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POINTE TOWERS CONDOMINIUM
ST. PETE BEACH, FL
IMPRESSED CURRENT CATHODIC PROTECTION
BIANNUAL SYSTEM INSPECTION

Prepared for:
Pointe Towers Condominium

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Introduction

The Pointe Towers Condominium in St. Pete Beach, Florida, has an impressed current cathodic protection (ICCP) system that is intended to mitigate steel reinforcement corrosion from occurring along the building's ocean-facing reinforced concrete balconies and columns. The ICCP system implements a conductive coating that has been applied to the top surface of each balcony and along the exterior faces of each column. The coating impresses a current onto the reinforcement, which lowers the steel's potential, thereby passivating the steel. The system was activated (commissioned) in 2008. VCS Engineering, Inc. (VCS) has been commissioned to provide bi-annual monitoring of the system. VCS performed the first set of diagnostic measurements on February 14th and 15th, 2019. VCS collected the fourteenth set of measurements on August 27th and 28th, 2025.

System Performance Measurements

During the VCS site visit, performance data of the ICCP system was collected. Reference electrodes are sensors that have been previously installed within specific balconies so that the performance of the ICCP system can be monitored and verified against the Association of Materials Performance and Protection (AMPP) criteria for cathodic protection. The applicable standard for this project is *NACE SP21520 Acceptance Criteria for Cathodic Protection of Steel in Concrete Structures,* published by AMPP. Section 3, "Criteria," identifies the criteria for cathodic protection as follows: (the following text in the italic font is quoted directly from the standard)

3.6.1 100 mV Polarization Development/ Decay Criterion

3.6.1.1 A minimum of 100 mV of polarization should be achieved at the most anodic location in each area or zone or at artificially constructed anodic site, provided its native corrosion potential, or decayed off-potential, is more negative than -200 mV (versus a copper/copper sulfate reference electrode [CSE] with a measured potential adjusted to 20°C as the measured potential drifts significantly with temperature), -134 mV Ag/AgCl [KCL 0.5 M/seawater], or -83 mV vs. Ag/AgCl [KCl sat]. If the corrosion potential or decayed off-potential is less negative than -200 mV CSE, then the steel is passivated, and no cathodic protection minimum polarization is required.

3.6.1.2 When the polarization decay method is used, the decay should be determined by interrupting the protective current and monitoring the reinforcement's Potential measured relative to a stable reference electrode. When the current is interrupted, an immediate voltage shift that is the result of eliminating the IR drop occurs. This shift should not be included in the polarization measurement. The Potential of the steel immediately after the shift (instant-off Potential measured between 0.1 and 1.0 seconds after interrupting the current flow) shall be used as the initial value from which to measure polarization. Figure 1 depicts a typical polarization decay curve. Polarization equals the reinforcing steel's decay potential subtracted from the instant-off Potential.

3.6.1.3 Polarization development should be determined by measuring the Potential immediately before applying current to the reinforcing steel (native corrosion potential) and measuring the instant-off Potential at intervals of time during the polarization of the steel reinforcement. The polarization equals the reinforcing steel's instant-off Potential subtracted from the native Potential (Base) as depicted in Figure 1.

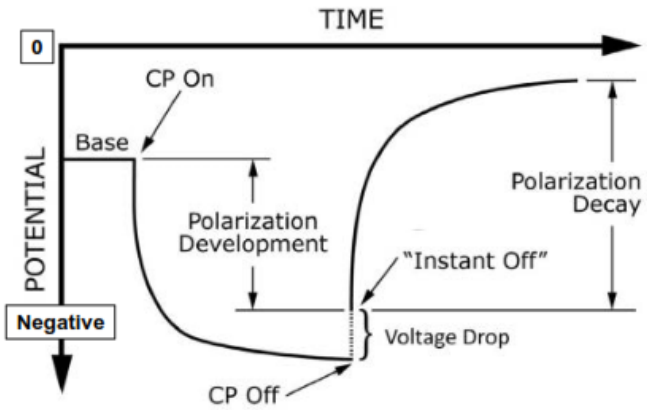


Figure 1: Typical Polarization Decay and Development Curves

3.6.1.4 Changes in environmental conditions, such as temperature and moisture, can significantly change the native corrosion potential, decayed off-potential, the Potential of reference electrodes, and the rate of decay being measured from one day to the next. Therefore, the corrosion engineer shall monitor for the impact of these phenomena throughout the polarization measurement test period to ensure these conditions have not affected the readings. The period for potential decay or polarization development is largely determined by oxygen availability at the reinforcement surface and is not a reflection of the performance or efficiency of the cathodic protection system. Longer periods of decay or polarization development are required for less permeable, coated, or water-saturated concrete.

Prior to performing the reference electrode measurements, VCS checked the electrical continuity of the test connections. It was determined that all the test connections were electrically continuous with each other, with the exception of balconies B3N and 4N, which were previously found to be electrically isolated from any other test connections and from the structure connections. No new discontinuous test connections were discovered. Therefore, all the measurements for balconies B3N and 4N were made by connecting the multimeter to their respective structure connections instead of the test connections. The electrical continuity of all structure connections was verified as well, and all the structure connections were determined to be electrically continuous.

Table 1 provides the results of the reference electrode measurements conducted during VCS's site visit. VCS performed instant off measurements on each reference electrode, then allowed the whole system to depolarize for 24 hours. This allowed VCS to determine if the AMPP criteria for cathodic protection were being met. The green Reference Electrode ID in Table 1 indicates that the reference electrode passed at least one of the AMPP criteria, while being highlighted red means that none of the AMPP criteria were met. In addition, the 24 Hr Off-Potential and Depolarization columns were highlighted green if these cells met the NACE criteria for cathodic protection.

The ICCP system has only 12 reference electrodes; therefore, testing of these reference electrodes can only provide information regarding their particular balconies and not the building as a whole. The collected measurements were similar to those observed during the previous site visits. The change in the Instant Off Potential, 24 Hr Off Potential, and depolarization over this time period and the previous visits are plotted in Figure 2 through Figure 4. The 24 Hr Off Potentials were generally uncharged, which indicates that the system is performing properly.

Table 1: Reference Electrode Performance Data

Reference Electrode ID	On Potential (mV vs. CSE)	Instant Off Potential (mV vs. CSE)	IR Drop (mV)	24 Hr Off Potential (mV vs. CSE)	Depolarization (mV)
B2N	-131	-107	24	64	171
B3N	-152	-144	8	44	188
4N	-62	-60	2	-44	16
B5N	-257	-86	171	106	192
C6N	-147	-120	27	84	204
B6N	-51	-48	3	-7	41
C2S	-240	-24	216	48	72
B2S	-103	-94	9	-13	81
4S	-168	-129	39	43	172
C5S	-151	-135	16	-7	128
B5S	-115	-112	3	-106	6
7S	-120	-105	15	-27	78

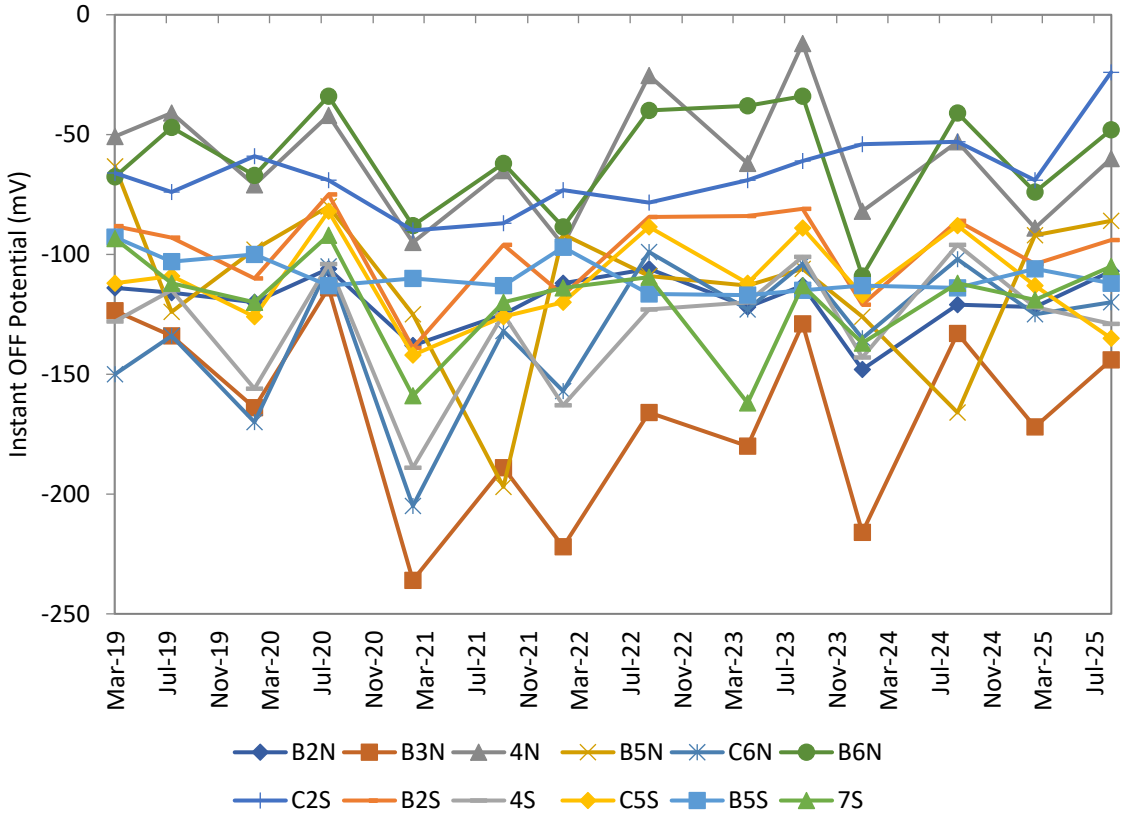


Figure 2: Development of Instant OFF Potential over Time

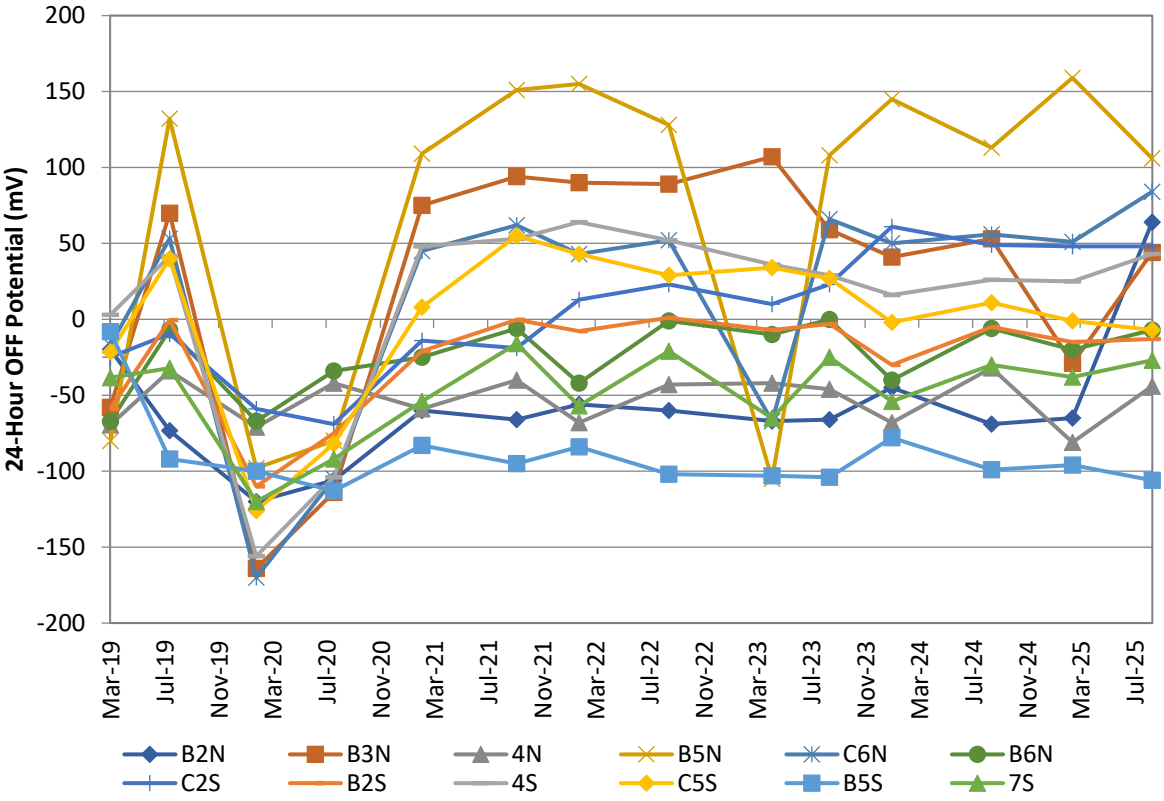


Figure 3: 24-Hour OFF Potentials Over Time

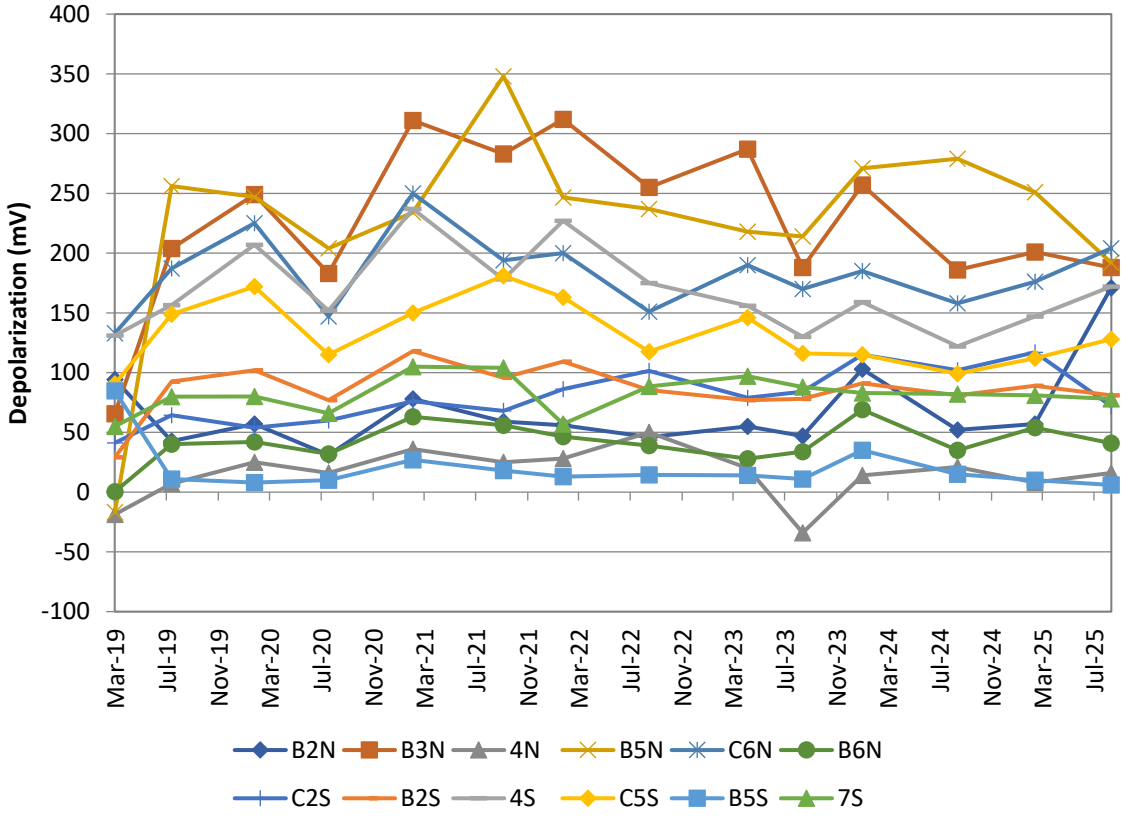


Figure 4: Depolarization over Time

A review of the data indicates that all 12 reference electrodes meet the AMPP criteria for passive steel, as the reference electrodes at the 24-hour Off Potential are more positive than -200 mV vs. CSE. All the electrodes had substantial depolarization, which indicates good current flow from the CP system to the balcony reinforcement. The exceptions were balconies B5S and 4N, which did not have much polarization, the same as during the previous site visits.

Table 2 provides the current measurements made across each unit's shunt during the previous site visit. A shunt is a calibrated resistor that allows for a potential reading to be made across it to determine the current flowing through the shunt. A shunt provides a much easier way to measure current in a DC circuit. The shunts used at Pointe Towers are 0.1 Ohms; therefore, to measure current, the potential in mV is measured across the shunt, and then that voltage reading is divided by the shunt resistance to determine current in mA. All the balconies have a fairly even current flow, similar to the previous inspection. The currents through the shunts recorded during this site were slightly higher than those recorded during the previous visit. The change in current to each balcony over time is shown in Figure 5.

Table 2: Current to Each Balcony

Balcony ID	Current (mA)	Balcony ID	Current (mA)
B2N	13	C2S	9.5
B3N	11.5	B2S	14
4N	7.5	4S	14
B5N	9.5	C5S	12
C6N	11	B5S	12.5
B6N	12	7S	14.5

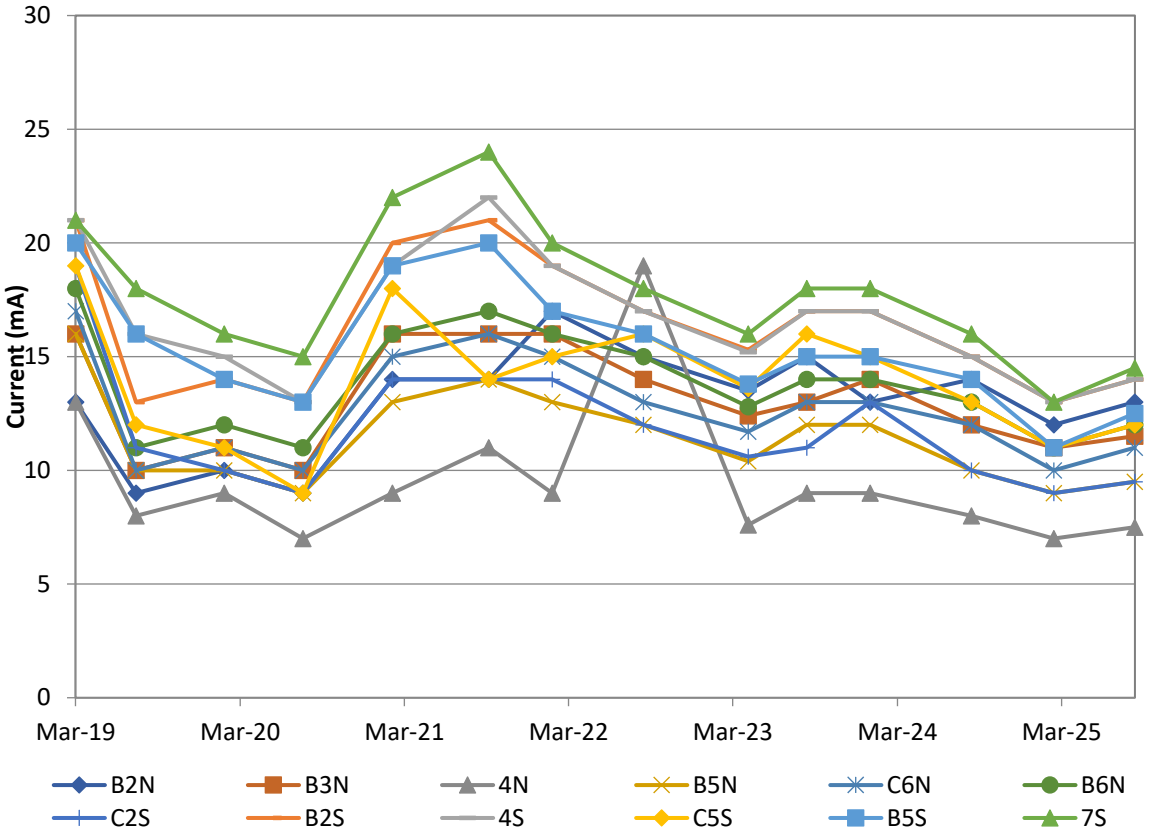


Figure 5: Current Distribution to Each Balcony

Table 3 provides the rectifier settings during VCS's site visit. The rectifier DC current output is stable as compared to the last site visit, returning to August 2024 values, while the voltage has slightly decreased. The rectifier voltage and current output are plotted in Figure 6.

Table 3: Rectifier Settings During Site Visit

Tap Setting	Coarse 1 Fine 1
DC Voltage	2.176 Volts
DC Current	0.49 Amps
Calculated ICCP Current Resistance	4.44 Ohms

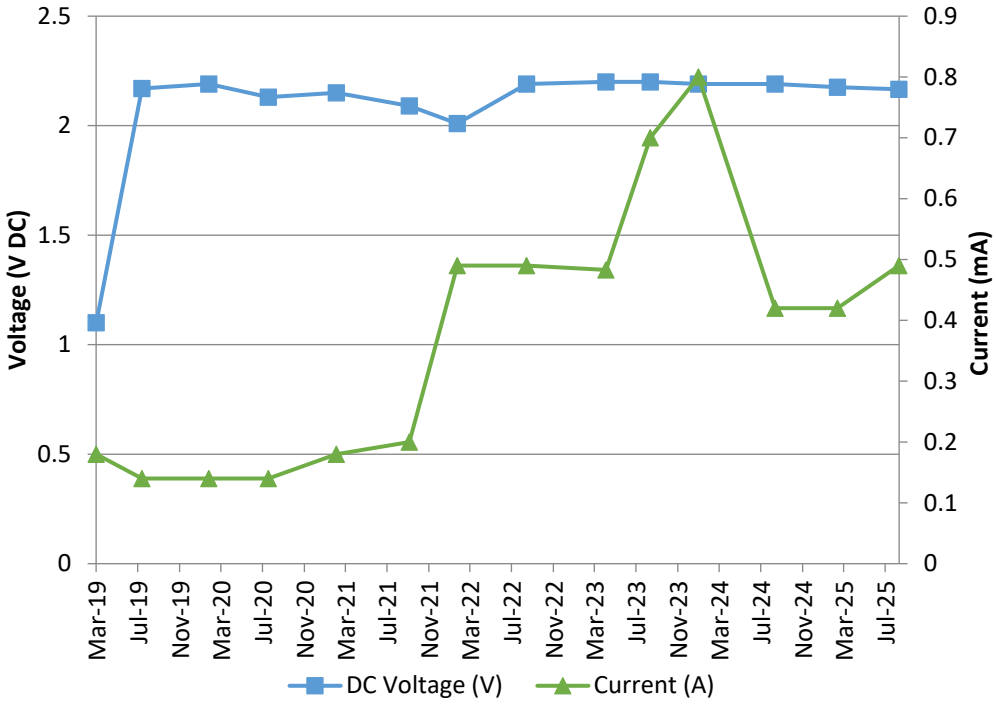


Figure 6: Rectifier Voltage and Current Over Time

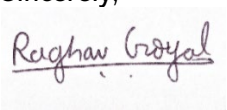
Conclusions

The system is performing well with 100% of the zones being protected from corrosion.

Recommendations

VCS has no recommendations at this time. Thank you for the opportunity to work with you on this project. If you have any questions, please do not hesitate to contact me directly.

Sincerely,



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