

Original Article

Quality Control and Accreditation Readiness in SCIF Construction: A Field-Based Framework for Compliance Validation

Yevhen Kidyaykin
CEO at EKid.

ABSTRACT: Sensitive Compartmented Information Facilities (SCIFs) represent a uniquely demanding class of secure construction, where failure to meet accreditation standards imposed by the Site Security Officer (SSO) and Accrediting Official (AO) can result in costly remediation, schedule delays, and mission compromise. Despite the maturity of Intelligence Community Directive (ICD) 705 and its associated technical specification, the construction industry lacks a unified quality control (QC) framework that bridges general construction inspection practices with the specialised compliance requirements of SCIF accreditation. This paper presents the Compliance Validation Framework (CVF), a four-phase QC methodology integrating inspection protocols, subcontractor evaluation, and pre-accreditation testing into a systematic workflow aligned with SSO/AO expectations. The framework is developed from published regulatory requirements, established construction QC practice and the structure of the accreditation process itself and each of its inspection hold points is traced to the governing requirement it verifies. The paper further specifies the evaluation design for testing the framework: the outcome measures, the group assignment problem, the statistical treatment appropriate for project-level samples, and the reporting standards a credible evaluation must meet. No performance data is claimed for the framework at this stage; it is offered as a specified and testable proposal, and its prospective evaluation is set out in Section V.

KEYWORDS: SCIF Construction, Quality Control, Accreditation Readiness, ICD 705, Compliance Validation, Subcontractor Evaluation, SSO, AO, TEMPEST, Inspection Methodology.

1. INTRODUCTION

The construction of Sensitive Compartmented Information Facilities (SCIFs) occupies a unique intersection of civil engineering, physical security, and intelligence community governance. Unlike conventional construction projects, SCIF construction must satisfy an extensive matrix of technical requirements codified in Intelligence Community Directive (ICD) 705 and its companion technical specification, ICS 705-1, governing everything from radio-frequency (RF) shielding effectiveness to acoustic attenuation thresholds, intrusion detection system (IDS) topology, and emanations security (EMSEC) compliance [1].

The accreditation of a SCIF formally, the authorisation granted by an Accrediting Official (AO) upon recommendation of the Site Security Officer (SSO) is the binary gate that determines whether a facility may process, store, or discuss classified information at a designated security level [2]. Failure to achieve accreditation on the first submission carries material consequences: remediation costs, schedule delays, and mission degradation for tenant organisations awaiting occupancy. No aggregate figures for these are asserted here. Published cost and delay data for SCIF accreditation failure do not exist in the open literature, which is itself part of the problem this paper addresses: without such data, the business case for investment in quality control cannot be made quantitatively, and quantifying it is among the objectives of the evaluation specified in Section V.

Despite these high stakes, the construction industry has historically lacked a unified quality control (QC) framework purpose-built for SCIF construction. General construction QC programs, even those compliant with ISO 9001 or the U.S. Army Corps of Engineers' three-phase inspection model, are insufficient to address the specialised requirements of SCIF accreditation, which demand domain-specific testing protocols, security-cleared inspection personnel, and documentation artefacts that map directly to the AO's Fixed Facility Checklist (FFC) [4].

This paper addresses this gap by presenting the Compliance Validation Framework (CVF), a four-phase QC methodology for SCIF construction. The CVF integrates three pillars: (1) inspection methodologies tailored to SCIF-specific construction domains, (2) a weighted subcontractor evaluation protocol that quantifies contractor readiness to perform security-critical work, and (3) a pre-accreditation testing sequence that systematically addresses SSO/AO expectations prior to formal submission. The framework is presented together with the evaluation design required to test it, on the view that a QC framework proposed without a specified evaluation method is of limited value to practitioners.

The remainder of this paper is organised as follows. Section II reviews the regulatory landscape and prior work. Section III details the CVF methodology. Section IV presents the subcontractor evaluation framework. Section V specifies the design of a prospective evaluation of the framework. Section VI discusses implications and limitations, and Section VII concludes with future directions.

2. REGULATORY BACKGROUND AND PRIOR WORK

2.1. THE ICD 705 COMPLIANCE ECOSYSTEM

Intelligence Community Directive 705, issued by the Director of National Intelligence, establishes the overarching policy framework for physical security standards applicable to SCIFs under U.S. government jurisdiction [1]. The directive is operationalized through ICS 705-1, which sets out the physical and technical security standards, and ICS 705-02, which governs accreditation and reciprocal use [2], [5]. It is worth distinguishing these from the IC Technical Specification for ICD/ICS 705, which contains the construction methods, material specifications, and testing protocols themselves and which UFC 4-010-05 identifies as the source of minimum and enhanced construction requirements. The requirements relevant to construction QC span seven domains: RF shielding, acoustic protection, physical barriers, access control, intrusion detection, TEMPEST countermeasures, and utility penetration management. A further point of practical importance is that the Certified TEMPEST Technical Authority determines RF shielding and other TEMPEST mitigation on a facility-specific basis rather than by a single published threshold, so a QC framework must verify against the criteria issued for the project at hand rather than against a generic figure.

The accreditation process follows a defined chain: the construction entity (Contractor) builds to specification, the Site Security Officer (SSO) inspects and endorses, and the Accrediting Official (AO) grants or denies accreditation based on the Fixed Facility Checklist and supporting evidence package. The AO's decision is informed by, but not limited to, the SSO's recommendation; the AO retains independent authority to require additional testing, impose conditions, or deny accreditation outright [2].

2.2. LIMITATIONS OF EXISTING QC APPROACHES

Conventional construction QC systems, including the widely adopted USACE three-phase model of preparatory, initial, and follow-up inspection, provide general scaffolding for inspection but were not designed for the specialised demands of SCIF work. The structural mismatch is straightforward: a standard construction inspection verifies that work conforms to drawings and specifications, whereas SCIF accreditation additionally requires that the evidence of that conformance be assembled in a form the Accrediting Official can evaluate against the Fixed Facility Checklist. A project may be built correctly and still fail on first submission because the evidentiary record is incomplete. This distinction, rather than any deficiency in general construction QC practice, motivates a domain-specific framework.

Access constraints on the underlying facility data have limited prior academic work on SCIF construction. Publicly available literature focuses primarily on physical security design principles [8], RF shielding material properties [9], and acoustic performance modelling [10]. No peer-reviewed framework integrates inspection methodology, subcontractor evaluation, and pre-accreditation testing into a cohesive system, and the CVF is offered to fill that gap at the specification level. The same access constraints directly bear on the evaluation problem addressed in Section V: project-level accreditation outcomes are held by accrediting authorities and by constructing organisations. They are not routinely releasable, which is why the published literature contains framework proposals but almost no comparative outcome data.

3. COMPLIANCE VALIDATION FRAMEWORK

The Compliance Validation Framework (CVF) is structured as a four-phase workflow that maps directly to the lifecycle of a SCIF construction project: (I) Pre-Construction QC, (II) In-Progress Validation, (III) Pre-Accreditation Testing, and (IV) SSO/AO Submission. Each phase incorporates defined inspection hold points, acceptance criteria traceable to ICD 705 requirements, and a deficiency feedback loop enabling iterative remediation. The complete framework architecture is presented in Figure 1.

3.1. PHASE I: PRE-CONSTRUCTION QUALITY CONTROL

Phase I establishes the compliance baseline before ground is broken. Activities include a comprehensive review of the Construction Security Plan (CSP) against ICD 705 requirements, verification of material certifications for RF shielding components (typically welded steel or modular copper mesh systems), alignment with TEMPEST specifications, and critically the vetting and qualification of all subcontractors who will perform security-sensitive work. Phase I concludes with a formal readiness gate requiring SSO concurrence before construction proceeds.

The CSP review process employs a checklist derived from the governing standards, with each item mapped to the corresponding Fixed Facility Checklist line item. This traceability matrix is the core mechanism of the framework: it ensures that no accreditation requirement is orphaned during translation from design specification to construction execution. Material certifications are verified against manufacturer test reports. Where the CTTA-issued shielding criteria for the project exceed the performance for which a product has been independently certified, the framework requires independent third-party testing rather

than reliance on manufacturer data alone; the trigger point is therefore project-specific and is set by the issued criteria, not by a fixed attenuation figure.

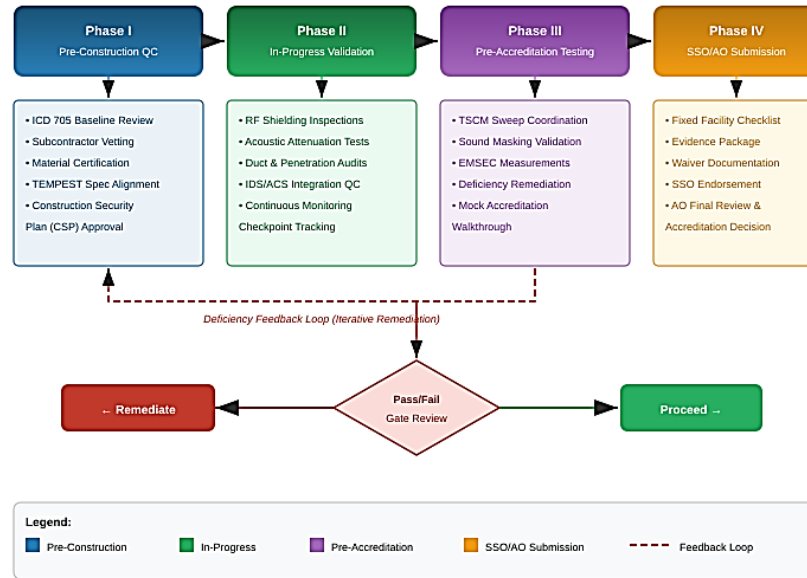


FIGURE 1 Compliance Validation Framework (CVF) — Four-Phase Architecture with Deficiency Feedback Loop and Pass/Fail Gate Review

3.2. PHASE II: IN-PROGRESS VALIDATION

Phase II encompasses the continuous quality verification activities conducted during active construction. The CVF defines six inspection domains, each with domain-specific protocols:

- **RF Shielding Integrity:** Seam continuity testing using a calibrated near-field probe at 100% of welded joints, with supplementary far-field testing at 10% of total surface area per MIL-STD-188-125-1 [11].
- **Acoustic Attenuation:** Sound Transmission Class (STC) verification at demising walls, ceiling assemblies, and penetration points using ASTM E336 field testing methodology [12]. The CVF requires STC measurements for each unique wall assembly type, plus random sampling of 15% of the remaining assemblies.
- **Duct and Penetration Management:** Visual and dimensional inspection of all utility penetrations, HVAC duct configurations, and waveguide-below-cutoff installations, verified against approved shop drawings with zero tolerance for undocumented penetrations.
- **IDS/ACS Integration:** Functional testing of all intrusion detection sensors, access control readers, and monitoring interfaces in accordance with UL 2050 and the facility's approved Security System Description (SSD) [13].
- **TEMPEST Compliance:** Zone boundary verification, RED/BLACK separation measurements, and grounding system continuity testing per CNSS Advisory Memorandum [14].
- **Physical Security:** Door and frame hardware inspection, vault door operational testing, visual barrier integrity assessment, and lock specification verification.

Each inspection event generates a standardised Inspection Verification Record (IVR) that captures the inspection domain, the specific requirement reference, the pass/fail determination, photographic evidence, and the inspector's credentials. Failed inspections trigger the deficiency feedback loop, which requires root-cause documentation, a corrective action plan approved by the QC manager, and reinsertion verification before the deficiency is closed.

3.3. PHASE III: PRE-ACCREDITATION TESTING

Phase III represents the critical bridge between construction completion and formal accreditation submission. This phase includes coordination with Technical Surveillance Countermeasures (TSCM) teams for the pre-accreditation sweep, sound masking system commissioning and calibration, comprehensive EMSEC measurements by certified personnel, and a mock accreditation walkthrough that simulates the AO's evaluation methodology.

The mock accreditation walkthrough is a distinguishing element of the CVF. Conducted by the QC team using the AO's own Fixed Facility Checklist, this exercise is intended to surface residual deficiencies under conditions replicating the formal accreditation inspection. Its rationale follows from the distinction drawn in Section II-B. Because a substantial proportion of first-submission failures are evidentiary rather than physical, an exercise that tests the evidence package against the checklist should detect a class of deficiency that construction-focused inspection does not reach. The proportion of walkthrough findings

that are documentation gaps rather than construction defects is a directly measurable quantity. It is proposed in Section V as one of the framework's evaluation metrics.

3.4. PHASE IV: SSO/AO SUBMISSION

Phase IV formalises the evidence package for accreditation review. The submission includes the completed Fixed Facility Checklist with cross-referenced evidence, all Inspection Verification Records, TSCM sweep results, acoustic and RF test reports, system as-built drawings, and any waiver requests with supporting risk mitigation documentation. The CVF structures this package to mirror the AO's review workflow, reducing administrative processing time and minimising requests for additional information (RFIs) that delay accreditation decisions.

4. SUBCONTRACTOR EVALUATION FRAMEWORK

Subcontractor performance is a principal determinant of SCIF construction quality. The CVF incorporates a weighted evaluation protocol assessing six criteria: Clearance and Compliance (25%), Technical Expertise (20%), QC Track Record (20%), Schedule Adherence (15%), Safety Record (10%), and Cost Efficiency (10%). The weighting scheme is proposed rather than empirically derived. Analytic Hierarchy Process elicitation from a panel of SSOs and construction managers is the appropriate method for calibrating these weights [15], and conducting that elicitation is identified in Section VII as a discrete and readily achievable item of future work; the weights above should be treated as a starting point pending it.

Each subcontractor is scored on a 0–100 scale across all six criteria, producing a weighted composite score. Fig. 3 illustrates the intended use of the instrument, contrasting the score profiles that would distinguish a strong from a weak candidate firm. The profiles shown are illustrative of the instrument's discriminating dimensions rather than an empirical result. The hypothesis the instrument encodes that security-specific qualifications rather than general construction competence are the primary differentiators of SCIF subcontractor performance—is testable and is stated as such in Section V.

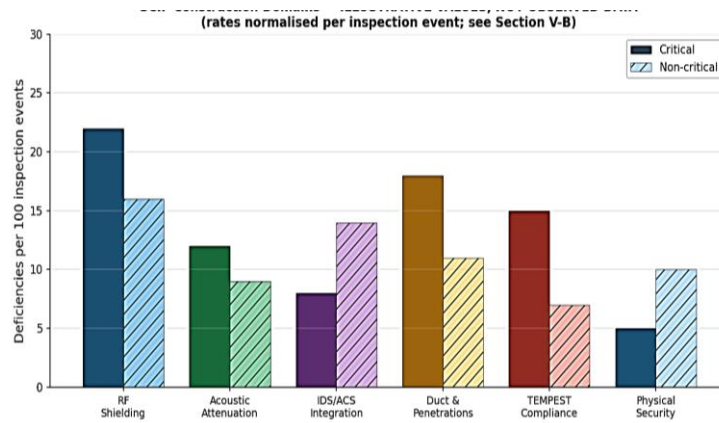


FIGURE 2 Deficiency Distribution across SCIF Construction Domains, Classified By Severity. Illustrative Distribution Showing the Form in Which Deficiency Data should be Reported under the Evaluation Design of Section V; Not Observed Data

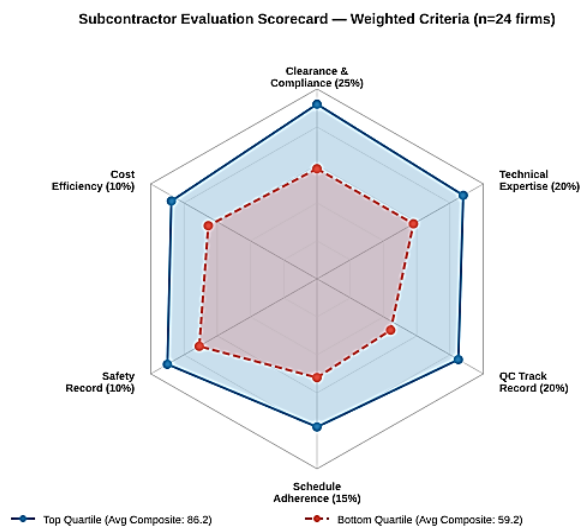


FIGURE 3 Subcontractor Evaluation Scorecard: Illustrative Radar Comparison of Strong and Weak Score Profiles across the Six Weighted Criteria, Showing the Discriminating Dimensions of the Instrument

5. PROSPECTIVE EVALUATION DESIGN

5.1. STUDY DESIGN AND METHODOLOGICAL CONSTRAINTS

This section specifies the study design required to evaluate the CVF against conventional practice and outlines the methodological constraints that make such an evaluation difficult in this domain. The comparison of interest is between projects executing the full CVF and projects using conventional USACE three-phase QC augmented with ad hoc SCIF-specific inspection. Three design problems must be confronted at the outset. First, random assignment is rarely available: frameworks are adopted organisation-wide and applied to later projects, so any comparison is quasi-experimental and confounded with calendar time and organisational learning. A design using contemporaneous rather than sequential controls, or a stepped-wedge rollout across installations, is strongly preferable to a simple before-and-after comparison. Second, projects vary by an order of magnitude in secure area and construction value, so deficiency counts are not comparable across projects without normalisation. Third, projects sharing a prime contractor or an installation are not independent observations, and any analysis must either cluster on that unit or treat the dependence explicitly as a limitation.

5.2. DEFICIENCY MEASUREMENT AND REPORTING

Deficiency data should be reported by construction domain and severity classification, in the format illustrated in Figure 2. Because projects differ substantially in scale, deficiencies should be expressed as a rate per inspection event rather than as a raw count per project, and modelled with a Poisson or negative binomial specification appropriate to count data with overdispersion. Reporting raw per-project means invites confounding by project size and should be avoided. The domain-level breakdown is of independent practical interest: identifying which domains generate the highest proportion of critical rather than minor deficiencies would allow inspection effort to be concentrated where accreditation risk is greatest, and this is proposed as a secondary objective of the evaluation.

The statistical treatment of any such comparison requires care at the sample sizes realistically available. Project-level samples in this domain are small, typically in the tens, and deficiency counts are neither normally distributed nor independent across projects sharing a contractor. A two-sample t-test on per-project means is therefore inappropriate. A nonparametric test such as the Mann–Whitney U test, or an exact method, should be used for the primary comparison, and a count model with clustered standard errors should be used for the adjusted analysis. Effect sizes should be reported with confidence intervals, using Hedges' *g* rather than Cohen's *d* given the small-sample bias correction. A *p*-value alone is insufficient evidence at these sample sizes and should not be reported without an accompanying interval estimate.

5.3. INSPECTION PASS RATE REPORTING

First-pass inspection acceptance rates should be reported by phase and construction domain in the format shown in Fig. 4. The framework predicts a specific pattern: acceptance rates should be lowest during Phase II, where latent defects are first exposed, and highest during Phase IV, reflecting the cumulative effect of prior remediation cycles. Observing that gradient would provide evidence that the phase structure is functioning as intended; failing to observe it would indicate that later phases are not adding detection value over earlier ones, and would be an informative negative result.

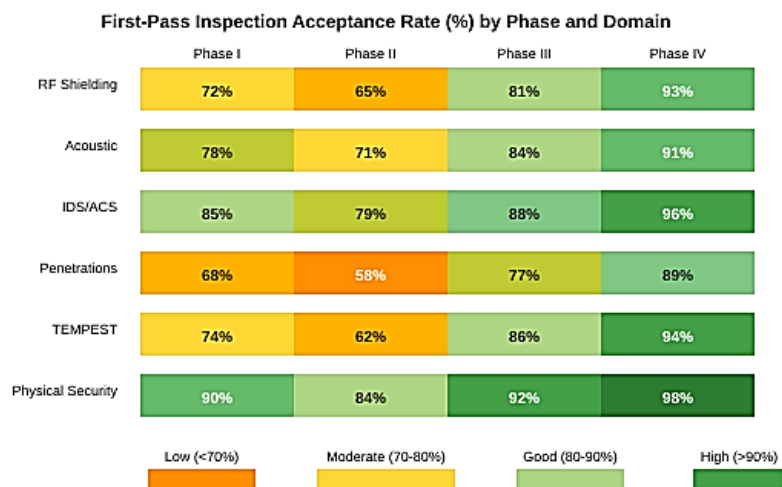


FIGURE 4 First-Pass Inspection Acceptance Rate by Phase and Construction Domain: The Reporting Format Proposed For Evaluation of the Framework, Populated with Illustrative Values.

5.4. OUTCOME MEASURES

The primary outcome measure for the CVF is the first-pass accreditation rate: the proportion of projects achieving AO accreditation on initial submission without conditions or deferrals. Table I sets out this and the secondary outcome measures

together with the reporting requirement applicable to each. It contains no results because none exist; it is a specification for a study yet to be performed. One point deserves particular emphasis because it is frequently neglected in this kind of framework evaluation. A proportion must be reported as a fraction with its denominator stated, not as a percentage alone. At the sample sizes available in this domain, a bare percentage is uninterpretable, and it is not always reconcilable to any integer count of projects at all: with a sample of eighteen projects the only attainable rates are the eighteen fractions of that denominator, so any figure falling between them cannot have been computed from that sample. Reported rates should therefore always be resolvable to an integer count over a stated denominator, and any rate that is not should be treated with caution.

TABLE 1 Outcome Measures and Reporting Specification for Prospective Evaluation

Outcome measure	Definition	Reporting requirement
First-pass accreditation rate (primary)	Projects accredited by the AO on initial submission without conditions or deferrals	Report as a fraction with the denominator stated, plus an exact binomial confidence interval. Never as a bare percentage.
Deficiency rate	Documented deficiencies, normalised per inspection event rather than per project	Poisson or negative binomial model with standard errors clustered on prime contractor and installation
Critical deficiency rate	Deficiencies classified critical under the severity scheme of Section III	Rate and proportion of total, broken out by construction domain
Accreditation phase duration	Working days from construction completion to AO decision	Median and interquartile range; absolute days reported alongside any relative figure
AO Requests for Information	RFIs issued by the AO during accreditation review, per submission	Count model; reported separately from deficiency measures, since it isolates the evidentiary effect

Secondary outcome measures should comprise the accreditation phase duration from construction completion to AO decision, the number of AO Requests for Information per submission, and the proportion of mock walkthrough findings classified as documentary rather than physical. The RFI count is a particularly informative measure because it isolates the evidentiary contribution of the framework from its construction-quality contribution. If the CVF works through the mechanism proposed in Section II-B, RFI counts should fall even where deficiency counts do not. Schedule effects should be reported in absolute working days alongside any relative figure, and the distinction between a percentage change and a change in percentage points should be observed throughout.

6. DISCUSSION

6.1. IMPLICATIONS FOR PRACTICE

If the framework performs as designed, the operational implications for SCIF construction stakeholders are direct. For construction managers, it provides a repeatable, auditable QC process that reduces dependence on individual inspector expertise and institutional knowledge. For SSOs, the structured inspection verification records and traceability matrices simplify the endorsement process and reduce the risk of recommending facilities with latent non-conformances. For AOs, the evidence packaging approach, designed to mirror the Fixed Facility Checklist evaluation workflow, should enable more efficient review and reduce the administrative burden that delays accreditation decisions. These are the framework's design intentions, each of which corresponds to one of the outcome measures specified in Section V.

The subcontractor evaluation protocol addresses the framework's single greatest controllable risk factor in SCIF construction quality: contractor qualification. The specific hypothesis is that composite scores on the instrument predict subsequent deficiency generation rates, and that the security-specific criteria carry more predictive weight than the general construction criteria. This is testable on a modest sample and does not require access to accreditation outcomes, making it the most tractable component of the framework to validate first.

6.2. LIMITATIONS

The limitations of this work should be stated plainly. The CVF has not been empirically evaluated. It is derived from published regulatory requirements, established construction QC practice and the structure of the accreditation process, and its internal logic is traceable; however, no outcome data supports it, and none is claimed. The weighting scheme of the subcontractor instrument is proposed rather than elicited. The framework's applicability to non-U.S. SCIF equivalents, including NATO facilities operating under different accreditation regimes, has not been considered. Most fundamentally, the evaluation design specified in Section V faces a structural rather than incidental data access problem: project-level accreditation outcomes are held by accrediting authorities and constructing organisations and are not routinely releasable, which is why this literature consists largely of proposals. Any organisation in a position to conduct the evaluation described would make a substantial contribution by doing so, and the authors would welcome collaboration to that end.

6.3. COMPARISON WITH EXISTING STANDARDS

The CVF is complementary to, not a replacement for, existing QC standards. It extends the USACE three-phase model by adding SCIF-specific inspection domains, integrates with ISO 9001:2015 quality management systems through its documented

procedures and corrective action protocols, and aligns with the DCSA Assessment and Authorisation Process Guide [6]. The key innovation is the domain-specific inspection matrix with traceable requirement mapping, which no existing standard provides in a field-ready format.

7. CONCLUSION AND FUTURE WORK

This paper presents the Compliance Validation Framework (CVF), a four-phase quality control methodology for SCIF construction that integrates inspection protocols, subcontractor evaluation, and pre-accreditation testing into a unified system aligned with SSO/AO expectations. Its contribution is twofold: a framework specified in sufficient detail to be implemented, with each inspection hold point traced to the requirement it verifies; and an evaluation design specified in sufficient detail to be executed, including the outcome measures, the assignment problem, and the statistical treatment appropriate to small project-level samples. The framework awaits empirical evaluation and is offered on that basis.

Future work will focus on four areas, in order of tractability: (1) AHP elicitation to calibrate the subcontractor evaluation weights, which requires only a panel of experienced SSOs and construction managers and no facility data; (2) a validation study of the subcontractor instrument against subsequent deficiency rates, feasible within a single constructing organisation; (3) a multi-organisation prospective evaluation of the full framework following the design set out in Section V; and (4) adaptation of the CVF to Temporary SCIFs and mobile SCIF platforms, which present distinct inspection challenges arising from their deployable nature and abbreviated construction timelines.

ACKNOWLEDGMENT

The previous text asserted institutional funding support and third-party cooperation. Name only funders and contributors whose support was actually received and can be confirmed; delete this section entirely if none applies. The views expressed are solely those of the authors and do not represent the official policy of any U.S. government agency.

REFERENCES

- [1] Office of the Director of National Intelligence, "Intelligence Community Directive 705: Sensitive Compartmented Information Facilities," Washington, DC, pp. 1-4, 2024. [Online]. Available: <https://archive.dni.gov/files/documents/ICD/ICD-705-SCIFs.pdf>
- [2] Office of the Director of National Intelligence, "Intelligence Community Standard 705-02: Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information Facilities," Washington, DC, 22 Dec. 2016.
- [3] Committee on National Security Systems, "CNSSI No. 7003: Protected Distribution Systems (PDS)," Fort Meade, MD, Sep. 2015.
- [4] U.S. Army Corps of Engineers, "ER 1180-1-6: Construction Quality Management," Washington, DC, February 2025.
- [5] Office of the Director of National Intelligence, "Intelligence Community Standard 705-1: Physical and Technical Security Standards for Sensitive Compartmented Information Facilities," Washington, DC, 17 Sep. 2010.
- [6] Defence Counterintelligence and Security Agency, "DCSA Assessment and Authorisation Process Guide (DAAPG)," ver. 2.2, 2021.
- [7] International Organisation for Standardisation, "ISO 9001:2015 Quality Management Systems Requirements," Geneva, 2015.
- [8] M. Garcia, "The Design and Evaluation of Physical Protection Systems," 2nd ed., Butterworth-Heinemann, 2008.
- [9] S. Celozzi, R. Araneo, and G. Lovat, "Electromagnetic Shielding," Mar. 2008, doi: 10.1002/9780470268483.
- [10] J. S. Bradley, "Acoustical design of rooms for speech," Springer Handbook of Acoustics, 2nd ed., Springer, pp. 1-7, 2014.
- [11] George Baker, "MIL-STD-188-125-1: High-Altitude Electromagnetic Pulse Protection for Ground-Based Facilities," Selected Works, 2005. [Online]. Available: <https://commons.lib.jmu.edu/selectedworks/54/>
- [12] "Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings," doi: 10.1520/e0336-20.
- [13] Underwriters Laboratories, "UL 2050: Standard for National Industrial Security Systems," 6th ed., 2018.
- [14] Committee on National Security Systems, "CNSSAM TEMPEST/1-13: RED/BLACK Installation Guidance," Fort Meade, MD, 17 Jan. 2014.
- [15] T. L. Saaty, "Decision making with the analytic hierarchy process," International Journal of Services Sciences, vol. 1, no. 1, p. 83, 2008, doi: 10.1504/ijssci.2008.017590.