

***Fourteen-Year-Old Laborer Dies After Falling Through a Skylight--Alabama*****SUMMARY**

On February 4, 2001 a 14-year-old male laborer (the victim) died from injuries he sustained the previous day when he fell approximately 12 feet through a skylight to the lower concrete level below. The victim was reportedly working with his employer and a crew of six other workers removing existing roofing materials from the flat roof of a wholesale florist shop. None of the workers had received training in fall protection methods and no means of fall protection had been provided by the employer. A coworker told police that the victim was removing roofing materials and apparently lost his balance and fell backwards through an unguarded skylight. Immediately following the incident, workers inside the florist shop called 911, and police and emergency medical services (EMS) personnel responded within 4 minutes. The victim was transported by ambulance to a local hospital where he died the day after the incident. NIOSH investigators concluded that in order to help prevent similar occurrences, employers should



*Photo 1: Skylight Through Which Victim Fell.*

- *conduct a site inspection prior to beginning roofing work to identify all potential fall hazards present, and take appropriate steps to ensure that identified hazards are eliminated or controlled prior to the commencement of work activities*
- *develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition, including but not limited to fall hazards, and the avoidance of unsafe conditions*

**Fatality Assessment and Control Evaluation (FACE) Project**

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when notified by participating states (North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia); by the Wage and Hour Division, Department of Labor; or when a request for technical assistance is received from NIOSH-funded state-level FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Nebraska, New Jersey, New York, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin. The goal of these evaluations is to prevent fatal work injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. The FACE program does not seek to determine fault or place blame on companies or individual workers. For further information visit the FACE website at [www.cdc.gov/niosh/face/faceweb.html](http://www.cdc.gov/niosh/face/faceweb.html) or call toll free 1-800-35-NIOSH.



- *contact the U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, as well as the State agency responsible for child labor in their State, for guidance in complying with child labor laws which prohibit certain types of work by workers less than 18 years old.*

*Additionally,*

- *building owners should consider installing permanent railings around skylight perimeters or protective covers over individual skylights to guard against falls through skylights by maintenance or other personnel who must access the roof*
- *general contractors should ensure through contract language that all subcontractors have appropriate safety programs, and training specific to the work to be performed*
- *designers/manufacturers of skylights should evaluate load capacities of current designs and consider strengthening skylight components and incorporating safeguards, such as protective screens, into skylight designs*
- *government agencies, school officials, and health and safety organizations should continue their efforts to inform the public about child labor laws, and parents should become familiar with occupations which are prohibited for minors.*

## **INTRODUCTION**

On Saturday February 3, 2001, a 14-year-old male laborer (the victim) fell through a skylight to a concrete floor approximately 12 feet below. He died the following day from injuries sustained in the fall. On February 7, 2001, officials of the Wage and Hour Division of the U.S. Department of Labor notified the National Institute for Occupational Safety and Health (NIOSH) Division of Safety Research (DSR) of the incident. On March 14, 2001, a DSR occupational safety and health specialist met with personnel from the U.S. Department of Labor, Wage and Hour Division. The case was reviewed with personnel from the Alabama State Department of Labor, Wage and Hour Division and with personnel from OSHA through telephone conversations. Official photographs taken by OSHA investigators shortly after the incident were reviewed. The employer was interviewed via telephone.

The employer was a roofing subcontractor who had over 18 years of experience in roofing and was a sole proprietor for 3 years. He had subcontracted this roofing job from a general contractor (GC) who supplied all materials while he supplied all labor. The employer routinely hired day-laborers to work with him to complete small roofing jobs. In the year prior to the incident, four youths under 18 years of age had worked with him on roofing projects on an occasional basis. He had one regular full-time employee. On the day of the incident, he had employed four adult day-laborers and two brothers, ages 14 and 16, to complete this roofing job along with his full-time employee and himself. The adult day-laborers and the youths had not worked for this employer prior to the day of the incident. The employer did not have a written safety program and there was no indication that training in hazard awareness, avoidance, or abatement had been provided to any of the employees. This was the first fatality experienced by the employer.

## INVESTIGATION

The employer had been subcontracted to remove existing built-up roofing materials on a one-story wholesale floral shop. The building was built in 1986. Three businesses occupied approximately equal areas in the building, but only the L-shaped section of the building's flat roof over the wholesale florist shop located at the south end was being replaced. The section of roof being replaced was approximately 12 feet above ground level and had six 56-inch by 24-inch opaque dome-type curb mounted skylights installed, apparently as part of the original construction. The dimensions of the L-shaped roof being worked on and the skylight layout are shown in Figure 1. The skylights were the non-opening type and had no warning labels or manufacturer information affixed to them. Examples of the skylights are depicted in photographs 1 and 2.

At approximately 8:30 a.m., the seven employees and their employer climbed a ladder to gain access to the roof and began to remove roofing materials. The roofing job was expected to take 3 days, 1 day to remove old roofing materials and 2 days to spread tar and gravel over the 7,350 - square-foot roof. The employer instructed the crew to pull up the existing built-up roofing materials and throw them over the edge of the roof into a dumpster located on the ground below. The crew had been prying up roofing materials with shovels and pitchforks and then removing them by hand for approximately 15 minutes when the victim fell backwards through one of the unprotected skylights. The victim's 16-year-old brother was standing next to him and saw him fall. The other workers did not see the victim fall but upon hearing the sounds produced when the skylight dome shattered, climbed off the roof to help the victim. The victim fell into an area where florist-shop employees were working. Rescue 911 was called immediately, and police and emergency medical services (EMS) personnel responded within 4 minutes. At the time of EMS arrival, the victim was conscious and complaining of back pain. EMS personnel placed a cervical collar around the victim's neck, started an intravenous (IV) line, placed him on a backboard, and transported him to a local hospital where he died the following day.

## CAUSE OF DEATH

The official cause of death was listed as clinical brain death due to severe head injury.

## RECOMMENDATIONS/DISCUSSION

***Recommendation #1: Employers should conduct a site inspection prior to beginning roof work to identify all potential fall hazards present, and take appropriate steps to ensure that identified hazards are eliminated or controlled prior to the commencement of work activities.***

Falls from elevation are a leading cause of death and injury for construction workers. To protect workers from falls, roofing contractors or their designated "competent person"\* should conduct a hazard assessment prior to starting work in order to identify fall hazards and eliminate or control them before work begins

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\* According to OSHA, a competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective action to eliminate them (29CFR 1926.32).

(e.g. provide an adequate skylight cover, such as a properly sized and installed screen, metal grill work, or plywood cover that could withstand, at minimum, 200 pounds of downward pressure, to prevent employees from falling into or through a skylight or opening; provide barrier protection (railings/guardrails) to prevent workers from falling through skylights or openings or over roof edges; provide adequate fall protection at all other exposed areas on the roof surface). According to OSHA regulations (29CFR 1926),<sup>1</sup> employers are required to protect employees from falling when working from heights greater than 6 feet above the next lower level. Protection against falling through skylights can be accomplished by covering the skylight with an adequate cover or by installing protective barriers around them. A personal fall arrest system (PFAS) can also be used. When a PFAS is used, extreme care must be given to the correct choice of harness, lanyard, and anchor point so that the worker is adequately protected given the fall distance present.

Additionally, OSHA regulations require employers to provide fall protection for employees engaged in any type of roofing activities where workers work near unprotected edges 6 feet or more above the level immediately below. Some acceptable methods to protect employees on a roof of this type (flat or low-sloped) include utilizing

- guardrail systems
- safety net systems
- PFAS.

Employers are responsible for selecting and ensuring the use of adequate fall protection for the hazards present.

***Recommendation #2: Employers should develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition, including but not limited to fall hazards, and the avoidance of unsafe conditions***

A comprehensive safety program should be developed that includes training in hazard recognition and the avoidance of unsafe conditions. Employers should not allow workers to perform any work until appropriate safety training has been provided for the tasks assigned.

OSHA regulations require employers to train workers to recognize and avoid unsafe conditions that may be present in their work environment and to provide training on the regulations applicable to their work (e.g. 29 CFR 1926). When employees are working in jobs that expose them to fall hazards, the employer's safety training must contain a component that specifically addresses how to minimize worker exposure to fall hazards (29CFR 1926.500-503). Employers are to assure that each employee has been trained, as necessary, by a "competent person" qualified in the following areas:

- the nature of fall hazards in the work area
- the correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems to be used

- the use and operation of guardrail systems, PFAS, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protections to be used
- the limitation on the use of mechanical equipment during the performance of roofing work on low-sloped roofs
- the correct procedures for handling and storage of equipment and materials and erection of overhead protection
- the role of employees in the fall protection plans
- the applicable regulations contained in OSHA's subpart M--Fall Protection (29CFR 500-503). For further information see the OSHA website at <http://www.osha.gov><sup>2</sup>

Employers can obtain additional information pertaining to preventing falls through skylights and roof openings in a NIOSH alert on this topic (DHHS, NIOSH Publication No. 90-100).<sup>3</sup> Additional information pertaining to worker deaths by falls from elevation is contained in a NIOSH publication on this topic (DHHS, NIOSH Publication No. 2000-116).<sup>4</sup> These publications are available through NIOSH by calling 1(800) 356-4674 or by visiting the NIOSH website at <http://www.cdc.gov/niosh/90-100.html> and <http://www.cdc.gov/niosh/00-116pd.html>

***Recommendation #3: Employers should contact the U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, as well as the State agency responsible for child labor in their State, for guidance in complying with child labor laws which prohibit certain types of work by workers less than 18 years old.***

Before employers hire workers less than 18 years old, they should contact the U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division for information on the type of work youths are allowed or not allowed to perform under the Fair Labor Standards Act (FLSA). Information on the FLSA can be obtained by visiting the DOL ESA website at [http://www.dol.gov/dol/esa/public/whd\\_org.htm](http://www.dol.gov/dol/esa/public/whd_org.htm)<sup>5</sup> These employment standards are listed and explained in WH-1330<sup>6</sup> and summarized in DOL Fact Sheet No. 43.<sup>5</sup> Offices of Federal and State child labor departments can be located by using the telephone directory government pages.

Employers are not permitted to hire workers less than 18 years old to perform roofing work. Hazardous Order No. 16 prohibits youths from work in roofing operations because of the associated hazards. Employers should ensure that workers less than 18 years old are not assigned to perform prohibited work. Employers should also meet with their workforce to explain that young workers are at increased risk for injury at work and reinforce the importance of assigning youths to appropriate work tasks.

***Recommendation #4: General contractors should ensure through contract language that all subcontractors have appropriate safety programs, and training specific to the work to be performed.***

General contractors should ensure, through contract language, that all subcontractors have comprehensive safety programs and training that appropriately address the tasks their workers are assigned to perform. Contract language should address safe work procedures specific to roofing work and an adequate training program specific to the recognition and avoidance of fall hazards. The type of fall protection systems to be used on the work site should also be specified. The comprehensive safety program should include a plan to verify that every new employee entering the work site meets all legal employment requirements, including age. A comprehensive safety program for roofing contractors should indicate that employees under 18 years old are prohibited from working in any aspect of roofing operations.

***Additionally, building owners should consider installing permanent railings around skylight perimeters or protective covers over individual skylights to guard against falls through skylights by maintenance or other personnel who must access the roof.***

Unprotected skylights present a fall hazard to anyone who must access the area in which skylights are located. Building owners should consider installing permanent guardrails around the perimeter of the skylight or protective covers, such as screens or metal grills, over individual skylights to eliminate the hazard of falling through the skylights. Guidance for installing permanent railings around skylights is outlined in 29CFR1910.23 (e)(2) (i through v). In summary, the railing must be installed so that they can withstand a load of at least 200 pounds applied in any direction at any point on the top rail.

Requirements for a standard skylight screens are provided in 29CFR 1910.23 (e)(8) as follows: “Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of statwork with openings not more than 2 inches wide with length unrestricted.”

***Designers/manufacturers of skylights should evaluate load capacities of current designs and consider strengthening skylight components and incorporating safeguards, such as protective screens, into skylight designs.***

Designers/manufacturers of skylights should evaluate the materials used to fabricate skylights, and also evaluate current skylight designs, to determine the feasibility of increasing the load capacity. If an individual falls against a skylight or skylight screen, the load transferred to the skylight or screen from his impact can be several times his body weight. For example, a 200-pound individual could easily transmit a load of 400 to 500 pounds at impact by tripping and falling onto the skylight or skylight screen. As a result, load capacity should be carefully evaluated to provide a margin of safety in the event of an inadvertent fall against a skylight. Additionally, a metal grid or screen could be developed as an integral part of the skylight fixture and installed over the skylight. There are several models of skylight screens available that can be retrofit over existing skylights. A grid or screen



would add additional exposure protection against falling through skylights. Manufacturers should also consider placing warning decals on the frames of the skylights they produce, identifying the hazard of sitting or stepping on skylights, and consider writing fall-hazard warnings into their installation instructions. The American Architectural Manufacturers Association (AAMA) has developed several voluntary standards which could be used by manufacturers to improve the load-bearing capacity of the skylights they manufacture. AAMA voluntary standards are available on the world wide web at <http://global.ihs.com><sup>7</sup> [Disclaimer: Mention of the name of any company or product or website address does constitute endorsement by NIOSH].

***Government agencies, school officials, and health and safety organizations should continue their efforts to inform the public about child labor laws, and parents should become familiar with occupations which are prohibited for minors.***

Federal, State, and local government employment and regulatory agencies should continue working together with school officials and health and safety organizations to inform the general public about the types of work youths are prohibited from performing because of concerns about their safety and well-being or because the work is recognized as especially hazardous. It has been reported in the literature that employers, parents, and teens are often unaware of work activities prohibited by child labor laws.<sup>8</sup>

There are a number of examples of efforts to raise the awareness of risks to young workers and of child labor laws, including activities underway in Alabama. Agencies in Alabama are taking action to increase awareness of prohibited work activities for youth. Federal and State child labor enforcement personnel in Alabama have tried to increase parent, teacher, employer and youth awareness about activities prohibited for minors by traveling to high schools within the State and talking with high school personnel responsible for giving out work permits. The list of prohibited activities was recently added to Alabama's work permit system. Since a work permit is required under Alabama's child labor laws, must be signed by the youth's parents and a school representative, and must be in the possession of the employer at the time of hire, the listing of prohibited tasks on the form should help promote greater awareness on the part of each of the parties involved. These agencies plan to continue their educational efforts and are considering asking building supply retailers to post the list of prohibited work activities for youths in areas of their stores where the list is most likely to be seen by customers picking up their supplies.

Government agencies have produced documents designed to inform the public about safe work for youth. This effort should continue. Examples include a DOL document entitled "Work Safe This Summer: Employer's Guide to Teen Worker Safety"<sup>9</sup> and a NIOSH Alert, "Preventing death and injuries of adolescent workers."<sup>10</sup> The DOL document can be obtained by contacting an area DOL Wage and Hour Division Office or by visiting the DOL website at <http://www.dol.gov/opa/summer/guide/ideas.htm>. The NIOSH Alert can be obtained by contacting the NIOSH Education and Information Division at 1(800) 356-4674 or by visiting the NIOSH website at <http://www.cdc.gov/niosh/childlab.html>.



Before giving consent for their children to work, parents should contact the U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, and the State child labor agency, to obtain information regarding appropriate work assignments for young workers, to discuss any task assignment issues, learn about the youth work permit requirements and process, and obtain written child labor information. Documents mentioned earlier in this report, WH 1330 and DOL Wage and Hour Fact Sheet 43, offer useful summary information about tasks that are permissible and those that are not permissible for specific age groups. When parents are more aware of the age-specific types of work their children are permitted to perform, they will be in a better position to help their children make appropriate employment decisions. Once their children are employed, parents should communicate regularly with them about the work they are doing. Whenever parents have concerns about safety and health protection and safety training, they should contact an area OSHA office for information.

#### REFERENCES

1. Code of Federal Regulations 2000 edition. 29CFR Parts 1926. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.
2. DOL OSHA information pertaining to fall protection is available at <http://www.osha.gov>
3. NIOSH [1989]. NIOSH alert: request for assistance in preventing worker deaths and injuries from falls through skylights and roof openings. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 90-100. Also available on NIOSH website at <http://www.cdc.gov/niosh/90-100.html>
4. NIOSH [2000]. Worker deaths from falls. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2000-116. Also see at the NIOSH website at <http://www.cdc.gov/niosh/00-116pd.html>
5. DOL ESA information pertaining to child labor is available at [http://www.dol.gov/dol/esa/public/whd\\_org.htm](http://www.dol.gov/dol/esa/public/whd_org.htm)
6. DOL [2001]. Child Labor Requirements in Nonagricultural Occupations Under the Fair Labor Standards Act, U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, WH-1330, revised March, 2001.
7. Information on voluntary load bearing specifications for plastic skylight domes can be found in American Architectural Manufacturer's Association Standard 1600 and is available for purchase at <http://global.ihs.com>.
8. National Research Council, et al. [1998]. Protecting youth at work: health, safety, and development of working adolescents and children in the United States. Washington, DC: National Academy Press.

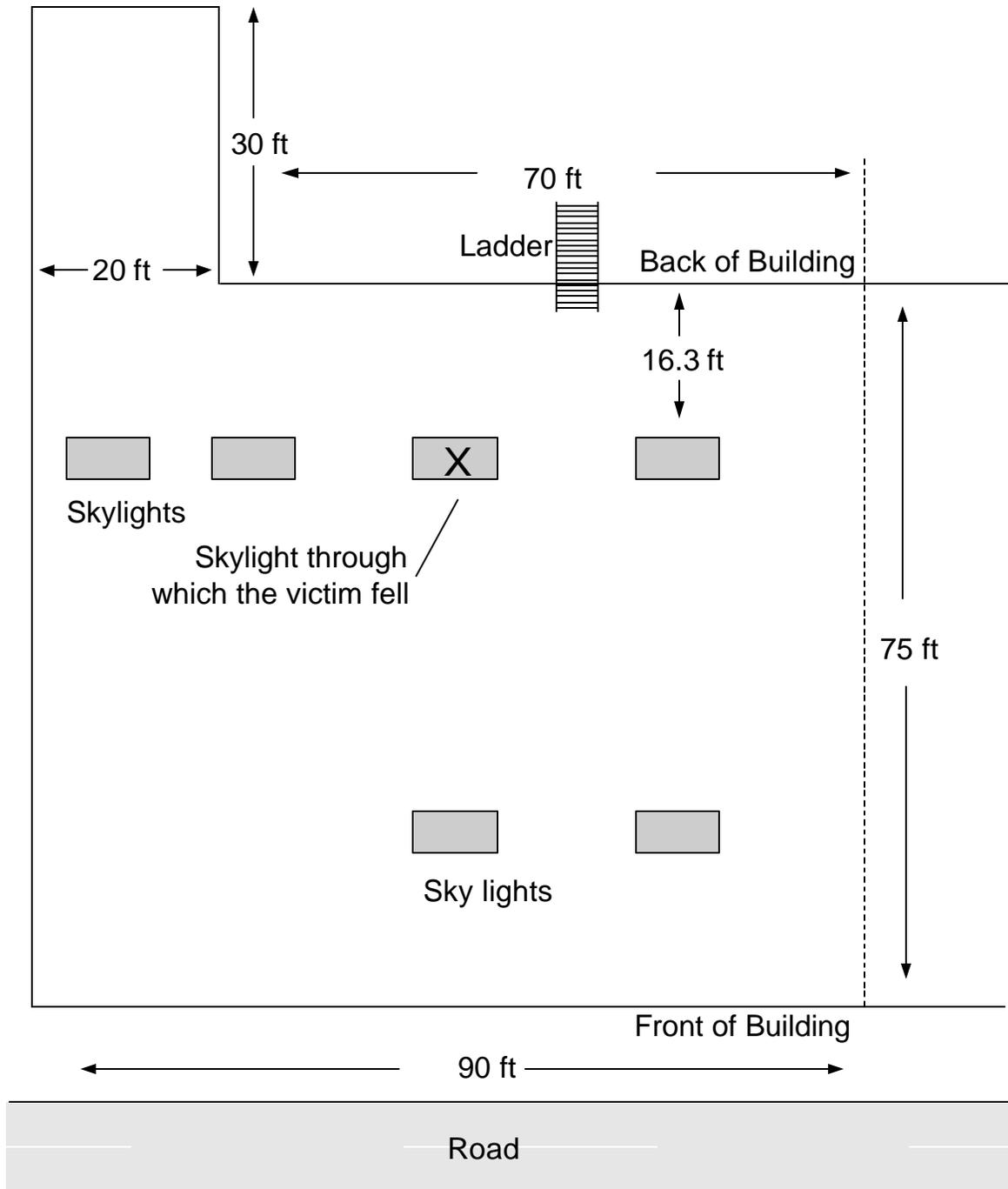


9. Work Safe this Summer: Employers Guide to Teen Worker Safety. Available at <http://www.dol.gov/opa/summer/employer.htm>

10. NIOSH [1995]. NIOSH Alert: preventing deaths and injuries of adolescent workers. Cincinnati, OH: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS, Publication No. 95-125. Also see at the NIOSH website at <http://www.cdc.gov/niosh/childlab.html>.

#### **INVESTIGATOR INFORMATION**

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**Figure 1:** Figure illustrates the layout of the skylights on the L-shaped roof over the florist shop. An X is placed on the skylight through which the youth fell.



**Photograph 1:** Photo illustrates the skylight through which the victim fell. The skylight was removed from its original location on the roof before this photograph was taken.



**Photograph 2:** Photo illustrates the placement of five of the six skylights on the roof. The photograph was taken several days after the incident and the skylights had been covered with plywood.



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