# McLaughlin Erectors, Inc.

## Skylight Survey

# Westfield Mall

Chesterfield, MO

05/26/05

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# Appendices




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SINCE 1986

Consultants on skylight repairs and solar heat reduction

# I. General Information

Date Survey Conducted: 05/22/05

Property owner: Westfield

Mall Information: Westfield Shoppingtown
291 Chesterfield Mall
Chesterfield, MO 63017
Phone: (636) 532-4004
fax. (636) 532-9728

Gen. Manager: Brent Wise
bwise@westfield.com

Operations Dir: Rich Zagorski
rzagorski@westfield.com

Original Installation: 1976

Year Last Renovation: 1999

# II. Observations and Concerns

The existing skylights consist of four (4) principle types. Curb mounted plexiglass octagons, curb mounted plexiglass low rise barrel vaults, curb mounted double plexiglass barrels, and curb mounted laminated glass octagons. There is a considerable amount of concern for several of these units, and the problems need to be addressed in order for your center to become water tight and prevent further leaks and water damage.

**Plexiglass Octagons:** There are 31 octagonal pyramid units glazed with single, 1/4" bronze plex. These units have reached the end of their useful service life. The plex is old and is sagging. The pressure cap gaskets have failed - warranting numerous caulking repairs. Some leaks are large enough as to require duct tape to slow leaking (see photos). The wood curbs are in good shape with slight water damage. There are typical problems with the existing old octagons. These problems include the plex falling out, skylights leaking badly, and improperly applied caulk.

Some problems that are not typical include deteriorated lexan that was installed upside down with the UV on the inside of the system causing fogging (see photos). Some skylights have loose gutter screws as well. The pressure caps on the hips of the old octagonal pyramids are not extruded aluminum. They are flat, then formed and therefore do not hold their shape and will eventually lose the pressure necessary to hold and keep a watertight seal.

There are two (2) octagons that are of newer design manufactured by Naturalite. The plex on these systems is crazing. The gaskets have failed and many improper repairs exist. There are unsealed seams in the gutters with loose bolts in the gutters and some of the fasteners are rusted.

**Single Glazed Barrel Vaults:** These units are single glazed, 1/4" plexiglass vault systems. There are eighteen (18) units of various lengths. Given their age, signs of deterioration are visible. All, with the exception of two newer plexiglass units, have an insufficient pressure cap design causing gasket failure (see photos). The plex is crazed and several have holes or are broken. The frames and flashing are structurally unsound (see photos). The two newer units are in fair condition with the skylight slightly bowed on ones side at the curb.

**Double Plex Barrels:** These units are double glazed, 1/4" bronze plex and are in good condition.

**Laminated Glass Octagons:** These units are 1 1/8" insulated glass and are in good condition.

# III. Conclusions

The original skylights are almost 30 years old. There are consistent with that of a low end commercial quality and typical for the application for which they have been used. Acrylics are produced using petroleum distillate which causes the material to eventually dry out. The resulting *crazing* (a series of small cracks which develops in the surface of the acrylic) weakens the material and will eventually develop into full fledged cracks due to stresses caused by their mal expansion and contraction of the acrylic. The sagging of the plex occurs when acrylic is installed flat or on a low slope.

**31 Plexiglass Octagonal Pyramids:** There are 29 plex octagonal pyramids that need to be replaced. The frames are not of a sufficient design to allow for re-glazing. The gutter systems are of poor design and are not allowing the proper weeping of the system. The two naturalite octagonal pyramids **(31, 32)** need to be re-glazed. The sills can be renovated and flashing correctly installed to allow proper weepage and prevent any further damage to the curbs and sheetrock inside.

**18 Single Plex Barrel Vaults:** There are 16 barrel vaults that need to be replaced. These types of units are no longer manufactured and are vastly inferior compared to newer designs. The curbs are in good shape with minimal water damage. The 2 newer barrel vault units **(C)** appear structurally sound at this time and no action is needed.

**Double Plex Barrel Vaults (A, B):** These units appear to be in good condition and no action is needed.

**Laminated Glass Octagons (21-28):** These units are structurally sound and in good condition, no action is needed.

# IV. Recommendations

McLaughlin Erectors Inc. recommends the 29 plex octagonal pyramids should be replaced. We recommend new CPI units aluminum frames and Quadwall polycarbonate glazing. Another options would be to go back with a like system that would give the dame look, but would not be as thermally efficient. The alternative Wasco systems would be double glazed acrylic with a steeper pitch and a UV inhibitor used in the acrylic.

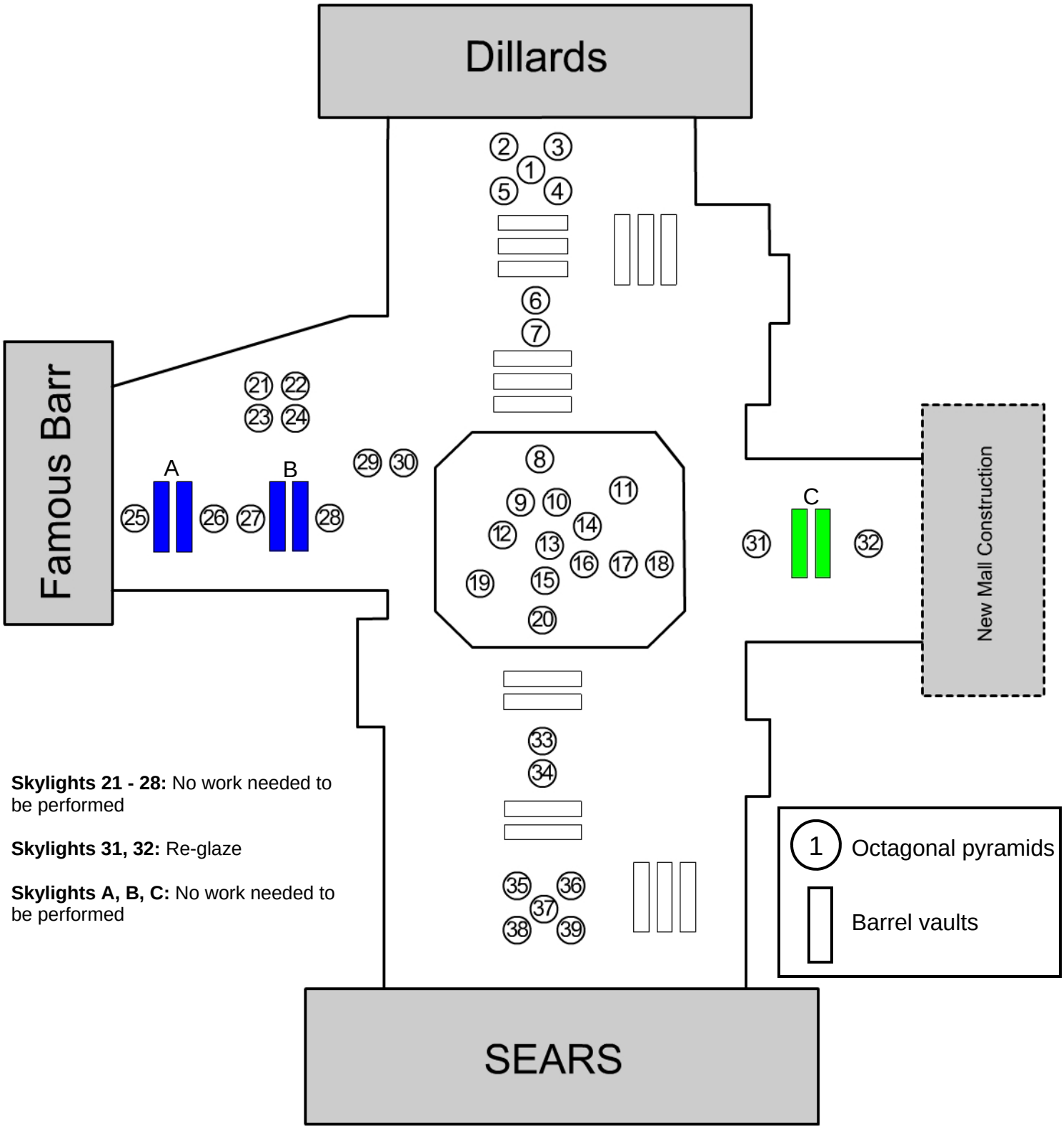
We recommend that the 2 newer design Naturalite octagonal pyramids should be re-glazed with a multi-wall polycarbonate to prevent sagging and improve thermal efficiency. Installing new gaskets and wetsealing with DOW 795 structural sealant, along with new flashing and renovating the sills.

MEI recommends removing the 16 acrylic barrel vaults and installing CPI Quad glazed vaults. This will help with energy conservation and has a ten year warranty. The 1/4" bronze acrylic has a U-value* of 0.94 and the CPI Quadwall units have a U-value of 0.24.

Another option is Wasco double glazed acrylic barrels. Again, these units would not be as thermally efficient as the CPI product.

* VALUE IS THE MEASURE OF HEAT GAIN OR LOSS THROUGH GLAZING DUE TO ENVIRONMENTAL DIFFERENCES BETWEEN THE OUTDOOR AND INDOOR TEMPERATURE. THE LOWER THE U-FACTOR, THE GREATER A WINDOW'S RESISTANCE TO HEAT FLOW AND THE BETTER ITS INSULATING VALUE. (SOURCE: NFRC)

# Appendix A

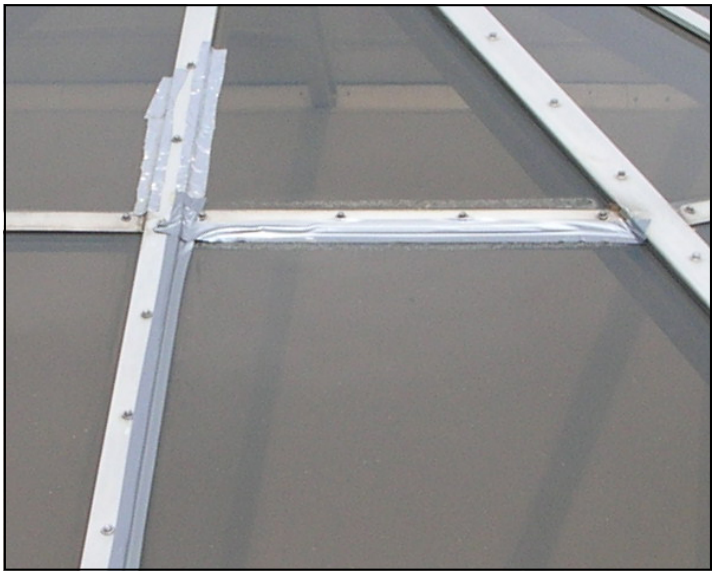



**Skylights 21 - 28:** No work needed to be performed

**Skylights 31, 32:** Re-glaze

**Skylights A, B, C:** No work needed to be performed

# Appendix B



Duct tape applied to slow leaking

Installed properly vs. Upside down (fogging)

Improperly formed pressure caps on hip.
Not extruded aluminum.

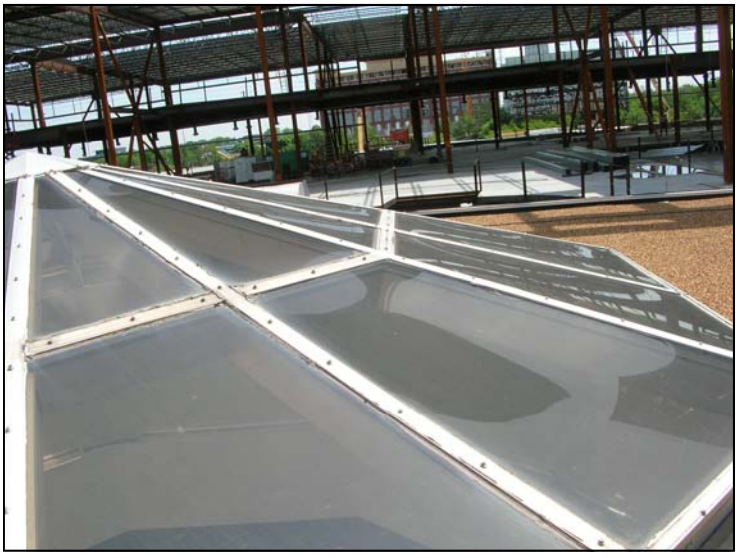
Old repairs - improperly applied caulk and roof tar on flashing.

Gasket failure with improper fix

Frame and flashing failing

Broken piece of plex and failed gasket

Sheetrock damage caused from leaks



Sagging Plex

Heat distortion