3.3 Infrastructure Retrofitting

In addtion to applying to new streets, the utility corridor standards and guidelines described in this Manual shall be applied to infrastructure retrofitting.

Retrofitting design solutions shall be developed on a case-by-case basis and are dependent on the specific identified retrofitting objectives and the existing and planned street configuration and utility requirements.

Infrastructure retrofitting objectives of utility upgrades, additions, replacement or other modifications may result from:

- A change in land use;
- Additional utility demands;
- A need for new pipes, cables or ducts, etc.; or
- Retrofit of existing streets (to provide more Travel Lanes or Parking, etc.)

3.3.1 Infrastructure Retrofitting Principles

The following principles shall be applied, where possible, when carrying out infrastructure retrofitting:

- Utility corridor widths and locations presented in this Manual should be followed;
- New utilities shall be installed adjacent to existing utilities (in accordance with location rules) to avoid compromising future spare corridors;
- Where space is available under the Pedestrian Realm, the placement of utilities under Travel Lanes or Parking should be avoided, unless these street elements are being reworked as part of a street retrofitting scheme;
- To promote efficiency and minimise disruption, multiple retrofit activities should be carried out together, where possible, including street retrofitting configuration as required;
- Approval by all relevant stakeholders, including utility providers, is required for infrastructure retrofitting; and
- When installing new utilities as part of infrastructure retrofitting, adherence to this Manual should not be the primary cause of relocating other existing utilities.

Where installation of a new utility is not possible without relocating existing utility, and all other solutions, including alternative routes, have been explored, full technical justification for the proposed relocation(s) is required.

3.3.2 Step-by-Step Guide to Infrastructure Retrofitting

For the development of infrastructure retrofitting of utility corridors arrangements in existing streets, the following five steps may be applied as shown in Figure 3.3:

Step I: Understand Land Use Context

Develop a thorough understanding of the existing and planned land uses.

Step II: Identify Infrastructure Retrofitting Objectives and Confirm Utility Requirements

Develop utility network plans for utilities to be retrofitted, in accordance with retrofitting objectives and utility providers' specifications.

Step III: Develop Cross Section of Existing Streets

Develop a cross section to include all existing street elements (including street furniture), utilities (including type, size and location) and existing surface finishes based on as-built and site survey data.

Step IV: Select Closest Applicable UCDM Cross Section Arrangement

Select the closest applicable utility corridors cross section for the identified existing street, which may contain street elements, including Travel Lanes, Frontage Lanes, Cycle Tracks, etc. This selection is based on matching the Street Type and the configuration of the street elements with the UCDM cross sections.

Step V: Adjust and Finalise Utility Corridor Retrofit in Optimal Location

Finalise the utility corridors cross sections arrangements, incorporating both existing utilities and proposed retrofitted utilities. Adjustments should be made, where necessary, within the RoWs in accordance with the location rules and corridor width requirements.

Utility corridor plans for a network of streets may be developed by repeating Steps III, IV and V for each change in cross section/street.

A sample project demonstrating the use of these steps is included in Appendix B.