

REQUIRED BASIC PROJECT INFORMATION

D2.9 – 2.1 Introduction:

As with any design job, there is certain basic information that is required before seismic restraints can be selected and placed. The building owner, architect, and structural engineer make the decisions that form the basis for the information required to select the seismic restraints for the pipe and duct systems in the building. This is information that should be included in the specification and bid package for the project. It also should appear on the first sheet of the structural drawings. For consistency, it is good practice to echo this information in the specification for each building system, and on the first sheet of the drawings for each system. In this fashion, this information is available to all of the contractors and suppliers that will have a need to know.

D2.9 – 2.2 Building Use – Nature of Occupancy [Sentence 4.1.2.1]¹:

How a building is to be used greatly affects the level of seismic restraint that is required for the MEP (Mechanical, Electrical, and Plumbing) components. In the NBCC 2005 the building use is defined through the Importance Category, which ranges in four stages from Low to Post-Disaster. Table 2-1 below summarizes the information found in Tables 4.1.2.1 of the NBCC 2005. The nature of the building use, or its Occupancy Category, is determined by the building owner and the architect of record.

¹ References in brackets [Sentence 4.1.2.1 and Table 4.1.2.1] apply to sections, tables, and/or equations in the National Building Code of Canada 2005.

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Table 2-1; Importance Category vs. Building Use and Occupancy [Table 4.1.2.1]

Importance Category	Building Use or Nature of Occupancy
Low	Buildings whose failure will present a low direct or indirect hazard to human life <ul style="list-style-type: none"> ∅ Low human occupancy buildings where structural collapse is unlikely to cause injury or other serious consequences. ∅ Minor storage buildings and structures.
Normal	Buildings not listed as Importance Category Low, High, or Post-Disaster.
High	Buildings which are likely to be used in Post-Disaster situations as shelters, which will include the following building types: <ul style="list-style-type: none"> ∅ Elementary, middle, or secondary schools. ∅ Community centers. Manufacturing and storage facilities which contain toxic, explosive, or hazardous materials in sufficient quantities to pose a hazard to the public is released, such as: <ul style="list-style-type: none"> ∅ Petrochemical facilities. ∅ Fuel storage facilities ∅ Manufacturing and storage facilities for dangerous goods.
Post-Disaster	Buildings and structures which are designated as essential facilities which include but are not limited to: <ul style="list-style-type: none"> ∅ Hospitals, emergency treatment facilities, and blood banks. ∅ Emergency response facilities, fire, rescue, ambulance, and police stations, housing for emergency response equipment, and communications facilities including radio and television, unless exempted by the jurisdiction having authority). ∅ Power generating stations and sub-stations. ∅ Control centers for air land and marine transportation. ∅ Water treatment, storage, and pumping facilities. ∅ Sewage treatment facilities and buildings or structures required for national defense.

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D2.9 – 2.3 Site Class – Soil Type [Sentences 4.1.8.4.(2) and 4.1.8.1.(3)]:

The Site Class is related to the type of soil and rock strata that directly underlies the building site. The Site Class ranges from A to F progressing from the stiffest to the softest strata. Table 2-2 lists the various Site Classes and their corresponding strata.

Generally the structural engineer is responsible for determining the Site Class for a project. If the structural engineer's firm does not have a geotechnical engineer on staff, this job will be contracted to a geotechnical firm. The site profile is normally obtained by drilling several cores on the property. Unlike the U. S. building codes, there is no published default Site Class that may be that can be substituted for the actual Site Class that is determined from soils testing performed at the actual project location.

Table 2-2; Site Class vs. Soil Type [Table 4.1.8.4A]

Site Class	Soil Type
A	Hard Rock
B	Rock
C	Very Dense Soil & Soft Rock
D	Stiff Soil
E	Soft Soil
F	Liquefiable Soils, Quick Highly Sensitive Clays, Collapsible Weakly Cemented Soils, & etc. These require site-specific evaluation.

D2.9 – 2.4 Spectral Response Acceleration Value at 0.2 Second [Sentence 4.1.8.4.(1) and Table C-2]

The Spectral Response Acceleration Values at 0.2 Second, which are denoted as $S_{a(0.2)}$, have been determined for selected location in Canada and documented in the Canadian Journal of Civil Engineering, Volume 10, Number 4, pp 670-680, 1983. These values for selected location in Canada are presented in Table C-2 of the NBCC 2005, and are repeated for convenience below in Table 2-3

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Table 2-3; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada
[Table C-2]

Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$
British Columbia	-----	Masset	0.53	Langley	1.10
100 Mile House	0.28	McBride	0.27	New Westminster	0.99
Abbotsford	0.92	McLeod Lake	0.18	North Vancouver	0.88
Agassiz	0.67	Merrit	0.32	Richmond	1.10
Alberni	0.75	Mission City	0.93	Surrey (88 Ave & 156 St.)	1.10
Ashcroft	0.33	Montrose	0.27	Vancouver	0.94
Beaton River	0.12	Nakusp	0.27	Vancouver (Granville & 41 Ave)	0.88
Burns Lake	0.12	Nanaimo	1.00	Vernon	0.27
Cache Creek	0.33	Nelson	0.27	Victoria Region	-----
Campbell River	0.62	Ocean Falls	0.38	Victoria (Gonzales Hts.)	1.20
Carmi	0.28	Osoyoos	0.28	Victoria (Mt. Tolmie)	1.20
Castlegar	0.27	Penticton	0.28	Victoria	1.20
Chetwynd	0.24	Port Alberni	0.75	Williams Lake	0.28
Chilliwack	0.73	Port Hardy	0.43	Youbou	1.00
Comox	0.66	Port McNeill	0.43	Alberta	-----
Courtenay	0.65	Powell River	0.67	Athabasca	0.12
Cranbrook	0.27	Prince George	0.13	Banff	0.24
Crescent Valley	0.27	Prince Rupert	0.38	Barrhead	0.12
Crofton	1.10	Princeton	0.42	Beaverlodge	0.13
Dawson Creek	0.12	Qualicum Beach	0.82	Brooks	0.12
Dog Creek	0.32	Quesnel	0.27	Calgary	0.15
Duncan	1.10	Revelstoke	0.27	Campsie	0.12
Elko	0.27	Salmon Arm	0.27	Camrose	0.12
Fernie	0.27	Sandspit	0.56	Cardston	0.18
Fort Nelson	0.12	Sidney	1.20	Claresholm	0.15
Fort St. John	0.12	Smith River	0.52	Cold Lake	0.12
Glacier	0.27	Smithers	0.12	Coleman	0.24
Golden	0.26	Squamish	0.72	Coronation	0.12
Grand Forks	0.27	Stewart	0.30	Cowley	0.20
Hope	0.63	Taylor	0.12	Drumheller	0.12
Kamloops	0.28	Terrace	0.34	Edmonton	0.12
Kaslo	0.27	Tofino	1.20	Edson	0.15
Kelowna	0.28	Trail	0.27	Embaras Portage	0.12
Kimberley	0.27	Ucluelet	1.20	Fairview	0.12
Kitimat Plant	0.37	Vancouver Region	-----	Fort MacLeod	0.16
Kitimat Townsite	0.37	Burnaby (Simon Fraser Univ.)	0.94	Fort McMurray	0.12
Lilloet	0.60	Cloverdale	1.00	Fort Saskatchewan	0.12
Lytton	0.60	Haney	0.97	Fort Vermilion	0.12
Mackenzie	0.23	Ladner	1.10	Grande Prairie	0.12

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Table 2-3 Continued; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada [Table C-2]

Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$
Alberta		Humboldt Bay	0.12	Selkirk	0.12
Habay	0.12	Island Falls	0.12	Spit Lake	0.12
Hardisty	0.12	Kamsack	0.12	Steinbach	0.12
High River	0.15	Kindersley	0.12	Swan River	0.12
Hinton	0.24	Lloydminster	0.12	The Pas	0.12
Jasper	0.24	Maple Creek	0.12	Virden	0.12
Keg River	0.12	Meadow Lake	0.12	Winnipeg	0.12
Lac la Bishe	0.12	Melfort	0.12	Ontario	
Lacombe	0.12	Melville	0.12	Ailsa Craig	0.16
Lethbridge	0.15	Moose Jaw	0.12	Ajax	0.22
Manning	0.12	Nipawin	0.12	Alexandria	0.68
Medicine Hat	0.12	North Battleford	0.12	Alliston	0.17
Peace River	0.12	Prince Albert	0.12	Almonte	0.58
Pincher Creek	0.19	Qu' Appelle	0.12	Armstrong	0.12
Ranfurlly	0.12	Regina	0.12	Arnprior	0.64
Red Deer	0.12	Rosetown	0.12	Atikokan	0.12
Rocky Mountain House	0.15	Saskatoon	0.12	Aurora	0.19
Slave Lake	0.12	Scott	0.12	Bancroft	0.26
Stettler	0.12	Strasbourg	0.12	Barrie	0.16
Stony Plain	0.12	Swift Current	0.12	Beaverton	0.16
Suffield	0.12	Uranium City	0.12	Belleville	0.26
Taber	0.12	Weyburn	0.23	Belmont	0.20
Turner Valley	0.15	Yorktown	0.12	Big Trout Lake	0.12
Valleyview	0.12	Manitoba		CFB Borden	0.16
Vegreville	0.12	Beausejour	0.12	Bracebridge	0.18
Vermilion	0.12	Boussevain	0.12	Bradford	0.18
Wagner	0.12	Churchill	0.12	Brampton	0.26
Wainwright	0.12	Dauphin	0.12	Brantford	0.24
Wetaskiwin	0.12	Flin Flon	0.12	Brighton	0.25
Whitecourt	0.12	Gimli	0.12	Brockton	0.40
Wimborne	0.12	Island Lake	0.12	Burk's Falls	0.21
Saskatchewan		Lac du Bonnet	0.12	Burlington	0.36
Assiniboia	0.17	Lynn Lake	0.12	Cambridge	0.22
Battrum	0.12	Morden	0.12	Campbellford	0.23
Biggar	0.12	Neepawa	0.12	Cannington	0.17
Broadview	0.12	Pine Falls	0.12	Carleton Place	0.52
Dafoe	0.12	Portage la Prairie	0.12	Cavan	0.20
Dundurn	0.12	Rivers	0.12	Centralia	0.14
Estevan	0.15	Sandilands	0.12	Chapleau	0.12

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Table 2-3 Continued; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada [Table C-2]

Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$
Ontario	-----	Grimsby	0.40	Mattawa	0.51
Chatham	0.20	Guelph	0.21	Midland	0.15
Chesley	0.13	Guthrie	0.16	Milton	0.30
Clinton	0.13	Haileybury	0.29	Milverton	0.15
Coboconk	0.18	Haldimand (Caledonia)	0.34	Minden	0.19
Cobourg	0.24	Haldimand (Hagersville)	0.29	Mississauga	0.31
Cochrane	0.21	Haliburton	0.21	Mississauga (Port Credit)	0.32
Colborne	0.24	Halton Hills (Georgetown)	0.25	Mitchell	0.14
Collingwood	0.14	Hamilton	0.33	Moosonee	0.15
Cornwall	0.67	Hanover	0.13	Morrisburg	0.63
Corunna	0.14	Hastings	0.23	Mount Forest	0.15
Deep River	0.66	Hawkesbury	0.65	Nakina	0.12
Deseronto	0.27	Hearst	0.12	Nanticoke (Jarvis)	0.26
Dorchester	0.19	Honey Harbour	0.15	Nanticoke (Port Dover)	0.23
Dorion	0.12	Hornepayne	0.12	Napanee	0.28
Dresden	0.18	Huntsville	0.20	New Liskeard	0.29
Dryden	0.12	Ingersoll	0.19	Newcastle	0.22
Dunnville	0.35	Iroquois Falls	0.21	Newcastle (Bowmanville)	0.21
Durham	0.14	Jellicoe	0.12	Newmarket	0.19
Dutton	0.20	Kapuskasing	0.14	Niagara Falls	0.41
Earlton	0.26	Kemptville	0.60	North Bay	0.29
Edison	0.12	Kenora	0.12	Norwood	0.22
Elmvale	0.15	Killaloe	0.48	Oakville	0.35
Embroy	0.18	Kincardine	0.12	Orangeville	0.18
Englehart	0.25	Kingston	0.30	Orillia	0.16
Espanola	0.12	Kinmount	0.19	Oshawa	0.21
Exeter	0.14	Kirkland Lake	0.24	Ottawa	0.66
Fenelon Falls	0.18	Kitchener	0.19	Owen Sound	0.13
Fergus	0.18	Lakefield	0.20	Pagwa River	0.12
Forest	0.14	Lansdowne House Leamington	0.20	Paris	0.22
Fort Erie	0.40	Lindsay	0.18	Parkhill	0.15
Fort Erie (Ridgeway)	0.39	Lion's Head	0.15	Parry Sound	0.16
Gananoque	0.31	London	0.18	Pelham (Fonthill)	0.40
Geraldton	0.12	Lucan	0.16	Pembroke	0.66
Glencoe	0.19	Maitland	0.41	Penetanguishene	0.15
Goderich	0.12	Markdale	0.14	Perth	0.39
Gore Bay	0.12	Markham	0.22	Petawawa	0.66
Graham	0.12	Martin	0.12	Peterborough	0.20
Gravehurst (Muskoka Airport)	0.17	Matheson	0.22	Petrolia	0.16

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Table 2-3 Continued; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada [Table C-2]

Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$
Ontario	-----	Temagami	0.30	Beauport	0.60
Pickering (Dunbarton)	0.23	Thamesford	0.18	Bedford	0.60
Picton	0.26	Theford	0.14	Beloil	0.67
Plattsville	0.18	Thunder Bay	0.12	Brome	0.42
Point Alexander	0.66	Tillsonburg	0.20	Brossard	0.68
Port Burwell	0.21	Timmins	0.17	Buckingham	0.68
Port Colborne	0.38	Timmins (Porcupine)	0.19	Campbell's Bay	0.67
Port Elgin	0.12	Toronto (Metropolitan)	-----	Chambly	0.67
Port Hope	0.23	Etobicoke	0.26	Chicoutimi	0.62
Port Perry	0.19	North York	0.24	Chicoutimi (Bagotville)	0.63
Port Stanley	0.20	Scarborough	0.24	Chicoutimi (Kenogami)	0.62
Prescott	0.44	Toronto	0.26	Coaticook	0.41
Princeton	0.20	Trenton	0.25	Contrecoeur	0.66
Raith	0.12	Trout Creek	0.25	Cowansville	0.48
Rayside-Balfour (Chelmsford)	0.14	Uxbridge	0.19	Deux-Montagnes	0.68
Red Lake	0.12	Vaughan (Woodbridge)	0.24	Dolbeau	0.31
Renfrew	0.63	Vittoria	0.21	Drummondville	0.50
Richmond Hill	0.22	Walkerton	0.13	Farnham	0.59
Rockland	0.66	Wallaceburg	0.18	Fort-coulonge	0.67
Sault Ste. Marie	0.12	Waterloo	0.19	Gagon	0.12
Schreiber	0.12	Watford	0.16	Gaspé	0.22
Seaforth	0.14	Wawa	0.12	Gatineau	0.68
Simcoe	0.22	Welland	0.40	Gracefield	0.62
Sioux Lookout	0.12	West Lorne	0.20	Granby	0.48
Smith Falls	0.42	Whitby	0.21	Harrington-Harbour	0.12
Smithville	0.40	Whitby (Brooklin)	0.20	Harve-St-Pierre	0.33
Smooth Rock Falls	0.19	White River	0.12	Hemmingford	0.68
South River	0.23	Warton	0.12	Hull	0.68
Southampton	0.12	Windsor	0.18	Iberville	0.66
St. Catharines	0.41	Wingham	0.13	Inukjuak	0.12
St. Mary's	0.16	Woodstock	0.19	Joliette	0.63
St. Thomas	0.20	Wyoming	0.15	Jonquière	0.62
Stirling	0.25	Québec	-----	Kuujuuaq	0.12
Stratford	0.16	Acton-Vale	0.45	Kuujuarapik	0.12
Strathroy	0.17	Alma	0.59	La-Malbaie	2.30
Sturgeon Falls	0.23	Amos	0.17	La-Tuque	0.29
Sudbury	0.15	Asbestos	0.37	Lac-Mégantic	0.40
Sundridge	0.22	Aylmer	0.67	Lachute	0.64
Tavistock	0.17	Baie-Comeau	0.66	Lennoxville	0.38

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Table 2-3 Continued; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada [Table C-2]

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Québec	-----	Richmond	0.38	New Brunswick	-----
Léry	0.70	Rimouski	0.63	Alma	0.27
Loretteville	0.63	Rivière-du-loup	1.10	Bathurst	0.41
Louiseville	0.63	Roberval	0.43	Campbellton	0.39
Magog	0.38	Rock-Island	0.42	Chatham	0.41
Malartic	0.21	Rosemère	0.68	Edmundston	0.41
Maniwaki	0.66	Rouyn	0.20	Fredericton	0.39
Masson	0.66	Salaberry-de-Valleyfield	0.69	Gagetown	0.34
Matane	0.68	Schefferville	0.12	Grand Falls	0.42
Mont-Joli	0.62	Senneterre	0.20	Moncton	0.30
Mont-Laurier	0.66	Sept-Îles	0.37	Oromocto	0.36
Montmagny	0.89	Shawinigan	0.58	Sackville	0.25
Montréal Region	-----	Shawville	0.67	Saint John	0.34
Beaconsfield	0.69	Sherbrooke	0.37	Shippagan	0.34
Dorval	0.69	Sorel	0.65	St. Stephen	0.66
Laval	0.68	St-Félicien	0.31	Woodstock	0.41
Montréal	0.69	St-Georges-de-Cacouna	0.98	Nova Scotia	-----
Montréal-Est	0.68	St-Hubert	0.68	Amherst	0.24
Montréal-Nord	0.69	St-hubert-de-Temisouata	0.64	Antigonish	0.19
Outremont	0.69	St-Hyacinthe	0.59	Bridgewater	0.23
Pierrefonds	0.69	St-jean	0.69	Canso	0.24
St-Lambert	0.69	St-Jérôme	0.64	Debert	0.22
St-Laurent	0.69	St-Jovite	0.63	Digby	0.26
Ste-Anne-de-Bellevue	0.69	St-Nicolas	0.59	Greenwood (CFB)	0.25
Verdun	0.69	Ste-Agathe-des-Monts	0.59	Halifax Region	-----
Nicolet (Gentilly)	0.64	Sutton	0.44	Dartmouth	0.23
Nitchequon	0.12	Tadoussac	0.84	Halifax	0.23
Noranda	0.20	Témiscaming	0.59	Kentville	0.24
Percé	0.20	Thetford Mines	0.35	Liverpool	0.24
Pincourt	0.69	Thurso	0.63	Lockeport	0.26
Plessisville	0.45	Trois-Rivières	0.64	Louisburg	0.22
Port-Cartier	0.46	Val-d'Or	0.22	Lunenburg	0.23
Povungnituk	0.22	Varenes	0.68	New Glasgow	0.18
Québec City Region	-----	Verchères	0.67	North Sydney	0.19
Ancienne-Lorette	0.60	Victoriaville	0.43	Pictou	0.18
Levis	0.58	Ville-Marie	0.33	Port Hawkesbury	0.21
Québec	0.59	Waterloo	0.41	Springhill	0.24
Sillery	0.58	Windsor	0.36	Stewiacke	0.22
Ste-Foy	0.59	-----	-----	Sydney	0.20

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Table 2-3 Continued; Spectral Response Acceleration Value at 0.2 Second for Selected Locations in Canada [Table C-2]

Province & Location	$S_{a(0.2)}$	Province & Location	$S_{a(0.2)}$
Nova Scotia	-----	Echo Bay / Port Radium	0.12
Tatamagouche	0.19	Fort Good Hope	0.15
Truro	0.21	Fort Providence	0.12
Wolfville	0.25	Fort Resolution	0.12
Yarmouth	0.23	Fort Simpson	0.12
Prince Edward Island	-----	Fort Smith	0.12
Charlottetown	0.19	Hay River	0.12
Souris	0.15	Holman	0.12
Summerside	0.19	Inuvik	0.12
Tignish	0.22	Mould Bay	0.35
Newfoundland	-----	Norman Wells	0.51
Argentia	0.18	Rae-Edzo	0.12
Bonavista	0.17	Tungsten	0.51
Buchans	0.15	Yellowknife	0.12
Cape Harrison	0.24	Nunavut	-----
Cape Race	0.20	Alert	0.12
Channel-Port aux Basques	0.15	Arctic Bay	0.18
Corner Brook	0.14	Arviat / Eskimo Point	0.18
Gander	0.16	Baker Lake	0.12
Grand Bank	0.18	Cambridge Bay	0.12
Grand Falls	0.15	Chesterfield Inlet	0.16
Happy Valley-Goose Bay	0.15	Clyde River	0.50
Labrador City	0.12	Coppermine	0.12
St. Anthony	0.15	Coral Harbour	0.24
St. John's	0.18	Eureka	0.33
Stephenville	0.14	Iqaluit	0.13
Twin Falls	0.12	Isachsen	0.40
Wabana	0.12	Nottingham Island	0.24
Wabush	0.12	Rankin Inlet	0.12
Yukon	-----	Resolute	0.35
Aishihik	0.26	Resolution Island	0.44
Dawson	0.54	-----	-----
Destruction Bay	0.73	-----	-----
Snag	0.61	-----	-----
Teslin	0.19	-----	-----
Watson Lake	0.45	-----	-----
Whitehorse	0.22	-----	-----
Northwest Territories	-----	-----	-----
Aklavik	0.18	-----	-----

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D2.9 – 2.0

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D2.9 – 2.5 Importance Factor for Earthquake Loads [Sentence 4.1.8.5 and Table 4.1.8.5]:

The Importance Factor for Earthquake Loads (I_E) for the building is assigned based on the Importance Category of the building. It may be prudent to request both the assigned Importance Category and the Importance Factor for Earthquake Loads. The Importance Factor for Earthquake Loads may be specified more stringently than the Importance Category of the building would indicate in order to artificially provide increased protection for the building and its contents. The Importance Factor for Earthquake Loads is assigned as shown in Table 2-4

Table 2-4; Importance Factor for Earthquake Loads by Importance Category [Table 4.1.8.5]

Importance Category	Importance Factor for Earthquake Loads I_E
Low	0.8
Normal	1.0
High	1.3
Post-Disaster	1.5

D2.9 – 2.6 Summary:

The following parameters will be required by the design professionals having responsibility for MEP systems in a building, and should be determined by the structural engineer of record.

1. Importance Category: This defines the building use and specifies which buildings are required for emergency response or disaster recovery.
2. Spectral Response Acceleration Value at 0.2 Second: This is used to determine the actual Lateral Design Seismic Force.
3. Importance Factor for Earthquake Loads: This is a numerical value that translates the building usage into the Lateral Design Seismic Force used to design and/or select seismic

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restraints for non-structural components. This value used in conjunction with the Spectral Response Acceleration Value at 0.2 Second will determine whether seismic restraints are required for non-structural components or not.

These parameters should be repeated in the specification and drawing package for the particular system, mechanical, electrical, or plumbing, in question.

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