CADream – Codebase Plan of Action

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1. Target Architecture

- CAD Core (Shared Library): DXF parsing, rendering model, geometry editing, DXF export, sheet generation utilities.
- Frontend (React + TypeScript): Site Plan Editor (BESS + cable routing) and SLD Builder (symbol-based editor).
- Backend (FastAPI + ezdxf): Accept structured JSON specs and generate editable DXF plan sets.

2. Data Contracts (JSON Schemas)

- ProjectMetadata: Customer info, system info, engineer info, sheet configuration.
- SiteDesignSpec: Base DXF reference, BESS placement, cable routing polyline, POI point.
- SLDDesignSpec: Symbol nodes, connections, wire types, labels, versioned symbol library.

3. Phase-Based Implementation Plan

- Phase 0 – Repo Setup: Monorepo structure, CI, linting, schemas folder.
- Phase 1 – DXF Ingestion & Viewer: Backend DXF parser endpoint, frontend renderer with pan/zoom/layer toggles.
- Phase 2 – Site Editor (UI A): Place BESS block, polyline cable routing with snapping, export SiteDesignSpec JSON.
- Phase 3 – SLD Builder (UI B): Drag/drop symbol palette, connection routing, export SLDDesignSpec JSON.
- Phase 4 – Plan Set Generator: Sheet composition engine, title block population, block insertion, DXF output.
- Phase 5 – DWG Support: Optional DXF to DWG conversion using ODA converter.
- Phase 6 – QA & Regression: DXF validation tests, golden file testing, layer/block integrity checks.

4. Milestones

- Milestone 1: Load DXF and render successfully.
- Milestone 2: Implement BESS placement and cable routing tools.
- Milestone 3: Generate one working site plan sheet DXF.
- Milestone 4: Implement SLD builder and generate SLD sheet DXF.
- Milestone 5: Expand to full required page list.

5. Key Risks & Mitigation

- Large DXF performance: Use backend parsing and simplified render JSON.
- Template ambiguity: Recreate title blocks and sheets in DXF based on PDF reference.
- DWG licensing complexity: Use DXF-first approach with optional conversion.

6. Immediate Next Steps

- Define JSON schemas and sample payloads.
- Implement /dxf/parse endpoint in backend.
- Build frontend DXF viewer with layer control.
- Implement BESS placement and cable routing tools.
- Build single-sheet DXF generator as proof of concept.