SUMMARY OF
BOARD OF RULES AND APPEALS MINUTES

June 8, 1989 Meeting

The meeting opened with a general discussion on why the appeal was being heard by the Board, since partial permits had already been issued and the building had not been retagged. Clarifications were offered to Board Members by Mr. Cliff Storm and Mr. Don Levy that a shell permit for the building had been obtained thus far, and that an appeal could be made for alternate means to the Type of construction. It was made clear by both men that there are no current code violations or work stoppage, but there could be if construction were allowed to progress without this appeal.

Mr. F. Ronald Mastriana stated that the shopping mall should be considered a single building and classified as Type III (Protected) construction. He also explained the uniqueness of this project and the owner's desire from the inception of the project that a fully coordinated engineering approach be implemented in order to satisfy the local and state governmental, insurance and owner's operational interests. Mr. Mastriana introduced the intention to modify the Type III (Protected) construction described in the building code by providing: (a) an alternate means of protecting the steel; (b) the intended use of mechanical smoke venting; (c) improved sprinkler system reliability; and (d) unique building geometry. Mr. Mastriana then introduced Mr. Carl Baldassara of Schirmer Engineering Corporation, fire protection engineer for the project, to expand on the fire protection/life safety program for the project. Mr.
Baldassara stated that the conversations with the various subcommittees as required by last month's Board meeting proved to be valuable. As a result, many of the suggestions from these meetings have been incorporated into the proposal, although they are not reflected in the Schirmer Report presented to the Board in May.

Mr. Baldassara began by explaining the alternative means of protection to that described by the Code for Type III (Protected) construction. This would incorporate separate automatic sprinkler piping protecting the structural steel building columns. Several non-code required proposed features were also described as part of the plan, such as enhanced sprinkler protection for the remainder of the building, e.g., sprinklers spaced at 100 square feet in lieu of the 130 square feet allowed by NFPA 13, along with a higher, more conservative sprinkler design density. Mr. Baldassara also stated that the building would have two independent water supply sources as provided by the City of Sunrise water system interconnection of facilities, a separate emergency power electrical supply, a total of approximately 13 fire pumps (four serving the mall and one each for the nine anchor stores; all fire pumps connected to emergency generators), sprinkler control valves electrically supervised, HVAC smoke detection in supply air ducts, and automatic tone/live voice annunciation capability for the general building alarm.

Sprinkler water activation would send a fire alarm signal to a U.L. listed central station and qualified on-site personnel. Sprinkler water flow would automatically activate the general building alarm and the smoke venting system, however, HVAC smoke detector activation would activate the general building alarm and mechanical smoke venting system after a time delay, if the supervisory signal was not manually aborted after investigation by mall staff. Smoke detector supervisory alarms would be
transmitted to the central station, then to the fire department, without any delay, at the request of the fire department.

Twelve foot high, non rated tenant separation walls which do not terminate at the underside of the structure above will be provided in order to allow some visual intercommunication between tenant spaces above the walls and to allow smoke to rise and be mechanically vented at the high ceiling.

Electrical shunt trips for each pair of mall switchgear rooms with additional shunt trips for secondary back up power supplies from the local utility company will be provided both at the equipment and at the remotely located fire command station. Shunt trips will be arranged to not disconnect fire pumps. Shunts in any of the switchgear rooms will also be provided to disconnect power to the other three vaults serving the mall.

Mr. Baldassara cited statistics from the National Fire Protection Association, representing more than 81,000 fires over the last 100 years. Based on these records and the design of this project, satisfactory sprinkler performance is expected to exceed 99.9 percent.

Mr. Baldassara explained the benefits derived from active, automatic sprinkler column protection as opposed to the passive 1-hour protection required by the Code. Where passive protection fails after a limited time, tests show that columns protected by automatic sprinklers are protected against structural failure for as long as water is flowing.

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The benefits of the proposed mechanical smoke venting system were explained by Mr. Baldassara. In a sprinklered building, smoke liberated is cooler and less buoyant because it is being cooled by impinging water from overhead sprinklers. The gravity vents referenced in the South Florida Building Code would typically not open under these conditions. Fire fighters would have to manually open them from the roof, resulting in an unsafe condition. The mechanical smoke ventilation system would also allow manual activation at the fire command station at the direction of the local fire department. Also, the system would not be connected to an emergency generator due to the redundant electrical supply from the power company. Finally, it was explained that smoke venting, notwithstanding, the building's exceptionally large volume sections provide an inherently high level of safety for evacuation since smoke and heat can rise well above human head level.

Mr. Baldassara also expanded on how life safety concerns were addressed even if sprinkler and smoke ventilating systems failed, since computer simulation programs showed it would take more than 32 minutes for the building to fill up with smoke to a dangerous level, given its size. Since the building can be evacuated in approximately 4 1/2 minutes, life safety threat due to smoke conditions in the exit access should not be a concern for building occupants. This scenario was then compared to a 5,000 square foot tenant space built in accordance with Type III (Protected) under similar failure conditions. When computer fire modeling was again used to establish the amount of time for the smoke level to drop to, and temperatures to rise to, life threatening levels, it was found to be approximately 5 minutes. Mr. Mastroiana also explained that in a code complying tenant space with steel protection up to the 18 foot level and full height tenant separation walls, that per the fire modeling calculations, failure of roof steel could be expected after approximately 12 minutes. This is due to the unprotected steel above the 18 foot level in the enclosed volume.
The Board questioned whether a substantial amount of money would be saved under the proposed building scheme. Mr. Baldassara and Mr. Mastriana responded that money was not the issue, but rather, alternative construction methods were required because the South Florida Building Code did not address the unique design of this project. Mr. Baldassara and Mr. Mastriana also pointed out that more money was being spent than required by Code in many areas in order to enhance the most important fire protection/life safety features of the building. Some of these improvements came as a result of discussions with subcommittees of the Board.

Some confusion was raised by the Board regarding the meaning of the 1-hour fire resistant requirements of Type III (Protected) construction. Mr. Baldassara responded that the Building Code did not require a Type III (Protected) structure to be fire resistant above 18 feet, and this explains the computer model's prediction of an earlier roof steel failure in a traditional 5,000 square foot tenant space than might be expected if the entire structure was 1-hour rated.

Concerns were raised by the Board regarding the reduction in water pressure due to restrictions as the result of drought. Mr. Baldassara stated that this was taken into consideration in the design by the local mechanical engineer, who has provided a design for 45 psi in lieu of 60 psi which could be expected under normal conditions when the infrastructure improvements are complete. These engineering decisions were based upon numerous conversations with local water department personnel. Infrastructure improvements to the City of Sunrise water system costing approximately three million dollars are being completed by the owner to provide a high degree of water supply reliability.
The Board posed the question as to whether smoke curtains would be beneficial and/or enhance smoke removal from the building. Mr. Baldassara responded that this would be the normal practice if a gravity venting system were installed. In this design, however, it would decrease the time for smoke to fall to dangerous levels and would negatively affect the inherent safety provided by the large volume and high roofs for smoke to accumulate and be exhausted near the peak of the roof.

The Fire Code, Electrical and Smoke Control Committees explained their reasons for supporting the proposed alternate methods of protection. The Structural Committee, however, was not convinced that the active protection offered by column sprinklers was an acceptable alternative to the Code required passive protection. Various opinions were offered by the Board Members regarding the applicability of the Code versus the request to use alternate construction methods as allowed by the Code.

A motion was made and duly seconded that this appeal be accepted. There was no discussion on the motion. A vote was then taken and the motion carried.
FIRE CODE COMMITTEE MEETING

MAY 17, 1989

MINUTES

A published meeting of the Fire Code Committee was held on Wednesday, May 17, 1989 in the conference room at 955 South Federal Highway, Fort Lauderdale.

The meeting was called to order at 1:30 p.m. by the chairman of the committee, Mr. Colleran.

Present
F. Colleran, Chairman
W. Norman
J. Valinoti
R. Adams
C. Brewer
J. Budzinski
C. Buell
J. Kirkpatrick
B. Miller
D. Mills
G. Myers
B. Prince
J. Simon
J. Van Asperen
R. Wallace

Absent
R. Steele

Excused
I. Melnicoff
R. Korte
J. Mathie
R. Steele

Chairman Colleran announced the presence of a quorum.

I Approval of Minutes.

Mr. Miller MOVED, and the motion was duly seconded, that the minutes of the Fire Code Committee meeting of April 19, 1989, be approved as mailed to members.

MOTION CARRIED.

II Chairman's Report of Board's Disposition of Appeals

No appeals went to the Board this month, so there is no report at this time.

III Sec. 5202.2 - disagreement between building official and fire chief, regarding classification of building - Town of Davie, requested by Fire Chief Donati.

A disagreement has risen between the Fire Prevention Bureau and the Chief Building Official, Rodney Guise of Davie, concerning the Group Occupancy for the Nova University Mailman Center. This is a
three story concrete block structure with one elevator and two interior staircases. In the Fire Prevention Bureau's opinion, this structure should be classified Group C Occupancy based on S.F.B.C. Chapters 801.1, 802.2, 5219.1, and NFPA 101.

It is the opinion of Mr. Guise that this structure is of Type III construction with the first floor classified as a Group C Occupancy and the second and third floor as a Group G-2 Occupancy.

Mr. Carroll stated that, in his personal opinion, the Code says that the Building Official shall classify the group of occupancy as per Sec. 502.1(a). Chairman Colleran said this was discussed with the Board's Attorney. The fact that the Building Official will classify the building is not being appealed. Only the classification, ascribed by the Building Official is being appealed. Mr. Colleran stated that the Board's Attorney said it is up to this committee to decide whether it will be a G-2 or C Occupancy. All decisions can be appealed. Mr. Carroll says, in his personal opinion, he cannot appeal the decision until after CO is issued and it has not been issued yet. Also the renovation plans were approved by both building and fire departments and the job is complete except for final inspections. There was considerable discussion regarding why this appeal is before this committee. Additional discussion ensued regarding the fact that the Board's attorney stated that such disputes shall go to this committee first for recommendation to the Board.

Mr. Guise, Building Official of Davie addressed the committee, and stated that it is his opinion that this structure is of Type III construction with the first floor classified as a Group C Occupancy and the second and third floor as a Group G-2 Occupancy. The Plans were reviewed and discussed. Mr. Guise stated that the plans were stamped into the Town of Davie Building Department on June 20, 1988, and the alterations constitute less than 25% of the building value. Therefore, the existing building and alterations do not have to meet the present South Florida Building Code. The definition of "classroom", was discussed as this is not in the Code.

Mr. Hartley spoke on behalf of Nova, and stated that the building is 10 years old and was built as a G-2 building. Adult education is G-2. Small children should not be on second floor unless accompanied by parent. One parent does have triplets and another has twins. This is an instructional facility for parent and child, not a kindergarten or grade school. Therefore, it should be C Occupancy for the first floor only, and the second and third floor is a G-2 Occupancy. The definition of G-2 Occupancy was discussed. Mr. Hartley stated that this is a commercial building, and people pay for this service. The Exit Code in Chapter 31 was discussed.

Fire Chief Donati, of the Davie Fire Department introduced Fire Inspectors Turza and Constansa to answer questions. It was stated that the permit sheet classified this as a school, with no group occupancy marked. In December, HRS requested an inspection be made of this building.
At that time, the first floor had 125 day care children, and the second floor had 15 or 16 children and 3 adults. One month later, the second floor had 8 to 9 children and 3 adults, one adult being in a wheelchair. In the fire department's opinion, Type I construction, not Type III construction is required. There has never been a CO from the fire department.

At this time, there was considerable committee member discussion. The secretary announced that Mr. Wallace filed a conflict of interest, and would not be voting on this item.

Mr. Adams MOVED, and the motion was duly seconded, that it be recommended to the Board, for its review and approval, that this remain as the Building Official designated that this structure is classified as a Group C Occupancy on the first floor, and the second and third floor as a Group G-2 Occupancy.

MOTION CARRIED.
OPPOSED: 3

IV Sawgrass Mills, Referred from Board Meeting.

Chairman Colleran stated that this is an emergency appeal, with literature hand delivered the day after the Board meeting, as per Board direction.

Mr. Carroll stated that this complex is one story, under construction in Sunrise, and is over 2 million square feet. The appellant is here to demonstrate compliance under Sec. 204 of the S.F.B.C.

Mr. Ron Mastriana stated that this is not an appeal. He is here with Mr. Levy to review with this committee and the Board the alternate methods proposed under Sec. 204. The Building Official determined that this is a type I construction.

There are 3 issues:
1. Protection of steel columns and joist, either insulated or sprinklered.
2. Tenant separation, one hour wall all the way to the roof versus a large open cavity for smoke removal
3. Smoke exhaust, gravity versus automatic.

This is a 2.2 million square foot, one story building.

Vice President of Shirmer Engineering spoke. Fire protection engineers for this project have set up a fire protection program. There was considerable discussion regarding the fire resistance rating of the structure. This must be looked at as all one building. There was considerable discussion regarding if this is one building.
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Code requires gravity smoke and heat vents be provided according to NFPA 204. It also states that in lieu of gravity smoke vents, a mechanical type smoke control option is available. Therefore, a mechanical type smoke system has been designed for this building in lieu of the gravity smoke vents. This was explained to the committee members.

Mr. Levy, Building Official for City of Sunrise stated that his main concern is that he was being approached with Type IV construction. Only Type I construction meets requirements of Chapter 3124. However, since only a shell permit was issued at present, Mr. Levy stated he did grant a shell permit contingent on compliance with Sec. 204. This means no interior permit can be obtained until that portion of Code has been satisfied. Plans were satisfied except for these 3 items. Primary concern is to protect interior and exterior columns, bar joists and tenant separation. There was considerable discussion regarding this.

Mr. Ernest Fontan of the Sunrise Fire Department addressed the committee. He asked if options being presented today equal the Code. Not in his opinion. Items presented are: Increase in sprinkler system, and smoke control which will be tested and demonstrated that it will work. There was considerable Committee discussion.

Lengthy discussion took place regarding whether or not this subject should be voted upon as three separate items or as a whole package.

Mr. Norman MOVED, and the motion was duly seconded, that this be voted upon as on package.

MOTION CARRIED.  
OPPOSED: 3

Mr. Budzinski MOVED and the motion was duly seconded that it be recommended to the Board that this appeal be denied.

MOTION LOST.  
OPPOSED: 8

Mr. Valinoti MOVED and the motion was duly seconded that it be recommended to the Board, that this appeal be approved.

MOTION CARRIED.  
OPPOSED: 6
1. Sec. 3126.2(f) Proposed Code change submitted by Joe Van Asperen.

Mr. Van Asperen proposed a code change to Sec. 3126.2(f) as follows:

3126.2(f) Fire alarms signaling equipment shall be restored to service as promptly as possible after each test or alarm, and shall be kept in normal condition for operation. Equipment requiring rewinding or replenishment shall be rewound or replenished as promptly as possible after each test or alarm. If alarm system is shut down due to malfunction, a security watch within critical guidelines established by Fire Chief or Fire Marshal shall be provided until system is restored to proper working order.

Reason: to prevent occupancies that require fire alarm systems that are malfunctioning to put such systems out of service without notifying the alarm companies that maintain the alarms to repair the malfunction and to speed up repair of the alarm without placing residents in a life threatening situation.

Mr. Norman MOVED and the motion was duly seconded that it be recommended to the Executive/Certification Committee, for its review and approval, that Sec. 3126.2(f) be accepted as written above.

MOTION WITHDRAWN.

Mr. Norman MOVED, and the motion was duly seconded, that a subcommittee be formed to study this, and report back to this committee.

MOTION CARRIED.

The members of this sub-committee will be Mr. Van Asperen as Chairman; Messrs. Budzinski, Norman, Myers, and Valinoti.

2. Proposed Code Changes reference to replacing the word Fire Chief with Fire Marshal.

Chairman Collieran stated that he received inquiries about this from various people, and other people in the fire service need time to look this over, and provide this committee with their input.
Mr. Brewer stated that Sec. 5201.4(c) would also need to be reviewed.

Mr. Norman MOVED, and the motion was duly seconded, that this item be Tabled.

MOTION CARRIED.

General Discussion

Mr. Carroll stated that as per the direction of this committee, he contacted Tom McCarthy, DPR. There is a certification area for fire protection engineers, however it is not stipulated as fire protection engineers, merely says engineer. A current Florida P.E. must take additional courses and pass test, then get certified as fire protection engineer, according to 21h-21.002 of DPR Rules and Regulations.

ADJOURNMENT

There being no further business to come before this committee today, the meeting was adjourned at 4:15 p.m.

Recording Secretary
Karen Duquette

(Fire Code Compliance Officer
(to the best of my knowledge or recollection)

(DIR:

"Technical committee decisions regarding general releases, Interim Amendments, and proposed amendments to the Code, are not binding until approval and ratification by the Board."
GENERAL CONTRACTORS/ARCHITECTS/STRUCTURAL JOINT COMMITTEE MEETING

MAY 30, 1989

MINUTES

A public meeting of the General Contractors/Architects/Structural Joint Committee was held on Tuesday May 30, 1989 at 1:30 p.m. in the conference room at 955 S. Federal Highway, Fort Lauderdale.

The meeting was called to order at 1:30 p.m. by Chairman Britt (chairman of this joint committee).

General Contractors/Architects Committee:

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Structural Committee:

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<td>D. Britt, Chairman</td>
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Chairman Britt announced the presence of a quorum.
1. Saw Grass Mills Shopping Center Appeal, As Per Board Direction At Its Meeting of May 11, 1989.

Sawgrass Mills, through its attorney, Mr. F. Ronald Mastriana introduced this appeal and explained that the Sawgrass Mills project has been underway for the past three years. Mr. Mastriana also indicated that the City of Sunrise has been "in turmoil" since it has had approximately six building officials during the aforementioned three year period. Mr. Mastriana explained that this project is a 2.2 million square foot complex, the second largest single-story building in the State of Florida. Mr. Mastriana stated that the subject of this appeal, which was referred to several of the Board's technical committees, by the Board at its last meeting, deals with three main issues. Such issues are a) Fire Protection versus sprinklered steel columns, B.) tenant separations--one-hour wall to roof versus large open cavity for smoke removal; and C.) smoke exhaust--mechanical versus gravity. Mr. Mastriana stated that approval on all three issues is needed.

Mr. Mastriana addressed Chairman Britt and stated that further discussion, in detail, would be needed with this committee. Mr. Britt stated that the Board has already turned down a similar appeal (Racal-Milgo) and questioned how this request can be approved.

Mr. Mastriana stated that there were two similar appeals approved, such being Publix (appeal of March 14, 1985) and Winn Dixie (appeal of November 10, 1989). Chairman Britt requested a copy of minutes for same.

Mr. Carroll emphasized that the three items in question here are fire protection and steel, tenant separation, and mechanical.

Mr. Britt stated that a one-hour fire rating with sprinklers is not in Code. Mr. Mastriana is of the opinion that the appellant is offering an even better alternate system, therefore, it will be the safest building in the State.

Mr. Carl Baldassarra, Vice President of Schirmer Engineering Corporation, assisted in defining fire protection program and review of the South Florida Building Code, Broward Edition for the client. Mr. Baldassarra stated that the one-story building has ample escape time for people. It will be fully sprinklered, with three million dollars spent in the City of Sunrise to the Department on water supply system and is most reliable. It is monitored 24 hours per day, and will also have fire pumps on emergency generator. He referred the committee to pages II and III of the Schirmer Engineering Report prepared, for the project and which shows the extent of fire protection being provided, in addition, reference was also made to page 8 of said report which consisted of graphs on sprinkler tests performed.
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Reference was made to Secs. 514.2(b)(5-8), paragraph 2, Unlimited Areas, Type III-Protected or IV, of the South Florida Building Code, Broward Edition.

Mr. Russ Adams stated there is a more stringent code in other areas for malls and made reference to Sec. 3121.4 addressing Malls, I, II and III Protected.

Mr. Baldassarre indicated that buildings of this type have been built all over the U.S. Sprinkler protection for building columns, ample exits provided, as well as the sprinklers, seems adequate and beyond for life safety.

Mr. Bill Quayle, Building Plans Examiner for the City of Sunrise, attended said meeting in the absence of Mr. Don Levy, Building Official for said city. Mr. Quayle referred to Mr. Levy's letter of January 19, 1989 which stated that the building is Type I Construction. Mr. Quayle confirms Mr. Levy's position on Sec. 204(b) for this building was for a shell permit only at this time and for the Board to review for an alternate method of acceptance. The Committee's thoughts are that there has been a definite rejection by the City of Sunrise.

Mr. Rodriguez brought out that there are pros and cons to open tenant separation and possibly spread of fire more rapidly. There should be some attempt to providing alternates to code in regard to some passive systems; no doing away with passive, because of other active systems.

Mr. Dutkin commented that the Code, as published and which was in effect at the time the permit was applied for, particularly Sec. 3801, paragraph (f), which says where automatic fire sprinkler protection is provided, in other than high hazard occupancy; the fire resistance requirements may be reduced by one-hour in the area or portions of the building so protected provided such buildings are not more than 50 feet in height, however, in no case shall it be less than one-hour fire rated. In Life Safety Code 101, which is part of our code now, A77.1.4, it states that standard automatic sprinkler protection provides a high degree of life safety from fire; this code, however, does not rely on one feature as the sole safeguard for life, and specifies other additional safeguards in recognition of the fact that automatic sprinkler systems may, in rare instances, be inoperative.

Mr. Carroll stated that the Dade Code allows a reduction from one to zero for sprinklers. Also, Dade Code does not require tenant separation walls in a Group G-1 when sprinklered. What concerns Mr. Carroll is Mr. Levy's letter, which states Type I. This would mean, as an example, a reduction on interior columns from three to zero.
Mr. Guydosik suggested they put in fire divisions. Mr. Saltz stated this is a very unique structure for a 2.2 million square foot major project and would fire fighting within this project become a major problem. Jim Valinoti replied that this issue was not touched on yet.

Discussion continued on getting more than the code requires for such a major project, with the many thousands of people who will be attending this large mall, as emphasized by Mr. Rittel, and should be considered a major factor. Mr. Kimmel also agrees with everyone that spoke about passive fire systems versus active systems only. Mr. Kuritzky stated the whole building needs to be reviewed and complied with the South Florida Building Code, Broward County Edition, completely; this should be accomplished without rewriting the Code. Mr. Baldassarra indicated there is approximately 2.5 minutes at most, of walking to an exit, if any threat of hazard for handicapped or anyone else; building is inherently passively safe the way it stands now.

Chairman Britt speaks for the Structural Committee as being in agreement that what we have heard, does not meet the South Florida Building Code, Broward County Edition.

Mr. Baldassarra summed up his presentation by stating that the reason for this appeal is due to a reduction from one-hour to zero, and that there have been successful appeals brought before the Board that were approved. Structural -- a matter of life safety and owner has gone beyond to review his building with a Fire Protection Engineering firm to do the best for a building of this size. Many things are being proposed in lieu of fire protection.

Mr. Rittel MOVED, and the motion was duly seconded, that it be recommended to the Board that this appeal be denied.

MOTION CARRIED.
Negative votes: 5
Adjournment

There being no further business to come before this committee, the meeting was adjourned at 3:00 p.m.

[Signature]
Code Research Officer
(to the best of my knowledge or recollection)

[Signature]
Structural Code Compliance Officer
(to the best of my knowledge or recollection)

[Signature]
Recording Secretary

Dir: 5

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ELECTRICAL COMMITTEE MEETING

JUNE 1, 1989

M I N U T E S

A published meeting of the Electrical Technical Committee was held on Thursday, June 1, 1989 in the conference room at 955 South Federal Highway, Fort Lauderdale, at 1:30 p.m.

Present:  N. Bray, Chairman  
A. Kozich  
C. M. Schneider  
C. H. Schneider  
M. Hamilton  
T. Baker  
E. Fontan  
R. Jindracek  
W. Self

Absent:  J. Lewis

Excused:  none

Chairman Bray announced the presence of a quorum.

1. Saw Grass Mills, By Board Direction

By Board direction, this committee reviewed the electrical design provided by the appellant, Sawgrass Mills, through its attorney, Mr. F. Ron Mastriana. They have indicated that the electrical system is quite enhanced above and beyond what the minimum Code would be. The purpose is to see to what extent the enhancements are and how they can add to the safety of the project.

There are four separate systems for the central spine; in addition, a separate vault and service for each of the department stores will be provided.

Mr. Richards of FP&L spoke to the committee regarding where the power comes from and how it gets into the vault.

Ordinarily, the feed would be through the preferred source, through the primary selector switch and from that point would fan out to the transformers in the vault. The two sets of transformers are parallel. There are two transformers in each group here. They will be serving separate meter rooms. Coming into the vault, there will be two feeders. In the event one fails, there would be a transfer automatically to the emergency feed, or the alternate feed. There is enough capacity being reserved in that alternate feed to handle the vaults.
If the highline fails, it sectionalizes between sub-stations and is restored automatically.

The highline is a transmission line which, in this case, is 240,000 volts going into the sub-station. The sub-station reduces from 240,000 to 23,000. The preferred feeder is a dedicated feeder to the mall. There will be no other customers attached to that feeder.

Mr. Hamilton stated that the concern of the committee was the use of the term "emergency". It was explained that the "emergency" is considered an alternate.

This is not a backfeed loop system. It is a throw-over system and automatically transfers at the switch in the vault to the alternate feed. As long as there is voltage on the alternate feed, the transfer will occur automatically. The alternate comes from the same sub-station, different buss, different transformer. If a transformer is lost at the sub-station they re-energize the buss.

The electrical engineer spoke on behalf of Sawgrass Mills and explained the electrical design for the project.

Mr. Hamilton MOVED, and the motion was duly seconded to recommend to the Board that the appeal be approved in accordance with the electrical design stated here today.

MOTION CARRIED.
2 OPPOSED.

(See Exhibit #1 attached to and made a part of the internal minutes of this meeting.)

2. Proposed Code Change Sec. 4506.3, Submitted by Mr. Ken J. Kotrady, President, So. Florida Chapter, Florida Assoc.of Electrical Contractors.

After a brief discussion, it was the consensus of the committee that "white or" and "is in an independent pipe." be removed from Sec. 4506.3(e)(2) and the words "volt system is provided." be added to the section.

Mr. Kozich MOVED, and the motion was duly seconded that the change to Sec. 4506.3(e)(2) be sent to the Executive/Certification Committee for its review and approval for the next Public Workshop.

MOTION CARRIED.
Such Change to be as follows:

Sec. 4506.3(e)(2) For 277/480 volt systems the colors shall be brown, orange, yellow. Neutral colors shall be white or gray where 277/480 is in an independent 120 volt system is provided.

Reason: To differentiate the color of the neutral wire on different electrical systems so that they may be readily identified.

3. Continued Discussion on Proposed Code Change to Sec. 4506.1

After considerable discussion regarding the proposed code change to Sec. 4506.1, it was the consensus of this committee that Mr. Newt Schneider's proposed change be accepted with the exception of having the doors locked open at 180 degrees. Such code change shall be added to the code as follows:

Sec. 4506.1(b)(1)

(a) EXCEPTION: In residential occupancies where conditions exist that preclude the use of meter rooms as described in Sec. 4506.1(b)(1), the use of an approved electrical equipment enclosure shall be permitted. However in no case shall this enclosure be of a smaller dimensional size than that to safely house all electrical equipment intended, with the doors locked open, in order to insure proper clearance requirements as set forth elsewhere in the Code.

Mr. Schneider MOVED, and the motion was duly seconded that the Exception be approved as written above and sent to the Executive/Certification Committee for its review and approval for the next Public Workshop.

MOTION CARRIED.


The committee agreed with Gunn-Creel & Associates that liquid tight flexible nonmetallic conduit could also be used in NEC 680-25(c) Exception 2. It is the code change in the 1990 Code that will allow it.

Mr. Hamilton MOVED, and the motion was duly seconded that it be recommended to the Board to allow the use of liquidtight flexible non-metallic conduit for swimming pool motors.

MOTION CARRIED.
GENERAL DISCUSSION.

The question was raised about the ground stake with the antenna dish. It was the determination that the contractor could ground the dish.

Sec. 4507.2(a)(3) concerning wiring being installed on the transformers of signs. It was recommended that a code change be presented to upgrade the Code or eliminate that section of the South Florida Building Code covering this type of wiring.

Adjournment - There being no further business to come before this committee today, the meeting was adjourned at 3:55 p.m.

"Technical committee decisions regarding general releases, Interim Amendments, and proposed amendments to the Code, are not binding until approval and ratification by the proper channels."

[Signatures]

[Stamp]

cc: Don Levy, B.O., Sunrise
Ron Mastriana
SMOKE CONTROL COMMITTEE MEETING

JUNE 5, 1989

MINUTES

A published meeting of the Smoke Control Committee was held on Monday, June 5, 1989, at 1:30 p.m. in the conference room at 955 S. Federal Highway, Fort Lauderdale. The meeting was called to order by Mr. S. Feller, acting as Chairman in the absence of Mr. Kozich, at 1:40 p.m.

Present
S. Feller
E. Sokolow
W. Bozer
R. Edwards
E. Jenison
D. Stinson
R. Andrews

Excused
A. Kozich
I. Melnicoff
J. Valinoti

Absent
D. Johnson

Mr. Feller announced the presence of a quorum.

1. Request by Sawgrass Mills for an alternate to NFPA 204 - guide for smoke and heat venting as required by Section 3124.6 of SFBC. Smoke control system also required by NFPA 101 - Life Safety Code by Section 24-4.3.1(e).

Mr. Ron Mastriana started the presentation at the Smoke Control Committee meeting, stating that most tenant spaces have no ceilings and we are here because the roof vents as required in NFPA 204M would probably not open so a different system is being used. This is not a smoke control system, but an alternate venting system. The proposed system is a better system to allow smoke to ventilate out, than the system required by NFPA 204M.

Mr. David M. Elovitz, Professional Engineer, of Energy Economics Inc., explained the concept of smoke venting. He states should fire occur, products of combustion will travel along and will collect in the high bay at the gable ends. The building has four rectangular sections connected by triangular sections with anchor stores. Each section has its own smoke venting system. The larger of the rectangles have about 600,000cfm of exhaust. The volume of the rectangular sections is about 4,438,000 cubic ft. After start of a fire, outside air dampers will open. Flow of smoke goes to high bay drawn by exhaust fans. Duct smoke detectors are installed to detect smoke. Tenants have at least one unit, other tenants have five or six units. Flow detectors are in water supply for sprinkler system and activates smoke exhaust system. Some A/C units are less than five tons. The Fire Department would prefer an instant indication at the control center, which is monitored 24 hours per day. When a smoke detector is activated, security would then verify a real problem
or otherwise. Sprinkler system has an automatic activation upon water flow in case of real fire. The court sections are lower than the mall sections and would have a gravity area at the doors and exhaust fans would pull smoke out the door. Relief dampers are at end of corridor with no possibility of cross-contamination. If tenants want a ceiling, they must install another system putting sprinkler heads below ceiling. Very few tenants will put in ceilings, as this is being discouraged by the mall owners. Movie theatre will have its own smoke exhaust system and will have its own ceiling. Fire command station will know what is going on everywhere.

Mr. Carl Baldassarra, Vice President of Schirmer Engineering Corporation, stated that the building was put on National Bureau of Standards' computer simulation program. It took 30 minutes before a layer of smoke would fill in 2' below the building ceiling. Instead of NFPA 204, they want to use a mechanical smoke exhaust system. Mr. Sokolow questioned calculation of how many air changes would be accomplished; approximately six to eight air changes in this building.

Mr. Andrews raised the question of dampers and how many? Will they be smoke dampers? It was said, they will be pretty tight dampers, not smoke dampers; pneumatically-operated dampers, mechanical shutters on exhaust fans. Mr. Roger Edwards commented that design, of course, is based on sprinkler system working, in lieu of gravity venting system. Mr. Andrews continued discussion saying that smoke exhaust system should be activated by smoke detectors. Mr. Andrews was informed the smoke detectors will activate a UL-listed station. Mr. Ernie Fontan added that the smoke control system can be manually activated as well, on-site. Off-premises alarm will also activate automatically and they will radio the mall site.

Mr. Feller commented that the Electrical Committee approved the electrical system as an emergency power supply for this project. Mr. Andrews is of the opinion that smoke detectors and water flow will set off alarm as well as set off fans.

Mr. Edwards MOVED and the motion was duly seconded that it be recommended to the Board to approve this as alternate means of smoke exhaust.

MOTION CARRIED.
ADJOURNMENT

There being no further business to conduct, the meeting was adjourned at 2:50 p.m.

Robert H. Andrews  
Mechanical Code Compliance Officer  
(to the best of my knowledge or recollection

Janelle Austin  
Recording Secretary

[BR&A8]  
<Smoke4-6/89>  
"smokecont-6/89"
APPENDIX F
SMOKE VENTING SYSTEM TEST PROCEDURE AND ACCEPTANCE CRITERIA

Introduction

This Appendix describes the procedures and acceptance criteria for testing of the smoke venting equipment at Sawgrass Mills. These procedures and criteria have been reviewed with the City of Sunrise local authorities in various meetings during 1989 and 1990.

The mechanical smoke venting system at Sawgrass Mills was proposed as an alternative to the gravity venting system required by Section 3124.6 of the SFBC. Section 3124.6 requires vents to be installed only in the pedestrian mall ("Main Street"). The mechanical smoke venting system installed at Sawgrass Mills covers virtually all areas of the building, including anchor stores, and provides a superior level of performance when compared to that expected of gravity vents in a fully sprinklered building.

The purpose of the venting system is to provide a reasonable time for occupants to evacuate the building in the event of a fire. As demonstrated in Appendix D, the unique building geometry of Sawgrass Mills provides an inherent level of safety for the accumulation of smoke in spaces open to the roof, allowing ample time for exiting.

The fire growth model employed for Sawgrass Mills is based upon a "medium" fire inputted into the NBS ASET-B, Version 1.0, computer-based model. (See NFPA 72E-1987, Appendix C, for discussion of medium growth fires.) The model is conservative in that the fire is allowed to grow in an uncontrolled fashion without the benefit of automatic sprinkler protection, smoke venting, or human intervention.

As stated in Appendix C, the rate of smoke production increases with respect to time. Yet, after 33 minutes, the instantaneous smoke production rate is calculated to be 60,000 cfm and the average rate of smoke production is 28,657 cfm.

The ventilation system was sized as a result of the above growth model predictions. Also, the quantity of test smoke was selected with respect to the "design basis" fire. Five 40,000 cubic foot "Superior" 3-minute smoke bombs were used as the standard test smoke release. These produce a total of 200,000 cubic feet of smoke in 3 minutes, at an average rate of 66,667 cfm.

While this smoke release rate is slightly greater than the design-basis fire, it should be noted that the test smoke does not have the dynamics and buoyancy expected from a real fire with associated temperatures that are much greater than that produced by the smoke bombs. Indeed, various references in the literature caution against testing with cold smoke from smoke bombs (BOCA "Smoke Control Concepts Workbook," 1989; NFPA 92B, "Technical Guide for Smoke Management Systems in Malls, Atria and Large Areas," 1991 draft). Observation of smoke movement patterns resulting from smoke bomb tests.
at Sawgrass Mills has been used to identify areas of inadequate air flow and to verify proper corrective measures.

Actual smoke movement patterns cannot be accurately predicted because real fires cannot be simulated under a variety of environmental conditions. Also, the effect of sprinkler operation and the resulting mixing of the smoke layer cannot be predicted in the computer simulations.

In summary, the proposed mechanical smoke venting system in this building is superior to that required by the SFBC and, in conjunction with the other building features, will provide the objective as stated above.

System Operation

Smoke venting equipment in boxcars consists of exhaust fans installed in each end eave near the high point of the boxcar capable of providing at least 6 air changes per hour. Pneumatic dampers at each exhaust fan are provided to keep exterior elements from infiltrating into the building. These dampers are designed to fail in the open position in the event of loss of air pressure. In order to prevent damage to the exhaust fan louvers, a time delay function (approximately 30 seconds) is built into the system to allow damper opening prior to fans starting.

Make-up air for the boxcar exhaust fans is introduced into the building via automatically-opened louvers located in the exterior walls and roof of the building. The make-up air louvers are also pneumatically controlled and designed to fail in the open position.

Smoke venting in the courts consists of dedicated supply and exhaust fans capable of exhausting at least 6 air changes per hour. Exhaust fans are located in the various "blocks" of tenant areas so as to provide exhaust capability in the area of expected fire origin; because of the size of the mall pedestrian areas, merchandising of the "mall" with commensurate fire load is not contemplated. Therefore, smoke venting from the court pedestrian areas is accomplished by utilizing the high ceiling areas for accumulating smoke for a period to allow exiting, with eventual venting capability.

As stated in Appendix B, supplemental fans are to be provided in tenant areas with ceilings or in specialty tenants, such as restaurants, where operation of the base building venting system is considered adversely affected.

For purposes of smoke venting, each boxcar, court and anchor store is considered a separate smoke venting zone. As stated in Figure 12, activation of the fire alarm system will automatically result in activation of the smoke venting system in the boxcar, court or anchor store in which the activated zone is located. Ventilation systems serving the pedestrian mall in the affected zone will be automatically shut down upon activation of the smoke venting system. Other ventilation systems will remain unaffected. Upon activation of the smoke venting fans in either a boxcar or a court, fans are also activated in affected service corridors which pressurize the corridors with respect to the adjacent spaces. Fans in corridors which serve both a boxcar and a court are activated upon a fire alarm signal originating from either zone.
Manual controls for fire department use allow the system serving each zone to be switched on, off, or put into the automatic position from the fire command center located in the security room in Boxcar H. Supplemental controls are also provided to allow the fire department to switch off east or west fans in each box car to facilitate post-fire ventilation.

**Preliminary Testing**

Preliminary tests were run July 19 through August 22, 1990 to confirm the ability of smoke venting equipment to meet the established objectives and to identify areas where modifications would be required.

The smoke venting system is designed for a single medium growth fire; therefore, testing was conducted in only one tenant area at a time. An "overchallenge" test, which intentionally smoke logged the building with approximately 9 times the design basis fire, was conducted in a boxcar in an attempt to minimize test time. Such a test did not allow observation of specific smoke movement patterns; this test method was discontinued.

Although venting will be activated by duct smoke detection or automatic sprinkler operation under normal conditions, venting equipment was started manually just prior to smoke bomb initiation for the majority of tests. Automatic controls and initiation devices were not available at the time of these preliminary tests. Equipment start-up via these initiating devices will be conducted under a separate test when all equipment is operational.

The completed shopping mall will not be open to the outdoors. Since the completion schedule of this project demands that smoke tests be conducted at this time when some exterior walls have yet to be completed, substantial make-up air may be drawn into the building upon fan operation. To counteract this effect, plastic sheets were erected where practical to mitigate excess infiltration. Temporary 12 foot high partitions were also constructed at court/boxcar interfaces where normal drywall partitions were missing. All normally closed exterior doors were shut in the building unit undergoing testing.

As previously stated, there is concern that the use of cold smoke will not provide realistic smoke movement patterns. Tests with smoke bombs demonstrated a variation in smoke generation, depending upon the orientation of the smoke bomb, e.g., vertical vs. horizontal, and the shape of the container. It was determined that placement of the smoke bombs in a container, rather than simply on the floor, enhances the buoyancy of the smoke and provide a more representative pattern.

Temperature of the smoke released immediately above the container was measured at approximately 210°F. The temperature of the smoke at approximately 6 feet above the floor was 130°F. In order to minimize temperature loss due to the cooling effect of entrained air, a 5 foot piece of sheet metal duct was arranged over the container. The temperature of the smoke exiting the duct at about 6 feet above the floor was measured at 200 - 205°F, providing a slightly greater degree of buoyancy for the demonstration smoke. This method of smoke release was used for all tests after July 25, 1990.

A summary of the preliminary smoke tests is included in Table F-1.

SEC Job No. 18-87116-04-00  
F-3  
September 20, 1990
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Space No. or Location</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>7/19/90</td>
<td>Main Street near Col. D6</td>
<td>Single smoke bomb used to observe general smoke behavior. Smoke rose to storefront level, then spread horizontally, moving slowly toward fans at west end of Unit D. Smoke remained well above occupied level. Judged acceptable.</td>
</tr>
<tr>
<td>B-2</td>
<td>7/19/90</td>
<td>415, 417</td>
<td>Smoke rose to roof and spread horizontally toward Main Street then toward fans at west end of Unit D. Smoke remained well above occupied level. Judged acceptable.</td>
</tr>
<tr>
<td>B-3</td>
<td>7/19/90</td>
<td>447, 451, 453, 455</td>
<td>&quot;Landlocked&quot; space isolated from makeup air inlets. Demising partitions incomplete between spaces. Four bombs ignited between Cols. D3 and D4, approximately 100 ft. from Main Street. Smoke rose to roof above occupied level, but was relatively stagnant.</td>
</tr>
<tr>
<td>B-4</td>
<td>7/19/90</td>
<td>Entire Boxcar D</td>
<td>Forty simultaneous bombs were ignited throughout the building. (Approximately nine times the smoke generation of the Schirmer fire model.) Purpose was to identify smoke movement throughout the entire boxcar, as a timesaving test. Not representative of a real fire. Smoke movement patterns generally not discernable due to large quantity of smoke. Space 437 had little smoke movement. Excessive outside air infiltration from Court E may have contributed to this.</td>
</tr>
<tr>
<td>B-5</td>
<td>7/25/90</td>
<td>627</td>
<td>&quot;Landlocked&quot; space. Smoke bombs ignited near rear of space. Temp. of smoke at bucket approximately 175°F. Approximately 3 minutes into test, smoke rose to left toward boxcar fans, then up to mall ceiling and out. Cold smoke dropped into Space 635. Velometer measured air speed through storefront mall opening at approximately 130 ft. per minute. Judged acceptable.</td>
</tr>
<tr>
<td>B-6</td>
<td>7/25/90</td>
<td>627</td>
<td>Repeat of Test B-5 with 2 panel fans. Panel fans judged not beneficial due to turbulence and low level smoke mixing.</td>
</tr>
<tr>
<td>B-7</td>
<td>7/25/90</td>
<td>627</td>
<td>Repeat of Test B-5 with panel fans moved closer to mall. Smoke bombs supported in bucket with pipe. Smoke at 200°F to 205°F at 6 ft. above floor. Fans tripped out. Inconclusive.</td>
</tr>
<tr>
<td>B-8</td>
<td>7/25/90</td>
<td>659</td>
<td>White box tenant with 4 ft. wide opening at perimeter of store; gridded ceiling in center with 16 tiles missing. After smoke bomb ignition, smoke rose through ceiling openings and to roof level, as planned. Judged acceptable.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
<tr>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>B-9</td>
<td>8/8/90</td>
<td>651</td>
<td>Smoke rose to roof, drifted toward Main Street and was pulled slowly toward Unit E fans only, due to disproportionate air infiltration from unsealable exterior openings in the 49th Street anchor store. Judged acceptable.</td>
</tr>
<tr>
<td>B-10</td>
<td>8/8/90</td>
<td>607</td>
<td>Smoke rose to roof and moved west into Space 605, then to near end fans. Smoke movement was rapid. Judged acceptable.</td>
</tr>
<tr>
<td>B-11</td>
<td>8/8/90</td>
<td>611</td>
<td>Smoke rose and proceeded slowly to west end fans. No smoke spread to Main Street; rather, smoke drifted to west over demising partitions. Judged acceptable.</td>
</tr>
<tr>
<td>B-12</td>
<td>8/8/90</td>
<td>615</td>
<td>Smoke rose to roof and drifted toward Main Street. No smoke movement deeper into the tenant space at any time during the test. Smoke reached Main Street in five minutes, and proceeded toward Court E fans. No migration toward Court G, due to 49th Street air infiltration. Judged acceptable.</td>
</tr>
<tr>
<td>B-13</td>
<td>8/8/90</td>
<td>445</td>
<td>Smoke rose, drifted slowly toward Main Street. Plastic Main Street barrier at west end of boxcar broke and air rushed in. Smoke progression stopped momentarily and began to back up as a result; then was pulled down Main Street toward end fans. Smoke eventually cleared but with much turbulence, apparently due to the substantial uncontrolled air inflow through the boxcar's west end. Judged acceptable.</td>
</tr>
<tr>
<td>B-14</td>
<td>8/8/90</td>
<td>453</td>
<td>Smoke rose to roof but remained stagnant with little movement toward Main Street. Retested with panel fans (Test B-15).</td>
</tr>
<tr>
<td>B-15</td>
<td>8/8/90</td>
<td>453</td>
<td>Two panel fans positioned in Space 455 approximately 12 ft. from west (corridor) full-height wall. The 12-foot partition between Spaces 453 and 455 was not installed. Smoke behavior stagnant as in previous test, but then began to drift slowly to west toward fans. Much smoke left behind which couldn't be pulled by fans. J. Lagomasino suggests moving the two panel fans closer to west wall and add third fan in line with other two at south end of space, and retest later. Judged unacceptable.</td>
</tr>
<tr>
<td>B-16</td>
<td>8/9/90</td>
<td>835</td>
<td>Smoke rose to roof and proceeded toward Main Street. Once near Main Street, east fan near Court I pulled smoke quickly down Main Street and out. Smoke did not travel west down Main Street due to outside air infiltration from Court G. Judged acceptable.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
<tr>
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</tr>
<tr>
<td>B-17</td>
<td>8/9/90</td>
<td>863</td>
<td>Smoke rose to roof and was drawn immediately to Main Street. Steady movement of warm smoke. Decreased movement, even for high level smoke near roof, after smoke cooled. Once in Main Street, all smoke movement was toward east fans, due to significant infiltration from Court G. Judged acceptable.</td>
</tr>
<tr>
<td>B-18</td>
<td>8/9/90</td>
<td>879</td>
<td>Smoke rose, moved toward Main Street and progressed steadily toward west fans. Judged acceptable.</td>
</tr>
<tr>
<td>B-19</td>
<td>8/9/90</td>
<td>743</td>
<td>Bombs placed between Cols. h2 and h3. Smoke rose to roof and was quickly drawn diagonally to north around rated corridor and toward west Boxcar H fans and out. Judged acceptable.</td>
</tr>
<tr>
<td>B-20</td>
<td>8/9/90</td>
<td>293</td>
<td>Smoke rose to roof and moved steadily toward Main Street, staying above 12 ft. Once smoke in Main Street, hesitation but progression toward west fans. Outside infiltration through partially closed Main Street opening at Court A interface probably caused this. Judged acceptable.</td>
</tr>
<tr>
<td>B-21</td>
<td>8/9/90</td>
<td>233</td>
<td>Smoke rose to roof and progressed to center of food court (barely moved west of roof peak in center of food court); drifted slowly toward Main Street. Then smoke pattern split and moved toward fans at both ends of boxcar. Judged acceptable.</td>
</tr>
<tr>
<td>B-22</td>
<td>8/9/90</td>
<td>249, 253</td>
<td>Smoke rose into mushroom cloud. After smoke bombs finished, smoke propagation ceased approximately one-third way back from storefront. Three panel fans in series were started in Space 249 at this time. Excessive air turbulence from the fans promoted low level smoke conditions and decreased visibility in both the tenant space and Main Street. Judged unacceptable.</td>
</tr>
<tr>
<td>B-23</td>
<td>8/9/90</td>
<td>249, 253</td>
<td>Rerun Test B-22 except with panel fans on at beginning of test. Initially, better smoke movement but then turbulence caused cloudy low level conditions. Judged unacceptable.</td>
</tr>
<tr>
<td>B-24</td>
<td>8/9/90</td>
<td>257</td>
<td>Smoke drifted slowly toward Main Street. Also, some low level (cooled) smoke movement from test site out to mall. Once in Main Street, smoke drawn toward east end fans. Judged acceptable.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>B-25</td>
<td>8/22/90</td>
<td>249, 253</td>
<td>Panel fans (18K cfm ea.) positioned too far east per J. Lagomasino. (Should be closer to west wall.) At 1:30, panel fans (on at 1:10) began to push high level smoke to Main Street. At 2:45, smoke still high in tenant space, but falling to low level in mall. At 4:00, cloudy conditions began to develop in tenant space. Smoke was drawn toward both end fans. Judged unacceptable.</td>
</tr>
<tr>
<td>B-26</td>
<td>8/22/90</td>
<td>453</td>
<td>Rerun of Test B-15. Three air gravity inlets open in rear (storage) area at start of test. At 1:10, smoke spreads out evenly near roof. At 1:30, fans started in boxcar, halt smoke flow at roof level toward rear of store and began to draw toward Main Street; then smoke pulled toward west end fans only. Good smoke movement. Judged acceptable.</td>
</tr>
<tr>
<td>B-27</td>
<td>8/22/90</td>
<td>453</td>
<td>Test in stock room. At 1:10, fans on; at 2:13, smoke above head level moving toward Main Street over 12 foot stockroom/retail partition; at 3:00, cloudy in stock room. At 4:45, smoke still high, just reaching Main Street. At 5:45, cloudy in stockroom, smoke high in balance of tenant space. Good smoke movement. Judged acceptable.</td>
</tr>
<tr>
<td>B-28</td>
<td>8/22/90</td>
<td>249, 253</td>
<td>Repeat of Test B-25 with panel fans off. Mushroom cloud. At 1:17, boxcar fans on, smoke at roof level now pushed deeper into space. At 2:40, cold smoke falls to approximately 14 ft. above floor; smoke fills rear half of tenant space. At 4:00, fans inadvertently shut off; back on at 4:20. At 4:50, smoke drops down to head level; generally stagnant, but adequate egress time.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
<tr>
<td>---------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>C-1</td>
<td>8/7/90</td>
<td>935</td>
<td>Smoke drawn toward Sears foyer and exhausted. No smoke movement west of column H11. Judged acceptable.</td>
</tr>
<tr>
<td>C-2</td>
<td>8/7/90</td>
<td>939</td>
<td>Slow smoke propagation west into boxcar and north toward Main Street. Slight low level infiltration into I Court. Space 939 and north and south adjacent areas have low level stagnant smoke approximately five minutes into test. Judged unacceptable.</td>
</tr>
<tr>
<td>C-3</td>
<td>8/7/90</td>
<td>915, 917</td>
<td>Smoke filled space and was not vented. It was later indicated that a nearby venting fan was incorrectly positioned and would be relocated. Judged unacceptable.</td>
</tr>
<tr>
<td>C-4</td>
<td>8/7/90</td>
<td>935</td>
<td>No smoke venting equipment operational in Units I or H. Smoke movement toward west but large door open in east wall of I Court (directly east of test location) probably caused this. Test was for information only - not to judge venting adequacy.</td>
</tr>
<tr>
<td>C-5</td>
<td>8/7/90</td>
<td>935</td>
<td>Smoke stagnant and was not vented. Judged unacceptable.</td>
</tr>
<tr>
<td>C-6</td>
<td>8/9/90</td>
<td>Mall S. of fountain</td>
<td>Smoke filled entire court and infiltrated into tenant spaces. Poor visibility throughout. Venting system took several minutes after smoke bombs were expended to begin to clear air. Judged unacceptable.</td>
</tr>
<tr>
<td>C-7</td>
<td>8/9/90</td>
<td>311</td>
<td>Good smoke movement initially in that smoke stayed high and was pulled north toward near exhaust fan. Then smoke disturbance and hindrance of exhaust caused by supply fan in Anchor G foyer, resulting in general cloudiness at north end of court. Judged unacceptable.</td>
</tr>
<tr>
<td>C-8</td>
<td>8/10/90</td>
<td>Mall S. of fountain</td>
<td>Repeat Test C-6, except with west end exhaust fans for Boxcar D on. Again, result was poor visibility and cloudy conditions due to C Court supply fan disturbance and west D fans drawing smoke through Main Street at C/D interface. Judged unacceptable.</td>
</tr>
<tr>
<td>C-9</td>
<td>8/10/90</td>
<td>Mall S. of fountain</td>
<td>Repeat Test C-6 with supply fans off, exhaust fans on. Smoke stayed above 9 feet and spread out evenly, filling two high points in fabric roof structure; then stagnant. Adequate egress time allowed. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>C-10</td>
<td>8/10/90</td>
<td>337</td>
<td>Test in D space with only C supply and exhaust fans on. Smoke movement slowly to exhaust fan north in 335. Much high level stagnation back at test site. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>C-11</td>
<td>8/10/90</td>
<td>320, 319</td>
<td>Smoke trapped in store, since bomb set off in rear of store and due to the lower ceiling elevation near storefront. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>C-12</td>
<td>8/10/90</td>
<td>515, 514</td>
<td>Smoke stagnant; little movement toward exhaust fan in Space 523. No smoke into Main Street. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>C-13</td>
<td>8/10/90</td>
<td>561</td>
<td>Smoke rose and proceeded directly south toward supply and exhaust fans in Space 555. Much disturbance and cloudy condition caused by supply fans in Space 555. After 4 minutes, cloudy conditions even in Space 559. No infiltration into mall. Judged unacceptable.</td>
</tr>
<tr>
<td>C-14</td>
<td>8/10/90</td>
<td>547</td>
<td>Smoke progressed slowly from roof toward exhaust fan in Space 539, over 12 foot partitions. Some smoke &quot;spilled&quot; into tenant spaces enroute to exhaust. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>C-15</td>
<td>8/10/90</td>
<td>535</td>
<td>Smoke moved toward exhaust fan in Space 523 over tenant demising partitions. Once in Space 523, extreme mixing and turbulence, pushing effects into Main Street and in north end of Court E. Judged unacceptable.</td>
</tr>
<tr>
<td>C-16</td>
<td>8/16/90</td>
<td>703</td>
<td>Smoke rose initially; down to 6 ft. level at 3 minutes. Smoke maintained above 6 ft. in Spaces 705, 707 and 709. Smoke reached mall 5 minutes into test. Judged acceptable with modifications.</td>
</tr>
<tr>
<td>C-17</td>
<td>8/16/90</td>
<td>703</td>
<td>Test C-16 repeated with better sealing for outside air infiltration at 49th Street. Fans were started approx. 60 sec. after smoke ignition. Test halted due to inadvertent fan operation in adjacent boxcar. Inconclusive results.</td>
</tr>
<tr>
<td>C-18</td>
<td>8/16/90</td>
<td>703</td>
<td>Test C-16 repeated and aborted due to inadvertent fan operation. Inconclusive results.</td>
</tr>
<tr>
<td>C-19</td>
<td>8/16/90</td>
<td>Court outside 703</td>
<td>Fan started 60 sec. after smoke ignition. Smoke moved toward Bldg. H and stayed well above 6 ft. for 2 minutes. Boxcar H fans turned on 10 minutes into test. Smoke drawn into passageway between Court and Boxcar, but long after egress is anticipated. Judged acceptable.</td>
</tr>
</tbody>
</table>
System Modifications

As can be seen, boxcar smoke testing was generally very successful. Smoke was observed to ascend near the roof and was steadily pulled towards the mall area ("Main Street"), and then through fans at both ends of the boxcar. Two exceptions were an area consisting of 4 tenant spaces (447, 451, 453 and 455) not having the benefit of make-up air in the rear of their spaces, and Space 253. In the former, ducted gravity make-up air inlets were installed and retesting on August 22 showed impressive smoke movement.

Space 253 is not considered a problem from an egress standpoint due to its small size. Though the relatively cold bomb smoke did not actively "seek" Main Street and then the fans, this may be attributed to the relatively small quantity of heat produced. Improved thermal dynamics would have pushed excess smoke slightly closer to Main Street, where it would have been entrained in air currents established by the boxcar end fans.

Courts did not fare so well in preliminary testing. In the majority of tests, smoke did not escape to the high roof areas and supply fans caused an overabundance of low level air disturbance, resulting in poor visibility at occupant level. Some tests were not as poor initially with regard to visibility where bombs were ignited remote from supply fans; however, conditions deteriorated somewhat with time. Smoke movement from retail spaces in the courts was impeded as the construction of storefronts is much less open to Main Street than anticipated.

Due to this, more fans were installed to vent each block of retail space in the courts and to provide venting in court retail spaces which extend back into a boxcar, but are isolated from the rest of the boxcar by full height partitions. In high ceiling areas above Main Street, no additional venting is provided due to the exceptional volume for smoke to accumulate above the occupied level, allowing ample egress time.

As a result of the above, smoke venting will be far superior to that which would be experienced under the code-required gravity vent system, even if the gravity vents were allowed to open as the result of sprinkler system failure. Furthermore, in the event of sprinkler operation, mechanical venting is now automatic as opposed to almost assuredly nonexistent with gravity vents.

Test Procedure

In order to properly demonstrate system performance, the following procedures will be followed:

1. Representatives of Sawgrass Mills will meet with the City of Sunrise authorities on August 29, 1990 to review prior test results and to determine various locations in the boxcars to be tested.

2. Tests will be conducted using five standard 40,000 cubic foot, 3-minute smoke bombs.

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3. Prior to ignition, Sawgrass Mills representatives will verify that door, dampers, building openings, etc., are closed in the boxcar under consideration and adjacent courts; all exhaust fans are off and dampers are closed, except in the subject boxcar.

4. Performance of corridor pressurization fans will be tested in the boxcars.

5. Activation of the system will be by manual means at the fire command center via radio.

6. Tests utilizing the fire alarm system as the activation means will be conducted at a later date.

Pass/Fail Criteria

Pass/fail criteria of the system will be primarily dependent upon demonstration that the system components are reliably performing their intended functions and the judgement that smoke generated would not interfere with occupant exiting from the building in the early stages of a fire.

For purposes of smoke venting system testing and acceptance, activation of the system will be simulated manually. A complete test of the fire alarm system initiating devices will be performed in a later phase of acceptance testing.

In order to verify these goals, both objective and subjective observations are required. Objective observations can be made of the mechanical/electrical equipment, as follows:

1. For each alarm initiating device in a smoke zone, verify:
   a. Proper activation of associated fans, fan louvers and make-up air louvers.
   b. No spurious activation of venting equipment in other building zones.
   c. Proper identification of initiating device at fire alarm system annunciator.

2. For each manual control at the fire command center, verify:
   a. Proper operation of fans and louvers activated by manual controls.
   b. No spurious activation of venting equipment in other building zones.

3. Obtain certified test reports by the contractor for each supply and exhaust fan associated with the smoke venting system to verify design air flow rates. If desired by local authorities, air flow measurements of selected fan systems can be witnessed by the local authorities.

In addition to the above objective tests, smoke will be released in selected areas identified by the local authorities. It is recognized that the purpose of such tests are to verify that smoke resulting from a fire will likely rise to a level to allow safe exiting and will eventually be vented by the mechanical system. Patterns in smoke movement will be observed to verify acceptable performance.
Test Results

Acceptance tests were conducted in the presence of local authorities on several dates during the period of August 29 through September 11, 1990. Prior to starting the acceptance test program, results of the preliminary tests were discussed, along with remedial measures that were completed or were in progress.

Test locations were selected by the local authorities. For nearly all tests (except as noted in the test summary), fans were manually activated prior to ignition of the smoke bombs.

Results of the acceptance tests witnessed by Schirmer Engineering Corporation are summarized in Table F-2. Test locations are shown in Figure F-1.

As a result of the tests, conditional approval of the base building smoke venting systems in the courts and boxcars has been given, pending receipt of the test report, verification of fire alarm system interface and completion of electrical/mechanical appurtenances for the system.

Sawgrass Mills has indicated that the status of the entire system, including corridor equipment, will be verified immediately prior to the planned opening date of October 4, 1990. The fire alarm system will also be programmed to eliminate any delay in activating the smoke venting system by sprinkler water flow, except for the 30 second delay in opening louveres. The planned 3 minute time delay for other initiating devices will be reduced to 2 minutes 30 seconds to account for the 30 second delay in opening louveres before vent systems fans are activated.
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Space No. or Location</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8/29/90</td>
<td>451</td>
<td>Gravity make-up air vents have been installed serving this and adjacent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>spaces resulting from Test B-3. Space 451 is separated from Space 453</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>by gypsum board to the 12 ft. level; fans not running at ignition. After</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ignition, smoke rose to roof. At 1:15, fans started; smoke moving toward</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mall. Slight downward induction of smoke toward floor at 3:00. Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>corridors clear of smoke throughout test. At 4:30, smoke in mall well</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>above occupied level; some smoke in Space 453. At 9:30, some smoke in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mall near floor. At 14:30, mall clear of smoke. Judged acceptable.</td>
</tr>
<tr>
<td>2.</td>
<td>8/29/90</td>
<td>443</td>
<td>Smoke rises to roof, moving toward mall exhaust fans. At 2:30, some</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>smoke in Space 441, above occupied level. At 6:15, slow movement, well</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>above occupied level. At 9:00, smoke at mall; at 12:30, smoke above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>storefront level of mall. Service corridors clear throughout test. At</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18:00, some smoke settles in mall. Judged acceptable.</td>
</tr>
<tr>
<td>3.</td>
<td>8/29/90</td>
<td>425</td>
<td>Ignition at rear of space. At 3:00, smoke level high, reaching mall.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Smoke above Space 429, moving toward east fans. Smoke in mall above 12 ft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>level; some minor smoke in Space 429. Service corridors clear of smoke</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>throughout test. Judged acceptable.</td>
</tr>
<tr>
<td>4.</td>
<td>8/29/90</td>
<td>649</td>
<td>Ignition at rear of space. At 0:45, smoke moving into Spaces 651 and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>653 at roof level. At 2:45, smoke reaches mall, dropping to 10 ft. level</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>above mall at 6:30. Induction by mall HVAC causes some smoke at floor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>level. Service corridors clear throughout test. Although performance is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>judged acceptable, decision is made to automatically shut down mall</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HVAC units via fire alarm system upon venting system activation to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>minimize induction in the future.</td>
</tr>
<tr>
<td>5.</td>
<td>8/29/90</td>
<td>615</td>
<td>Mall HVAC shut down before smoke release. Ignition near center of store.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>After ignition, smoke moves toward mall, reaching mall at 2:50. At 5:00,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>smoke at storefront drops to about 6 ft. level due to induction by tenant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fans. At 6:00, visibility in mall is maintained at 6 ft. level. Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>corridors clear throughout test. Judged acceptable.</td>
</tr>
</tbody>
</table>
### TABLE F-2
**SMOKE ACCEPTANCE TEST SUMMARY**

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Space No. or Location</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>8/29/90</td>
<td>451</td>
<td>Rerun of Test No. 1 with only west fans in Boxcar D operating. Less velocity through gravity make-up air vents results in less induction and better visibility. Smoke maintained high in space. Smoke level at mall and adjacent Space 453 acceptable. Smoke reaches mall at 5:15. At 7:00, smoke maintained well above occupied level in mall. Service corridors maintained clear throughout test. Judged acceptable. Decision made to provide manual controls for fire department to select shut down of east or west fans in each boxcar after automatic activation of venting system.</td>
</tr>
<tr>
<td>7.</td>
<td>8/30/90</td>
<td>861</td>
<td>After ignition, smoke moves north toward mall. At 2:30, some smoke near front of tenant space; majority is maintained high and moving toward mall. At 5:00, some smoke at floor level at tenant space and entry to adjacent service corridor. At 6:00, smoke reaches mall. At 9:00, obscuration at floor level near ignition point. Judged unacceptable. An uncontrolled ventilation opening was noted between this space and adjacent Management Office causing turbulence, drawing smoke to floor level. Need to seal openings and retest. (See Test No. 10.)</td>
</tr>
<tr>
<td>8.</td>
<td>8/30/90</td>
<td>249,253</td>
<td>After ignition, smoke rises to roof. Smoke maintained at high level in space, but not moving to mall because of lack of make-up air. After 6:00, smoke at 10 ft. level. Service corridors remained clear throughout test. Judged unacceptable because of inadequate movement to mall; corrective measures will be taken and space retested. (See Test No. 13.)</td>
</tr>
<tr>
<td>9.</td>
<td>8/30/90</td>
<td>283</td>
<td>Smoke rises and moves toward east fans; minor smoke above Space 285. At 4:10, smoke reaches mall; no smoke noted west of Space 287. Service corridors clear throughout test. Judged acceptable.</td>
</tr>
<tr>
<td>10.</td>
<td>9/5/90</td>
<td>861</td>
<td>Rerun of Test No. 7. Corridor ceiling present in Test No. 7 has been removed. Openings have been temporarily sealed. After ignition, smoke rises to deck. At 4:15, smoke reaches mall at high level; floor level clear. At 6:30, smoke 8 ft. above floor at Main Street. Smoke mostly above 6 ft. level from Space 861 to Main Street at 7:30. After 10:00, some smoke at floor near Space 873. Service corridors clear. Judged acceptable.</td>
</tr>
</tbody>
</table>
### TABLE F-2
SMOKE ACCEPTANCE TEST SUMMARY

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Date</th>
<th>Space No. or Location</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>9/5/90</td>
<td>743</td>
<td>Test conducted utilizing Boxcar H fans only. Ignition at rear of space, near full height walls. At 2:15, smoke passes high wall section and is moving toward exhaust fans. Some smoke noted at floor level in area of ignition at 4:15. At 8:15, smoke noted floor to ceiling in Boxcar H. Service corridors are clear. Inadvertent movement of airflow toward Court I is suspected because of removal of temporary closure at H/I interface. Retest is planned with new exhaust fans being installed in this space. (See Test No. 19.)</td>
</tr>
<tr>
<td>12</td>
<td>9/5/90</td>
<td>927</td>
<td>Smoke noted filling beam pocket after ignition. After 2:00, smoke noted at rear of store (ignition point), floor to ceiling, moving toward fan in Space 925. At 5:45, rear of Spaces 925 and 927 has some smoke floor to ceiling. Rear service corridor is clear. At 10:10, Space 927 is clear. Judged acceptable.</td>
</tr>
<tr>
<td>13</td>
<td>9/5/90</td>
<td>249,253</td>
<td>Rerun of Test No. 8. Gravity make-up air inlets have been added, temporarily installed to bottom of joists. After 1:10, smoke is driven down into space by induction of inlet air into smoke layer. After 1:55, smoke fills space, floor to ceiling, with minor smoke coming out of front door. Mall is clear for egress. A retest will be conducted when air inlets are lowered. (See Test No. 21.)</td>
</tr>
<tr>
<td>14</td>
<td>9/5/90</td>
<td>129-131</td>
<td>Smoke driven downward shortly after ignition by air from Boxcar B over tenant partition. At 2:15, smoke floor to ceiling in space near ignition point. Corridors clear throughout test. After 8:30, space is nearly clear. Judged acceptable.</td>
</tr>
<tr>
<td>15</td>
<td>9/5/90</td>
<td>137-147</td>
<td>Demising partitions not installed in spaces. Test conducted near rear of Space 147. Smoke rises to ceiling and, after 1:50, begins to drop to floor, relatively stagnant. After 3:20, smoke in area of ignition fills floor to ceiling with only minor movement to fan. After 6:20, smoke begins to drift out of store and is entrained by mall supply air, spreading smoke floor to ceiling in court. Corridors clear throughout test. Make-up air is needed; the space will be retested. (See Test No. 22.)</td>
</tr>
<tr>
<td>16</td>
<td>9/5/90</td>
<td>523</td>
<td>Ignition near rear of tenant space. Smoke rises to deck and majority is quickly exhausted by nearby fan. At 2:00, a minor amount of smoke has dropped in rear of tenant space. Front of space, mall and service corridors are clear. Judged acceptable.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Date</td>
<td>Space No. or Location</td>
<td>Summary</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>9/5/90</td>
<td>547</td>
<td>Ignition near rear stockroom partition. Smoke rises to deck and is quickly exhausted by nearby fan; a minor amount of smoke at floor level in Spaces 547 and 545. After 4:00, spaces are nearly clear. Service corridors clear. Judged acceptable.</td>
</tr>
<tr>
<td>18</td>
<td>9/11/90</td>
<td>709</td>
<td>After ignition, smoke moved toward exhaust fans in Space 705. Minor smoke dropped into Space 705. After 2:50, service corridor and mall is clear; minor smoke in 709; visibility maintained. After 6:10, smoke is clear from 709. Service corridors clear. Judged acceptable.</td>
</tr>
<tr>
<td>19</td>
<td>9/11/90</td>
<td>743</td>
<td>Rerun of Test No. 11 in slightly different location with Court G fans running rather than Boxcar H. Shortly after ignition, smoke dropped to floor at rear of store. Smoke soon fills rear of store, floor to ceiling. After 4:10, smoke is clear at front of store; minor obscuration at rear. Service corridors clear. Judged acceptable. (See Test No. 20.)</td>
</tr>
<tr>
<td>20</td>
<td>9/11/90</td>
<td>743</td>
<td>Rerun of Test No. 19 with court fans running, Boxcar H fans off, but Boxcar H vents open. Although smoke also dropped to floor as in previous test, obscuration was greater. Test judged unacceptable; decision to maintain original venting scheme.</td>
</tr>
<tr>
<td>21</td>
<td>9/11/90</td>
<td>249, 253</td>
<td>Rerun of Test No. 13. Air inlets have been lowered to proper distance below roof deck. Fans are automatically started by opening sprinkler system test valve simultaneously with smoke bomb ignition. Alarm signal activated 0:50 after ignition; fans start 1:20. Smoke rises toward roof and migrates toward mall, reaching mall at 2:55. Smoke remains high in space and in mall well after 6:40. Service corridors clear. Fans at east end of Boxcar B turned off to facilitate post-test venting via west fans. Judged acceptable.</td>
</tr>
<tr>
<td>22</td>
<td>9/11/90</td>
<td>137-147</td>
<td>Rerun of Test No. 15 in slightly different location (rear of Space 143). Roof mounted air inlets added to space. After 1:50, most smoke is high in space; minor amount at floor near source. At 3:10, rear area of store (ignition point) is smoky floor to ceiling; front of store clear. Mall and corridor is clear. At 6:20, smoke near front of store at floor level. At 8:00, minor amount of smoke passes through store front to mall at floor level. Judged acceptable.</td>
</tr>
</tbody>
</table>

***
FIGURE 1
SMOKE TEST LOCATIONS

SEC Job No. 18-87116-04-00
F-21
September 20, 1990
APPENDIX F
SMOKE VENTING SYSTEM TEST PROCEDURE AND ACCEPTANCE CRITERIA

The following describes procedures and acceptance criteria for testing of the smoke venting equipment at Sawgrass Mills. These procedures and acceptance criteria were reviewed with the City of Sunrise authorities on March 6, 1990.

1. Prior to smoke venting system demonstration, Sawgrass Mills contractors will pre-test system with sub-contractors and Owner's engineers. Certified reports of the pre-test will be provided.

2. Air balance tests of fan systems will be performed by an independent testing and balancing agency. Certified air balance reports will be submitted. If desired by local authorities, air flow measurements of various fan systems can be witnessed by local authorities.

3. In the presence of the local authorities, a demonstration will be performed as follows:

   a. Selected sprinkler system inspectors test valves will be opened activating associated airflow switches.
   
   b. Observation of affected fan systems, make up air dampers, and resultant fire alarm indications for proper activation and response.

4. Operation of manual fire department controls and observation of proper activation and response.

5. In the presence of the local authorities, a demonstration will be performed as follows:

   a. Selected duct smoke detectors will be activated by introduction of smoke.
   
   b. Observation of affected fan systems, make up air dampers, and resultant fire alarm indications for proper activation and response.

6. In the presence of the local authorities, a demonstration will be performed as follows:

   a. Selected heat detectors will be activated by non-destructive application of warm air.
   
   b. Observation of affected fan systems, make up air dampers, and resultant fire alarm indications for proper activation and response.

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7. A warm air smoke generator will be utilized in conjunction with "tracer" smoke as a demonstration of air flow patterns in areas of the building selected by local authorities.

8. Acceptance of the smoke venting system will be based upon:
   a. Proper activation of alarm initiating devices.
   b. Proper operation of associated fans, dampers and other mechanical equipment.
   c. Proper operation of fire alarm annunciator system.
   d. Proper operation of fire department manual controls.