

Universal Data Intelligence Report

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Source: construction_contractors_profit_leaks_dataset.csv · 9,000 rows

Detected Industry

Field	Value
Industry	Construction
Confidence	High
Company Size	Mid-market to Enterprise
Reasoning	The dataset contains numerous construction-specific terms such as "project_id," "contract_value_usd," "phase," "trade," "cost_code," "labor_hours_actual," "material_qty_wasted," "equipment_rental_rate_usd_day," "change_order_number," "sub_scope_value_usd," "liquidated_damages_usd," "safety_incident_flag," "cpi," and "spi." These columns are highly indicative of activities and financial tracking within the construction sector.

Executive Summary

This dataset provides a granular view into project-level financial and operational aspects of a construction business. We've identified critical areas where profit is likely eroding, particularly in labor and material cost overruns, equipment underutilization, and inefficient change order management. The total estimated identified leakage exceeds \$32 million in this dataset sample, indicating substantial financial risk. Addressing these leaks can significantly improve project profitability and cash flow, driving better financial performance for World Group Solutions.

Top Money Leaks

#1 - Excessive Labor Variance & Idle Time	Critical
Signal	Actual labor costs significantly exceed budget, and there's a substantial amount of idle time for labor.
Evidence	Total Labor Cost Actual = \$34,984,793.24 vs Total Labor Cost Budget = \$29,301,497.28, resulting in a variance of \$5,683,295.96. Additionally, Total Idle Hours = 60,094.99 and Total Rework Hours = 26,351.40.
Benchmark	Construction Financial Management Association (CFMA) reports that direct labor typically accounts for 20-40% of project costs. Unproductive time (idle, rework) can account for 10-20% of total labor hours.
Root Cause	Poor labor scheduling, inadequate supervision, coordination issues between trades, or unexpected site conditions leading to delays and rework. This could also point to inaccurate initial labor cost estimations.
Financial Impact	\$5,683,295.96 (Labor Cost Variance) + (60,094.99 idle hours * avg blended labor rate \$69.74/hr) = ~\$9.8M
Recommended Action	Implement real-time labor tracking and analytics to pinpoint causes of idle time and rework. Improve project planning and scheduling, enhance site supervision, and provide targeted training to reduce rework. Review budgeting processes for labor costs.

#2 · Material Waste & Unit Cost Overruns Critical	
Signal	A significant quantity of materials is being wasted, and actual unit costs are consistently higher than budgeted.
Evidence	Total Material Quantity Wasted = 196,589.99 units. Average Unit Cost Actual = \$172.71 vs Average Unit Cost Budget = \$166.10. Total Material Cost Actual = \$541,200,049.48 vs Total Material Cost Budget = \$520,768,193.98, resulting in a variance of \$20,431,855.50. The top waste reasons include 'Cut Waste', 'Over-Order', and 'Wrong Spec Delivered'.
Benchmark	Construction industry benchmarks suggest material waste can range from 5% to 15% of total material costs, depending on the material and project type. The Lean Construction Institute targets less than 10% material waste for efficient projects.
Root Cause	Poor material handling and storage, inaccurate material take-offs, design errors, quality control issues with suppliers, or lack of proper training for installation crews.
Financial Impact	\$20,431,855.50 (Material Cost Variance). If this variance is 3.9% of actual material costs, and 10% of material costs are typically attributed to waste, this leak alone represents a substantial portion of the expected waste.
Recommended Action	Conduct a deep dive into material procurement and logistics processes. Implement better inventory management, enforce stricter quality checks on incoming materials, and train teams on optimal cutting and installation practices. Re-evaluate supplier contracts and explore value engineering opportunities.

#3 · Uncontrolled Equipment Idle Costs High	
Signal	A substantial amount of equipment is sitting idle, generating unnecessary costs.
Evidence	Total Equipment Idle Hours = 5,618.50 and Total Equipment Idle Cost = \$1,803,171.18. Some projects show 'rental_days_billed' significantly higher than 'rental_days_needed'.
Benchmark	General contractors often aim for equipment utilization rates above 80%, meaning idle time should be kept to a minimum. Industry estimates suggest idle equipment can contribute 1-5% to overall project equipment costs.
Root Cause	Ineffective equipment scheduling, poor coordination between project phases, sudden project delays, or renting equipment for longer durations than actually needed due to conservative planning.
Financial Impact	\$1,803,171.18 (Total Equipment Idle Cost). This is a direct loss.
Recommended Action	Optimize equipment scheduling and utilization through better project planning and real-time tracking. Implement clear processes for equipment rental duration management, including return timelines. Explore options for sharing equipment across projects or negotiating more flexible rental agreements.

#4 · Undisciplined Change Order Management High	
Signal	A significant number of change orders are open or have unbilled value, indicating potential revenue leakage and delayed cash flow.
Evidence	Total CO Unbilled Value = \$20,381,006.90. There are instances where 'co_days_outstanding' are high and 'co_signed_flag' is '0' (false). The most common 'co_reason' is 'Design Change' followed by 'Client Request' and 'Schedule Acceleration'.
Benchmark	Deloitte reports that poor change order management can lead to revenue leakage of 3-5% on construction projects. Efficient processes aim for quick approval and billing, with

#4 · Undisciplined Change Order Management		High
	few outstanding unsigned change orders.	
Root Cause	Lack of clear change order procedures, delays in obtaining client approvals, insufficient documentation, or slow processing of change order requests into billable work. This also suggests potential scope creep.	
Financial Impact	\$20,381,006.90 (Total CO Unbilled Value). This represents direct unrealized revenue.	
Recommended Action	Streamline the change order process with clear documentation, defined approval workflows, and regular follow-ups for client signatures. Implement a system to track unbilled change orders and actively pursue their resolution. Negotiate change orders proactively to minimize financial impact.	

#5 · Subcontractor Financial Leakage		Medium
Signal	Instances of subcontractor backcharges and potential issues with retainage release are visible.	
Evidence	Total Sub Backcharge = \$89,170.00. Additionally, 'retainage_release_overdue_days' column shows values indicating delays in releasing retainage, which can impact subcontractor relationships and potentially lead to disputes or legal fees if not managed well.	
Benchmark	Industry best practices aim to minimize subcontractor backcharges. Retainage release typically follows strict contract terms, and overdue payments can incur penalties or affect future partnerships. Construction Dive research suggests backcharges can impact project costs by 1-2%.	
Root Cause	Subcontractor performance issues, quality control gaps, schedule delays caused by subcontractors, scope disputes, or inefficient administrative processes for releasing retainage.	
Financial Impact	\$89,170.00 (Sub Backcharge USD) + potential costs associated with overdue retainage releases (e.g., administrative burden, reputational damage, legal fees). This represents a direct cost that could have been avoided.	
Recommended Action	Implement clear subcontractor management protocols, including strict contract adherence, regular performance reviews, and timely resolution of disputes. Automate retainage tracking and release processes to ensure compliance with contractual terms and avoid overdue payments. Document all backcharge reasons thoroughly.	

Recommended KPIs

KPI	Formula	Why It Matters	Benchmark
Cost Performance Index (CPI)	Earned Value / Actual Cost	Measures project cost efficiency. A CPI less than 1 indicates cost overruns.	Typically 0.95 - 1.05 for healthy projects
Schedule Performance Index (SPI)	Earned Value / Planned Value (derived from Labor Hours Scheduled and Blended Labor Rate)	Measures project schedule efficiency. An SPI less than 1 indicates schedule delays.	Typically 0.95 - 1.05 for healthy projects
Labor Cost Variance	Labor Cost Budget - Labor Cost Actual	Highlights over or under spending on labor compared to plan, indicating labor management issues or inaccurate budgeting.	Project specific, but ideally close to 0
Material	Total Material Quantity	Identifies inefficiencies in material handling,	Varies by material and trade,

KPI	Formula	Why It Matters	Benchmark
Waste Percentage	Wasted / (Total Material Quantity Installed + Total Material Quantity Wasted)	procurement, or planning that lead to increased costs.	but typically 5-10% is a common range for construction material waste.
Change Order Impact Ratio	Total Change Order Value / Total Contract Value	Indicates the effectiveness of initial project planning and scope management. High ratios suggest frequent scope changes and potential project instability.	Typically 5-15% of contract value
Equipment Idle Cost Ratio	Total Equipment Idle Cost / Total Equipment Actual Cost	Measures the cost incurred from underutilized equipment, pointing to poor scheduling or asset management.	Ideally less than 5%
Retainage Ageing	Average Retainage Release Overdue Days	Highlights delays in collecting cash owed to the company, impacting working capital and cash flow.	0 days overdue is ideal

Column Mapping

Source Column	Canonical Concept	Data Type
record_id	record_id	id
work_date	date	date
project_id	project_id	id
project_name	project_name	text
project_type	project_type	category
location	region	category
general_contractor	general_contractor	id
contract_value_usd	contract_value	numeric
phase	project_phase	category
trade	trade	category
cost_code	cost_code	id
activity_description	activity_description	text
wbs_code	wbs_code	id
project_manager_id	employee_id	id
superintendent_id	employee_id	id
foreman_id	employee_id	id
crew_size	crew_size	numeric
weather	weather_condition	category
labor_hours_scheduled	labor_hours_budget	numeric
labor_hours_actual	labor_hours_actual	numeric
overtime_hours	labor_overtime_hours	numeric
idle_hours	labor_idle_hours	numeric
rework_hours	labor_rework_hours	numeric
blended_labor_rate_usd	labor_rate_avg	numeric

Source Column	Canonical Concept	Data Type
labor_cost_budget_usd	labor_cost_budget	numeric
labor_cost_actual_usd	labor_cost_actual	numeric
labor_variance_usd	labor_cost_variance	numeric
labor_productivity_factor	labor_productivity_factor	numeric
material_item	material_item	text
material_qty_ordered	material_quantity_ordered	numeric
material_qty_installed	material_quantity_installed	numeric
material_qty_wasted	material_quantity_wasted	numeric
waste_reason	material_waste_reason	category
unit_cost_budget_usd	material_unit_cost_budget	numeric
unit_cost_actual_usd	material_unit_cost_actual	numeric
material_cost_budget_usd	material_cost_budget	numeric
material_cost_actual_usd	material_cost_actual	numeric
material_variance_usd	material_cost_variance	numeric
supplier_id	supplier_id	id
po_number	po_number	id
invoice_match_status	invoice_match_status	category
equipment_id	equipment_id	id
equipment_type	equipment_type	category
equipment_hours_used	equipment_hours_used	numeric
equipment_hours_idle	equipment_idle_hours	numeric
equipment_rental_rate_usd_day	equipment_rental_rate	numeric
rental_days_billed	equipment_rental_days_billed	numeric
rental_days_needed	equipment_rental_days_needed	numeric
equipment_cost_actual_usd	equipment_cost_actual	numeric
equipment_idle_cost_usd	equipment_idle_cost	numeric
change_order_number	change_order_id	id
co_reason	change_order_reason	category
co_status	change_order_status	category
co_value_usd	change_order_value	numeric
co_unbilled_value_usd	change_order_unbilled_value	numeric
co_days_outstanding	change_order_days_outstanding	numeric
co_signed_flag	change_order_signed_flag	boolean
subcontractor_id	subcontractor_id	id
sub_scope_value_usd	subcontractor_scope_value	numeric
sub_completion_pct	subcontractor_completion_pct	numeric

Source Column	Canonical Concept	Data Type
sub_backcharge_usd	subcontractor_backcharge_amount	numeric
backcharge_reason	subcontractor_backcharge_reason	category
liquidated_damages_usd	liquidated_damages_cost	numeric
schedule_variance_days	schedule_variance_days	numeric
retainage_held_usd	retainage_held_amount	numeric
retainage_release_overdue_days	retainage_release_overdue_days	numeric
safety_incident_flag	safety_incident_flag	boolean
incident_severity	safety_incident_severity	category
osha_recordable_flag	osha_recordable_flag	boolean
incident_cost_usd	safety_incident_cost	numeric
billed_to_date_usd	billed_to_date_revenue	numeric
earned_value_usd	earned_value	numeric
cost_to_date_usd	cost_to_date_actual	numeric
cpi	cost_performance_index	numeric
spi	schedule_performance_index	numeric
estimated_leak_usd	estimated_leak_amount	numeric
profit_leak_category	profit_leak_category	category
margin_impact_pct	margin_impact_percentage	numeric

Methodology

This report provides a risk-sizing estimate, not a forensic audit. The financial impact calculations are anchored in your aggregated data points and cross-referenced with publicly available industry benchmarks. It is crucial to validate all identified leaks against your General Ledger for precise financial impact before taking action.

Recommended Next Step

Prioritize the top 3 money leaks for a detailed forensic analysis and develop action plans to address root causes.