## Contents

1.	General			
1.1	Introduction			
1.2	Definition of the problem			
1.3	Comparison with seismic design			
1.4	Terms and definitions			
2.	Actions and structural response properties			
2.1	Type and importance of accidental actions	6		
	2.1.1 Domestic gas explosions (internal)	6		
	2.1.2 Explosives (external and internal)	8		
	2.1.3 Vehicle impact	10		
2.2	Dynamic effects	11		
2.3	Important structural properties	11		
	2.3.1 Structural integrity and redundancy	11		
	2.3.2 Resistance	13		
	2.3.3 Continuity and anchorage capacity	13		
	2.3.4 Ductility, deformability and energy absorption	13		
	2.3.5 Deformations in tying systems	16		
	2.3.6 Summary of important properties for the robustness of tied connections	22		
3.	Strategies to cope with accidental actions			
3.1	Categorisation of buildings	22		
3.2	Systematic risk assessment	24		
3.3	Measures to reduce the potential for progressive collapse	27		
3.4	Facilitating evacuation			
3.5	Structural design concepts	29		
	3.5.1 Introduction	29		
	3.5.2 Design approaches	29		
4.	Design methods to prevent progressive collapse	31		
4.1	Combination of actions for accidental loading	31		
4.2	Material properties	32		
4.3	Indirect design method	32		
	4.3.1 General requirements	32		
	4.3.2 Tie functions	33		
	4.3.3 Code provisions	34		
4.4	The alternative load path method	34		
	4.4.1 Extent of primary local damage	36		
	4.4.2 Mechanisms to provide for alternative load paths	39		
	4.4.3 Analysis procedures	47		
	4.4.4 Combinations of actions	48		
	4.4.5 Practical analysis	50		
4.5	The specific load resistance method (key elements)56			

5.	Detail	58		
5.1	Tie reinforcement		58	
	5.1.1	Tie reinforcement with regard to ductility	58	
	5.1.2	Splicing of tie bars	58	
5.2	Connections		58	
	5.2.1	Column-to-base and column-to-column connections	58	
	5.2.2	Beam-to-floor connections	58	
	5.2.3	Wall-to-wall and wall-to-floor connections	62	
	5.2.4	Floor topping	63	
	5.2.5	Stairs	63	
6.	Refer	66		
Annex A: Calculation example				

Alternative load path design of simply supported precast beams, after the removal of an intermediate façade column in a high rise skeletal building structure.