CLAIMS

1. An amusement park surveying system, comprising:
an amusement park feature comprising a retro-reflective marker covered by a surface treatment of the amusement park feature;
an emitter configured to emit electromagnetic radiation toward the retro-reflective marker;
a detector configured to detect retro-reflection of the electromagnetic radiation from the retro-reflective marker while filtering non-retro-reflected electromagnetic radiation; and
a control system communicatively coupled to the detector and comprising processing circuitry configured to:
monitor the retro-reflection of the electromagnetic radiation from the retro-reflective marker;
determine an intensity of the retro-reflection of the electromagnetic radiation from the retro-reflective marker;
compare the intensity of the retro-reflection of the electromagnetic radiation from the retro-reflective marker to a stored intensity in the control system; and
evaluate a degree of degradation of the surface treatment of the amusement park feature based on comparing the intensity and the stored intensity.

2. The system of claim 1, wherein the surface treatment of the amusement park feature comprises paint.

3. The system of claim 1, wherein the processing circuitry of the control system is configured to determine an amount of exposure of the retro-reflective marker with respect to the surface treatment of the amusement park feature based on the intensity of the retro-reflection of the electromagnetic radiation from the retro-reflective marker.

4. The system of claim 3, wherein the processing circuitry of the control system is configured to output a user-perceivable indication upon determining that the retro-reflective marker is fully exposed with respect to the surface treatment of the amusement park feature.

5. The system of claim 4, wherein the user-perceivable indication comprises a notification to reapply the surface treatment to the amusement park feature and over the retro-reflective marker.

6. The system of claim 1, wherein the amusement park feature is a building.

7. The system of claim 1, wherein the processing circuitry of the control system is configured to monitor the retro-reflection of the electromagnetic radiation from the retro-reflective marker upon reapplication of the surface treatment to the amusement park feature to determine the stored intensity.

8. The system of claim 1, wherein processing circuitry of the control system is configured to determine that a spectral shift has occurred on the amusement park feature based on comparing the intensity and the stored intensity.

9. The system of claim 8, wherein the spectral shift comprises paint fading.

10. An amusement park surveying system, comprising:
an amusement park feature comprising a retro-reflective marker;
an emitter configured to emit electromagnetic radiation toward the retro-reflective marker;
a detector configured to detect retro-reflection of the electromagnetic radiation from the retro-reflective marker while filtering non-retro-reflected electromagnetic radiation; and
a control system communicatively coupled to the detector and comprising processing circuitry configured to:
monitor a first phase of the electromagnetic radiation emitted from the emitter toward the retro-reflective marker;
monitor a second phase of retro-reflection of the electromagnetic radiation from the retro-reflective marker;
determine a phase difference between the first phase and the second phase;
evaluate a distance between the emitter and the retro-reflective marker based on the phase difference; and

determine that the amusement park feature has shifted based on the evaluated distance between the emitter and the retro-reflective marker.

11. The system of claim 10, wherein the amusement park feature comprises a track, and wherein the processing circuitry of the control system is configured to determine movement of the track relative to a support configured to support the track based on the evaluated distance.

12. The system of claim 10, wherein the processing circuitry of the control system is configured to monitor the first phase of the electromagnetic radiation emitted from the emitter toward the retro-reflective marker by modulating the electromagnetic radiation using a quartz crystal oscillator.

13. The system of claim 10, comprising an additional amusement park feature having an additional retro-reflective marker, wherein the processing circuitry of the control system is configured to:
monitor a third phase of the electromagnetic radiation emitted from the emitter toward the additional retro-reflective marker;
monitor a fourth phase of additional retro-reflection of the electromagnetic radiation from the additional retro-reflective marker;
determine an additional phase difference between the third phase and the fourth phase; and
evaluate an additional distance between the emitter and the additional retro-reflective marker based on the additional phase difference.

14. The system of claim 13, wherein the processing circuitry of the control system is configured to determine the phase difference and the additional phase difference substantially simultaneously.

15. A method of surveying amusement park features, comprising:
monitoring retro-reflected electromagnetic radiation from a retro-reflective marker disposed on an amusement park feature;
determining a first phase of the retro-reflected electromagnetic radiation from the retro-reflective marker;

comparing the first phase of the retro-reflected electromagnetic radiation from the retro-reflective marker to a second phase of emitted electromagnetic radiation from an emitter and directed toward the retro-reflective marker; and

determining that the amusement park feature is in need of maintenance by at least determining a distance between the emitter and the retro-reflective marker based on comparing the first phase and the second phase.

16. The method of claim 15, comprising determining that the amusement park feature has shifted based on the distance between the emitter and the retro-reflective marker.

17. The method of claim 15, comprising:

monitoring second retro-reflected electromagnetic radiation from a second retro-reflective marker disposed on the amusement park feature;

determining a third phase of the second retro-reflected electromagnetic radiation from the second retro-reflective marker;

comparing the third phase of the second retro-reflected electromagnetic radiation from the second retro-reflective marker to the second phase of the emitted electromagnetic radiation from the emitter and directed toward the second retro-reflective marker; and

determining that the amusement park feature is in need of maintenance by at least determining a second distance between the emitter and the second retro-reflective marker based on comparing the third phase and the second phase.

18. The method of claim 17, wherein the amusement park feature comprises at least one support and a track, wherein the retro-reflective marker is disposed on the at least one support, wherein the second retro-reflective marker is disposed on the track, and wherein the method comprises determining movement of the track relative to the at least one support based on determining the distance between the emitter and the retro-reflective marker and determining the second distance between the emitter and the second retro-reflective marker.

19. The method of claim 17, wherein the amusement park feature comprises a plurality of supports and a track, wherein the retro-reflective marker is disposed on a first support of the plurality of supports, wherein the second retro-reflective marker is disposed on a second support of the plurality of supports, wherein the method comprises

determining movement of the track based on determining that the first support has moved relative to the second support or determining that the second support has moved relative to the first support, and wherein determining that the first support has moved relative to the second support or determining that the second support has moved relative to the first support is based on determining the distance between the emitter and the retro-reflective marker and determining the second distance between the emitter and the second retro-reflective marker.

20. An amusement park surveying system, comprising:

an amusement park feature comprising a retro-reflective marker;

an emitter configured to emit electromagnetic radiation toward the retro-reflective marker;

a detector configured to detect retro-reflection of the electromagnetic radiation from the retro-reflective marker while filtering non-retro-reflected electromagnetic radiation; and

a control system communicatively coupled to the detector and comprising processing circuitry configured to:

monitor a first phase of the electromagnetic radiation emitted from the emitter toward the retro-reflective marker;

monitor a second phase of retro-reflection of the electromagnetic radiation from the retro-reflective marker;

determine a phase difference between the first phase and the second phase;

evaluate a distance between the emitter and the retro-reflective marker based on the phase difference; and

determine a frequency of vibration of the amusement park feature based on the phase difference.