



## City of Vancouver *Planning - By-law Administration Bulletins*

Community Services, 453 W. 12th Ave Vancouver, BC V5Y 1V4 ☎ 604.873.7344 fax 604.873.7060

planning@vancouver.ca

# GRADES, FILLING AND DRAINAGE - RA-1 DISTRICT

*Authority - Director of Planning*

*Effective December 1, 2002*

The intent of the RA-1 Guidelines as it applies to grades, filling and drainage, is to preserve the natural low lying landscape of the Southlands, while meeting the City of Vancouver floodproofing standards as established by the Province of British Columbia.

### **Fraser River Floodplain**

Two-thirds of Southlands is in the Fraser River floodplain. As there is no contiguous dyke system in the Fraser River floodplain, floodproofing is achieved by raising building grades through fill and structural means and by providing adequate drainage systems to reduce flood hazard. Fulfilling the practical concerns of flood management while minimizing man-made interventions to the natural landscape, is a key challenge in the RA-1 District.

### **Provincial Standards**

*(For detailed floodproofing requirements refer to Administrative Bulletin "Floodproofing Policies")*

Provincial floodproofing standards were adopted by the City of Vancouver in 1986 and are consistent with subsequent Floodproofing Policies and RA-1 Guidelines. In general, floodproofing elevations are determined by the site's proximity to the Fraser River: within 300 m of the natural boundary it is 3.5 m Geodetic (102.9 ft. City Datum), beyond it is 3.0 m Geodetic (101.2 ft. City datum)<sup>1</sup>. No construction is permitted within 30 m of the natural boundary of the Fraser River, however this may be reduced with the conditional approval of the City Engineer. In these instances, it is important to have the City Engineering staff brought into the discussion early in the design process.

### **Limits on Fill Elevations**

To protect the amenity of the low lying areas there are height limits to fill elevations. The floodproofing elevation can be achieved by fill alone if the adjacent street elevations are above 2.5 m Geodetic (99.5 ft. City Datum). In all other cases, fill is limited to 2.6 m Geodetic (100.0 ft. City Datum) with the remainder achieved by structural means. In all instances where floodproofing is required, the fill should be a *minimum* .9 m (3 ft.) above the elevation of the street fronting the site. Non-floodproofing fill is permitted, but is limited to a maximum .6 m (2 ft.) above base surface of the existing grades, determined by an interpolative average of the four corners of the site.

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<sup>1</sup> For the purposes of calculating floodproofing elevations, the City of Vancouver Datum has been replaced by the Geodetic Survey of Canada Datum. To convert from the City Datum to the Geodetic Datum, subtract 91.37 ft. from 100 ft. and convert to metric. For example, 102.9 ft. City Datum is 3.5 m Geodetic.

## Limits on Fill Areas

The RA-1 Guidelines encourage floodproofing to habitable buildings only and include a surrounding 4.5 m (15 ft.) wide fill apron. Provincial Floodproofing Standards may, in certain instances, extend floodproofing requirements to non habitable buildings that are used for storage of goods damageable by flood-waters. Further, the Chief Building Official may require flood construction standards for *any* building in a designated floodplain. The City may make the determination during the initial enquiry or scoping sessions what, if any, special requirements are applicable and which approving authorities need to be brought in early into the Development Permit process. An example where this might occur would be a land development within 30 m of the Fraser River.

## Fill Apron

The 4.5 m fill apron should follow the outline of the building footprint. An “L” shaped building for example, would have a fill apron similar in shape. In this case, an expanded rectangle shape that effectively extends the fill apron would not be acceptable. The width of the fill apron may be reduced, such as in narrow side yards, but the 20% transition to base grade should be maintained. Retaining walls, terracing and rockeries should not be used for grade changes where possible.

There may be exceptions to the maximum size of the fill apron based on special conditions. Limiting factors such as lot size and shape, the location of existing buildings and other potential conflicts of use with adjacent sites that may cause an unnecessary hardship will be considered. The Director of Planning may relax fill conditions after considering applicable policy and by-laws.

## Pre-Loading

Development sites in Southlands usually need to be pre-loaded, because of the low bearing capacity of the native soil. Pre-loading requires a Development Permit (DE) to allow for an evaluation of the site and neighbouring properties. An application for a DE can be made either separately or as part of a comprehensive site and building DE.

However, because most development in the Southlands requires a DE, which determines the location, shape and size of the building(s), applicants are advised to have their comprehensive site and building DE approved before proceeding with pre-loading. Applicants who begin pre-loading before the location, shape and size of the development is approved, *do so at their own risk*. Although staff may give preliminary advice on the general direction of the development, a final evaluation cannot be completed until after a formal DE application is made.

Documentation for a pre-loading DE application includes the following:

- geotechnical analysis of the soil conditions and general specification for the pre-load;
- site plan showing property boundaries, existing buildings, landscaping, proposed building(s) and an outline of the pre-load area, indicating how long the pre-load is required;
- drainage plan for the entire property during the pre-loading;
- survey of existing and proposed grades;
- sectional profile of the pre-load;
- details of any protective barriers required for existing trees; and
- arborist’s report for any trees requiring a protective barrier.

Site drainage is an important concern in the Southlands area because of the low lying topography and proximity to the Fraser River. Pre-loading changes site drainage characteristics and has the potential for causing drainage problems on neighbouring sites. As a condition for approval, all site drainage needs to be dealt with on site with drainage ditches, swales, etc., that control and divert runoff away from neighbouring sites. Site drainage should not cross property boundaries.

Maintaining the existing low lying topography of Southlands is a design objective of the RA-1 Guidelines. For this reason, existing grades should be included with pre-loading DE applications as a record of pre-development conditions and as a reference for future development. Although land fill is permitted for floodproofing and up to 0.6 m for non-floodproofing purposes, building height determination is measured from the existing grade prior to development.

As a condition of approval, all DE’s related to pre-loading will have a time limit for the pre-load material to be permitted on site. If the DE is not proceeded with and becomes void after one year, any pre-loading material on site should be removed.

## **Filling and Drainage**

A Filling and Drainage Plan, prepared by a registered engineer, is a Development Permit Application submission requirement. The Filling and Drainage Plan should indicate existing and proposed elevations, areas of fill and drainage patterns, and location and methods of detention if required. Minimizing the impact on drainage patterns during pre-loading should also be considered in the drainage study. Generally, the emphasis is on ensuring that:

- on fill respect the RA-1 Design Guidelines; and
- increased runoff does not occur on adjacent properties and drainage is diverted to City ditches and not to adjacent lands.

Where necessary, permeable surfaces and detention systems should be used to limit and control excess runoff.

## **Final Grades**

Supervision during site regrading is to be monitored by a registered engineer with a signed Letter of Assurance submitted at completion of grading. Additionally, a re-survey of completed grades will be required to ascertain that the final grades are in conformance with the approved construction documents and a Survey Certificate prepared by a B.C. Land Surveyor verifying floodproofing standards<sup>2</sup>.

## **Reference Documents**

### **Southlands Plan**

### **Southlands RA-1 Guidelines**

### **Planning - By-law Administration Bulletins**

Floodproofing Policies

### **Interpretive Notes (superceded)**

RA-1 Floodplain Area, December 1990

RA-1 Floodplain - Existing and Finished Grades, December 1990

RA-1 Site Pre-Loading

Floodproofing Policies, September 1997

Floodproofing Standards, October 1993

### **Vancouver Building By-law, 1999**

Section 2.3.7, 1A.6.1.9

### **Government of British Columbia, Land Title Act**

Section 82 "Subdivided Land Subject to Flooding"

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<sup>2</sup> Planning - Bylaw Administration Bulletins: Floodproofing Policies, "Verification of Flood Construction Setbacks and Elevations", February 28, 1995