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Monitoring And Evaluating Cracks In Masonry

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Division:

Masonry

Section:

Unit Masonry

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MONITORING AND EVALUATING CRACKS IN MASONRY

PART 1---GENERAL

1.01 SUMMARY

A. This standard includes guidance on monitoring and evaluating cracks in masonry. Three different methods are described and include the following:

1. Using tape and a pencil,
2. Using glass and epoxy, and
3. Using the Avongard Crack Monitor.

B. Cracks in masonry are evidence that the building material has moved or is still moving, (active cracking).

C. Some causes of cracking include: settlement or foundation erosion, decay of materials, "vandalism" by renovators, structural failure, change in materials or geometry, and moisture and temperature changes.

1. In foundation piers and piles, general cracking is often due to settlement or rotation of the pier footing.
2. Vertical cracking or bulging of a masonry foundation wall is often due to physical deterioration of the pier from exposure, poor construction or oversteering.
3. Horizontal cracking or bowing of a masonry foundation wall may be caused by improper backfilling, or by swelling or freezing and heaving of water saturated soils adjacent to the wall.
4. Differential settlement of a masonry foundation wall may be caused by many different things including soil consolidation, soil shrinkage, soil swelling, soil heaving, soil erosion or soil compaction.
5. Differential settlement of a chimney is often caused by inadequate foundations which may cause the chimney to lean and crack.

D. See "General Project Guidelines" for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

E. Safety Precautions

1. Historic Structures Precautions
2. Submittals
3. Quality Assurance
4. Delivery, Storage and Handling
5. Project/Site Conditions
6. Sequencing and Scheduling
7. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Regional Historic Preservation Officer (RHPO).

PART 2---PRODUCTS

2.01 MANUFACTURERS

A. Crack Monitor: Avongard,

2.02 EQUIPMENT

- A. A pencil, tape, ruler
- B. Small piece of window glass (single thickness) or glass slide
- C. Epoxy adhesive
- D. Crack monitor

PART 3---EXECUTION

3.01 EXAMINATION

A. Examine the nature and severity of the crack:

1. What direction are the cracks going and where are they the widest?
2. Note sloped floors, bulging walls and doors that do not fit.

B. Determine the probable cause:

1. Foundation erosion.
2. Decay and/or improper use of materials.
3. Structural failure.
4. Change in materials or geometry.
5. Changes in moisture content.
6. Thermal changes:
 - a. Horizontal or diagonal cracks near the ground at piers in long walls: due to horizontal shearing stresses between the upper wall and the wall where it enters the ground,
 - b. Vertical cracks near the ends of walls,
 - c. Vertical cracks near the top and ends of the facade,
 - d. Cracks around stone sills or lintels: due to expansion of the masonry against both ends of the tight fitting stone piece that cannot be compressed.

3.02 ERECTION, INSTALLATION, APPLICATION

A. Monitoring Cracks Using Tape and Pencil:

1. Place a piece of tape on each side of the crack.
2. Draw one short line on each piece of tape at a convenient distance apart (2 inches) and parallel to the crack.
3. If there is movement in the crack, the distance between the line on the tape will vary; If the crack is long, several monitors will be needed.
4. Make a record chart of the distance between the marks of the tape at weekly intervals.
5. Keep accurate records of these measurements and place them along with photographs in file.
6. If significant widening occurs, report this with back-up data and copies of photographs to the RHPO for consideration.

B. Monitoring Cracks Using Glass and Epoxy:

1. Take a small piece of single strength window glass (a microscope slide is good) to bridge over the crack. Tiny glass rods are also made for this purpose.
2. Epoxy the ends of the glass to the masonry on either side of the crack; locate it in an inconspicuous place.
3. If the glass breaks, it is an indication that the walls are still moving and that the crack is widening.

C. Monitoring Cracks Using the Avongard Crack Monitor:

1. Position the monitor over the crack with the vertical "0" line on scale parallel with the crack to be measured.
2. Fix the monitor with screws or adhesive.
3. Cut the transparent tape holding the two plates of the scale on the monitor in a fixed position with a sharp knife; over time, the degree of movement on either side of the crack will be measured as the two plates slide independently of one another.

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