

1 EXECUTIVE SUMMARY

The team of Hoyle, Tanner & Associates, Inc. (Hoyle, Tanner), Freeman, French, Freeman (FFF), and Kirck Engineering has been retained by the City of Burlington to perform detailed conditions assessment with repair recommendations and budgetary considerations at the College Street Parking Garage in Burlington, VT. These recommendations include immediate, short term, mid term, and long term needs as well as long term maintenance. This report summarizes our field observations, engineering opinions, and estimated costs.

The College Street (formerly Burlington Square) parking garage is a precast prestressed concrete structure constructed with a Bay Side By Side layout using three rows of "double-tee" beams for the deck that is approximately 174' long by 252' wide. Reference Appendix B for garage floor layout plans. This 4 level structure plus partial roof was opened in 1985 and now serves as the main parking for the Hilton Hotel guests as well as many downtown businesses including Peoples United Bank and Fletcher Allen Health Care. The garage is centrally located within the downtown district midway between Church Street and the Waterfront. There are three vehicular entrances to the garage; the first floor entrance under the Hilton Hotel from Battery Street, the second floor entrance from College Street, and the fourth floor entrance from the Lakeview Parking Garage.

In preparation of this report the following assumptions were made:

- The garage was inspected within the limits of its footprint (generally 252' x 174'). The skywalk to the hotel, walls and ceiling of the tunnel (on Level 1) below the hotel are not owned by the City and are not included in this report.
- The interior of the elevator shaft was inspected for structural and architectural considerations. The elevator and associated equipment are routinely inspected and maintained under a separate contract.

There are many issues in the College Street parking garage that require repair or replacement. Understanding the level of capital investment required for this garage, this report has attempted to categorize repairs that allows for spending to be budgeted and spread over multiple years. All of the recommendations are important to the long term integrity of this garage, if they can be coordinated and completed sooner we recommend doing so. We have also included recommendations for general housekeeping and preventive maintenance schedules. Deferred capital spending will lead to more costly, more structure-critical repairs.

During our inspection we identified the following issues that should be addressed as soon as possible:

1. Remove loose overhead concrete from spalled areas on double tee beams and inverted tee beams. Particularly prevalent on the underside of Level 2 framing this presents a hazard to pedestrians and vehicles below. (DT-8: this nomenclature is used with the report to key identified issues and is further explained in the Conditions Assessment Section of the report)
2. Repair beam bearing condition on Level 2 framing at Grid B/2. (DT-9)

3. Cover and protect exposed wiring connections (ED-1)
4. Repair surface spalls on stair treads. These present a dangerous tripping hazard. (ST-1)
5. Replace concrete pedestrian ramp on Level 4 by the Northeast stair tower. Accelerated concrete failure and voids present pedestrian hazard. (RA-1)

Almost all of the issues in this garage stem from poor drainage pitch and poor drain placement. Sealants, membranes, and concrete integrity break down faster due to ponding, delcing salts carried by vehicular traffic, and freeze/thaw cycles. Because of this it should be anticipated that garage maintenance will be more frequent and will be more costly than for a standard garage of this size and age.

Though there are many repairs and improvements necessary for this garage, much of the structure is still in serviceable condition. If repairs are completed with the recommended timeframe, future issues are quickly addressed, and a strong maintenance plan is adhered to this structure can be serviceable for another 20 to 30 years.

When considering alternatives at this garage location, recent average construction costs are at approximately \$25,000 per parking space for new parking garage facilities. So to reconstruct a new garage at this location, matching the existing 460 parking spaces would cost approximately \$11,500,000 (including engineering fees and demolitions costs).

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The team of Hoyle, Tanner & Associates, Inc. (Hoyle, Tanner), Freeman, French, Freeman (FFF), and Kirck Engineering has been retained by the City of Burlington to perform detailed conditions assessment with repair recommendations and budgetary considerations at the Lakeview Parking Garage (including the Westlake Garage public parking level) in Burlington, VT. These recommendations include short term and mid term needs as well as long term maintenance. This report summarizes our field observations, engineering opinions, and estimated costs.

The **Lakeview Parking Garage** is a steel framed structure constructed with a "Modified" Bay Side By Side layout using three rows of prestressed precast "double-tee" concrete beams for the deck that is approximately 172' long by 252' wide. (Reference Appendix B for garage floor layout plans.) The original structure, opened in 1998, consisted of 3 levels and was later expanded to 5 levels in 2006, supporting a combined total of 678 parking spaces. The garage now serves as the main parking for the Hotel Vermont guests as well as many downtown businesses including Macy's department store and Burlington Town Center. The garage is centrally located within the downtown district midway between Church Street and the Waterfront. The main entrance/exit to the garage is from Cherry Street on the second level. A driveway on the first level connects to the fourth level of the College Street garage.

The Lakeview garage is connected to the second level of the **Westlake Garage** via a driveway at the bottom of the western ramp from the first level. Access to the Westlake Garage is also provided from the Courtyard Marriott Hotel entrance on Cherry Street. Constructed in 2005, this public parking level (garage level 2) holds 59 spaces and is mainly used for Hotel staff and guests. The structure consists of elevated cast-in-place concrete slabs supported on concrete columns. The roof of this parking level supports the paved drive entrance for the Hotel as well as a landscaped garden and hotel terrace area.

In preparation of this report the following assumptions were made:

- The Lakeview garage was inspected within the limits of its footprint (generally 252' x 172'). The skywalk to the Macy's department store is not owned by the City and is not included in this report however it was noted that work is needed in this location.
- The interior of the elevator shaft was inspected for structural and architectural considerations. The elevator and associated equipment are routinely inspected and maintained under a separate contract.
- Only the public parking level of the Westlake Garage was inspected. The first level of this garage holds private parking and was not accessible during our inspection.

There are various issues in the Lakeview parking garage that require repair or replacement. The repair recommendations within this report prioritize the timeframe for the repairs to be completed as either short term or mid term to assist with preparing a plan and budget. We have also included recommendations for general housekeeping and preventive maintenance schedules.

Most of the issues in the Lakeview Garage are a result of typical wear and tear and are repairs that are required as part of routine maintenance. The repairs identified in the Westlake Garage are typically associated with the roof use above.

In general both the Lakeview and Westlake garages are in good condition; most of the repairs and improvements necessary are minor and the structures are currently in serviceable condition. If repairs are completed within the recommended timeframe and a routine maintenance plan is adhered to these structures can be serviceable for another 30 to 40 years.

Though the Westlake Garage is currently in fair condition, and has many years of serviceable life remaining, we recommend the City release ownership of this portion of the structure. With the first level being private ownership, and the Hotel's roof garden and access drive use above, the mixed systems and responsibilities will become increasingly complicated. This garage can easily be separated from the Lakeview Garage, and an entrance can be maintained from the Westlake garage to maintain overflow support. For example the majority of issues noted for this garage in this report are directly related to the Hotel roof garden and paved driveway above. Responsibility and timeframe for the completion of these repairs is not fully in the City's control.

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The team of Hoyle, Tanner & Associates, Inc. (Hoyle, Tanner), Freeman, French, Freeman (FFF), and Kirck Engineering has been retained by the City of Burlington to perform a detailed conditions assessment with repair recommendations and budgetary considerations at the Market Place Parking Garage in Burlington, VT. These recommendations include immediate, short term, mid term, and long term needs as well as long term maintenance. This report summarizes our field observations, engineering opinions, and estimated costs.

The Marketplace Garage is a "modified" double helix comprised of post tensioned cast-in-place concrete slabs and beams supported by cast-in-place concrete columns. Post Tensioning (PT) systems are typically used to reduce the structural depth of the slabs and beams to minimize the overall weight of the garage and to provide a more economical design. Each helix is 114' wide by 141' long, reference Appendix B for garage floor layout plans. This 5 level structure was opened in 1976 and serves as an important public parking facility for the Church Street Marketplace as well as other downtown destinations. There are two vehicular entrances on the first level of the garage; a south entrance from Bank Street and North entrance from Cherry Street. There is one exit from the Garage on the second level that outlets onto South Winooski Avenue. Three detached stair towers provide pedestrian access into and out of the garage. These are indicated on the original garage plans alphanumerically and labeled in the garage based on street access. They are as follows; Stair Tower A (Church Street), Stair Tower B (Cherry Street) and Stair Tower C (Bank Street). Stair Tower A houses two elevators in a single shaft in addition to stairs.

In preparation of this report the following assumptions were made:

- No record drawings are available for this garage. Therefore, the exact layout including size of the post tensioning tendons is unknown. The Design Drawings provided indicated the PT system for the slab was performance specified for the Contractor to design.
- The interior of the elevator shaft was inspected for structural and architectural considerations. The elevator and associated equipment are routinely inspected and maintained under a separate contract.

There are many issues in the Marketplace parking garage that require repair or replacement. Understanding the level of capital investment required for this garage, this report has attempted to categorize repairs that allows for spending to be budgeted and spread over multiple years. All of the recommendations are important to the long term integrity of this garage, if they can be coordinated and completed sooner we recommend doing so. We have also included recommendations for general housekeeping and preventive maintenance schedules. Deferred capital spending will lead to more costly, more structure-critical repairs.

During our inspection we identified the following issues that should be addressed as soon as possible:

1. Remove loose overhead grout patch from the underside of the construction joint at Level 1 D-E Ramp at Beam Line 4 (JS-3: this nomenclature is used with the

report to key identified issues and is further explained in the Conditions Assessment Section of the report)

2. Patch concrete spalls with exposed reinforcing steel until more permanent floor surface repairs can be completed (CS-3)
3. Cover electrical junction boxes and patch spall locations until more permanent floor surface repairs can be completed (CS-4)

The most pressing issues at this garage stem from poor quality control during the original construction of the garage. Some structural elements, including the concrete slab and columns were constructed with inadequate concrete cover over reinforcing bars and PT strands which accelerates the rate of reinforcing corrosion and concrete deterioration.

Though there are many repairs and improvements necessary for this garage, much of the structure is still in serviceable condition. If repairs are completed within the recommended timeframe, future issues are quickly addressed, and a strong maintenance plan is adhered to this structure can be serviceable for another 15 to 20 years.

When considering alternatives at this garage location, recent average construction costs are at approximately \$25,000 per parking space for new parking garage facilities. So to reconstruct a new garage at this location, matching the existing 400 parking spaces would cost approximately \$10,000,000 (including engineering fees and demolitions costs).

City of Burlington
 Parking Garage Conditions Assessment
 Budgetary Cost Estimate Summary - DRAFT

Garage	Budgetary Cost Estimates					Annual Maintenance
	IMMEDIATE	Short Term	Mid Term	Long Term		
Marketplace Garage	\$16,000	\$2,736,300	\$1,337,700	\$85,000	\$105,000	
College Street Garage	\$79,400	\$3,036,200	\$529,500	\$697,700	\$145,000	
Lakeview Garage (Including Westlake)	\$0	\$318,500	\$335,500	\$0	\$155,000	
Total Cost Per Phase	\$95,400	\$6,091,000	\$2,202,700	\$782,700	\$405,000	

Note: The above information has been provided to assist the City with 2014 Garage Repair Planning. The Garage Reports have not yet been finalized and budgetary numbers may change. Budgetary Estimates are based on our field observations, engineering experience, and anticipated scope of work. Further development of design repairs and fluctuations in construction industry costs could impact overall project costs in either direction.