**Attachment C
Design Deliverable Schedule[[1]](#footnote-2)**

1. **Purpose (direction to LANL personnel)**

This document includes a template for the project to edit as necessary/allowed and impose on design agency [e.g., via Statement of Work (SOW)].

*Guidance: Various SOW templates in which to capture Appendix A of this document, including for all capital projects, are maintained by ASM, ALDICP-PEO, STRs and ES-Div (OPS Work Control and Design Contract Services POC).[[2]](#footnote-3)*

1. **General Usage Requirements (direction to LANL personnel)**
2. Applicability: This schedule is required for construction-type projects with a total initial estimated unburdened cost over $500k[[3]](#footnote-4) or a design unburdened cost over $150k.
	1. It is intended for both conceptual design phase efforts[[4]](#footnote-5) and for preliminary and final design efforts (but not studies, though may be adapted to such if desired).
	2. It also addresses design deliverables deferred to construction phase and, at the end, SOW language for engineering support during construction.
	3. Codes of record: This document addresses both the ESM and Tailored Standards Manual (TSM); it facilitates tailoring for either.
	4. LANL facility engineering organization division leaders may allow other approaches.
	5. *Guidance: Other projects may adapt as desired; e.g., if used for fast-track, commercial conceptual design acceptance by LANL, LANL and Design Agency must agree on the deliverables required to achieve the expected overall maturity.*
3. The stated 30/60/90% design delivery review points refer to the default/typical design review schedule where such numbers represent the approximate percentage of the design effort during the combined preliminary and final (aka Title I and II) phase that is required to reach permit-to-construct.) Note: In part for historical reasons, this ignores the fact that any line-item project conceptual design effort represents 15-30% of the overall project design effort.[[5]](#footnote-6)
4. For use in the SOW, Attachment A should be edited to clearly identify what is required for each project (see Tailoring Guide table which precedes Table 2).
	1. This tailoring process is typically performed by LANL project engineers, designers, FDARs, and/or SMEs evaluating the functional and operational requirements and criteria.

***CAUTION****: Elimination of listed deliverables is not relief from TSM or ESM requirements for applicable design output documents per Chapter 1 (general) or discipline-specific chapters. For new systems/structures, such may require a Variance; for small facility modifications, it is primarily FDAR decision.*

* 1. The project may assign some tasks (e.g., telecom design, facility design description) to a LANL entity and not require of DPIRC (ref. ESM Ch 1 Z10 Attachment B).
	2. Once agreed upon, portions of the edited table expected of the main Engineer of Record (EOR) should be inserted into the SOW document (along with the rest of Appendix A if not already present in SOW template).

**Appendix**

Appendix A. Template for Input to SOWs for Design Services

**Record of Revisions**

| **Rev** | **Date** | **Description** | **POC** | **RM** |
| --- | --- | --- | --- | --- |
| 0 | 2/1/06 | Initial issue | Tobin Oruch, *ENG-CE* | Mitch Harris, *ENG-DO* |
| 1 | 10/27/06 | Added code analysis pg. 3 Arch design criteria | Tobin Oruch, *CENG* | Kirk Christensen, *CENG* |
| 2 | 6/16/08 | Added energy deliverables under Multi-Discipline heading. | Tobin Oruch, *CENG* | Kirk Christensen, *CENG* |
| 3 | 5/21/09 | Admin changes; was App. C | Tobin Oruch, *CENG* | Gary Read, *CENG* |
| 4 | 8/25/10 | FCN Criteria doc. 90% expectations. | Tobin Oruch, *CENG* | Larry Goen, *CENG* |
| 5 | 5/16/13 | Dropped 15% column. Added phasing, deferred design, spec expectations, IBC/IEBC forms, submittal schedule input, struct obs, arc-flash calcs, fire alarm, security, Cx, ML1-2, Title 3. Other minor updates. | Tobin Oruch, *ES-DO* | Larry Goen, *ES-DO* |
| 6 | 3/23/15 | Changes on threshold for use, specs maturity, electrical deliverables, pressure safety, telecom. | Tobin Oruch, *ES-DO* | Mel Burnett,*ES-DO* |
| 7 | 11/28/18 | Separated LANL instructions for usage/editing of template from design agency direction. Added design verification, test/acceptance, TIP, SE, and software expectations; other minor changes throughout. | Tobin Oruch, *ES-FE* | Larry Goen,*ES-DO* |
| 8 | 5/09/21 | Evaluated deliverables based on required dependencies and adjusted accordingly.  Added guidance for pre-30% deliverable development to help ensure 30% deliverables are delivered on time.  Deleted spec-related requirements at 30%. Major changes for fire protection, pressure safety. Added direction on deferred designs. Other minor changes throughout. | Tobin Oruch, *ES-FE* | Jim Streit,*ES-DO* |
| 9 | 7/23/25 | Prefacing (internal direction) material revised to add applicability for conceptual design phase; dropped 30/60/90/100 from title to better support this. Schedule modification and review process requirements revised to support commercial and capital projects.Design agency scope became Appendix A SOW template to better separate from internal direction. In App. A, TSM non-applicability column added; conceptual design deliverables indicated by new column, fire protection matters by other disciplines moved to them and indicated by [FP], same with pressure safety; many other updates. Incorporated VAR-10554 re Ch. 21, and VAR-10564 re TIP. | Tobin Oruch, *ES-FE* | Mike Richardson,*ES-DO* |
| 9.1 | 7/30/25 | Added Building Information Modeling (BIM) and additional fire protection expectations in Table 2. | Tobin Oruch, *ES-FE* | Mike Richardson,*ES-DO* |

**Appendix A. Template for Input to SOWs for Design Services**

1. **General Requirements for Design Agency**
2. For the conceptual, preliminary (design development), and final (construction documents) design phases, as required by the EOR’s statement of work, for each review point:
	1. Table 1A establishes the overall (general) maturity, and specification maturity details, for typical review points. Table 1B addresses status/steps after the 90%.
	2. Table 2 provides the deliverables for each review and the details on calculation and drawing maturity. *EOR should propose any modifications prior to entering into a contract for work.*
3. Deliverables are Design Agency (EOR/design professional in responsible charge) responsibility, whether LANL-in-house or external, unless noted otherwise in their SOW.
4. The primary LANL Standards Manuals — the ESM and TSM, of which one will be part of the code of record — contain additional detail on these deliverables as well as, potentially, additional required deliverables for permitting or closeout (herein, “ESM/TSM” means the project-applicable one). Project-specific documents such as SOWs, performance criteria, RCDs, and others may also contain deliverable requirements not contained here.
5. Approval of modification: The LANL IPT may approve combing, shifting, or elimination of one or both the 30% and 60% reviews as these are Owner reviews not related to permitting by LBO (but they can reduce rework and help ensure the 90% and subsequent reviews are quick and successful, and are therefore recommended if only as over-the-shoulder or even less formal).
6. The 90% and subsequent reviews must always occur as they best accomplish the LANL Building Code Program’s plan review and permitting process.
7. Typical deferrals to construction phase are not a modification.
8. Phased design and approval: Because design disciplines may operate on different timelines, this schedule does not preclude phased design whereby a sub-package (e.g., part of the civil or structural design) is submitted before the remaining scope package(s) to seek early LANL Building Official (LBO) release for such work.
	1. At a minimum; however, the main-package 90% review must include all disciplines in a combined package for a comprehensive review.
	2. Basis: IBC-2021 107.3.3 Phased approval:“The *building official* is authorized to issue a *permit* for the construction of foundations or any other part of a building or structure before the *construction documents* for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such *permit* for the foundation or other parts of a building or structure shall proceed at the holder’s own risk with the building operation and without assurance that a *permit* for the entire structure will be granted.”
9. Incomplete design review delivery: Except for the phased design packaging described above, it is not acceptable to deliver design review documents or a set of documents without all deliverables required by Table 2 in separate submissions [at non-specified (staggered) intervals], unless pre-approved by LANL. Such can cause miscommunication and instances of incomplete or incorrect design documents being processed during the multiple reviews; it will only be allowed when actions are taken to clarify roles and responsibilities, processes, and tools to be used by the staff involved.
10. Design review method for commercial construction: Reviews may generally be conducted by any method preferred by the EOR. LANL supports electronic review systems but is open to alternative review formats as well.
11. Over-the-shoulder (OTS): The reviews (a) midway through a conceptual design contract or (b) after any conceptual completion and prior to 90% may be conducted as an OTS review with LANL Engineering concurrence. OTS is typically a meeting to perform a page-turn (PT) review of the design and obtain comments from LANL. *The design submittal should be provided at least three working days prior to the OTS*. *The OTS comments will be submitted to the EOR by LANL*. *Within LANL, OTS is addressed in the* [*Design Review Guidance Document*](https://int.lanl.gov/org/ddops/aldfo/nuclear-safety/engineering-services/lanl-building-office/commercial-implementation/index.shtml) *for commercial implementation.*
12. Responsiveness: For each deliverable provided for review or as a final product, all previous LANL requirement compliance-problem (e.g., “C”) comments shall have been resolved, and all others dispositioned, in writing.

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Authors note to LANL IPT: Tables 1 and 2 below should be edited to clearly identify what is required for each project. This is discussed further in Att. C’s main section *(at B.3).*

**Guidance for LANL’s Tailoring of Att. A in SOW**

| **Situation** | **Actions to Consider** |
| --- | --- |
| The SOW doesn’t include a Conceptual Design Phase and CDR (e.g., it is not a capital project, or CDR is already complete) | Eliminate “Conceptual” row in Table 1A, “Conceptual Phase Need” column in Table 2, and related non-table text |
| The SOW is only for a CDR for a capital project | * Eliminate all post-conceptual phase review rows in Table 1A [1st (“30”) review and those below] and entire Table 1B, and 1st/2nd/90% columns in Table 2
* Eliminate text above Table 2 that discusses these reviews
 |
| The TSM is the primary code or record manual, not the ESM | Eliminate “N/A to TSM” deliverable rows in Table 2, then the “N/A to TSM” column itself |
| The 1st (“30%”) and 2nd (“60%”) reviews are combined (e.g., to a 50%), eliminated (very small projects), or changed to another maturity (e.g., 25 & 45%) | * Modify or eliminate 1st (“30%”) and/or 2nd (“60%”) rows in Table 1A, and corresponding columns in Table 2
* Modify non-table text that discusses these reviews as 30 & 60
 |
| A deliverable is in no way applicable to scope | Eliminate, but see CAUTION in B.3 of Att. C body above regarding approvals for elimination of those that may be applicable and necessary |

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**Table 1. Overall Maturity Requirements by Review**

**Table 1A. Maturity Through 90%**

| **Review** | **Overall Design Maturity** | **Specification Maturity** |
| --- | --- | --- |
| Conceptual | EOR’s understandable presentation of the deliverables specified (the key design outputs necessary for a reliable cost estimate and customer acceptance). Focuses on foundational concepts, ensuring the design meets project scope and high-level functional requirements. | Table of Contents of presumptively necessary spec sections. |
| 1st (“30%”) | EOR’s understandable presentation of the First Review (“30%”) deliverables specified. Although the design is far from complete, a few deliverables will be final or near-final while most will be preliminary or not yet expected. | Table of Contents of intended spec sections, and indication which will be based on LANL Master Spec sections. |
| 2nd (“60%”) | EOR’s understandable and thoroughly developed presentation of the Second Review (“60%”) deliverables specified. Core design elements and technical content must be complete, as this is when most comments are expected. Only minor design elements should be missing at this stage (rare exceptions as noted herein). | Portray complete scope of work; Sections have non-applicable portions removed. Some quality, manufacturer, and execution details may be TBD. Unedited LANL office master templates are unacceptable. |
| 90% | EOR’s complete, cross-discipline-coordinated, QA-checked, and final-quality documents — such as typically presented for building department permit, with the EOR willing to stand behind them (and either already PE-sealed or ready for PE seal, when seal is required by TSM or ESM Ch. 1). Any design being deferred to post-permit must be described so that it is clear what aspects of the design are missing and to be provided in construction phase.*Guidance: LANL’s 90% review should merely be a backcheck of comment resolution from the previous and a review of the additional development from that time.*  | Quality and other test and inspection requirements, manufacturer/model(s) as appropriate, and execution details final. Complete, checked, and ready for LANL acceptance. |

**Table 1B. After-90% Maturity Deliverables**

| **Step/Status** | **State of Design Maturity** |
| --- | --- |
| Backcheck (as needed) | AKA 95% or 95% backcheck. Provide this review set to LANL PE upon request. *Guidance:*  *If multiple comments from the 90% review warrant commentor confirmation for acceptance, this review provides them the updated (or all) documents with all compliance (e.g., “C”) comments resolved and all others dispositioned as necessary. LANL’s backcheck review should merely be a final check of comment resolution from the 90% review and a review of any additional development from that time. Review ensures commentor satisfaction and should help ensure the 100% submission will be acceptable to LANL. If numerous comment resolutions remain at 95% it may warrant another pre-100% (e.g., 96%) review.* |
| 100 | The design documents with all compliance (e.g., “C”) comments resolved, all others dispositioned as necessary, and documents approved and issued (and sealed where required), submitted by the EOR for final LANL acceptance. They can/should say “Issued for construction,” but are not until IFC step below. |
| IFC | The LANL-accepted 100% “IFC” documents, completely ready for construction upon notice-to-proceed for same. |

1. **Table 2 — Usage by Design Agency**
2. The review point (or percentage) column X’s indicate the documents required for each review (these may include final versions of some documents).
	1. A single X in a row reflects the first time a deliverable is required; however, submit latest versions at each subsequent phase also, even if they have not changed (this is sometimes reiterated with multiple X’s, or a topic’s last row indicating a “final” version).
3. Coordination with LANL-performed scope: Certain project components, such as selected network and security systems, must be designed by LANL entities. However, the EOR is still responsible for coordinating with LANL staff to define requirements and interfaces their design must accommodate (e.g., power supply, structural supports, wall space). The EOR must engage with LANL-designated personnel throughout the design process to ensure the final design is properly integrated and aligned.
4. “Final” as a deliverable description means mature enough to issue for LANL acceptance.
5. For SOWs that include a conceptual design phase: The Conceptual column indicates required deliverables (rows) for this with an X. Drafts are required for a midway review.
6. Table 2 coloring is guidance for post-conceptual design: Due to discipline interdependencies, deliverables shaded yellow in a 1st (30) column cell should really be produced no later than the 5% point of the phase, and items shaded green at the 15% point (“green=15”). LANL’s first review will generally be at 30% unless EOR desires sooner.

**Table 2. Design Agency Deliverables Schedule Template**

1. Items shaded yellow should be produced at the 5% point of the post-conceptual phase
2. Items shaded green normally at the 15% point of the post-conceptual phase (“green=15”)
3. [FP] after a description indicates Fire Protection SME review interest

| **N/A to TSM** | **DELIVERABLE** | **Conceptual****Phase Need** | **Post-Conceptual Phase Reviews****(% of that effort)** |
| --- | --- | --- | --- |
| **1st****(30)** | **2nd****(60)** | **90%** |
|  | **GENERAL (Ch. 1)** |  |  |  |  |
|  | **Programming Document** (e.g., Owner’s requirements or Program Requirements Document)–created, or existing one updated with any new expectations, including any authorized program growth. | **X** |  |  |  |
|  | **Building Info Model (BIM)**, when required by CAD Stds Manual (CSM) Section [400](https://engstandards.lanl.gov/cad-manual.shtml#400) |  |  |  |  |
|  | CSM Section 400-required elements modeled with data applied to a level to produce discipline drawings at maturities stated below |  | **X** |  |  |
|  | BIM updated to produce output drawings and support specification maturities stated below; no clashes |  |  | **X** |  |
|  | BIM at level-of-development (LOD) per CSM Section 400 requirements to produce output drawings and equipment lists for known products, coordinated with the specifications; no clashes. |  |  |  | **X** |
|  | **Review Comment Resolution (all disciplines)** |  |  |  |  |
|  | First review (30%) comments addressed |  |  | **X** |  |
|  | Second review (60%) comments addressed; design complete |  |  |  | **X** |
|  | **General (Division 01) Specs** |  |  |  |  |
|  | See Table 1A above for spec maturity definitions at 2nd (“60%”) and 90% |  |  | **X** | **X** |
|  | **Other** |  |  |  |  |
|  | When IBC/IEBC, Design Professional in Responsible Charge **(DPIRC)** designation form (ESM Chapter 16, IBC-GEN, Form 3), final |  | **X** |  |  |
|  | When IBC/IEBC, **Statement of Special Inspections** when required by IBC Ch. 17. [ref. ESM Ch.16 IBC-IP Att. B] |  |  |  |  |
|  | Preliminary  |  |  | **X** |  |
|  | Final, with clearly defined testing requirements and acceptance criteria |  |  |  | **X** |
|  | **Project Equipment List** (MEL input, per Ch. 1 of TSM/ESM and ESM Ch. 1 Section 200 and its workbook; for existing facilities, ID numbers chosen with concurrence by LANL system engineers) |  |  |  |  |
|  | Major equipment with IDs (also on P&IDs), MLs  |  | **X** |  |  |
|  | Preliminary – All known equipment and information including Management Level (MLs) |  |  | **X** |  |
|  | Final including all known components (may lack unknown data for constructor-supplied SSCs) |  |  |  | **X** |
|  | **Project Document List** (PDL, per Ch. 1, when not waived by project) |  |  |  |  |
|  | PDL showing documents in-process or issued to date |  |  | **X** |  |
|  | PDL updated |  |  |  | **X** |
|  | **Design verification (DV)** evidence document meeting NQA-1 or DOE O 414.1E; e.g., Design Verification Matrix and/or Design Verification Report[[6]](#footnote-7) including design review documentation, qualification test plans and results, and alternate calculations. Where DV approach includes individual design deliverables reflecting peer-type DV review, evidence of same should be on each final (e.g., 90% and later deliverable), including those listed herein. |  |  |  | **X** |
|  | **Facility Design Description and/or System Design Descriptions** (FDD, SDD; if required, e.g., by Z10 App B or TSM/ESM Chapters 10–Hazardous Process or ESM 12–Nuclear) |  |  |  |  |
|  | Preliminary – major systems described conceptually, preliminary design criteria and constraints, and other data indicated for this phase (per DOE-STD-3024, *Content of System Design Descriptions* and/or Z10 App D on FDDs). | **X** | **X** |  |  |
|  | Updated – major system descriptions matching drawing representations and complete design criteria and constraints; minor systems described conceptually and have preliminary design criteria and constraints, other data per drivers listed at “preliminary” |  |  | **X** |  |
|  | Final – FDD and/or SDD information per drivers listed at “preliminary” |  |  |  | **X** |
|  | **DEMOLITION** |  |  |  |  |
|  | **Demo Drawings** If applicable, prepared using digital photographs of existing facility structures, systems & components (including security) as base drawings to the maximum extent practicable. Items to be removed or demolished to be indicated by annotation or editing of the photographs (government camera, DC/RO-approved for release) |  |  |  |  |
|  | Preliminary layout drawings and elevations with pictures of existing inserted | **X** | **X** |  |  |
|  | Annotated drawings with details for demolition of major SSCs  |  |  | **X** |  |
|  | Fully annotated drawings with details for demo of all SSCs and/or temporary support of enduring SSCs |  |  |  | **X** |
|  | **Demo Calculations (partial and entire buildings)** |  |  |  |  |
|  | Preliminary structural calcs for any temporary shoring or structures required |  | **X** |  |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  | **X** |  |
|  | **Demo Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **CIVIL/UTILITIES (Ch. 3)** |  |  |  |  |
|  | Site Survey: To document existing grading, drainage, structures, utilities (overhead and underground), and any special conditions and/or constraints. | **X** | **X** |  |  |
|  | **Civil Calculations** |  |  |  |  |
|  | Preliminary, for topics described in Chapter 3, Civil of the TSM/ESM |  | **X** |  |  |
|  | Exterior natural gas system calcs including flow rates and pipe sizing per the requirements of 40 CFR 192 and ASME B31.8 — preliminary |  | **X** |  |  |
|  | External NG calcs updated and resolve/address comments from the 30% design |  |  | **X** |  |
|  | All design calcs, including, but not limited to, the following: |  |  | **X** |  |
|  | Drainage calcs and hydrologic analysis, where applicable |  |  | **X** |  |
|  | Earthwork calcs of cut and fill volumes with applicable cross sections |  |  | **X** |  |
|  | Pressure, demand, and capacity analysis for sizing and material proposed in the utility system improvements |  |  | **X** |  |
|  | Pavement design calcs |  |  | **X** |  |
|  | Road design calcs including horizontal and vertical alignment, curve data, super elevation, minimum sight distances, and pavement thickness  |  |  | **X** |  |
|  | Traffic counts and future volume projections to a traffic impact analysis and to establish design parameters as required |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Civil Drawings** (C sheets) |  |  |  |  |
|  | Existing Site Condition Plan: Show existing buildings, structures, contours, and drainage features, as applicable. | **X** | **X** | **X** | **X** |
|  | Preliminary Plan View: Include proposed improvements including geometry, typical sections, pavement sections, site grading and drainage, utility locations with applicable clearance offsets. Indicate fire protection needs (size, type and location of underground water mains and location of hydrants, sprinkler system lead-ins, and sectional valves); and fire department access roadwaysand markings[FP]. For new construction/Guiding Principles-applicable facility, document the site is not in the floodplain and design is EISA 438 compliant.  | **X** | **X** |  |  |
|  | Preliminary Site Grading and Drainage Plan: Show proposed building location and orientation, access roads, parking location, and ground floor elevations. | **X** | **X** |  |  |
|  | Plan view of proposed site grading and drainage improvements identifying locations of roads, curb and gutter, parking areas, sidewalks, buildings and structures  |  |  | **X** | **X** |
|  | Roadway or drainage structure plan and profile sheets with appropriate horizontal and vertical design information |  |  | **X** | **X** |
|  | Utility plan sheets identifying the proposed improvements with existing utilities clearly identified in locations where conflicts could exist |  |  | **X** | **X** |
|  | Profile for (gravity) sanitary sewer or steam and condensate lines | **X** | **X** | **X** | **X** |
|  | Details if required |  |  | **X** | **X** |
|  | Final |  |  |  | **X** |
|  | **Civil Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | Commissioning Plan for utilities |  |  |  | **X** |
|  | **ARCHITECTURAL (Ch. 4)** |  |  |  |  |
|  | **Architectural Decisions & Calculations** |  |  |  |  |
|  | Completed Building Code Analysis based on the project’s Design Criteria and Scope of Work. The analysis includes a Life Safety Plan (IEBC 2B or higher), IBC and IEBC Code Compliance Review, and evaluation of ABA accessibility requirements and Sustainable Design considerations. For projects involving modifications to existing buildings, LANL will provide the initial IEBC Alteration Level determination (if applicable), along with any required seismic risk analysis in accordance with ICSSC RP-8 guidelines. | **X** | **X** |  |  |
|  | Fire Protection Analysis: including Means of Egress, Life Safety Plan, Occupant load, Egress Capacity, and related analysis and calculations outlined by Chapter 2, of the ESM/TSM.[FP] | **X** | **X** |  |  |
|  | Updated calcs, and updated Design Criteria if required |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance. See Fire section for code analysis. |  |  |  | **X** |
|  | **Architectural Drawings** (G, A, and I sheets) |  |  |  |  |
|  | Exterior elevations—preliminary | **X** | **X** |  |  |
|  | Building plans show building layout, egress routes and exits, vertical openings, fire or smoke rated walls/barriers/partitions.[FP] | **X** | **X** | **X** | **X** |
|  | Code analysis with applicable codes of record, IBC construction type, IEBC Alteration Level and IBC and NFPA 101 occupancy classification, hazardous materials storage and use details, and additional code analysis as required to demonstrate design compliance. (The scope and scale of the project dictates the contents and level of detail of the code analysis, may come from Fire Protection Design Analysis (FPDA). See Ch. 2 of the TSM/ESM) [FP] | **X** | **X** | **X** | **X** |
|  | Updated version of 30% plan layouts and exterior elevations; preliminary wall sections and details, ABA requirements finalized, life safety plans (as necessary for scope and scale of project).[FP] |  |  | **X** |  |
|  | Further detailing of information in life safety plans or other coordinating with other discipline drawings, including details, system numbers, locations of all components and access panels.[FP] |  |  | **X** |  |
|  | Preliminary landscaping plans and schedules | **X** |  | **X** |  |
|  | All plans, elevations, sections, details, interior elevations, and schedules completed, authorized, and ready to issue for approval |  |  |  | **X** |
|  | For new facilities and existing ones requiring (re)configuration of floor plan(s), updated Record Floor Plan; notify the ES project engineer to initiate Emergency Evacuation Diagram updating |  |  |  | **X** |
|  | **Architectural Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90%Include specs for fire-related construction features including rated walls and doors, and built-up roof construction, where used[FP] with test and inspection requirements for systems including roofing |  |  | **X** | **X** |
|  | **STRUCTURAL (Ch. 5)** |  |  |  |  |
| **X** | **Design Basis Document** (ref LANL ESM Chapter 5, Sect III for nuclear only) |  |  |  |  |
| X | Draft with building function, design methodology, performance category, hazard category, acceptance criteria, etc. |  | **X** |  |  |
| X | 30% review comments addressed |  |  | **X** |  |
| X | 60% review comments addressed, complete |  |  |  | **X** |
| **X** | **QA Plan for Structural Design** (ref LANL ESM Chapter 5, Sect I) |  |  |  |  |
| X | Final |  | **X** |  |  |
|  | Statement of Special Inspections (see GENERAL above) |  |  |  |  |
|  | Statement identifying the frequency and extent of the structural observation per IBC 1704.6 |  |  | **X** |  |
|  | **Structural Calculations** (ref Chapter 5 of the TSM/ESM) |  |  |  |  |
|  | Foundation description and preliminary sizing (e.g., footings, mats, slabs, piles, tie-beams, etc.) | **X** |  | **X** |  |
|  | Superstructure description and preliminary sizing (e.g., concrete or steel, cast-in-place vs pre-stress, lateral force resisting system, demonstration of complete load path, etc.) | **X** |  | **X** |  |
|  | Structural anchorage design (see also topic under Drawings below) |  |  | **X** |  |
|  | Descriptions of special structural considerations |  | **X** |  |  |
|  | Completed structural scheme with all members sized |  |  | **X** |  |
|  | Calcs or manufacturer’s catalog data validating sizing and selection of all components |  |  | **X** |  |
|  | Secondary component designs (e.g., baseplates, seismic bracing, support stands, etc.)  |  |  | **X** |  |
|  | Foundation design(s)  |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Structural Drawings** (S sheets) |  |  |  |  |
|  | Preliminary floor plans and cross-sections | **X** | **X** |  |  |
|  | Complete and accurate with correct dimensions, tolerances, detail references, general and keyed notes, and compatibility with other disciplines |  |  | **X** |  |
|  | Beam, column and footing schedules as applicable |  |  | **X** |  |
|  | Secondary component details  |  |  | **X** |  |
|  | Foundation details |  |  | **X** |  |
|  | Anchorage details, including main structural framing and non-structural components (including, for existing concrete: strength, thickness, and min. embedment depth as required by ICC-ESR). ***NOTE****: Non-structural component anchorage design of major equipment may be deferred to after procurement; distribution system supports (e.g., HVAC duct, conduit) may be deferred to shop drawings submitted prior to installation. In either case, deferment shall be noted in EOR’s design.* |  |  | **X** |  |
|  | Reinforcement and connection details, including bolt and weld sizes |  |  | **X** |  |
|  | Final (ensure notes give accurate instructions including SFRS indicated, AWS D1.8 welds, NDE, pointer to SSI document—and/or requirement that shop dwgs contain this) |  |  |  | **X** |
|  | **Structural Specs** (ref Chapter 5 of the TSM/ESM) |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **HVAC (Ch. 6)** |  |  |  |  |
|  | **HVAC Calculations** |  |  |  |  |
|  | Preliminary HVAC heating and cooling loads, and meeting ASHRAE 55. | **X** | **X** |  |  |
|  | Preliminary ASHRAE 62.1 ventilation calcs corrected for elevation with exhaust, outside air and building pressurization requirements |  | **X** |  |  |
|  | Preliminary duct sizing calcs including system pressure drops |  | **X** |  |  |
|  | Energy conservation analysis (see Ch 14 Sust. Design deliverables) | **X** |  |  |  |
|  | Calcs updated and resolving/addressing comments from the 30% design |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **HVAC Drawings** (M sheets) |  |  |  |  |
|  | Preliminary mechanical symbols and legend | **X** | **X** |  |  |
|  | Preliminary HVAC floor plans showing major equipment, duct runs, and VAVs/heating coils | **X** | **X** |  |  |
|  | Preliminary HVAC plans showing offices and equipment rooms, major equipment, penetrations, and pipe/duct runs.  | **X** | **X** |  |  |
|  | Preliminary PFDs/airflow diagrams including major equipment, supply & return diffusers, transfer grills, dampers, VAV/reheat coils, airflow rates, and facility/room pressurization requirements  | **X** | **X** |  |  |
|  | Preliminary P&IDs including major system equipment, control devices, control wiring & logic, and sequence of operation – and revisions under change control. |  | **X** |  |  |
|  | Preliminary equipment schedule including all major equipment with significant operating parameters and equipment specs |  | **X** |  |  |
|  | Drawings updated and that resolve/address comments from the 30% design |  |  | **X** |  |
|  | Preliminary mechanical sections, elevations, and details. Fire protection requirements shown (e.g., dampers, access panels). [FP] |  |  | **X** |  |
|  | Complete P&IDs and PFDs, revisions under change control. |  |  | **X** |  |
|  | All other drawings complete, authorized, and ready to issue for approval  |  |  |  | **X** |
|  | **HVAC Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90%.Include specs for fire-related construction features including dampers[FP] |  |  | **X** | **X** |
|  | **PLUMBING AND PIPING (Ch. 6);****See also Civil/Utilities/Ch. 3 and Pressure Safety/Ch.17 section below** |  |  |  |  |
|  | **Piping Calculations** |  |  |  |  |
|  | Preliminary piping system calcs including flow rates, pipe sizing with friction factors, velocities, expansion/contraction and system equipment pressure drops for (pump selection), (compressor selection), (pressurized gas system –bottle or cryogen) |  | **X** |  |  |
|  | Preliminary plumbing systems calcs including the water supply and drainage fixture unit requirements per the UPC |  | **X** |  |  |
|  | Preliminary roof drainage system calcs sized per the requirements of Chapter 6 of the TSM/ESM (ref. ESM D2040 §10A in Section D20 r6) |  | **X** |  |  |
|  | Preliminary natural gas system calcs including flow rates and pipe sizing per the requirements of UPC, UMC, and NFPA 54 |  | **X** |  |  |
|  | Preliminary steam/condensate system calcs incl. flow rates and pipe sizing |  | **X** |  |  |
|  | Preliminary Plumbing Equipment Schedule including all major equip. and fixtures |  | **X** |  |  |
|  | Updated and resolve/address comments from the 30% design |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Piping Drawings** (P, M, and D sheets; refer to the LANL Standard Details for mechanical) |  |  |  |  |
|  | Preliminary heating water P&ID – and revisions under change control |  | **X** |  |  |
|  | Preliminary chilled water P&ID (as necessary) – and revisions under change control |  | **X** |  |  |
|  | Preliminary process P&ID – and revisions under change control |  | **X** |  |  |
|  | Preliminary piping & plumbing Symbols and Legend (see app. E1 to E3 of the LANL CAD Stds Manual) |  | **X** |  |  |
|  | Preliminary Plumbing and piping-related Floor Plans including office layout, restrooms, janitor’s closets and equipment room, major equipment locations, fixture locations, and distribution and vent piping; enlarged plans may be required to clearly show the plumbing systems in certain areas, e.g. equipment rooms (coordinate with Architectural for ADA requirements) | **X** | **X** |  |  |
|  | Preliminary Plumbing Diagrams including riser diagrams for the potable water system, sanitary waste/vent system, roof drainage, and make-up water system. Major equipment, fixtures, and piping included on the riser diagrams |  | **X** |  |  |
|  | Preliminary HVAC Piping Plans including all major equipment, pipe runs, pipe sizes (including refrigerant), and water flow rates. Enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms | **X** | **X** |  |  |
|  | Preliminary Piping Plans; Enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms |  | **X** |  |  |
|  | Complete P&IDs – revisions under change control (locked down) |  |  | **X** |  |
|  | Preliminary Plumbing Details include major equipment requirements and specialties, e.g. backflow preventer installation assemblies, PRV piping details, floor drain details, and cleanout details |  |  | **X** |  |
|  | Floor Plans – under change control (locked down) |  |  | **X** |  |
|  | Piping Plans -- Enlarged plans as required to clearly show the systems in certain areas, e.g., equipment rooms |  |  | **X** |  |
|  | Piping Details -- include major equipment requirements and specialties, e.g., pressure vessels, boilers, air receivers, and pressure relief devices piping details |  |  | **X** |  |
|  | P&ID – Final |  |  |  | **X** |
|  | Floor Plans – Final |  |  |  | **X** |
|  | Piping Details -- Final |  |  |  | **X** |
|  | **Piping Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **PRESSURE SAFETY (Ch. 17)** |  |  |  |  |
| **X** | **Pressure Safety Implementation Plan** (For ESM projects, determination of code of record, roles and responsibilities, documentation requirements per ESM Chapter 17) |  |  |  |  |
| X | Initial |  | **X** |  |  |
| X | Final draft |  |  | **X** |  |
| X | Final |  |  |  | **X** |
|  | **Calculations** |  |  |  |  |
|  | Pressure system calcs — preliminary |  | **X** |  |  |
|  | Pressure safety calcs and other documentation for piping and vessels per Chapter 17 of the TSM or ESM |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **FIRE PROTECTION (Ch. 2)**  |  |  |  |  |
|  | ***NOTE:*** *Detailed alarm and sprinkler system design, installation (shop or working) drawings, and calcs are typically prepared by the installing subcontractor after construction begins. These plans are reviewed and approved by LANL as required deferred design submittals prepared in accordance with the applicable NFPA codes and standards (with first submission expected to be and treated as a 60% or higher maturity level). They are contained in the Ch. 2 Group 2 rows below this Group 1 set. If being deferred/delegated, note as such in design. Basic fire protection performance criteria and details (Group 1) cannot be deferred and shall be captured in the Group 1 documents to direct the Group 2 designs.* |  |  |  |  |
|  | **Group 1 – Required from EOR Before Permitting** |  |  |  |  |
|  | **Summary of Scope/Basis of Design** Location, size, number of stories, construction, occupancy and hazard classification of buildings, and identification of locations to be provided with fire protection and fire alarm systems. | **X** | **X** |  |  |
|  | **Where Applicable** (as required in Ch.2)**: Fire Protection Design Analysis (FPDA), Fire Hazards Analysis (FHA), Fire Hazard Evaluation (FHE), and/or Dust Hazard Analysis (DHA)** |  |  |  |  |
|  | Initial, mature draft |  | **X** |  |  |
|  | Final draft |  |  | **X** |  |
|  | Final approval |  |  |  | **X** |
|  | **Fire Calcs** |  |  |  |  |
|  | **Note:** Preliminary fire protection system calculations below are often necessary pre-permit to ensure feasibility. As with all calculations, fire protection calcs must be in accordance with the requirements of the standards governing the design. |  |  |  |  |
|  | For fire water service supplying the downline fire protection system, calcs to establish the needed capacity (and for existing, versus available capacity) | **X** | **X** |  |  |
|  | Preliminary hydraulic calculations for fire suppression systems (e.g., sprinkler, standpipe) – only required when complex or to determine need for fire pump(s)) | **X** | **X** |  |  |
|  | Detailed hydraulic calculations for fire suppression systems – when not deferred to during construction phase |  |  | **X** |  |
|  | Preliminary fire alarm calculations (e.g., battery loads, voltage drops, circuit impedance) – for complex buildings or complexes, especially where using and extending existing systems |  | **X** |  |  |
|  | Detailed/final Fire alarm calculations (e.g., battery loads, voltage drops, circuit impedance) – when not during construction phase |  |  | **X** |  |
|  | Preliminary calculations for any special fire protection systems (e.g., smoke control/removal, special hazard, performance-based calculations, etc.). |  | **X** |  |  |
|  | **Fire Drawings** (F sheets) |  |  |  |  |
|  | Performance criteria of fire alarm, fire detection, fire suppression, and other fire protection and life safety systems identified and shown on fire protection drawings | **X** | **X** |  |  |
|  | Further detailing of fire protection and fire alarm drawings, including areas to be protected/covered (or areas exempt), features of construction impacting sprinkler or fire alarm detailed design, finalized interfacing and input/output function details.  |  |  | **X** |  |
|  | All the above complete, checked, cross-discipline coordinated, and ready for approval |  |  |  | **X** |
|  | **Fire Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | Sprinkler systems: Specify type of system – (wet pipe, dry-pipe, deluge) how actuated; type, style, and temperature rating of sprinkler heads; hydraulic design criteria, (e.g., Ordinary Hazard, Group 2), allowed types of pipe and fittings, backflow preventer, other equipment anticipated on the installation | **X** |  | **X** |  |
|  | For alarm systems: type of system, type of detectors, what calcs will be required, what interlocks are to be provided. |  |  | **X** |  |
|  | **FP Group 2 – Detailed Design/Shop Drawings****(may be deferred to construction phase, wherein first review** **is treated as a 60%)**As-Built Note: Group 2 (and other critical fire protection design in Group 1) is normally verified/redlined by LANL post-construction, then designs shall be updated to as-built condition by the respective designer |  |  |  |  |
|  | **Fire Suppression/Sprinkler**  |  |  |  |  |
|  | Complete hydraulic calculations on all remote/design areas, including peaking analysis; all hanging (if required) and seismic bracing calculations. |  |  | **X** |  |
|  | Complete drawings, including floor plans, section views, riser diagrams, details; and all piping, sprinkler heads, and valves. |  |  | **X** |  |
|  | Complete materials and equipment (M&E) package with technical datasheets, and listing or approval certifications when required and bill of materials (BOM). |  |  | **X** |  |
|  | Drawings, calculations, and M&E updated to resolve/address comments from the 60% design, complete, checked, cross-discipline coordinated, and ready for approval. |  |  |  | **X** |
|  | **Fire Alarm/Detection** |  |  |  |  |
|  | Detailed/final Fire alarm calculations (e.g., battery loads, voltage drops, circuit impedance) – when not during construction phase  |  |  | **X** |  |
|  | Complete drawings, including floor plans, section views, riser diagrams, wiring diagrams, details, and input/output matrix; and all panels, devices, conduit, and conductors shown. |  |  | **X** |  |
|  | Complete materials and equipment (M&E) package with technical datasheets, listing or approval certifications when required, and bill of materials (BOM). |  |  | **X** |  |
|  | Drawings, calculations, and M&E updated to resolve/address comments from the 60% design, complete, checked, cross-discipline coordinated, and ready for approval.Provide fire alarm panel program and installation instructions with 100% deliverable. |  |  |  | **X** |
|  | **ELECTRICAL (Ch. 7)** |  |  |  |  |
|  | **Electrical Calculations** |  |  |  |  |
|  | Preliminary electrical load estimate for component sizes | **X** | **X** |  |  |
|  | Preliminary fault current calcs or 1st approximation/estimate |  | **X** |  |  |
|  | Preliminary interior lighting (normal and emergency/interior means of egress)[FP]. Daylighting calcs for a Guiding Principles-applicable project.  |  | **X** |  |  |
|  | Preliminary paging system sound distribution calcs (if being deferred/delegated, note that) |  | **X** |  |  |
|  | Interior lighting calc updated [FP] |  |  | **X** |  |
|  | Load study with best estimates; circuits sized and distribution components selected |  |  | **X** |  |
|  | Fault current calcs with best estimates |  |  | **X** |  |
|  | Voltage drop calcs with best estimates |  |  | **X** |  |
|  | Preliminary coordination study, if applicable |  |  | **X** |  |
|  | Preliminary arc-flash hazard calculations |  |  | **X** |  |
|  | Exterior lighting calcs (normal and emergency/exterior means of egress and exit discharge) [FP] |  |  | **X** |  |
|  | Paging system calcs complete; wiring sized and components selected (if being deferred/delegated, noted as such in design) |  |  | **X** |  |
|  | All updated to resolve/address comments from the 60% design, complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Electrical Drawings** (E sheets) |  |  |  |  |
|  | Preliminary site plan includes power and telephone service connection points and routing to project | **X** | **X** |  |  |
|  | Preliminary one-line diagram portrays service and distribution system arrangement | **X** | **X** |  |  |
|  | Preliminary power plans include electrical rooms and major electrical equipment locations |  | **X** |  |  |
|  | Preliminary enlarged electrical room plans show electrical service and distribution equipment and NEC required working spaces (if required) |  | **X** |  |  |
|  | Preliminary lighting plans include luminaire locations, type designators, and control device locations | **X** | **X** |  |  |
|  | Preliminary luminaire schedule includes basic descriptions of luminaires shown on the preliminary lighting plans, including dark sky compliant luminaires. |  | **X** |  |  |
|  | Preliminary paging system plans show speaker locations, if applicable |  | **X** |  |  |
|  | Site plan further developed to include site lighting |  |  | **X** |  |
|  | One-line diagram further developed to show all component sizes and preliminary fault currents |  |  | **X** |  |
|  | Power plans further developed to show receptacles, mechanical equipment, building equipment, user equipment, and preliminary branch circuiting |  |  | **X** |  |
|  | Final enlarged electrical room plans (if required) |  |  | **X** |  |
|  | Lighting plans further developed to show complete branch circuiting and lighting controls |  |  | **X** |  |
|  | Luminaire schedule further developed to include complete descriptions and catalog numbers of all luminaires |  |  | **X** |  |
|  | Paging system plans further developed to show speaker circuiting and equipment locations (if being deferred/delegated, noted as such in initial construction package and provided later) |  |  | **X** |  |
|  | Preliminary paging system riser diagram includes paging controllers, amplifiers, speakers, and interconnections |  |  | **X** |  |
|  | Preliminary lightning protection system plans include locations of air terminals, main conductors, down conductors, ground ring, and surge protective devices (may not be delegated to construction Subcontractor) |  |  | **X** |  |
|  | Preliminary grounding diagram includes main grounding electrode, main electrode ground bar, supplemental ground bars, and bonding locations for piping and structural steel |  |  | **X** |  |
|  | Preliminary motor control diagram created for typical each motor control configuration |  |  | **X** |  |
|  | Preliminary Panel Schedules created for each panel not detailed on the one-line. Include load descriptions and values. |  |  | **X** |  |
|  | Preliminary Nameplate Schedules including information required for equipment ID tags, category I nameplates, and arc-flash warning labels |  |  |  | **X** |
|  | All the above complete, checked, cross-discipline coordinated, and ready for approval |  |  |  | **X** |
|  | **Electrical Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **INSTRUMENTATION AND CONTROLS (Ch. 8)** |  |  |  |  |
|  | **NOTE:** Detailed control system design, installation (shop or working) drawings, and calcs are typically prepared by the installing subcontractor after construction begins (particularly for the BAS). These plans are reviewed and approved by LANL as required deferred design submittals (with first submission expected to be and treated as a 60% maturity level). They are contained in the I&C Group 2 rows below this Group 1 set. If being deferred/delegated, note as such in pre-permit design (e.g., in the Specification). Basic I&C performance criteria and details (Group 1) cannot be deferred and shall be captured in the Group 1 documents to direct the Group 2 designs. |  |  |  |  |
|  | **Group 1 – Required from EOR Before Permitting** |  |  |  |  |
|  | **I&C Calculations** |  |  |  |  |
|  | Preliminary calcs for engineered instrumentation devices (rare) |  |  | **X** |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **I&C Drawings (M sheets)** |  |  |  |  |
|  | Preliminary control or P&ID drawing for each system, nearly final, under change control  |  | **X** |  |  |
|  | Preliminary sequence of operations  |  |  | **X** |  |
|  | Preliminary BAS I/O list  |  |  | **X** |  |
|  | Preliminary instrument location drawing (may be on P&ID; include critical distances/diameters from bends, etc.)  |  |  | **X** |  |
|  | Preliminary Instrument List  |  |  | **X** |  |
|  | Preliminary Control Schematics (as required) |  |  | **X** |  |
|  | Preliminary instrument location drawing (may be on P&ID)  |  |  | **X** |  |
|  | Complete P&IDs under change control  |  |  | **X** |  |
|  | Major control panels shown on mechanical and electrical drawings |  |  | **X** |  |
|  | Control power feeds shown on electrical floor plans and panel schedules |  |  | **X** |  |
|  | Drawings updated to portray the complete scope of work and substantially complete |  |  |  | **X** |
|  | **I&C Specs** |  |  |  |  |
|  | Outline or preliminary specs, to include commissioning requirements including pre-functional testing, functional testing, and checklists -- including start up and testing requirements |  |  | **X** |  |
|  |  See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **Software QA/Control Documentation** (rare; e.g.,process control or ML-3 or higher) |  |  |  |  |
|  | Development, operating, and verification documentation for any design agency developed process-operating software |  |  |  | **X** |
|  | **I&C Group 2 – Detailed Design/Shop Drawings, Calcs****(may be deferred to construction phase, wherein first review is treated as a 60%)**As-Built Note: Group 2 (and the P&ID) is normally verified/redlined by LANL post-construction, then designs shall be updated to as-built condition by the respective designer |  |  |  |  |
|  | **I&C Calculations** - Device sizing calcs, e.g., power supplies |  |  | **X** |  |
|  | **I&C Drawings (M sheets)** |  |  |  |  |
|  | Network drawing – complete |  |  | **X** |  |
|  | Control panels shown on mechanical and electrical drawings – complete (may be input to a rev of EOR’s M sheet) |  |  | **X** |  |
|  | Control power feeds shown on electrical floor plans and panel schedules – complete (may be input to a rev of EOR’s M sheet) |  |  | **X** |  |
|  | Instrument location drawing – complete (may be on P&ID; include critical distances/diameters from bends, etc.; may be input to a rev of EOR’s M sheet) |  |  | **X** |  |
|  | Instrument List - Complete |  |  | **X** |  |
|  | Instrument point list - Complete |  |  | **X** |  |
|  | Drawings updated to portray the complete scope of work, substantially complete |  |  | **X** |  |
|  | Bill of Materials |  |  | **X** |  |
|  | **Calcs, Drawings, and BOM** updated to resolve/address comments from the 60% design, complete, checked, cross-discipline coordinated, and ready for approval. |  |  |  | **X** |
|  |  **SECURITY (Ch. 9)***Note: Security systems are normally designed by LANL, however design coordination is needed for supporting components and location (e.g. structural support, power, wall space)* |  |  |  |  |
|  | **Security Calculations** |  |  |  |  |
|  | Preliminary versions of any required calcs |  | **X** |  |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Security Drawings (X sheets; Note, device design/details normally by LANL)** |  |  |  |  |
|  | Prelim. Arrangement including fence, gate, barrier, PIDA(D)S, Limited Area, vault, VTR, and SCIF locations/boundaries | **X** | **X** |  |  |
|  | Preliminary security plans include room locations and preliminary cable tray routing |  | **X** |  |  |
|  | Updated security plans including rough-in/device locations, type designators, and circuiting |  |  | **X** |  |
|  | Device schedule including basic descriptions of devices shown on the preliminary plans |  |  | **X** |  |
|  | All the above complete, checked, cross-discipline coordinated, and ready for approval |  |  |  | **X** |
|  | **Security Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **TELECOMMUNICATIONS (Ch. 18, 19)****including Secure Telecon (design normally by LANL ISD-TS)***Note: Telecom designed by LANL still needs design coordination for supporting components and location (e.g. conduit, wall space, structural hangers)* |  |  |  |  |
|  | **Telecom Calculations** |  |  |  | **X** |
|  | Preliminary versions of any required calcs |  | **X** |  |  |
|  | All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance |  |  |  | **X** |
|  | **Telecom Drawings (T sheets)** |  |  |  |  |
|  | Preliminary site plan includes service connection points and routing to project | **X** | **X** |  |  |
|  | Preliminary plans including telecom room, rack locations, and preliminary cable tray routing |  | **X** |  |  |
|  | Updated telecom room plans include cable trays, receptacles, grounding, and equipment racks |  |  | **X** |  |
|  | Beyond-room plans showing telecom outlet locations and final conduit and cable tray routing |  |  | **X** |  |
|  | Telecom system riser diagram includes system from service to station outlets |  |  | **X** |  |
|  | All the above complete, checked, cross-discipline coordinated, and ready for approval |  |  |  | **X** |
|  | **Telecom Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
|  | **R&D AND PROGRAMMATIC** |  |  |  |  |
|  | Anchorage designs (see Structural) |  |  |  |  |
|  | Services hookup design (see Piping, Mechanical, Electrical, etc.) |  |  |  |  |
|  | **SUSTAINABLE DESIGN (SD; Ch. 14)** |  |  |  |  |
|  | “Simple box” **energy model** (should be started before 30% point to inform design decisions) | **X** | **X** |  |  |
|  | Energy model updated, and associated ASHRAE Standard 90.1 Performance Based Compliance Form(Form or COMCheck when only ASHRAE 90.1 is required) |  |  | **X** | **X** |
|  | **Life cycle cost (LCC) analysis reports related to model above**1. To demonstrate LCCE of energy efficiency related decisions, and
2. As applicable, for any Guiding Principles *core* criterion not being pursued due to LCC.
 |  | **X** | **X** |  |
|  | **Tools:** Guiding Principles Checklist; LEED certification proposed credits worksheet; and a narrative to address Smart Labs design guidelines; each as applicable. |  | **X** | **X** | **X** |
|  | **Specs** modified as appropriate to incorporate SD/Environmental Preferable Products (EPP)/Green Purchasing requirements per ESM Ch. 14 Att. 1. |  |  |  | **X** |
|  | **COMMISSIONING (Ch. 15, when required)**  |  |  |  |  |
|  | **Cx Plan (by LANL unless in SOW)** |  |  |  |  |
|  | Preliminary plan defining Cx authority, how authority will verify that design agency and constructor will implement the F&OR requirements and addressing coordination of all disciplines from design through the construction and warranty periods. |  | **X** |  |  |
|  | Finalized including list of design checklists, list of all Cx spec sections |  |  |  | **X** |
|  | **Cx Specs** |  |  |  |  |
|  | See General Requirements table above for spec maturity at 60% and 90% (Note: Cx submittal requirements shall be coordinated with project submittal procedures) |  |  | **X** | **X** |
|  | **Cx Procedures** |  |  |  |  |
|  | Completed Cx procedures and construction requirements including those for Division 01 and all applicable disciplines |  |  | **X** |  |
|  | Procedures complete, checked, cross-discipline coordinated, and ready for approval |  |  |  | **X** |
|  | **Cx Schedule** (by LANL unless in SOW) |  |  |  |  |
|  | Proposed Cx Schedule |  |  |  | **X** |
|  | **SYSTEMS ENGINEERING (Ch. 20)** |  |  |  |  |
|  | **For TSM Chapter 20 *(capital projects over $34M total project cost)*** |  |  |  |  |
|  | TSM: Provide a description of Design Agency’s approach to the following SE tasks prior to the end of conceptual design or before beginning preliminary design. | **X** | **X** |  |  |
|  | TSM: For the design, as appropriate, perform activities linked to, verifying, and satisfying engineering requirements; contribute to LANL’s crosswalk for same in TSM Para. 3.f. See also Paras 3.b. and 3.e. (*rev. 3*) |  | **X** | **X** | **X** |
|  | TSM: Provide testing, inspection, and commissioning requirements linked to and verifying engineering requirements, including through any design revisions/changes. See TSM Paras 3.d and 3.e |  |  |  | **X** |
|  | TSM: Describe the SE approach in a plan subject to approval by LANL Project Engineering Management or delegate. See TSM Para B 1. |  | **X** |  |  |
|  | TSM: Describe interface management by engineering in an Interface Control Document. See TSM Para B 2. |  |  | **X** |  |
|  | TSM: Engineering requirements shall be established and documented in a requirements document subject to approval by LANL Project Engineering Management or delegate. See TSM Para C. |  | **X** | **X** | **X** |
| **X** | **For ESM Chapter 20 (*capital projects over $20M total project cost modifying*** ***or building hazard category 1–3 nuclear facilities*)** |  |  |  |  |
| X | Deliverables both during and at the conclusion of all project phases, and some correspond to the 30-60-90% design maturity deliverables (these are summarized in Ch. 20’s Table SE-PL-1 Summary for Chapter 20 Systems Engineering Deliverables). Projects shall deliver all required deliverables, and those tied to 30-60-90% milestones at those points. |  | **X** | **X** | **X** |
|  | **SOFTWARE (Ch. 21)** |  |  |  |  |
|  | **TSM** |  |  |  |  |
|  | For all SSC software (controls hardware real-time), provide listing of such locations/usage |  |  | **X** | **X** |
|  | For ML-3 or higher software (e.g., certain high-value, security, or environmental implications of failure beyond typical commercial), provide summaries for potentially safety affecting – preliminary (ref. Ch. 21, SOFT-GEN [e.g., r1 article 2.1]) |  |  | **X** |  |
|  | For ML-3 or higher software, provide summaries for potentially safety affecting – final |  |  |  | **X** |
| **X** | **ESM** |  |  |  |  |
| X | For Non-SSC software (e.g., design): Summaries for potentially safety affecting – preliminary (ref. Ch. 21, SOFT-GEN [e.g., r1 article 2.1]) |  | **X** |  |  |
| X | For Non-SSC software (e.g., design): Summaries for potentially safety affecting – Updated (ref. Ch. 21, SOFT-GEN [e.g., r1 article 2.1]) |  |  | **X** |  |
| X | For Non-SSC software (e.g., design): 2033 forms for potentially safety affecting – Final |  |  |  | **X** |
| X | For SSC software, all documents required by Ch. 21, leaving approvals for LANL to complete -- Preliminary |  | **X** |  |  |
| X | For SSC software, all documents required by Ch. 21, leaving approvals for LANL to complete -- Updated |  |  | **X** |  |
| X | For SSC software, all documents required by Ch. 21, leaving approvals for LANL to complete -- Final |  |  |  | **X** |
| **X** | **HAZARDOUS (ML-1 or 2, nuclear, or other high hazards) (ESM Ch’s. 1, 10–12)** |  |  |  |  |
| **X** | **Drawings**: ML and/or SS/SC boundaries indicated |  |  | **X** |  |
| **X** | **Specs** |  |  |  |  |
| X | See General Requirements table above for spec maturity at 60% and 90% |  |  | **X** | **X** |
| X | Specs, using tracked changes from LANL masters, portraying complete scope of work, non-applicable sections removed; unedited masters are unacceptable. Include preliminary safety functions and critical characteristics except where latter are being developed by third party dedicator. |  |  | **X** |  |
| X | Specs, with continued use of tracked changes from 60%, complete, checked, cross-discipline coordinated, and ready for approval, including identification of safety functions and, where applicable, critical characteristics. |  |  |  | **X** |

1. **Design and other EOR Tasks during Construction Execution Phase**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

LANL -- For SOW, edit below as appropriate.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Project record documents (PRDs)**: At the completion of construction, provide updated PRDs of key design outputs delivered—drawings, specs, SDDs, databases, and final calculations with verified assumptions. Where applicable (ref. TSM/ESM Ch. 1), incorporate redlines from as-built findings by LANL or others to that small set of critical PRDs.

**Deferred Design**

Deferral of design for the fabrication of (1) technical specialties (e.g., fire protection, controls, HVAC) or (2) nonstructural anchorage design for major equipment not selected by EOR or distribution systems (e.g., HVAC duct, field-routed raceway) may be completed after the 100% submittal if this approach is consistent with the TSM/ESM and SOW/Subcontract—and indicated on specs or drawings (e.g., “delegated to construction Subcontractor”). See table that follows. *Guidance: LANL may treat first submission as a 60% document from a review maturity standpoint using Section 01 3300; see Chapter 16 of the TSM/ESM for additional requirements on deferred/delegated design.*

| **Deferred Design Deliverables** |
| --- |
| **Calculations** |
| Nonstructural anchorage |
| Fire suppression |
| **Drawings** |
| Nonstructural anchorage |
| Fire alarm |
| Fire suppression |
| Building automation systems |

Further EOR scope of services during/after construction include such tasks as:

1. Review and approval of submittals including shop drawings and “or equal” substitutions;
2. Review and approval of delegated deferred design;
3. RFI and SDDR review and dispositioning;
4. Review/comment on change order requests affecting scope or quality;
5. Review and approval of nonconformance reports with a use-as-is or repair disposition;
6. Creation, review, and/or disposition of design revision documents (e.g., FCR, DRN, DCT; ref. AP-341-519, Design Revision Control);
7. Seismic anchorage and bracing design of architectural, mechanical and electrical components (if not completed in design phase);
8. Structural observation where required by the IBC and Chapter 16 of the TSM/ESM, and work in general for other disciplines for conformance to design;
9. LEED submittal handling per Chapter 14 of the TSM/ESM where required, and delivery of final certification. Periodic and final reporting on guiding principles and energy efficiency when LEED is not required.
10. Project close-out activities including participating in a final inspection; preparation of record documents including updated drawings (and BIM where required), delivery of native CAD files, MDL/documents for EDMS, Project Equipment Listing, and assisting in completing the certificate of occupancy.
1. Title previously included “30-60-90-100%.” [↑](#footnote-ref-2)
2. *Some SOW templates* [*here*](https://int.lanl.gov/services/procurement/statement-of-work/index.shtml)*; ES-Div IDIQ SOW template for AE task orders* [*here.*](https://int.lanl.gov/org/ddops/aldfo/nuclear-safety/engineering-services/conduct-of-engineering/ae-contracts.shtml) *New templates for commercial construction expected summer 2025.* [↑](#footnote-ref-3)
3. SD350’s GPP/IGPP/minor construction lower limit; an appropriate threshold for use of this approach. The $500K comes from the *DOE Financial Management Accounting Handbook* Chapter 10 and brought forward in the LANL CFO procedures CFO-B3032 and CFO-B3049. [↑](#footnote-ref-4)
4. [SD 413.3 AdmChg 1](https://directives.nnsa.doe.gov/nnsa-directives-browse?b_size=300&facets=NNSAType&facets=OPI&facets=ApprovedDate&facets=DNFSB&facets=crd&query=%5B%7B%22i%22%3A%22portal_type%22%2C%22o%22%3A%22paqo.selection.any%22%2C%22v%22%3A%5B%22NNSA.Type.policy%22%5D%7D%2C%7B%22i%22%3A%22DirStatus%22%2C%22o%22%3A%22paqo.selection.is%22%2C%22v%22%3A%5B%22Current%22%5D%7D%2C%7B%22i%22%3A%22NNSAType%22%2C%22o%22%3A%22paqo.list.contains%22%2C%22v%22%3A%5B%22Advance%20Change%20Directive%20%28ACD%29%22%2C%22Supplemental%20Directive%20%28SD%29%22%5D%7D%5D&sort_on=getId&sort_order=ascending) App. D contains the basic Conceptual Design Report (CDR) expectations. [↑](#footnote-ref-5)
5. To explain, for capital projects, 30/60 may not correlate precisely with the project’s overall project design maturity timeline, but that is not relevant to this document’s approach. Per NNSA [SD 413.3 AdmChg1](https://directives.nnsa.doe.gov/nnsa-directives-browse?b_size=300&facets=NNSAType&facets=OPI&facets=ApprovedDate&facets=DNFSB&facets=crd&query=%5B%7B%22i%22%3A%22portal_type%22%2C%22o%22%3A%22paqo.selection.any%22%2C%22v%22%3A%5B%22NNSA.Type.policy%22%5D%7D%2C%7B%22i%22%3A%22DirStatus%22%2C%22o%22%3A%22paqo.selection.is%22%2C%22v%22%3A%5B%22Current%22%5D%7D%2C%7B%22i%22%3A%22NNSAType%22%2C%22o%22%3A%22paqo.list.contains%22%2C%22v%22%3A%5B%22Advance%20Change%20Directive%20%28ACD%29%22%2C%22Supplemental%20Directive%20%28SD%29%22%5D%7D%5D&sort_on=getId&sort_order=ascending) App. D, a CDR is produced for CD-1 normally representing 15% of the overall project design effort (30% if nuclear); preliminary takes overall effort to 40% (60% if nuclear). Z10 Att. C “30/60/90” reviews are really a rough division of the ultimate EOR’s effort into thirds, not the overall project design effort/maturity.

In addition, [SD 413.3](https://directives.nnsa.doe.gov/nnsa-directives-browse?b_size=300&facets=NNSAType&facets=OPI&facets=ApprovedDate&facets=DNFSB&facets=crd&query=%5B%7B%22i%22%3A%22portal_type%22%2C%22o%22%3A%22paqo.selection.any%22%2C%22v%22%3A%5B%22NNSA.Type.policy%22%5D%7D%2C%7B%22i%22%3A%22DirStatus%22%2C%22o%22%3A%22paqo.selection.is%22%2C%22v%22%3A%5B%22Current%22%5D%7D%2C%7B%22i%22%3A%22NNSAType%22%2C%22o%22%3A%22paqo.list.contains%22%2C%22v%22%3A%5B%22Supplemental%20Directive%20%28SD%29%22%5D%7D%5D&sort_on=getId&sort_order=ascending) also defines minimum maturity expectations for CD-2 (approval to construct) as a 90% deliverable (lower for non-nuclear); this recognizes that true 100% design is achieved when design activities during construction are complete. Att. C does not conflict with that either; when Att. C uses 90% and 100%, it is referring to the completeness percentage of the package needed for the building official to permit construction start, recognizing that deferred design often occurs afterwards.

Guidance on expectations for design and other project documentation deliverables not addressed in the TSM/ESM is available in (1) [DOE G 413.3-12A](https://www.directives.doe.gov/directives-documents/400-series/0413.3-EGuide-12a), *Front-End Planning and Project Definition Rating Index for Nuclear and Non-Nuclear Constructions Projects*, and (2) the maturity matrices at the end of AACE 56R-08: Cost Estimate Classification System - As Applied for the Building and General Construction Industries (Rev. Dec. 5, 2012) ([www.aacei.org](http://www.aacei.org/) by purchase, or via Chapter POC). [↑](#footnote-ref-6)
6. Ch. 20 of the TSM (also ESM) describes these DV concepts, includes a sample matrix. When in-house design, follow AP-341-620 process in any case. [↑](#footnote-ref-7)