

Our File No.: M08-123
March 5, 2009

2348 Yukon Street
Vancouver, BC
Canada V5Y 3T6
Phone 604 872-1211
Fax 604 872-1274

Markham
43 Niven Street
PO Box 3364
Napier 4142, New Zealand
(Email: sales@markhamdistributing.co.nz)

Attention: Mr. Graham Smith

Dear Sir:

Re: 1155 Homer Street, Vancouver, BC
– Concrete Parkade Slabs Protected With Aquron 2000 System

This report is in response to your request and the subsequent mandate from you for us to review and revisit three large concrete parkades that were treated with Aquron 2000 approximately 18 years ago. This report includes observation and testing reports on three parkades that the writer has intimate knowledge of the construction of the parkades and the subsequent treatment of the top surfaces of the exposed concrete slabs with Aquron 2000.

1.0 Synopsis

1. Part of the reason for testing of Aquron 2000 on parkade slabs was to determine if the Aquron system would produce resistance to the passage of road salt chlorides, which penetrate concrete slabs, reaching the rebar and causing corrosion.
2. The results of our investigation at the present time indicates indeed, that Aquron 2000 has produced results comparable to urethane traffic membranes, which are usually considerably more expensive than the Aquron treatment.

2.0 Historical Review

1. The writer received his masters of engineering in concrete technology at McGill University, Montreal, Canada in 1956. His Masters research was funded by a scholarship from one of Canada's largest ready-mix firms.
2. The writer's experience in parkade construction, analysis, overview, design, etc. began in 1954 in Montreal, and has continued without interruption to the present. The number of parkades involved in his consulting practice would be in excess of 3000.
3. The writer was part of the Canadian Standards Association Committee dealing with durability of concrete.
4. The writer was a member of Structural Engineers Group, formed to advise the City of Vancouver on matters relating to parkade slabs and deterioration thereof.

3.0 Records

1. See Appendix A attached for a copy of reports prepared by the writer. It is self explanatory.
2. Unfortunately, our files on the three parkades involved in this report have been destroyed. We have reconstructed the data based upon Mr. Spratt and Mr. Lee's recollections. They were both involved in the parkades in question.

4.0 Aquaron Specifications

1. See Appendix B attached for the material specification and the installation standards set by the manufacturer. These were followed for the subject parkades.

5.0 Reviews and Testing

1. **1155 Homer Street parkade Vancouver.**
 - See Appendix A attached for details of this parkade and results of tests.
 - The writer visited and inspected the parkade at 1155 Homer Street on October 16, 2008.
 - The parkade is in excellent condition, with no evidence of any leakage, spalling, or abnormal cracking.
2. **Grandview Court, 10523 West Whalley Ring Road & Parkview Court, 10533 West Whalley Ring Road**
 - The ramp, with no protection other than Aquaron, and suffering the highest salt concentrations has absolutely no signs of any spalling, unusual cracking, scaling.
 - The remainder of the one level parkade is the same as the ramp.
 - I conducted 6 water penetration tests, and noticed good resistance to water penetration.
 - This parkade 18 years old is subjected to about 80-100 cars coming and going each day.
 - At the time of my visit, all the streets in the area were heavily salted, due to the 4" snowfall in Surrey the night before.
 - In December and January, Surrey had several feet of snow, multiple freeze-thaw cycles, and heavy salting on all roads.
 - The Property Manager, who has been present at the building for 15 years, said there have been no additional treatments or maintenance conducted to the slab or ramps.
3. **Pacific Plaza, 1180 McKim Road, Richmond**
 - This parkade is two storeys above grade.
 - The lower level is at grade, and is reinforced concrete, Aquaron-treated.

SEE

- The concrete ramp going to the second floor is exposed, Aquaron-treated concrete.
- The second floor is a traffic-membrane coated deck. It is failing at many locations.
- The top level is exposed concrete, Aquaron-treated, and shows no evidence of any freeze-thaw/salt-attack deterioration.
- Concrete slabs and ramps were checked at several locations for water penetration and absorption. Results satisfactory.
- Original trowel marks still present with almost no erosion of the surface, at the top deck which is fully exposed to the elements. This is in spite of 18 years of Vancouver's acid rain which has not managed to cause the typical surface erosion with untreated concrete.
- The non-Aquaron membrane, second deck, at areas where it is failed is showing surface erosion caused by salty water and acid rain.

We trust the above information meets your requirements. Please contact the writer if there are any questions.

Yours truly,
SPRATT EMANUEL ENGINEERING LTD.

Per:


Gordon W. Spratt M.Eng., P.Eng.

GWS/gm/encl.



**GORDON
SPRATT & ASSOCIATES LTD.**

CONSULTING PROFESSIONAL ENGINEERS
2348 Yukon Street, Vancouver, British Columbia
V5Y 3T6 Phone (604) 872-1211
Fax (604) 872-1274

Our File No. A-068-01

September 10th, 2001

AQRON CORPORATION
P. O. Box 758
Rockwell, Texas USA
75087

Attention: Mr. Ken Solomon

Dear Sir:

Re: Aquron CPT 2000, Concrete Preservation Treatment
-Historical Evaluation

During the last 9 years, on an annual basis, Gordon Spratt & Associates Ltd. (GS&A) has performed testing in accordance to ASTM C876-80 "Standard Test Method for Half-Cell Potential on Reinforcing Steel in Concrete", for the entire parkade at a project at 1155 Homer Street, Vancouver, B.C., Canada. We received from the City of Vancouver an equivalency to CSA S-413, "Parking Structure Guide", to use an alternate mix design incorporating Aquron CPT 2000, Concrete Preservation Treatment for the subject suspended parkade slabs and ramps.

The Owners of the high-rise complex could eliminate the annual maintenance costs inherently associated with traffic deck membranes, because of the mix design and the Aquron 2000 CPT penetrating treatment.

The annual tests utilizing the above ASTM method and the results of the tests have been interpreted. We find there is a 95% or higher probability that there is no corrosion of the reinforcing steel in the suspended slab and ramps of the subject parkade. We can safely state that the performance of the suspended slabs and ramp concrete is excellent, and that the Aquron CPT 2000 enhanced the overall performance of the concrete.

GORDON SPRATT & ASSOCIATES LTD.

Our File No. A-088-01

Utilizing the Windsor Probe Test System, we originally found that at 28 days, the in-situ concrete treated with the Aquaron CPT 2000 at two coats, at approximately 250 sq.ft. per Imperial gallon, was 47.6 MPa (C) vs the standard lab cured cylinders tested at 37.2 MPa (C). The Windsor Probe test results were originally correlated with test specimens fabricated from the proprietary concrete mix under controlled field and laboratory conditions.


Our results in testing this particular parkade structure in downtown Vancouver, British Columbia Canada is supportive of the controlled laboratory tests performed during the Aquaron test program by ourselves and others.

If there are any questions with regard to the above please do not hesitate to contact the writer.

Yours truly,

GORDON SPRATT & ASSOCIATES LTD.

Per:

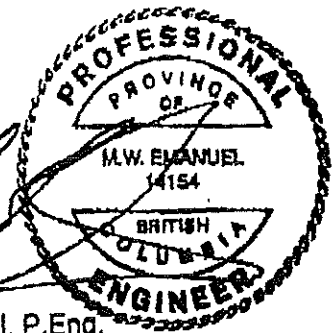


Don E. Lee
Project Consultant
DEL/op

Reviewed by:



Mark Emanuel, P.Eng.
Chief Engineer



**GORDON
SPRATT & ASSOCIATES LTD.**

CONSULTING PROFESSIONAL ENGINEERS
2348 Yukon Street, Vancouver, British Columbia
V5Y 3T6 Phone (604) 872-1211
Fax (604) 872-1274

FAXED

Our File No. C-740-92
Method of Testing
AASHTO T-259-80(1990)

March 1st, 1993

ConTreat Sales
1375 Palmerston Avenue
West Vancouver, B.C.
V6L 2E2

Attention: Mr. Keith Margetson

Dear Sir:

Re: 1155 Homer Street, Vancouver, B.C.
- Parkade
- Evaluation of Aquaron 2000 as a Chloride Barrier

On October 3rd, 1992, two 4 inch diameter by 3 inch deep cores were drilled from parkade slabs. The first core was from the P3 floor slab placed on September 16th, 1992, and the second core from the P1 floor slab placed September 29th, 1992 pour. Aquaron 2000 had been applied to these concrete slabs on the same date as placement, at a coverage rate of approximately 200 square feet per gallon.

After drying of the cores in laboratory air for 28 days, a light sandblast was done to the top surface of the cores, to simulate wear from vehicular traffic. Exterior dams were applied to the top surfaces of the cores, and a 0.5 inch deep solution of 3% Sodium Chloride was applied on November 4th, 1992.

The test specimens were subjected to continuous ponding of the chloride solution for 90 days. Schedule A attached presents "Standard Method of Test for Resistance of Concrete to Chloride Ion Penetration AASHTO Designation: T 259-80(1990)". This is the procedure that we have followed.

1.0 RESULTS

| SAMPLES TAKEN FROM FLOOR SLABS AT CITY TOWER PROJECT, 1155 HOMER STREET, VANCOUVER | | | |
|---|--|--|-----------------------------------|
| SAMPLE LOCATIONS SAMPLE DETAILS | P3 SLAB POURED ON SEPT. 16th, 1992 | P1 SLAB POURED ON SEPT. 29, 1992 | COMPOSITE BASELINE SAMPLE * |
| SAMPLE DEPTH | PERCENTAGE OF WATER SOLUBLE CHLORIDES BY WEIGHT OF CONCRETE | | <0.01 |
| 1.6 mm TO 13 mm | 0.11% | 0.11% | <0.01 |
| 13 mm to 25 mm | 0.021% | 0.012% | |

*Prior to Chloride exposure.

2.0 DISCUSSION

2.1 The values at the surface are below the ACI recommended limit of 0.15%, i.e., for reinforced concrete exposed to chlorides in-service.

2.2 The internal chloride values at 0.021 and 0.012, are considerably less than the allowance for reinforced concrete exposed to chloride in-service (0.15% maximum) and, in fact are approximately 1/3 or less than the value allowed for prestressed concrete.

2.3 See Appendix "A" which presents the ACI chloride limits.

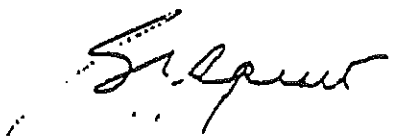
The results indicate that Aquaron 2000 acts as an effective chloride barrier.

We have retained the samples, for further review by others, if required.

Yours truly,

GORDON SPRATT & ASSOCIATES LTD.

Per:



SPECIFICATION

1. PRODUCT NAME

AQURON™ Concrete Preservation Treatment-2000
ACPT-2000 is a clear Aquas borne sub-surface molecular bonding and water proofing solution/treatment.

2. MANUFACTURER

American Masonry Protection, Inc.
Post Office Box 758
Rockwall, Texas 75087
(800) 662-2688



3. PRODUCT DESCRIPTION

Basic Use: AQURON™ 2000 is a permanent clear treatment/preservative/sealant solution for new or old concrete installations. AQURON™ 2000 will seal the matrix and significantly preserve its imbedded steel. AQURON™ 2000 is a highly reactive catalytic agent which reacts with free alkali and/or alkaline hydrates by internally producing a silica aero gel which fills the pore spaces and the voids around aggregate. Furthermore, alkali is converted to a neutral compound structure, reducing the potential for internal chemical reactions. More density is added, additional bonding strength is provided and concrete is permanently hydrostatically sealed from within.

AQURON™ 2000 is an ideal primer for concrete or other masonry surfaces to be painted or coated since it enhances the surface's bonding quality. AQURON™ 2000 prevents peeling, cracking and loss of bond caused by capillary moisture or internal chemical reactions that can cause saponification.

AQURON™ 2000 will not alter the surface's appearance or physical characteristics and will enhance surface traction quality, making it ideal for use on all new or existing concrete installations including bridges, decks, streets, airport runways, parking lots, parking garage decks, sidewalks, driveways, slabs, etc.

The use of AQURON™ 2000 will significantly protect concrete from damages (spalling, etc.) caused by freeze-thaw cycles, especially where road salt or calcium chloride has been used. AQURON™ 2000 neutralizes existing internal corrosives or acids preventing internal chemical reactions. Also, AQURON™ 2000 severely retards the rusting or corroding of imbedded steel.

AQURON™ 2000 will arrest or at least severely retard concretes being deteriorated by alkali-aggregated reactions. In addition, by treating concrete not yet affected, the potential will be virtually eliminated.

Some Attributes:

Seals Matrix
Hardens Surface

Stays Pliable, concrete can breathe
Application is permanent
Stops hydrostatic weeping from negative or positive side while weeping
Adds density and bonding strength
WaterProofs
Resists Freeze/Thaw Spall-Off
Stops penetration of oil or grease
Increases thermal resistance
Resists fungus and mildew
Retards dusting and pitting
Makes removal of ice easier
Neutralizes internal corrosives
Non-toxic
Severely retards capillary action
Preserves imbedded steel
Clean equipment using only water

Limitations: Spills or spray droplets in contact with glass should be removed immediately by flusing with water and NOT ALLOWED TO DRY, as etching can occur.

Some discoloration of aluminum can occur.

Do not apply ACPT-2000 when air and/or substrate temperatures are less than 37° F and will not decrease to less than 37° F for 6 hours.

Composition: AQURON™ CPT-2000 is a highly reactive catalytic agent in a water borne proprietary silicate base which produces a Silica Aero Gel below the surface and inside its matrix.

Applicable Standards: AQURON™ CPT-2000 meets or exceeds the following standards:

ASTM C-67 Section 7 (Water absorption)
ASTM C-67 Section 9 (Suction)
ASTM C-67 Section 10 (Efflorescence)
ASTM C-666 (Freeze-thaw resistance)
ASTM 6-23-69 (Artificial weathering)
ASTM C-666 (Salt attack resistance)
AASHTO T260 (Chloride ion content)
AASHTO T259-78 (Chloride ion penetration)
ASTM C-309-74 (Curing compound)
USDA APPROVED FOR USE IN FOOD PROCESSING AREAS
VOC/VOS Compliant

4. TECHNICAL DATA

Physical: Liquid
Color: Clear
Odor: None
Specific Gravity: 1.19
Ph: 11
Weight per gallon: 9.18 pounds
Boiling Point: 230° F
Flash Point: None
Freeze Temp: 0 Degrees C
Freeze Harm: None
Flammability: None
Toxicity: None
Resistance to U.V.: Excellent
Paintable: Yes
Pollutants: None

Hazardous Vapors: None

Waste Disposal Methods:

Non-Hazardous

Environmentally: Neutral

User: Friendly

Resistance to Abrasion: Excellent

VOC/VOS, Compliant: Yes

Shelf Life: Indefinite

Clean Up Solvent: Water

Polymerization: Excellent

Solids Before Applied: NIL

Solids After Applied: 100%

R-Factor Increase: Up to 20%

Recommended Coverage:

150-200 Sq. Ft. Per U.S. Gallon

5. INSTALLATION

A. Job Conditions

1. Do not proceed with application of ACPT-2000 when ambient temperature and/or substrate temperatures are less than 37° F or forecasted to drop below 37° F during the next six(6) hours.
2. Should temperatures be extremely hot, cool surface with sufficient water to decrease temperature.
3. Caution should be taken in windy conditions as ACPT-2000 if allowed to dry on glass can etch. (Flush immediately with water should contact with glass occur).
4. ACPT-2000 is a water borne product and as such must have access to the surface, any previous coatings or heavy build ups of oil or grease must be removed. (ACPT-2000 can penetrate through some coating, a test area is recommended to see if penetration is possible).

B. Application Procedure (for established cured concrete)

1. Coverage Rate is from 150 to 200 Sq. Ft. per gallon depending on porosity size.
2. Application to established cured concrete must be made using a medium to high pressure airless paint sprayer with an .019 25 degree fan spray tip.
3. Prewet with tap water area of application to dampen, all pooled and puddled areas must be removed. Continue to keep area damp till ACPT-2000 has been applied.
4. Always start application to lowest possible area first and proceed to the higher elevations. On verticle applications (walls) start at bottom and proceed up the surface.
5. When application is to weeping hydro-static walls or floors two coats are recommended,
 - Second coat applied immediately following first coat.