

SECTION 01 45 36
CONCRETE IMAGING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Procedural requirements for the nondestructive examination (NDE) of concrete, three dimensionally locating, mapping and identifying embedments in concrete prior to drilling, coring, cutting or breaking activities.
 - 1. NDE services include inspections, tests, and related actions, including reports performed by an approved, independent testing agency.
 - 2. NDE services are required to verify compliance with requirements specified or indicated in the contract documents. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- B. Requirements to provide quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by these requirements.

1.2 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, provide NDE inspections, tests, and quality control services specified in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.
- B. Retesting: Retesting is the Contractor's responsibility where results of NDE inspections, tests, or quality control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless who was responsible for the original test.
- C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the NDE agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
 - 1. Provide access to the work.
 - 2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 - 3. Provide the NDE agency with available as-built drawings and project design documentation as requested by the agency.
- D. Duties of the NDE Testing Agency: The independent agency engaged to perform concrete NDE inspections and surveys shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Architect and the Contractor promptly of potential clashes between proposed penetrations of the subject concrete and embedments observed in the Work during performance of its services.
 2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the work.
 3. The agency shall not perform the duties of the Contractor.
- E. Coordination: Coordinate the sequence of activities to accommodate required NDE services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- F. Schedule date and time for inspections, tests, taking samples, and similar activities.

1.3 SUBMITTALS

- A. The independent NDE testing agency shall submit a written report, in duplicate, of each inspection, test, survey, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of tests or inspection
 - e. Names of individuals making the inspection or test.
 - f. Designation of the Work and test method(s).
 - g. Complete NDE test data with annotations.
 - h. Survey results and an interpretation of the results.
 - i. Site conditions at the time of NDE testing.
 - j. Comments or professional opinions on whether proposed concrete penetrations clash or interfere with observed embedments in the concrete.
 - k. Name and signature of NDE report preparer.
 - l. Recommendations on retesting.

1.4 QUALITY ASSURANCE

- A. Qualifications for NDE Service Agencies:
1. NDE Agency: Entity having a minimum of 10 years documented experience in the use of ground penetrating radar (GPR) for the three dimensional locating, mapping and identification of concrete embedments for similar, mission critical, facilities.
 - a. Ability to archive project reports, collected data, and related documents for a period of not less than 5 years from completion of the NDE Work.

2. GPR Field Technicians and Analysts: Individuals having minimum 5 years documented experience in the use of ground penetrating radar (GPR) for the three dimensional locating, mapping and identification of concrete embedments for similar, mission critical, facilities.
 - a. Demonstrated ability to accurately, dimensionally locate concrete survey and data collection areas.
3. Professional Liability Insurance ("Errors and Omissions") with minimum limits of \$2 million per occurrence / \$2 million annual aggregate.
4. NDE Work shall be performed in accordance with the applicable sections of ASTM D6432, CSDA Best Practice BP-007.
5. Acceptable NDE Service Agencies:
 - a. Dearborn Companies - Bridgeview, IL (708-430-7600)
 - b. CTLGroup - Skokie, IL (847-965-7500)

PART 2 - PRODUCTS
Not used.

PART 3 - EXECUTION

3.1 NONDESTRUCTIVE EXAMINATION (NDE) OF CONCRETE

- A. Utilize ground penetrating radar (GPR) as the primary NDE investigative tool deployed for the three dimensional (3D) imaging of concrete.
- B. Prior to drilling, coring, cutting, or breaking of concrete, image the area utilizing GPR by an approved NDE agency and evaluated by the agency for potential clashes with embedded elements in the concrete (conduit, piping, reinforcing bar, post tensioning tendons, etc.).

3.2 GROUND PENETRATING RADAR (GPR)

- A. GPR system shall utilize a ground coupled antenna system with minimum center frequency of 1000 MHz.
- B. Collect data utilizing defined, bi-directional grids with supplemental line scans being performed deemed necessary by the operator. Collect data on a grid basis, unless physical constraints restrict the data collection process to only line scans.
- C. Grid locations shall be dimensionally located relative to fixed building or site elements. Identify the grid origin position and grid axis orientation and recorded.
- D. Data shall be initially processed on-site, with observed embedments "real-time" marked on the concrete surface. Marking methods and materials shall be approved by the Owner in advance of the NDE services commencing. Marks shall be documented using digital photography.

- E. Digitally record and post-process data utilizing the system manufacturer's analytical software. Line scan images and GPR plan map images shall be annotated to convey the nature and three dimensional location of observed embedments. Annotated images shall be included as part of each written report.

3.3 RESTRICTION ON LOCATION OF PROPOSED CONCRETE PENETRATIONS

- A. Concrete penetrations shall not be made within 4 inches (100 mm) of any fixed obstruction (wall, etc.) due to the physical limitation presented by the typical GPR antenna dimensions.

END OF SECTION