FIRE PROTECTION/BUILDING CODE PROGRAM
FOR
SAWGRASS MILLS
SUNRISE, FLORIDA

SEC Job No. 18-87116-04-00

Prepared For
Western Development Corporation
Washington, D.C.

By
Schirmer Engineering Corporation
Fire Protection Engineers/Building Code Consultants

September 7, 1989
EXECUTIVE SUMMARY

This report represents a special fire protection/building code program developed for Sawgrass Mills because of the unique nature and design of the structure.

An appeal was made to the Broward County Board of Rules and Appeals under Section 204 of the South Florida Building Code, demonstrating alternate materials and methods of meeting the intent of the code to design a structure that provides for the public safety. This report reflects the fire protection/building code design features as approved by the Board on June 8, 1989.

Significant approved alternatives include a means of achieving a fire resistance rated structure through an active suppression system, an alternative to traditional tenant separation requirements and an alternative method of providing smoke venting.

The project includes several features not required by the applicable codes.

- Highly reliable automatic sprinkler system. The system has three independent water supply supply sources; full dual path power feed for normal power; emergency power for fire pumps in the event of power failure; complete electrical supervision of sprinkler valves, pumps, fuel level, etc.; on- and off-site monitoring of fire and supervisory conditions.

- Highly effective sprinkler design. Higher sprinkler discharge densities and closer sprinkler spacing exceeds the minimum requirements of the code, thereby assuring prompt fire control and less smoke generation, minimizing the impact on life safety and property.

- Special column fire sprinklers. While not normally required for a retail facility, special sprinkler protection will be provided for exposed steel columns, enhancing their fire performance and supplementing sprinklers at the roof and ceiling level.
Sprinkler configuration which minimizes expected interruptions to service during periods of tenant remodeling, resulting in greater reliability.

Building geometry which has an inherent, passive beneficial effect on smoke development, allowing ample escape time.

Mechanical smoke venting system, superior to gravity smoke venting requirement allowed by the code.

Voice notification system to alert building occupants in the event of an emergency.

Smoke detectors in HVAC ducts arranged to notify U.L. listed central station and on-site personnel of emergency condition.

Full dual path electrical service for the mechanical smoke venting system.

Full dual path normal electrical service, plus emergency generator, for emergency egress lighting.

These features, in conjunction with other features included in the design, provide a high level of life safety and property protection as demonstrated by many years of experience of similarly built covered malls through the United States.
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INTRODUCTION

Sawgrass Mills is a 2.2 million square foot covered shopping mall, including nine anchor stores, to be located approximately 15 miles west of Ft. Lauderdale in Sunrise, Florida. Because this type of structure presented unique concerns from the standpoint of life safety, fire protection and code compliance, Western Development Corporation retained Schirmer Engineering Corporation to prepare a master Fire Protection/Building Code Program for the project.

Features such as building construction type, fire resistance ratings of structural components, exit requirements, fire suppression, smoke venting and fire alarm systems are discussed and alternatives to selected local building code requirements are provided. Such alternatives are merited through the fire experience gained with covered mall shopping centers over the last several decades.

The following are applicable codes to the Sawgrass Mills project:


A summary of major fire protection/building code criteria proposed for this project is provided in Appendix A.

This report has been modified to reflect conditions of the approval granted by the Broward County Board of Rules and Appeals on June 8, 1989. Prior to the approval, the Board requested that the Fire Code, General Contractors/Architects/Structural, Electrical and Smoke Control subcommittees consider the proposed design and make recommendations to it at the June 8th monthly meeting. Appendix E consists of minutes from the various subcommittee meetings as well as the June 8th Board meeting.
BUILDING FEATURES

Construction Type

According to the South Florida Building Code (SFBC), the occupancy classification of Sawgrass Mills is Group G, Division 1. An "unlimited area" building, required by the project's design, is permitted under Section 514.2(b)2 of the SFBC for one-story Group G occupancies of Types II, III Protected and IV construction where there is a minimum of 60 feet of open space on all sides of the building. In the case of Sawgrass Mills, the 60-foot minimum clearance requirement is met considering that the project is owned and operated as a single entity.

However, Section 3124.4 only allows the use of Types I, II and III Protected construction for covered malls, which would not allow the exposed steel design concept for this building. Application of this section would present practical difficulties for the project; therefore, alternate protection in the form of a Type III Protected modification, providing an equivalent or greater degree of protection to the Type III Protected construction as defined by the code, was proposed and approved.

The intent of the project is that the entire Sawgrass Mills project, consisting of anchor stores, covered mall and tenant spaces, be considered a single, one-story building, having the required 60 feet distance separation to the communal property line. It is in the interest of the various mall tenants and anchor stores for the building to be merchandised and operated in this manner. Both visual openness and free communication among stores are necessary for a successful retail mall.

Even if separate ownership of several anchor stores were presently expected, applying traditional code provisions for protection of buildings at their property lines would effectively preclude the vital visual openness and pedestrian access between the mall and the anchor stores. Traditional protection between "buildings" at the property line are typically not applied to covered mall buildings. Fire behavior is not affected by the presence or absence of property lines, i.e., no separation would be required by the SFBC if it were not for the property line.

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The imposition of Type III Protected construction on a structure of this nature is overly restrictive. Unlimited area covered malls of multiple ownership and unprotected non-combustible construction have existed for many years with an excellent record of safety and continue to be built across the United States, respecting the proven, traditional prerequisites of open perimeter and automatic sprinkler protection. Whether an anchor store which abuts a covered mall is independently owned or leased from the mall, the merchant chooses the location in order to enhance his marketing efforts. In so doing, he relinquishes the extent of exposure protection that would be realized by doing business in a detached structure. Since a voluntary decision is made by the owner of the anchor store to participate in an operation which not only meets their marketing objectives, but has been proven to offer a high level of life safety and property protection given the implementation of such features as supervised automatic sprinkler protection and ample exit design, the construction alternative proposed in this report has been allowed.

The proposed structure is a single-story design utilizing steel columns, beams and bar joists. Typical sections of rectangular and triangular building units are given in Figures 1 and 2, respectively. Roof height over the tenant spaces varies from 17 feet to approximately 21 feet. The proposed Type III Protected modification will substitute active protection on all structural building columns in the form of independently controlled, electrically supervised automatic sprinklers, in lieu of the code required, passive steel fireproofing (Figures 3 and 3A). According to tests by Factory Mutual under more severe fire conditions than would be expected in a shopping mall, sprinklers have proven to preserve column structural integrity indefinitely, versus the relatively brief period of structural protection afforded by Type III Protected or even Type I construction, in the absence of sprinklers (Figure 4).

Other fire tests have demonstrated that both fire control and protection of structural steel elements can be provided by a properly designed sprinkler system. Figure 5 demonstrates the time versus temperature performance during the U.L. wood crib fire test. Sprinkler performance is required to reduce ceiling air temperatures to below 530 degrees F above ambient within 5 minutes and throughout the duration of the test. Such performance does not jeopardize structural integrity, as maximum attainable temperatures are far below the critical temperatures for steel failure.
FIGURE 1
TYPICAL SECTION THROUGH RECTANGULAR BUILDING UNIT

PUBLIC MALL

12'-0"

TENANT SPACE

17'-0"

SECTION
FIGURE 2
TYPICAL SECTION THROUGH TRIANGULAR BUILDING UNIT
FIGURE 3
TYPICAL SPRINKLER DETAIL AT SQUARE COLUMN

1" PIPE DROP FROM OVERHEAD PIPING TO 1/2" SIDEWALL SPRINKLER AT MINIMUM ELEV. 15"-0"
A.F.F. (TYPICAL)

TYPICAL STEEL COLUMN
FIGURE 3A
TYPICAL SPRINKLER DETAIL AT H-COLUMN

NOTE: USE ONLY ONE OF THE TWO SIDEWALL SPRINKLERS SHOWN ABOVE IN CASES WHERE ONLY ONE SIDE OF THE COLUMN WEB IS EXPOSED TO THE BUILDING'S INTERIOR, E.G., WHEN THE COLUMN IS LOCATED AT AN EXTERIOR BUILDING WALL.
FACTORY MUTUAL TEST OF TEMPERATURES OF BARE STEEL H-COLUMNS DURING EXPOSURE TO ASTM E-119 STANDARD FURNACE AND SIMULATED EXPOSURE WITH SPRINKLER PROTECTION


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FIGURE 5
CEILING AIR TEMPERATURES VERSUS TIME WITH SPRINKLER PROTECTION

Source: "Fire Sprinkler Laws: A Legislative Guide to Their Development", by Joseph F.
It should be noted that the 1985 NFPA Life Safety Code (LSC) also allows an entire covered mall structure to consist of unprotected, noncombustible construction and without the special column protection being provided on this project, in the presence of the planned sprinkler and fire alarm provisions described later.

Separation of Anchor Stores

Although this facility is designed as a single building with no required fire division walls, "anchor stores" will be separated from the mall by two-hour fire division separation walls constructed in accordance with Section 506.2. These walls will terminate at the bottom of the noncombustible roof deck. Communicating doors and openings between the anchor stores and the mall will be protected by a water curtain consisting of automatic sprinklers spaced a maximum of six feet on center, rather than by fire doors. The sprinkler water curtains, located on each side of the wall, will be connected to separate sprinkler systems on their respective sides to enhance reliability. This provision serves to maintain the integrity of the fire separation while preserving the functional need for visual intercommunication.

Tenant Separation Walls

One-hour fire rated tenant separation walls are required per Section 507.2 of the SFBC. An exception to this requirement is when 50 percent or more of the wall area between tenants is open for visual intercommunication.

The approved design of the Sawgrass Mills project has tenant separation walls consisting of full-height (floor to roof deck) metal studs with one-hour type construction on each side of the studs to a height of 12 feet. This leaves five to nine feet of open metal studs above the 12 foot level (Figures 6 and 7). A noncombustible, decorative ceiling consisting of "slats" or an open grid arrangement may be installed at or below the 12 foot level in the tenant spaces. A noncombustible security mesh fastened to the tenant separation wall studs may be installed from the decorative ceiling to the roof, at the tenant's option.
1. reserved for mall utilities
2. steel building frame
3. metal studs to deck or steel frame above
4. signband/bulkhead
5. security mesh at tenant option
6. minimum 50% open above 12'-0"

7. 12'-0", maximum height of storage
8. ceiling grid
9. demising partition (one hour type construction, not rated)
10. possible stock room with open grid ceiling
11. tenant toilet room with ceiling
12. exterior wall
13. minimum entry opening is 5' by 9' high, and area above bulkhead (average 14' above floor) is open except for optional security mesh

SCHEMATIC RETAIL TENANT SECTION

1. demising partition, one hour rated if other than retail space adjacent
2. steel frame
3. egress aisle
4. 4'-0" maximum width of soffit with second "layer" of sprinklers below soffit, except where soffit complies with NFPA 13
5. ceiling grid, slats, or other open treatment; sprinklers to be provided below if required by NFPA 13
6. store entry
7. tenant toilet room with interior sprinkler head
8. possible stock room with open grid ceiling
9. area above 13'-0" reserved for mall utilities and HVAC equipment

SCHEMATIC RETAIL TENANT PLAN

NOTES:

a. any soffit which exceeds 4'-0" in one direction shall have additional sprinklers installed below the soffit
b. in instances where tenants exit into a service/egress corridors, these corridors shall have a one hour rating with 45 minute door assemblies
1. building roof
2. steel building frame
3. security mesh at tenant option
4. signband/bulkhead
5. metal studs
6. visual closure by tenant, min. 50% open
7. minimum 50% open above 12'-0"
8. maximum height of any storage is 12'-0"
9. ceiling grid, slats or other type open treatment
   (additional sprinklers to be provided at this level
   if required by NFPA 13)
10. tenant demising wall
11. service/egress corridor, one hour rated construction
    of ceiling and walls with 45 minute door assemblies
12. partition between tenants steps back
13. adjacent food tenant

NOTES:
  a. no ceiling or grid permitted in storage area
  b. ceiling at food preparation and display areas to be in accordance with requirements of the Health Department and other governing authorities
  c. one hour rated partitions will separate food court tenants from adjacent service/egress corridors
  d. restaurant tenants shall have one hour rated demising partitions at all service/egress corridors, retail tenants, food court tenants, and other restaurants. The restaurant storefront and exterior walls will not be rated.
  e. any soffit which exceeds 4'-0" in one direction shall have additional sprinklers installed below the soffit

SCHEMATIC FOOD COURT TENANT SECTION

SCHEMATIC FOOD COURT TENANT PLAN
Although the approved tenant separation wall leaves less than 50 percent of the wall area between tenants open for visual intercommunication, this non-rated and alternative design is justified for the following reasons:

1. If compared with the code requirement for full height tenant separation walls, a much higher level of life safety is afforded through the approved design, which allows partial communication between tenants.

First, by taking advantage of the excess volume available near the roof of adjacent tenant areas, if a fire were to occur, smoke could rise and accumulate near the roof over a much larger floor area than if restricted by tenant separation walls. According to fire modeling studies, if full height separation walls were to be built, the smoke/toxic gas layer would descend to life threatening levels in a typical mall retail space in approximately five minutes. With the approved design, tenable conditions still exist after 32 minutes even without automatic fire suppression and smoke venting - both planned features for this project (also see discussion under "Exiting Features.")

2. Non-rated walls are permitted by code at the store fronts (walls common to tenants and the mall). Without full compartmentation (rated walls, floors and ceilings), the value of rated walls between tenants is greatly diminished. (Rated tenant separations are not required by the Dade County edition of the SFBC.)

3. Due to the single story design and ample egress provisions, exiting to either the mall or the building's exterior is achieved in a few minutes.

4. A mean roof height of 20 feet contributes to rapid exiting by providing an ample volume of space above human head level for the accumulation of smoke as demonstrated in a later section of this report. This will also provide opportunity for occupants in the mall to observe such a situation.

5. A properly designed automatic sprinkler system limits the effects of a vast majority of fires to an area of 500 square feet or less, based on records and testing. Fire spread is therefore minimal.
6. Tenants and their spatial needs frequently change in a covered mall shopping center. If full height tenant demising walls are required, sprinkler systems will likely be shut down wherever tenant needs dictate that walls be moved. This is due to the fact that sprinkler spacing requirements will likely be exceeded on one side of the wall, requiring sprinkler additions and/or relocations. With 12 foot high demising walls, sprinklers located near the roof of the structure will require minimal changes, if any, and therefore remain in service, providing uninterrupted protection during such construction modifications.

7. Traditional code requirements for tenant separation are intended to provide protection for tenants that are not in visual communication with the remainder of the structure and to limit property damage in the event of an act by a neighboring tenant. In the case of a covered mall shopping center, all tenants recognize the mutual benefits associated with limited tenant separation walls and accept the risk of property damage resulting from the acts of an adjoining tenant. Life safety is afforded through a combination of adequate exit facilities, automatic suppression and automatic alarm notification to tenants and the local fire department.

Occupancy Separations

Two-hour rated full-height fire separation walls will be provided between the mall and restaurants, and between the mall and theaters. The store fronts of these occupancies which face the mall shall be non-rated.

The provisions of the SFBC shall govern regarding applicable occupancy separations within anchor stores.

Fire Suppression

The entire covered mall structure, including mall retail and anchor stores will be protected with electrically supervised automatic sprinkler systems. (See Sawgrass Mills Tenant Handbook, Appendix B, for additional details.) All systems will be designed according to NFPA Standards 13 and 231, where applicable. However, the minimum design density will be 0.20 gpm per square foot over the hydraulically most remote 3,000
square feet, in accordance with insurance criteria, based upon maximum height of storage of 12 feet. This rate of water application exceeds the applicable code requirements for mercantile occupancies. Automatic sprinkler spacing will be a maximum of 225 square feet in the mall and 100 square feet in retail and other areas. (The 100 square feet per head, is more conservative than the 130 square feet per head allowed by the code.) Five hundred gpm for inside hose streams will be provided, in lieu of the minimum acceptable 100 gpm. Provisions will also be made in the design of the roof system piping for a second level of sprinklers to be installed below the roof level if a tenant's decorative ceiling will obstruct the required water distribution pattern from sprinklers at the roof level. (See Sawgrass Mills Tenant Handbook, Appendix B.)

Electrical switchgear rooms (480 volts) will be protected with automatic sprinklers. Transformer vaults will be unsprinklered, but will have 3-hour rated walls and roof-ceiling assemblies and automatic smoke detection, per local utility company requirements.

Six water supply lines from the City of Sunrise municipal system will supply a 12-inch underground perimeter water loop for reliability (Figure 8). Backflow prevention will be provided as shown. Fire hydrants will be located a maximum of 300 feet apart along the perimeter water loop, in accordance with local fire department requirements.

Figure 9 depicts the typical fire pump room/electrical switchgear room/transformer vault arrangement, which will have four locations throughout the mall. These rooms will have outside access for fire department use in the event of an emergency. Each fire pump will supply a single rectangular building and two halves of two triangular units. Each fire pump will be installed per NFPA 20, have a rated capacity of 1,000 gpm, and will be connected to an emergency generator through a separate transfer switch. Also, dual electric services with automatic transfer will be provided by the local utility company. Anchors will have their own transformer vaults, electrical switchgear and fire pumps. See Figure 10 for a typical system arrangement.
SAWGRAS MILLS SCHEMATIC WATER PLAN

NOTE: POTABLE WATER AVAILABLE FOR FIRE SERVICE SHALL BE A TOTAL OF 4,000 GPM WITH A RESIDUAL PRESSURE OF 20 PSI. THIS IS BASED ON A MINIMUM AVAILABLE PRESSURE OF 50 PSI AS DOCUMENTED BY THE CITY OF SUNRISE, FIRE DEPT. ON APRIL 11, 1988.

- Backflow preventers: typical of 4 at mall pump rooms, 2 at Carrefour pump rooms, and 7 at other anchor pump rooms, or 13 total.

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MALL ELECTRICAL SERVICE SYSTEM (TYPICAL OF 4)

FIGURE 9

- TRANSFER SWITCH TO EMERG. POWER
- TRANSFORMER VAULT
- 3 hour fire resistance rating at walls and roof over vault
- Switch Vault
- Switch Gear
- Fire Pump & Valves
- Foam

- Sidewalk
- Underground conduit
- Service court

- Landscape area
- Screen wall
- Skid mid. diesel emers. generator & fuel tank.

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The dedicated column sprinklers discussed under the earlier section titled "Construction Type" will be supplied from the same piping used to supply inside hose stations in the preceding paragraph. Such piping will constitute independently controlled systems from all other overhead sprinklers. Each interior rectangular column will be protected by two horizontal sidewall sprinklers - one at each of two opposite corners (Figure 3). "H" columns at exterior walls will be protected by one or two horizontal sidewall sprinklers spraying into each side of the column webs, depending upon whether one or two sides of the web are exposed to the building interior. Column sprinklers will be positioned a minimum of 15 feet above the floor.

All kitchen cooking equipment installations will comply with NFPA 96, Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors From Commercial Cooking Equipment. Kitchen equipment will have special extinguishing systems.

Two and one-half inch hose valve stations for fire department use will be provided in the mall at 200 foot intervals per Section 3124.3(a)(5).

Portable fire extinguishers will be provided throughout the building in accordance with the requirements of the local code.

Smoke Venting

According to SFBC Section 3124.6, it is necessary to provide emergency smoke/heat ventilation for covered malls per NFPA 204M, Guide For Smoke and Heat Venting. However, it is not in the scope of NFPA 204M to describe smoke/heat venting requirements for a sprinklered building such as Sawgrass Mills.

Chapter 6 of NFPA 204M states that "concern has been raised that inclusion of automatic roof venting may be detrimental to the performance of automatic sprinklers," and that "an equivalent, generalized design basis for using both sprinklers and vents together for hazard control (e.g. property protection; life safety, water usage, obscuration, etc.) has not been developed and is not presently available." The Guide, therefore, advises that an engineering approach be implemented by those qualified when ventilation and
sprinklers are contemplated, in order to determine the best method of protecting a particular hazard.

Tests performed by Factory Mutual Research Corporation (Appendix C) have concluded that the activation of automatic smoke/heat vents in a sprinklered building may result in increased fuel consumption and system water demand, negatively affecting the sprinkler system's ability to suppress a fire.

Other test data reveals that with an operable sprinkler system, roof temperature will not reach the necessary level for vent operation. This is due to the fact that the thermal sensitivities of sprinklers are lower than those of the fusible links on smoke/heat vents, in general. Also, once sprinklers operate, smoke is cooled and is less buoyant, rendering gravity venting almost useless for the designed level of control. For these reasons, NFPA 204M allows a mechanical exhaust alternative to automatic "gravity" vents in order to actively move smoke from a building. Schirmer Engineering Corporation concurs with this approach. Therefore, a mechanical venting system has been designed for this project.

The proposed mechanical smoke venting system will activate automatically upon sprinkler water flow or upon smoke detection in an HVAC supply air duct (after a time delay, unless the supervisory signal is aborted by on-site personnel) in the mall (rectangular or triangular building) areas. A manual venting mode will also be provided for fire department use. The mechanical venting system will be capable of supplying at least six air changes per hour for the entire rectangular or triangular building. Exhaust fans will be installed in each end eave of the rectangular units, as shown in Figure 11. Louvers located in the walls and roof of the building will introduce the necessary make-up air. Power for the exhaust fans will be connected to a full dual path electric power supply from the local utility company, for reliability. If tenants install a ceiling, adequate means of smoke venting equivalent to that described above must be provided in accordance with the criteria contained in the Sawgrass Mills Tenant Handbook (Appendix B).

Anchor stores do not require smoke venting per the SFBC, however, it will be included throughout this project.
The smoke venting system will be tested in the presence of the local fire department per criteria to be determined prior to occupancy by the owner's consultants and the local fire marshal. See Appendix F for test procedure and acceptance criteria.

Exiting Features

In addition to the pedestrian mall with exits to the exterior, interior exit corridors will be provided to minimize exit travel distance. The SFBC requires that exit access corridors have a one-hour fire resistance rating per Section 3104.6. All doors serving these corridors are to be rated at 45 minutes per the code.

The maximum exit travel distance is 400 feet in accordance with SFBC Section 3102.4(c)(3), considering the provisions of automatic suppression, adequate ceiling heights and mechanical smoke venting.

Occupant loads for the mall retail and anchor stores are to be determined using the areas per person described in Table 31-A of the SFBC. Mall tenant spaces will have egress either to the mall or to the exterior of the building. Anchor stores will have adequate egress design and capacity without relying on their connection to the mall. The common area of the mall is considered a pedestrian way and is not assessed an occupant load. Means of egress from the common area are to be determined by dividing the gross leasable area (anchors not included) by 55, per the LSC.

In order to demonstrate the building's inherent safety and ability to promote timely exiting in the event of a fire, a computerized smoke model was run (details in Appendix D). The model assumed the worst case scenario - no automatic sprinkler protection or smoke ventilation.

The computer was programmed for a fire originating in a mall retail store. Because there was no sprinkler protection, the fire grew in an uncontrolled fashion. The data generated shows the descent of the toxic smoke/hot gas layer versus time. It is evident from the data that even after 30 minutes, the toxic smoke/gas layer has not descended to a life threatening level; therefore, safe exiting is still possible. Because the maximum travel distance is 400 feet, and since the average walking speed is approximately 150

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feet per minute, it will take about three minutes to evacuate the building. This evidence demonstrates the lack of a life safety problem, even without the intended protection features of automatic suppression and mechanical venting. In reality, smoke liberation would be incidental compared to that predicted by the computer model due to the effect of the sprinkler system.

The provisions of the SFBC shall govern regarding egress requirements in anchor stores.

Fire Alarm System

Fire alarm, supervisory and trouble signals for the mall and anchor stores will be monitored by a U.L. listed remote receiving facility, as well as by on-site annunciation. The off-site location will receive a general fire, supervisory or trouble signal.

On-site annunciation will include zoned sprinkler waterflow switches, sprinkler control valve tamper switches, fire pump power, fire pump running, low city water pressure, emergency generator fuel level, engine trouble, discharge of kitchen suppression systems and smoke detectors. Trained security personnel present 24 hours per day, 365 days per year, will respond to all on-site alarms.

The building's public address system will serve as the general evacuation alarm. A prerecorded message may be automatically sounded over this system, if desired.

Smoke detectors will be installed only in transformer vaults and supply air ducts of HVAC systems (also see Tenant Handbook, Appendix B). Upon smoke detection, the mechanical smoke ventilation system and general evacuation alarm will operate after a time delay, unless the signal is aborted by trained mall security personnel after investigating the alarm location. An alarm signal will be sent immediately, however, to the remote receiving facility. Similarly, an immediate automatic fire alarm signal will be sent to the remote receiving facility in the event of sprinkler waterflow.

See Figure 12 for a matrix of the fire alarm/emergency control events for the project.
FIRE MODE MATRIX  
SAWGRASS MILLS

<table>
<thead>
<tr>
<th>Fire Protection System Response</th>
<th>Activate General Building Alarm</th>
<th>Activate Mechanical Smoke Venting System</th>
<th>Alarm at UL Listed Central Station</th>
<th>Alarm at Mall Fire Control Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler Waterflow</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HVAC Supply Air or Transformer Vault Smoke Detection Activation</td>
<td>X*</td>
<td>X*</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Food Tenant Kitchen Extinguishing System Activation</td>
<td>X*</td>
<td>X*</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

* After time delay
Both the off-site transmission of fire alarm signals and electrical supervision of the system provide a high degree of system reliability not required by the applicable codes. Shopping malls protected in this manner have demonstrated a high degree of life safety and property protection.

**Electrical System Shunt Trips**

Electrical power for the rectangular and triangular buildings is supplied from four transformer vaults, one in each rectangular building in the mall area. Each vault, which is served by two electrical feeders from the utility company, supplies two adjacent switchgear rooms. Each switchgear room will have the ability to shut off normal power to itself, its companion switchgear room and the remaining three sets of switchgear rooms located throughout the mall. None of these switchgear rooms will have the ability to disconnect power to their respective or other mall zone mechanical smoke ventilating equipment. Also, none of these rooms control the nine anchor stores, which will have their own electrical supply and similar provisions for emergency shutdown.

The fire command center will have the ability to interrupt normal power for the eight mall switchgear rooms or the four mall mechanical smoke ventilating distribution equipment locations, as well as the nine anchor stores. It will also have start/stop capability for the four (mall) plus nine (anchor) emergency generators. (See Figures 13 and Notes.)

No switchgear room, whether mall or anchor, nor the fire command center, will have the ability to disconnect electrical power from the utility company to the fire pumps, as this would be a violation of NFPA 20.
FIGURE 13
ELECTRICAL SYSTEM SHUNT TRIP CONTROL LOCATION NOTES

NOTES

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B &amp; 2B</td>
<td>FOUR PUSHBUTTONS TO BE PROVIDED AT EACH LOCATION FOR TRIPPING NORMAL POWER MAIN CIRCUIT BREAKERS. EACH PUSHBUTTON TO TRIP BREAKERS AT RESPECTIVE ELECTRIC SWITCHGEAR ROOMS AT AREAS 'B','D','F' &amp; 'H'.</td>
</tr>
<tr>
<td>1D &amp; 2D</td>
<td>FOUR PUSHBUTTONS TO BE PROVIDED AT EACH LOCATION FOR TRIPPING NORMAL POWER MAIN CIRCUIT BREAKERS. EACH PUSHBUTTON TO TRIP BREAKERS AT RESPECTIVE ELECTRIC SWITCHGEAR ROOMS AT AREAS 'B','D','F' &amp; 'H'.</td>
</tr>
<tr>
<td>1F &amp; 2F</td>
<td>FOUR PUSHBUTTONS TO BE PROVIDED AT EACH LOCATION FOR TRIPPING NORMAL POWER MAIN CIRCUIT BREAKERS. EACH PUSHBUTTON TO TRIP BREAKERS AT RESPECTIVE ELECTRIC SWITCHGEAR ROOMS AT AREAS 'B','D','F' &amp; 'H'.</td>
</tr>
<tr>
<td>1H &amp; 2H</td>
<td>FOUR PUSHBUTTONS TO BE PROVIDED AT EACH LOCATION FOR TRIPPING NORMAL POWER MAIN CIRCUIT BREAKERS. EACH PUSHBUTTON TO TRIP BREAKERS AT RESPECTIVE ELECTRIC SWITCHGEAR ROOMS AT AREAS 'B','D','F' &amp; 'H'.</td>
</tr>
<tr>
<td>(M)</td>
<td>TWENTY-SIX PUSHBUTTONS TO BE PROVIDED IN ENCLOSED PANEL. EACH OF FOUR PUSHBUTTONS TO TRIP NORMAL POWER MAIN CIRCUIT BREAKERS AT RESPECTIVE ELECTRIC SWITCHGEAR ROOMS AT AREAS 'B','D','F' &amp; 'H'. EACH OF FOUR PUSHBUTTONS TO TRIP MAIN CIRCUIT BREAKER AT RESPECTIVE DISTRIBUTION PANELBOARD FEEDING SMOKE FANS AT AREAS 'B','D','F' &amp; 'H'. EACH OF NINE PUSHBUTTONS TO TRIP NORMAL POWER MAIN CIRCUIT BREAKERS AT RESPECTIVE ANCHOR TENANT ELECTRIC SWITCHGEAR ROOM. EACH OF NINE PUSHBUTTONS TO TRIP MAIN CIRCUIT BREAKER AT DISTRIBUTION PANELBOARD FEEDING SMOKE FANS AT RESPECTIVE ANCHOR TENANT.</td>
</tr>
</tbody>
</table>

NOTE: MAIN FIRE ALARM CONTROL PANEL WILL INCLUDE ON-OFF CONTROLS FOR EACH OF THIRTEEN EMERGENCY GENERATOR SETS. FOUR EMERGENCY GENERATOR SETS TO BE LOCATED ONE AT EACH AREA 'B','D','F' & 'H'. NINE EMERGENCY GENERATOR SETS TO BE LOCATED ONE AT EACH ANCHOR TENANT.
CONCLUSION

The fire protection/building code program for the Sawgrass Mills shopping mall incorporates features which provide a high degree of life safety and property protection as demonstrated by many years of successful experience. The project utilizes the following features:

- Noncombustible structural elements.
- Automatic suppression system throughout the facility.
- Redundant water supplies for fire protection.
- Electrical supervision of fire protection equipment for reliability.
- Mechanical smoke venting system.
- Off-site central station facility for fire and supervisory alarms.
- Single story design with ample exit facilities.
- Full dual path electrical service for emergency lighting and smoke venting.
- Emergency power supply for fire pumps and exit lighting.

Throughout its existence, the properly designed covered mall has manifested itself as an inherently safe building. In combining the Sawgrass Mills mall with the aforementioned fire safety features, an architectural landmark evolves which shares the main goals of the South Florida Building Code – those of preservation of life and property protection.
APPENDIX A
SUMMARY OF FIRE PROTECTION/BUILDING CODE CRITERIA

PURPOSE

This appendix presents a summary of major fire protection/building code related requirements for Sawgrass Mills. Refer to applicable codes for additional information.

APPLICABLE CODES


Note: All code references refer to the SFBC unless otherwise indicated. Alternatives to code requirements, as approved by the Broward County Board of Rules and Appeals at the June 8, 1989 meeting, are denoted by an asterisk.

SUMMARY OF PROPOSED CODE PROGRAM

A. Construction

1. Covered Mall:
   Modified Type III Protected with supplemental automatic sprinkler protection.*
   Sec. 3124.4

B. Occupancy

1. Mall Retail Stores, Anchor Stores:
   Group G, Division 1
   Sec. 1201

2. Storage Areas in Mall Retail, Anchor Stores:
   Group G, Division 1
   Sec. 502.1(b)(2)

SEC Job No. 18-87116-04-00 A-1
September 7, 1989