**Created:** 2025-10-29 **Updated from:** Pryor\_Bod\_EVS\_Rev01.md + Erik\_BOD references

# BASIS OF DESIGN - SITE AND INFRASTRUCTURE

## CSI Divisions 31-32

### Pryor Data Center - PACHYDERM GLOBAL

**Parent Document:** [[Saga Pryor DC/Basis of Design/Erik\_BOD\_Updated/\_BOD - Exec Summary and TOC]]

## DIVISION 31 – EARTHWORK

### Site Characteristics

* **Parcel:** ~120 acres (master plan)
* **Topography:** Slightly rolling; balanced cut/fill expected
* **Flood/Tornado:** Outside FEMA floodplain; high tornado risk (EF3+ region)
* **Soils:** TBD by geotechnical; design for frost depth per Oklahoma code

### Required Surveys and Studies

* ALTA/NSPS land survey (boundaries, easements, topo)
* Geotechnical investigation (bearing, CBR, slab support)
* Phase I ESA; wetlands/waters delineation if applicable
* Utility locates and capacity confirmations (water, sewer, gas, fiber)

### Site Grading and Pads

* **Building pad:** 50,000 GSF building (precast tilt-up) + aprons
* **Electrical yard:** ~100,000 SF (138 kV substation, MV gear, generator yard)
* **Mechanical yard:** ~50,000 SF (air-cooled chillers, pumps, headers)
* **Solar array area:** Allocate 10–20 acres adjacent (phased build)
* **BESS yard:** Allow 6–10 container positions (future-ready)

### Subgrade and Earthwork

* Over-excavate poor soils; import select fill (per Geo report)
* Proof-roll building pad; 95% compaction (ASTM D698 unless D1557 required)
* Underground utility trenches: sand bedding, warning tape, marker posts

## DIVISION 32 – EXTERIOR IMPROVEMENTS

### 138 kV Substation Yard (Customer-Owned)

* **Footprint:** ~35,000–50,000 SF fenced yard
* **Equipment:** 138 kV switchyard, 2 × 25 MVA 138/11 kV transformers (2N), protection & control house
* **Grounding:** Copper grid per IEEE 80; step/touch potential analysis
* **Oil containment:** Transformer spill containment per EPA SPCC
* **Security:** 8–10 ft fence + barbed wire, cameras, access control

### Medium-Voltage (11 kV) Distribution

* Dual-ring MV ductbanks encircling building (Ring A/B)
* Concrete-encased ductbank, galvanized ground grid bonding at RMUs
* Pull boxes/manholes at 300–500 ft intervals; spare conduits for expansion

### Generator Yard (MV Generators)

* **Capacity:** 6 × 4.0 MW @ 11 kV diesel gens (N+1 at 12 MW design)
* **Pads:** Individual concrete pads with anchorage; crane access aisle
* **Fuel:** ~2,000 gal belly tanks per unit connected via common fuel manifold to centralized bulk fuel storage tank farm (24 hours runtime); spill containment per SPCC
* **Bulk Fuel Storage:** Above-ground or underground tank farm (~12,000 gal capacity for Phase 2) with redundant fuel service contracts (24-hour SLA)
* **Noise:** Enclosures targeting ≤65 dBA @ 7 m at property line compliance
* **Security:** Fenced, CCTV, vehicle barriers at perimeter
* **Access:** East-west emergency/maintenance access points for equipment delivery and temporary rental equipment

### Mechanical Yard (Air-Cooled)

* **Phase 1:** 4 × 1,500 kW chillers; **Phase 2:** +8 (total 12)
* **Layout:** Two rows with 15 ft service corridors; overhead pipe racks to building
* **Drainage:** Sloped slabs; trench drains to oil/water separator where needed
* **Access:** East-west emergency/maintenance access points for equipment delivery
* **Temporary Equipment Support:** Connection provisions for rental chillers and load banks via quick-connects and cable pass-through doors

### Building Envelope Equipment Yard Interface

**Cable Pass-Through Doors:** - Multiple small access doors (~dog door sized, approximately 24” × 24”) in building envelope at equipment yard boundaries - Purpose: Pass temporary cables/hoses from secure equipment yard into building without opening larger doors - Applications: - Temporary load bank connections during testing - Rental generator paralleling cables - Backup chiller piping/connections - Testing equipment hookups - Security: Normally sealed/secured; opened only during authorized maintenance activities - Location: Marked on as-built drawings with clear access paths from equipment yards

### Solar and BESS Areas

* **Solar:** Inverter stations at 11 kV tie to common bus (separate fenced area)
* **BESS:** 4–8 MWh containers; 11 kV bi-directional inverters; space for growth
* **Fire lanes:** 20 ft access; signage; clearances per NFPA 855 for energy storage

### Stormwater Management

* **Detention/Retention:** Southeast “horseshoe/moat” basin; sized for local criteria
* **Quality:** Forebay + outlet control; bioswales where feasible
* **Discharge:** Match pre-development rates; protect downstream receiving waters

### Paving and Hardscape

* **Access roads:** 12” aggregate base; asphalt or PCC pavement per truck loads
* **Dock apron:** 10” PCC with doweled joints
* **Parking:** 30–45 stalls; EV-ready conduits stubbed
* **Walks:** 6 ft sidewalks to entries; ADA routes and ramps

### Site Access and Entrances

**Two Property Entrances:**

**1. Main Entrance (NE Corner):** - Primary manned entrance with sally port vehicle trap - Permanent visitor center (climate-controlled guard post) - Full-height pedestrian turnstile adjacent to vehicle entrance - K4-rated vehicle arrestor - Primary access for all normal operations, deliveries, visitors, and personnel

**2. Secondary Entrance (NW Side - Emergency/Construction Access):** - Normally unmanned emergency and construction entrance - Single-gate with K4-rated vehicle arrestor - Card-controlled pedestrian gate - Remote operation visible from Security Control Booth (SCB) at loading dock - Used for emergencies or special construction/maintenance activities (not employed during normal operations)

### Fencing, Lighting, and Landscaping

* **Perimeter fence:** 8 ft + 3-strand barbwire or ornamental steel (AHJ)
* **Lighting:** LED poles at yards and perimeter; photocell + BMS control
* **Landscaping:** Native drought-tolerant planting; clear CCTV sightlines

## SITE LAYOUT (High-Level)

* **NE Corner:** Main entrance with sally port vehicle trap and permanent visitor center
* **NW Side:** Secondary emergency/construction entrance (normally unmanned, visible from loading dock SCB)
* **North:** Electrical yard (generators, substation, RMUs)
* **South:** Mechanical yard (chillers, pumps, pipe racks)
* **East/West:** Dual MPOE/MMR fiber entries; delivery dock on leeward side
* **Southeast:** Detention basin; public frontage landscaped buffer

## CODES AND STANDARDS

* IBC/IFC 2021 (local amendments)
* NFPA 110, 70 (NEC), 855 (for BESS if deployed)
* IEEE 80 (substation grounding), 142 (grounding), 484/485 (battery rooms as applicable)
* Oklahoma DEQ stormwater and erosion control

## COST SUMMARY (ROM)

| Scope | ROM Cost |
| --- | --- |
| Earthwork, grading, pads | $0.7–1.2M |
| MV ductbanks, manholes | $0.6–1.0M |
| Substation yard civil (excl. electrical) | $0.4–0.8M |
| Generator/Chiller yards civil | $0.4–0.8M |
| Paving, parking, dock | $0.4–0.7M |
| Fencing, lighting, landscaping | $0.3–0.6M |
| Stormwater basin & LID | $0.3–0.6M |
| Total Div 31–32 (civil scope) | $3.1–5.7M |

**Tags:** #site #infrastructure #substation #yards #stormwater #ductbank #csi-31-32

**Next Steps:** 1. Complete topo and geotechnical; finalize grading and pad elevations 2. Lay out MV ductbank/ring routes and manholes 3. Substation civil/grounding design (IEEE 80 study) 4. Finalize stormwater basin hydraulics/hydrology 5. Site plan approval and permits (grading, stormwater)

**Document Control:** - **Source:** Pryor\_Bod\_EVS\_Rev01.md, Electrical Div 26, Erik\_BOD references - **Date Updated:** October 29, 2025 - **Prepared by:** EVS / PGCIS Team - **Key Updates:** 138 kV substation yard, MV rings, BESS/solar yards, 50,000 SF mech yard