



PDF Tools Working Group
Technical Lead

DATE: January 19, 2026

TO: Document Processing Stakeholders

SUBJECT: SF901 Layout Implementation (TikZ vs Alternatives)

OFFICE OF PRIMARY RESPONSIBILITY: PdfTools

1. **Purpose**

This memorandum documents the decision to use TikZ with absolute positioning for the SF901 CUI Cover Sheet template layout, rather than alternative LaTeX layout approaches.

2. **Background**

The SF901 template requires precise reproduction of a government form with:

- Full-page purple background with white margin border
- Two white content boxes at specific positions
- Text elements positioned precisely on both purple and white areas
- Exact visual match to the official GSA Standard Form 901

Several implementation approaches were evaluated for achieving this layout in LaTeX.

3. **Analysis**

Approach A: TikZ with Absolute Positioning

- Uses TikZ `overlay` and `remember picture` for full-page drawing
- All elements positioned with absolute coordinates from page origin
- Provides pixel-perfect control over placement
- Requires manual adjustment when elements change
- No automatic content flow between sections
- Well-suited for fixed-format government forms

Approach B: Standard LaTeX with Boxes/Minipages



- Uses standard LaTeX flow with colored boxes
- Content flows automatically within containers
- Difficult to achieve full-page colored background extending to margins
- Less precise control over exact positioning
- Better suited for dynamic content documents

Approach C: tcolorbox Package

- Specialized package for colored boxes with content
- Better handling of content within colored regions
- Still requires absolute positioning for purple background
- Adds package dependency
- Hybrid approach still needed for full layout

Approach D: PDF Form Overlay

- Use official GSA PDF and overlay custom text
- Preserves exact original layout
- Requires external PDF manipulation tools (pdftk, qpdf)
- Text positioning on existing PDF is technically challenging
- Runtime dependency on external tools

4. Decision

Approved: Approach A — TikZ with absolute positioning.

Rationale:

- SF901 is a fixed government form that has not changed since November 2018
- Low maintenance burden due to form stability
- Pixel-perfect reproduction of official form is achievable
- No external tool dependencies
- Single LaTeX file contains complete template
- TikZ is part of standard TeX Live distribution
- Absolute positioning trade-off is acceptable for stable, fixed-format forms

Trade-offs Accepted:

- Manual positioning required (no auto-flow)
- Changes to spacing require adjusting multiple coordinate values
- Less intuitive than CSS/HTML-style layout



- Acceptable because form layout is fixed and rarely changes

5. Implementation Notes

The SF901.tex template uses:

- `tikzpicture` with `[remember picture, overlay]` for full-page drawing
- `calc` library for coordinate calculations
- `current page.north west` as origin reference
- All vertical positions as negative offsets from top
- Customizable variables at top of file for colors and margins
- Requires two xelatex passes for correct positioning

Maintenance Guidance:

- When adjusting vertical spacing, update all dependent element positions
- Keep official SF901 PDF for visual comparison during changes
- Run `build.sh` to generate PNG comparison images

6. References

- TikZ/PGF Manual: <https://ctan.org/pkg/pgf>
- Official SF901 Form: <https://www.archives.gov/cui/registry/forms>
- Related Decision: DM-2026-001 (SF901 LaTeX Recreation)
- Related Decision: DM-2026-002 (Font Selection)