SUMMER 2020 CHAMBERLIN Roofing & Waterproofing NEWSLETTER

High School Leak-Free for First Time in Decades

Heights High School in Houston, Texas, is leak-free for the first time in 20 years thanks to Chamberlin.

Heights High School, formerly John H. Reagan, in Houston, Texas, is home to 165 staff members serving 3,000 students in grades nine through twelve and is part of the Houston Independent School District (HISD).

This Magnet School of Computer Technology is one of three in HISD to offer an exclusive program that encourages creative, critical and reflective thinking while promoting skills for communication, intercultural understanding and global engagement. In addition to 20 Advanced Placement (AP) courses, this program helps prepare future leaders for further education and the workforce. The students receive hands-on training in one of four specialized academies to prepare them for careers in those fields.

For over 20 years, the basement, housing an ROTC classroom in the upper half and a mechanical space in the lower half, suffered severe water infiltration issues due to unknown causes. Chamberlin was employed to put a stop to the leaks and seal the basement watertight. The values and creed the ROTC program teaches its cadets prepare them for college and their future career. Without adequate classroom space, their learning environment was challenging, making these renovations extremely important to the growth and future of the Houston area.

BEST IN CLASS SAFETY

The basement area was still in full use during the renovations, and the protection of not only the

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CONSULTANT'S CORNER:

Amir Hassan, M.Sc., P.Eng., P.E.
Building Science Manager
EXP

Parking Deck Systems

It's hard to imagine any urban setting without parking garages. Given the limited availability of usable areas in busy cities, parking structures efficiently provide stalls for vehicles in airports, train stations, bus stations, commercial buildings, hospitals, and malls. Those structures are commonly built using cast-in-place, precast concrete, post-tensioned concrete, structural steel, even engineered lumber, or a combination of these systems. Structural parking decks consist typically of

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crew members but also students and teachers was a primary focus. During the school year, the crew could not work on the interior sections of the building since classes were still in session. They even had to limit noise while summer courses were in session. Chamberlin adjusted their schedule to work around school hours.

Keeping students on the busy campus out of construction zones and away from tools and machinery was a challenge in itself. Directional signage, fencing and locks were used to reroute students and faculty.

All equipment was inspected daily by a competent person before use. Personal protective equipment was worn at all times. Daily Job Hazard Analyses were completed, and weekly toolbox talks were held for the crew covering pertinent safety topics and reinforcing Chamberlin's safety policies and procedures.

A+ APPROACH

Once on the job, Chamberlin discovered excessive water underground around the building reaching the top of the water table which was three to ten feet deep. The water table separates the groundwater zone that lies below it from the capillary fringe that lies above it. It was unclear where the water was coming from, though it was clear this was the source of the water infiltration problems that had plagued the basement for years. Chamberlin was to install French drains around the school, apply positive side waterproofing to the exterior of the basement and perform a comprehensive urethane curtain grout injection from the interior side of the basement where excavation was not possible. A temporary dewatering system was installed to control the elevated levels of ground water and facilitate the waterproofing scope.

SURPRISE POP QUIZ

The building is over 100 years old and, during construction, the crew discovered gas lines and underground structures on the north side of the building that were not on the drawings they had received. With these gas lines, it was no longer safe to excavate that side of the building. An additional challenge was the unstable soil that would not allow H-piles to be installed deeply enough to safely secure a sheet pile shoring system to protect the excavation site. This

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Chemical grout injection was applied to basement walls and slabs.

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reinforced concrete slabs over precast supporting units. The slabs' initial slopes and their structural deflections are important to direct the water toward the drains as per the water management plan.

Parking decks are costly to build, repair and replace. To have a durable deck, water management is vital. Designing, installing and then testing waterproofing systems are the keys to divert water away from the structural elements. Water is the major cause of concrete deterioration and steel rusting. The waterproofing layer can be placed on the top of the deck system where it's easy to inspect and repair; however, the layer is not protected from pedestrian and vehicular traffics. Therefore, the preferable approach in parking garages is to use protected waterproofing membrane. As the name implies, the membrane will be protected from the traffic, and that will extend the service life of the deck. Nonetheless, the limited accessibility will make the assembly hard and expensive to maintain. Loose-laid membrane can be applied; however, the most common application of deck membrane is full adhesion.

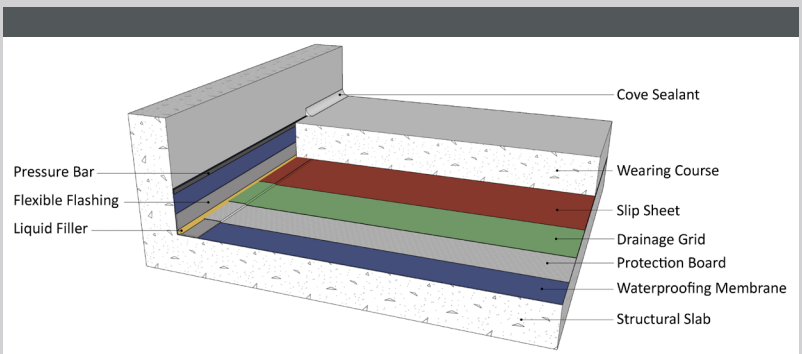

Figure 1: Typical parking deck system

The adhered system can be achieved by cold, hot, or sheet applications. With some challenges with maintaining thicknesses and quality of the installed membrane using cold and hot applications, rolling out premanufactured rubberized-asphalt membrane is the most common application. The sheet membrane has many joints that may leak if

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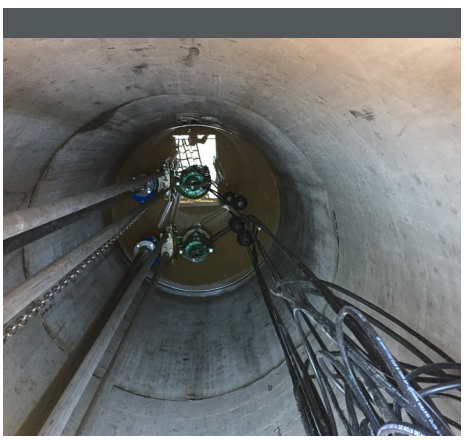
prevented the installation of positive side waterproofing and the French drain that was planned on that side of the building. Instead, the chemical grout injection was performed from the interior side of the wall.

BLUE SKIES AHEAD

In the ROTC portion of the basement, two catch basin sump pumps were installed to pump any rising ground water out of the finished ROTC classroom into the storm sump pit lift station installed into the ground in the lower level of the basement. An exterior lift station was also installed to service the French drain system.



An exterior lift station was built to eject water from the French drain system.

Chamberlin arrived to find bare stud frames and exposed conduit due to years of water damage to the drywall in the ROTC classroom.

Water damage had led to the bottom portion of drywall around the classroom being removed, exposing bare stud frames and electrical conduit. The next step was replacing this interior drywall and finishes. Finally, a permanent dewatering system was recommended for the school since the scope on the north side of the building could not be completed per the original design due to the unforeseen conditions. It took about eight months to develop this system, and it was installed in the summer of 2019.

Chamberlin's attention to detail and expertise gained from decades of roofing and waterproofing experience helped them deliver high-quality installations for this high school. The Heights High School project was a success, and the school is leak-free for the first time in more than 20 years. ■

A permanent dewatering system was designed to drain below grade water to the city storm system.

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they are not sealed tightly. Creating a continuous plane throughout the deck - especially around penetrations - is essential for water-tightness. Flashing and pressure bars are used to maintain membrane continuity at terminations. Cracks plus expansion and construction joints in decks require special attention and consideration. The structural behavior of the floor slab, including deflection values and locations, affects the performance of the waterproofing system.

The typical parking deck comprises a waterproofing membrane adhered onto the top of the structural slab, drainage grid and wearing course (Figure 1). This assembly works like a rain-screen exterior wall as most of the water trenches over the wearing surface while some water, which finds its way onto the waterproofing membrane, would move towards drains through the drainage grid. Therefore, the topping acts as a membrane protector and water shedding layer – just like siding on walls. Other layers can be added, such as protection boards, insulation and slip sheets to improve the overall performance and durability.

An insulation layer within a deck assembly is crucial when it separates two spaces with a wide difference in temperature. That case can exist between a parking floor and air-conditioned/heated living space. Similarly, the lack of insulation (thermal barrier) below a plaza deck and above heated parking space in cold climate can cause condensation issues on the exposed bottom surface of the concrete deck (Photo 1). In contrast to a parking deck that separates two parking floors, a plaza deck is a supported slab that provides green-scape and tree planters in addition to pedestrian vehicle loads over an occupied space.

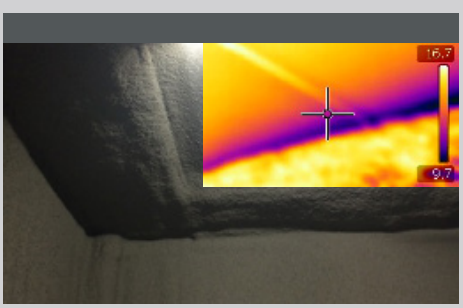

Photo 1: Closed-cell foam insulation on bottom surface of concrete slab - Inset Photo: Thermographic scan showing the cold surface in blue due to the lack of exterior insulation

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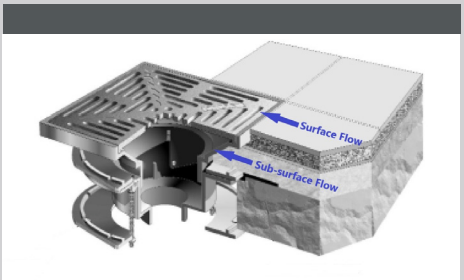

Figure 2: Two-stage drain

Unlike fully shielded buildings, parking garages are open to the elements; therefore, concrete surfaces are more prone to deterioration, such as spalling, scaling, cracking and delamination. Parking structures are also subjected to dynamic loading conditions and destructive chemical attacks from de-icing materials in addition to mechanical abrasions from cleaning and snow-removing equipment. Functional maintenance and repair programs are very important to save the structure. In general, a full comprehensive condition review must be conducted by a structural engineer with experience in concrete restoration repair and waterproofing technology every five years or when there are signs of structural and performance issues.

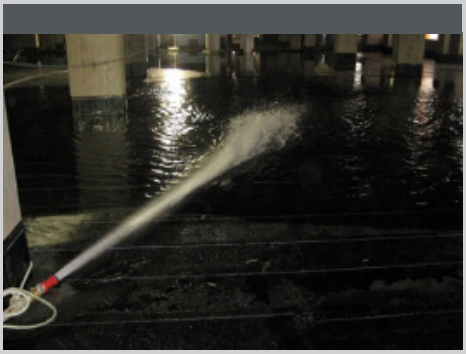

Photo 2: Flood test

Keeping water drained away from the deck will increase its service life as sitting water rapidly deteriorates the deck components, such as waterproofing membrane and concrete slab. Also, water within the assembly causes extra damage by posing freezing and thawing cycles in cold climates. Maintaining a minimum slope of 2% at the topping (for surface flow) and at deck slab (for sub-surface flow) is essential to direct water towards the highly recommended double-tiered drains (Figure 2). Considerations should be given to the effects of structural deflections and building settlements on the magnitudes of slope.

The installation quality of waterproofing membrane is as important as the selection and design of the waterproofing system, as the integrity and continuity of the membrane are paramount to the performance and durability of parking deck systems. Hiring a third-party reviewer to inspect installation and test the system can be very beneficial – especially before adding additional layers and the wearing course. Visual reviews, as part of the quality control program, should be conducted frequently. Testing can be employed as a quality assurance measure.

Flood testing using ASTM D5957-98 "Standard Guide for Flood Testing Horizontal Waterproofing Installations" is a good method to verify the continuity of waterproofing membrane (Photo 2). This test suits parking decks since they have mostly a slope of no greater than 2% (1/4" per ft.) with waterproofing membrane that can be liquid-applied, adhered or loose-laid sheets. Testing is performed for a minimum of 24 hours and maximum of 72 hours when rainfall is not expected. If a failure happens, the tested floor will be drained, and the breach will be mended; then, the retest will be performed using the same conditions. Preparation work is required including installing containment assemblies and plugging the drains with inflatable devices (Photo 3) consisting of a rubber ball, draw chain and ring, and other standard plumbing fixtures.

Photo 3: Inflatable drain plugs

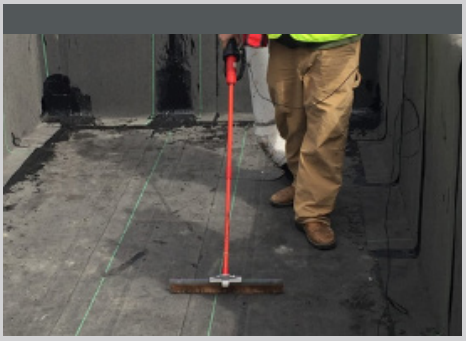

Photo 4: High-voltage ELD testing

As an alternative to flood testing, utilizing Electronic Leak Detection (ELD) to test the integrity of a waterproofing membrane can be safe, fast, accurate and economical (Photo 4). ASTM D7877-14 "Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes" describes standard procedures for using electrical-conductance-measurement methods to locate leaks in waterproof membranes. ■

To continue reading this article, visit: www.chamberlinltd.com/articles/parking-deck-systems/

Amir Hassan has more than 25 years of experience in Building Envelope and Forensic Restoration in the Middle East, Europe and North America. He has worked on very complex projects for both existing buildings (including historical and heritage buildings) and new construction. His Building Science knowledge includes work with structural glass, curtain wall design and evaluation, frameless and skylight systems, structural assessment, property condition assessment, building enclosure commissioning, roofing and waterproofing systems, weather-tightness, energy modeling, thermal performance, and thermography.

Amir has a Bachelor of Science degree in Civil Engineering and a Master of Science degree in Façade Engineering. He is a frequent speaker and author on roofing and building envelope topics. He's the current president of ABECN. Amir also holds the role of Subject Matter Expert in the field of Building Science with APEGA. He can be reached at: amir.hassan@exp.com.

Proactive Roof Maintenance Saves Money

Roof systems often do not last their expected lifespan because they are not properly maintained. If you own or manage a commercial building, you know this is one of the highest-ticket items on your property. However, you can protect your investment with semi-annual surveys and regularly scheduled maintenance. Even though a manufacturer's warranty may have been purchased with your roof when it was newly installed, documented inspections and preventative maintenance are typically needed to maintain warranty coverage.

Proper care and preventative maintenance are the best ways to extend your roof's life. A visual assessment of your roof's condition along with a detailed report of all findings helps you in more ways than one.

SAVE MONEY. Condition assessments of your roof can uncover small deficiencies that are easily repaired before they lead to larger, more costly issues.

ACCURATE BUDGETING. Roof data collected during surveys can assist with budgeting for immediate repairs, annual maintenance and future expenditures or replacement.

WARRANTY FULFILLMENT. Documented semi-annual surveys are required to meet most roofing manufacturer's requirements. Regular maintenance can also extend the life of your roof, so you get more for your money.

Our thorough and effective Proactive Roof Maintenance Program includes:

DEBRIS REMOVAL. Debris is one of the leading causes of holes and punctures on roofs. Drains, gutters, scuppers and downspouts are cleared to avoid ponding or water back up under flashings.

CONDITION ASSESSMENT. Pictures and details assessing your roof's current condition, deficiencies, repairs and its expected life cycle allow you to make informed decisions.

DETAILED REPORT. A detailed report of the survey's findings is provided to you for your records. This roof data can help you budget for immediate and future repairs or replacement.

Contact your local Chamberlin office today to get started on your own proactive roof maintenance program to protect your building's biggest asset. **www.chamberlinltd.com/all-locations** ■

Employee Profile

Jim Bookhout
Maintenance Department Manager
Roof Maintenance & Leak Repair
Dallas, Texas

Experience:
With over 30 years in the business, Jim brought considerable knowledge in the construction industry when he joined Chamberlin. Before starting his journey at Chamberlin, he spent over 20 years working for a roof coatings company.

A Day in the Life:
While there is no typical day at Chamberlin, there is a morning routine Jim follows. Every morning starts with coffee and is followed by a 45 to 60 minute drive to work during which he listens to an audio book.

Outlook:
Jim believes customer service, safety, quality installation and productivity are four critical aspects to retaining business. He thinks maintaining a trusting and strong relationship with our clients is of utmost importance since a large majority of Chamberlin's work comes from repeat business.

Outside the Office:
Jim lives on Lake Ray Hubbard so, needless to say, he spends ample time there. When not working, he spends as much time as he can fishing and sailing.

Alternate dream career:
Jim has a longtime love for sailboats and sailing. In fact, he's been racing sailboats since he was eight years old. While he competed in many national and world championships, he also made sailboat sails for five years before starting his journey in the construction world. In addition to making sails he also taught sailing lessons. If he weren't at Chamberlin, Jim would resume teaching and become a sailmaker. ■

We asked Jim to choose his favorites from this random list of things as a way to get to know him a little better:

JIM'S LIST:	
Ice Cream	Froyo
Reading	Audio Book
Dogs	Cats
Text	Phone Call
Apple	Android

PROJECTS IN PROGRESS

CHAMBERLIN
Roofing & Waterproofing

LOCATIONS:

HOUSTON
4545 Langfield Road
Houston, TX 77040
Ph. (713) 880-1432
Fax (713) 880-8255

DALLAS/FT. WORTH
2170 Diplomat Drive
Farmers Branch, TX 75234
Ph. (214) 273-9110
Fax (214) 273-9120

AUSTIN
2755 Business Park Drive
Buda, TX 78610
Ph. (512) 275-1600
Fax (512) 523-9350

SAN ANTONIO
13111 Lookout Run
San Antonio, TX 78233
Ph. (210) 822-6536
Fax (210) 822-8211

OKLAHOMA CITY
912 Messenger Lane
Moore, OK 73160
Ph. (405) 680-0506
Fax (405) 680-0508

TULSA
10828 E. Newton Street, Ste. 117
Tulsa, OK 74116
Ph. (918) 439-0055
Fax (918) 439-0067

Also licensed in Arkansas and Louisiana

New Hidalgo County Courthouse - Edinburg, TX
New Construction Waterproofing
Contract Amount: $1,150,000 (approx.)
Owner: Hidalgo County
Architect: HDR Architecture, Inc.
General Contractor: Morganti Texas, Inc.
Scope of Work: Installation of sheet waterproofing, traffic coatings, air barrier, sheet metal flashing, flexible flashing, firestopping and joint sealants
Project Description: County courthouse

Comal High School #5 - San Antonio, TX
New Construction Waterproofing
Contract Amount: $1,650,000 (approx.)
Owner: Comal Independent School District
Architect: Pfluger
General Contractor: Bartlett Cocke
Scope of Work: Installation of hot applied waterproofing, sheet waterproofing, water repellents, insulation, air barrier, sheet metal flashing, drip edge flashing, pavers and pedestals, firestopping, joint sealants, site sealants and expansion joints
Project Description: Public high school

TCU Hyatt Place - Fort Worth, TX
New Construction Roofing and Waterproofing
Contract Amount: $1,000,000 (approx.)
Owner: Campus Hotel Venture
Architect: GPF Architects
General Contractor: Jordan Foster Construction
Scope of Work: Installation of roof pavers, TPO roofing, flashing and sheet metal, counterflashing, gutters, cap wall and curb flashings
Project Description: Hotel on college campus

HCA Medical Center - Exterior Façade Repair - Houston, TX
Remedial Waterproofing
Contract Amount: $800,000 (approx.)
Owner: HCA
Architect: Perkins and Will
General Contractor: O'Donnell/Snider Construction
Scope of Work: Power washing, cut out and re-caulking of expansion joints, wet glazing of windows, tuck-pointing of mortar joints and installation of window perimeter sealants and elastomeric coating
Project Description: Hospital

Holdsworth Center - Austin, TX
New Construction Roofing
Contract Amount: $2,500,000 (approx.)
Owner: Charles Butt, Chairman of HEB
Architect: Lake|Flato Architects
General Contractor: Beck Commercial Construction, LLC
Scope of Work: Installation of hot modified roofing, wood blocking, coping, gutters and sheet metal roofing
Project Description: Leadership institute campus

Grapevine Rail Station Hotel - Grapevine, TX
New Construction Waterproofing
Contract Amount: $400,000 (approx.)
Owner: PMM Hotel Partners 2017 LP
Architect: Architexas
General Contractor: Manhattan Construction Company
Scope of Work: Installation of sheet metal flashing and trim, metal underlayments, air barrier, cementitious and reactive waterproofing, firestopping, joint sealants and expansion control
Project Description: Marriott Autograph Collection Hotel

Piedmont at River Oaks - Houston, TX
Remedial Roofing and Waterproofing
Contract Amount: $3,700,000 (approx.)
Owner: Piedmont at River Oaks HOA
General Contractor: Building Engineering Consultants, Inc.
Scope of Work: Removal of modified bitumen roofing and installation of wood blocking, hot modified roofing, TPO roofing, flashing and sheet metal, exterior rainscreen drainage composite, fluid-applied waterproofing, new three-coat stucco, window replacement, exterior elastomeric coating, balcony handrail restoration, wall flashing and joint sealants
Project Description: Condominium complex

Union Stadium East Renovations - Tulsa, OK
Remedial Waterproofing
Contract Amount: $150,000 (approx.)
Owner: Union Public Schools
Architect: Dewberry Architects
General Contractor: Crossland Construction
Scope of Work: Installation of traffic coatings, air barrier, firestopping and joint sealants
Project Description: Football stadium

The Center of Hearing and Speech - Houston, TX
New Construction Roofing
Contract Amount: $400,000 (approx.)
Owner: The Center of Hearing and Speech
Architect: Inventure Design
General Contractor: Tellepsen
Scope of Work: Installation of wood blocking, curb flashings, TPO roofing, PVC membrane roofing, flashing and sheet metal
Project Description: Full service resource for deaf children

TFC North Austin Complex - Austin, TX
New Construction Waterproofing
Contract Amount: $400,000 (approx.)
Owner: Texas Facilities Commission
Architect: STG Design
General Contractor: Vaughn Construction
Scope of Work: Installation of drainage composite, fluid-applied waterproofing, below-grade insulation, flashing and sheet metal, firestopping, joint sealants, paving sealants and expansion control
Project Description: Health services commission headquarters

For a complete list of specialty contracting services, visit www.chamberlinltd.com.

ROOFING/SHEET METAL
- Modified Bitumen/BUR
- Single ply
- Reflective coatings
- Vegetative roofing
- Metal standing seam
- Roof related sheet metal
- Tile

WATERPROOFING/CAULKING
- Joint sealants
- Membrane waterproofing
- Elastomeric wall coatings
- Traffic coatings
- Expansion joints
- Dampproofing/flashing
- Water repellents/metal flashing

BUILDING/GARAGE RESTORATION
- Concrete/Masonry restoration
- Exterior cleaning & coating
- Epoxy & grout injection
- Bearing pad replacement
- Structural repair
- Paver repair & replacement

ROOF MAINTENANCE/LEAK REPAIR
- Roofing & waterproofing expertise
- Leak repair specialists
- Preventative roof maintenance plans
- Roof & building envelope surveys
- Proactive Roof Asset Management
- On-call service 24 hours/365 days a year
- Free estimates