

# Impact of Safety Margins and Routing Style on Footprint

## 1. Summary

Many authors have written on the need for the physical footprint of a golf course to accommodate the possibility of errant shots. These authors point out the need for each site to be evaluated in a responsible manner. As a result, there is reluctance to provide hard and fast guidance on appropriate safety margins. However, there have been limited dimensional guidance over the past 40 years. Depending on which of these dimensions are selected, it is demonstrated that the choice can strongly influence the total footprint of the golf course. Furthermore, in studying the impact of safety offsets, it was found that the impact can be compounded depending on the choice of routing styles. It is shown that compact configurations of golf courses have significantly lower total footprint than other routing styles, especially courses designed as part of a residential development.

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## 2. Safety Margin Dimensions

The consideration of safety on a golf course has been discussed at length by many authors. However, hard and fast guidelines are virtually non-existent, possibly for fear of assuming responsibility and liability should those guidelines prove to be insufficient to prevent injury.

There exist a few examples of measured dimensional guidance through the years, and this report focuses on these examples and how the guidance has evolved over time. The purpose of this report is not to validate any dimensional guidance but rather simply to quantify the change and the theoretical impact on the footprint of a golf course, were these guidelines adopted in practice. In researching the evolution of safety margins, it also became apparent that the theoretical footprint and the impact of safety margins greatly depend on the style of course routing.

Forrest Richardson (Richardson, 2002) identifies five categories of safety concerns on a golf course:

- Injury from swinging clubs
- Fall injuries
- Accidents involving golf carts
- Injuries caused by lightning

- Errant balls hit off-line

It is this last risk that appears to have the greatest influence on safety margins, and therefore on the footprint of the golf course.

## 2.1 Offset to Course Boundaries

Richardson stresses the need for the architect to use judgement in determining safety (or to use his suggestion, “safer”) envelopes although he provides very few specific dimensions of these envelopes. He does however cite a municipality that provides specific guidance for golf hole “envelopes” that require at 200 ft clearance from the centre of the fairway. Based on a survey of golf course architects, Richardson indicates that 180 ft of clearance from the fairway centreline to adjacent property lines is generally used.

Michael Hurdzan (Hurdzan, 2018) discusses an even wider range of potential safety risks on a golf course. Hurdzan devotes an entire chapter to the discussion of golf related accidents and suggests guidelines that have clear implications on the footprint of a golf course. Hurdzan provides two specific dimensions for the purpose of safety. First, he indicates that 92% of shots from recreational golfers will end up within a  $\pm 15^\circ$  cone. Unfortunately, he does not provide guidance on the reasonable shot length in order to calculate a safe offset. However, he does indicate that the property line should not be less than 200 ft from the centreline of a fairway.

The Urban Land Institute (Muirhead & Rando, 1994) once published more specific guidelines with respect to safety margins for single and double corridor fairway designs which specified larger margins than prior, similar, published dimensions. The ULI text cites guidance from the 1970s by Patrick Shane Mulligan in which the safety corridor should be approximately 200 ft. The ULI increased this in 1994 to 210 ft. Figure 1 shows some of the dimensional guidance provided by the ULI.

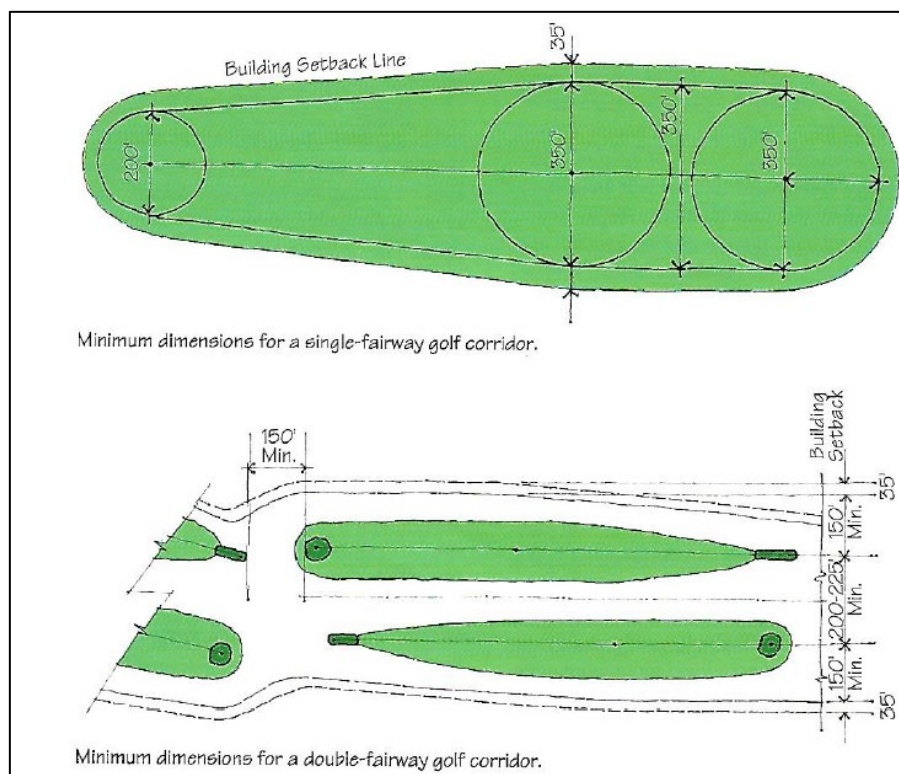


Figure 1 Safety margin recommendations. (Muirhead & Rando, 1994)

Golf course architect Robert Cupp, in personal correspondence, indicated that his planned distance from the fairway centreline to the course boundary in 1990 was 175 ft and that this had increased to 200 ft by 2010.

Table 1 lists the dimensional guidance values from the sources cited above.

*Table 1 Safety Margin Dimensions*

Source	Year	Fairway Centreline to Course Boundary (ft)
<b>Mulligan</b>	1975	200
<b>Cupp</b>	1990	175
<b>Muirhead &amp; Rando</b>	1994	210
<b>Richardson</b>	2002	180 - 200
<b>Cupp</b>	2010	200
<b>Hurdzan</b>	2018	200

The range of acceptable values listed in Table 1 suggests that the choice of safety margins has a strong influence on the footprint of the golf course. As a potentially oversimplified estimate, if we imagine a course comprised of a single loop of straight holes with a 50-yard buffer from the green centre to the next tee, we can compute a theoretical total footprint. Table 2 shows the impact on footprint of the choice of safety corridor width. Also included is the effect of a 6500-yard golf course compared with a 7200-yard golf course.

*Table 2 Effect of Safety Margin Dimensions on Footprint*

Course Length (y)	Corridor Width (ft)	Total Footprint (acres)
7200	350	195
7200	400	223
7200	420	234
6500	400	204

It can be seen in Table 2 that these theoretical estimates are not unreasonable. Further, it can be seen that the impact on footprint of the choice of safety corridor and the effect of increasing golf course length can be substantial.

### 3. Effect of Routing Style

In reviewing the guidance on safety margins, it became clear that the style of course routing also has a profound impact on the total footprint of a golf course. For example, according to the Urban Land Institute, the safety corridors can be somewhat smaller within a golf course compared to those with properties that border the course. Figure 2 shows five possible course routing configurations.

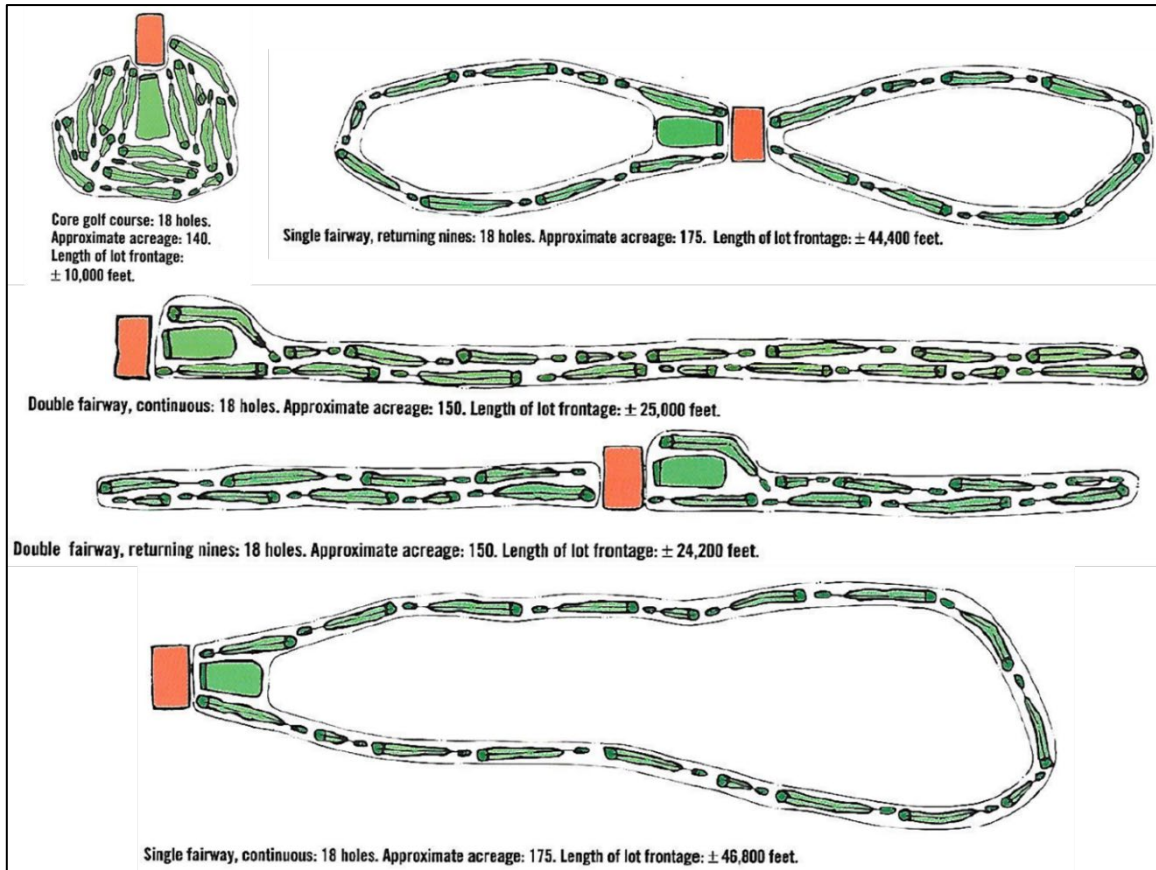


Figure 2 Effect of routing style on footprint. (Muirhead & Rando, 1994)

It can be seen in Figure 2 that depending on the style, the total golf course footprint can range from 140 acres to 175, an increase of 25%. In personal communications with golf course architect Robert Cupp, Cupp attributes a footprint increase of between 17% and 22% on routing style. As an example, Figure 3 shows the “Contiguous” (smallest) and “Residential” (largest) routing styles circa 1990 and 2010.



Figure 3 Effect of routing style on footprint. Contiguous style on left, residential style on right. (Bob Cupp, personal communication)

Table 3 summarizes theoretical estimates of footprint for four different routing styles in circa 1990 and 2010.

Table 3 Effect of routing style on footprint

Routing Style	1990 Design Length (y)	1990 Total Footprint (acres)	2010 Design Length (y)	2010 Total Footprint (acres)
<b>Contiguous</b>		200	7,900	250
<b>Meadow</b>	7,130	206	7,940	279
<b>Mountainous</b>	7,050	223	7,940	288
<b>Residential</b>	7,230	233	8,130	304
<b>Max/Min</b>		117%		122%

It should be noted in Table 3 that Cupp’s designed lengths are longer than average and have been included only to compare the relative sizes of different routing configurations.

## 4. References

- Hurdzan, M. J. (2018). *Golf and Law, Golf Course Safety, Security, and Risk Management*. Columbus, OH: Hurdzan Golf LLC Publication.
- Muirhead, D., & Rando, G. L. (1994). *Golf Course Development and Real Estate*. Washington, DC: The Urban Land Institute.
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