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## FIRE IN SHOPPING COMPLEXES

ANALYZED

### An Annotated Bibliography

Compiled by

A. M. Phillips

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## **FIRE IN SHOPPING COMPLEXES**

This annotated bibliography of selected references to fire in shopping complexes was compiled during a DBR/NRC study of fire protection features of urban-core and suburban enclosed-mall shopping centres.

The references are in two groups, the first containing case histories of actual fire incidents, the second dealing with fire protection design principles in complex assemblages of buildings including shopping facilities.

It is hoped that all the significant recent references have been included, though no claim is made that the list is comprehensive.

## CASE HISTORIES

Bimonthly Fire Record: Enclosed Shopping Mall. Fire Journal 67 (2), 62. 1973.

Fire originated at night in a shoe store in an unsprinklered Canadian enclosed-mall shopping centre. The smoke detection system failed to operate and the alarm was not given until smoke reached a distant store where employees were working late. Heat built up rapidly in the mall and fire entered most of the stores. The anchor stores were saved from direct fire damage by sprinklers which operated and formed water curtains, but they received severe smoke damage.

The Portsmouth Tricorn Shopping Precinct Fire. Fire 65, 23. 1972.

Intense fire resulted after flashover of a fire in a 12-unit boutique village in this enclosed-mall complex in the U. K. Heat and smoke hampered access to the fire via the mall. Severe structural damage and widespread smoke damage occurred.

Tactic Cuts Off Fire In Mall. William E. Clark. Fire Engineering 125 (11), 65. 1972.

Advancing hose lines down the central mall of this U.S. enclosed-mall complex prevented fire in a shoe store from spreading to other stores with unprotected open fronts.

Bimonthly Fire Record - Mercantile. Fire Journal 66(3), 61. 1972.

This U.S. shopping centre opened for business before construction in all areas had been completed. Welding operations without a fire watch ignited stored Christmas stock. The sprinkler and heat detector systems had not been completed. The fire was confined to the area of origin but smoke spread through the enclosed mall causing widespread damage.

Fire Held to 2 Shops in Center. Jack E. Nagle. Fire Engineering 125 (7), 3. 1972.

A smoke-filled enclosed mall somewhat hampered fire fighting operations involving over 100 voluntary firemen in this U.S. fire. Ventilation by opening roof areas cleared much of the smoke. Actual fire damage was limited to two stores, although others received smoke and water damage. Water stood 5 to 12 in. deep in some areas of the shopping mall.

(Place Versailles, Montreal). The Gazette (Montreal), 29 and 31 Jan 72. The Ottawa Journal, 29 Jan 72. Dimanche-Matin (Montreal), 30 Jan 72.

These appear to be the only published accounts of this afternoon fire in a major Canadian enclosed-mall free-standing shopping complex. The fire was said to have spread rapidly through false ceilings; spectators remained in the mall to watch firemen at work.

Britain's first large fire in a modern shopping precinct. Fire Prevention No. 93, 36. Dec. 1971.

Severe heat and smoke damage occurred during an early morning fire in this modern extensive multilevel shopping precinct at Wolverhampton, U.K. The extent of damage was due largely to rapid heat and smoke travel assisted by combustible ceiling linings in the enclosed mall, lack of means of venting the fire, and a brisk wind blowing the flames through the tunnel-like malls. Smoke damage extended through a covered bridge to a second adjoining complex.

(Place Ville Marie, Montreal). The Gazette (Montreal), The Ottawa Journal. 23 Jul 71.

This afternoon fire in a major Canadian urban-core shopping complex is said to have started in a shoe store and spread by way of a false ceiling. Dense smoke prevented location of the fire for two hours, but it was then doused in a short time. Two high-rise office buildings connected to the complex were evacuated.

Fire at Wolfrun Shopping Centre, Wolverhampton, 24 Dec 70. A. Silcock and P. Hinkley. Joint Fire Research Organization (U.K.), Fire Research Note No. 878, July 1971.

Fire broke out in a store facing onto a covered shopping arcade in a modern U.K. shopping centre. A layer of high-temperature gases extended beneath the entire length of the arcade ceiling, and the arcade was smoke logged when fire fighters arrived. The report analyses the fire conditions from a theoretical standpoint.

\$940, 000 Enclosed Mall. Report of the Fire Marshal-1970. Ontario, Department of Justice, 1971.

A late afternoon fire occurred in a Canadian enclosed-mall shopping complex. The complex was partially occupied, although construction was not yet complete and the fire warning, fire detection and fire fighting systems were not operational. The entire mall was smokelogged when fire fighters arrived, and damage was high due to smoke and water entering the mall.

Fire at Another Noncombustible Shopping Center - Plymouth Meeting Mall. Laurence D. Watrous. Fire Journal 64(5), 5. 1970.

Fire occurred at about 1000 hrs in a store on the lower level of a two-level enclosed-mall shopping centre in the U.S. Severe smoke conditions hampered operations in the mall, from which a major part of the fire fighting was waged, and also delayed access to the controls of the air handling system, which was contributing to the spread of smoke throughout the mall area and the stores. Excess water stood several feet deep in some parts of the complex. Excessively long hose lays (over 250 ft) were needed within the complex.

Bimonthly Fire Record - Mercantile. Fire Journal 64(4), 48. 1970.

A guard observed smoke coming from a shoe store in this U.S. enclosed-mall shopping centre. Fire damage was confined to only five stores, due in part to partial sprinkler protection (in the mall only) which confined the fire to one section of the building. Other stores, however, suffered smoke and water damage.

The Major Fires of 1969. Fire Journal 64(3), 43. 1970.

Fire on the top floor of a five-storey U.S. shopping centre caused heavy damage on that floor, and smoke and water damage occurred in the lower storeys.

Architectural and Development Note. Fire Protection Review 33, 271. 1970.

Fire took place during the early hours of the morning in an unsprinklered toy shop in this modern enclosed-mall U.K. shopping complex. When fire fighters arrived visibility was virtually nil in the mall, the only feasible access route to the fire. Severe damage requiring reconstruction occurred to the concrete roof deck normally used as access for vehicles servicing all the stores.

Shopping Center Fire - Winter Park, Florida. Laurence D. Watrous.  
Fire Journal 63(6), 89. 1969.

An early morning fire damaged one quadrant of a large U.S. shopping centre built in four sections connected by enclosed promenades. Smoke and water travelled throughout the centre unimpeded by the grille gates or loose-fitting glass doors on the store fronts. Early venting by collapse of part of the roof is credited with aiding fire department operations. At an early stage the decision was made to abandon the involved quadrant and isolate the remainder of the centre by use of deluge sets. The centre had been built with virtually no fire protection features other than structural protection. Following the fire extensive improvements were carried out.

Bimonthly Fire Record - March 1966. Fire Journal 60(2), 48. 1966.

When fire broke out in the department store of this enclosed-mall shopping complex in the U.S., attack on the fire was delayed by the need to bring hose lines in through the mall. Much of the building was windowless and the rear access doors to the store could not be opened. The delay allowed heat and smoke to build up and prevent access to the seat of the fire, and a tractor was used to breach the outside wall. This admitted fresh air to the fire, causing a flashover involving most of the store, and the entire complex was heavily damaged.

Mall-type Center. Occupancy Fire Record No. FR66-1 - Shopping Centers. National Fire Protection Association. Boston, U.S.A. 1966.

A small fire in an unsprinklered area of this partially sprinklered enclosed-mall U.S. shopping centre was extinguished without much difficulty, although heat and smoke had spread throughout the mall area by the time the fire was discovered. Three sprinklers remote from the fire operated. Smoke damage was extensive to many tenants.

Fire Hazards of Windowless Buildings. Ernest E. Juillerat. National Fire Protection Association Quarterly 58, 22. 1964.

Although a fire was confined to a 25-ft-square area on the top storey of this five-storey windowless U.S. department store (not a shopping complex), smoke and water damage throughout the store amounted to more than a million dollars. Heat buildup caused 147 sprinklers to open. It took fire fighters 30 minutes to locate the seat of the blaze in the smoke-charged structure.

1961 Large Loss Building Fires - Spread of Fire, Exposure Fires.  
National Fire Protection Association Quarterly 55, 394. 1962.

Although this large-loss fire in a U.S. department store did not concern any shopping centre, the account provides a good illustration of fire problems likely to be encountered in complex interconnected assemblages of buildings.



FIRE PROTECTION DESIGN PRINCIPLES

Security of Shopping Precincts. K.G. Wright. Security Gazette 15, 50. 1973.

Contains some comment on fire protection and escape routes and their influence on security planning.

Fire Service and Town Centre Development. D.J.P. Walker. Fire Protection Review, 35, 519. 1972.

Describes design features incorporated into a U.K. shopping complex to facilitate fire fighters' access and operations. Identical text appeared in Fire (65, 351 (1972)) under title "Early Planning a 'Copybook Example' of Architect and Fire Service Cooperation."

Wolverhampton's Shopping Complex - the improvements that have been made. S.G. Keely. Fire 65, 62. 1972.

Fire chief reports on changes made following a major enclosed shopping complex fire (fire described in this Bibliography - see Case Histories). Sprinklers and drenchers were installed, together with automatic fire detection equipment and some automatic venting.

Fire Protection at Victoria Centre. M.W.T. Power, Fire Protection Review 35, 132. 1972.

Outlines the fire protection features of the first large enclosed shopping complex of its kind in Britain. It is 1200 ft long with two levels of shopping and three of parking and services, up to 23 storeys of apartments above it, and a bus terminal.

Enclosed Shopping Centres. Clive Darlow (ed). Architectural Press. London. 1972.

Book on shopping centre design has 5 pages on "Fire and building regulations," listing the provisions of U.K. Fire Regulations that bear on enclosed-mall designs. Hints on how to meet the regulations. Not much emphasis on design principles.

Lessons from the Wolverhampton precinct incident. S.G. Keely. Fire 63, 585. 1971.

A fire chief presents his views of fire protection needs evidenced at a major fire in an enclosed shopping centre in the U.K.

Shopping Complexes - what fire safety provisions are needed. Patrick Watters. Fire 63, 479. 1971.

The author reports on fire protection facilities observed at shopping complexes in Sweden, Canada and the United States, and gives a checklist of 25 features he considers desirable from the fire fighter's viewpoint.

Shopping Center Challenge. R.L. Nailen. Fire Engineering 124 (5), 32. 1971.

How the fire department in a small U.S. community coped with the potential fire challenge of a newly opened regional shopping centre. Prefire planning and training are emphasized.

Some Notes on the Control of Smoke in Enclosed Shopping Centres. P. L. Hinkley. Fire Research Note No. 875. Joint Fire Research Organisation, Fire Research Station. Boreham Wood, U.K. May 1971.

Authoritative detailed discussion of the desirability of controlling smoke movement in enclosed shopping centres and a variety of methods for achieving this. Outlines main benefits and disadvantages of each, and discusses other factors that must be considered. A useful aid for a design engineer; strong theoretical basis; nomograms, charts, diagrams.

Shopping Center Managers View Insurance Coverage. Shopping Center Information Bulletin. International Council of Shopping Centers. New York 1971.

Insurers and managers exchange views on fire insurance schemes and fire protection requirements.

Planning for the Pedestrian: Access Networks. Jim Antoniou. Official Architecture and Planning 33, 510. 1970.

Mainly devoted to pedestrian traffic planning, but has a brief discussion of how to provide emergency access to pedestrianised streets and precincts.

Fires in Shopping Complexes. Monthly Bulletin No. 107. Australian Fire Protection Association. Melbourne. August 1970.

Summarizes Australian fire experience; lists fire protection problems common to shopping complexes of all types.

Podium Problems. N. Musselwhite. Fire 63, 236. 1970.

Now is the time for a revision of thought and codes to learn and prepare for fire incidents on complex building sites. Makes special reference to the Barbican complex in London, U. K.

Fire Protection in Urban Development. Frank Rushbrook. Fire 62, 25. 1969.

The author discusses the fire fighting and escape problems posed by complex large-area urban development schemes closed to vehicular traffic. He outlines some desiderata.

Land-Rover Adapted for Midland Town Centre. S.G. Keely. Fire 61, 435. 1969.

Short news item gives information on lightweight vehicle used by fire department at a U.K. shopping precinct.

Fire Prevention in Shopping Developments. R. Noble. The Architect and Building News 4(3), 55. 1969.

Fire consultant comments in detail on fire-safety considerations in the design of the communal parts of traffic-free shopping complexes.

The Building Regulations 1965 - Town Centres and Shopping Precincts. Circular 19/69. Ministry of Housing and Local Government (UK). London 1969.

Official document for the guidance of local authorities and developers. Deals with the particular features that the U. K. national regulatory authority would wish to consider when examining applications for relaxations of the Structural Fire Precautions in the Building Regulations applicable in England for this type of development.

Ring Up "No Sale". Factory Mutual Record 45(2), 4. 1968.

Short article by major "preferred risk" insurer explains sources of fire problems and losses in shopping centres, and discusses design features which can contribute to loss reduction. Emphasises values of prompt detection and of sprinklering.

Fire aspects of central redevelopment and high buildings. Institute of Fire Engineers Quarterly 25, 390. 1965; and 26, 147. 1966.

Proceedings of a conference organized by the Institute at Keele University, U.K., in 1965. Includes details of open-forum discussion and two relevant papers:

Central Area of Manchester. J. Whiteside

Central Area of Birmingham. G.F. Goodman

Town Centre Development - its Impact and Relationship to the Fire Service. Institute of Fire Engineers Quarterly 26, 111. 1966.

Proceedings of a conference organized by the Institute at Bristol, U.K., 29 Sep 65. Includes details of open forum discussion, and three papers:

Design for Britain in the 21st Century. N.R.F. Collins

Town Centre Development. K.L. Holland

Town Centre Development. W.A. Coggan

Occupancy Fire Record - Shopping Centres. Fire Record FR66-1. National Fire Protection Association, Boston. 1966.

Contains statistical data on 125 fires in U.S. shopping centres, mostly the non-enclosed type, with capsule case histories of 41 of them, indicating the lessons learned.

Fire Hazards in the Shopping Mall. John C. Thornton. National Fire Protection Association Quarterly 54, 129. 1960.

Discusses problems that can arise when downtown shopping streets are converted to pedestrian malls. Some parts are relevant to enclosed shopping complexes.

Burned Out Shopping Centers Lose Customers and Profits. Information Sheet D2 (no date). Improved Risk Mutuals. New York.

Insurer's design recommendations for some fire protection features of shopping centres.