

PRENDOS Limited

RISK EVALUATION

BUILDING WEATHERTIGHTNESS

Risk Evaluation

What factors increase the likelihood of failure?

Where is leakage most likely?

What are the consequences of failure?

Pilot Study of Weathertightness Failures

Data collected from 50 residential sites, mostly
in Auckland.

250 household units

Age between 0 and 12 year with average age of
5.2 years

Total value \$90 million

Median value \$450,000

Unitec study, median value of post-1990 houses
\$354,000

Pilot Study of Weathertightness Failures

Average height – 2.38 storeys

Average wind zone – 30% above medium (NZS
3604)

1420 leaks at an average of 5.7 leaks per unit

39 of 50 sites had balconies

39 of 50 sites had balconies that leaked

Repair Statistics

Total cost of repairs - \$8 million

Average repair cost - \$32,654

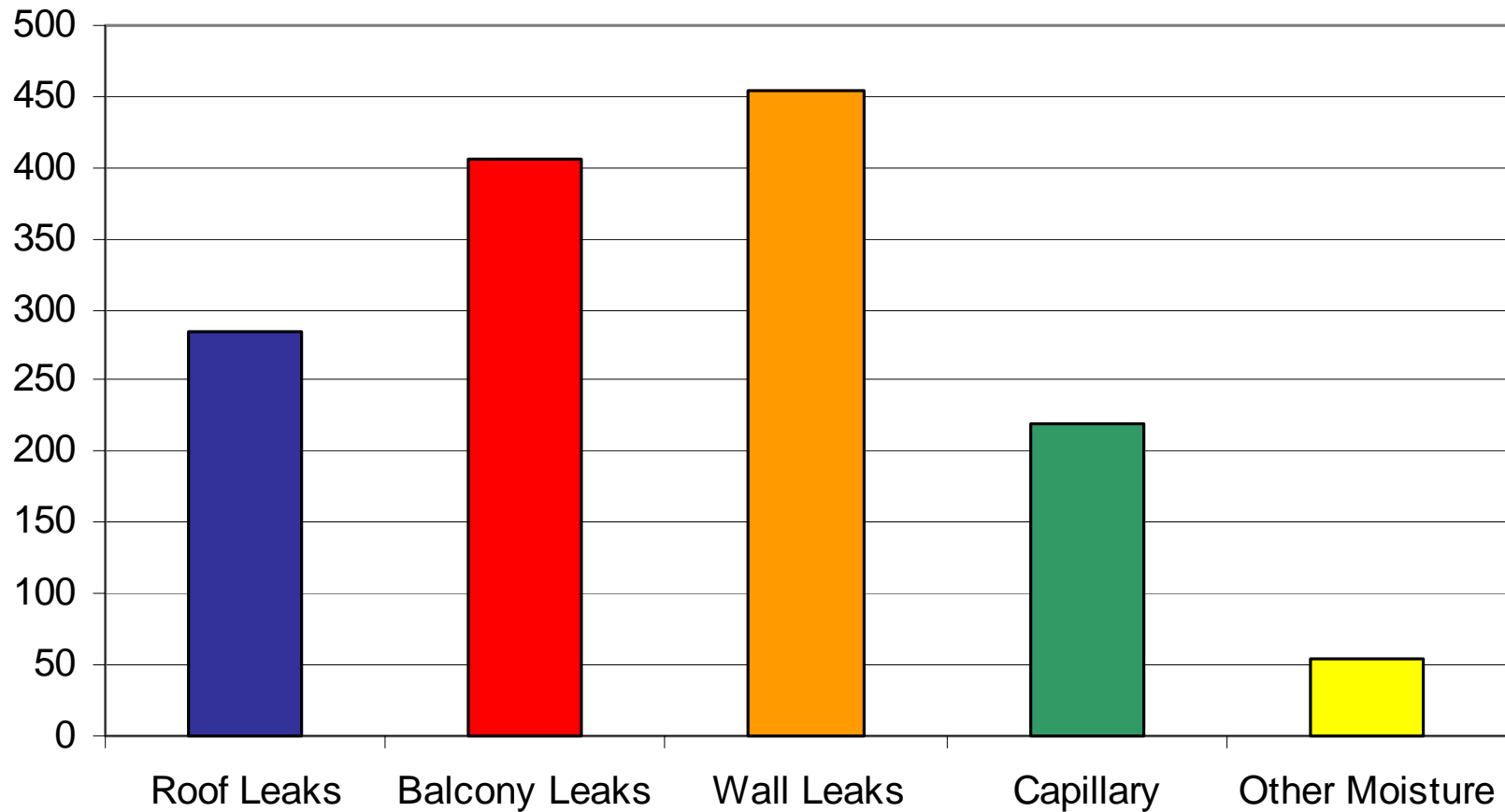
Worst case justified demolition and
reconstruction

Four of the sites involved significantly
'repaired' buildings that have failed
again

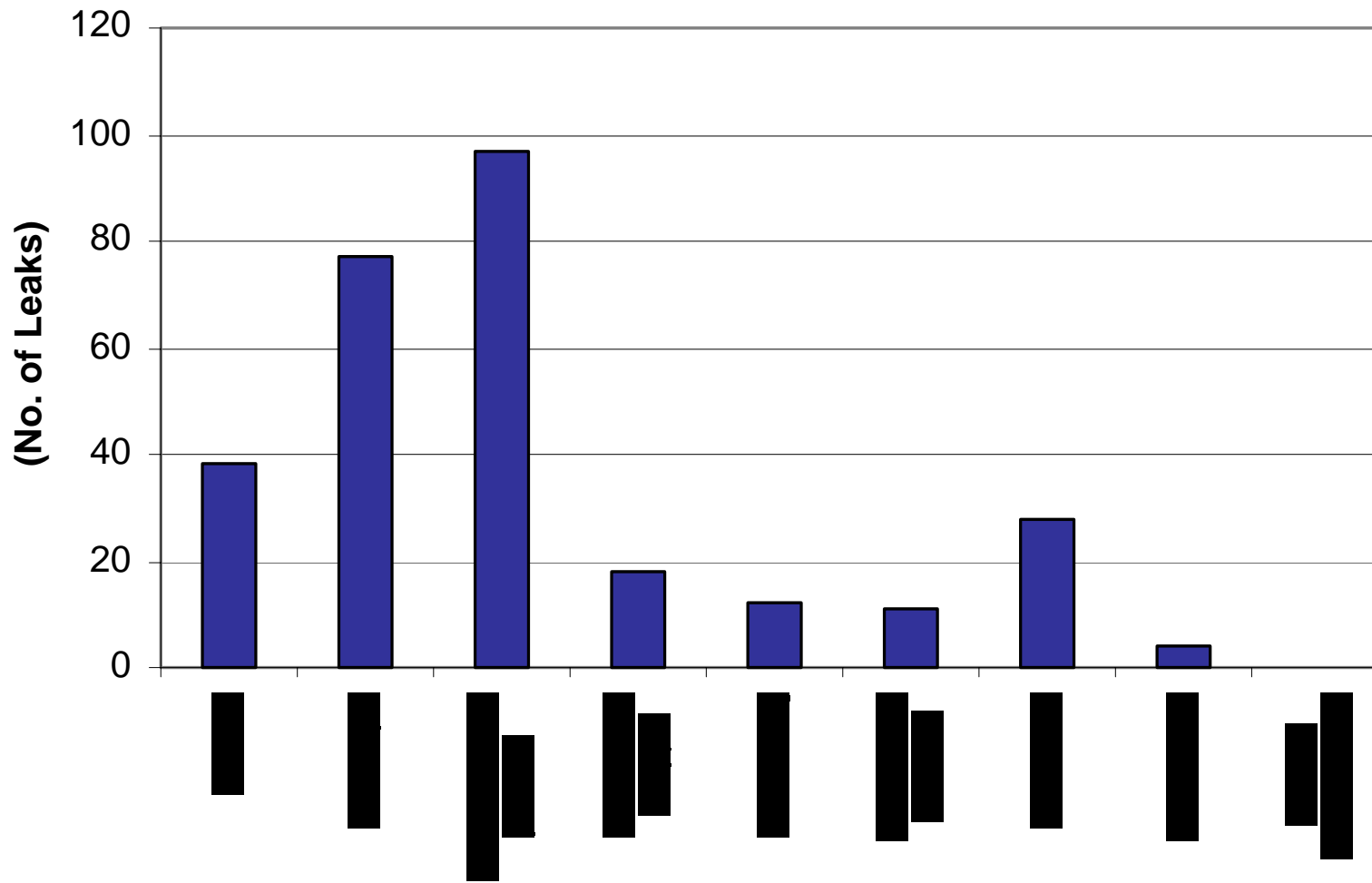
Examples of 'Leak' Definitions

| | |
|----------------------|-----------------------------------------------------------------------------------|
| Leak thru' parapet | 1 per wall length up to max of 10 m |
| Balcony membrane | 1 per deck up to 10m ² of area |
| Window installation | 1 leak per window |
| Cladding to ground | 1 per wall length up to 10 m of wall |
| Subfloor ventilation | 1 per elevation and 1 for missing dampcourse if adequate ventilation not possible |
| Shower leaks | 1 per shower unit leaking |

Water Sources and Frequency



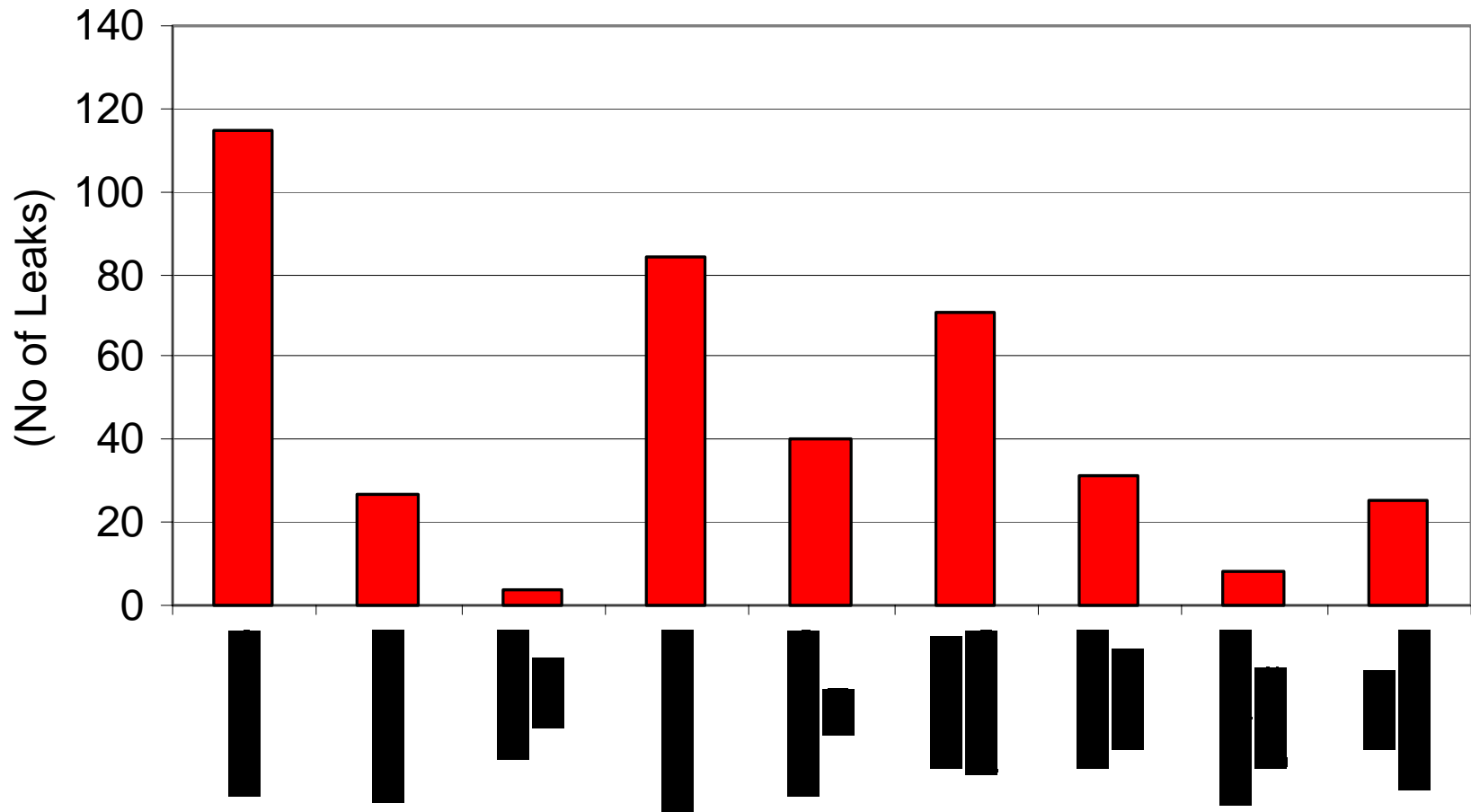
Roof Leaks







Balcony Leaks





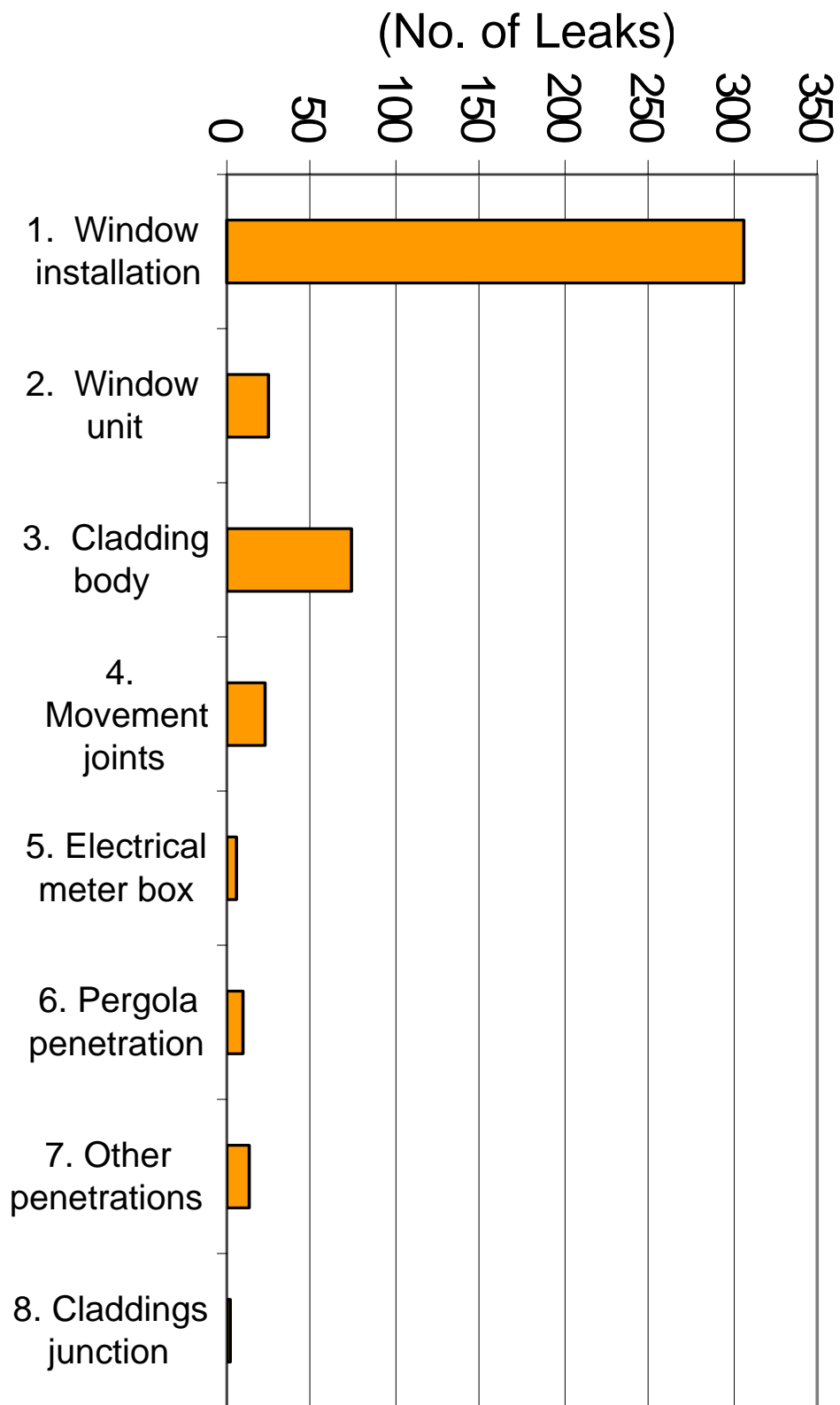




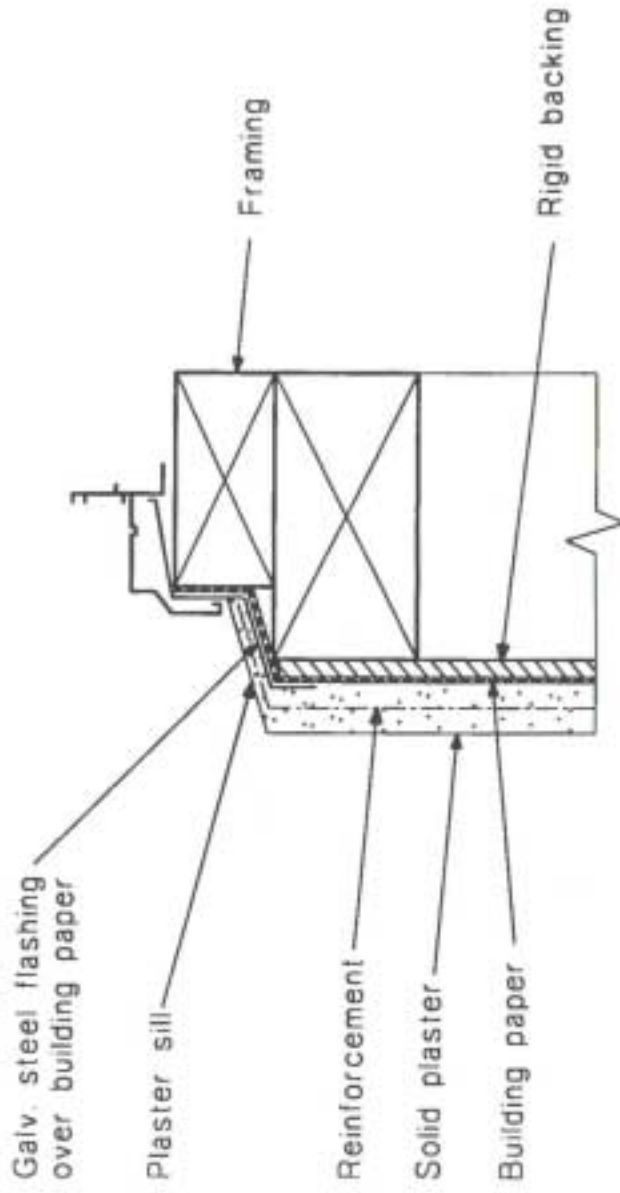




Wall Leaks



NZS 4251:Part 1:1998

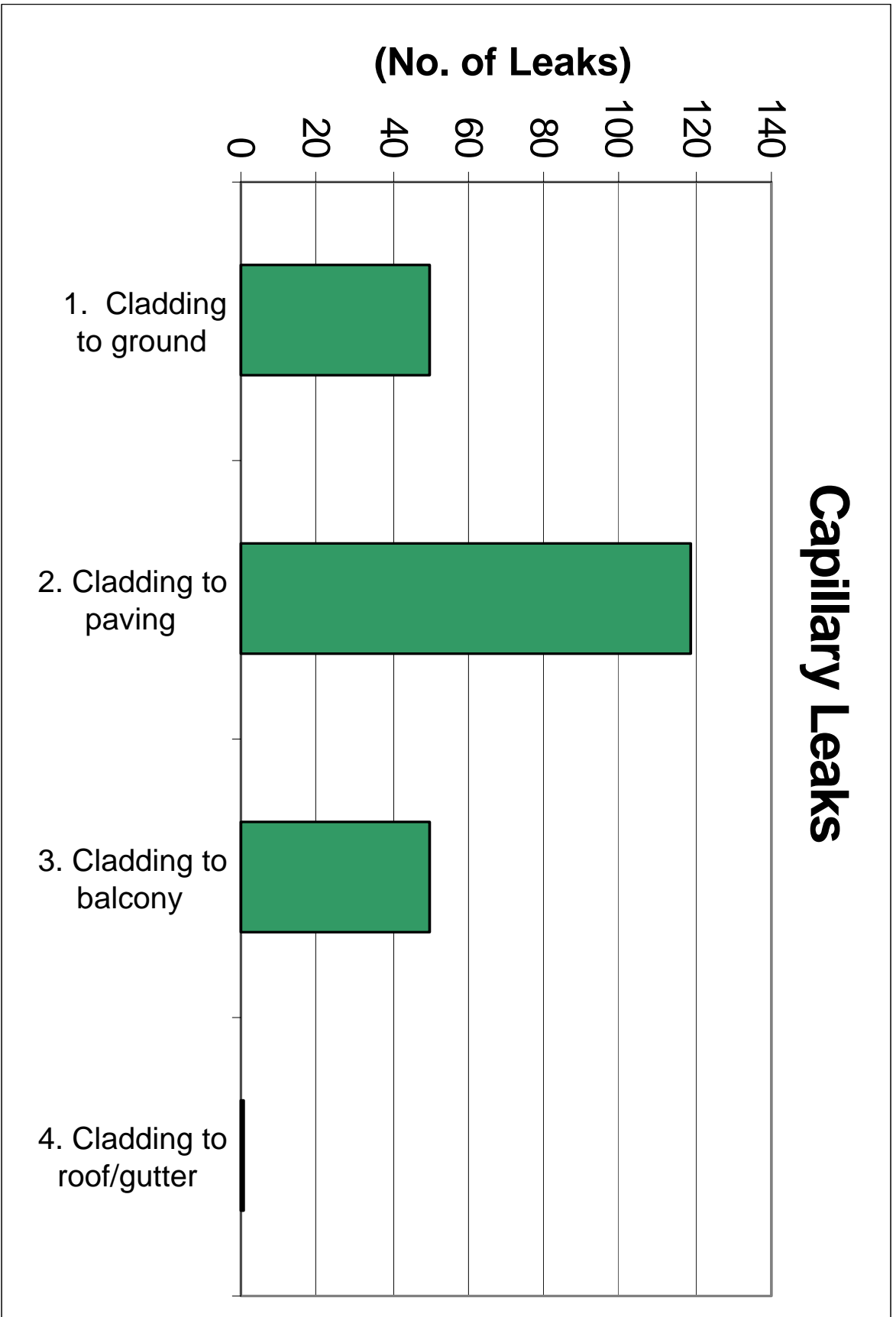


NOTE -
Intermediate solid plaster coats
not shown for clarity.

Figure 1(c) – Alternative sill detail

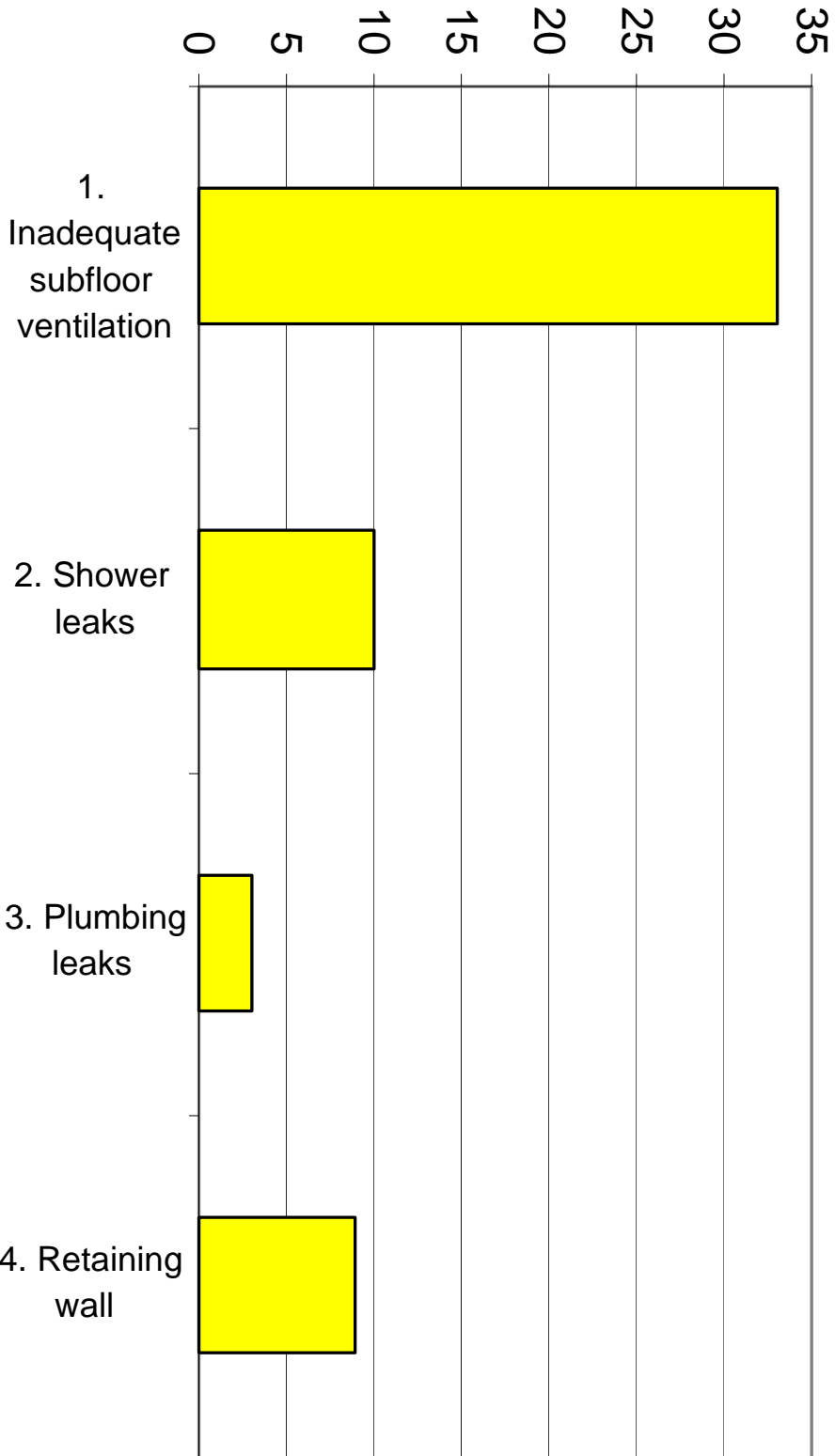


Capillary Leaks





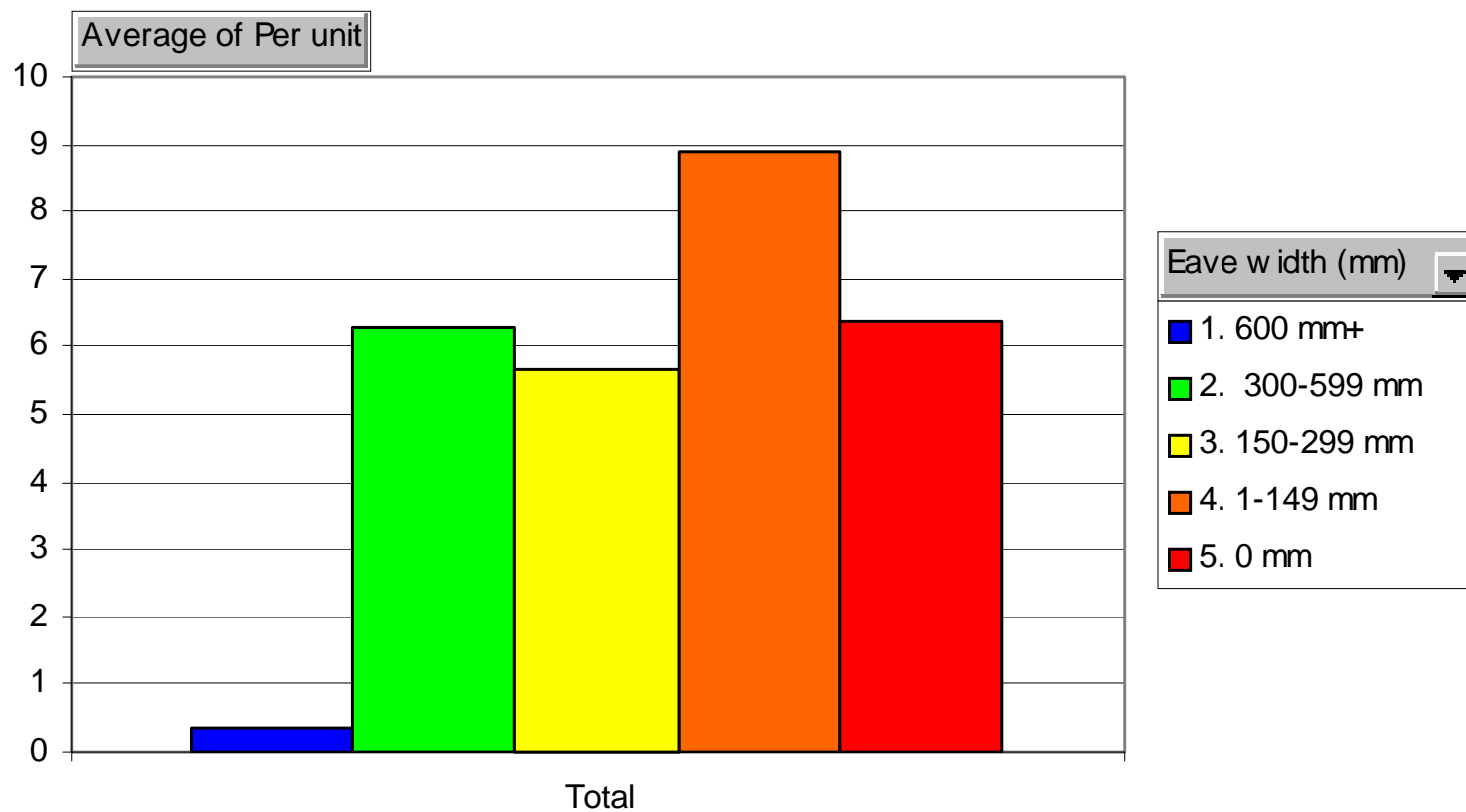
(No. of Leaks)



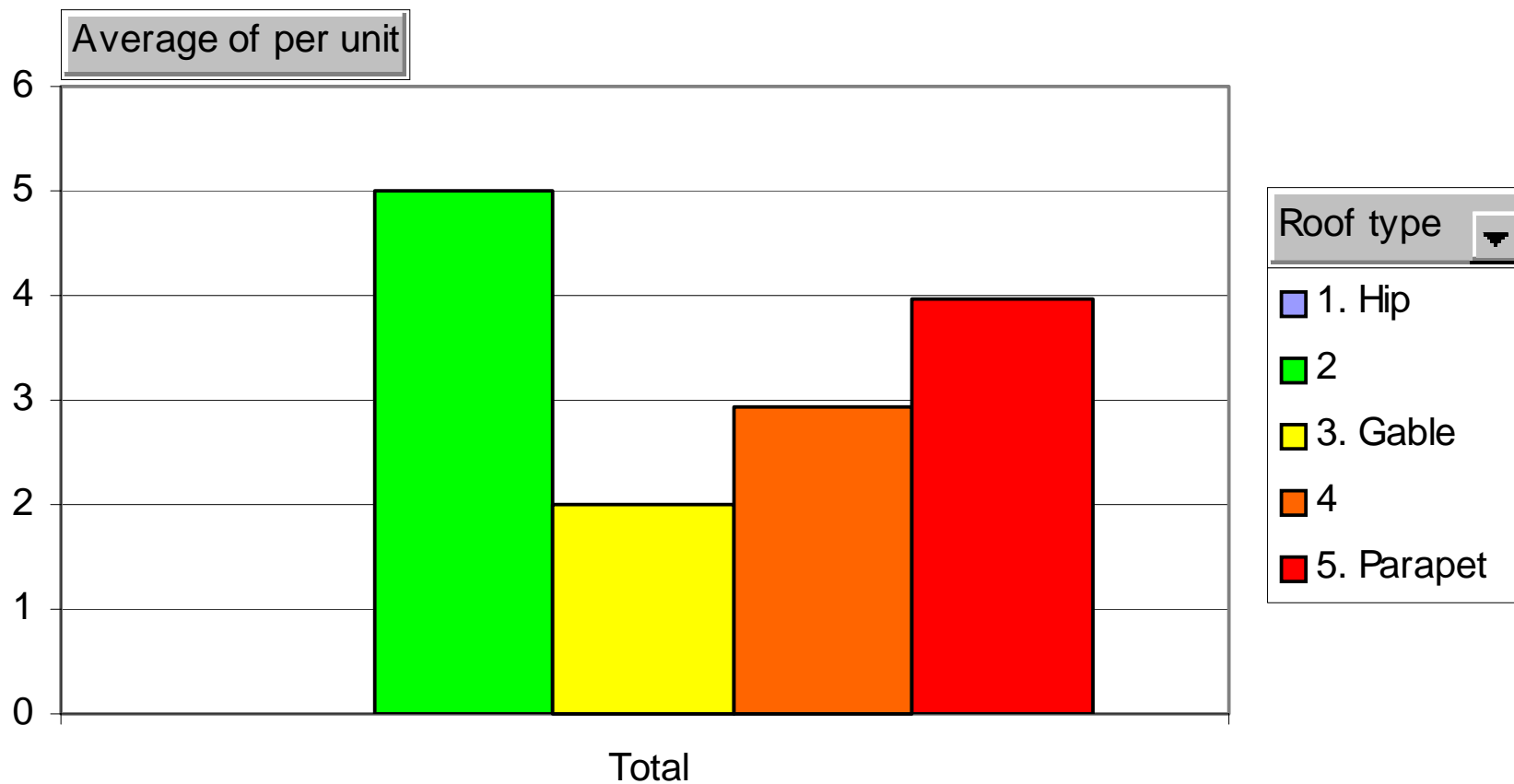
Other Leaks



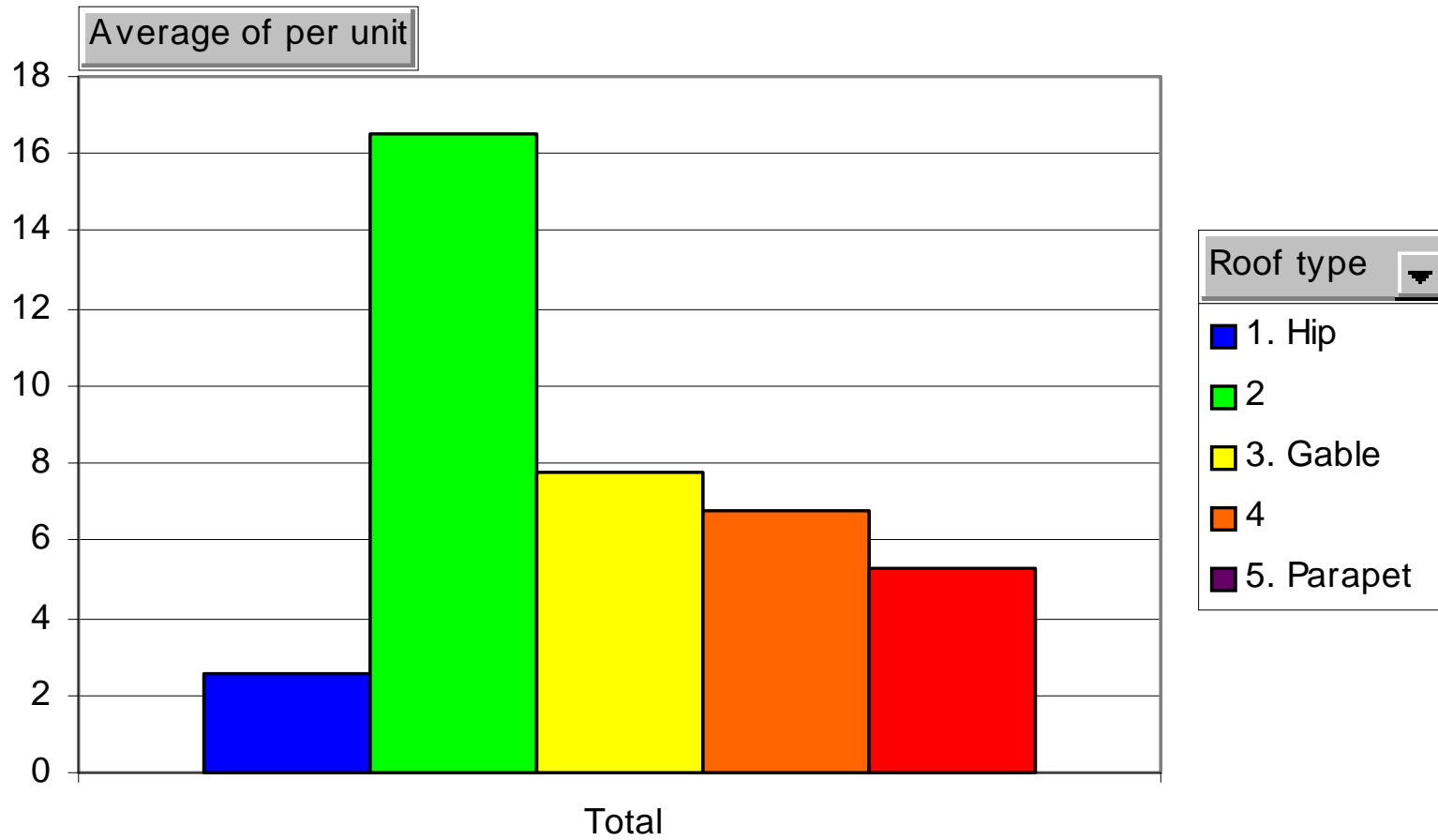
Roof Eave Width vs Wall Leaks Per Unit



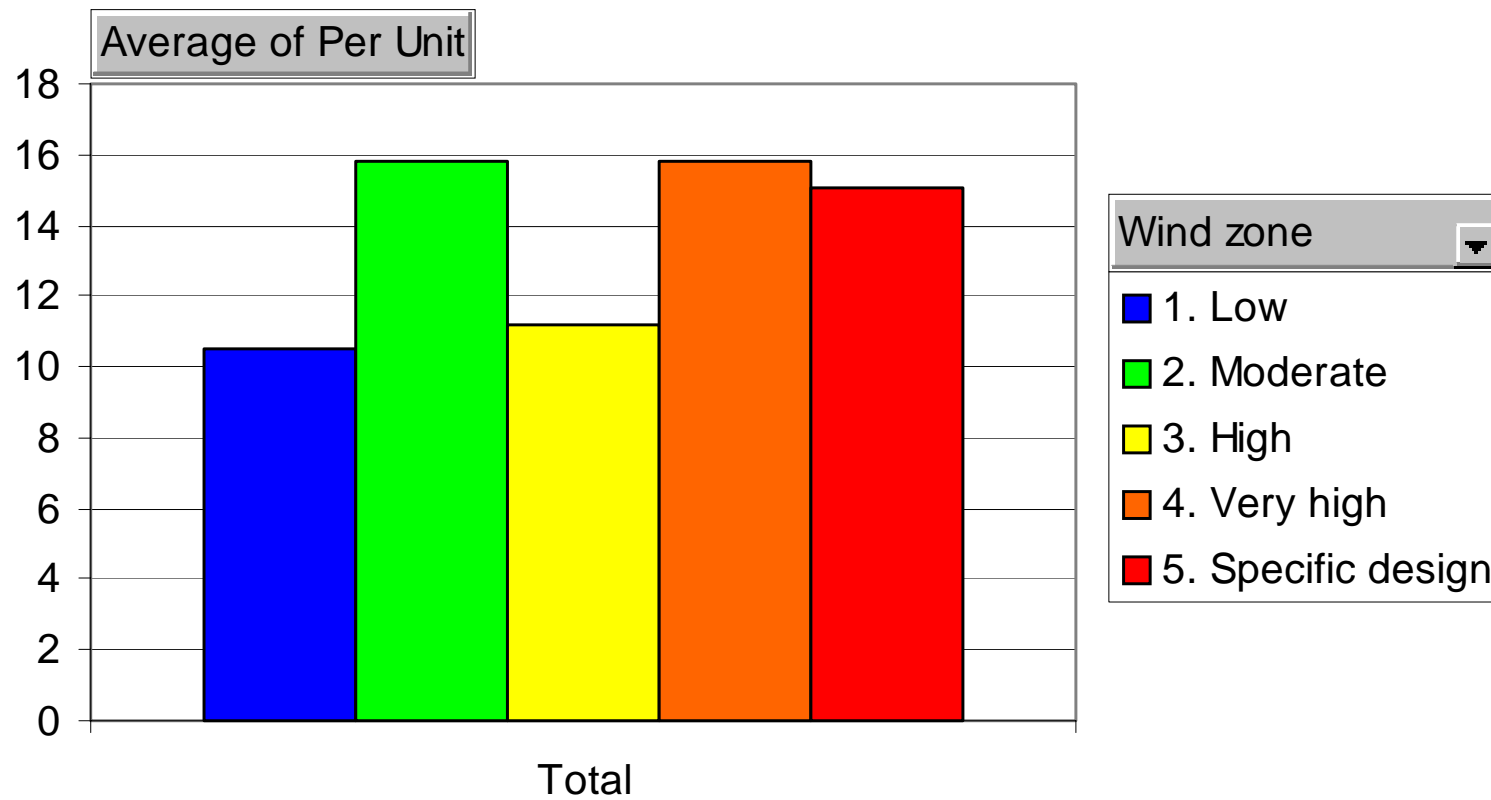
Roof Type vs Wall Leaks Per Unit



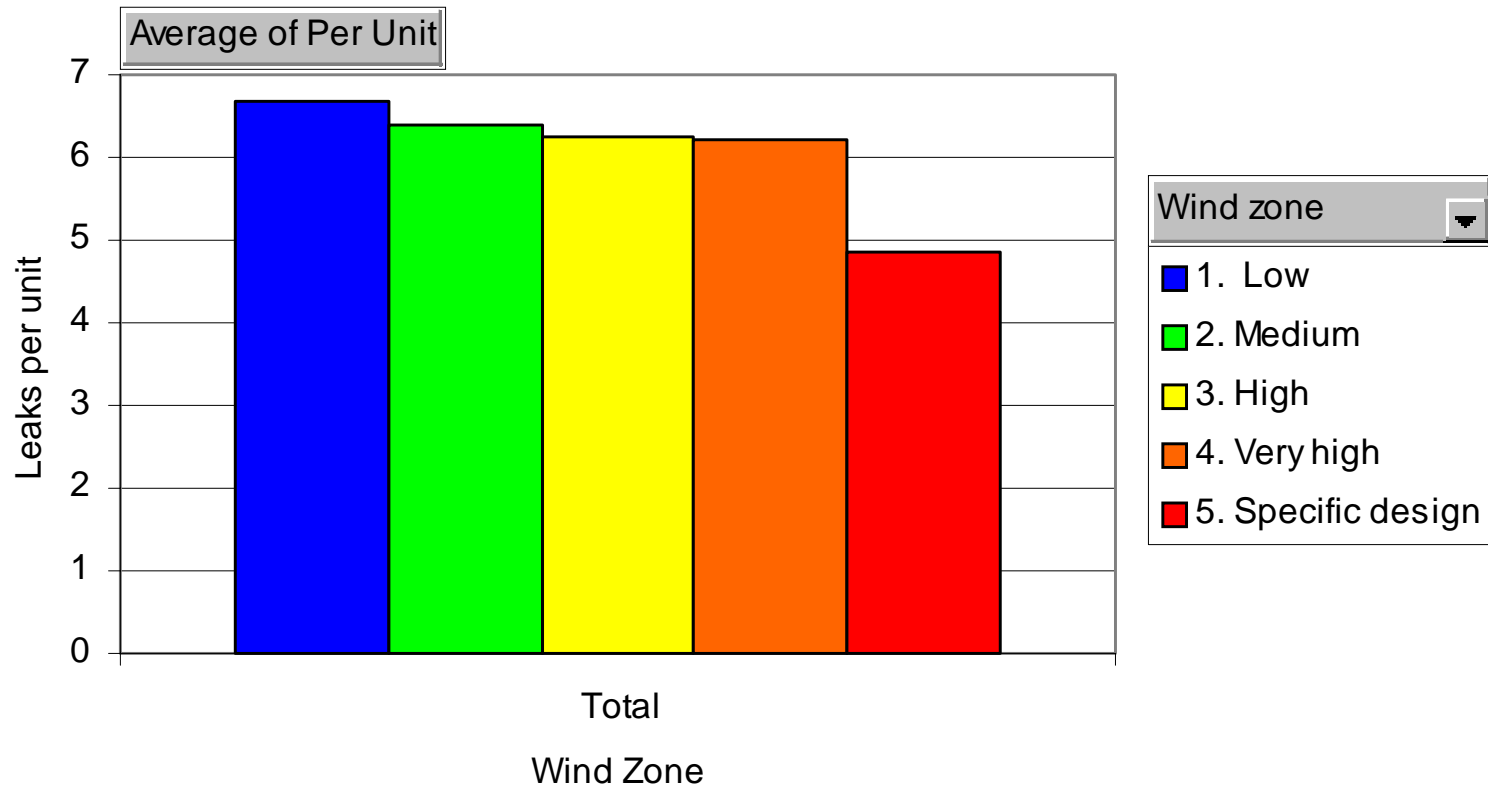
Roof Type vs Leaks Per Unit



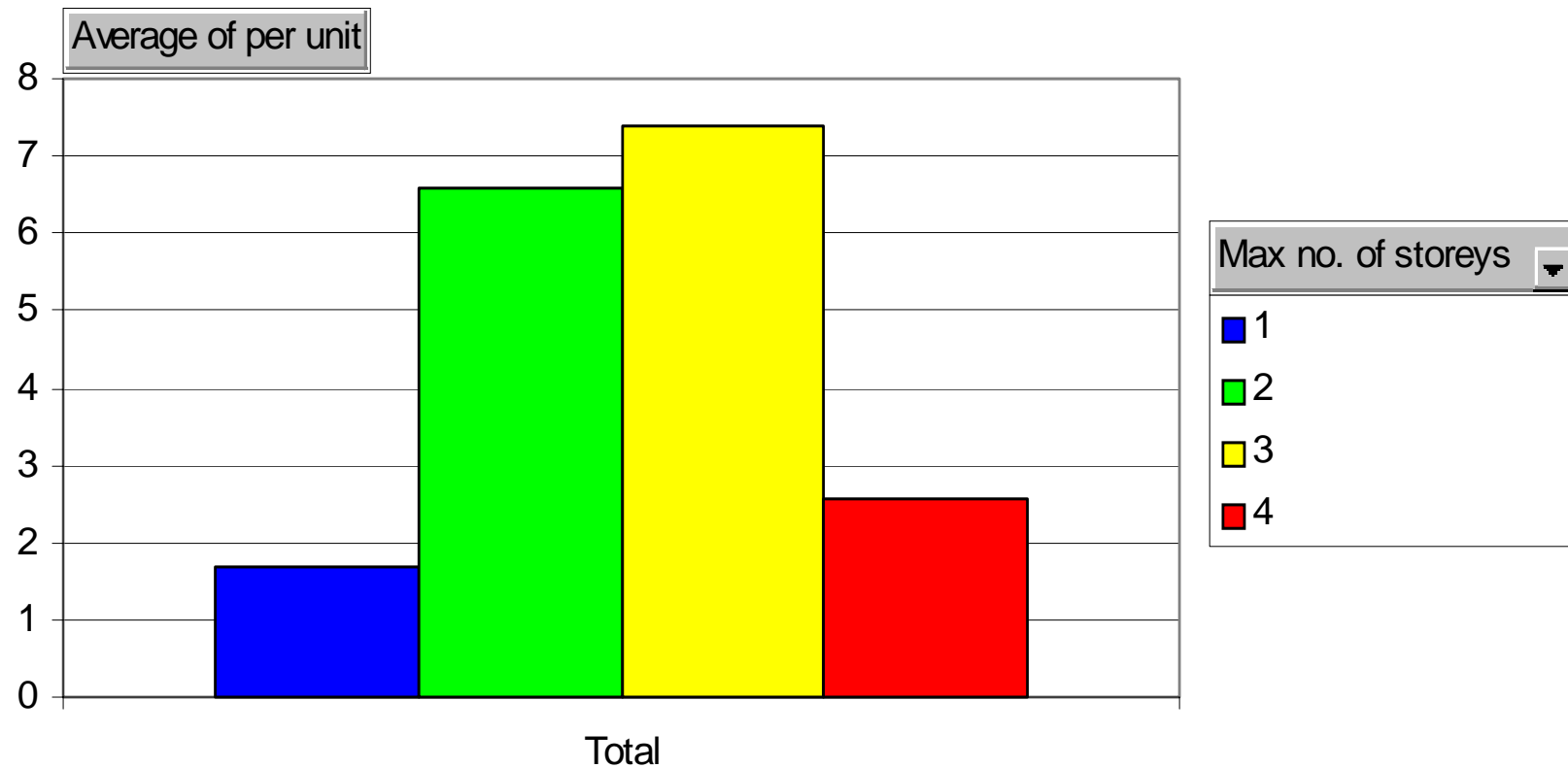
Wind Zone vs Wall, Roof and Balcony Leaks Per Unit



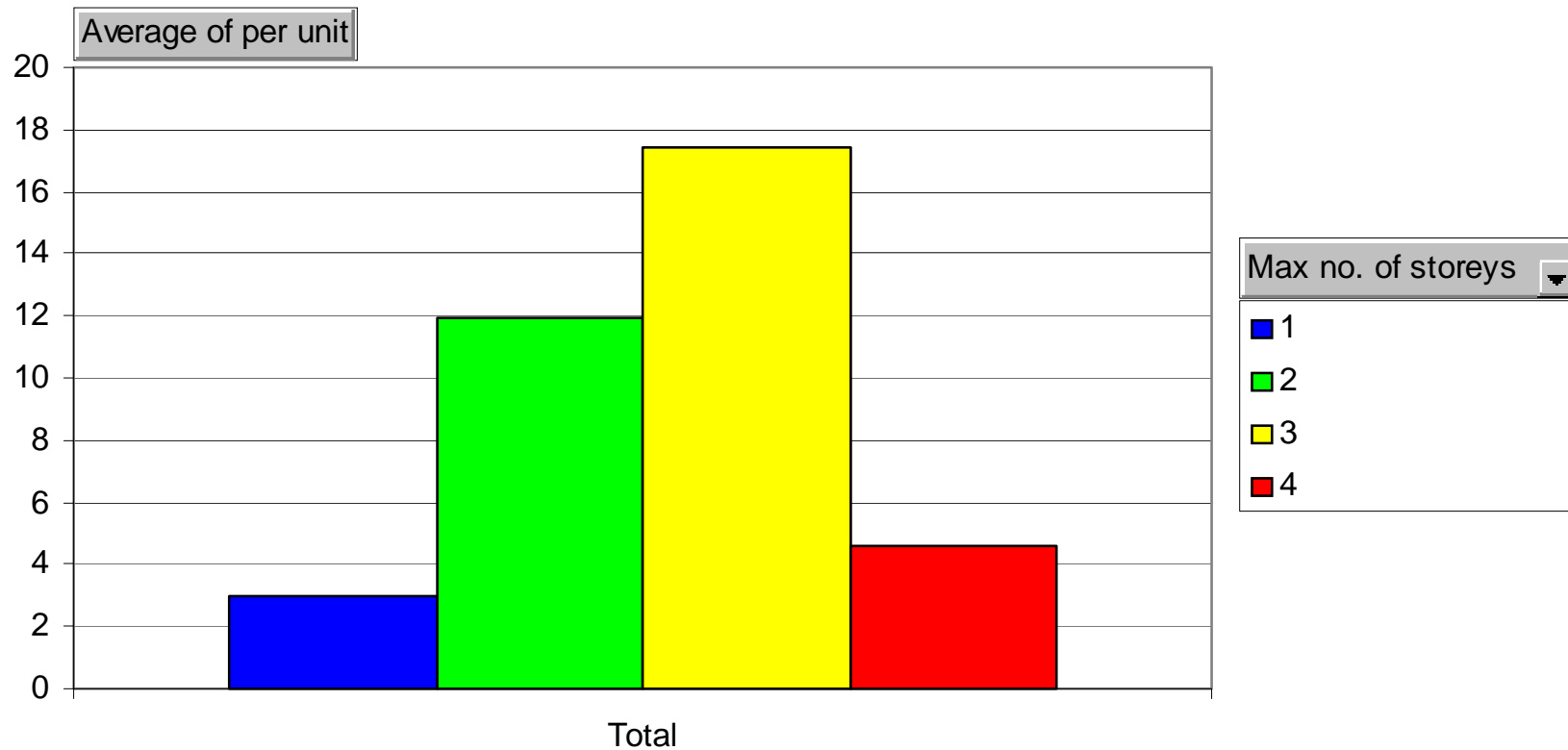
Wind Zone vs Wall Leaks Per Unit



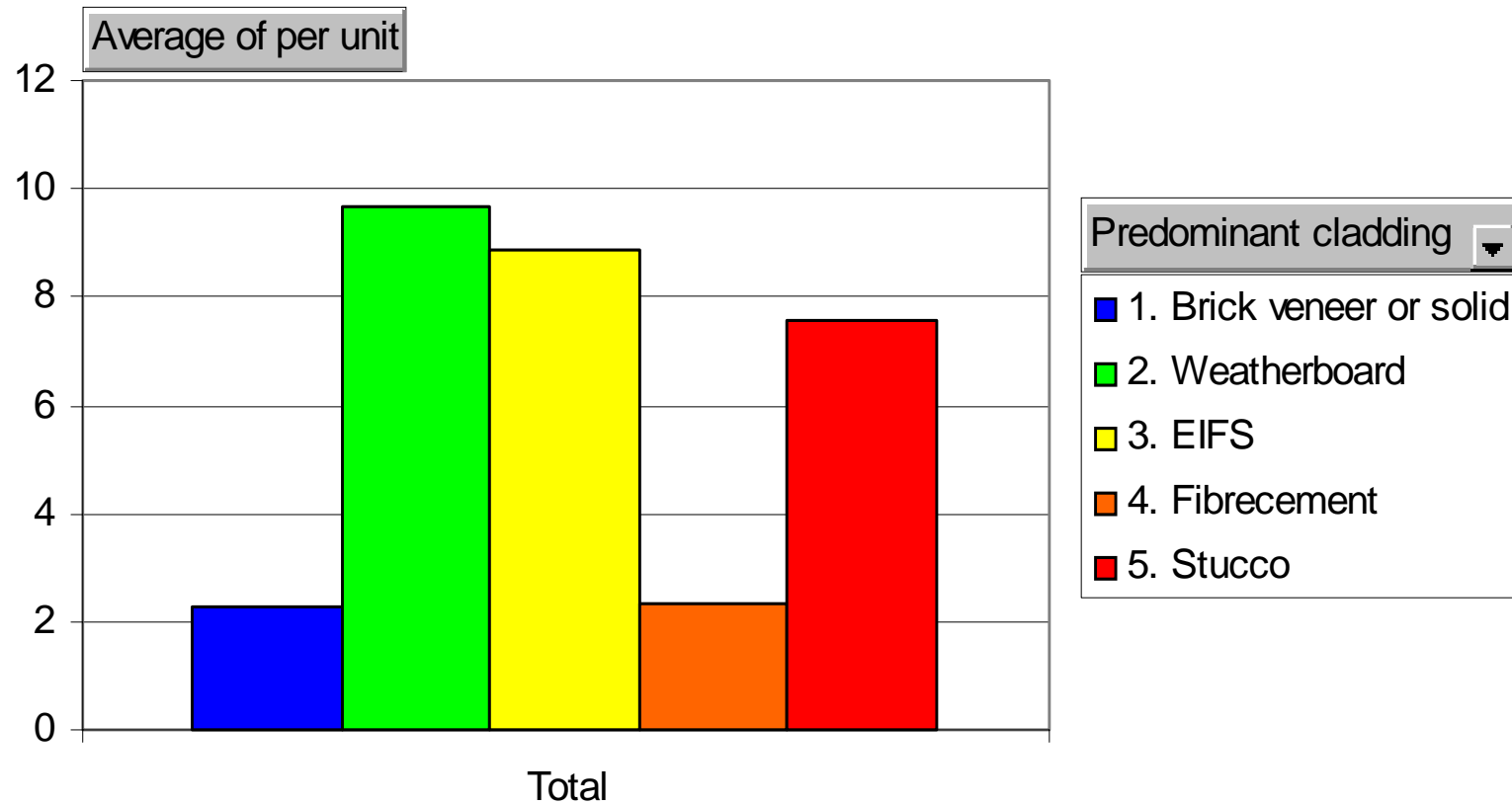
No. of Storeys vs Wall Leaks Per Unit



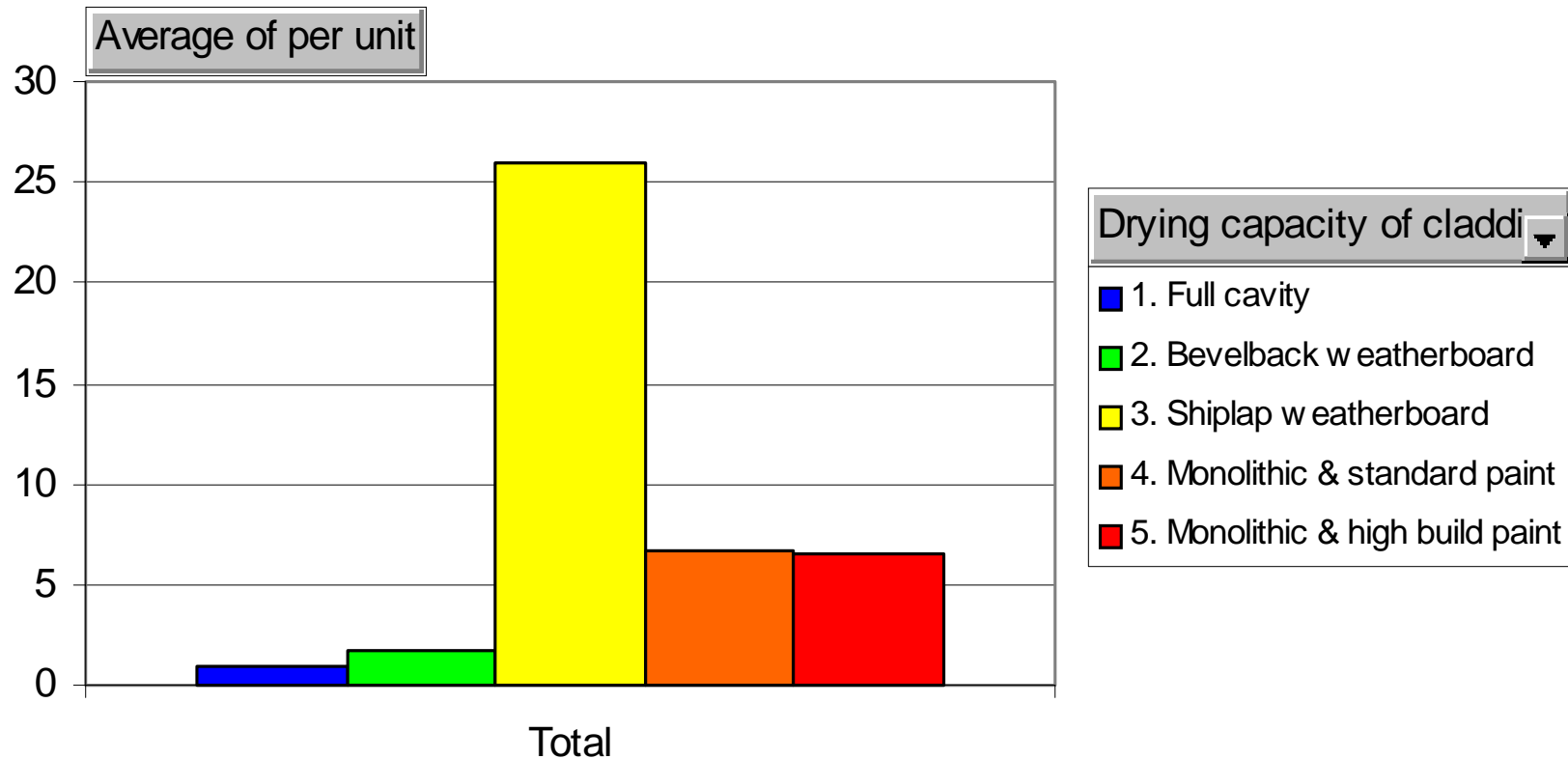
No. of Storeys vs Roof, Balcony and Wall Leaks Per Unit



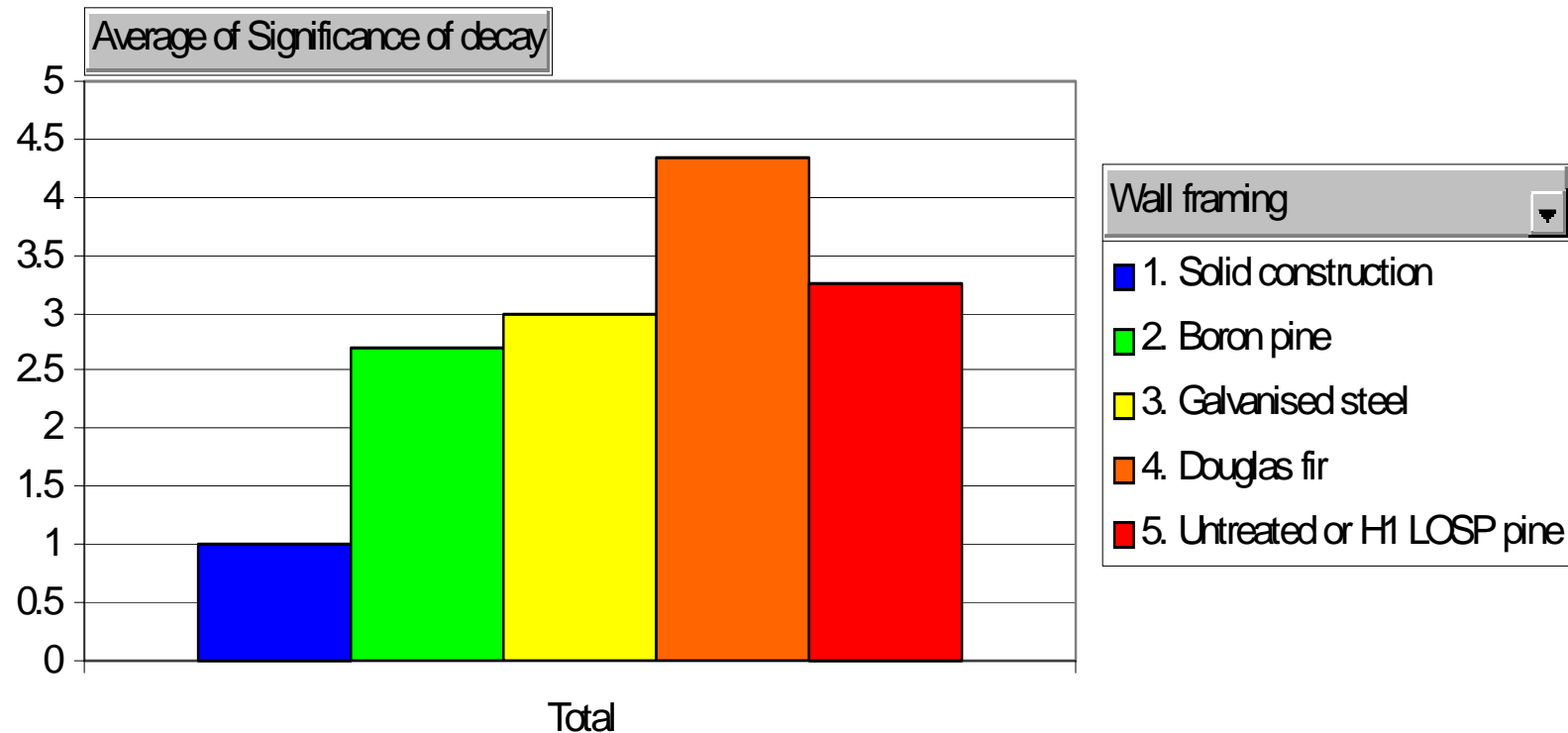
Predominant Cladding vs Wall Leaks Per Unit



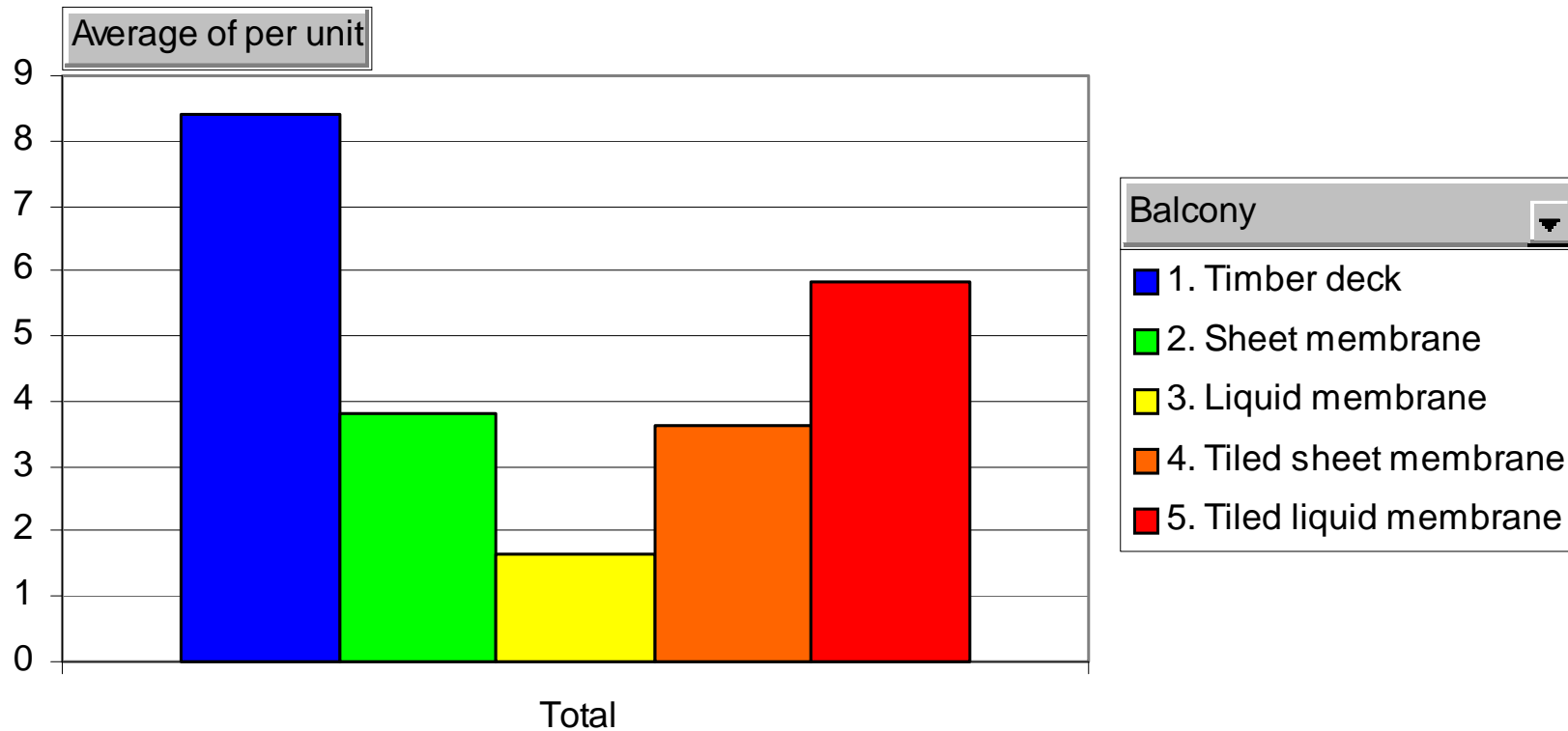
Cladding Drying Capacity vs Wall Leaks Per Unit



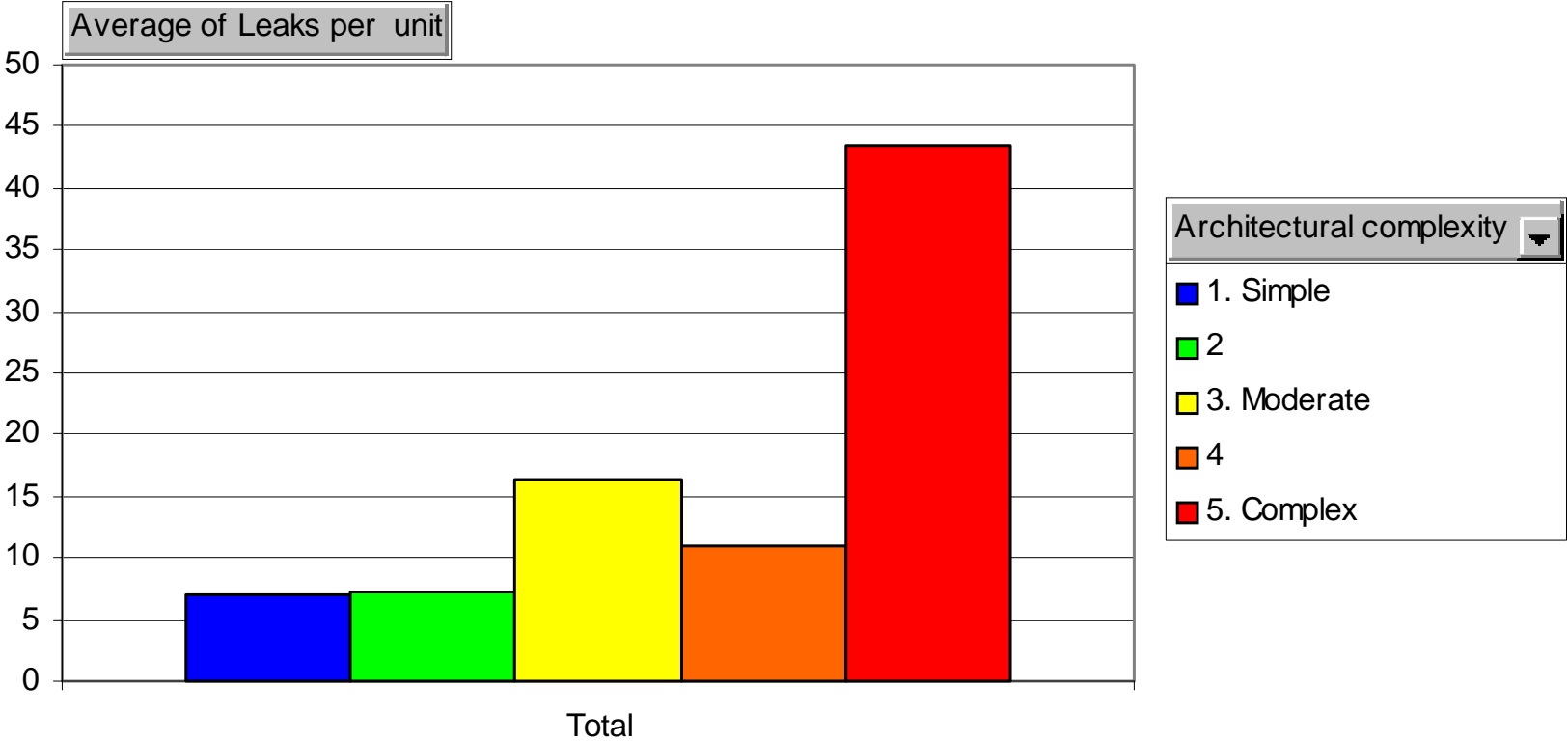
Framing vs Significance of Corrosion Decay (Average)



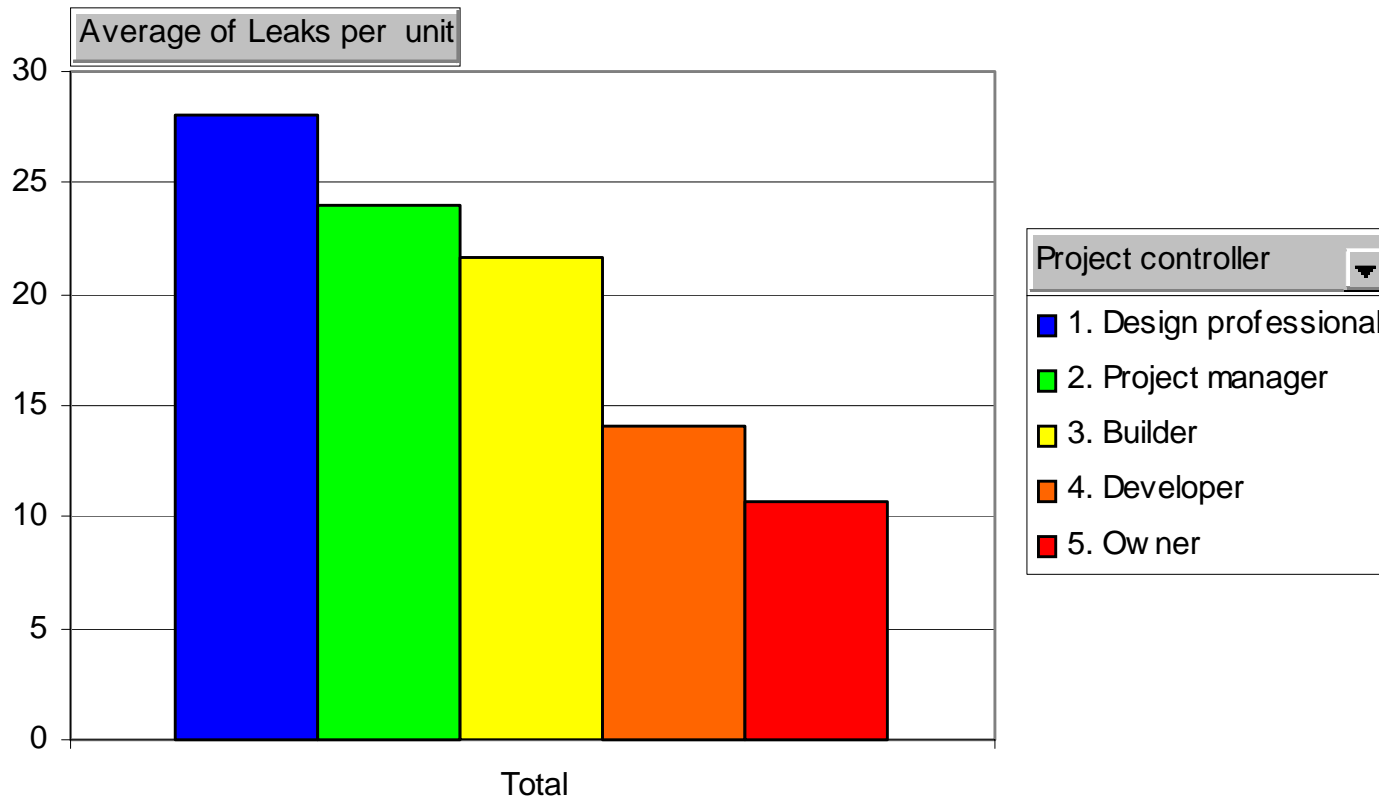
Balcony vs Balcony Leaks Per Unit



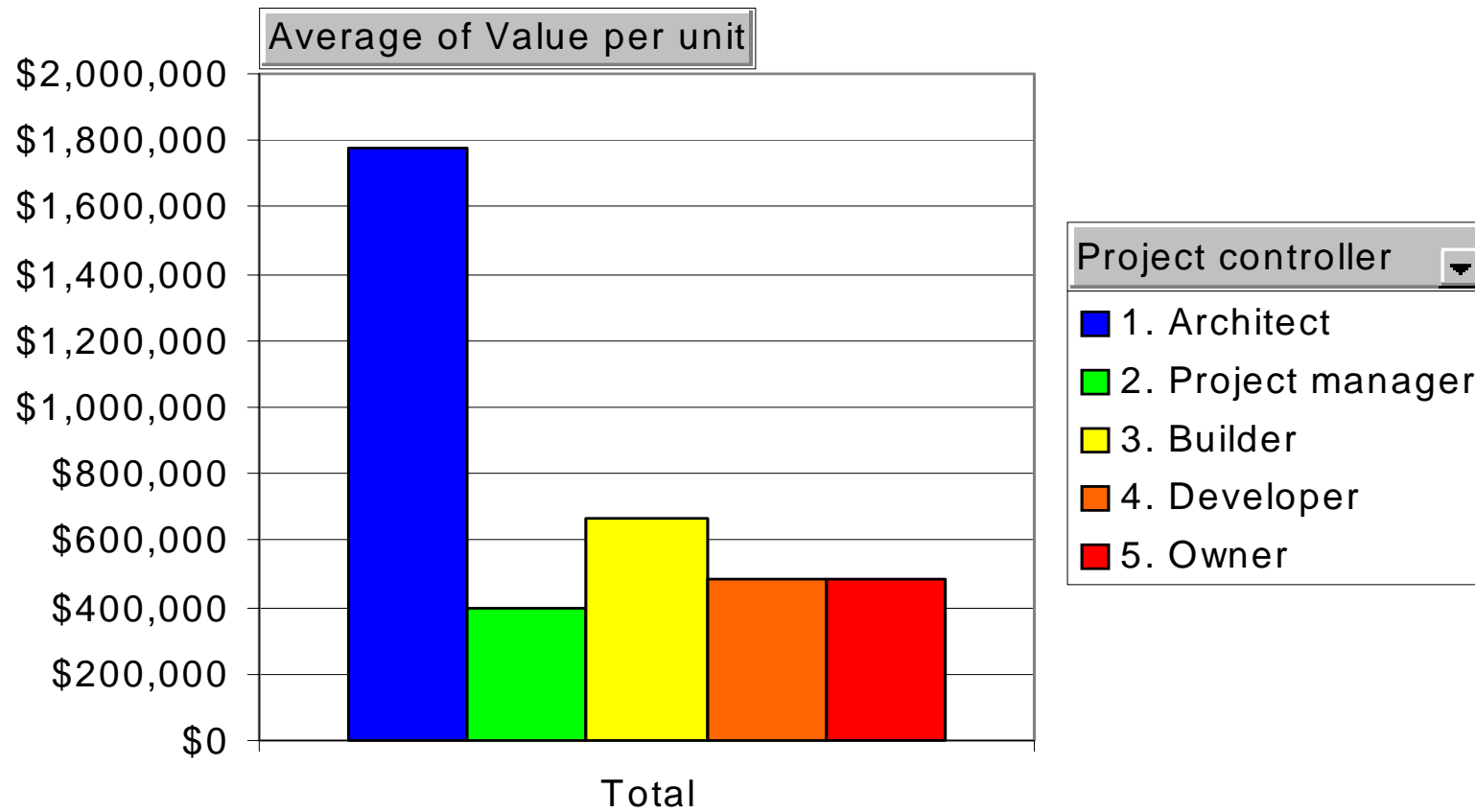
Architectural Complexity vs Leaks Per Unit



Project Controller vs Leaks Per Unit



Project Controller vs Value



| Weathertightness Risk Evaluation | | | | | | | | | | | |
|----------------------------------------------|---------------|---|-------------------|---|-------------------|---|--------------------|---|-----------------|-------|----------------|
| Risk Levels | Low | | Medium low | | Medium | | Medium high | | High | | |
| Climate | Central Otago | 0 | Canterbury | 1 | Auckland | 2 | Otago | 3 | West Coast | 5 | |
| Wind zone (NZS3604) | Low | 0 | Medium | 1 | High | 2 | Very high | 3 | Specific design | 5 | |
| No. of storeys | One | 0 | Two | 1 | Three | 3 | Four | 5 | Five or more | 7 | |
| Architectural complexity | Simple | 0 | Moderately simple | 1 | Moderate | 2 | Moderately complex | 3 | Complex | 4 | |
| Roof type | Hip | 0 | mix | 1 | Gable | 2 | mix | 3 | Parapet | 4 | |
| Eave width (ignore if parapet) | 600mm + | 0 | 300 - 599mm | 1 | 150 - 299mm | 2 | 1 - 149mm | 4 | 0mm | 5 | |
| Balcony over habitable space | None | 0 | | | Sheltered by roof | 2 | | | Open | 5 | |
| TOTALS >> | | | + | | + | | + | | + | | |
| GRAND TOTAL | | | | | | | | | | | |
| ↓ | | | | | | | | | | | |
| No treatment or ventilation required | | | | | | | | | | ←←←←← | 0 to 5 |
| H3 treatment <u>OR</u> ventilation required | | | | | | | | | | ←←←←← | 6 to 12 |
| H3 treatment <u>AND</u> ventilation required | | | | | | | | | | ←←←←← | 13 plus |