may be assumed to represent the reaction of a jack placed under one end of the vehicle. Omit uniform live load in area (6 ft. x 9 ft.) representing one half the vehicle, adjacent to the point of load concentration.
	1,500 (each wheel)	To be used in lieu of uniform live load in stalls of mechanized garages where there is no slab or deck.
Parking areas—trucks, buses and passenger vehicles accommodating more than nine passengers	150 per cent of maximum wheel load with vehicle loaded (on area of 20 sq. in.)	Same as for Parking areas—passenger vehicles accommodating nine passengers, or less.
Floor of office areas	2,000	Nonconcurrent with uniform live load.
Resident and multiple dwellings	200 (on area of 4.0 sq. in.)	Nonconcurrent with uniform live load.
Scuttles and skylights ribs	200	Nonconcurrent with uniform live load.
Steel joists—for each individual joist	800 (for trussed joists apply at a panel point)	Nonconcurrent with uniform live load.
Roofs	250 (on area of 2 ft. x 2 ft.)	Nonconcurrent with uniform live load. Not applicable for awnings, canopies, and similar constructions where access by persons is difficult and not intended.
Stair and fire escape treads	300 (on area 1 ft. wide by depth of the tread and spaced at 3 ft. center-to-center)	Nonconcurrent with uniform live load.
Boiler rooms	3,000	The concentrated load of 3,000 lbs. may be assumed to represent the weight of minor items of equipment (pumps, etc.) in temporary locations during installation. In addition provision shall be made for supporting the weight of the empty boiler at pertinent locations on the floor to provide for replacement of the boiler.

Note:-

[a] Except when otherwise indicated loads are assumed to be applied over an area 2 1/2 ft. x 2 1/2 ft.

UNIFORMLY DISTRIBUTED AND CONCENTRATED LIVE LOADS FOR CONSTRUCTION ELEVATOR AND MATERIAL HOIST TOWER BACK STRUCTURES

DEFINITION:
Back Structure: A system of landing platforms and/or supports designed to transmit construction elevator or material hoist tower loads into the building structure.
WALKWAY PLATFORMS
{L} Live load
1. Uniformly Distributed: 100 psf defined by the area enclosed by handrail, or by the gross area of the walkway if handrails are not provided.
2. Concentrated: 40% of the highest rated capacity of the hoist cars, non-concurrently with the uniform load,acting on a 4 square inch area anywhere within the boundary of handrail, or within the gross area of the walkway if handrails are not provided.
FRAME STRUCTURE
{L} Live load values determined by detailed analysis performed by the design professional acting on any combination of differing floor levels equal to the number of hoist cars plus one but not less than 50 psf or the carrying capacity of the elevator cars and hoist cars, whichever is greater.
SNOW LOAD
{S} 20 psf acting on the top two floors of gross plan area of the back structure.
ICE LOAD
{I} 40% of the dead load or a detailed analysis performed by the design professional based on the equivalent of one-quarter inch ice.
DYNAMIC LOADING
{d} Lateral force and moment resulting from the starting and stopping of the hoist cars. When more than one car is in operation, the dynamic loading shall reflect the most critical combination. The Dynamic loading is to be considered basic loading. Impact loading need not be considered.
DEAD LOADS {D}– REFER TO RS 9-1
WIND LOADS {W} & {w}– REFER TO RS 9-5
DESIGN LOAD COMBINATIONS
For Allowable Stress Design, factors used in loading combinations conform to section 27-594 of the Building Code. The back structures shall be designed for the critical combination of:
1. {D} + {L} + {d}
2. 0.67 ({D} + {W})
3. 0.75 ({D} + {L} + {d} + {w})
4. 0.67 ({D} + {I} + {w} + {S})

Load factors for LRFD designs shall adhere to the LRFD recommendations and guidelines contained in the reference standard for the material used.
DOB 9-2-01

* REFERENCE STANDARD RS 9-3

AASHTO HB-13-1983-Standard Specifications for Highway Bridges, Thirteenth Edition, and 1984, 1985 and 1986 Interim Specifications.
135-88 BCR

* REFERENCE STANDARD RS 9-4

AREA-1987-Specifications for Steel Railway Bridges, Chapter 15, Steel Structures, Manual for Railway Engineering.
135-88 BCR

REFERENCE STANDARD RS 9-5
MINIMUM DESIGN WIND PRESSURES

1. DESIGN WIND PRESSURES ON STRUCTURAL FRAMES.-Minimum design pressures due to wind acting on vertical surfaces shall be in accordance with table RS 9-5.1, and minimum design pressures acting normal to horizontal or inclined surfaces shall be in accordance with table RS 9-5.2. The occurrence of the pressures on vertical, horizontal, and inclined surfaces of the building shall be considered as simultaneous.

TABLE RS 9-5.1 DESIGN WIND PRESSURES ON VERTICAL SURFACES

Height zone (ft. above curb level)	Design Wind Pressure on Vertical Surfaces (psf of projected solid surface)	
	Structural Frame	Panels Glass
0-50 (signs and similar constructions of shallow depth only)…….	15	—
0-100……	20	30
101-300……	25	30
301-600……	30	35
601-1000…….	35	40
Over 1000……	40	40

TABLE RS 9-5.2 DESIGN WIND PRESSURES ON HORIZONTAL AND INCLINED SURFACES

Roof Slope	Design Wind Pressure Normal to Surface
30 degrees or less	Either pressure or suction equal to 40 per cent of the values in Table RS 9-5.1 over the entire roof area
More than 30 degrees	Windward slope—pressure equal to 60 per cent of values in Table RS 9-5.1. Leeward slope—suction equal to 40 per cent of values in Table RS 9-5.1.

2. WALL ELEMENTS.-For design of mullions, muntins, girts, panels, and other wall elements (including their fastenings), other than glass panels, the wind pressure acting normal to wall surfaces shall be 30 psf or a 20 psf suction, for all height zones up to 500 ft. These values shall be deemed to include allowance for gust pressures. For height zones over 500 ft., the applicable design pressures shall be specifically investigated, but shall not be less than the values indicated in table RS 9-5.1.

3. ROOF ELEMENTS.-The wind pressures acting on purlins, roofing, and other roof elements (including their fastenings) supporting small contributory areas of wind presentment shall be 1 1/2 times the values given in table RS 9-5.2.

4. OTHER BUILDING ELEMENTS.-Minimum wind pressures to be used in the design of other building elements shall be the values in table RS 9-5.1 multiplied by the following shape factors given in table RS 9-5.3.

TABLE RS 9-5.3 SHAPE FACTORS

Construction	Shape Factor
Signs (and their supports), or portions thereof, having 70 per cent or more of solid surface……	1.5
Signs (and their supports), or portions thereof, having less than 70 per cent of solid surface……	2.0
Tanks, cooling towers, and similar constructions……..	1.5
Upright, circular cylindrical surfaces……..	0.7
Square and rectangular chimneys….	1.5

For special structures such as curved and saw-toothed roofs, guys and cables, open trussed structures, parallel solid girders, and spheres, the design wind pressure shall be determined on the basis of recognized engineering analysis or by test.

5. EAVES AND CORNICES.-Eaves, cornices, and overhanging elements of the building shall be designed for upward pressures of twice the values given in table RS 9-5.1.

6. WIND LOAD BY MODEL TEST.-In lieu of the design wind pressures established in sections 1 and 2 of this reference standard, and subject to review and approval of the commissioner, design wind pressures may be approximated from suitably conducted model tests. The tests shall be predicated on a basic wind velocity of 80 mph at the 30 ft. level, and shall simulate and include all factors involved in considerations of wind pressure, including pressure and suction effects, shape factors, functional effects, gusts, and internal pressures and suctions.

**7. CONSTRUCTION ELEVATOR AND MATERIAL HOIST TOWER BACK STRUCTURES DEFINITIONS:

Back Structure: A system of landing platforms and/or supports designed to transmit construction elevator or material hoist tower loads into the building structure.

Inland: As defined by ASCE 7-98, exposure Category A

Coastal: As defined by ASCE 7-98, exposure Category D

WIND LOADS

{W} Storm Wind Load: equivalent to 25 yr. Mean recurrence wind per ASCE 7-98 standard, taking into account the exposure terrain, height zone, shielding

coefficients, etc. In lieu of detailed analysis by the design professional, the following values may be used:

Design storm wind (25 yr. Mean Recurrence)
Wind pressure loading (in psf) on gross cross sectional area of the back structure

Zone/ Elevation	0-50 feet	50-150 feet	150-400 feet	400-700 feet	>700 feet
Inland	14.4	20.7	25.6	33.8	40
Coastal	14.4	25.6	43.2	65.5	69.6

Unless the structure is fully enclosed in curtain walls, the following wind loading shall be analyzed:

1. Parallel to the building façade per the above table.
2. Normal to the building façade at one-half the value of the above table.

Wind directions shall be considered to be non-concurrent.
{w} In-Service wind: a 35 mph (wind pressure of 3.13 psf) from any direction acting on the back structure.
***** DOB 9-2-01***

* REFERENCE STANDARD RS 9-6 EARTHQUAKE LOADS

UBC SECTION 2312-1990
Earthquake Regulations with Accumulative Supplement
MODIFICATIONS- The provisions of UBC Section 2312 shall be subject to the following modifications. The subdivisions, paragraphs, subparagraphs and items are from this section.
Subdivision (a) General.
Paragraph 1. Minimum seismic design.
Delete this paragraph and substitute the following:
"The following types of construction shall, at a minimum, be designed and constructed to resist the effects of seismic ground motions as provided in this section:
new structures on new foundations;
new structures on existing foundations; and
enlargements in and of themselves on new foundations.
Buildings classified in New York City occupancy group J-3 and not more than three stories in height need not conform to the provisions of this section.
The Commissioner may require that the following types of construction be designed and constructed to incorporate safety measures as necessary to provide safety against the effects of seismic ground motions at least equivalent to that provided in a structure to which the provisions of the section are applicable:
new buildings classified in occupancy group J-3 and which are three stories or less in height; and
enlargements in and of themselves where the costs of such enlargement exceeds sixty percent of the value of the building.
Pursuant to section 27-191 of the code the Commissioner shall have the authority to reject an application for a building permit which fails to comply with the requirements of this section.
Subdivision (b) Definitions.
Delete the definitions of the following terms and substitute the following new definitions:
"ECCENTRIC BRACED FRAME (EBF) is a steel-braced frame designed in conformance with reference standard RS 10-5C.
ESSENTIAL FACILITIES are those structures which are necessary for emergency operations subsequent to a natural disaster.
STORY DRIFT is the displacement of one level relative to the level above or below, including translational and torsional deflections."
Add the following definition before "SHEAR WALL":
"REINFORCED MASONRY SHEAR WALL is that form of masonry wall construction in which reinforcement acting in conjunction with masonry is used to resist lateral forces parallel to the wall and which is designed using reinforcement in conformance with Chapter 7 of reference standard RS 10-2."
Delete the definitions of the five frames under the SPACE FRAME paragraph and substitute the following stand-alone definitions:
"INTERMEDIATE MOMENT-RESISTING FRAME (IMRF) is a concrete frame designed in accordance with the requirements of Chapters 1 through 20 and Sections 21.1, 21.2 and 21.9 of reference standard RS 10-3.
MOMENT-RESISTING FRAME is a frame in which members and joints are capable of resisting forces primarily by flexure.
ORDINARY MOMENT-RESISTING FRAME (OMRF) is a moment-resisting frame conforming to the requirements of Chapters 1 through 20 of reference standard RS 10-3 or reference standards RS 10-5A and RS 10-5C but not meeting special detailing requirements for ductile behavior.
SPECIAL MOMENT-RESISTING FRAME (SMRF) is a moment-resisting frame conforming to reference standards RS 10-3 or RS 10-5A and RS 10-5C and specially detailed to provide ductile behavior by complying with the requirements of Chapters 1 through 20 and Sections 21.1 through 21.8 of reference standards RS 10-3 or reference standards RS 10-5A and RS 10-5C.
VERTICAL LOAD-CARRYING FRAME is a frame designed to carry all vertical gravity loads."
Subdivision (d) Criteria Selection.
Paragraph 1. Basis for design.
Delete the word "zoning" in the first sentence and delete the last sentence.
Paragraph 2. Seismic Zones.
Delete the title and paragraph and substitute the following:

"2. Seismic Zone. The seismic zone factor, Z, for buildings, structures and portions thereof in New York City shall be 0.15. The seismic zone factor is the effective zero period acceleration for S_1 type rock."
Paragraph 3. Site geology and soil characteristics.
Delete the title and the paragraph and substitute the following:
"3. Site geology, soil characteristics and foundations.
A. General.
Soil profile type and site coefficient, S, shall be established in accordance with Table No. 23-J.
B. Liquefaction.
(i) Soils of classes 7-65, 8-65, 10-65 and non-cohesive class 11-65 below the ground water table and less than fifty feet below the ground surface shall be considered to have potential for liquefaction.
(ii) The potential for liquefaction of level ground shall be determined on the basis of Standard Penetration Resistance (N) in accordance with Figure No. 4;
Category A: Soil shall be considered liquefiable.
Category B: Liquefaction is possible.
Soil shall be considered liquefiable for structures of Occupancy Categories I, II and III of Table No.23-K.
Category C: Liquefaction is unlikely need not to be considered in design.
At any site the highest category of liquefaction potential shall apply to the most critical strata or substrata.
(iii) Liquefiable soils shall be considered to have no passive (lateral) resistance or bearing capacity value during an earthquake. An analysis shall be submitted by an engineer which demonstrates, subject to the approval of the Commissioner, that the proposed construction is safe against liquefaction effects on the soil.
(iv) Where liquefiable soils are present in sloped ground or over sloped non liquefiable substrata and where lateral displacement is possible, a stability analysis shall be submitted by an engineer which demonstrates, subject to the approval of the Commissioner, that the proposed construction is safe against failure of the soil.
C. Foundation Plates and Sills.
Foundation plates or sills shall be bolted to the foundation or foundation wall with not less than one-half inch nominal diameter steel bolts embedded at seven inches into the concrete or masonry and spaced not more than six feet apart. There shall be a minimum of two bolts per piece with one bolt located within twelve inches of each end of each piece. A properly sized nut and washer shall be tightened on each bolt to the plate.
D. Foundation Interconnection of Pile Caps and Caissons.
Individual pile caps and caissons of every structure subjected to seismic forces shall be interconnected by ties. Such ties shall be capable of resisting, in tension or compression, a minimum horizontal force equal to the product of ZI/4 and the larger column vertical load at the end of each tie.
Exception: Other approved effective methods of foundation interconnection may be used where it can be demonstrated by an analysis that equivalent restraint and relative displacement can be provided."
Paragraph 5, subparagraph C, Irregular structures.
Delete the entire last sentence in item (i).
Paragraph 6, subparagraph E, Dual system.
Delete items (ii) and (iii) and substitute the following:
"(ii) Resistance to lateral load is provided by shear walls or braced frames and a moment-resisting frame (SMRF, IMRF or OMRF). The moment-resisting frames shall be designed to independently resist at least 25 percent of the design base shear. The shear walls or braced frames shall be designed to resist at least 75 percent of the cumulative story shear at every level. Overturning effects may be distributed in accordance with item (iii) below.
(iii) The two systems shall be designed to resist the total design base shear in proportion to their relative rigidities considering the interaction of the dual system at all levels."
Paragraph 7. Height limits.
Delete this paragraph.
Paragraph 8. Selection of lateral force procedure.
Delete paragraph 8 and substitute the following:
"8. Selection of lateral force procedure. All structures shall be designed using either the static lateral force procedure of Section 2312 (e) or using the dynamic lateral force procedure of Section 2312(f). In addition, the dynamic lateral force procedure shall be considered, but is not required, for the design of the following:
A. Structures over 400 feet in height.
B. Irregular structures.
C. Structures located on Soil Profile Type S_4 which have a period greater than 1 second. The analysis should include the effects of soils at the site and should conform to Section 2312(f)2."
Paragraph 9, subparagraph C, Irregular features.
Delete this subparagraph and substitute the following:
"C. Irregular features. Only structures having either vertical irregularities Type D or E as defined in Table No. 23-M or horizontal irregularities Type D or E as defined in Table No. 23-N shall be designed to meet the additional requirements of those sections referenced in the tables."
Paragraph 10. Alternate procedures.
Add at the end of the paragraph the words "when such procedures are consistent with this standard and subject to the approval of the Commissioner".
Subdivision (e) Minimum Design Lateral Forces and Related Effects.
Paragraph 1. General, subparagraph A.
Add the words "parking structures" before the word "storage" in the first sentence.
Paragraph 1. General, subparagraph C.

Delete this subparagraph.
Paragraph 2, subparagraph A, Design base shear.
Change the value for the minimum ratio of C/R_W shown at the end of this subparagraph to "0.050".
Paragraph 2, subparagraph B, Structure period.
Delete the values in item (i) for C_t and substitute the following:
"C_t = 0.035 for concrete and steel moment-resisting frames.
C_t = 0.030 for eccentric braced frames.
C_t = 0.030 for dual systems where the building height exceeds 400 feet or 0.020 for heights
less than 160 feet and varies linearly from 0.020 to 0.030 for building heights from 160 to 400 feet.
C_t = 0.020 for all other structures."
Delete the sentence immediately after "C_t = 0.020 for all other structures" and substitute the following:
"Alternately, the value of T for structures with concrete or masonry shear walls may be taken as $0.1(h_n)$ ¾ √Ac."
Paragraph 3, subparagraph C, Combinations along different axes.
Delete this subparagraph.
Paragraph 6. Horizontal torsional moments.
Delete the fourth paragraph starting with words "Where torsional irregularity exists" and ending with the words "considered for design."
Paragraph 7, Overturning, subparagraph B.
Delete the words "Seismic Zones 3 and 4" at the beginning of this subparagraph.
Delete item (iii) and substitute the following:
"(iii) Such columns shall meet the detailing or member limitations of reference standard RS 10-3 for concrete and reference standard RS 10-5C for steel structures."
Paragraph 7, subparagraph C.
Delete this subparagraph and substitute the following:
"C. For regular buildings, the force F_t may be omitted when determining the overturning moment to be resisted at the foundation-soil interface."
Paragraph 8. Story drift limitation.
Change the value for the minimum ratio of C/R_w shown at the end of this paragraph to "0.050".
Paragraph 9. P-delta effects.
Delete the last sentence of this paragraph.
Paragraph 10. Vertical component of seismic forces.
Delete this paragraph in its entirety and substitute the following:
"10. Vertical component of seismic forces. Horizontal cantilever components shall be designed for a net upward force of 0.05 W_p."
Subdivision (f) Dynamic lateral force procedure.
Paragraph 2. Ground motion.
Add the following at the end of subparagraph A.:
"For soil type S_4 profile, see B. below."
Add the following at the end of subparagraph B.:
"The design of all structures located on a soil of type S_4 profile shall be based on properly substantiated site-specific spectra."
Paragraph 5, subparagraph C, Scaling of results.
Add after the word "procedures" in the first sentence, the words "including the appropriate Importance Factor, I,".
Delete item (i) and substitute the following:
"(i) The base shear shall be increased to the following percentage of the value determined from the procedures of Section 2312 (e), including consideration of the minimum value of C/R_w, except that the coefficient C, for a period T greater than 3 seconds, may be calculated as 1.80 S/T:
(a) 100 percent for irregular buildings; or
(b) 90 percent for regular buildings, except that base shear shall not be less than 80 percent of that determined from Section 2312 (e) using the period, T, calculated from Method A."
Paragraph 5, subparagraph D, Directional effects.
Delete the words "and prestressed elements" in the second sentence and delete the word "Alternately" at the start of the third sentence.
Paragraph 5, subparagraph F, Dual systems.
Delete this subparagraph and substitute the following:
"F. Dual systems. Where the lateral forces are resisted by a dual system, as defined in Section 2312(d)6E above, the combined system shall be capable of resisting the base shear determined in accordance with this section. The moment-resisting frame, shear walls and braced frames shall conform to Section 2312(d)6E. The moment-resisting frame may be analyzed using either the procedures of Section 2312(e)4 or those of Section 2312(f)5."
Paragraph 6. Time history analysis.
Add the following words at the end of the sentence: "and the results shall be scaled in accordance with Section 2312(f)5C".
Subdivision (h) Detailed Systems Design Requirements.
Paragraph 1. General.
Delete the words "Chapters 24 through 28" in the fourth sentence of the first paragraph and insert the words "reference standard RS 10".
Delete the words "in Seismic Zones 2, 3 and 4" in the second and fourth paragraphs.
Paragraph 2, subparagraph A, General.
Delete the words "Chapters 24 through 27" at the end of this subparagraph and insert the words "reference standard RS 10".
Paragraph 2, subparagraph C, Connections.
Delete this subparagraph.
Paragraph 2, subparagraph D, Deformation compatibility.
Delete the words "to the reinforcing steel" from the last sentence.
Paragraph 2, subparagraph G, Concrete frames.
Delete this subparagraph and substitute the following:

"G. Concrete frames. Concrete frames required by design to be part of the lateral force resisting system shall, at a minimum, be intermediate moment-resisting frames, except as noted in Table 23-0."
Paragraph 2, subparagraph H, Anchorage of concrete or masonry walls.
Delete the words "Section 2310" in the fifth line and insert the words "reference standards RS 9-6, 10-1B and 10-2".
Paragraph 2, subparagraph I, Diaphragms.
Delete items (iv), (v) and (vi).
Paragraph 2, subparagraph J, Framing below the base.
Delete the words "Chapters 26 and 27" in the third line and insert the words "reference standards RS 10-3 and RS 10-5C".
Paragraph 2, subparagraph K, Building separations.
Delete this subparagraph and substitute the following:
"K. Building Separations. All structures shall be separated from adjoining structures. Separation due to seismic forces shall allow for 1 inch displacement for each 50 feet of total building height. Smaller separation may be permitted when the effects of pounding can be accommodated without collapse of the building."
Subdivision (i) Nonbuilding Structures.
Paragraph 4. Other nonbuilding structures.
Delete in the first sentence of item (iii) the word "national" and insert the word "reference", and delete the words "seismic zones and" in the paragraph following item (iii).
Subdivision (j) Earthquake-recording Instrumentations.
Delete this subdivision.
Table No. 23-I, Seismic Zone Factor Z.
Delete this table and substitute the following new table:

TABLE NO. 23-I
SEISMIC ZONE FACTOR Z

ZONE	NEW YORK CITY
Z	0.15

Table No. 23-J, Site Coefficients.
Delete this table and notes and substitute the following new table and notes:

TABLE NO. 23-J
SITE COEFFICIENTS

TYPE	DESCRIPTIONS	FACTOR
S_o	A profile of Rock materials of class 1-65 TO 3-65	0.67
S_1	A soil profile with either: (a) Soft Rock (4-65) or Hardpan (5-65) or similar material characterized by shear-wave velocity greater than 2500 feet per second, or (b) Medium Compact to Compact Sands (7-65) and Gravels (6-65) or Hard Clays (9-65), where the soil depth is less than 100 feet.	1.0
S_2	A soil profile with Medium Compact to Compact Sands (7-65) and Gravels (6-65) or Hard Clays (9-65), where the soil depth exceeds 100 feet.	1.2
S_3	A total depth of overburden of 75 feet or more and containing more than 20 feet of Soft to Medium Clays (9-65) or Loose Sands (7-65, 8-65) and Silts (10-65), but not more than 40 feet of Soft Clay or Loose Sands and Silts.	1.5
S_4	A soil profile containing more than 40 feet of Soft Clays (9-65) or Loose Sands (7-65, 8-65), Silts (10-65) or Uncontrolled Fills (11-65), where the shear-wave velocity is less than 500 feet per second.	2.5

Notes:

1. The site S Type and correspondings S Factor shall be established from properly substantiated geotechnical data with the classes of materials being defined in accordance with Section 27-675 (C26-1103.1) of the administrative code of the City of New York.

2. The soil profile considered in determining the S Type shall be the soil on which the structure foundations bear or in which pile caps are embedded and all underlying soil materials.

3. Soil density/consistency referred to in the table should be based on standard penetration test blow counts (N-values) and taken as: (a) for sands, loose - where N is less than 10 blows per foot, medium compact - where N is between 10 and 30, and compact - where N is greater than 30 blows per foot; and (b) for clays, soft - where N is less than 4 blows per foot, medium - where N is between 4 and 8, stiff to very stiff - where N is between 8 and 30, and hard - where N is greater than 30 blows per foot.

4. When determining the type of soil profile for profile descriptions that fall somewhere in between those provided in the above table, the S Type with the larger S factor shall be used.

5. For Loose Sands, Silts or Uncontrolled Fills below the ground water table, the potential for liquefaction shall be evaluated by the provisions of Section 2312(d)3.

Table No. 23-K, Occupancy Categories.

Add the words "Buildings for schools through secondary or day-care centers - capacity more than 250 students" below the words "Fire and police stations" in the Essential Facilities category, and delete those words from within the Special Occupancy Structure Category.

Add in item III Special Occupancy Structure to the words, "All structures with occupancy > 5000 persons", the words "excluding Occupancy Group E buildings".

Table No. 23-0, Structural Systems.
Delete this table and notes and substitute the following new Table No. 23-0 and notes.

TABLE NO. 23-O
STRUCTURAL SYSTEMS

BASIC STRUCTURAL SYSTEM	LATERAL LOAD-RESISTING SYSTEM DESCRIPTION	R_w
A. Bearing Wall System	1. Light-framed walls with shear panels	
	a. Plywood walls for structures three stories or less	8
	b. All other light-framed walls	6
	2. Shear Walls	
	a. Concrete	6
	b. Reinforced masonry	5
	3. Light steel-framed bearing walls with tension-only bracing	4
	4. Braced frames where bracing carries gravity load	
	a. Steel	6
	b. Concrete	4
	c. Heavy timber	4
B. Building Frame System	1. Steel eccentric braced frame (EBF)	10
	2. Light-framed walls with shear panels	
	a. Plywood walls for structures three-stories or less	9
	b. All other light-framed walls	7
	3. Shear Walls	
	a. Concrete	8
	b. Reinforced masonry	6
	4. Concentric braced frames	
	a. Steel	8
	b. Concrete	8
	c. Heavy timber	8
C. Moment-Resisting Frame System	1. Special moment-resisting frames (SMRF)	
	a. Steel	12
	b. Concrete	12
	2. Concrete intermediate moment-resisting frames (IMRF)	8
	3. Ordinary moment-resisting frames (OMRF)	
	a. Steel	6
	b. Concrete [4]	4
D. Dual System	1. Shear Walls	
	a. Concrete with SMRF	12
	b. Concrete with Steel OMRF	6
	c. Concrete with concrete IMRF	9
	d. Concrete with concrete OMRF	5
	e. Reinforced masonry with SMRF	8
	f. Reinforced masonry with steel OMRF	6
	g. Reinforced masonry with concrete IMRF	7
	2. Steel eccentric braced frame	
	a. With steel SMRF	12
	b. With steel OMRF	6
	3. Concentric braced frames	
	a. Steel with steel SMRF	10
	b. Steel with steel OMRF	6
	c. Concrete with concrete SMRF	9
	d. Concrete with concrete IMRF	6

Notes:

1. Basic structural systems are defined in Section 2312(d)6.
2. See Section 2312(e)3 for combinations of structural systems.
3. See Sections 2312(d)8C and 2312(d)9B for undefined systems.
4. Prohibited with S_3 or S_4 soil profiles or where the height exceeds 160 feet.

Table No. 23-P, Horizontal Force Factor C_p.
Delete this table and notes and substitute the following new Table No. 23-P and notes:

TABLE NO. 23-P
HORIZONTAL FORCE FACTOR C_P[1]

ELEMENTS OF STRUCTURES, NONSTRUCTURAL COMPONENTS AND EQUIPMENT	VALUE OF C_p
I. Part of Portion of Structure	
1. Walls, including the following:	
a. Unbraced (cantilevered) parapets.	2.00
b. Other exterior walls above street grade[2].	0.75
c. All interior bearing walls.	0.75
d. All interior nonbearing walls and partitions around vertical exits, including offsets and exit passageways.	0.75
e. Nonbearing partitions and masonry walls in areas of public assembly > 300 people.	0.75
f. All interior nonbearing walls and partitions made of masonry in Occupancy I, II and III.	0.50
g. Masonry or concrete fences at grade over 10 feet high.	0.75
2. Penthouses (defined in article 2 of subchapter 2 of chapter 1 of title 27 of the building code) except where framed by an extension of the building frame.	0.75
3. Connections for prefabricated structural floor and roof elements other than walls (see above) with force applied at center of gravity.	
4. Diaphragms[3].	
II. Nonstructural Components	
1. a. Exterior ornamentation and appendages including cornices, ornamental statuaries or similar pieces of ornamentation.	2.00
b. Interior ornamentation and appendages in areas of public assembly including cornices, ornamental statuaries or similar pieces of ornamentation.	2.00
2. Chimneys, stacks, trussed towers and tanks on legs.	
a. Supported on or projecting as an unbraced cantilever above the roof more than one-half its total height.	2.00
b. All others, including those supported below the roof with unbraced projection above the roof less than one-half its height, or braced or guyed to the structural frame at or above its center of mass.	0.75
3. Exterior signs and billboards.	2.00
III. Equipment and Machinery[4].	
1. Tanks and vessels (including contents), including support systems and anchorage.	0.75

Notes:

1 See Section 2312(g)2 for additional requirements for determining C_p for nonrigid equipment or for items supported at or below grade.
2 See Section 2312(h)2D(iii) and Section 2313(g)2.
3 See Section 2312(h)2I.
4 Equipment and machinery include such items as pumps for fire sprinklers, motors and switch gears for sprinkler pumps, transformers and other equipment related to life-safety including control panels, major conduit ducting and piping serving such equipment and machinery.

Figure No. 3, Normalized Response Spectra Shapes.

Delete the Figure No. 3 and insert the new Figure 3 and Table No. 23-R.

TABLE NO. 23-R
SPECTRAL ACCELERATION IN FRACTION OF G 5% DAMPING

T-SEC	S_0	S_1	S_2	S_3
.01	0.150	0.150	0.150	0.150
.02	0.150	0.150	0.150	0.150
.05	0.375	0.283	0.262	0.244
.075	0.375	0.375	0.336	0.303
.090	0.375	0.375	0.375	0.334
.112	0.375	0.375	0.375	0.375
.267	0.375	0.375	0.375	0.375
.40	0.250	0.375	0.375	0.375
.48	0.208	0.313	0.375	0.375
.60	0.167	0.250	0.300	0.375
1.00	0.100	0.150	0.180	0.225
2.00	0.050	0.075	0.090	0.113
3.00	0.033	0.050	0.060	0.075

Note: This table presents acceleration (g) versus natural period (seconds) to facilitate the presentation of spectra in log-log form.
Local Law 17-1995.

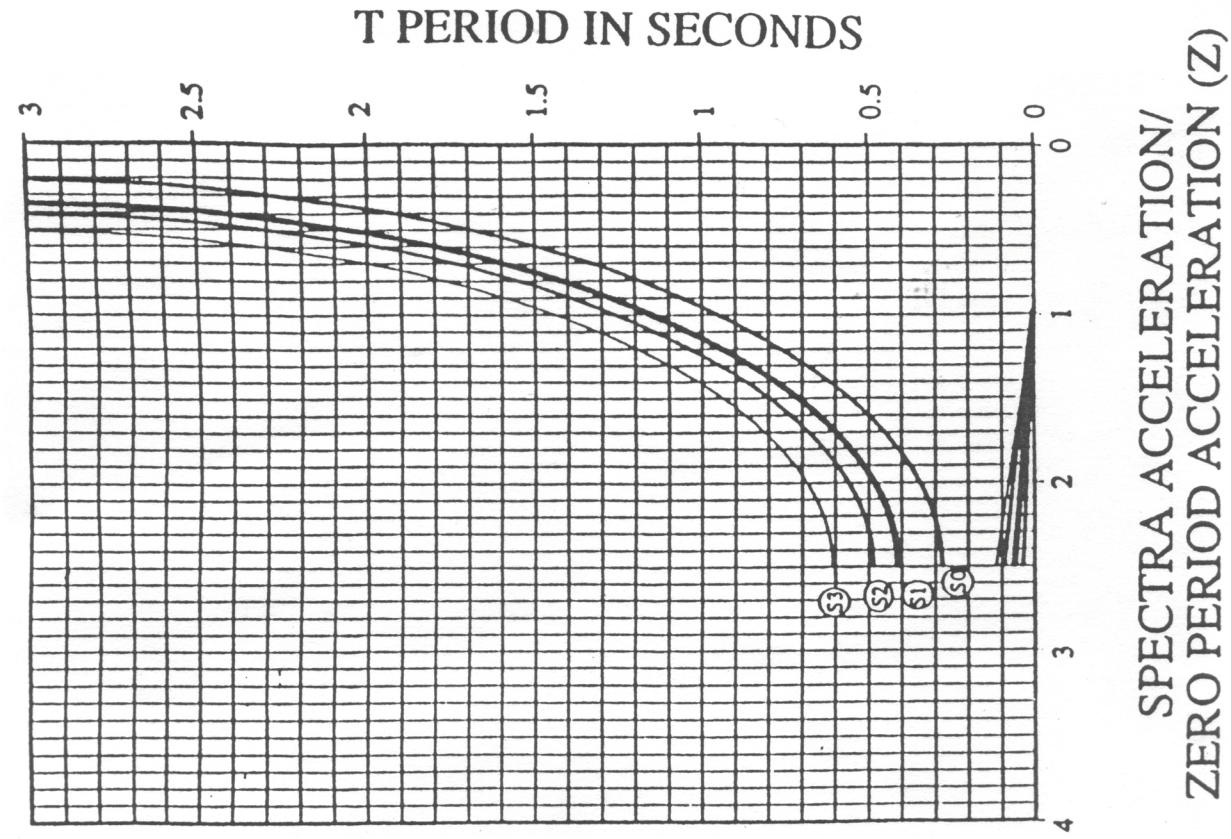
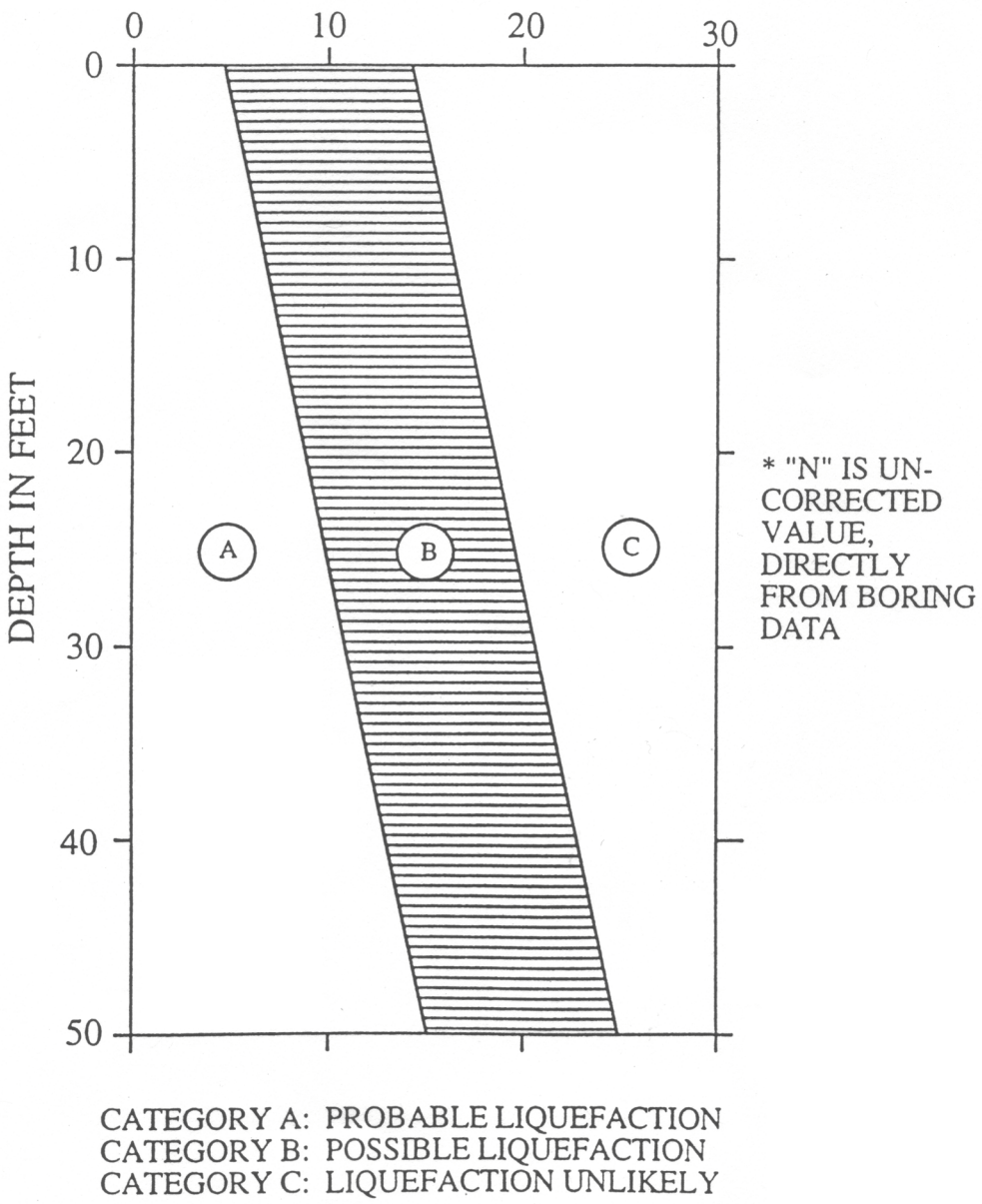


FIGURE NO. 3
NORMALIZED RESPONSE SPECTRA
5% DAMPING

FIGURE NO. 4



CATEGORY A: PROBABLE LIQUEFACTION
CATEGORY B: POSSIBLE LIQUEFACTION
CATEGORY C: LIQUEFACTION UNLIKELY

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