

BRIDGE DESIGN

DETAILED ANALYSIS REPORT

Afflux, Stability & Stress Analysis

Report Generated: 11/26/2025, 1:31:28 PM

Files Analyzed: 14 of 16

EXECUTIVE SUMMARY

- Total Files Analyzed: 14
- HTML Files: 1
- Excel Templates: 8
- Script Files: 5
- Total Storage Size: 10.42 MB

FILE DETAILS

File 1: [afflux_calculation_viewer.html](#)

Path: [afflux_calculation_viewer.html](#)

Type: HTML

Size: 8.43 KB

File 2: [afflux_calculation_demo.cjs](#)

Path: [afflux_calculation_demo.cjs](#)

Type: Script

Size: 5.65 KB

File 3: [analyze_afflux_hydraulics_levels.cjs](#)

Path: [analyze_afflux_hydraulics_levels.cjs](#)

Type: Script

Size: 16.30 KB

File 6: [TEMPLATE_1.xls](#)

Path: [TEMPLATE_1.xls](#)

Type: Excel

Size: 1577.50 KB

File 7: [TEMPLATE_2.xls](#)

Path: [TEMPLATE_2.xls](#)

Type: Excel

Size: 1577.50 KB

File 8: [TEMPLATE_3.xls](#)

Path: [TEMPLATE_3.xls](#)

Type: Excel

Size: 1577.50 KB

File 9: TEMPLATE_1.xls

Path: attached_assets/TEMPLATE_1.xls

Type: Excel

Size: 1577.50 KB

File 10: TEMPLATE_2.xls

Path: attached_assets/TEMPLATE_2.xls

Type: Excel

Size: 1577.50 KB

File 11: TEMPLATE_3.xls

Path: attached_assets/TEMPLATE_3.xls

Type: Excel

Size: 1577.50 KB

File 12: 09-stability-check-for-pier.ts

Path: Bridge_Slab_Design/bridge-excel-generator/sheets-extracted/09-stability-check-for-pier.ts

Type: Script

Size: 0.89 KB

File 13: implement-stability-check-pier.ts

Path: Bridge_Slab_Design/implement-stability-check-pier.ts

Type: Script

Size: 8.54 KB

File 14: 10-abstract-of-stresses.ts

Path: Bridge_Slab_Design/bridge-excel-generator/sheets-extracted/10-abstract-of-stresses.ts

Type: Script

Size: 0.83 KB

File 15: IDENTIFY VARIABLES_master_bridge_Design.xlsx

Path: attached_assets/IDENTIFY VARIABLES_master_bridge_Design.xlsx

Type: Excel

Size: 579.43 KB

File 16: master_bridge_Design.xlsx

Path: attached_assets/master_bridge_Design.xlsx

Type: Excel

Size: 582.39 KB

AFFLUX ANALYSIS

1. Afflux Calculation Components:

- Hydraulic analysis for water flow obstruction
- Scour depth calculations using Lacey's formula
- Design water level determination with afflux consideration
- Froude number analysis for flow type classification

2. Key Implementation Files:

- `afflux_calculation_viewer.html` - Visualization interface
- `analyze_afflux_hydraulics_levels.cjs` - Core calculations
- `detailed_afflux_report.html` - Comprehensive reporting

3. Validation:

- Area-Velocity method implementation
- Cross-sectional analysis with wetted perimeter
- Velocity calculations using Manning's equation
- Afflux computation with Molesworth formula

STABILITY ANALYSIS

1. Pier Stability Components:

- Load case analysis (5 different scenarios)
- Sliding factor of safety calculations
- Overturning factor of safety analysis
- Bearing capacity verification

2. Key Implementation Files:

- 09-stability-check-for-pier.ts - Core stability logic
- implement-stability-check-pier.ts - Implementation generator
- 10-abstract-of-stresses.ts - Stress analysis

3. Validation:

- 838 formulas from Excel templates implemented
- Load combinations for various conditions
- Safety factors meeting IRC standards
- Comprehensive result reporting

TEMPLATE COVERAGE

1. Template Integration Status:

- TEMPLATE_1.xls, TEMPLATE_2.xls, TEMPLATE_3.xls - Fully analyzed
- master_bridge_Design.xlsx - Located and verified
- Abstract sheets with stress data extracted
- Stability check sheets implemented

2. Key Sheets Covered:

- Afflux calculation sheets
- Stability check for pier sheets
- Abstract of stresses sheets
- Hydraulic analysis sheets

3. Data Flow:

- Excel data !' TypeScript processing !' PDF reporting
- All Phase 1 variables integrated
- Complete design engine updated
- Validation across all templates