

# Four Storey Residential Plan Review

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**General Approach to four storey multi-suite residential occupancy plan reviews**  
**Key focus area: residential condo or apartment.**

- This process will provide some insight into the general issues that should be reviewed during plans examination for a four storey wood frame multi-suite residential building, typically located above a one or two level parking garage. You will note that this is a long process and that is because this is one of the more complex buildings to examine for code compliance.
- This process will assist you in going to the right drawings at the right time, and provides guidance on the key issues related to each type of drawing. You are not expected to review every detail or plan, but to review the key ones for plan review. Also, by following the suggested steps, we hope that you will save a great deal of time by using some of the suggestions and plan review techniques we have listed in this process guide.

### KEY ISSUES:

- Fire Safety
- Life Safety
- General Structural design notes
- Accessibility for persons with disabilities.

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*Start with the Occupancy Classification for the building*

*By focussing on the Occupancy Classification of the building at the outset of your plans examination, you will be able to know from the outset what the construction requirements are for:*

- *Combustible / non-combustible construction (there may be an alternative solution that clarifies this part of the process – if so, include in file and attach summary to drawings.) This is your, and the building inspector's, snapshot of the building:*

*Fire Resistance Rating requirements for floors, mezzanines, load-bearing & supports.*

*You may find that the designer is choosing to create more than one building for the purposes of 3.2.2. [See also 3.2.1.2. and 3.1.9.1 (2)] This is not always the case, and need not be done in all cases, so you must note carefully what the designer intends to do at this area.*

*In most cases, you will be classifying the wood frame four storey component to 3.2.2.45. (if this building shares a parking garage with a high building this may not be the case and many provisions of 3.2.6 would apply. However, wood frame above a 3.2.1.2. slab is still ok.)*

*The parking garage will have a separate 3.2.2. classification and may be designed to 3.2.1.2. as well in order to consider it a separate building. (more discussion later) (note: we do get the odd storage garage, and there is a slight change to this occupancy – see page 862 for code references in this case)*

### **Determine this is definitely a four storey building:**

- This involves dealing with the fundamental basics of the code:
- Review the following definitions:
- **Building Height:** See Division A, Part 1 at page 7 (2006 BCBC)
- **First Storey:** Same Division, same page.
- **Grade:** See Division A, Part 1 at page 10 (2006 BCBC)
- The key here is to review all elevations to ensure that the criteria for meeting the intent of four storey building height is achieved. Artificial berming and manipulation of grades should be closely reviewed to ensure that the intent of the code has been complied with. Local depressions noted in the definition of grade should only include such things as driveway ramps leading to an underground parking garage and pedestrian entrances and exits. This does not include such things as lower level decks unless specifically used exclusively for exits. Also, constructing the building's parking garage elevated, and then backfilling to create a new sloped area that is not level will hinder fire fighting access to the building and does not meet the intent of the code either.

Start at the site plan and orient yourself with the general location of the building on the lot:

- To begin with, do a short review of all plans submitted, including architectural, structural, mechanical, plumbing, fire suppression, electrical, civil and geotechnical. This is of a preliminary nature, and will only give you a broad perspective of where things are and what is included in different drawings. Try not to focus on any specific issue at this time. This is meant as a brief overview only (to start) go to your computer program (if you have one) and enter your name.
1. Start by creating a building classification form for this building. You may need to find an alternative solution, if applicable and attach it to the plans, as well as use it as a guideline on the Building Classification. When BC is complete, you can proceed with other functions in your computer program, or begin plans examinations now. See end of presentation for a sample building classification form.
  2. Locate the wall schedule, floor schedule and door schedule and make up a tab (self-sticking removable notes with a hand written label) and attach to each individual page. (wall, floor, door schedules) You will use this later when reviewing fire separations. This allows you to locate these schedules quickly when reviewing the individual floor plans.
  3. Start at the architectural site plan and review this plan for the following:
    - a. Review for compliance with 3.2.5.16 (fire department connections) (you may need to review plumbing/ fire suppression/ civil drawings to locate all the needed information)

Site plan review (continued)

b. Review for compliance with 3.2.5.4., 3.2.5.5. and 3.2.5.6. (fire department access routes)

- Note that this review will include such issues as: main entry within 3m to 15m max., turning radiuses, turn - around for fire department vehicles, access route width, and looking at any projections that limit the required 5m height clearances.
- c. Look for a statement on the structural drawings that slabs supporting driveway access for fire department will support an 80,000 pound fire department vehicle with outriggers. (or your specific fire department criteria) If not, make a note of this and include in letter to architect /structural engineer. (don't forget delivery truck access may be required)

Note: If the fire department vehicle will not be driving on the suspended slab, then of course this note may not be required and no note and letter items are required. However, a fire lane access created new should be capable of this loading, and a short note requesting confirmation of this criteria would still be appropriate, especially in areas where the ground may be soft (building needs piles for instance). In this case you may get this confirmation from geotechnical engineers rather than a structural engineer.

Further issues to review at site plan:

4. In general terms, look for accessibility issues related to:
  - a. Access from street to main entry,
  - b. curb drops (letdowns),
  - c. walkway and ramp widths and slope,
  - d. handrails, and handrail extensions,
  - e. notes related to slip resistance and tactile warnings on stairs and ramps, (this is a good time to have the access handbook handy)
5. In specific terms, related to accessibility, review for compliance with 3.8.2.1., 3.8.2.2., 3.8.2.3., and 3.8.2. 27. Also review 3.8.3.2., 3.8.3.3., 3.8.3.4., 3.8.3.5., 3.8.3.6., 3.8.3.10, 3.8.3.11 and 3.8.3.12.

[Note that hotels and motels are residential occupancies also, and have additional accessibility issues such as 3.8.2.31, 3.8.3.12, 3.8.3.13, 3.8.3.14., 3.8.3.16, 3.8.3.18 and especially 3.8.3.5. (4) (a)]. Also note that the access handbook shows things that are suggested, not necessarily required by code.

Further issues to review at site plan:

6. If appropriate (look at a flood - proofing map) review flood-proofing level compliance (minimum floor levels consistent with map) Also, soil gas may be an issue if you are in a flood plain with peat bogs. Radon may also be an issue to consider in some areas.
- If shown, review retaining wall geometry and design, and note that "retaining walls require separate permit" (if your bylaw requires this) on drawings if retaining wall structural drawings are not included. If the structural design includes retaining walls, then this note may not be required.
7. Review exit paths shown related to main floor and below grade floors.
8. Review Right of Ways (R.O.W.'s) and Easements (highlight if shown on architectural drawings, consider noting on architectural drawings (if not shown there, but on civil drawings only). Note any overhead building projections (awnings, decks, eaves etc. -these may not be permitted) that would interfere with the R.O.W.'s or Easements that are shown. Concrete stairs leading to and resting on the easement or R.O.W. may need special legal agreements or may not be allowed at all.

9. Highlight the assemblies using the F..R.R. color coding conventions.\*

**\*Time saving tips:**

*\*Mark the wall type with the color coding for the listed assembly (if appropriate use of assemblies is confirmed). If you highlight the wall number, plus the actual rating (such as two hour), you will find that this will save you a lot of time when going back and forth between the floor plan being reviewed and the schedule page with the color coding on both of them.\**

*\*When going through the door schedules, you will need to know which walls have which ratings in order to know what the closure (or door, frame and hardware) ratings will be required. Refer to 3.1.8.4. for requirements. Notice that these door ratings are not F.R.R., but F.P.R. ratings, and use the correct terminology when sending letters to designers. [F.R.R. = Fire Resistance Rating, F.P.R. = Fire Protection Rating]. When you have reviewed the appropriate door, highlight it (or annotate correction) to show that you have reviewed it. (this helps you refocus if interrupted by counter enquiry or phone)*

*\*When reviewing the floor plans, one idea is to continue the wall rating through the door rating and use a yellow high-lighter to indicate you have checked that the rating is correct. Another idea is to color code the door rating with the appropriate color for the F.P.R. rating, which will show you that you have checked that particular door and confirmed that the rating is correct. After that, you can then continue the wall color code through the door opening area.*

Review lowest floor level (usually a parking garage area –may be more than one level) (start at the bottom and work your way up)

- You may need to review section drawings and other discipline drawings, as well as plan views, to complete these tasks. This is normally done when you review the plumbing, mechanical, civil, and electrical for fire, life safety and disabled access.

10. Note that all room areas should be identified for use (occupancy). (3.1.2.1.) & 3.1.3.1.)

11. Review travel distances. (3.4.2.1. and 3.4.2.4) and Location of exits (3.4.2.5., 3.8.3.19)

12. Locate and review elevator areas – does this area require a vestibule? (3.1.8.17, 3.2.8.5., 3.3.5.4., 3.3.5.7.)

13. Review exit widths. (3.4.3.1. to 3.4.3.3.) and exit heights (3.4.3.4.).

14. Review fire separations at walls where required, and beside other occupancies if applicable. (remember that you have “tagged” the wall schedules before). Color code fire resistance rated assemblies using the color coding conventions.

15. Review door widths and ratings (remember that you have “tagged” the door schedules before also)

Review of lowest floor level (continued)

16. Review corridor widths [3.4.3.2.(8)]

17. Review disabled accessible latch clearances [300mm or 600 mm clearances -see 3.3.1.13.(10)]

18. Review exterior exit paths to public thoroughfares (note any pathways blocked or changes in elevation that require special design –handrails, guards, tactile warnings, ramps, etc.

19. Review exterior exit paths related to exit protection (3.2.3.13)

20. Review disabled washrooms and sizes (if for example a Group D or E is part of a residential development)

21. Review and highlight wall and floor ratings (refer to tagged floor and wall schedules and use color coding for F.R.R.'s) . Continuous highlight for fire separations and dashed highlight for load bearing supports are a suggested “standard”. You may have a 45 min. F.R.R. required by 3.2.2. but might require a 1 hour to be supported, so the 1 hour support color would be in dashed lines (does not affect door F.P.R.'s – doors are related to the suite to suite or corridor separation requirements).

22. Review stair widths, rise and run (3.4.6.7.), landing sizes (3.4.6.3.) (highlight noted rises and runs in yellow to indicate that you have reviewed them and that they are compliant)

23. Review handrail sizes and geometry for size, height, extensions. (3.4.6.4.)

Review of lowest floor level (continued)

24. Review exits for continuity – see 3.4.4.4.

25. Review cross section drawings as well as plans for these levels of parking garage and note minimum height requirements per 3.3.5.4.(5).

26. Note any alternative solutions on plans. Typically, issues like assault security water curtains at vestibules, (although they don't require an F.R.R.) and similar items may be included in alternative solutions. These should be noted at the affected areas on each floor plan and on appropriate elevations. For instance, we indicate where a water curtain equivalency is at the affected window by placing a red wavy line and a yellow highlight on the side (or sides) of the windows needing this provision, and provide a note “water curtain required per alternative solution.” Note also 3.3.5.4 (note that 3.3.5.7. (2) applies to this occupancy). It is also very obvious on elevations if you highlight in yellow the windows that have water curtains. (this applies where an exit is exposed to a window and not what you would see inside a garage area)

27 Review accessibility issues for the following:

- a. Highlight accessible parking stalls in purple highlighter. (suggestion only)
- Use a purple line to indicate path of travel from parking stall to accessible entry (in parking garage, this will normally be the vestibule and elevator)
- b. Review and highlight any obstructions such as curbs, security gates and stairs that would prevent a person with a disability from gaining access to the building.

*Main floor plan review:*

- **NOTE:** By now you should have already reviewed many key issues related to fire department access and accessibility issues at the site plan review. The process for this floor level will generally be in a larger scale than the site plan and will include interior details that would not normally be shown on the site plans.
28. Review key details shown for sidewalks and other related access issues leading someone to the main entry. Highlight accessible paths in purple from sidewalk to front entry doors, and to the elevator. (for residential) (you may have to review landscaping plans and civil drawings as well at this time to be sure of what is being done) Note height for enter-phone for disabled height requirements [3.8.2.27 (2)]
29. Review all walls for fire separation requirements and note any non-continuous or non-compliant areas. Highlight walls with appropriate colors as per F.R.R. requirements. (use standard color coding)
30. All rooms and spaces should be identified for occupancy or use and you determine if there are any additional fire separation requirements (such as service rooms (3.6.2.1.), incinerator rooms (3.6.2.4.) garbage rooms and recycling rooms (3.6.2.5.) electrical rooms (3.6.2.7), emergency power rooms (3.6.2.8.), locker storage rooms (3.3.4.3.) and similar rooms requiring fire separations.

*Main floor plan review: (continued)*

- As you have already done on the lower floor, review the same issues as noted before. (use of rooms and spaces, fire separations required, egress and exit paths, travel distance, etc.)
31. Locate and highlight (in yellow) where fire alarm panel / annunciator will be located. Review criteria for location of annunciator panel. (3.2.4.8.) This is normally on electrical drawings, but many architects include this on architectural drawings as well. The yellow color is a suggestion so that it stands out.
32. Review exits at or near the lobby area and review Table 3.4.2.1.B (a four storey residential building is required to be sprinklered), 3.4.2., 3.4.3. and specifically 3.4.2.6. and 3.4.4.2.
33. Look for any dead end corridor situations [see 3.3.1.9 (7)]
34. Review floor elevations for any changes and note if elevation changes affect accessibility to elevators. (this may affect this floor or lower floors) (see 3.8.3.3.)

*Main floor plan review: (continued)*

35. Look for mechanical duct shafts when you check the mechanical drawings that come from the parking garage level and see how the designers have provided closures for the two hour fire separation between the parking garage and the residential areas. (See 3.1.8.4.).

Many designers will provide a vertical two hour shaft wall that essentially makes the shaft part of the parking garage. Others wish to use only a 1 hour fire separation and a horizontal fire damper. Listed assemblies are important for this issue. A two hour shaft wall should have listed assemblies for instance. Note any assemblies listed are appropriate for the design being reviewed, and if not provided with the design, we suggest that you ask for them.

36. Note also that higher STC ratings (STC 55) are required at elevator hoistways, or a refuse chute. (see 5.9.1.2. (2))

*Second, third and fourth floors plans review.\**

- By this time, you should be familiar with the designer's designations for fire resistant walls. To save time now, it is a good idea to mark up the walls that have fire resistant ratings on all of the remaining three floors. \*This will save you time now, as the F.R.R.'s will normally be very similar from floor to floor.\* If floors are repetitive you need only mark up the first one. With more time, you can consider marking up the rest. Note: it is not necessary to mark up / color code repetitive floor plans. Usually, the 3<sup>rd</sup> and 4<sup>th</sup> floor are repeats.
37. As with the main floor, you will be looking for the same issues as listed in items #26 to #35 previously discussed.
38. On the fourth floor, look for access to roof area. (attic access panels and attic / roof access) Normally there will be a roof access ladder (see 3.2.5.3.). This access is a required item for the purposes of maintenance of the roof, flashings, skylights and any roof top appliances or vents. In many designs, you will notice that the elevations show a sloping roof, however, many buildings are designed with a 1:50 sloped (almost flat) roof area. (review section drawings)
39. Look for roofs and attic space to see if it has been divided by fire separations above suite separations. (see 3.1.8.3. and 3.6.4.2.(2.) This should also occur above corridors. If more than two suites share an attic space, then soffit protection will be required. (see 3.2.3.16) You may also want to do a review on vent areas of roof (1/300<sup>th</sup> of insulated area) and highlight roof vents if shown on architectural roof drawings. (by highlighting them, you can count them easier, and calculate areas)

*Elevation drawing plans review:*

*Review spatial separations, Limiting Distance and Percentage of Unprotected Openings.*

40. Review the height of the building per 3.2.1.1. and definitions at Division A, Part 1 page 7.
41. There is a fundamental difference between 3.2.3 and 9.10.15. – not appropriate for a Part 3 building. “Unprotected Openings” –Part 3 versus “Glazed Openings” – Part 9. Refer to 3.2.3. for requirements related to spatial separations and note that you will be using Table 3.2.3.1. C (sprinklers are required for 3.2.2.45 designs).
42. Refer to 3.2.3.2. and 3.2.3.3. for specific issues related to Exposing Building Face and Walls Enclosing Attic or Roof Spaces. (may affect spatial calculations).
43. Note 3.2.3.5. for limiting distances less than 1.2 m.
44. Note 3.2.3.6. as well as 3.1.10.7 when you have a firewall in the building. You should be aware that this includes items as listed in this Article. In some cases, you will notice that alternative solutions may address an alternative to a firewall, but the criteria for parapets has not been modified in this edition of the code. (see 3.1.10.4. related to parapets)

*Elevation drawings (continued)*

45. Review windows and exit doors and their relationship. (see 3.2.3.13) By now, you should have identified all exits from the building. We find it helpful to indicate these on the elevations and high-light in yellow, so that you can plainly see where windows near exits will be located. (i.e.: sometimes the window in the upper storey affects exiting below.)
  - (you may wish to indicate on the door face on the elevation drawing “exit door” or “exit corridor” or “exit lobby” and high-light in yellow – this is not necessary, but helps you orientate yourself on each elevation from a floor plan.)
46. Note exit doors that have sidelight glazing beside them. Note the criteria for sidelight glazing next to exit doors in 3.4.1.8 and 3.3.1.19, as well as criteria related to mirrors next to exits in 3.4.1.9. In these cases, it should be noted that glazing and glass doors require physical protection in the form of guards or similar fixtures (see 3.3.1.19 and also 9.6.6.2. as this Article is specifically cited in Part 3)
47. Where exits go through lobby areas, note the criteria in 3.4.4.2. (see also 3.4.2.6 as this requires exit signs, manual stations, exit width, exit height, and ratings for fire separations.)
48. If the building under review has an exterior passageway as part of the primary exit, note that flame spread ratings may apply to combustible construction (see 3.1.13.10. and 3.4.4.3. -while this may be meant to apply to high buildings only, the clause is stand alone.)

*Sections plan and detail review:*

49. Review all section drawings for floor assembly designations, and if floor schedule is correct for the area you are reviewing, then color code the floor assemblies as the floor schedule shows. Note that this will typically show a 2 hour F.R.R. (green) at the parking garage floors and the underside of the main floor. For floors above the main floor, you will normally see a 1 hour F.R.R. designation (pink). You may wish to show Suite to Suite and corridor walls in pink if they are shown on the section drawings. Refer to 3.3.4. for criteria for residential occupancy. We may not mark up every section and detail –choose a few representative sections and details to illustrate these ratings.

*Note that fire separations need to go to underside of floors or roof, and not just up to drop ceilings. See 3.1.8.3.*

50. For loadbearing walls, you will need to “dash highlight” them as 1 hour F.R.R.’s as well (pink). (see 3.2.2.45)
51. Review fire stop details for fire separations and compliance with 3.1.9.1. (1) or (2).  
*Note: we may not request fire stopping system specifications at this time as this may be done by the on-site building official during their field examinations.*
52. Review stair details for coordination with plan views and compliance with stair design criteria in 3.3.1.14., 3.4.3.2 (8), 3.4.3.4. and 3.4.6.1. to 3.4.6.8. Note also that stairs are affected by 3.3.1.17. , review landing criteria in 3.4.6.3. and guard criteria in 3.4.6.5.

*Sections plan and details review: (continued)*

53. Review landing criteria in 3.4.6.3.
54. Review handrail criteria in 3.4.6.4. (1) to (9)
55. Review guard criteria in 3.4.6.5. (1) to (7)
56. Review Treads, risers, and tactile warnings in 3.4.6.7. (1) to (6)
57. Review sections that show attic access, attic fire separations and confirm that they are consistent with floor plans and elevations (fire wall parapet should show on elevations and section drawings, and a detail should be included showing how the parapet is projected, shrinkage allowances noted, and how the parapet is flashed. This includes provisions for Part 5 as well as fire wall criteria.) Make sure that firewalls at exterior ends are not bridged by combustible projections (see 3.1.10.7)

*Note: To assist on-site building officials, it is good practice to highlight all floor plans, elevations and sections with a green (2 hour) highlighter (and annotate in red “2 hour firewall”) so that it is clear where the firewall is located. As you go through the floor plans, also note that all doors penetrating this firewall will be required to have a 1.5 hour F.P.R. rating and come complete with self-closers. When you have two doors at a fire wall, and they open in opposite directions [see also 3.3.1.11(4)], there is a requirement in NFPA 80 that a smoke detector be located on each side of the firewall. (See Appendix A-3.4.6.9. at page 567). Review also Division A-Appendix A at A-1.3.3.4 (1) & (2) and figure A-1.3.3.4.(2) on page 32.*

### Sections plan and detail review: (continued)

58. Review insulation factors if Part 9 applies (part 3 building size with firewall dividing building into two part 9 buildings – Table 10.2.1.1.A. applies, but as a Part 3 building with multifamily, Part 9 does not apply to Part 3.) In the case of Part 3 application only, you need to refer to Part 5 at 5.3.1.1., 5.3.1.2., and 5.3.1.3.

- Note: it is important that you read and become familiar with Part 5 as well as the Appendix notes to Part 5. Of particular note is Appendix., A - 5.3.1.2.(all) and A-5.3.3.1. The designer must also deal with 5.4.1.1. and 5.4.1.2., as well as 5.5.1.1. Should you note omissions related to these issues, you need to include them in the letter to the architect.

59. Review access to exit heights. (3.3.1.8), exit widths (3.4.3.2., 3.4.3.3.) headroom clearance (3.4.3.4.) and note that this will apply to parking garage access to exits as well.

### Structural Drawings review:

- Key issues that are reviewed on structural drawings:

Design notes should include:

60. Edition of B.C. Building Code and allowances for fire department apparatus and other loads. (delivery trucks may need to be considered in design for instance, but the building code does not specifically deal with this)

61. Snow loads consistent with building bylaw.

62. Rain loads consistent with building bylaw.

63. Wind loads consistent with building bylaw.

64. Seismic loads consistent with building bylaw.

### Structural Drawings review: (continued)

65. Note on welding: – confirm CWB certified welders required if building has steel structural assemblies requiring welding. (may be dealt with by on-site building official)

66. Note on parking structures designed to CAN/CSA-S413 “Parking Structures”. This standard typically requires portions of the slabs to include epoxy coated reinforcing bars for instance. Also, review Appendix D at D.1.1.3 to D.1.2.1 to understand limitations on the use of Appendix D. For the purposes of review of coordination between architectural and structural drawings for determination of F.R.R., we want to focus on Appendix D at D.2.2.1 and Tables D.2.2.1 A, D.2.2.1.B and D.2.2.3.B. (please note that there is criteria listed here that requires that reinforcing has a minimum cover of concrete, both at the top and at the underside.) Ensure that this cover is consistent with the listing provided.

67. For firewalls present in the building, quickly review how the design compensates for the collapse of one side during a fire. (see definition on page 9, 3.1.10.1 at page 78, and 4.1.5.18. at page 193).

68. General coordination (general form and shape only) between architectural, structural, mechanical and other designs that create holes or voids in horizontal or vertical assemblies. This is a quick review and is only meant to see if there are similar situations shown. The key is to see if a large opening is accounted for in structural drawings. (especially important at suspended slabs)

### Mechanical review

- For this review, what is important to remember is that many ducts will pass through fire separations. The ratings of the fire separations are important to know, both for your plan check and for the on-site building official to review what needs to be done.

- To make it easy to plan check, and easy for the on-site building official to review, you should highlight walls that require F.R.R.’s and color code these walls using the appropriate highlighter colors per the color code standard. (you may choose to not highlight the F.R.R. rating of the walls, and instead just yellow highlight the fire damper.) The on-site building official can then compare the F.R.R. of the wall designation on architectural drawings to the F.P.R. rating of the damper.

69. Review 3.1.8.4. and Table 3.1.8.4. for F.P.R. ratings (highlight if compliant) relative to F.R.R. requirements. Review 3.1.8.9. relative to fire dampers. Notice that fire damper ratings (F.P.R) relate directly to Table 3.1.8.4. as they are “closures” in a fire separation.

70. To assist on-site building officials, you will find that a short note can be added, noting the F.R.R. of the wall it is penetrating and the F.P.R. rating of the fire damper. (ie: “2 hour F.R.R. wall” (optional), “1.5 hour F.P.R. fire damper” with an arrow going to each.) This will also save you time when you are interrupted, as you will be able to see what you have checked and noted readily.

#### Mechanical review (continued)

- 71. Of particular importance is ductwork leading to exit stair shafts, and especially in the parking garage areas. Review 3.3.5.7. For exit stairs, it is normal to pressurize the stair shafts. This will place a higher air pressure in the stair shafts than adjoining spaces, and will force any smoke or other contaminants from entering the exit stair shaft areas. In order to get a supply duct into the exit stair shaft space, the designer normally needs to go from the mechanical room serving the stair shaft to the stair shaft with duct work. It is important that we see that the shaft surrounding the duct is separating the duct work from the rest of the floor. (often a 2 hour shaft wall is required) The duct should serve only the stair shaft, and not anything else within the floor area. (The concept is to not let any smoke from a fire within the floor area or another mechanical room contaminate the exit stair shaft) Of special note, please review 3.4.4.4. (1) to (9) related to ductwork in a stair shaft, and note that the ducts cannot supply other portions of the building. This provision is to prevent smoke contamination from other portions of the building.
- 72. In order to maintain the integrity of the exit stair shaft, the designer will need to enclose the duct work that runs through the parking garage with a shaft wall equal to the required fire separation of the slab (normally a 2 hour, but may be less if the design allows it) In this case, the designer should have a note at the duct stating that a shaft wall enclosure is necessary, and you should highlight the shaft wall rating and make sure that the shaft wall is designed to be complete from the mechanical room right to the stair shaft. Any deviations or areas that are incomplete should be noted and included in the letter to the CRP (architect usually).

#### Plumbing review

- These drawings will normally be in your Plumbing department's hands to do the plan reviews, however if you are a "dual inspector" it is yours to review as well. Normally, they contact the designers (mechanical engineers) directly and let us know what was said by providing us with a copy of the fax cover sheet and letter. We are not going to cover the plumbing review as part of this process module.
- When separate plumbing departments are satisfied that the drawings meet the requirements of Part 7, they will let us know and sign off their portion of the permit process area. We will then receive the approved, stamped drawings, and insert them in the plan set after reviewing the comments.
- Our key focus in reviewing the plumbing drawings is not to review Part 7 requirements, but instead to observe the type of plumbing piping that is being used, and specifically, if the pipe is combustible or non-combustible.
  - In this case there are a number of issues you need to be aware of:
    - The parking garage is most often designed as non-combustible construction, but not always.
    - The four storey residential portion is normally designed as combustible construction,
    - There will be penetrations to F.R.R. assemblies that affect which type of piping is permitted, and what type of fire stopping components are required (3.1.9.1.)

#### Plumbing review (continued)

- You need to review and understand the following:
- Standpipe systems (see 3.2.5.8. and Table 3.2.5.8.) Is it a "Type I" (2'1/2") or "Type II" (1-1/2") that is required ?
- Review standpipe system design (see 3.2.5.9.) Note that a fire department connection is required for every standpipe system – 3.2.5.9.(6) and 3.2.5.16.
- Hose connections (see 3.2.5.10)
- Hose Stations (see 3.2.5.11) and locations [specifically 3.2.5.11 (3), (4), and (5) and NFPA 14 for hose lay spacing and coverage]

#### Electrical review:

76. To start the electrical plans review, go through each page as a general overview of the drawings to compare with architectural floor plans and check for coordination. While you are doing this, locate the schedule that shows the symbols used. \*(time saver tip)\* Attach a self-sticking note and label it "schedule" or "legend" to easily find it, and highlight all fire and life safety components in yellow. This should include:
77. **Exit signs** (see 3.4.5.1. and 3.4.5.2.). Place yourself (in your mind) on each floor level and follow the access to exit routes through the building. You should be able to see two exit signs from any given point.
78. **Emergency lights** (see 3.2.7.1. to 3.2.7.9.) Consider how the access to exits are lit with emergency lighting, including the stair shafts.
79. **Manual stations** (3.2.4.16) Look for the symbol that will indicate manual stations next to each exit. Also look for fire alarm gongs. \*(time saver tip)\* place a tab in your code to find this one easily.
80. **Smoke alarms** (3.2.4.20) (top of exit stairs, elevator shafts, close to bedrooms in suites)
81. **Carbon Monoxide detectors** (6.2.4.1) Look for compliance with the criteria for proximity to bedrooms and also that there are smoke alarms at the top of stair shafts and elevator shafts. Note also that C.O. detectors are required in underground parking garages, which will activate exhaust fans after a certain level is reached. \*(time saver tip)\* place a tab in your code to find this one easily.

Electrical review: (continued)

82. **Fire detectors** (3.2.4.10) - Look for compliance with the criteria in (2), (a).
83. **Fire alarm panel** (3.2.4.1) fire alarm (3.2.4.17., 3.2.4.18., 3.2.4.19). You should read this section and be familiar with how the fire alarm panel and fire alarm will be installed within the building. You will usually see a drawing page with the fire alarm panel layout on it. Check to make sure that the required devices are monitored on the panel layout, and that the system complies with the above-noted articles. Verify and note if the system is a single or two stage system. (should normally be single stage only for this occupancy)
84. **Electrical hold open devices** for doors (3.3.1.11., 3.1.8.12). Review the location of these in relation to the articles noted, and ensure that there is a smoke alarm noted on each side of the doors. (a fire alarm panel connection should be evident on electrical drawings - must release and close on F/A actuation)
85. **Any Electromagnetic locks** (see 3.4.6.16 for criteria) (also 3.3.1.13). As these devices become more popular for solving security and access issues, it is important that these do not delay exiting from a building. Review the articles carefully and note any deviations from the requirements in the code. Note that an electric strike is different and is not code compliant for fire separation closures - must be a positive latch at required F.P.R. doors (see 3.1.8.13.) (NFPA 80 is also a document that should be referred to)

Electrical review: (continued)

86. Start at the lowest floor, review and highlight the location of each fire and life safety device.
87. You should be able to follow each egress to exit path and see exit lights and emergency lighting as you follow the path. If you observe an area that isn't covered, mark it on the drawings and include in the letter.
88. At each "exit door", you should find a symbol for a manual pull station. If not, mark one on the drawings and add this to the letter to architect.
89. Smoke detectors should be at the top of each exit stair, top of each elevator shaft, and within or close to bedrooms.
90. Fire detectors should be located in storage rooms, service rooms, janitor's rooms, at elevator hoist ways, and laundry rooms. (when areas are not sprinklered) (sprinklers are fire detectors so a 3.2.2.45 design may not require them in certain areas)
91. Locate the fire alarm panel (should be at or near the main entry to the building along with enter phone complying with 3.8.2.27 (2) (accessible height) and highlight the locations. (see 3.2.4.8 also - this relates to annunciation and zone indication)

Electrical review: (continued)

92. **Electrical hold open devices on doors:** You will normally see these doors paired and they will be in the main corridors leading to exits. (these should also appear on the door schedule as well) The key issues to note here are that the door hold open devices (see 3.1.8.12):
- must be connected to the fire alarm,
  - must close on any signal, and
  - must be provided with smoke detectors on each side of each pair of doors per NFPA 80 Appendix B. (you should see a smoke detector lined up on the centerline of one door in one direction, and centered on the opposite door on the other side.)
93. **Electromagnetic Locking Devices (EMLD's):** The key issues with EMLD's are that you need to understand all the requirements for this type of appliance. There tends to be a trend to want to create more security from parking garages into elevator vestibules, and from certain areas within the main floor area. It is key that you understand 3.3.1.13. and 3.4.6.15. The description in the electrical design should indicate that full compliance with all clauses in 3.4.6.15.(4) (a) to (q) will be required. (note the "and" at the end of sentence (f). (see also Appendix A-3.4.6.1. (4) at page 567)

Landscape drawing review:

- This review is focussed on the following issues:
94. Are there indications of any changes in sidewalk access to the main entry (3.8)
95. Review site plans and details that show ramps and sidewalks. Note any non-compliant areas related to accessibility, stairs, stairs without guards, etc.
96. Are there any indications that landscaping areas (trees, shrubs, etc.) will block fire department direct access to the fire department connection or other fire department required access points? (see 3.2.5.5.) This may be the time to spot a 3.2.3.13 issue related to exit exposure (exit path guided by landscaping features past a window in another fire compartment). This may occur where the designers have included raised planters which guide a person exiting an area past another fire compartment. (If this does not allow two directions of exiting)
97. Are there indications of retaining walls? This will require you to write a note "retaining walls require separate permits" if not included in the structural drawings set for this permit and include in your letter to the architect. Highlight any retaining walls in yellow so that you can easily see where they are located on the site.

*Civil Drawings review:*

- *The key focus areas for the civil drawings will be:*

98. *Coordination with other drawings, such as plumbing. (service entry to building same on both sets)*

99. *Noting where the fire hydrants are, and that they are consistent with the requirements in 3.2.5.5. Compare these fire hydrant locations with landscaping drawings and architectural drawings (if shown).*

100. *Review grades shown on these drawings and note any steep grades that may affect fire department access. [see 3.2.5.6. (1), (d).]*

*Geotechnical review:*

- *101. The key issue to look for is what type of footing and foundation system is being recommended by the geotechnical engineer. You need to be aware if there will be some piling required and you should see that there are pile caps and grade beams showing on the structural drawings. This is most often consistent between the two design disciplines, but should be compared.*
- *One other issue to focus on is the areas that may possibly contain methane or radon gas. The geotechnical engineer should provide a statement that confirms that no soil gas or radon gas is present on the site, or provide design criteria to deal with potential methane gas problems. (Dealing with soil gas may require additional sub-surface piping and an exhaust system) Soil gas areas are typically low lying properties that may have some swampy areas or were swamps at one time. Areas with radon may not be easily identified, however, Health Canada may be able to provide some guidance on this issue.*

*Confirmation of acceptance of Alternative Solutions:*

102. *Before a permit can be issued for a four story residential building, you must find out if there were alternative solutions for the building, and if the alternative solutions have been accepted and approved. (if you aren't the one doing the approval). In some situations, your plan review may create the need for an alternative solution.*

103. *Although you may not be involved in the acceptance process of the alternative solution, the solutions proposed will affect how you will view the building code approvals for this building. As the process gets close to finalizing, you should seek out the proposal, and if possible, obtain the summary of the alternative solutions.*

*We recommend cutting and pasting the summary (final accepted version) to one of the front pages of the architectural drawings, and color coding any fire separations, water curtains and other alternative solution issues that are indicated on any section drawings or plans that are included in the alternative solutions report.*

*Finalizing the permit for a four storey building*

103. *You have the duty of ensuring that all departments have signed off on their respective areas of the process. This will take some time to get to know who needs to sign off and close and who doesn't. If you are not sure, contact your supervisor.*

104. *All "notes transfers" (your red - lined notes that are critical for compliance) must be done, and all required stamps, stickers, cut and paste code issues, and alternative solution summaries or key principles should be attached and should be completed on both sets prior to issuing the permit. (as with all other permits)*

105. *Check with your building clerk to ensure that all fees required for this type of permit have been accounted for (includes DCC's, Engineering fees, damage bonds, rock bolting de-tensioning bonds, and utilities if applicable to your operation).*

106. *Sign the bottom of the BC form and provide the file to the Building Clerk advising that this permit is now ready to issue. (optional depending on departmental organization)*

Guide for types of required revisions:

**When revisions are required to drawings:**

- **Major fire, life safety or construction issues.** Things that affect the layout, or physical shape of the building, or other "big picture" items.

**Major design revisions to the plans such as:**

- fire department access,
- exits,
- exit protection,
- spatial separation,
- wall construction (combustible/ non-combustible construction),
- improper disabled ramps,
- stairs and handrail design/ details,
- door latch clearances

**When written confirmations work (smaller issues that don't affect the layout):**

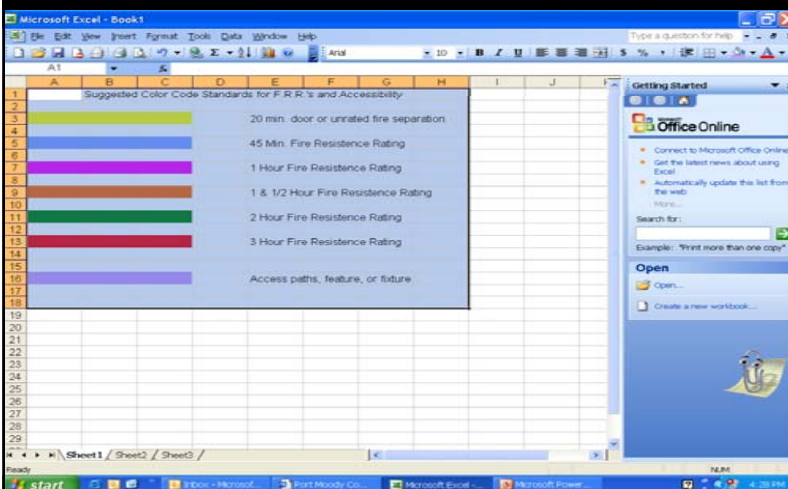
**Minor changes such as:**

- door ratings,
- missing exit signs/ emergency lights,
- fire dampers,
- some wall ratings,
- self-closers,
- wired glass sizes,
- grab bars,
- auto door openers,
- fire detectors.

## BOABC Disclaimer Statement:

- The presenters have provided this PowerPoint presentation to BOABC members for educational purposes only and BOABC and the presenters are not responsible for any errors or omissions that may result from the processes described in this training module.
- The responsibility for code compliance remains with the design professionals undertaking designs for buildings and with the owner undertaking the construction of a given project.
- This presentation is based on the original published version of the B.C. Building Code 2006 and does not address any revisions or errata that may be published. Changes resulting from revisions or errata may change the intent of various cited code references in this presentation. It is the user's responsibility to observe the changes that result, and adjust the plan review process according to any changes that may result from revisions and errata.
- This module may be invalid when a new version of the building code is issued.

**Recommended Color Coding Standard For F.R.R.'s and accessibility.**  
 Note these colours can be provided by using standard hi-lighter colour pack and are available at most office supply outlets. The chart shown can be easily created on an Excel program.



## Sample Building Classification form

- Building Address: \_\_\_\_\_ Date: \_\_\_\_\_
- Legal Address: \_\_\_\_\_ Zoning: \_\_\_\_\_
- Proposed Use: (example – four storey wood frame residential apartment)
- Applicable Building Code Edition: (example 2006 BCBC)
- Building Area (m<sup>2</sup>) \_\_\_\_\_ Building Height: 4 Storeys
- Major Occupancies: \_\_\_\_\_ (ie: C/ F3) Subsidiary Occupancies \_\_\_\_\_
- Building Classification Requirements: (example 3.2.2.45)
- Major governing Occupancy Classification: Group C (3.2.2.45)
- Construction Requirements: 3.2.2.45, up to 4 storeys, Sprinklered
- Max. Permitted Building Area: 1800m<sup>2</sup> Floor Assembly: 1 hour F.R.R.
- Construction: Combustible / non- combustible Mezzanine: 1 hour F.R.R.
- Sprinklers: Required Roof: No requirement
- Loadbearing Components: F.R.R. same as supported assembly
- 3.2.1.2 Common Parkade: Yes Occupancy on Roof: No
- Parking Sprinklers: Required Hose Stations: Class II
- Fire Detection: Required Smoke control: not required
- Fire Alarm: Required (3.2.4.7. (4) monitored Emergency Lighting: Required
- Sprinkler Standard: NFPA 13 / NFPA 13R Exit Lights: Required
- Standpipe System: Required Panic Hardware: Required
- High Building: No Disabled Access: Required to entrance only
- Interconnected floors: No

Plan Checker/ Building Official providing review:  
 (or by chief building official if appropriate)

Signature \_\_\_\_\_

*Communications with designers –some suggestions:*

- Remember that communications should be in written form, and that they will become legal records as part of the building file.
- You should consider providing point by point comments, and all communications should be addressed to the CRP, with possible cc's to the designated design discipline.
- Time saving suggestion:
  - List each item as a numbered item.
  - Include the code reference that is at issue.
  - Provide grid lines or room number / description if possible.
- Divide correspondence into design disciplines A, S, M, P, FSS, E, & Geotechnical (hint: you can cross reference the issue with the item # on the plans)
- To aid in finding the items, you may want to consider **bolding the referenced page number and issue** (ie: "**Page A-4 at Grid line 6 and B, at corridor 103**" – then include item being discussed in non- bold print) Note: This typically does not take a lot of time, but focuses the reader and yourself on finding the item later. (you may want to also cross reference the item with a mark up on the city copy of the plan review –then check it off when response is appropriately answering the question or issue)

*Communications with designers:*

- Remember to keep your comments professionally worded and in the proper wording related to Part, Section, Subsection, Article, Sentence, Clause, Sub-clause. (hint – copy the format from page xiv and paste on the inside front cover of your code so you have a ready reference.)
- Request that all replies come back as one coordinated package rather than piecemeal replies, which are more time-consuming to deal with.
- Remain professional and non-judgemental in the wording of all correspondence.
- Request that the designers reply in the same numbering sequence as used in your letter. (This will save much time when reviewing all issues and responses)

*Communications with designers:*

- We suggest that you keep a "working copy" of the correspondence on the building permit file so that in later years the issues can be reviewed and see that the corrections or clarifications have been dealt with and documented. One method of doing this is to keep a "clean copy" with no notes and a "working copy" with tick marks and an initial (and possibly date) of when the issue was dealt with satisfactorily.
- For correspondence to a CRP, you may wish to include the owner in the correspondence, so that they are aware of any issues, and also the timelines involved in the responses. This often can serve as evidence that the building permit was not held up as a result of City Hall procedures, but rather in timelines not being met by designers.

**Possible Six Storey Residential Building Code Adoption  
– Jan.1/09**

- We were going to provide you with a list of what will be adopted in the five and six storey building code that is now on the Building Policy Website for public consultation. However, the list of code changes that are posted are only part of what the technical advisory group made as recommendations. We urge all participants to provide individual comments to the BPB on the proposed changes. The public consultation ends December 15, 2008.