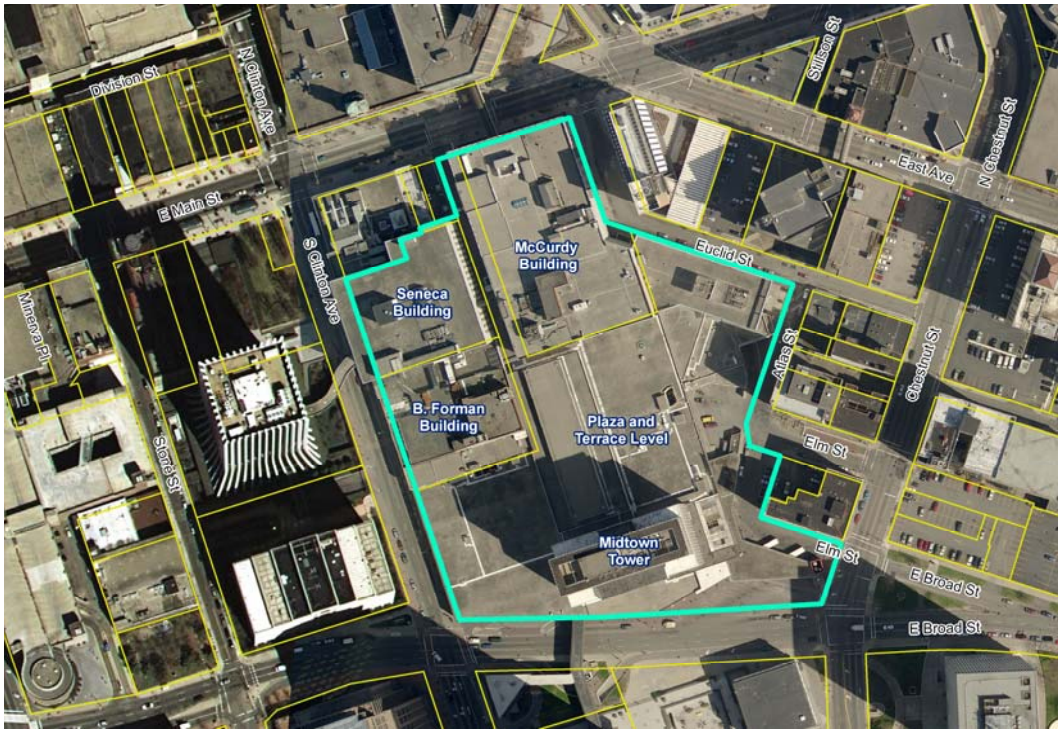
WALKER
PARKING CONSULTANTS

CONDITION APPRAISAL

MIDTOWN PARKING STRUCTURE

ROCHESTER, NEW YORK

Prepared for:
LABELLA ASSOCIATES, P.C.



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PROJECT # 11-2343.00

May, 2008

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EXECUTIVE SUMMARY

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An evaluation of the Midtown Parking Structure was performed to determine whether repair or demolition of the structure was appropriate for incorporation into the Midtown Redevelopment project, and what the relative costs of each are for comparison. Our review indicates that demolition of the Midtown parking structure, based on its present physical condition, is not warranted at this time. Our opinion of probable construction cost is significantly lower as compared to full garage removal and replacement. Although other implementation requirements and costs for the redevelopment project may dictate demolition of the parking structure, current conditions indicate that repair of the parking structure is a viable and cost-effective option.

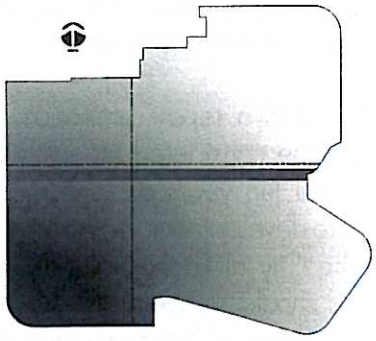
Walker Parking Consultants has developed two repair scenarios for consideration. Repair Scenario #1 should be considered for selection if the structure is repaired for an additional ten years of service life. Scenario #2 should be selected if the re-development of the site is intended to remain as a focal point as the City of Rochester continues to revitalize. Selection of repair scenarios should be weighted against other factors that effect the overall development of Midtown and the costs associated with overall project cost. It is the opinion of Walker Parking Consultants that repair Scenario #2 should be selected based on the overall perception of the Midtown Re-development.

Repair Scenario #1 addresses repair of current concrete deterioration only. Our opinion of probable construction cost for Repair Scenario #1 is $3,100,000. Repair Scenario #2 addresses current deterioration with a more aggressive concrete repair approach and also includes repair and maintenance of waterproofing systems (to reduce the rate of continued deterioration) and replacement of the lighting, sprinkler and fire alarm systems in the garage. Our opinion of probable construction cost for Repair Scenario #2 is $11,300,000.

The two repair scenario costs can be compared against full slab replacement (saving other structural elements such as columns, foundations and retaining walls) which could range from $20-$22 million and full garage replacement which could range from $60-$80 million dollars (Note these two replacement costs are only intended for comparison on a conceptual level and do not account for project specific conditions). These cost ranges are specific to underground garage construction based on Walker Parking Consultants extensive experience where more extensive mechanical and electrical systems are required as compared to an open air above ground garage.

In order of extent and severity, the most significant deterioration in the facility occurs:

- East-west drive lanes on each supported floor
- South-west quadrant
- North-west quadrant
- South-east quadrant
- North-east quadrant



GRAPHICAL REPRESENTATION OF DETERIORATION. DARKER AREAS INDICATE GREATER DETERIORATION IN THE STRUCTURE

Identification of the areas that have the most extensive deterioration may be useful in aiding the possible location of PayTech Corporations Headquarters Building.

The limited deterioration found in the facility is attributed to the extensive repairs completed during the mid 1980's, including strip and full depth patches, traffic topping installation, and maintenance that has been performed since garage construction. These repairs appear to have slowed the rate of deterioration throughout the parking facility. Although repairs and maintenance have been performed on the structure, deterioration is expected to continue, and current deterioration should be repaired. Materials testing results indicated the concrete is of high strength and has low chlorides which will maximize the useful life of the facility.

Andrew J. Vidor 5/5/08

Andrew J. Vidor, E.I.T. Date

Russell F. Thurston 5-5-08

Russell F. Thurston, P.E. Date

INTRODUCTION

INTRODUCTION

OBJECTIVE

The City of Rochester, Rochester Economic Development Department and Empire State Development have identified the area known as Midtown for significant redevelopment. The project will be completed in two phases. The first phase has identified the site for the new corporate world headquarters of PAETEC Corporation. Phase two of the redevelopment in Midtown has not been specifically determined; however, it is anticipated to begin once the new PAETEC tower is occupied in 2011. Parking re-development plans will be addressed as a separate document not included in this report.

An important part of the re-development process is to determine the existing condition of the parking structure and associated costs to repair deterioration. Note: Consideration to demolition or modification of the parking structure due to the construction of PAETEC Corporation's New World Headquarters is not included as part of this report. This report provides the project stakeholders with information necessary to make informed decisions relevant to the future use of the parking facility.

FACILITY DESCRIPTION

The site known as Midtown currently includes a twelve story office tower, a two story building, the countries first indoor shopping mall, a plaza area encompassing these buildings, and an underground parking garage extending under the entire complex and a portion of Broad Street.

The parking structure was constructed in 1960 and is an integral part of the existing surrounding infrastructure. The parking structure is three levels below grade and contains 1,844 vehicle spaces. The structure consists of two supported cast-in-place conventionally reinforced concrete slabs framed by concrete walls, and columns. The third below grade level is an asphalt-topped concrete slab-on-grade. The structure is divided into four quadrants separated by expansion joints.

Vehicle entry/exits are located off Broad Street, Chestnut Street, Court Street and Clinton Street and are controlled by parking access and revenue control equipment. Stair towers are located around the perimeter of the structure for emergency use only. An elevator tower and escalators are located in the center of the garage and provide

access to the main level of the indoor mall and the twelve story office tower.

The facility is lit using fixtures with high pressure sodium fixtures. A ventilation, standpipe and fire suppression systems are located throughout the facility. A security system is installed throughout the structure and is monitored in the parking and security office located on Level A.

PREVIOUS REPAIRS

Various repairs have been performed in the parking garage since it was constructed in 1960, including:

- Concrete repairs
- Waterproofing installation and repairs
- Mechanical, electrical and plumbing repairs and system replacements
- System modernizations

In the mid 1980's, extensive concrete floor repairs were performed on Levels A and B, curbs were removed and full depth floor areas were replaced at mid-span of the parking stall areas. Concrete was removed and replaced partial depth in some areas of the drive lanes. An original asphaltic membrane and coating was removed from most of the supported floor slab area and replaced with a urethane traffic topping membrane system.

The last major structural repairs were performed in the 1980's while recent mechanical and electrical repairs and upgrades have been made over the last ten years.

RECOMMENDATIONS

RECOMMENDATIONS

We recommend the following repairs be implemented to restore the Midtown Parking Structure. Recommendations are provided in two general categories: Immediate Repairs and Recommended Repairs. Immediate Repairs are intended to address deterioration conditions of concern related to structure and/or patron safety. These items should be implemented as soon as is practical to reduce potential for injury and liability exposure. Recommended Repairs address existing structural, architectural, functional, and/or aesthetic conditions that need to be corrected, but can be implemented in a scheduled or phased approach.

IMMEDIATE REPAIRS

We recommend initiating the following repairs to address potential safety issues in the structure.

1. Shore the beams supported by the severely deteriorated columns along the expansion joint at Wegman's / Broad Street until permanent repairs are made.
2. Shore beams supported by deteriorated stub walls at two locations on Level B, adjacent to the east/west expansion joint until permanent repairs are made. These columns, beams and walls should be repaired in conjunction with the Broad Street expansion joint replacement.
3. Remove loose ceiling concrete throughout the structure that has the potential to fall on patrons and on vehicles.
4. Replace all broken or missing floor drain gates throughout the structure.

We understand that the City of Rochester is addressing these issues after Walker Parking Consultants informed them of such.

REPAIR OPTIONS

Two potential repair scenarios and discussion of the advantages and disadvantages of each scenario are provided in the Summary Discussion section of this report. Repair Scenario #1 consists of structural repairs, whereas Repair Option #2 consists of structural repairs and other recommended repairs and upgrades necessary to operate the structure at a level considered to be in good condition to other comparable structures in operation.

REPAIR SCENARIO #1

Repair Scenario #1 focuses on providing only those repairs necessary to maintain structural integrity, and includes the following:

STRUCTURAL REPAIRS

- Repair delaminations in floor slabs, curbs and ceilings
- Repair delaminations in columns, beams and walls

MAINTENANCE REPAIRS

- Replace leaking expansion joints under old Wegman's store

MISCELLANEOUS

- Install supplemental floor drains to reduce ponding water

Repair Scenario #1

DESCRIPTION		COST OPINION
Mobilization:		$ 124,000
Structural Repairs:		$1,808,000
Expansion joint replacement, column and beam repair under old Wegman's store		$ 225,000
Miscellaneous:		$ 20,000
Subtotal		$2,177,000
Design (10%)		$ 128,000
RPR (15%)		$ 327,000
Contingency (15%)		$ 327,000
TOTAL	(2008 Dollars)	$3,100,000
Total	(2010 Dollars with 8% Annual inflation)	$3,700,000

We recommend performing these repairs if the intended use of the parking facility is for a shorter period of time as compared to option #2 (10-15 years).

REPAIR SCENARIO #2

Repair Scenario #2 focuses on structural repairs which incorporate durability enhancements and includes the following:

STRUCTURAL REPAIRS

- Repair delaminations in floor slabs, curbs and ceilings
- Replace main drive lane area slab full depth on Levels A and B
- Repair delaminations in columns, beams and walls
- Remove Level C curbs except at exhaust grates and install bollards to protect grates

MAINTENANCE REPAIRS

- Replace expansion joints
- Rout and seal floor cracks
- Remove asphaltic coating on ramps and apply new urethane traffic topping system
- Repair loose and debonded urethane traffic topping and recoat

STAIR REPAIRS

- Replace stair lighting
- Rout and seal cracks in concrete landings
- Repair broken tiles
- Clean and paint rusted frames and pans

MECHANICAL/ELECTRICAL

- Replace fire sprinkler system branch piping and main valves
- Replace lighting control system
- Replace lighting fixtures
- Replace fire alarm system
- Replace Emergency Call System

MISCELLANEOUS

- Install supplemental floor drains to reduce ponding water

Repair Scenario #2

DESCRIPTION		**COST OPINION**
Mobilization:		$ 457,000
Structural Repairs:		$1,606,000
Replace drive lane slab:		$1,290,000
Waterproofing:		$1,019,000
Expansion joint replacement, column and beam repair under old Wegman's store:		$ 225,000
Stairs Repairs:		$ 100,000
Mechanical/Electrical:		$3,365,000
Subtotal		$8,062,000
Design (10%)		$ 807,000
RPR (15%)		$1,210,000
Contingency (15%)		$1,210,000
TOTAL	(2008 Dollars)	$11,300,000
Total	(2010 Dollars with 8% Annual inflation)	$13,200,000

We recommend implementing Repair Scenario #2 if the intent of the parking garage is to remain in operation as Midtown and the City of Rochester continues to re-vitalize.

SUMMARY DISCUSSION

REPAIR SCENARIOS

SUMMARY DISCUSSION

Repair scenarios primarily focus on the restoration and service life of the floor slab. Repair Scenario #1 only addresses the repair of current concrete deterioration and the leaking expansion joint and severely deteriorated underlying beams and columns. We recommend that this scenario be selected if future operation of the parking facility will be limited due to redevelopment Midtown. This scenario does not address waterproofing and other maintenance items and, at some time, will require significant repairs sooner than Repair Scenario #2. Removal of chloride ions from concrete typically is neither practical nor economical based on the level of chloride ions on the concrete at this time. Therefore, continued corrosion induced deterioration should be expected.

Repair Scenario #2 addresses the current concrete deterioration, the waterproofing such as expansion joints and the traffic coating, stair repairs and replacement of the fire suppression, fire alarm and lighting systems. The traffic topping membrane installed on the floor slabs does and will continue to slow the rate of concrete deterioration, but future concrete repairs can be expected. We recommend this scenario to maintain the service life of the Midtown Parking Structure due to the redevelopment of Midtown.

We recommend repairs to deteriorated structural members, floors, curbs, ceilings, beams, columns and walls, replacement of the leaking expansion joint under the old Wegman's store, and repairs to floor drains be performed regardless of the chosen repair scenario.

After review of visual observations and data collected from the field survey and testing, the following two repair scenarios were evaluated for the Midtown Parking Structure.

REPAIR SCENARIO #1

Repair Scenario #1 consists of:

- Repairing all concrete spalls and delaminations in floors, curbs, ceilings, beams, columns and walls.
- Install supplemental floor drains to alleviate ponding water and replace broken or missing drain grates.
- Replace lighting in stairs, repair broken tiles, and clean and paint rusted metal.

The service life of Scenario #1 ranges from 8 to 10 years. Minor repairs should be anticipated every 3 to 5 years.

Advantages

- Only addresses current deterioration, thus reduces initial cost for capital improvements

Disadvantages

- More significant future repairs should be anticipated

REPAIR SCENARIO #2

Scenario 2 consists of all the repairs stated in Scenario 1, with the following exceptions:

- Floor slab in the main drive aisle on both Levels A and B will be removed and replaced full depth. (20% to 35% of the floor delaminations on Levels A and B are located in this area. 35% of the ceiling delaminations under Level B and 5% of the ceiling delaminations under Level A are also in this area).
- Remove the majority of the curbs on Level C except where the exhaust system is embedded. Install bollards at each remaining curb section.
- Floor slab cracks will be routed and sealed.
- Expansion joints will be removed and replaced.
- The existing asphaltic coating will be removed and replaced with a urethane traffic topping membrane system.
- The remaining floor area that is traffic topped with a urethane membrane system will be repaired and recoated to return the traffic toppings nonslip surface and waterproofing.
- Perform repairs in the stair towers.
- Replace the fire alarm and suppression system; lighting control and fixtures; and emergency call systems throughout the garage.

The expected service life of the full depth repairs should be between 20-30 years before extensive repairs should be expected. Other structural repairs performed should be expected to last between 15-20 years before another extensive repair program should be anticipated. Limited structural repairs should be expected prior to another extensive repair program. Maintenance of the waterproofing systems should be performed every 5 to 7 years in order to maximize structural repairs.

Advantages

- Removes and replaces the worst area of floor and ceiling slab, thus reducing future repairs
- Installation of traffic topping and recoating existing traffic topping extends the service life of the slab and new repairs
- New more water tight expansion joints will better protect the underlying structural members which reduces future deterioration in that area
- Stair tower repairs will brighten the existing stairs and add life to the structural steel pans and frames

Disadvantages

- Higher initial cost
- Future repairs are still anticipated, although at a lesser rate
- Expansion joints and traffic topping membrane require maintenance; however, protect the concrete from accelerated deterioration

MATERIAL TESTING

Materials testing was performed on concrete cores extracted from both supported parking levels of the garage. Compressive strength tests were performed for comparison of in-situ strength versus original design requirements. Test results indicate strengths in excess of 5,000 psi, which is 50% higher than original design requirements.

Chloride content testing was performed to determine the concentration of deicing salts which have penetrated the slab to the depth of embedded steel reinforcement, and to assess the resulting potential for corrosion of the embedded steel. Test results ranged from 250 to 760 parts per million (ppm), with an average concentration of approximately 340 ppm at the depth of reinforcing steel. This concentration is relatively low, but within the threshold range (280 to 410 ppm) required to support corrosion. Corrosion is most likely to occur at locations with high moisture exposure, i.e. adjacent to cracks.

Petrographic examination was performed on a single core, which contained both original concrete and 1980's topping concrete. The examination found both the topping concrete and the substrate concrete to be of "excellent" quality and made with durable materials. Furthermore, both concretes contain microscopic air void systems with

characteristics that should cause it to be highly resistant to degradation due to freeze-thaw cycling.

OBSERVATIONS

Our field survey considered structural elements, safety concerns, waterproofing and a limited visual review of electrical and mechanical items in the parking garage. The review of these elements in the parking facility allows us to make professional recommendations as to the types of repairs that will be required to be performed on the facility to address current structural deterioration as well as other repairs and maintenance items that are recommended to be addressed. The recommendations specific to this structure were developed on the understanding that the Midtown Development site will undergo significant redevelopment with the relocation of Paytech's World Headquarters. Following Walker Parking Consultants recommendations for repairs are the substantiated observations that we made during our evaluation of the facility.

SAFETY CONCERNS

There is loose overhead concrete throughout the garage that could potentially fall on patrons or vehicles if not removed.

Expansion joint columns under the old Wegman's store and Broad Street are severely deteriorated. It is recommended that the expansion joint beams that the columns support be shored to grade until permanent repairs are made.

In two locations of wall/beam intersections on Level B adjacent to east/west expansion joint, wide cracks in the wall have compromised the beam shear capacity. The beams should be shored until permanent repairs are made.

Broken or missing floor drain grates throughout the garage are a trip hazard to patrons. It is recommended that new grates be installed.

FLOORS

A chain drag survey of the supported floors on Levels A and B denoted floor delaminations. The majority are located along column lines where top steel is present and in the main drive lane between the north and south halves of the deck, where the original asphaltic coating remains. This coating is debonded from the concrete floor surface in many locations. The floor delaminations are much more prevalent on the west half of both floors where the parking is the heaviest. Salt laden snow is brought in by vehicles and deposited on the floor slabs

LOOSE OVERHEAD CONCRETE

CRACKED END OF WALL COMPROMISING THE BEAM SHEAR BEARING

BROKEN FLOOR DRAIN GRATE

FLOOR DELAMINATIONS PRESENT IN MAIN DRIVE LANE

resulting in concrete delaminations over time. Isolated delaminations were observed on the perimeter raised curbs throughout both levels. Isolated floor slab cracks were noted on both levels. Isolated areas of ponding water were noted on both levels.

TYPICAL CURB DETERIORATION ON LEVEL C

Level C slab-on-grade has an asphalt topped concrete slab. This slab is generally in good condition. No potential trip hazards were observed. Concrete curbs are present between the rows of parked vehicles. These curbs separate parked vehicles and contain the garage exhaust systems. It appears that some sections of curbing have been replaced. Many delaminated sections of curb faces were observed throughout Level C. Delaminations of curb concrete were also noted around the perimeter of exhaust grates. Salt laded snow is brought in by vehicles and deposited onto and against the curbing resulting in concrete delaminations over time.

There are entry/exit ramps from four surrounding streets: Court, Broad, Clinton and Chestnut. All of the concrete ramp slabs have a membrane and asphaltic coating applied to the concrete floor surface. Isolated floor slab delaminations were noted on the ramps. Isolated curb delaminations were also noted.

During the construction repair phase in the mid 1980's, the majority of the black asphaltic coating and membrane was removed and a urethane traffic topping membrane was applied. The remaining areas of the asphaltic coating have become brittle and debonding of the coating from the floor slab is widespread. The urethane traffic topping is holding up well for its age, but is worn or missing in isolated locations.

EXPANSION JOINTS

The existing expansion joints consist of metal edged angles with compression seal type rubber glands. On Level A and Level B the expansion joints in both the east/west and north/south direction are performing as expected and no visible leaks were observed. The north/south expansion joint that runs under Broad Street was replace in 1992 and appears to be performing; however, the expansion joint running under the old Wegman's store and is leaking. The present leaking and the previous leaking under Broad Street have caused significant concrete damage to the adjacent underlying beams and columns. Repairs plans were developed and the contract was bid to repair the section of expansion joint under the old Wegman's store and the underlying deteriorated beams and columns but the work has not been performed.

CEILINGS

Visual observations were performed on the underside of Level A and Level B floors, the underside of the plaza above, and the ceiling of the entry/exit ramps.

Delaminations and heavily stained ceilings were observed on the underside of Levels A and B with the majority located along column lines at mid span where the bottom slab reinforcement is concentrated. Most of the delaminations are located on the west side of the south half of the garage. Some delaminations have become open spalls exposing the slab reinforcement.

STAINED AND DELAMINATED CEILING

Previous patching, both partial depth and full depth, was observed. Along with the full depth strip repairs, the previous patching appears to be performing. The full depth patches will typically last longer than the partial depth repairs. New delaminations are occurring adjacent to the full depth strip repairs in many locations. This is referred to as ring corrosion where the PH value of the new patch material is quite different from the existing concrete accelerating corrosion of the reinforcement at the patch interface.

COLUMNS / BEAMS / WALLS

Columns, beams and walls were noted to be in generally good condition on Levels A and B, with only isolated delaminations observed. The urethane topping extends approximately 6 inches up the bottom of the columns. The walls and beams are in generally good condition on Level C with only isolated delaminations noted. Many of the columns on Level C are delaminated near the floor line. This is largely due to vehicles splashing salt laden water against the columns.

TYPICAL BOTTOM OF COLUMN DETERIORATION ON LEVEL 'C'

The columns on Level C do not have traffic membrane protecting the bottom of the columns as they have on Levels A and B. Numerous cracks were observed in the perimeter walls throughout the garage on level C. Some of these cracks exhibit evidence of previous leaking but the adjacent concrete is sound. No active water leaking through the cracks was observed.

STAIRTOWERS

The stairtowers throughout the structure have alarms on each door and are only used as emergency exits. The stairs consist of a steel frame

NOTE RUST ON STAIR FRAMING AND UNDER SIDE OF METAL PAN

and pan system with concrete infill for the treads. There are florescent lights over the landings and emergency lighting and sprinklers are present in each stair. The handrails are aluminum. We observed broken wall tiles, cracks in the landing concrete, and burned out lights in the West and South stairs. Rust was present on welds and metal nosings in the South stairs.

MECHANICAL SYSTEM

Ventilation for the parking structure is supplied through 9 fans located in ventilation shafts 'B' and 'E' with 3 supply fans on each floor. The central core, consisting of the escalators, lobby, and administrative areas, is supplied through an air handling unit and condensor located in a fenced area on Level 'A'. The supply and exhaust fans have been repaired or replaced through an ongoing maintenance process. The most recent repairs occurred 2 years ago; one exhaust fan was replaced, one exhaust fan was rebuilt, and the condensing unit was replaced. Ductwork in the north half of the garage was also replaced at that time. A visual examination of the system and discussion with garage management revealed no immediate need for major repairs.

ELECTRICAL DISTRIBUTION

The electrical distribution system is supplied from Rochester Gas and Electric (RG&E) vaults #5 and #9 in the garage. The utility busses are interconnected to avoid an interruption in power should the loss of one bus occur. A manual transfer switch is provided for the Motor Control Centers (MCC's) in the event of loss of the main supply through the Main Distribution Panel.

The electrical distribution is supplied by panel MDP located in the 'B' Level Electric Room. This panel supplies the branch circuit panels, and Motor Control Centers MCC-A and MCC-B. The Motor Control Centers power the supply and exhaust fans, escalators, elevator, and pumps. The electrical distribution, including the main distribution panel, MCC's, branch circuit panels, and feeders were replaced within the past 8 years.

TYPICAL GARAGE LIGHTING FIXTURE IN PARKING BAYS

LIGHTING

The garage lighting consists of fluorescent fixtures along the entrance and exit ramps, the center drive aisle, and pendant-mounted High Intensity Discharge (HID) fixtures for the parking areas. The fluorescent fixtures are gasketed and sealed, suitable for wet locations. These

fixtures utilize T8 lamps and energy efficient ballast. They appear to be in acceptable condition, except that the lenses were dirty in some areas.

The HID Fixtures are Millbrook type 'L' with a 100 watt high pressure sodium lamp. The Millbrook fixtures are second generation to the structure and were installed in the 1980's. These fixtures require increased maintenance, and spare parts are becoming difficult to obtain. In areas where replacement fixtures are needed, a Hubbell Microlux fixture has been used.

Emergency lighting consists of a separate service ahead of the main, supplied from the downtown network.

LIGHTING CONTROL

The lighting control is a relay-based system installed in 1991. The control shuts off 50% of the light fixtures during the evening hours and all-day on Sundays. This system has experienced increased failures and unreliability. Replacement parts are becoming difficult to obtain.

FIRE ALARM SYSTEM

The Fire Alarm System is a Simplex 4100 installed in 1991. There are detectors in the elevator lobbies and electrical rooms and manual pull stations at the stairways. Horn/strobes are provided at each stairway. The fire alarm system monitors the flow and tamper switches for the sprinkler system and the air pressure. This system has reached a point where replacement parts are becoming difficult to obtain. The horn/strobes are also not in compliance with ADA Requirements.

TYPICAL HORN STROBE – THIS DEVICE IS NOT IN COMPLIANCE WITH ADA REQUIREMENTS

EMERGENCY CALL SYSTEM

The Emergency Call System consists of a pushbutton in 5 locations on each level and a blue light above the pushbutton. The system is operating acceptably, but does not comply with ADA Requirements.

FIRE SPRINKLER

The entire garage is protected by a dry-pipe sprinkler system installed as part of the original construction in the 1960's. The system is supplied from 8 Sprinkler Rooms which contain a total of 23 main valves and an air compressor in each room. The system has experienced numerous leaks in the branch piping requiring frequent

TYPICAL OLD FIRE SPRINKLER MAIN VALVE

maintenance. Of the main valves, seven have been replaced recently and the others are original to the system installation.

FIRE PROTECTION STANDPIPES

There is a separate standpipe system throughout the garage. This is a wet system during the summer months. It is drained and pressurized as a dry system during the colder months. Flushing the system has served to keep it in good condition. Minimal maintenance and repairs have been required.

APPENDICES

APPENDIX A – REPAIR SCENARIOS

APPENDIX A – OPINIONS OF PROBABLE CONSTRUCTION COST – REPAIR SCENARIOS 1 AND 2

REPAIR SCENARIO - 1

Midtown Parking Structure			
TABLE 1			
Opinion of Probable Construction Cost			
Work Item	**Description**		**Total $**
1.1	Mobilization, 6%	$	124,000
3.2	Partial Depth Floor Spall & Delamination Repair	$	745,000
3.3	Full Depth Floor Spall & Delamination Repair	$	40,000
3.4	Curb Repair	$	62,000
4.2	Ceiling Repair	$	748,000
5.1	Beam Repair	$	45,000
6.1	Column Repair	$	138,000
7.1	Wall Repair	$	30,000
25.2	Install Supplemental Floor Drains	$	20,000
40.1	Replace Expansion Joints under Wegmans, repair columns	$	225,000
	CONSTRUCTION COST	**$**	**2,177,000**
	Design, 10%	$	218,000
	RPR, 15%	$	327,000
	Contingency, 15%	$	327,000
	TOTAL (2008 Dollars)	**$**	**3,100,000**
	TOTAL (2010 Dollars @ 8% Annual Inflation)	$	3,700,000

REPAIR SCENARIO - 2

Midtown Parking Structure			
TABLE 2			
Opinion of Probable Construction Cost			
Work Item	**Description**		**Total $**
1.1	Mobilization, 6%	$	457,000
3.2	Partial Depth Floor Spall & Delamination Repair	$	679,000
3.3	Full Depth Floor Spall & Delamination Repair	$	35,000
3.4	Curb Repair and Removal	$	50,000
3.5	Full Depth Floor Slab Replacement	$	1,290,000
4.2	Ceiling Repair	$	629,000
5.1	Beam Repair	$	45,000
6.1	Column Repair	$	138,000
7.1	Wall Repair	$	30,000
10.1	Expansion Joint Replacement	$	85,000
11.1	Rout and Seal Cracks	$	20,000
16.1	Traffic Topping - Vehicular	$	185,000
16.2	Asphaltic Coating Removal	$	85,000
16.3	Traffic Topping - Repair	$	14,000
16.3	Traffic Topping - Recoat	$	630,000
25.2	Install Supplemental Floor Drains	$	20,000
26.1	Replace Fire Alarm System	$	80,000
26.2	Replace Fire Sprinkler System	$	2,400,000
30.1	Stair Repairs (Replace lighting, broken tiles, clean & paint)	$	100,000
30.2	Replace Lighting Fixtures	$	800,000
30.4	Replace Lighting Control System	$	40,000
32.1	Replace Emergency Call System	$	25,000
40.1	Replace Expansion Joints under Wegmans, repair columns	$	225,000
	CONSTRUCTION COST	**$**	**8,062,000**
	Design, 10%	$	807,000
	RPR, 15%	$	1,210,000
	Contingency, 15%	$	1,210,000
	TOTAL (2008 Dollars)	**$**	**11,300,000**
	TOTAL (2010 Dollars @ 8% Annual Inflation)	$	13,200,000

APPENDIX B – PHOTOGRAPHS

APPENDIX B – PHOTOGRAPHS

Photo 1 - Severely Deteriorated Beams And Columns Under Leaking Expansion Joint

Photo 2 - Severely Deteriorated Beams And Columns Under Leaking Expansion Joint

Photo 3 – Ceiling Delamination / Loose Concrete

Photo 4 – Broken Drain Grate is Trip Hazard

Photo 5 – Main Drive Aisle Area

Photo 6 – East/West Expansion Joint

Photo 7 – Outline of Floor Delamination

Photo 8 – Aged and Debonded Asphaltic Coating

Photo 9 – Typical Expansion Joint System

Photo 10 – Plugged Floor Drain Causing Ponded Water

Photo 11 – Exhaust System Grate @ Level C

Photo 12 – Curb with Scaled Surface @ Level C

Photo 13 – Deteriorated Curb Face

Photo 14 – Main Drive Aisle Area with Asphaltic Coating

Photo 15 – Typical Stairwell

Photo 16 – Stairwell, Note Rust on Bottom of Pan.

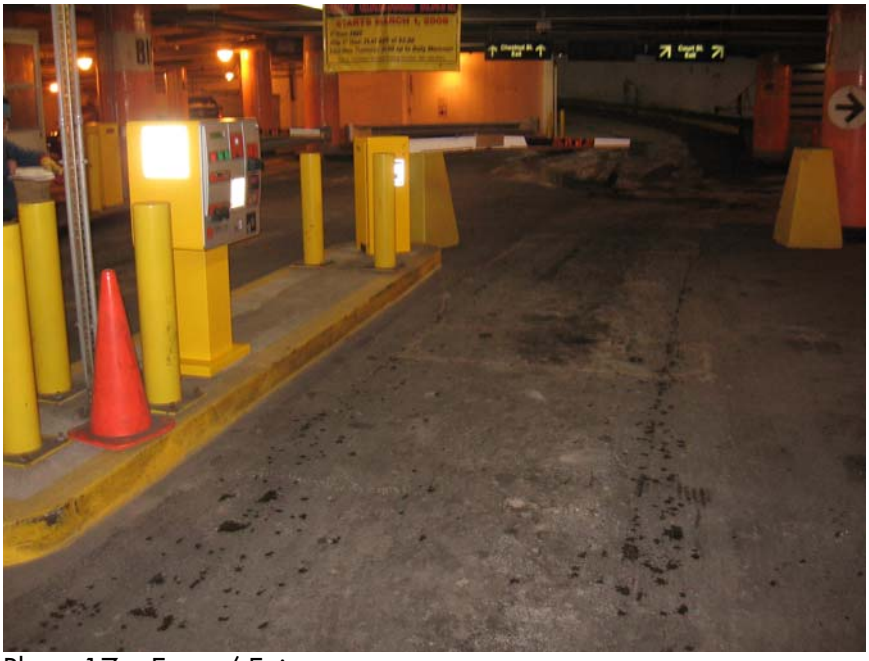


Photo 17 – Entry / Exit

Photo 18 – Pay-on-Foot Machine

Photo 19 – Debonded / Missing Traffic Topping

Photo 20 – Column Spall

Photo 21 – Entry

Photo 22 – Typical Wayfinding Sign

Photo 23 – Exit, Note Asphaltic Coating


Photo 24 – Exit

Photo 25 – Typical Garage Lighting on Level 'A'

Photo 26 – Typical Fire Alarm system Manual Pull Station

Photo 27 – Main Fire Alarm Panels Located on Level 'A' outside of Escalator Lobby

Photo 28 – Typical Stairway Door Layout

Photo 29 – Main Telephone Cabinets for Garage and Mall

Photo 30 – PARCS Equipment on Level 'B'

Photo 31 – Pay on Foot Station in Escalator Lobby – Level 'A'

Photo 32 – Sewage Ejector Pump on Level 'C' – One of Two Pumps in this Room

Photo 33 – MCC Electrical Room 204 on Level 'B' Recently Replaced

Photo 34 – MDP A in Main Electrical Room on Level 'B' Recently Replaced

APPENDIX C – MATERIAL TESTING REPORTS

APPENDIX C - MATERIAL TESTING REPORTS

Concrete floor slab material samples were obtained by coring from each quadrant of both supported parking floors, for a total of eight sampling locations throughout the parking structure. Three types of tests were performed on these samples; chloride concentration vs depth, compressive strength, and petrographic analysis.

CHLORIDE CONCENTRATION VS DEPTH

Chloride content testing was performed to determine the depth of chloride penetration into the slab relative to the depth of embedded reinforcement. Chloride, acting as an electrolyte, provides one of the three primary components needed to support a corrosion reaction. Since the other two components (moisture and oxygen) are readily available in most environments, chloride concentration at the depth of embedded steel provides an indication of the potential for corrosion of the embedded steel to occur.

Chloride testing was performed on three cores to identify potential variability within the structure due to parking area and/or parking level:

- Core C-1A (NW quadrant – Level A),
- Core C-4 (SE quadrant – Level A), and
- C-7B (SW quadrant – Level B).

Chloride concentrations in the range of 280 to 420 parts per million (ppm) are generally considered to be the threshold levels to initiate corrosion. Corrosion of steel will cause the structure to deteriorate at an accelerated level. The range in concentration is due to variability in accompanying moisture content.

Test results ranged from a maximum of 760 ppm to a low of 270 ppm at a depth of 2.5" into the slab. The average chloride concentration at the depth of embedded steel was found to be approximately 330 ppm. While this concentration is within the corrosion threshold, it is relatively low for a 40 year old structure and reflects the fact that the 1980's repairs were effective. The low chloride ion rates will result in a reduced rate of structure deterioration. The traffic topping on the concrete drive surfaces will also reduce the amount of chlorides that will be susceptible to entering the concrete.

COMPRESSIVE STRENGTH

Compressive strength testing was performed to verify the strength of the in-place concrete relative to the specified design strength. Testing was performed on three cores to identify potential variability within the structure:

- Core C-4 (SE quadrant – Level A),
- C-5A (NW quadrant – Level B), and
- C-5B (NW quadrant – Level B).

These three cores indicate an average compressive strength of 5,630 psi, which is 50% higher than the original design strength of 3,750 psi. The higher than design compressive strength results in a more durable concrete.

PETROGRAPHIC EXAMINATION

A petrographic examination was performed on a single core, which contained both original concrete and 1980's topping concrete. The examination found both the topping concrete and the substrate concrete to be of "excellent" quality and made with durable materials. Furthermore, both concretes contain microscopic air void systems with characteristics that should cause it to be highly resistant to degradation due to freeze-thaw cycling.

The examination found the topping concrete and substrate concrete to be very similar in component materials, but with mix design variations which are typical for 1980's construction versus 1960's construction.

SUBSTRATE CONCRETE (ORIGINAL – 1960'S)

The substrate concrete utilized ¾" crushed limestone coarse aggregate and natural sand (3/8" max) with 5½ to 6 bags of cement per cubic yard. The water: cement ratio is estimated at 0.50, which is typical of 1960's mixes, and the air content is estimated at 5% to 6%. The selection of aggregate material gradations and appropriate mixing resulted in a concrete with well distributed aggregate particle sizes. The concrete mix was also found to be dense and well-consolidated, which indicates appropriate placement and consolidation practices were utilized.

The examination also found the concrete to have 5% to 6% total air content and an air void system that was rated as "excellent", with

numerous very fine, uniformly distributed, entrained air voids. While the total air content is fairly typical, a high-quality entrained air system is unusual in 1960's vintage concrete and is likely a significant factor in the success of the 1980's overlay repairs.

TOPPING CONCRETE (1980'S REPAIR)

The substrate concrete utilized a slightly smaller ½" crushed limestone coarse aggregate and natural sand (3/8" max) with 6 to 6½ bags of cement per cubic yard. The water: cement ratio is estimated at 0.40, making it more resistant to moisture penetration than the substrate concrete, and the air content is estimated at 5% to 6%. As with the substrate, the selection of aggregate material gradations and appropriate mixing resulted in a concrete with well distributed aggregate particle sizes. The concrete mix was also found to be dense and well-consolidated, which indicates appropriate placement and consolidation practices were utilized.

The examination also found the topping concrete to have 5% to 6% total air content and an air void system that was rated as "excellent", with numerous very fine, uniformly distributed, entrained air voids. This is a critical factor in the long term durability of concrete subject to repeated freeze-thaw cycles, which is common in the Rochester area.

SJB SERVICES, INC.

Contract Drilling and Testing

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Fax: (607) 758-7188

☒ **ROCHESTER OFFICE**
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Henrietta, NY 14467
Phone: (585) 359-2730
Fax: (585) 359-9668

April 8, 2008

LaBella Associates, P.C.
300 State Street
Suite 201
Rochester, NY 1461

Attention: Brian Miller, P.E.

Reference: Concrete Coring and Testing
Midtown Parking Garage
110 South Clinton Avenue
Rochester, New York

Dear Mr. Miller,

SJB Services, Inc. (SJB) completed a concrete coring and testing program for the above-referenced project. The work was performed under the direction of Walker Parking Consultants (Walker). The scope of work performed included the following:

- Utilizing a portable coring machine, SJB obtained twelve (12) concrete core samples from Level A and Level B of the existing parking garage
- Each recovered core was visually inspected, measured, and photographed
- Four of the recovered cores were submitted for compressive strength testing
- Eight of the recovered cores were submitted for water-soluble chloride content testing

- One of the cores was submitted for petrographic analysis

CONCRETE CORING

SJB utilized a portable coring machine to obtain twelve (12) concrete cores, #1A, #1B, #2, #3, #4, #5A, #5B, #5C, #6, #7A, #7B, and #8 from the parking garage floor slabs (Level A and Level B). The location of the cores is shown on Figure 1 in Appendix A.

In general, the concrete cores were well intact following coring, with the exception of #1B. A vertical saw cut was observed in the #1B core. The core sample consists of two sections of concrete, as the core broke during the extraction process.

Photographs of the cores are included in Appendix B.

COMPRESSIVE STRENGTH TESTING

SJB performed compressive strength testing of select concrete cores:

- Cores #1A, #4, #5A, and #5B were submitted for compressive strength testing. #1A was not able to be tested due to a fracture in the core located between 2.1 inches to 3.1 inches from the top of the core. The remaining cores were tested by ASTM Method C-42.

- The compressive strength of the concrete cores ranged between 5,300 pounds per square inch (psi) and 6,130 psi. A summary of the compressive strength testing is included in Appendix C along with individual test reports.

CHLORIDE CONTENT ANALYSIS

Water soluble chloride content tests were conduced on 3 of the 12 concrete cores:

- Cores #1A, #4, and #7B were submitted for chloride analysis. 3 depth intervals from #1A, 3 depth intervals from #4, and 2 depth intervals from #7B were submitted to Construction Materials Consultants, Inc. (CMC) in Greensburg, PA for water-soluble chloride testing via method ASTM C-1218.

- Chloride contents ranged between 0.025 and 0.076 (percent chloride by mass of sample). A summary of the chloride test results is included in Appendix D along with CMC's complete report.

PETROGRAPHIC ANALYSIS

One concrete core, #8 extracted from the southeast quadrant of Level B between grids R-Q and 4-5, was submitted to Construction Materials Consultants, Inc. (CMC) for petrographic analysis. The purpose of the petrographic analysis was to assess the condition of the concrete and reveal any evidence/causes of deterioration in the core sample submitted.

CMC's complete petrographic analysis report is provided in Appendix E.

CLOSING REMARKS

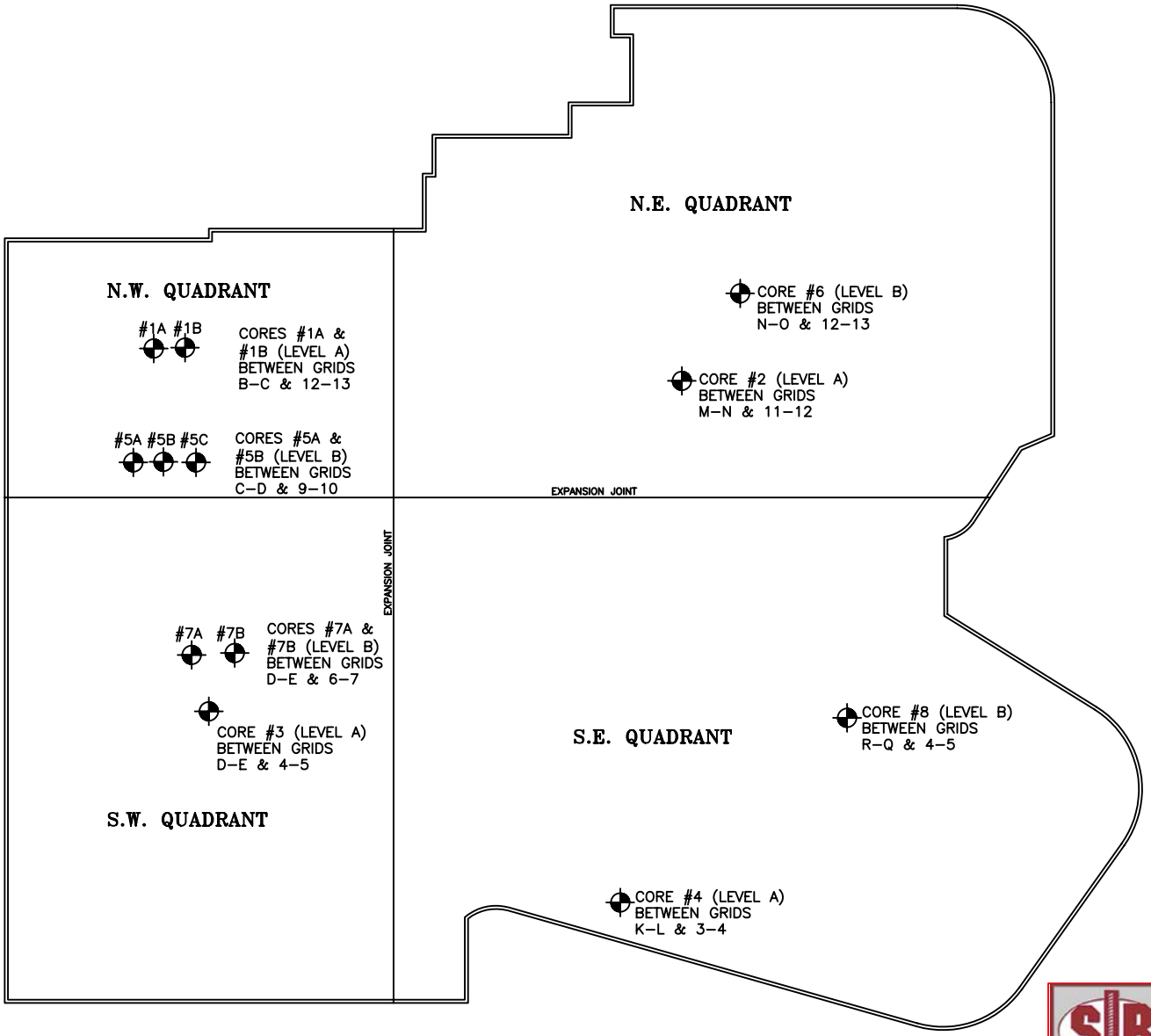
This letter report was prepared to document the results of a Concrete Coring and Testing conducted by SJB Services, Inc. under the direction of Walker Parking Consultants and LaBella Associates to assist in evaluating the existing structural conditions present at the Midtown Parking Garage. This report has been prepared for the exclusive use of LaBella Associates and designated agents for specific application to this site and this project only. Documentation and preparation of this report were based upon SJB's understanding of the conditions that were present during the time of our investigation, as described herein. No other warranties, expressed or implied are made.

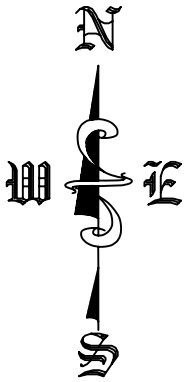
If you have any questions or concerns, please contact our office at your convenience.

Respectively Submitted:

Charles B. Guzzetta
Project Manager
Rochester District Manager

APPENDIX A
SITE PLAN





SJB SERVICES, INC.
Rochester New York Office
535 Summit Point Drive
Henrietta, NY 14467
phone: (585) 359–2730
fax: (585) 359–9668

CORE LOCATIONS–FLOOR PLAN

MIDTOWN PARKING GARAGE LEVEL 'A' AND 'B'

ROCHESTER, NEW YORK

SCALE:	
DATE:	04/08/08
DRAWN BY:	YILMAZ
REV'D BY:	CBG
DWG. FILE:	
PROJ. No.:	
FIGURE No.:	1

APPENDIX B
CORE PHOTOGRAPHS

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 1A

Core No. 1B

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 2

Core No. 3

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 4

Core No. 5A

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 5B

Core No. 5C

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 6

Core No. 7A

CONCRETE CORE PHOTOGRAPHS
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Core No. 7B

Core No. 8

APPENDIX C

SUMMARY OF CONCRETE COMPRESSIVE STRENGTH TEST RESULTS

CONCRETE COMPRESSIVE STRENGTH TEST REPORTS

SJB SERVICES, INC.

COMPRESSIVE STRENGTH SUMMARY

MIDTOWN PARKING GARAGE
ROCHESTER, NY
RT-08-024

Core Number	Core Location	Core Test Length inches	Core Diameter inches	Maximum Load Lbs.	Corrected Compressive Strength psi
C-1A	Level A floor slab northwest quadrant between grids B-C & 17-13	---	3.72	----	untestable
C-4	Level A floor slab southeast quadrant between grids K-L & 3-4	5.61	3.72	60000	5300
C-5A	Level B floor slab northwest quadrant between grids C-O & 9-10	3.30	3.72	76530	6130
C-5B	Level B floor slab northwest quadrant between grids C-O & 9-10	3.47	3.72	68200	5460

REMARKS

Core C-1A was untestable due to the present of a fracture in the core from 2.1" to 3.1"

Core C-5A did not meet the length requirements of ASTM C-42 section 7.2

Core C-5B did not meet the length requirements of ASTM C-42 section 7.2

SJB SERVICES, INC.
Contract Drilling and Testing

BUFFALO OFFICE
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Report of Compressive Strength of Concrete Cores
ASTM C-42

PROJECT: Midtown Parking Garage, Rochester NY

PROJECT NO.: RT-08-024

CLIENT: LaBella Associates

REPORT NO.: LTR-1A

LOCATION: Level A floor slab

CORE LOCATION: northwest quadrant, Level A, between grids B-C & 17-13

CORE IDENTIFICATION NO.
C-1A

LAB IDENTIFICATION NO.
bt-08-273

DATE OF CONCRETE PLACEMENT: unknown

DATE CORE WAS REMOVED: unknown

DATE OF TESTING: March 12, 2008

AGE OF CORE: unknown

MOISTURE CONDITION WHEN TESTED: as received

ORIGINAL CORE LENGTH: 5.50"

TRIMMED CORE LENGTH: -----

CAPPED CORE LENGTH: -----

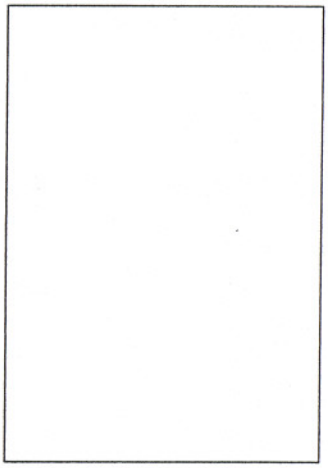
AVERAGE CORE DIAMETER: 3.72"

CROSS SECTIONAL AREA: 10.927

MAXIMUM LOAD: -----

CORRECTED COMPRESSIVE STRENGTH: -------

Sketch of the
Type of Facture



ADDITIONAL REMARKS:

Core sample was untestable due to the present of a fracture in the sample from 2.1" to 3.1".

APPARENT MAXIMUM AGGREGATE SIZE: ½" crushed stone

DIRECTION OF TEST LOAD WITH RESPECT TO THE HORIZONTAL SURFACE OF MEMBER OF CAST:

SJB SERVICES, INC.
Contract Drilling and Testing

BUFFALO OFFICE
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Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Report of Compressive Strength of Concrete Cores
ASTM C-42

PROJECT: Midtown Parking Garage, Rochester NY

PROJECT NO.: RT-08-024

CLIENT: LaBella Associates

REPORT NO.: LTR-1B

LOCATION: Level A floor slab

CORE LOCATION: southeast quadrant, Level A, between grids K-L & 3-4

CORE IDENTIFICATION NO.
C-4

LAB IDENTIFICATION NO.
bt-08-277

DATE OF CONCRETE PLACEMENT: unknown

DATE CORE WAS REMOVED: unknown

DATE OF TESTING: March 12, 2008

AGE OF CORE: unknown

MOISTURE CONDITION WHEN TESTED: as received

ORIGINAL CORE LENGTH: 6.15"

TRIMMED CORE LENGTH: 3.72"

CAPPED CORE LENGTH: 5.61"

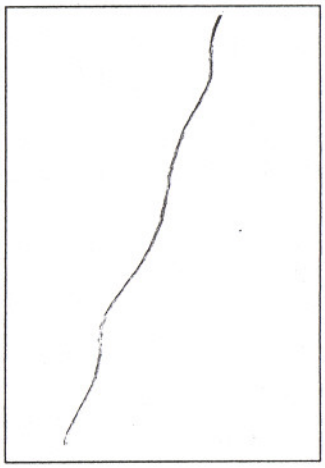
AVERAGE CORE DIAMETER: 3.72"

CROSS SECTIONAL AREA: 10.927

MAXIMUM LOAD: 60000 lbs.

CORRECTED COMPRESSIVE STRENGTH: 5300 psi

Sketch of the
Type of Facture



ADDITIONAL REMARKS:
l/d = 1.508
correction factor = 0.961

APPARENT MAXIMUM AGGREGATE SIZE: ¾" crushed stone

DIRECTION OF TEST LOAD WITH RESPECT TO THE HORIZONTAL SURFACE OF MEMBER OF CAST: perpendicular

SJB SERVICES, INC.
Contract Drilling and Testing

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Hamburg, NY 14075
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Fax: (716) 649-8051

Report of Compressive Strength of Concrete Cores
ASTM C-42

PROJECT: Midtown Parking Garage, Rochester NY

PROJECT NO.: RT-08-024

CLIENT: LaBella Associates

REPORT NO.: LTR-1C

LOCATION: Level B floor slab

CORE LOCATION: northwest quadrant, Level B, between grids C-O & 9-10

CORE IDENTIFICATION NO.
C-5A

LAB IDENTIFICATION NO.
bt-08-281

DATE OF CONCRETE PLACEMENT: unknown

DATE CORE WAS REMOVED: unknown

DATE OF TESTING: March 12, 2008

AGE OF CORE: unknown

MOISTURE CONDITION WHEN TESTED: as received

ORIGINAL CORE LENGTH: 3.33”

TRIMMED CORE LENGTH: 3.00”

CAPPED CORE LENGTH: 3.30”

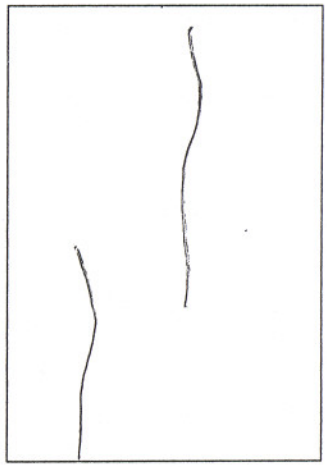
AVERAGE CORE DIAMETER: 3.72”

CROSS SECTIONAL AREA: 10.927

MAXIMUM LOAD: 76530 lbs.

CORRECTED COMPRESSIVE STRENGTH: 6130 psi

Sketch of the
Type of Facture



ADDITIONAL REMARKS:
l/d = 0.887
correction factor applied = 0.870
sample does not meet the length requirements of ASTM C-42 section 7.2

APPARENT MAXIMUM AGGREGATE SIZE: ¼” crushed stone

DIRECTION OF TEST LOAD WITH RESPECT TO THE HORIZONTAL SURFACE OF MEMBER OF CAST: perpendicular

Contract
Drilling
and
Testing

SJB SERVICES, INC.

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Report of Compressive Strength of Concrete Cores
ASTM C-42

PROJECT: Midtown Parking Garage, Rochester NY

PROJECT NO.: RT-08-024

CLIENT: LaBella Associates

REPORT NO.: LTR-1D

LOCATION: Level B floor slab

CORE LOCATION: northwest quadrant, Level B, between grids C-O & 9-10

CORE IDENTIFICATION NO.
C-5B

LAB IDENTIFICATION NO.
bt-08-282

DATE OF CONCRETE PLACEMENT: unknown

DATE CORE WAS REMOVED: wwww

DATE OF TESTING: March 12, 2008

AGE OF CORE: unknown

MOISTURE CONDITION WHEN TESTED: as received

ORIGINAL CORE LENGTH: 3.60"

TRIMMED CORE LENGTH: 3.24"

CAPPED CORE LENGTH: 3.47"

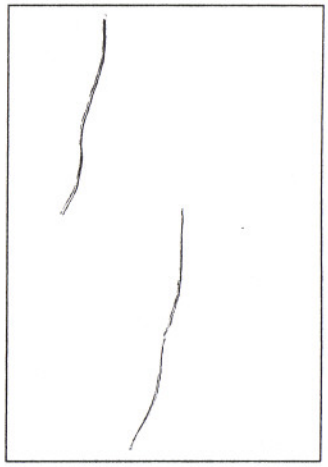
AVERAGE CORE DIAMETER: 3.72"

CROSS SECTIONAL AREA: 10.927

MAXIMUM LOAD: 68200 lbs.

CORRECTED COMPRESSIVE STRENGTH: 5460 psi

Sketch of the
Type of Facture



ADDITIONAL REMARKS:
l/d = 0.933
correction factor applied = 0.870
sample does not meet the length requirements of ASTM C-42 section 7.2

APPARENT MAXIMUM AGGREGATE SIZE: ½" crushed stone

DIRECTION OF TEST LOAD WITH RESPECT TO THE HORIZONTAL SURFACE OF MEMBER OF CAST: perpendicular

APPENDIX D

SUMMARY OF CHLORIDE TEST RESULTS

CHLORIDE TEST REPORT

SUMMARY OF WATER SOLUBLE CHLORIDE CONTENT IN CONCRETE
MIDTOWN PARKING GARAGE
ROCHESTER, NEW YORK

Sample Number	Core Identification	Percent Chloride by Mass of Sample
BT-08-274	#1A: 0-1” depth from top of core	0.076
BT-08-275	#1A: 1”-2” depth from top of core	0.025
BT-08-276	#1A: 2”-3” depth from top of core	0.027
BT-08-278	#4: 0-1” depth from top of core	0.026
BT-08-279	#4: 1”-2” depth from top of core	0.042
BT-08-280	#4: 2”-3” depth from top of core	0.035
BT-08-283	#7B: 2.5” depth from top of core	0.035
BT-08-284	#4: 3.5” depth from top of core	0.041

March 14, 2008
CMC 0308139

Chloride Analyses of Eight Concrete Samples

Midtown Parking Garage

Prepared for SJB Services, Inc.
By Dipayan Jana
Construction Materials Consultants, Inc.

Construction Materials Consultants, Inc.

Berkshire Center, Suite 104
4727 Route 30
Greensburg, PA 15601 USA
Phone: 724-834-3551
Fax: 724-834-3556
www.cmc-concrete.com

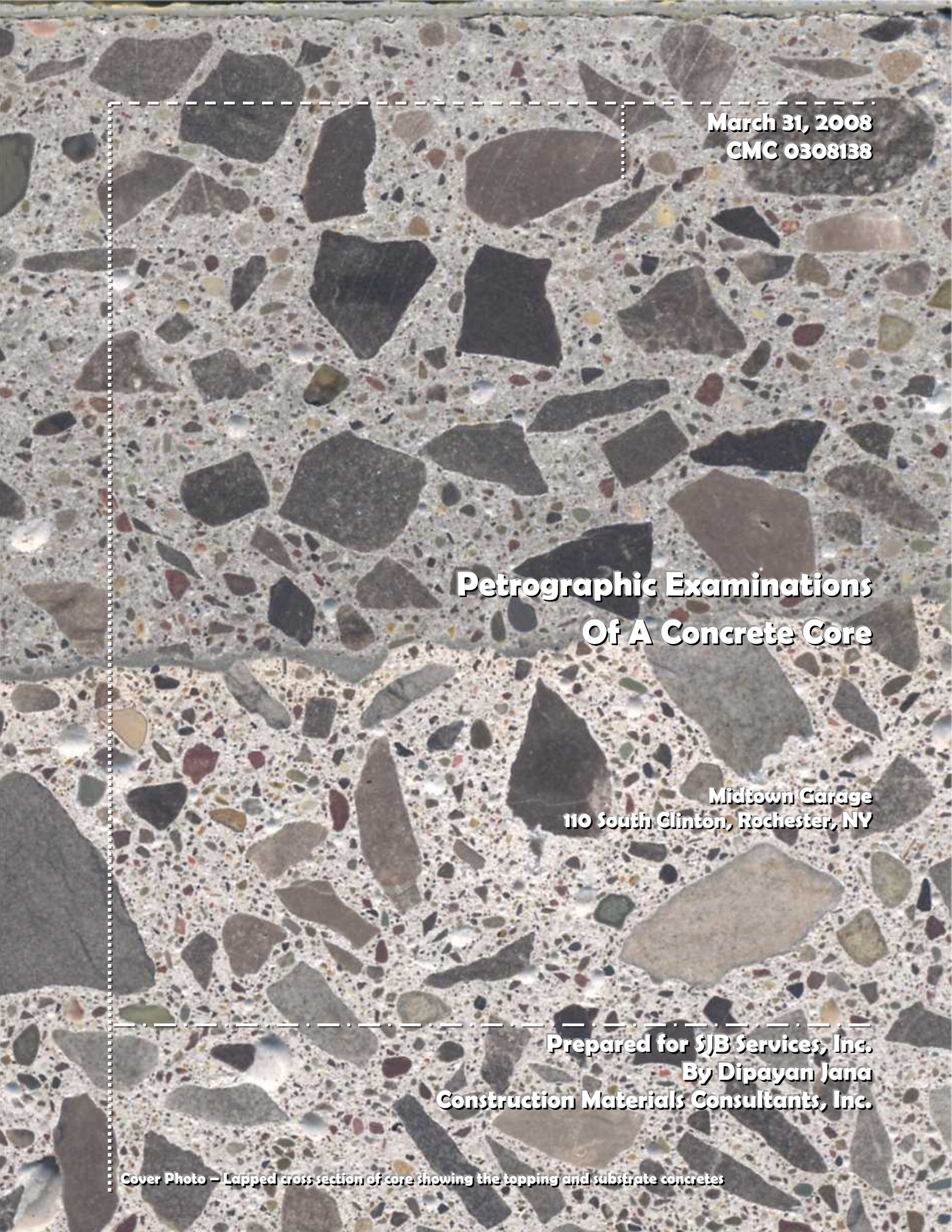
CHLORIDE ANALYSES OF EIGHT CONCRETE SAMPLES

FOR

SJB SERVICES, INC.
(Midtown Parking Garage)

CMC 0308139
03/14/2008

APPENDIX E
PETROGRAPHIC ANALYSIS REPORT



March 31, 2008
CMC 0308138

Petrographic Examinations Of A Concrete Core

Midtown Garage
110 South Clinton, Rochester, NY

Prepared for SJB Services, Inc.
By Dipayan Jana
Construction Materials Consultants, Inc.

Cover Photo – Lapped cross section of core showing the topping and substrate concretes

Construction Materials Consultants, Inc.

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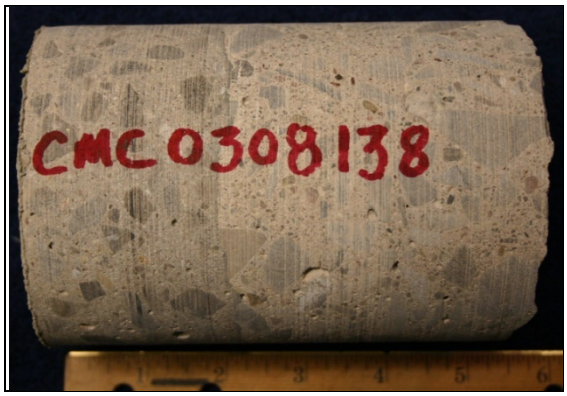
Greensburg, PA 15601 USA
Phone: 724-834-3551
Fax: 724-834-3556
www.cmc-concrete.com

PETROGRAPHIC EXAMINATIONS OF A CONCRETE CORE

FOR

SJB SERVICES, INC.
(Midtown Garage; 110 South Clinton, Rochester, New York)



CMC 0308138
03/31/2008

Construction Materials Consultants, Inc.

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SUMMARY & DISCUSSION

Purpose & Background – Reported herein are the results of detailed petrographic examinations of a concrete core received from Charles B Guzzetta of SJB Services, Inc. The core reportedly came from the Midtown Parking Garage at 110 South Clinton in Rochester, New York.

The purposes of the investigation are to determine the composition, quality, and condition of concretes present in the core.

Determined Concrete Compositions – Based on detailed petrographic examinations, the core is determined to contain a topping concrete on top of a substrate concrete.

Topping Concrete – The topping concrete, approximately $2^{1}/_{4}$-in. in thickness, is air-entrained and made using the following ingredients in the following estimated proportions:

(a) Crushed limestone-dolomite coarse aggregate having a nominal maximum size of $^{1}/_{2}$ in.;
(b) Natural siliceous-calcareous sand fine aggregate having a nominal maximum size of $^{3}/_{8}$ in.;
(b) A portland cement content estimated to be 6 to $6^{1}/_{2}$ bags per cubic yard;
(d) A water-cement ratio estimated to be 0.40; and
(e) An air content estimated to be 5 to 6 percent.

The concrete is dense and well-consolidated. Both coarse and fine aggregate particles are well-graded, well-distributed, and have been sound during their service in the concrete. There is no evidence of any physical or chemical deterioration found in the concrete. The concrete has an excellent air void system consisting of numerous very fine, uniformly distributed entrained air voids.

Substrate Concrete – The substrate concrete, approximately $3^{1}/_{2}$-in. in thickness, in the core with a fresh fractured bottom end, is air-entrained and made using the following ingredients in the following estimated proportions:

(a) Crushed limestone-dolomite coarse aggregate having a nominal maximum size of $^{3}/_{4}$ in.;

(b) Natural siliceous-calcareous sand fine aggregate having a nominal maximum size of $^{3}/_{8}$ in.;

(b) A portland cement content estimated to be $5^{1}/_{2}$ to 6 bags per cubic yard;

(d) A water-cement ratio estimated to be 0.50; and

(e) An air content estimated to be 5 to 6 percent.

The concrete is dense and well-consolidated. Both coarse and fine aggregate particles are well-graded, well-distributed, and have been sound during their service in the concrete. There is no evidence of any physical or chemical deterioration found in the concrete. The concrete has an excellent air void system consisting of numerous very fine, uniformly distributed entrained air voids.

Bond Coat – The interface between the two concretes is intimate with a thin (2 mm thickness) neat paste bond coat applied on the substrate concrete prior to the placement of the topping concrete.

Waterproofing Membrane – On top of the topping concrete is a waterproofing membrane, approximate 1.2-mm in nominal thickness, consisting of a top 0.6-mm nominal thickness urethane-type layer with quartz filler, which is intimately bonded to a bottom 0.6 mm thick neat urethane-type layer, which, in turn, is intimately bonded to the topping concrete.

Overall Quality – Both topping and substrate concretes are judged to be of excellent quality, made using good, sound aggregates, dense paste, well-consolidated concrete with no evidence of any physical or chemical deterioration. The air void systems of both concretes are excellent and suitable to provide necessary protection against distress due to exposures to cyclic freezing and thawing. The topping concrete is well-protected by a good quality waterproofing membrane. There is no evidence of any distress or concern noticed in the core.

* * * * * *

1. INTRODUCTION

Received for detailed petrographic examination was a concrete core from Charles B. Guzzetta of SJB Services, Inc.

The core, reportedly, came from Level B of the Midtown Garage at 110 South Clinton in Rochester, New York.

The purposes of the investigation are to determine the composition, quality, and condition of concretes in the core.

2. METHODOLOGY

The core was examined using the methods and procedures of ASTM C 856 "Practice for Petrographic Examination of Hardened Concrete." Petrographic examinations include:

(1) Detailed visual examinations of the core, as received;

(2) Low-power, stereomicroscopical examinations of freshly fractured and lapped cross sections of core at magnifications of up to 100X; and

(3) Examinations of oil immersion mounts and thin section of concrete in a petrographic microscope at magnifications of up to 1000X.

3. LABORATORY STUDIES

3.1 SAMPLE

Photographs and Dimensions – Figure 1 shows the core, as received. Figures 2 and 3 show lapped cross section of the core containing two different concretes. The core has a diameter of $3^3/_4$ in. and a nominal length of $5^1/_2$ in.

Surfaces – Adhered to the top end of the core is a thin elastomeric waterproofing membrane having a nominal thickness of 1.2 mm.

Cracks, Joints, and Large Voids – There are no large cracks, joints, or voids found in the core.

Embedded Items – The core does not contain any reinforcing steel, mesh, or fibers in any concrete.

Resonance – The core has a ringing resonance, when hammered.

3.2 PETROGRAPHIC EXAMINATIONS

3.2.1 Coarse Aggregate

Type and Nominal Maximum Size – Coarse aggregate is crushed limestone-dolomite in both topping and substrate concretes having nominal maximum size of $^{1}/_{2}$ and $^{3}/_{4}$ in., respectively.

Properties (Color, Angularity, Density, Hardness, Shape, Alteration, Coating, Cracking) – Particles are angular, dense, hard, dark gray, massive-textured, equidimensional, unaltered, uncoated, and uncracked. Particles contain pure limestone and dolomite in the topping concrete and siliceous limestone, and dolomite in the substrate concrete. Some particles are porous but have no effect on concrete.

Gradation and Distribution – Particles are well-graded and well-distributed in both concretes (Figure 2).

Potential Alkali-Aggregate Reactivity – There is no evidence of alkali-aggregate reaction in the coarse aggregate.

3.2.2 Fine Aggregate

Type and Nominal Maximum Size – Fine aggregate is natural siliceous-calcareous sand in both concretes having a nominal maximum size of $^{3}/_{8}$ in.

Properties (Color, Angularity, Density, Hardness, Shape, Alteration, Coating, Cracking) – Particles are subangular to subrounded, clear, light to medium gray brown, white, dense, hard, massive-textured, equidimensional, unaltered, uncoated, and uncracked. Particles contain quartz, quartzite, feldspar, sandstone, siltstone, dolomitic chert, limestone, dolomite, shale, ferruginous rocks, and mafic minerals.

Gradation and Distribution – Particles are well-graded and well-distributed in both concretes (Figure 2).

Potential Alkali-Aggregate Reactivity – There is no evidence of alkali-aggregate reaction in the fine aggregate.

3.2.3 Paste

Properties (Color, Hardness, Porosity, Luster) – Paste is darker gray in the topping concrete and relatively denser and harder than that in the substrate concrete. Freshly fractured surfaces have subvitreous lusters and subconchoidal textures.

Residual and Relict Portland Cement Particles – Residual and relict portland cement particles are present and estimated to constitute 8 to 10 percent in the topping concrete, and 6 to 8 percent of the paste volume in the substrate concrete (Figure 5).

Calcium Hydroxide – The calcium hydroxide component of cement hydration occurs as small, platy, patchy units and is estimated to constitute 4 to 5 percent of the paste volume.

Degree of Cement Hydration – Hydration of portland cement is normal.

Pozzolanic and Cementitious Materials – Besides portland cement, there is no evidence of use of any other pozzolanic or cementitious materials in any concrete.

Estimated *w/c* and Portland Cement Content – The textural and compositional features of the pastes are indicative of portland cement contents estimated to be 6 to $6^1/_2$ bags in the topping concrete and $5^1/_2$ to 6 bags in the substrate concrete, per cubic yard, and water-cement ratios estimated to be 0.40 in the topping and 0.50 in the substrate concrete.

Secondary Deposits, Carbonation – There is no evidence of any deleterious secondary deposits found in the concretes.

Aggregate-Paste Bond – Bond between the coarse and fine aggregate particles and paste is tight.

Microcracking – There is no evidence of any microcracking due to any deleterious effects in any concrete.

3.2.4 Air

Air occurs as: (a) numerous fine, discrete, spherical and near-spherical voids having sizes up to 1 mm; and (b) a few coarse, near-spherical and irregularly shaped voids having sizes up to 3 mm. The former voids are characteristic of entrained air and the latter voids are voids are characteristic of entrapped air.

Both concretes are air-entrained, having excellent air void systems, and amounts estimated to be 5 to 6 percent.

Figure 4 shows the good air void systems in two concretes.

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Dipayan Jana, PG
President, Petrographer

DJ:jlh

Figure 1: Shown are: (a) the top surface with waterproofing membrane, (top left photo); (b) the bottom fresh fractured surface (top right photo), and (c) side view (bottom photo) of the core as received.

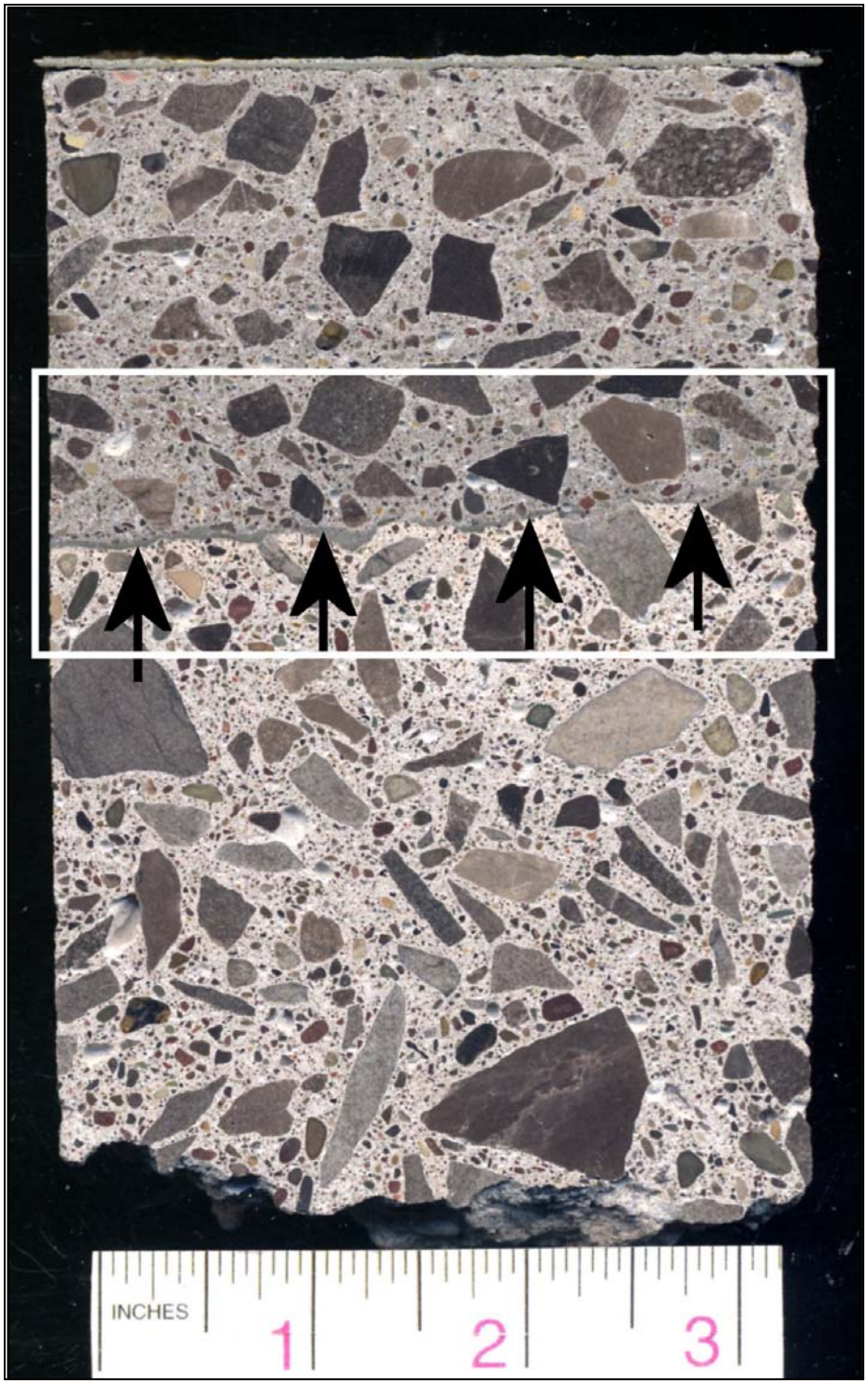

Figure 2: Lapped cross section of core showing the waterproofing membrane, topping concrete, and substrate concrete with a thin neat paste bond coat intimately bonding the topping and substrate concretes (boxed and enlarged in the next photo). Notice good grading and distribution of aggregates in both concretes.

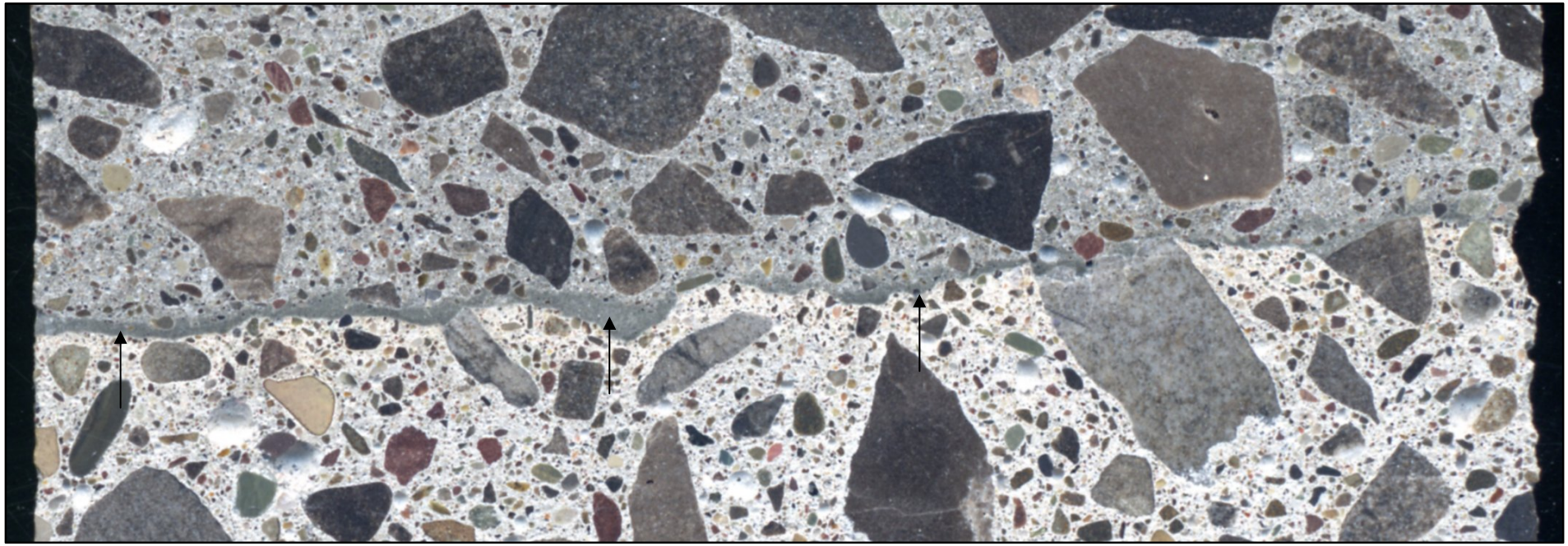

Figure 3: Enlarged view of the boxed area from Figure 2 showing the intimate bond between two concretes and the presence of a thin neat paste bond coat (arrows).

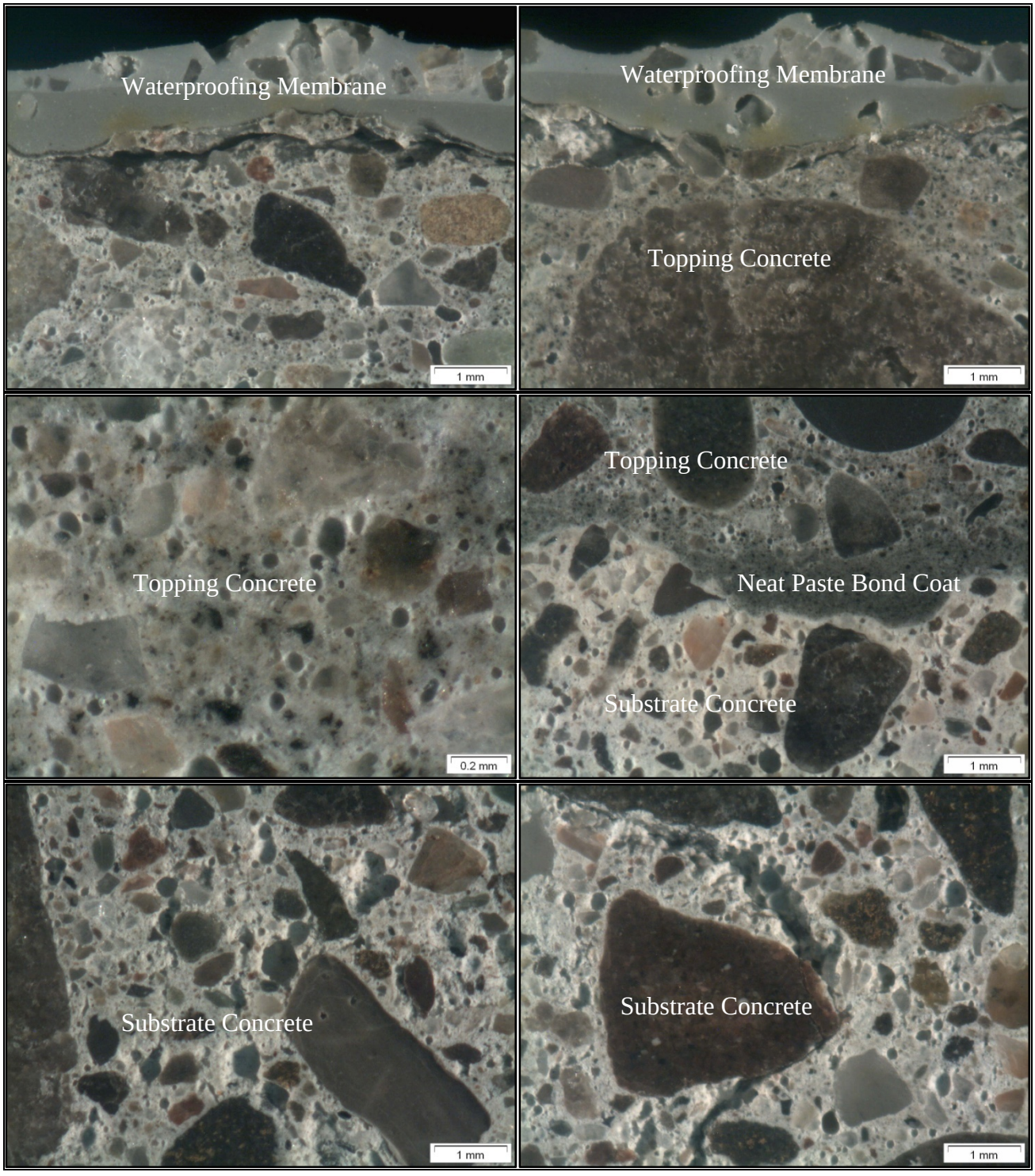

Figure 4: Photomicrographs of lapped cross section of the core showing: (a) the waterproofing membrane consisting of two applications (top photos), (b) the topping and substrate concretes intimately bonded by a thin neat paste bond coat (middle photos); and (c) the substrate concrete (bottom photos).

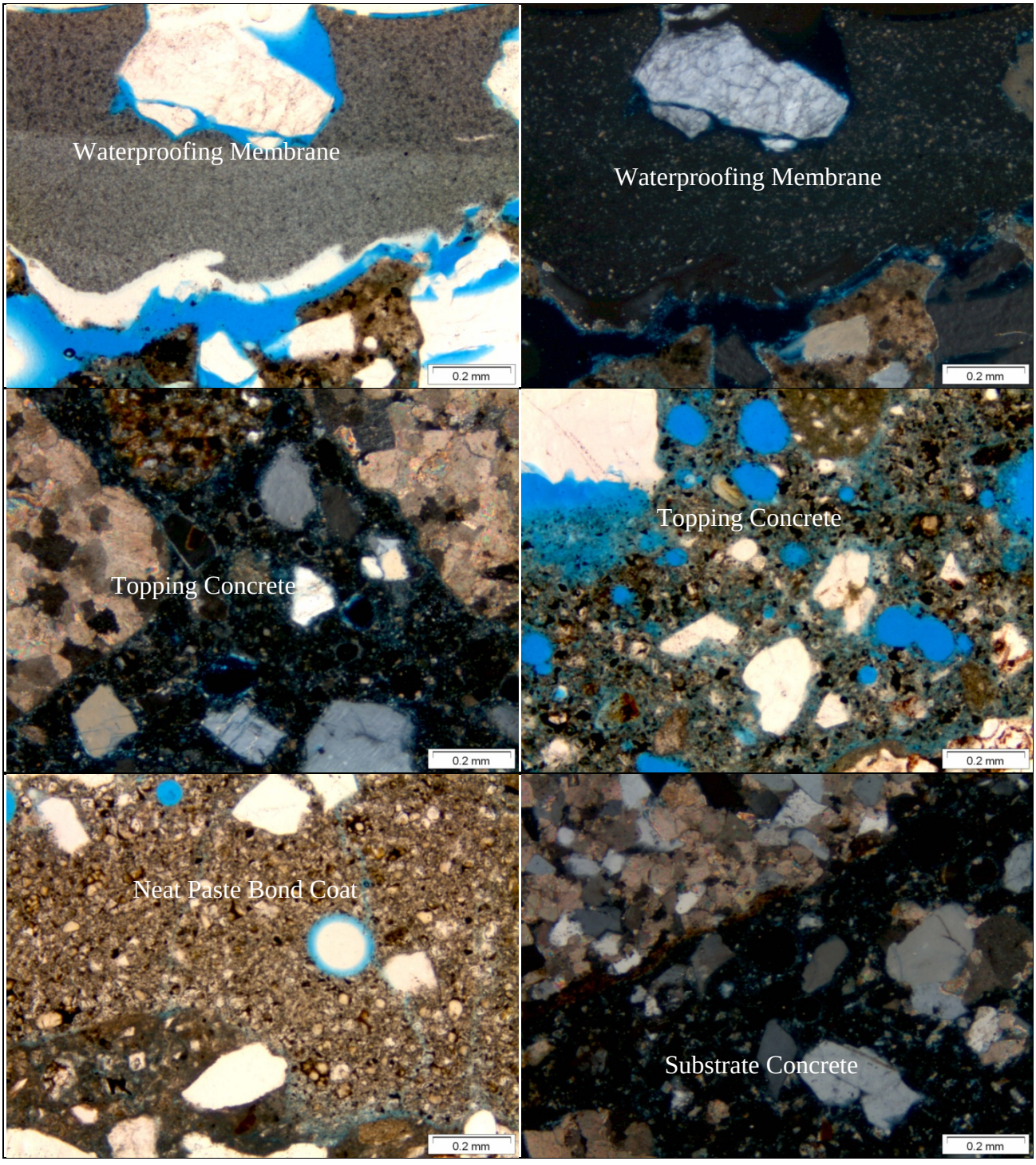

Figure 5: Photomicrographs of thin section of the core showing: (a) the waterproofing membrane consisting of two applications (top photos), (b) the topping and substrate concretes intimately bonded by a thin neat paste bond coat (middle photos); and (c) the substrate concrete (bottom photos).

APPENDIX D –
SCOPE OF SERVICES

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RESTORATION CONSULTING - CONDITION APPRAISAL

1. Perform a review of the parking structure to identify and document deterioration conditions and quantities including:

    a. Review existing documents provided by the City of Rochester, including original construction documents and previous reports and repair documents prepared by other consultants. We anticipate that LaBella Associates will obtain copies of existing documents and reports and provide them to Walker Parking Consultants.
    b. Meet with City of Rochester, the City's parking operator and other facilities maintenance personnel to discuss the current needs and concerns for the parking structure.
    c. Perform visual observations of concrete structural elements (floors, beams, columns, stair towers, façade, etc) within the structure. Review of the plaza level slab will include only the underside (ceiling) surface for cracking, deterioration, and/or leaking. We will also perform acoustic impact testing to determine hidden concrete delaminations on the floor surfaces. We will utilize the staff of Walker Parking Consultants for the completion of this item.
    d. Perform visual observations to evaluate the general condition of the waterproofing systems such as existing traffic bearing waterproofing membranes, expansion joints, and sealants. Evaluation of the existing plaza waterproofing system is not included except for documenting locations of observed leakage through the slab.
    e. Perform a limited visual review of the condition of the electrical and mechanical items in the parking garage. Our review will only be visual in nature and will provide our opinion of replacement cost if necessary.

        i. HVAC systems inside offices and storage rooms
        ii. Electrical systems, including lighting and power distribution panels
        iii. Fire suppression systems
        iv. Security system, note: this is a review of the physical condition of the equipment, not a garage security review. We will not assess the remaining service life of the equipment with respect to effectiveness as a security device.
        v. Ventilation fans for removing CO (exhaust) from the garage

vi. Plumbing systems, including water washdown system and drainage system
vii. Parking access control and revenue systems for their physical condition

f. Notify the City of Rochester immediately of any identified conditions that may pose a potential hazard to public safety.

2. Engage a qualified materials testing company to obtain eight (8) concrete core samples and analyze the concrete cores for:

a. Compressive strength for comparison to original design intent
b. Chloride contamination (water-soluble chloride concentration vs. depth) for evaluation of corrosion potential of embedded reinforcing steel
c. Concrete material durability properties by microscopic analysis (Petrographic examination)

3. Compile field data and identify deterioration conditions and quantities that require repair.
4. Develop two (2) repair scenarios and their associated probable construction costs for the conditions observed. The repair scenarios will be evaluated based on the current need for repairs, previously performed repairs and maintenance, intended future use of the site, and useful remaining service life of the structure.
5. Develop a report summarizing our findings, recommendations and associated probable construction costs. We will meet in person with the City of Rochester to review the draft report and incorporate comments that they may have prior to issuing a final report.