

**SECTION 01450  
STRUCTURAL TESTS AND SPECIAL INSPECTIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 INTENT AND CONDITIONS**

- A. Intent:
1. For compliance with the Minnesota State Building Code, the Owner shall employ and pay for a special inspector (or inspectors) as required by Chapter 17 of the International Building Code.
  2. Duties and responsibilities of the special inspector(s) shall be as outlined in Chapter 17 of the International Building Code and as herein specified.
  3. Define and coordinate structural tests and special inspection services.
  4. Define and coordinate conventional testing and inspection services.
  5. Testing and Inspection services are intended to assist in determining probable compliance of the work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents.
- B. Conditions:
1. If inspection of fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner, Architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with Contract Documents.
  2. Perform testing and inspection in accordance with industry standard used as reference for specific material or procedure unless other criteria are specified. In the absence of a referenced standard, accomplish tests in accordance with generally accepted industry standards.
  3. Failure to detect defective work or materials shall in no way prevent later rejection if defective work or materials are discovered.

**1.3 RELATED REQUIREMENTS**

- A. Refer to individual technical specification sections for additional qualifications, inspections, tests, frequency and standards required.

**1.4 DEFINITIONS**

- A. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.
- B. Inspection: Evaluation of systems, primarily requiring observation and judgment.
- C. Structural Tests and Special Inspections: Structural Tests and Special Inspection Services herein include items required by Chapter 17 of the International Building Code as adopted by the current Minnesota State Building Code, and other items which in the professional judgement of the Structural Engineer of Record, are critical to the integrity of the building structure.

- D. Conventional Testing and Inspections: Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.
- E. Architect of Record: The prime consultant in charge of overall design and coordination of the Project.
- F. Structural Engineer of Record (SER): The Licensed Engineer in responsible charge of the structural design for the Project.
- G. Licensed Structural Engineer: A professional engineer with education and experience in the design of structures similar to this Project and licensed in Minnesota.
- H. Testing Agency (TA):
  - a. Testing Agency: Approved independent testing agency acceptable to the Owner, Architect, SER and as noted below:
  - b. Authorized to operate in the State of Minnesota and experienced with the requirements and testing methods specified in the Contract Documents.
  - c. Meeting applicable requirements of references stated in paragraph 1.4.
  - d. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.
- I. Special Inspector (SI): A properly qualified individual or firm performing special inspections.
- J. The categories of special inspector are:
  - 1. Special Inspector - Technical I, II and III: Usually an employee of a testing agency:
    - a. Technical I (Sections 31 20 00, 31 62 23, 31 63 29) - Technician shall be under the direct supervision of a licensed civil/geotechnical engineer regularly engaged in this type of work. Work shall be performed in a qualified geotechnical/testing laboratory.
    - b. Technical I (Sections 03 10 00, 03 20 00, 03 30 00)
      - 1) ACI Certified Concrete Field Testing Technician – Grade I.
      - 2) ACI Certified Concrete Strength Testing Technician.
      - 3) ACI Certified Concrete Laboratory Testing Technician – Grade 1.
      - 4) ACI Certified Concrete Construction Inspector-In-Training.
      - 5) Inspector shall be employed by a testing laboratory, experienced in the type of work being performed, and under the direct supervision of a licensed civil/structural engineer.
    - c. Technical I (Section 04 20 00) - Technician shall be under the direct supervision of a licensed civil/structural engineer regularly engaged in testing and inspection of this type of work. The licensed engineer shall review and approve all inspection reports.
    - d. Technical I (Section 05 12 00) - Non-destructive Testing Technician SNT-TC-1A Level I, and/or AWS Certified Associate Weld Inspector (CAWI).
    - e. Technical I (Section 07 81 00) - Shall be familiar with the interpretation and use of ASTM E 605, and have prior field experience in testing and inspection of spray-applied fireproofing. Shall be supervised by an engineer licensed to practice in the state of Minnesota.
    - f. Technical II (Sections 31 20 00, 31 62 13, 31 62 23, 31 63 29,) - Technician with a minimum of 2 years' experience, or a graduate engineer, and is an employee of a qualified and approved geotechnical/technical laboratory, under the direct supervision of a licensed civil/geotechnical engineer regularly engaged in this type of work.
    - g. Technical II (Sections 03 10 00, 03 20 00, 03 30 00)
      - 1) ACI Certified Concrete Laboratory Testing Technician - Grade II.

- 2) ACI Certified Laboratory Aggregate Testing Technician.
  - 3) ACI Certified Concrete Construction Inspector.
  - 4) Inspector shall be employed by a testing laboratory, experienced in the type of work being performed, and under the direct supervision of a licensed civil/structural engineer.
  - h. Technical II (Section 04 20 00) - Graduate civil/structural engineer, with experience in this type of work. Supervised by a licensed civil/structural engineer. The licensed engineer shall review and approve all inspection reports.
  - i. Technical II (Section 05 12 00) - Non-destructive Testing Technician ASNT TC-1A Level II, (NDE Technician II), AWS/CAWI, with minimum 3 years' experience, or an AWS/CWI.
  - j. Technical III (Sections 31 20 00, 31 62 23, 31 63 29) - A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years' experience, licensed in the state of Minnesota, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.
  - k. Technical III (Section 03 30 00) - A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years' experience and licensed in the state of Minnesota and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.
  - l. Technical III (Section 05 12 00) - ASNT Level III with a minimum of 10 years' experience or an AWS/CWI with a minimum of 10 years' experience.
  2. Special Inspector - Structural I and II: Usually an employee of the Structural Engineer of Record.
    - a. Structural I (Sections 03 10 00, 03 20 00, 03 30 00, 03 38 16, 04 20 00, 05 12 00, 31 62 23, 31 63 29) - Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a licensed civil/structural engineer.
    - b. Structural II (Sections 03 10 00, 03 20 00, 03 30 00, 04 20 00, 05 12 00, 31 62 23, 31 63 29) - Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state of Minnesota. The licensed engineer shall review and approve all inspection reports.
- K. Building Official: The Officer or duly authorized representative charged with the administration and enforcement of the State Building Code.

## 1.5 REFERENCES

- A. ANSI/ASTM E329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- B. ASTM E543 – Standard Practice for Agencies Performing Non-destructive Testing.
- C. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- D. ASTM C1093 – Standard Practice for the Accreditation of Testing Agencies for Unit Masonry.
- E. ANSI/ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- F. Minnesota State Building Code.

- G. International Building Code.
- H. See technical specification sections for specific references.

## 1.6 RESPONSIBILITIES/AUTHORITY

- A. Structural Tests and Special Inspections:
  - 1. Special Inspector:
    - a. Attend all pre-installation meetings to review scope of structural tests and special inspections.
    - b. Test and/or inspect the work assigned for conformance with the building department approved plans, specifications, and applicable material and workmanship provisions of the code. Perform testing and inspection in a timely manner to avoid delay of work.
    - c. Bring nonconforming items to the immediate attention of the Contractor for correction, then, if uncorrected after a reasonable period of time, to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
    - d. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Structural Testing and Special Inspection Schedule.
    - e. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.
    - f. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
  - 2. Architect:
    - a. Coordinate the flow of reports and related information to expedite resolution of construction issues.
    - b. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
    - c. Complete and sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction. Provide a completed copy of the schedule to all signed parties including Building Official.
  - 3. Structural Engineer of Record:
    - a. Identify items requiring structural testing and special inspection including special cases.
    - b. Define "type" of special inspector required for "description" of work indicated on the Structural Testing and Special Inspection Schedule.
    - c. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
    - d. Complete and sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
    - e. Review reports issued by all special inspectors.
    - f. If engaged as a special inspector, provide structural testing and special inspection services as noted in Article 1.6.A.1.
  - 4. Testing Agency:
    - a. When engaged as a special inspector, provide structural testing and special inspection services as noted in Item 1.6.A.1.
    - b. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
    - c. Attend pertinent pre-installation meetings to review scope of structural testing and special inspection.
  - 5. Contractor:

- a. Arrange and attend all pre-installation meetings to review scope of structural testing and special inspection. Include the Building Official, Owner, Architect, SER, Testing Agency and other parties concerned.
  - b. Post or make available the Structural Testing and Special Inspection Schedule within project site office. Provide timely notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
  - c. Provide special inspector access to the approved plans and specifications at the project site.
  - d. Review all reports issued by special inspectors.
  - e. Retain at the project site all reports submitted by the special inspectors for review by the building official upon request.
  - f. Correct in a timely manner, deficiencies identified in inspection and/or testing reports.
  - g. Provide safe access to the work requiring inspection and/or testing.
  - h. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
  - i. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
  - j. Verification of conformance of work within specified tolerances is solely the responsibility of the Contractor.
6. Fabricator:
- a. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record stating the work was performed in accordance with the Contract Documents.
  - b. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
7. Building Official:
- a. Review all special inspector qualifications.
  - b. Review all fabricators who perform work in their shop, which requires special inspection.
  - c. Accept and sign completed Structural Testing and Special Inspection Schedule.
  - d. Review reports and recommendations submitted by special inspector.
  - e. Review the "final signed reports" submitted by special inspector. These documents must be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.
  - f. Determine work, which, in the Building Officials opinion, involves unusual hazards or conditions.
8. Owner:
- a. Provide and pay cost of structural testing and special inspection services.
  - b. Provide special inspector with Contract Documents and accepted shop drawings.
  - c. Provide special inspectors and testing agencies with full access to the site at all times.
  - d. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.
- B. Inspections by Building Official: provide timely notice for inspections performed by the building official, as required by IBC Chapter 17, the State Building Code, and local ordinance.

## 1.7 INSPECTION NOTICES

- A. Contractor: Provide minimum of 24 hours notice for all items requiring testing or inspection. Do not place items requiring testing and inspection services prior to or during placement until testing and inspection services are available. Do not enclose or obscure items requiring testing and inspection services after placement until testing and inspection services are performed.

## 1.8 REPORTS

- A. Testing agency and/or special inspectors shall submit a report in accordance with the Structural Testing and Special Inspection Schedule and shall conduct and interpret tests and inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.
- B. Submit reports for structural testing and special inspection, in timely manner to the Contractor, Building Official, SER, and Architect.
  - 1. Submit reports for ongoing work, to provide the information noted below:
    - a. Date issued.
    - b. Project title and number.
    - c. Firm name and address.
    - d. Name and signature of tester or inspector.
    - e. Date and time of sampling.
    - f. Date of test or inspection.
    - g. Identification of product and specification section.
    - h. Location in project, including elevations, grid location and detail.
    - i. Type of test or inspections.
    - j. Results of tests or inspections and interpretation of same.
    - k. Observations regarding compliance with Contract Documents or deviations there from.
  - 2. Submit final signed report stating that, to the best of the special inspector's knowledge, the work requiring testing and/or inspection conformed to the Contract Documents.

## 1.9 FREQUENCY OF TESTING AND INSPECTION

- A. For detailed requirements see individual technical specification sections, and Part 3 of this section.

## 1.10 PROTECTION AND REPAIR

- A. Upon completion of testing, sample-taking, or inspection, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

## 1.11 TESTS TO DEMONSTRATE QUALIFICATION

- A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect or SER may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.
- B. The Architect or SER reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 SCOPE OF STRUCTURAL TESTS AND SPECIAL INSPECTIONS

- A. Refer to individual specification section articles for Quality Control testing and inspection items.

**3.2 STRUCTURAL TESTS AND SPECIAL INSPECTIONS PROGRAM SUMMARY**

- A. The parties involved shall complete and sign the Structural Testing and Special Inspection Schedule. The completed schedule is an element of the Contract Documents and after permit issuance, becomes part of the building department approved plans and specifications. The completed schedule shall include the following:
  - 1. Specific listing of items requiring inspection and testing.
  - 2. Associated specification section which defines applicable standards by which to judge conformance with approved plans and specifications in accordance with IBC Chapter 17 as adopted by the State Building Code. The specification section should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
  - 3. Frequency of reporting, i.e., intermittent, weekly, monthly, per floor, etc.
  - 4. Parties responsible for performing inspection and testing work.
  - 5. Required acknowledgments by each designated party.
- B. See attached "Structural Testing and Special Inspection Schedule".

**END OF SECTION 01 45 33**

**STRUCTURAL TESTS AND SPECIAL INSPECTIONS SCHEDULE**

Project Name:

Location:

Permit No.: \_\_\_\_\_(1)

<b>STRUCTURAL TESTS AND SPECIAL INSPECTIONS</b>				
<b>Specification Reference (2)</b>	<b>Description (3)</b>	<b>Type of Inspector (4)</b>	<b>Report Frequency (5)</b>	<b>Assigned Firm (6)</b>
03 10 00	Concrete Formwork	Tech II	Periodic	
03 20 00	Concrete Reinforcement Footings, Foundation Walls, and Columns	Tech II	Periodic	
03 30 00	Cast-In-Place Concrete Material Sampling & Testing	Tech I	Daily	
03 30 00	Cast-In-Place Concrete Concrete Mix Verification	Tech I	Daily	
03 30 00	Cast-In-Place Concrete Concrete Placement	Tech I	Daily	
03 30 00	Cast-In-Place Concrete Protection & Curing	Tech II	Daily	
03 30 00	Cast-In-Place Concrete Embedded Items	Tech II	Periodic	
04 20 00	Unit Masonry Material Testing	Tech II	Periodic	
04 20 00	Unit Masonry Preparation & Placement	Tech II	Periodic	
04 20 00	Unit Masonry Reinforcement	Struc I	Periodic	
04 20 00	Unit Masonry Grouting	Tech II	Daily	
05 12 00	Structural Steel High Strength Bolting	Tech II	Periodic	
05 12 00	Structural Steel Welding	Tech I / Tech II	Periodic	
05 12 00	Structural Steel Headed Shear Studs	Tech I	Periodic	
05 12 00	Structural Steel Mechanical Fasteners	Tech I	Periodic	
05 12 00	Structural Steel General Configuration	Struc I	Periodic	
05 31 00	Steel Roof Deck Welding	Tech II	Periodic	
07 81 00	Spray-Applied Fire Resistive Materials	Tech I	Periodic	
31 20 00	Earthwork	Tech II	Daily	

Notes: This schedule to be filled out and included in the project specification. Information unavailable at that time shall be filled out when applying for a building permit.

- (1) Permit No. to be provided by the Building Official.
- (2) Reference to specific technical scope section in program.
- (3) Use descriptions per IBC Chapter 17, as adopted by State Building Code.
- (4) Special Inspector – Technical, Special Inspector – Structural.
- (5) Weekly, monthly, per test/inspection, per floor, etc.
- (6) Firm contracted to perform services.

**ACKNOWLEDGEMENTS**

Each appropriate representative shall sign below:

Owner:	Firm:	Date:
Contractor:	Firm:	Date:
Architect:	Firm:	Date:
SER:	Firm:	Date:
SI-S:	Firm:	Date:
TA:	Firm:	Date:
SI-T:	Firm:	Date:
TA:	Firm:	Date:
SI-T:	Firm:	Date:
F:	Firm:	Date:
F:	Firm:	Date:

\* The individual names of all prospective special inspectors and the work they intend to observe shall be identified. (Use reverse side of form, if more room is needed.)

**LEGEND:**

SER = Structural Engineer of Record

SI-S = Special Inspector – Structural

TA = Testing Agency

SI-T = Special Inspector – Technical

F = Fabricator.

Accepted for the Building Department By \_\_\_\_\_

Date. \_\_\_\_\_