LCR and COMPANY // DTG Automation Breakdown Modules

Module A — Automated Area Calculation Engine

Definition

This module is the **Area Extraction and Calculation System** that automatically identifies and measures all drainage-relevant surface areas directly from **Civil 3D 2025/2026 plan drawings**, **survey CSV data**, and **PDF plan sets**.
It replaces the manual process of tracing impervious (paved, roofed) and pervious (grass, soil) regions and typing those areas into Excel drainage worksheets.

How it works

- Reads closed **polylines and hatches** from Civil 3D layers (e.g. parking, building, green area) using LCR's .dwt template and naming conventions (IMP_SURFACE, CONC_DRIVE, TURF, etc.).
- Applies plan scale and coordinate reference automatically.
- Integrates **survey CSV data** (e.g. Storm Topo.csv, Storm Topo – IMPORT.csv) to confirm elevations, slopes, and drainage direction.
- Combines multiple building footprints into **grouped basins or subcatchments** as defined in grading plans.
- Exports structured outputs (CSV + GeoJSON) and populates the "**TOC Calculation – Sunset Park.xlsx**" workbook to update **Time of Concentration (Tc)** and **Weighted C** tables automatically.
- For PDF-based plans, uses **OpenCV + OCR** to visually extract scaled polygonal areas.
- Cross-links with **Autodesk Storm & Sanitary Analysis (SSA)** to supply area data directly into hydraulic simulations.

Example from LCR documents

In the **L.J. Alleman Middle School (C-4 through C-8)** grading sheets, engineers trace concrete, asphalt, and turf regions using Civil 3D's polyline + hatch tools.
This module automatically computes total square footage, assigns C-values, and updates the TOC workbook — matching LCR's current Excel process.

Value to LCR

- Reduces area takeoffs from hours to minutes.
- Eliminates manual scaling or transcription errors.

- Feeds **Module C (DIA Engine)** with live linked data.
- Standardizes templates and naming across AHS, Alleman, and future sites.

Module B — UDC & DOTD Specification Extraction Engine

Definition

This module is the **Code and Specification Parsing System** that reads **municipal, parish, and DOTD drainage manuals** (PDFs) and extracts structured data (tables, coefficients, rules) into a searchable database — forming LCR's **living specification library**.

How it works

- Parses PDFs such as **LCG Unified Development Code (UDC)** and the **DOTD Hydraulics Manual**.
- Extracts:
    - Runoff coefficients (C-values) by land use
    - Rainfall intensity tables (I) from NOAA Atlas 14
    - Maximum Time of Concentration (Tc) limits
    - Detention pond release criteria
- Uses LangChain LLM parser to interpret headings like "Section 6.2.3 – Stormwater Design Standards."
- Updates automatically when new code versions are uploaded.
- Stores data in **PostgreSQL**, queried by other modules via API.
- Includes optional parsing of **project-specific specs** (e.g. Architectural spec books from Deltek SpecPoint or subconsultant supplements).

Example from LCR documents

For **Acadiana High DIA reports**, rainfall intensities for 10-, 25-, 50-, 100-year storms and runoff coefficients come from LCG UDC and NOAA Atlas 14.
This module stores those values centrally so engineers never need manual lookup.

Value to LCR

- Centralizes all drainage standards.
- Ensures reports use the latest data (no outdated C-values).
- Cross-checks automatically in **Module D (QA Checker)**.

- Supports custom specs for DOTD or project-specific addenda.

Module C — Drainage Impact Report Generator

Definition

The **Drainage Impact Report Generator (DIA Engine)** automatically creates complete drainage impact reports using live data from Modules A and B.

How it works

- Pulls area data (Module A) and UDC/DOTD parameters (Module B).
- Runs **Rational Method (Q = CiA)** for multiple storm frequencies (10, 25, 50, 100-year).
- Generates pre- and post-development discharges and comparison tables.
- Interfaces directly with **Autodesk Storm & Sanitary Analysis (SSA)** to import ASCII input files and export simulation results (hydrographs, tabular flows).
- Produces formatted **Word and PDF reports** styled after LCR's Acadiana High templates (Exhibits 3A-3D).
- Allows re-running with updated plan data for instant revisions.

Example from LCR documents

Acadiana High DIA uses Exhibit 3A-3D tables showing Q results for each storm event.
This module recreates those automatically — no manual Excel work required.

Value to LCR

- Creates DIA reports in minutes.
- Ensures uniform layout and regulatory compliance.
- Removes manual SSA back-and-forth between Civil 3D and Excel.
- Supports rapid iteration when site plans change.

Module D — Plan Review & QA Automation

Definition

The **Plan QA and Compliance Checker** reviews every set of construction drawings (C-1 to C-18) to verify conformance with municipal and LCR standards before submittal. It functions as an "AI reviewer" for Civil 3D plans and PDFs.

How it works

- Reads all plan sheets and checks for required elements:
  • Standard notes (LPDES, LUS, DOTD, ASTM, etc.)
  • Sheet numbering and sequence (C-1 → C-18)
  • Critical callouts, legends, title blocks
  • Font, scale, and layout consistency
- Uses OCR and computer-vision recognition to cross-check text and detail references.
- Flags missing or incorrect items and generates a QA PDF with highlighted redlines.
- References content from standards like the **AHS Early Release (C-11)** sheet (ASTM grate standards) and **L.J. Alleman notes**, confirming presence and formatting.

Example from LCR documents

The AHS Early Release C-11 sheet includes ASTM references ("Grates/Solid Cover shall be Ductile Iron per ASTM A536 Grade 70-50-05").
QA Automation detects missing notes before submission and records compliance status digitally.

Value to LCR

- Prevents city rejections for omissions or formatting errors.
- Standardizes plan set layout and checklists.
- Cuts internal QA time from 3–6 hours to minutes.
- Creates digital audit trail of QA checks.

Module E — Proposal & Document Automation

Definition

The **Proposal and Document Generator** automates creation of client proposals, submittal letters, and internal summaries based on pre-approved LCR templates.

How it works

- Pulls project metadata (client name, location, jurisdiction, project type).
- Retrieves technical inputs (C-values, rainfall data, etc.) from Modules A and B.
- Applies LCR branding and Dozier Tech Group layout for consistency.
- Generates ready-to-send Word / PDF files for:
  • Fee proposals
  • Drainage submittals

  - Addenda and change orders
  - Cover letters and summaries
- Optionally auto-populates signature fields and fee breakdown tables (hourly vs lump sum).

Example from LCR workflow

An engineer creating a new drainage study (e.g. “L.J. Alleman Additions”) enters the project metadata once; the system fetches the correct UDC references, applies the template, and produces a professional cover letter and fee summary automatically.

Value to LCR

- Speeds agency correspondence and submittals.
- Maintains consistent tone and format across projects.
- Reduces time spent on Word formatting.
- Improves presentation and professional branding.

Overall Workflow Summary

1. **Start with raw project data** (Civil 3D DWGs + survey CSV + Excel TOC).
2. **Module A** extracts areas and updates Excel inputs.
3. **Module B** retrieves and stores UDC/DOTD specifications and manual data.
4. **Module C** runs Rational Method calculations and generates DIA reports (Word/PDF).
5. **Module D** performs automated QA and compliance checks on plan sets.
6. **Module E** creates cover letters, fee proposals, and submittals for delivery.

Each module feeds the next, creating a seamless pipeline from raw design files → verified city-ready reports and submittals.