

Total Building Envelope Management SolutionSM

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MEMO FROM THE PRESIDENT

It is extremely important to be aware of the "consequences of neglect" as it pertains to your buildings. Once a project is completed, there must be ongoing inspection and maintenance performed to ensure that everything continues to meet specifications.

The advanced degradation of property can include extended damage to the interior of buildings and increased distress and deterioration of the exterior components. The current degradation of the facilities will advance at an alarming rate if the existing conditions are not addressed.

Until the properly recommended restoration procedures are performed, extensive maintenance repairs will be required in order to maintain the exterior facades. These repairs are likely to be short lived, requiring constant attention and repetition.

As the ingress of moisture continues through the building envelope, the probability of mold and fungi infestation will increase, causing indoor air quality issues which may lead to sick building syndrome, as well as legal and litigation considerations. In addition, these degradations could cause potential pedestrian and occupant safety issues, such as potential slip and fall conditions or falling debris.

Continued deterioration and corrosion has an adverse effect on the overall structural integrity, in addition to the aesthetics of the buildings.

Finally, as leaking conditions continue to disrupt areas and access to building entry locations, manufacturing and operations may also be hampered. It is best to take care of these conditions before they become major problems with some simple preventative maintenance.



Jeffrey L. Brittan
President & CEO

Campus-Wide Asset Management Programs

Project Profile - Corporate/ Manufacturing

Kraft Foods - Post Division

<u>Location:</u>	Battle Creek, Michigan
<u>Profile:</u>	20 Buildings in the Complex
<u>Project:</u>	Building Envelope Program - Evaluation & Long-Range Plan
<u>Procedures:</u>	Building Envelope Evaluation, DMS Implementation, DMS IT Task Management, Development of a Long-Range Plan



Kraft Foods - Post Division in Battle Creek, Michigan is the manufacturer of approximately 60 percent of all Post brand cereals in the United States. The Battle Creek building complex includes several dozen buildings and silos. Due to its coming of age, the buildings were in varying degrees of deterioration and Kraft needed an effective way to budget repairs and maintenance to building facades.

StructureTec was contacted to perform a full evaluation of the building conditions in the complex and organize its findings in an easy-to-use and manageable fashion. This project consisted of a building facade survey of 20 masonry build-

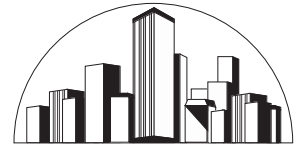


Overview of Kraft - Post Division Complex

ings, as well as concrete grain silos and other structural systems. Along with this, StructureTec helped Kraft prioritize repairs and prepared cost estimates for recommended repairs. A long range asset management program was developed.

One of the major problems de-

Continued on page 2...



Kraft Foods - Post Division Project Profile Continued...



Masonry wall facades dominated the structures of the complex.

noted when the evaluation was completed was the widespread deterioration of maintenance-type items such as sealants. Also noted was a severe deterioration of masonry and concrete components due to the corrosion of embedded steel elements, which had experienced excessive exposure to moisture for many years.

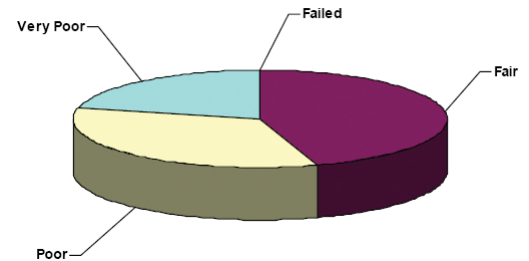
Of the many challenges of conducting a large-scale project such as this, StructureTec had to determine a way to evaluate many dif-

ferent buildings in a short period of time with varying wall components. To make the task more difficult, most of the original drawings were never updated when alterations or additions were completed.

To combat the challenge of the widespread campus, StructureTec formed multiple crews so they could canvas the entire area. A complete facade survey of all buildings was completed, which allowed Kraft to see the current state of its facilities.

A comprehensive report was prepared for Post from the information gathered during the evaluation, which included a summary of building components, conditions and recommendations, existing condition photos, building elevation drawings showing components and conditions, and prioritized budgetary cost estimates. Also, each building was rated with a Wall Condition Index (WCI) to compare the relative condition of each building. The budgets also factored in the deterioration of buildings over time, and the increased costs that would be incurred if the projects were delayed for a few years.

As a result, Kraft Foods - Post



Kraft - Post Division Wall Condition Index

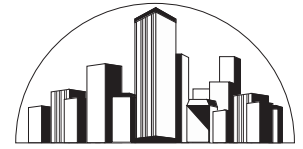
Division has a complete assessment of 20 buildings and silos on its complex. With individual comprehensive cost estimates for each building and a comprehensive cost estimate summary for the campus, incorporating separate budgets for



Concrete silos scattered the complex

short, mid-range, and long-term repairs, Kraft can plan capitol spending for facade repairs to prevent continued and additional deterioration. Kraft Foods - Post Division can use all these findings to help manage its buildings through time and personnel changes, as this information has become part of the infrastructure of their long range asset management program. Its greatest return on investment will be seen when this same data can be used several years from now as a benchmark of its building conditions.

FEATURES	BENEFITS
Develop a Weatherproofing Condition Index (WCI) rating.	Prioritized inventory of all facility assets.
Prioritization which encompasses all building envelope components.	Establish budgets for future work in chronological order.
Delineates which building envelope components require restoration and which require maintenance.	Able to allocate their resources properly, maximizing the return on investment



Project Profile - Health Sector

Spectrum Health - Blodgett Campus

<u>Location:</u>	Grand Rapids, Michigan
<u>Profile:</u>	Hospital Campus
<u>Project:</u>	Building Envelope Program - Evaluation & Long-Range Plan
<u>Procedures:</u>	Building Envelope Evaluation, Roof Evaluation, DMS Implementation, DMS IT Task Management, and Development of a Long-Range Plan

Spectrum Health, the largest healthcare provider in Southwest Michigan and the largest employer in Grand Rapids, needed an assessment of their Blodgett Campus, the oldest of their nine campuses. With a growing patient influx, Spectrum Health wanted to develop a maintenance and restoration plan that would revitalize this historical campus. Although Spectrum Health had used different architectural/engineering firms in the past, they wanted a specialist to perform this very specific building envelope assessment. StructureTec was contracted to perform an extensive evaluation of all of the buildings. StructureTec's systematic approach, comprehensive program, and industry expertise were desirable characteristics that Spectrum Health wanted as a part of their program. StructureTec faced several major challenges at the outset of the project. With buildings ranging from 1910's

construction through to the 1970's, the vast differences in construction methods and materials posed the first challenge. StructureTec was also faced with a very short deadline as Spectrum Health required this information for their annual budget submittal. With organization, a systematic approach, and a detailed program, StructureTec was able to overcome these challenges. An additional challenge arose because of the sparse documentation regarding all the aspects of the original construction. StructureTec conducted additional testing and research to better identify all the aspects of these unknown components. All the components on each building were entered into the building envelope management program individually, then evaluated and rated. When this was complete, the program was able to establish a picture of the campus as a whole. More research was then conducted to

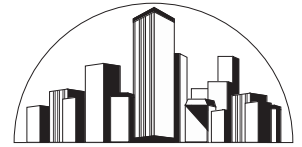


Overview of the 1976 building.

determine what current construction technology could be implemented to restore these older buildings. At the completion of this process, StructureTec was able to establish realistic budgets for completing the restoration of the entire campus. StructureTec then conferred with the client to establish priorities and determine their long-term objectives. From these priorities and objectives, StructureTec assembled a detailed, long-range budget plan for restoring the facilities. This information was then submitted by the facilities department as part of their annual budget. In conclusion, Spectrum Health now had a very clear understanding of their Blodgett Campus building envelope assets, as well as a feasible, accurate, long-range plan on how to restore these facilities and achieve the greatest return on investment.



The spalling of the terra cotta on the balcony was caused by the rusting of the embedded steel, as well as extensive freeze/thaw cycles.



Project Profile - Higher Education Sector

Lansing Community College - Main Campus

<u>Location:</u>	Lansing, Michigan
<u>Profile:</u>	25 Buildings
<u>Project:</u>	Building Envelope Program - Evaluation & Long-Range Plan
<u>Procedures:</u>	Roof Evaluation, Wall Evaluation, DMS Implementation, DMS IT Task Management, Development of Five-Year Long-Range Program

Lansing Community College (LCC), a school that serves the learning needs of a changing community, needed an accurate inventory of the facility assets they have, as well as how best to prioritize and maintain them. Historically, they had not had a formal plan of action and now required a long-range program to provide proper support documentation in order to receive government grants. They were experiencing roof problems as well as profuse leakage through foundation walls, degraded masonry, and window systems. One of the challenges LCC faced was that they wanted a firm to be able to handle all aspects of their exterior envelope problems. Data Management Services provided LCC with an effective and economical means of surveying both their large roof areas and their multiple building structures. Most of LCC's building envelope information was outdated, and DMS provided a

detailed, updated evaluation of their assets. LCC was even able to include off-campus buildings, in particular their buildings located at the airport.

LCC utilizes a database which incorporates their budgets for all aspects of their operations. DMS allowed LCC to network and incorporate the roofing and building envelope budgets into this existing program. With the benefit of accurate budgets and a prioritized plan, LCC was able to create a five-year program that will safeguard and enhance their facility assets through capital projects and maintenance. DMS's preventative maintenance schedule illustrated for LCC the cost effectiveness and



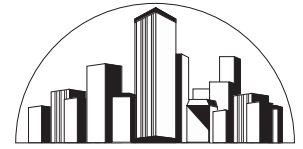
Overview of the Arts & Sciences Building

benefits that repair and maintenance will offer in extending roof and building envelope life. With this expanded program, LCC has been able to plan preventative maintenance procedures, as well as bid their capital projects early and reduce the cost of remediation. DMS also helped improve LCC's capital projects by providing LCC with a contractor rating system. The rating information, generated by project managers involved in many previous projects, has provided LCC with legitimate reasons for selecting quality contractors, rather than being forced to simply use the lowest bidder. This is an essential tool for LCC, which is a public sector institution. Once projects are completed, the information is incorporated into LCC's program and provides a permanent record of data. In conclusion, LCC has been able to prioritize, budget, plan ahead, and be prepared for the many challenges faced when dealing with roof and building envelope remedial programs.



Overview of Campus





Brick Appearance- A Face Only a Manufacturer Could Love

Eric J. Seaverson, P.E.

As the title implies, beauty is in the eye of the beholder. Because of disconcerting trends in the brick industry, visual defects are becoming more and more commonplace.

As used in this document, “face crack” refers to the cracks in the brick face, typically in the middle third of the length, which extend from bed face to bed face. Face cracking in this document does not refer to isolated cracking and desired architectural features.

Recently, we have been involved with several projects regarding face cracking and warpage of brick. Typically, a building owner or architect contacts us to evaluate face-cracked or warped brick that has been delivered, or in some cases, already installed. They explain that the brick are visually unacceptable and have concerns with durability issues. Similarly, building owners are also worried that visibly warped brick will give an awkward appearance from the warpage and non-uniform lines during installation. In most cases, durability is not an issue, and all that can be done is to tell them that the brick meets the ASTM specification and unfortunately nothing can be done. This typically aggravates the client; they state that face-cracked or warped brick is not what they approved.

In response to the client’s disapproval, the manufacturer of the brick typically issues a letter stating a cause for the face cracking and that the durability of the brick is not compromised. Although the manufacturers are typically correct stating that durability is not compromised, each manufacturer states a completely different, and typically unclear, cause of the face cracking. Furthermore, each letter always takes the stance that, as stated in a recent letter from one of the larger US brick manufacturers, “Millions of face cracked brick are manufactured on an annual basis and meet the ASTM standards”.

Similarly, warped brick raise similar concerns. First of all, brick off the pallet can be visibly warped, yet pass the ASTM standard. Secondly, warped brick are difficult to install

because of required vertical tolerances on sight lines. Lastly, once installed, the warped brick cast non-uniform shadow lines. Between the brick being visibly warped and non-uniform shadow lines, the appearance of the wall is detracted. Again, manufacturers stand behind the



ASTM standards.

As identified by many sources, including an article by The National Brick Research Center in Clemson, South Carolina, face cracking is a defect formed during the manufacturing process. Similarly, warpage is also caused during the manufacturing process. Face cracking and warpage are typically caused from drying and/or firing too quickly or slowly, non-uniform heating and cooling during drying and firing, poor particle size distributions, or initial moisture contents. Additionally, many of these sources continually present corrective actions to prevent such defects. It is apparent that both of these issues can be corrected during the manufacturing process, and should not be accepted.

ASTM C216 sets forth acceptable limits and tolerances for appearance issues such as cracking, chippage, size, and warpage. Why are face-cracked and other common defected brick deemed “acceptable”? What makes the specified limits reasonable? Why is one-eighth inch differential acceptable for an eight to twelve inch long type FBS brick? Have you ever seen a brick just below this limit? Have you ever seen the shadow lines from installed warped brick? What about face cracks?

What makes visibility from 20 feet acceptable?

As stated above, manufacturers stand on the point that millions of face-cracked and warped brick are produced each year and acceptable by ASTM standards. Our response is that if face cracking is so common, why do we never see face-cracked or warped brick on a manufacturer’s sample panel/board or a distributor’s showroom panel? Owners, architects, and engineers typically select the brick type from these sample panels.

Our general response to these problems is that face cracking and visible warpage is unacceptable. Face cracked brick should not be permitted by the standards, and acceptable/reasonable tolerances should be reduced for warpage; I propose that “reasonable” warpage may be 50% of the current specified limits. Corrective measures, such as varying particle size degradations, slowing drying/firing cycles, etc., can be taken by the manufacturers during the manufacturing process to prevent face-cracking and minimize warpage. ASTM specifications should not allow face-cracked or visibly warped brick, and contractors should cull all brick that are face-cracked and visibly warped. These brick should be replaced by the manufacturer at no additional cost to the project.

While the current standards are still in-place, specifiers should add statements such as, “brick shall have no face cracks,” to the project specifications, and require that job-site mock-up panels are built, accepting no face-cracked brick. Additionally, specifiers should reduce the allowable tolerances to reasonable limits.

By including additional requirements addressing face-cracking and warpage in the project specifications, hence altering the current ASTM requirements, building owners and architects can ensure that a completed brick masonry wall will meet their aesthetic appearance requirements.



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Building Envelope Symposium



Who Should Attend

Facility Managers,
Engineers, Building
Owners, Physical Plant
Administrators, Director of
Facilities, Maintenance
Directors, and CFOs

Seminar Topics

- Building Envelope/Restoration
- Roof Asset Management Program
- Sick Building Syndrome
- Construction Documents
- Engineered Management Systems
- Infrared Technology and Your Roof
- Facilities Management
- Design/Build in Building Envelope Restoration



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