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New in this Revision (older revisions addressed in 5.0 Record of Revisions)

Incorporated [VAR-10564](#), *Test and Inspection Plan (TIP) Development Responsibility* (now Constructor task) and VAR-10168 on inspection scope. LANL Qualified Inspection Agency (QIA) term introduced. Added Att J on inspection of Lowest/Moderate Risk work. Deleted Atts A and C (SI summary, NCR example). Other changes throughout.

This mandatory functional series document is available online at <https://engstandards.lanl.gov>
It derives from P342, *Engineering Standards*, which is issued under the authority of the Division Leader of Engineering Services as part of the Conduct of Engineering program implementation at the Laboratory.

Please contact the ESM Building Code Program (BCP) chapter [POC](#) for upkeep, interpretation, and variance issues.

The LANL Building Official Webpage is [here](#)

1.0 PURPOSE AND SCOPE

- A. To establish the process, the authority, and duties and reporting functions of code-related and other owner inspections.¹ It must be used in conjunction with Section IBC-GEN of this Building Code Program chapter ("Program").
- B. The scope of this Section IBC-IP applies to design professionals, constructors including Subcontractors and subtiers, and Program inspectors as they relate to the scope of the codes, the Program, and other duties assigned by the LBO or in support of activities addressed in this section. Inspectors are those qualified by the LBO Chief Inspector directly or through the LBO's approval of an inspection agency.
- C. This inspection process is specifically for IBC and IEBC work, and other codes invoked by same. Additional requirements are expected for ML-1 and ML-2 (nuclear) and ML-3 work; such higher-quality processes cannot reduce IBC levels of quality or inspections unless specifically authorized by the LBO in writing.
- D. LANL personnel: See [P330-8](#), *Inspection and Test*, for potential additional requirements.

2.0 ACRONYMS /DEFINITIONS (IBC-GEN HAS ADDITIONAL TERMS)

Term	Meaning
ACI	American Concrete Institute
ASNT	American Society for Nondestructive Testing
ASTM	ASTM International (formerly American Society for Testing and Materials)
AWS/ACWI	American Welding Society/Associate Certified Welding Inspector
AWS/CWI	American Welding Society/Certified Welding Inspector
CEIO	Chief Electrical Inspection Officer
DPIRC	(Registered) Design Professional in Responsible Charge
IAS	International Accreditation Service (subsidiary of ICC)
IBC	International Building Code, published by ICC
ICC	International Code Council
ICC-ESR	International Code Council—Evaluation Service Report
IEBC	International Existing Building Code, published by ICC
LBO	LANL Building Official
OBI	Owners Building Inspector (e.g., in ES Division). Same as inspector (terms used interchangeably in this Chapter)
Permitting Authority	Normally the LBO as executed by their staff (e.g., LBO-DPR); however, for FDAR-permitted work, the FDAR.
project	Term for any type of work/job/task/ that is performed under the purview of the ESM regardless of funding source or facility arrangement.
QIA	Qualified Inspection <u>Agency</u> or <u>Agent</u> (LANL). Entity having a formal qualification (and/or certification) for an inspection regime. This is most often the LBO Chief Inspector's LBO Inspectors (<i>in ES-FE</i>) or third-party inspectors approved by them but may be (1) OSH-ISH for electrical/NEC, (2) Fire Protection Office, (3) LBO-approved QC inspectors, (4) CWIs and NDE inspectors approved by the respective program administrator per ESM Ch. 13 and in the Welding Program Database, or (5) others as noted in table (e.g., appointed based on position).

¹ Pressure safety inspection is further governed by ESM Ch. 17 on same. For subcontracts, right to inspect is guaranteed by Construction [Subcontract](#) Exhibit A, GC-31, Inspection, Quality Surveillance, Rejection of Materials and Workmanship and Testing (Jun 2009)

Term	Meaning
Sub-QIA	Someone who did not personally perform the work, selected by management. May be by craft supervision, engineering, or QC other than a QIA (e.g., <i>in IQPA</i>) or programmatic or facility technicians.

3.0 RESPONSIBILITIES AND DUTIES (INSPECTION-RELATED)

A. LANL Project Owner (normally PM or Facility Management)

1. The project owner is responsible for funding inspection services. The inspectors and inspection agencies shall not be in the employ of a non-LANL constructing Subcontractor or material supplier.²

B. Design Professional in Responsible Charge

The DPIRC has many duties and responsibilities related to inspection, including the following:

1. SSI (Statement of Special Inspections). When required by IBC Ch. 17 (or the rare LANL additions reflected in the IBC-IP SSI template), the DPIRC shall list the special inspections to include structural element fabrication observation³, whether inspections are continuous or periodic, and the details of such inspection.

- a. The IBC-IP SSI template is an acceptable format and starting point for preparation of the SSI that can be easily reviewed by the LBO designees. Must include identification of any seismic-resisting structural elements.⁴ The DPIRC may add additional Special Inspections as they require for "Special Cases" under IBC Chapter 17 and more stringent inspection coverage where they deem necessary. Note: listing the specific agency performing special inspection is not required since LANL will provide these services.

- b. If this Program or a product's third-party code certification report (ICC-ES, ICC-NTA, or IAPMO-equivalent) requires special inspection, then the EOR is responsible for ensuring that all info/data necessary for inspector to perform SI is documented and conveyed in an effective manner (e.g., Project drawing notes, abbreviated version of Test & Inspection Plan, etc.).

Note: LANL-approved design documents supersede the ICC ESRs if there is a difference. *Guidance: Such design documents and the SSI should note this with a phrase such as "Contrary to ESR XXXX, do ..." so the difference is clearly intended and the inspection is based on the amended ESR.*

- c. The SSI must also follow IBC Chapter 17 requirements on degree of inspection ("continuous" and "periodic"), and the specific ICC-ESRs and LANL approval documents for special cases (e.g., post-installed anchors).

² Incorporates ES-DO-Memo-21-057, Independence Requirements for Third Party Inspection Agencies.

³ It is always a good practice to verify that key construction conditions are in conformance with the design intent. However, structural observations are only required for the conditions detailed in IBC Section 1704.6.1. In general, at LANL such conditions are met by RC-III and RC-IV structures, high-risk structures, or structures with special structural details/construction requirements (e.g., blast-resistant structures, where structural detailing either of steel or concrete elements are key to the final performance of the structure and nonstructural components).

⁴ Due to LANL's ESM Ch 5 wind criteria, IBC-2021 Ch 17 has no SI or structural observation for wind-resisting element fab/erection.

2. The DPIRC shall detail any required seismic testing and, when required by IBC 1704.6.1, structural observations³ to be performed by structural engineer of record (who is preferably not in same company as a Subcontractor⁵); see Att B SSI and Att G, *Structural Observation Report*). LBO may authorize observations by those other than the structural DPIRC.
 3. Submit SSI in native electronic file. LANL design reviewers and inspectors may require additional inspections and hold points to be added. *Also, Section 01 4000 may require construction subcontractor to provide input which must be incorporated.*
 4. The DPIRC shall also:
 - *Respond to field discrepancies.* The DPIRC shall respond to non-conformance reports (NCRs) that are proposed to be dispositioned as Use-As-Is or Repair (not required when Rework or Scrap/Reject).
 - See also ESM Ch 1 Section Z10 subsection on Clarifications, NCRs, etc.
 - NOTE: IBC 1704.1 requires that all special inspection reports be sent to the DPIRC. LANL Construction Inspection default policy is to send only reports with discrepancies (of any kind) to the DPIRC; if however, the DPIRC desires ALL inspection reports for a given project, then they may request this from Chief Inspector if they provide an email address to which they desire all reports be sent.⁶
 - Review shop and fabrication drawings and submit revisions to approved design documents: The DPIRC shall acknowledge and approve (with a stamp) shop/fabrication drawings. The DPIRC shall submit to the LBO-designated design reviewers for written approval of any deviations to the approved plans, drawings, or specifications and shall re-submit revised plans, drawings, and specifications that may be required due to the shop drawings, etc. Upon approval, send copy to the LANL Construction Inspection group.
 - When DPIRC is contracted by LANL to perform special inspection duties (this is rare), submit inspection agencies to the LBO for approval.
- C. Constructor (Prime Subcontractor, or LANL when self-perform)
1. TIP: Prepare Test and Inspection Plan using minimum requirements in the Attachment I TIP template posted with this Section [here](#)⁷. The TIP template outlining common test and inspection requirements, organized by installation type, must be edited by the Constructor⁸ to reflect project scope. The

⁵ Structural observations are the responsibility of the structural engineer of record (EOR) unless otherwise stated in the Subcontract. LBO must approve observation performance by persons other than the structural EOR. *EOR should subcontract observations if he/she is in the same company as the prime Subcontractor.*⁵

⁶ The default policy meets IBC intent that (1) DPIRC see discrepancies and (2) owner (LANL) sees evidence that special inspections (an owner responsibility) are occurring -- the later occurring due to owner self-inspecting in this case, rather than relying on DPIRC (as owner's agent) ensuring same.

⁷ TIPs are typically not required for lower-risk work; see ESM Ch. 16 (e.g., IBC-GEN). Other formats providing same information in equally useable manner are acceptable. E.g., a VIT (verification, inspection, and test plan, a term more common in the nuclear facilities) may serve as the TIP or vis-versa, assuming it meets requirements of both.

⁸ Guidance: For self-performed work, the responsible engineer (who is typically a field engineer but can be a system engineer, design engineer or any individual designated by management) will develop a project-specific TIP that not only identifies the applicable tests and inspections based on project scope, but also integrates test and inspection requirements within a Work Breakdown Structure for the project. The draft TIP will be provided to the LANL construction organization for review and, once acceptable to them (and AHJs/engineering), issued and maintained by ES Field Engineering on behalf of constructor (e.g., LOG or

- Constructor shall provide a TIP prior to commencement of the Work. LANL will review and may add additional inspections and witness or hold points. The TIP shall include inspections required by specifications, applicable codes, and applicable standards in tabular form and integrated with a Work Breakdown Structure (WBS) or within a 30 day look ahead to identify milestones/prerequisites for each test and inspection⁹. Specification Section [01 4000](#), Quality Requirements has detailed requirements. Maintain TIP current should scope or understanding of requirements change during execution.
2. QC: Constructors are required to perform QC inspections and testing as required by their contract. Such duties are addressed primarily in LANL Master Specification Section [01 4000](#), Quality Requirements and summarized in the TIP template. Testing agencies must be from LBO Approval listing posted with this chapter.
 3. SSI: When a Statement of Special Inspections is present, the prime Subcontractor must complete and submit Attachment H, *Subcontractor's Statement of Responsibility with respect to Special Inspections (SSRwrtSI)*, and attachments.
 4. Pass down: The constructor (e.g., prime Subcontractor) must assure that necessary requirements related to the project including hold and witness points, design documents, and IBC requirements are passed down to subtiers and suppliers.
- D. LANL Owners Building Inspectors (OBI) and Other Inspection (including third-party/contracted)¹⁰
1. IBC Ch 1 Section 110 routine inspections and Ch 17 Special Inspections are above and beyond that constructor QC and are performed by LANL or LBO-approved, LANL-contracted third-party inspectors that are independent of any construction Subcontractor.¹¹
 2. General requirements. OBIs shall review approved plans and specifications for inspection requirements.
 3. Signify presence at jobsite. OBIs shall notify constructors (e.g., Subcontractors) of their presence and responsibilities at the jobsite location. If required by the LBO they shall sign in on the appropriate form posted by a Subcontractor.
 4. Observe assigned work. OBIs shall inspect work for conformance with the FDAR- or LBO-approved¹² drawings and specifications, applicable provisions of IBC Section 1704 on special inspection, and applicable workmanship provisions of the IBC; inspections include special inspections in the structural fabricator's shop when required and other inspection identified in the inspection plan(s) for the work. Example inspection plans and records are included as Attachments.
 5. Refer to Attachment J, *Inspection of Lowest/Moderate Risk Category Work*, for a LANL-internal division of responsibility based on qualifications and risk.

MSS.

⁹ TIP shall include: Test or inspection ID.; brief description of the test or inspection; identify if inspection or test is a witness or hold point; entity responsible for performing each test and inspection (e.g., subcontractor qualified personnel, third party inspector, LANL building inspector, LBO-approved special inspector, or structural engineer-of-record); and reference to code, standard, or specification requiring the test or inspection.

¹⁰ Additional LANL OBI R2A2s are present in LANL's [SD350](#), *Project Management for Capital Asset Acquisition and Construction*.

¹¹ Incorporates ES-DO-Memo-21-057, Independence Requirements for Third Party Inspection Agencies.

¹² Ref IBC-GEN Three-Tiered Graded Approach table.

6. For continuous inspection, the OBIs shall be always onsite observing the work requiring inspection designated as "continuous." Periodic inspection is intended to mean that the OBI at periodic times inspects work performed but is not required to "witness" all work being performed.
7. Notify the LANL Chief Inspector immediately in cases where project conditions or personnel do not provide adequate notice for hold or witness points, inhibit the inspector's ability to inspect or any conditions that present themselves that would prevent adequate inspection. An example could be related to funding where non-conformances cause additional work and inspection cost but the project does not want to increase funding to cover additional costs for inspection.
8. Welding inspection subject to the IBC shall only be performed by Certified Welding Inspectors that have been approved by the LANL Welding Program Administrator (WPA)/Chief Inspector for IBC welding on behalf of the LBO.
 - a. LANL personnel pre-approved for such inspection are listed on the LANL Welding Program website (ESM Chapter 13) in the Approved Inspector listing on the website and as a reference under General Welding Standard GWS 1-03 (e.g., they have a "Yes" in IBC/IEBC column of table). http://engstandards.lanl.gov/ESM_Ch13.shtml#ch13_vol1
 - b. Non-LANL CWIs shall be submitted for approval to the LANL WPA via the Project Manager.
 - c. Other requirements are summarized in Specification Sections 01 4444 (Offsite Welding & Joining Requirements), 01 4455 (for onsite), and 01 4631 (Welding of ASME B31 Piping).
9. NDE: Nondestructive examination inspection (not CWI) is required by some codes. Inspector qualification is similar to welding and controlled by Chapter 13 Vol. 6; Subcontractors must use firms on LBO Approval Listing.
10. Report nonconforming items. OBIs shall bring all such items to the attention of the STR and constructor (e.g., Subcontractor). A nonconformance report must be written per LANL P330-6 *Nonconformance Reporting* when required by same. If any such item(s) is not resolved in a timely manner or is about to be incorporated into the work, notify the STR and LBO (*DPRIC should be notified*) immediately and note the item in the OBIs's written report (see IBC Section 1704.1). Note: Subcontractors may be required to complete a Form 2276 *Subcontractor Nonconformance Report (NCR)* and transmit to LANL as well. *Guidance: When in-process, potentially nonconforming work is noticed, inspectors should notify the constructor (verbally or in writing – e.g., deficiency report). It is only when deficient work is presented for acceptance and/or incorporated into the final construction that an NCR must be written by the close of the following business day.*
11. Provide timely reports. The OBI shall complete written inspection reports for each inspection visit and provide the reports on a timely basis as determined by the LBO Chief Inspector. The OBIs or inspection agency shall furnish these reports directly to the LANL Chief Inspector, DPIRC (when discrepancies), and others as designated by the project manager (see IBC Section 1704.1.2). *Guidance: These reports should be generated daily and may be submitted*

weekly at the option of the Chief Inspector. An example of a daily report form is included as Attachment D. In these reports, OBIs should:

- Describe inspections and tests made with applicable locations,¹³
- Indicate how nonconforming items were resolved,
- List unresolved items, parties notified, and time and method of notification,
- Itemize changes authorized by DPIRC if not included in nonconforming items,
- Reference stop work notices, NCRs, or other documentation vehicles that provide information regarding the quality of the IBC-related work.

12. Submit final report. OBIs or inspection agencies shall submit a final signed report to the LBO, Chief Inspector, and DPIRC stating that all items requiring LBO inspection and testing were fulfilled and reported and, to the best of their knowledge in conformance with the approved Drawings, Specifications, and the applicable provisions of the IBC (see IBC Section 1704.1.2). Items not in conformance, unresolved items, any discrepancies in inspection coverage, missed inspections, periodic inspection when continuous was required, etc. shall be specifically itemized in this report. *An example of a final report form is included as Attachment E.*
13. The OBI shall notify the Chief Inspector (regardless of whether the inspector reports directly to the LBO, the inspection agencies, or other entity on site) immediately when conditions on a project, job or other work under IBC causes the inspector to be unable to perform their duties. This can be due to lack of notification of hold or witness points, lack of funding, reduced funding, or any conditions that impacts the inspectors' independence.
14. The specific duties and responsibilities of the LBO relating to inspection (performed by the Chief Inspector primarily):
 - **Review submittal documents for compliance with special inspection requirements.** The LBO is charged with the authority to review the plans, specifications, inspection program, and other submittal documents for compliance with Code requirements.¹⁴
 - **Approve inspection program.** The LBO is responsible for approving the inspection program submitted by the DPIRC (see IBC Section 1704.1) and may require a preconstruction conference to review the program with all applicable members of the construction team. Accomplished through design review process that includes Chief Inspector (see IBC-GEN).
 - **Approve inspectors/inspection agencies.** The LBO is responsible for determining competence of inspectors for the types of work they will be inspecting (see IBC Section 1704). See Attachment F to this section, Job Task List for Special Inspectors; also, qualification guidance for inspectors is contained in ESM Ch 16, Section IBC-TIA, Attachment B.
 - **Monitor special inspection activities.** *The LBO should monitor the inspection activities at the jobsite to assure that qualified inspectors are performing their duties when work requiring inspection is in progress.*

¹³ NQA-1 requirement 10 states: Appropriate records shall be established, maintained, and, as a minimum, identify the following: (a) item inspected; (b) date of inspection; (c) inspector; (d) type of observation; (e) results or acceptability; (f) reference to information on action taken in connection with nonconformances.

¹⁴ IBC 2006 Sections 104.2, 106.3 and 106.3 through 106.5

- **Review inspection reports.** The LBO shall have access to inspection progress reports and final reports for conformance with the approved plans, specifications, and workmanship provisions of the Code.¹⁵
- E. Standards Program
- **Approval of Code- and Standard-related use-as-is and repair NCR dispositions and conditional releases (CR).** If CR is not approved, work on same must stop.
- F. Permitting Authority
- **Accept final inspection.** *The Authority should not release the structure for occupancy or use until the final inspection report has been completed (see Section IBC-GEN).*

4.0 PROCESS

See also Sections IBC-GEN's "Process" article.

- A. The DPIRC submits the design package including the Statement of Special Inspections (SSI) [and structural observation plan if required by IBC 1704.6.1], to the Permitting Authority for review and approval.
- B. IBC SMEs review and approve the design media and the plan and return it to the project for implementation or they return it with comments that need to be resolved.
- C. If there are comments to be resolved the project cannot proceed with construction or structural fabrication activities without Permitting Authority concurrence. Once the package is fully approved by the Permitting Authority and returned to the project/job the project team can begin the appropriate phases of the work. The Constructor prepares and submits the Test and Inspection plan (TIP) when required by Project's 01 4000 *Quality Requirements* section, IBC-GEN, or FDAR.
- D. The project assures that the inspectors have enough funding to fully comply with the inspection plan(s).
- E. Offsite structural member fabrication work is performed by an approved fabricator or is accomplished with one or more special inspectors in the shop when required by IBC Ch. 17. Designation as an approved fabricator is obtained from the LBO (see ESM Chapter 16 Section IBC-FAB). Such structural work requires a Certificate of Conformance (IBC-FAB Att B).
- F. Subcontractors must submit Attachment H, *Subcontractor's Statement of Responsibility with respect to Special Inspections and Tests*.
- G. Work progresses and the inspector(s) perform their inspections, fill out the reports, and notify the LBO if non-conformances occur.
- H. Inspection will be performed against approved design documents including specifications, drawings, shop drawings, deferred design documents, and to the TIP(s) and SSI(s). The

¹⁵ IBC 2006 Section 1704.1.2. Delegated to Chief Inspector.

OBI has no latitude to waive above-code (IBC or LANL) features (the design approved by the LBO is the basis for construction under the permit even though the details may be more than code requirements).¹⁶

NOTE: The requirements of the ESM are incorporated into the drawings and specifications, otherwise known as the construction package. Once this package has been signed and approved for construction or fabrication, the construction documents have been deemed to comply with the ESM.¹⁷

- I. Structural Engineer of Record performs required observations if required by IBC 1704.6.1 and completes report (IBC-IP Attachment G).
- J. Upon completion of the work, the project manager notifies the Permitting Authority who performs a final inspection review to his/her satisfaction prior to granting an occupancy authorization.
- K. All inspection records and any others required by IBC or IEBC are submitted to the LBO's Chief Inspector or Permitting Authority.

5.0 RECORD OF REVISIONS

Rev	Date	Description	POC	RM
0	10/27/06	Initial issue.	Tobin Oruch, <i>CENG-OFF</i>	Kirk Christensen, <i>CENG-OFF</i>
1	6/26/07	New App G for structural observation. ML level, reordering, other minor changes. App B, E reformatting.	Tobin Oruch, <i>CENG-OFF</i>	Kirk Christensen, <i>CENG-OFF</i>
2	7/21/08	Clarified structural observation, AE submittal approval, inspection basis. Minor changes to App B and G.	Tobin Oruch, <i>CENG-OFF</i>	Kirk Christensen, <i>CENG-OFF</i>
3	9/15/09	Clarified NCRs in 4.0.E. Added App H (SSRwrtSI) and referenced in App B.	Tobin Oruch, <i>CENG-OFF</i>	Gary Read, <i>CENG-OFF</i>
4	3/1/10	Clarified in-shop seismic- and wind-resistance inspection regardless	Tobin Oruch, <i>CENG-OFF</i>	Larry Goen, <i>CENG-OFF</i>
5	8/25/10	Corrected that fab shop approval does preclude in-shop special inspection. CM-CE must approve TIP (App B)	Tobin Oruch, <i>CENG-OFF</i>	Larry Goen, <i>CENG-OFF</i>
6	6/20/11	SSI need not include other inspections. Strengthened req't for CM-CE approval	Tobin Oruch, <i>CENG-OFF</i>	Larry Goen, <i>CENG-OFF</i>
7	9/24/13	Mandated TIP, new Att I template for same. Clarified no need for wind-resisting element SI or SO. Clarified inspection to	Tobin Oruch, <i>ES-DO</i>	Larry Goen, <i>ES-DO</i>

¹⁶ ICC document 2009 IEBC Q&A 1-19

¹⁷ The intent is to limit inspector investigation and enforcement of LANL Standards requirements beyond those of national consensus codes and standards and other DOE mandates and not explicitly shown on the approved design documents. When a code or national consensus standard requirement has not been met then an NCR is appropriate. Where it is merely a LANL preference (that may have been resolved/waived during the design process) it can be RFI'ed (or other method) to ask/clarify acceptability with engineering and determine if there is a need for an NCR.

		shop dwgs. Apps became Atts with minor changes.		
8	5/22/14	Clarified SI roles and funding, inspector role.	Tobin Oruch, <i>ES-DO</i>	Mel Burnett, <i>ES-DO</i>
9	10/6/16	Moved some delegated tasks to LBO at 3.0.E. Modified inspection role at 4.0.I.	Tobin Oruch, <i>ES-DO</i>	Larry Goen, <i>ES-DO</i>
10	03/22/23	Incorporated VAR-10564 , <i>Test and Inspection Plan (TIP) Development Responsibility</i> (now Constructor task) and VAR-10168 on inspection scope. LANL Qualified Inspection Agency (QIA) term introduced. Added Att J on inspection of Lowest/Moderate Risk work. Deleted Atts A and C (SI summary, NCR example). Other changes throughout.	Tobin Oruch, <i>ES-FE</i>	Michael Richardson, <i>ES-DO</i>

6.0 ATTACHMENTS

- A. deleted
- B. Statement of Special Inspections (SSI) Template*
- C. deleted
- D. LBO inspection Daily Report – Sample*
- E. LBO inspection Final Report – Sample*
- F. Job Task List for Inspectors (Guidance)
- G. Structural Observation Report (Sample)*
- H. Subcontractor’s Statement of Responsibility with respect to Special Inspections (SSRwrtSI)*
- I. Test and Inspection Plan (TIP) Template*
- J. Inspection of Lowest/Moderate Risk Category Work

* Indicates record when containing data on project execution quality.